V25 Version

COREMORROW
Piezo Nano Motion

Piezo Nano Motion

CoreMorrow Ltd.

Company Profile

CoreMorrow Ltd.(“CoreMorrow”for short) focuses on the research and development, production and sales of nano-scale precision positioning products, mainly serving customers who manufacture high-end precision equipment. After nearly 20 years of rapid development, our customers have covered a wide variety of universities, scientific research institutes and high-end precision equipment manufacturing enterprises across the country, and products are also exported to Europe, the United States, Japan, Korea and other countries. CoreMorrow has established partnerships with many high-tech companies and state key laboratories, and has become the most professional manufacturer of precision positioning products in China.

CoreMorrow has a professional technical R&D team, strong R&D strength, advanced production and testing equipments, customized products can be quickly delivered within 1 to 4 weeks. We have obtained the national high-tech enterprise certification and been certified by ISO9001:2015, CE and RoHS. We own more than 50 patents, including invention patents, utility model patents, appearance patents, and software copyrights, etc. that cover the key technologies of precise positioning, detection, sensing, control, and software.

CoreMorrow provides domestic and foreign customers with precision positioning technology solutions and products, which can achieve sub-nanometer resolution and nanometer positioning accuracy. The products mainly include plate/ring actuator, piezo ceramic/stack, piezo actuator with casing, piezo motor, 1 to 6-dimensional piezo nanopositioning /scanning /translation stage, 1 to 3-dimensional piezo deflection /rotation / steering platform, piezo objective positioner, 6 hexapod parallel mechanism, piezo driver/controller, inductance/capacitance/laser micrometer. Also, we provide maintenance services for piezoelectric products such as piezoelectric dispensing valves.

Our products have been widely used in semiconductor technology, optoelectronics, communication and integrated optics, optical instruments and equipment, medical biological microscopy equipment, life sciences, precision processing equipment, medical design and technology, data storage, nanotechnology, nanomanufacturing and nano-automation, aerospace, image processing and other fields.

Focusing on the development of the nanotechnology industry, CoreMorrow is based on its precise positioning technology, extensively absorbing international advanced technical experience, pioneering and innovative, constantly breaking through industry technical barriers, providing personalized solutions for domestic and foreign customers, and assisting customers in overcoming technical problems. We realize the common promotion of corporate value and customer value.



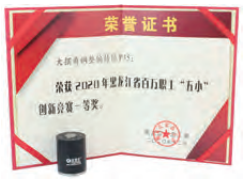
High-Tech Enterprise



Specialized and Sophisticated



Technology Center



Innovation First Prize

2003-2007

Engaged in the piezoelectric work at HIT company.

2007

CoreMorrow was founded. Focusing on the R&D, production and sales of piezo positioning products.

2008

Linear piezo actuators' performance reached international level.

2009

Piezo tip/tilt platform and controllers' performance reached international level. Launch of international trade business.

2010

Owned more than 30 patents. Occupied most of the domestic market.

2011

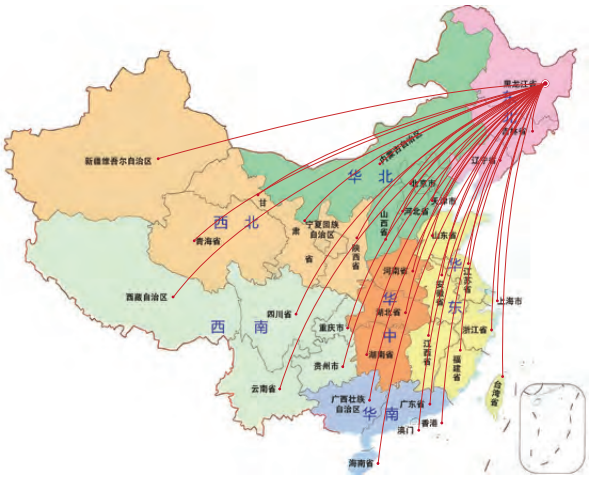
Launch of piezoelectric product testing services.

2012

Gained national recognition of hitech enterprises, etc.

2013

Users covered more than 100 industrial customers, Enter the field of industrial applications.



We are a team that strives and innovates, focusing on the development and production of nano motion and control products. We sincerely serve every customer and strive to create products that meet your needs.

Our products will be your best choice, our commitment is our mission!

CoreMorrow



ISO9001



RoHS



CE



Informatization and Industrialisation



Patents

2014

Products were widely used in semiconductor, optical measurement, ultra precise machining, etc.

2015

Launch of piezo micrometer and piezo motor, with millimeter travel and nanoscale accuracy.

2016

More than 3000 customers. Products were fully upgraded and dozens of small-volume, industrial products were launched. Comprehensive coverage of the field of information industrialization!

2017

Passed ISO9001, CE and RoHS.

2018

The self-revolution of miniaturized controllers. Launch of USB drivers. The 10th consecutive years being China's leading brand of piezoelectric nanopositioning products. Owned a recognition of >100, 000 people.

2019

Piezo deflection platform applied to satellite.

2020

Introduced ultra-small size, high dynamics, resistance vibration, fully closed loop piezoelectric deflection mirror.

2021

China's leading brand of piezo nanopositioning products, recognition of >200,000 people!
To be continued.....

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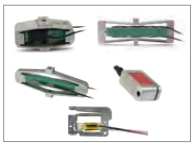


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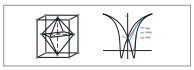
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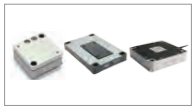
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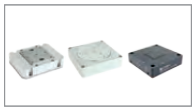
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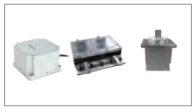
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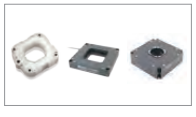
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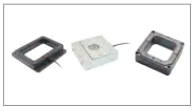


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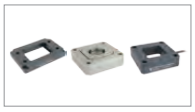


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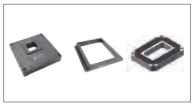
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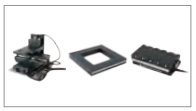


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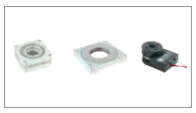
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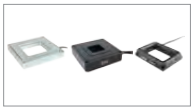
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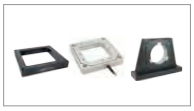
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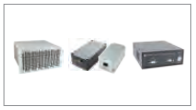
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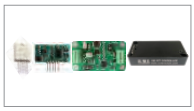


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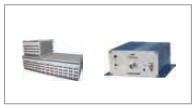
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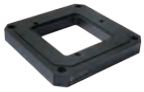
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Semiconductor

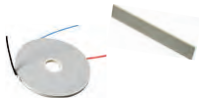
In the semiconductor field, our company provides various solutions based on piezoelectric ceramics, including long-life piezoelectric elements for shock absorption, and ultra-high-performance large-stroke nano-positioning ceramics for positioning. Other precision motion products include piezoelectric deflection stages for fast beam stabilization/angle correction, piezoelectric flexible nanopositioning stages for nanometer measurement applications, and nano alignment system for mask alignment, a new hybrid large-stroke nanopositioning stage for horizontal and vertical positioning.

Applications	Solutions	Typical Products	
Nanoimprint; CD test; Mask and wafer alignment; Objective lens precision positioning/lithography	Multi-axis piezoelectric system; Nano positioning stage; Piezo actuator; Nano focusing system	Customized 6-axis precision piezoelectric positioning stage; P16 nanometer precision positioning scanning stage; P72 piezo objective lens positioner	
Optical interferometry	Closed-loop piezoelectric actuators and flexible guiding system	Customized long travel objective scanner; P60 high-precision nanopositioner; P66 piezoelectric positioning stages	
Cable splicing	Piezoelectric bender actuators	Piezoelectric bending disk	
Optical test/6-axis positioning	Micro-positioning system of 6-axis parallel mechanism	H60 6-axis positioning system; Customized large stroke Hexapod system	
Large stroke nano-alignment system	Hinge amplified piezoelectric actuator; 1~6 axis piezoelectric flexible positioning stage	P11.XYZ piezoelectric positioning stage; Piezoelectric actuator with ultrahigh blocking force	
Optical beam scanning and stability; Optical path correction	Fast piezo steering mirrors system	P35 piezo deflection mirror; P33 high dynamic piezo deflection mirror	
Active damping	Piezoelectric ceramic actuator	Large blocking force piezo actuator; High-voltage piezo stacks; Piezoelectric fiber actuator/sensor	
Longitudinal wafer positioning	Piezoelectric Z/tip/tilt deflection stage	Customized 6-axis precision piezoelectric nanopositioning stage; S51 Z/tip/tilt positioning stage	

* In addition to the above, we may have other products more suitable for your application. Please contact our application engineer or visit www.coremorrow.com/en

Photonics/Laser Communication /Integrated Optics

We provide a large number of innovative solutions for the testing and manufacturing of MEMS and optoelectronic devices. The products range from automatic 6D alignment systems for industrial automation to laboratory equipment. The unique piezoelectric drive device makes sub-millisecond fast scanning response possible.
In this field, the specific applications of our products include automatic alignment of optical fibers or optical fiber arrays, test systems for MEMS and multi-channel waveguide devices, etc.

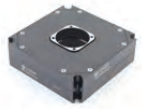
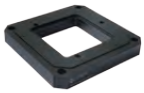
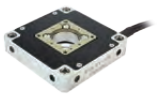
Applications	Solutions	Typical Products	
Automatic focusing	Piezoelectric Z scanner	P72 piezo objective positioner	
Nanophotonics; **Laser deposition;** **Quantum computing**	Multi-axis nanopositioning system; Hexapod 6-axis positioning system	H60 6-axis positioning system	
Optoelectronic packages; **MEMS positioning/alignment;** **Fiber alignment;** **Optical test system**	6-axis Hexapod alignment system; Piezo-driven ultra-small X, XY and XYZ translation stage; 3D piezoelectric driven nanoposit-ioning system	H60 6-axis positioning system; 3-dimensional manual piezoelectric hybrid drive positioning stage; Piezo nanopositioning stage	
Beam splitter; **Optical fiber alignment;** **Optical fiber switch**	Piezoelectric bender actuators; Piezoelectric positioning actuator; Miniature PZT actuator	Piezo actuator; Piezoelectric bender	
Beam splitter; **Optical fiber alignment;** **Optical fiber switch**	Piezoelectric bender actuators; Piezoelectric positioning actuator; Miniature PZT actuator	Piezo actuator; Piezoelectric bender	
Laser beam switch; **light switch;** **Free space communication**	Fast deflection mirror; Beam switch	P35 piezoelectric deflection mirror; P33 high dynamic piezo deflection platform	
F-P filter; **Laser cavity tuning**	Optical nano-positioning system; Special piezoelectric ceramic; Miniature PZT actuator	Piezoelectric bender; Large force piezo ceramics	
FBG writing **(fiber bragg gratings)**	Piezoelectric nano scanning Stage; Piezoelectric actuator	High precision nano positioning stage; Stacked piezo actuator	

* In addition to the above, we may have other products more suitable for your application. Please contact our application engineer or visit www.coremorrow.com/en

Biotechnology/ Life Science

The rapid development of biotechnology and related sciences has brought demands for high-speed and high-precision positioning systems. The piezoelectric actuator can make the microscope objective lens complete precise focusing within a few milliseconds, and it can also help the cells to arrange quickly. Drug screening technology also requires piezoelectric systems for nanoliter micro dispensing medicine. All of these depend on the speed, accuracy and long life of the actuator.

At present, the most important research tool in cutting-edge DNA research is scanning optical microscope. If there is no piezoelectric positioning system, this type of microscopic system will not work at all.

Applications	Solutions	Typical Products	
Flow cytometry; **Cell arrangement;** **Electrophysiology;** **Cell clamp/intracellular measurement**	Micro-translation stage; Fast piezoelectric actuator	P18 piezo nanopositioning scanner; Piezoelectric ceramic stack	
Optical trap; **Cell tracking;** **Optical tweezers;** **Molecular tensile**	Piezoelectric nanopositioning scanning platform	S51 tip/tilt scanning stage	
Confocal microscopy; **Focus;** **Z direction hierarchical image acquisition**	Z direction positioning stage; Piezoelectric Z direction sample stage; Piezoelectric objective lens positioner	S51 tip/tilt scanning stage; P76 piezo objective lens positioner	
Focused laser beam deflection; **Beam stability**	Deflection mirror (active optics)	P33 high-resolution & high- dynamic deflection mirror	
Cell penetrating	Nanopositioner; Piezoelectric linear scanner	XP-611 piezoelectric nanopositioning stage	
Micro-dose dispensing; **Micro-nanoliter pump**	Piezoelectric actuator; Piezoelectric element	Piezoelectric ceramic bending sheet	
Drug screening; **Fast positioning;** Biological treatment	Micro-positioning platform; Hexapod 6-axis parallel micro-positioning system	H60 6-axis parallel system	
Image processing resolution enhancement; **CCD jitter;** **Sub-pixel technology;** **Biometrics**	Fast and economic scanner	P16 piezoelectric scanner; Piezoelectric ceramic bending sheet; P32 piezoelectric deflection mirror; P33 high resolution & high dynamic piezo steering platform	

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Precision Machining (Metal, Optics, Laser Cutting, Diamond Trimming)

Because the piezoelectric positioning technology is unique in many ways, such as fast response, good rigidity, long life, unlimited resolution, soon it has been applied to the semiconductor test equipment, precision machining, and many other fields. Among them, the most representative application is piezoelectric fast tool servo system for precision machining.

The piezoelectric actuator products are widely used in factories around the world, working 24 hours a day, 7 days a week. They greatly improve the machining accuracy of the optical device, the crankshaft, bearings, pistons, cylinders etc., they become core components of diamond dressing, grinding, polishing, the non-circular bore and wear compensation and other critical processes in the machine.

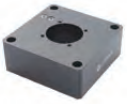
The life of the high-performance piezoelectric actuator can reach billions of reciprocating cycle which is able to meet the requirements of high dynamic industrial applications.

Applications	Solutions	Typical Products	
Optics/bearings/pistons/ non-circular turning of crankshafts/hole/ grinding/polishing	Precision piezoelectric positioning for grinding; The piezoelectric actuator for the control of rapid machining head	Long lifetime piezoelectric actuator and amplifier; VS35~45 piezoelectric actuator with large blocking force	
Aspheric optical processing; Diamond turning	Piezoelectric actuator and amplifier; Piezoelectric positioning stage; Nanopositioning stage; Customized nanopositioning stage	VS18~VS25 piezoelectric actuator; P93 fast tool positioner	
Laser welding; Cutting system focusing; Beam control	Piezoelectric actuator; Piezo deflection mirror/deflection system; Customized high-speed actuator	P33 high resolution and high dynamic piezoelectric deflection mirror; Stacked piezoelectric ceramics	
Active damping	Long lifetime piezoelectric actuator and amplifier; Customized nanopositioning stage	High voltage piezoelectric actuator; Piezoelectric stack ceramic	

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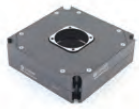
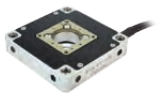
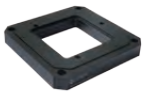
Metrology/Laser Technology/Optical Inspection/Tribology

The precision positioning stages and actuators produced by our company have been widely used in many non-contact optical inspection systems and contact nanometer measurement systems. Our company's positioning products have the advantages of nanometer precision, excellent consistency, flatness and straightness from nanometer to sub-nanometer, which are the prerequisites for the latest technological breakthroughs in these fields. By applying advanced digital control methods, scanning the linearity can be improved by several orders of magnitude, and the tracking error is reduced to the subatomic level. Our piezoelectric drive actuators are ideal components for nanoimprinting/microimprinting mechanisms and nanotribology/nanomanufacturing experiments.

Applications	Solutions	Typical Products	
Scanning interferometry; White-light interferometry	Objective lens nano focusing system; Piezo scanning stage	P76 piezo objective lens positioner P16 piezo scanning stage	
Nanomaterials test; Nm-thickness measurement; Nanoimprint; Nano-tribology; Contact surface profilometer	Micro-positioning stage; Piezoelectric linear positioning stages	VS12 piezo actuator; P12 piezoelectric scanner	

New Drug Design and Medical Technologies

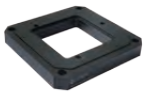
The rapid development of new drug design and related life sciences has brought demands for high-speed and high-precision positioning systems. The high-speed and non-magnetic characteristics of piezoelectric actuators are very suitable for MRI and OCT applications, and can also help achieve rapid cell alignment. Drug screening technology also requires piezoelectric systems nanoliter micro-dispensing, relying on the speed, accuracy and long life of the actuator. The piezoelectric beam deflection system can be used for ultra-fast and ultra-precision angle control of the laser beam. Currently the scanning optical microscope cannot work at all without the piezoelectric positioning system in DNA research.

Applications	Solutions	Typical Products	
Ophthalmology; Dermatology; Laser beam deflection; Beam stability	Beam deflection mirror (active optics)	P34 large load piezoelectric deflection mirror; P33 high-resolution & high-dynamic deflection mirror	
Flow cytometry; Cell clamp; Cell arrangement; Electrophysiology; Intracellular measurements	Micro positioning stage; Fast piezoelectric actuator	P18 Large stroke piezoelectric positioning stage; Piezo actuators	
Cell-penetrating; Micro-dose dispensing	Nanopositioner; Piezoelectric linear scanner	P11 precision piezoelectric nano positioning stage	
Drug screening; Fast positioning.	Micro-positioning stage; Piezoelectric linear positioning stages	P72 piezo objective positioner	
Image processing resolution enhancement; OCT	Fast XY scanner; Piezoelectirc actuator; Deflection mirror	P16 piezo scanning stage; Piezoelectric ceramic bender; Stacked piezoelectric ceramics; P35 piezoelectric deflection mirror	
Image processing resolution enhancement; OCT	Fast XY scanner; Piezoelectirc actuator; Deflection mirror	P16 piezo scanning stage; Piezoelectric ceramic bender; Stacked piezoelectric ceramics; P35 piezoelectric deflection mirror	
Force and motion sensors	Piezoelectric ceramic element	Piezoelectric ceramic element	
White-light interferometry diagnosis; Dermatology; Ophthalmology	Piezoelectric actuator; Piezoelectric ceramic controller	P60 piezo nanopositioning stage; XP-780 piezoelectric nano positioning stage; P72 piezo objective lens positioner	
Optical trapping; Cell tracking; Optical tweezers; Molecular tensile	Piezoelectric nanopositioning and scanning platform	S51 tip/tilt stage; P16 piezo scanning stage	
Confocal microscopy; Focus; Z direction stratified image acquisition	Z direction positioning stage; Piezoelectric Z direction sample stage; Piezo objective lens driver/positioner	S51 piezo tilting stage; P76 piezo objective lens positioner	

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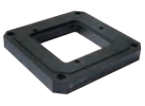
Data Storage Technology

As a basic tool, the piezoelectric positioning system is widely used in test and measurement systems, nano-imprinting, nano-assembly and nano-manufacturing in ultra-high-density data storage. Following Moore, its ultra-high precision and speed make it indispensable device.Through advanced mechanism design and high-performance control technology, the technical level of nano-positioning has been upgraded to nano-level precision and millisecond-level response.

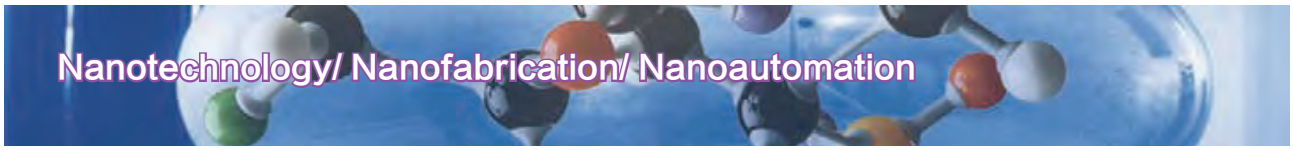
Applications	Solutions	Typical Products	
Read-write head test	High-dynamic nanopositioning	XP-611 high-precision nanopositioning stage	
High-speed tracking; Tracking servo	High-end modular controller	E00/E01 modular piezo controller	
Nanomagnetic test; Heat treatment annealing	Multi-axis nanopositioning system	S51 Z and tip/tilt stage	
Laser beam focusing/ alignment/ beam stability (DVD Mastering)	Nano-focusing system; Nanopositioning stage; Active optics	P76 large load piezoelectric objective positioner; P35 large-angle piezoelectric deflection mirror	

Astronomy/Adaptive Optics

The resolution of large ground-based telescopes is limited by vibrations and atmospheric disturbances. In order to overcome these technical obstacles, many high-speed deflection systems have been designed and produced for active secondary and tertiary stabilization of the mirror. The piezoelectric drive active mirror can improve the effective resolution by 1000% by correcting the image deviation in real time, which is very suitable for the integral observation of weak light sources.

Applications	Solutions	Typical Products	
High-speed beam deflection and beam stability	Piezoelectric deflection mirror	P33 high-resolution &high-dynamic deflection mirror	
Low-frequency adjustment of active optics mirror in astronomical telescopes	Large custom piezoelectric deflection mirror for the rapid correction of atmospheric disturbances; Hexapod 6-axis micro-positioning system	H60 Hexapod 6-axis positioning system	
Tuning of the laser cavity; Beam stability	Piezo actuators; Piezoelectric deflection system	S51 Z/tip/tilt scanner	

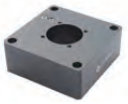
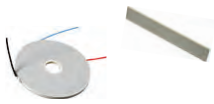
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Nanotechnology/ Nanofabrication/ Nanoautomation

Piezoelectric positioning system is a basic research tool in the field of nanotechnology. The extremely high precision and speed requirements in many applications in this field make the critical role of the nano-positioning system, such as nano-imprinting, nano-assembly, ultra-high-density data storage and nano-manufacturing.

In addition to ultra-fast mechanisms, our company's high-end digital piezoelectric controllers can get very high bandwidth, they can also eliminate dynamic nonlinear problems, and get very high tracking accuracy; Act trajectory control technology can eliminate off-axis errors.

Applications	Solutions	Typical Products	
Nanoimprint/Nano-assembly; Nano-manufacturing Nano-bonding/mechanical; Nanomaterials test	Multi-axis nanopositioning system; Positioning/scanning stage; Pre-load piezoelectric actuator; Nano-positioning drive	P12 piezo scanner; P15 piezoelectric nanopositioning stage; VS12 preloaded piezo actuators	
Micro-assembly and micro operating system	Hexapod 6-axis positioning robot	H60 Hexapod 6-axis positioning system	
Micro-assembly operator	Piezoelectric bender	Piezo bending sheet	
Micro-assembly	Long life piezoelectric actuator	VS9~VS35 piezo actuator; High voltage piezoelectric ceramic stack	
Nanoliter dispensing; Micro-dispensing; Nanoliter control; Fast valve control	Tube type actuator; Disc type actuator; Lever magnifying actuator; Bending actuator/piezo element	Single layer piezoelectric tube; Piezoelectric bender	



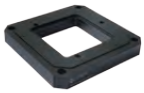
Microscopy/Imaging

For high-resolution microscopy, the piezoelectric positioning and scanning platform is the most basic research tool. Using the platform's rapid response and subatomic resolution, scientists can get high-quality images faster.

Various types of fast objective lens positioners and sample scanners produced by our company are used for deconvolution and 3D imaging (Z-layer acquisition) , and fast focusing. Piezo-driven Z scanners can usually achieve a focusing speed and accuracy that is 10 times higher than that of ordinary electric systems. The controllers designed by our company have high-bandwidth analog interfaces, which can achieve ultra quick response, and compatible with mainstream imaging acquisition equipment.

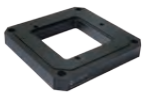
Light trap experiments often rely on closed-loop piezoelectric nanopositioning stages and deflecting mirrors to provide high resolution and stability. The latest generation of digital piezoelectric controller developed by our company is such an efficient tracking application, which can greatly improve the function of the nano positioning system.

Applications	Solutions	Typical Products	
Confocal microscopy; Focus Z direction layered image acquisition	Piezoelectric Z direction sample stage and piezoelectric objective positioner	P72 piezoelectric objective lens positioner; S51 tip/tilt scan stage	

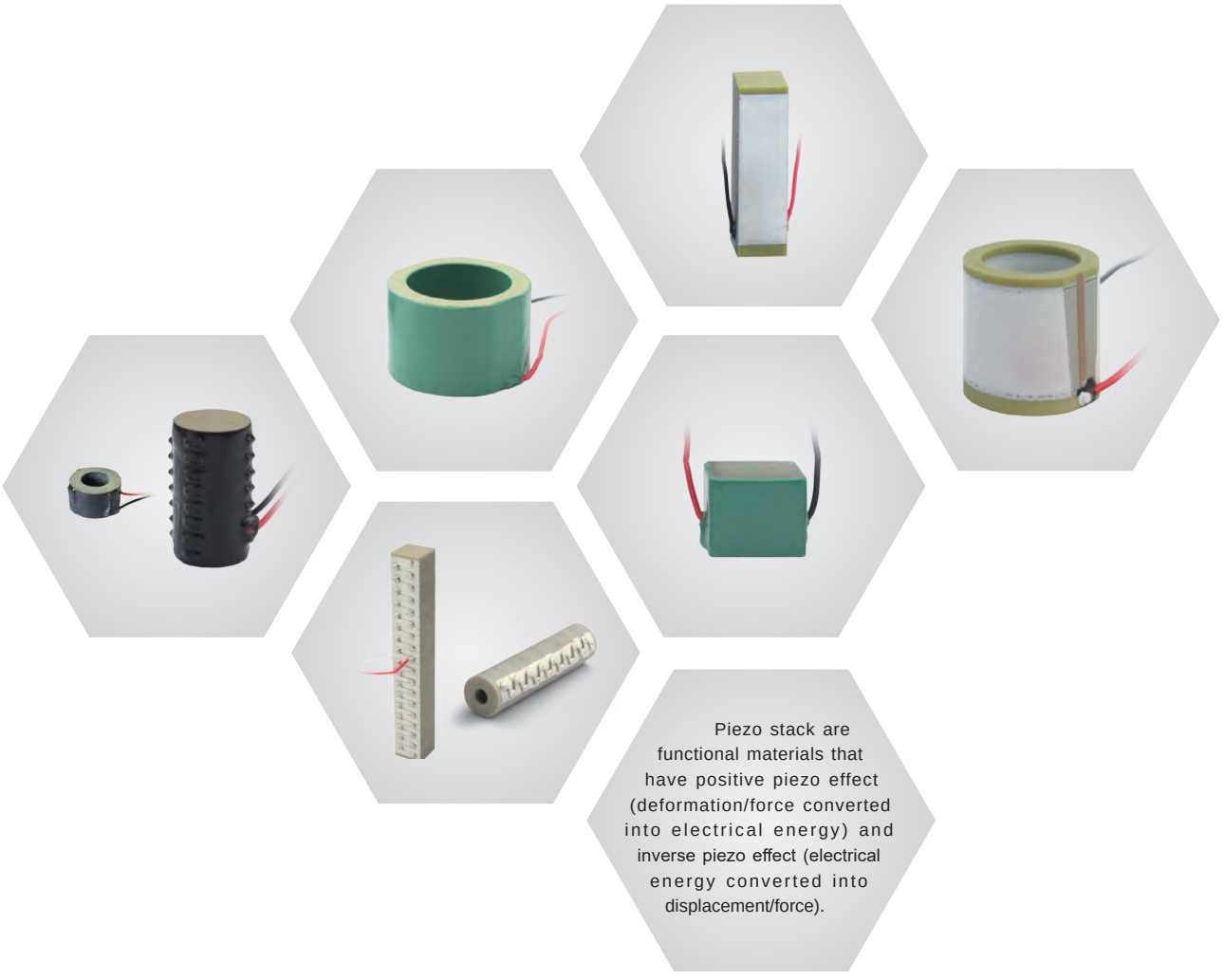
Scanning microscope; Optical trap (optical tweezers); SNOM, AFM, E-Beam	Fast XYZ nanopositioning system; Piezoelectric nanopositioning stage; Piezo actuator/scanning tube; Piezoelectric beam deflection mirror	Single layer piezoelectric tube; S22 high-resolution & high-dynamic deflection mirror	
Image processing resolution enhancement; CCD jitter; Subpixel step/multiplier; Biometrics	Fast and economic scanner	S51 tip/tilt scan platform; Piezoelectric ceramic bender; P32 piezoelectric deflection mirror P33 high-speed deflection mirror	
Laser beam deflection; Beam stability	Deflection mirror (active optics)	P33 high-dynamic deflection mirror; P32 high-resolution deflection mirror; P35 large angle deflection mirror	
Sample positioning (ultra-high resolution)	Piezoelectric actuator	Piezoelectric actuator	
Digital controller for high-speed track	High-end modular piezoelectric ceramic controller	E00/E01 modular piezoelectric ceramic controller	



In quasi-static applications, piezoelectric actuators can provide high driving force and low power consumption or even zero power consumption. They can also work under vacuum and extremely low temperatures, which are often used in aviation basic requirements. The Hexapod 6-axis parallel positioning system has been widely used in the alignment applications of microwave antennas, which can greatly shorten the alignment time and improve the antenna performance. Large-diameter high-speed deflection system can be designed. The piezo-driven active optical mirror can improve the effective resolution by 1000% by correcting the image deviation in real time. It is even more impressive in the integral observation of weak light sources.

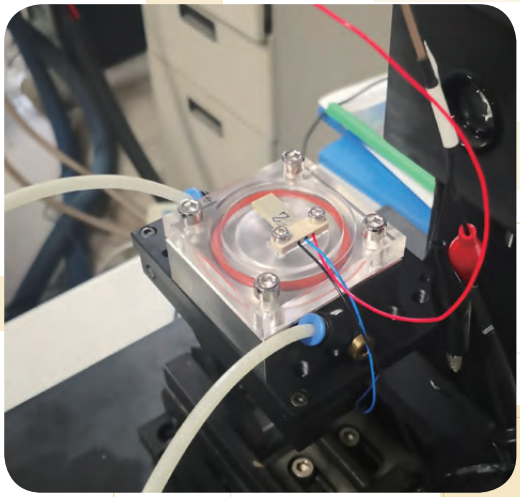
Applications	Solutions	Typical Products	
Microwave antenna precision alignment	Micro positioning system	H60 6-axis positioning system	
Fast laser beam deflection / Alignment	Piezoelectric deflection mirror	P35A Piezoelectric deflection mirror	
Resolution enhancement; Image stabilization; Pixel multiplication	Piezo scanning stage; Active optics	S51 Tip/Tilt scanning stage; P32 Piezoelectric deflection mirror; P35 Piezoelectric deflection mirror	
Beam line experiment; Angle alignment; Sample positioning	Hexapod 6-axis positioning system	H60 6-axis positioning system; Piezo deflection mirror	
Cavity tuning	High-thrust piezoelectric actuators	High-voltage piezoelectric actuators; Stacked piezoelectric ceramics	

Piezo Stacks

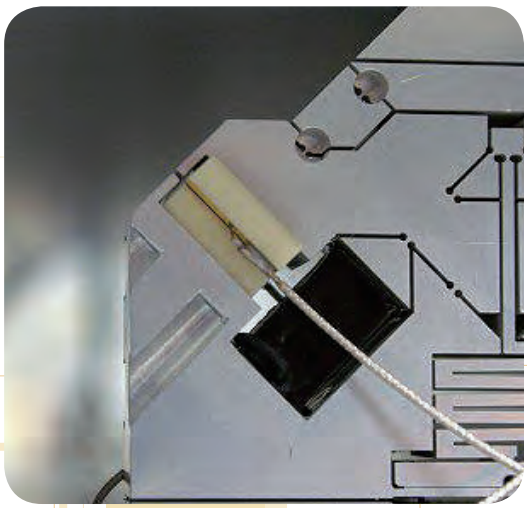


Piezo stack are functional materials that have positive piezo effect (deformation/force converted into electrical energy) and inverse piezo effect (electrical energy converted into displacement/force).

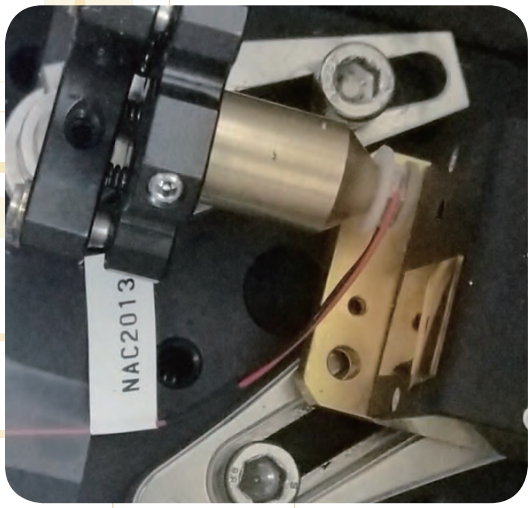
Applications



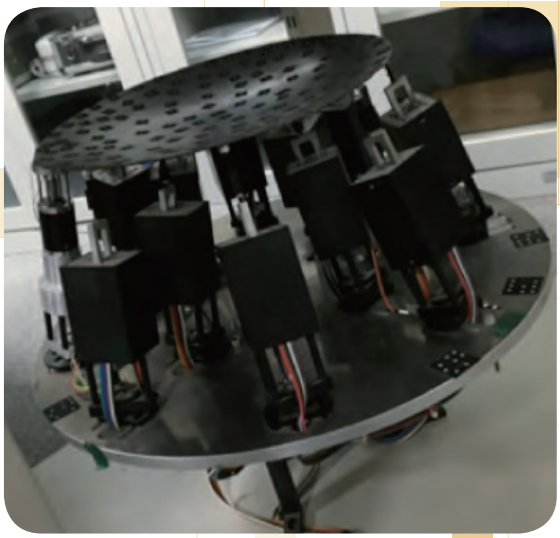
Pneumatic Valve



Lithography

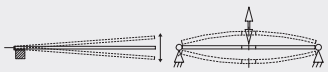
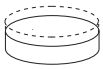
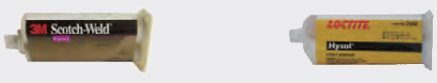


Laser Cavity Tuning



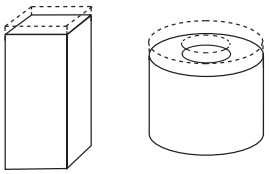
Sensor

▸ Product List

Product	Appearance	Motion direction	Characteristics	Page
Low/high voltage piezo stack			Square/ring/cylindrical shape 150/500/1000V driving voltage Blocking force to 50kN	17
Piezo plate/ring/stack			2mm thickness for single plate 3.3μm travel for single plate Up to 326.7μm travel for stack	23
Piezo actuator for dispensing valve			For dispensing valve Height of 20 or 36mm	30
Piezo bender			Square/ring shape 200 or ±100V driving voltage Travel up to 2.98mm	31
Piezo shear plate/ stack			0.5mm thickness for single plate Shear motion Available XYZ version	34
Ultrasonic/monolayer actuator			Ultrasonic vibration Piezo transducer Custom is available	37
Piezo scanning tube			XYZ motion, multiple sizes The scanning range is 114μm Custom is available	38
Piezo fiber			Diameter <1mm Standard length of 75mm or 150mm Custom is available	40
Ultrasonic transducer			Resonant frequency to 15MHz Suitable for ultrasonic application Custom is available	40
MFC (Micro fiber composite)			Used as actuator, large deformation Used as sensor, high sensitivity	41
MFC controller			-500~1500V output Chassis: 1~6 channels Board card: 1~2 channels	45
E69.charge-H2/H3 Smart charge			Charge amplifier Gain: 1, 10 or 100 Output voltage range: ±2.5V	47
Energy harvest			Charge Harvesting Power supply	48
Glue			Various glues for gluing piezo actuator	50

Low Voltage Piezo Stacks

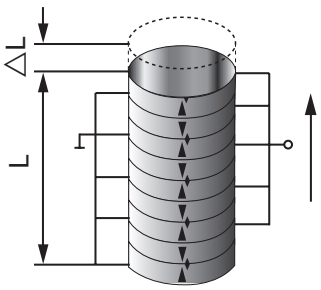




Mode of Motion

Low voltage piezo stacks have excellent performance, suitable for scientific experiments and industrial applications. Piezo stacks include both square and ring shape structures, with multiple sizes and displacements to meet the needs of different applications. Special insulation material ensures maximum output of dynamic performance under severe conditions.

Structure



Material Properties

Material: PZT(PZT5H)

Rel. dielectric constant ε_{ref}: 5400

Loss factor: 200×10^{-4}

Coupling factor: K_P=0.62, K_{31}=0.34, K_{33}=0.68

Piezo coefficient: d_{31}=-290pm/V, d_{33}=+635pm/V

Elast.compliance: $S_{33}^E=18.1\times10^{-12}m^2/N$, $S_{11}^E=14.8\times10^{-12}m^2/N$

Frequency constant: Radial=2040m/sec, Thickness=1800m/sec,
Transverse=1410m/sec,
Longitudinal=1370m/sec

Quality factor(resonance): 70

Density: 8g/cm³

Curie temperature: 150°C

Specific heat: 380Ws/°K kg

Thermal conductivity: ca.1.5 Ws/m·K(axial direction)

Above-mentioned parameters can vary significantly with the operating electrical field strength.

Temperature

Operating temperature: -50~+100°C(according to resin). If >100°C, PZT performance will be reduced reversibly .Above Curie temperature, piezo actuators will be permanently depolarized.

Coating

Color	Thickness	Operating temperature	Remark
Green	0.5mm	-25~80°C, at lower temperature, coating cracks	a protective effect and can effectively prevent moisture and slight impacts
Grey	50μm	-50~100°C, at -269°C, but the performance is greatly reduced, about 5% of that in room temperature	Can be used in a vacuum and low temperature environment, after replacing with a vacuum compatible lead
Black	≈100μm	-50~100°C, at -269°C, but the performance is greatly reduced, about 5% of that in room temperature	Designed for ultra-low temperature vacuum use

Model Naming Rules

Piezo Stack — L×W

PSt 150 / 5×5 / 20

Max voltage — ≈displacement

Piezo Stack — OD-ID

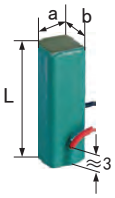
H PSt 150 / 14–10 / 12

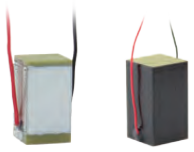
Ring — Max voltage — ≈displacement

Applications

- Fiber stretching
- Active vibration control
- Piezo dispensing valve
- Precision positioning
- Piezo deformable mirror
- Piezo gripper
- Laser cavity tuning

Low Voltage Plate Piezo Stacks





Different coatings



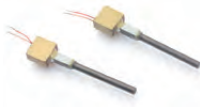
Both spherical ends



One spherical end



Pasting mirror



Anti-vibration for camera

▸ Technical data

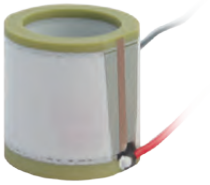
Models	Coating color	Dimensions[1] a×b×L[mm]	Max./Stroke[2] [μm]±15%	El. capacitance [μF]±20%	Stiffness [N/μm]±20%	Resonant frequency [kHz]±20%	Blocking Force [N]	Mass [g]±5%
PSt50/1.2×1.2/1.7	Gray	1.22×1.3×1.7	1/0.8	0.045	50	100	80	0.09
PSt100/1.65×1.65/5	Gray	1.66×1.72×5	4/3.2	0.090	30	50	120	0.48
PSt150/2×3/5H	Gray	2.1×3.1×5	6.5/5	0.1	45	150	300	1
PSt150/2×3/5L	Green	3×4×5						
PSt150/2×3/7H	Gray	2.1×3.1×9	13/9	0.17	25	100	300	0.6
PSt150/2×3/7L	Green	3×4×9						
PSt150/2×3/10H	Gray	2.1×3.1×10	13/9	0.18	22	100	300	0.7
PSt150/2×3/10L	Green	3×4×10						
PSt150/2×3/20H	Gray	2.1×3.1×18	28/20	0.42	12	50	300	1.2
PSt150/2×3/20L	Green	3×4×18						
PSt150/3.5×3.5/7H	Gray	3.6×3.6×9	13/9	0.35	50	100	800	1.05
PSt150/3.5×3.5/7L	Green	4.5×4.5×9						
PSt150/3.5×3.5/20H	Gray	3.6×3.6×18	28/20	0.8	25	50	800	2.1
PSt150/3.5×3.5/20L	Green	4.5×4.5×18						
PSt150/5×5/7H	Gray	5.1×5.1×9	13/9	0.8	120	100	1600	2
PSt150/5×5/7L	Green	6×6×9						
PSt150/5×5/20H	Gray	5.1×5.1×18	28/20	1.8	60	50	1600	3.8
PSt150/5×5/20L	Green	6×6×18	28/20	1.8	60	50	1600	4.1
PSt150/5×5/20	Green	6×6×20	28/20	1.5	60	50	1600	4.1
PSt150/7×7/7H	Gray	7.1×7.1×9	13/9	1.4	240	100	3500	3.8
PSt150/7×7/7L	Green	8×8×9						
PSt150/7×7/20H	Gray	7.1×7.1×18	28/20	3.4	120	50	3500	8
PSt150/7×7/20L	Green	8×8×18						
PSt150/10×10/7H	Gray	10.1×10.1×9	13/9	3.0	500	100	7000	8.1
PSt150/10×10/7L	Green	11×11×9						
PSt150/10×10/20H	Gray	10.1×10.1×18	28/20	6.5	250	50	7000	14.8
PSt150/10×10/20L	Green	11×11×18						
PSt150/14×14/20H	Gray	14.1×14.1×18	28/20	14.5	500	47	15000	31.3
PSt150/14×14/20L	Green	15×15×18						
PSt150/25×25/15H	Gray	25.1×25.1×20	19/15	30.5	1282	50	20000	109.55
PSt150/25×25/15L	Green	26×26×20						
Spherical 3mm 01	Black	5.2×5.2×18	28/20	1.8	60	50	1600	3.8
Spherical 3mm 02	Black	5.2×5.2×27	42/30	2.6	40	30	1600	5.7

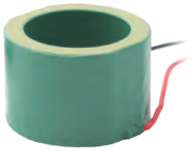
Note: Red lead for "+" electrode. Red lead for "-" electrode in PSt50 and PSt100. Mounting preloaded force during 10%~25% of blocking force. Stroke down to 5% in 2k temperature.

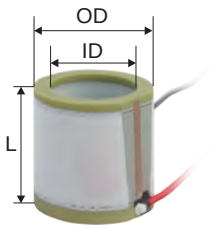
[1] Tolerance, L/W: ±0.1mm, Height: 0.05mm. Not include solder joint of 1mm±0.2mm height. Solder joint position varies with size.

[2] PSt150: Nominal stroke at 0~150V, max. stroke at -30~150V. Recommended 0~120V for long-term and high-reliable operation. PSt50: max. stroke at 0~50V. PSt100: max.stroke at 0~100V.

Low Voltage Ring Piezo Stacks



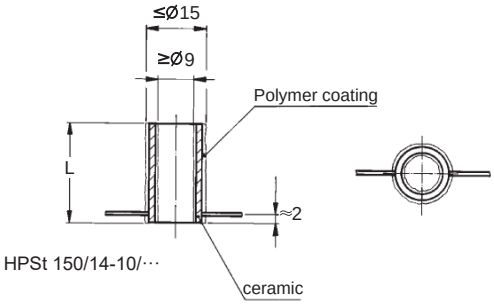


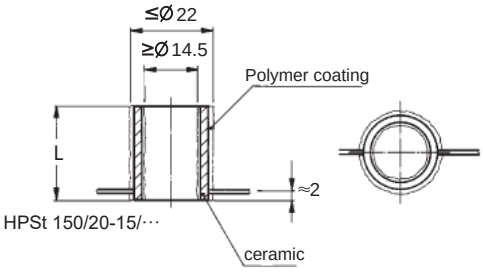


Technical Data

Models	Coating color	Dimensions[1] OD-ID/L [mm]	Max./Stroke[2] [µm]±15%	El. capacitance [µF]±20%	Stiffness [N/µm]±20%	Resonant frequency [kHz]±20%	Blocking Force [N]
HPSt150/14-10/12H	Gray	14.1-9.9/13.5	16/12	2.6	250	75	4500
HPSt150/14-10/12L	Green	15-9/13.5					
HPSt150/14-10/25H	Gray	14.1-9.9/27	30/25	5.2	120	22	4500
HPSt150/14-10/25L	Green	15-9/27					
HPSt150/20-15/12H	Gray	20.1-14.9/13.5	16/12	5	450	75	8000
HPSt150/20-15/12L	Green	21-14/13.5					
HPSt150/20-15/25H	Gray	20.1-14.9/27	32/25	10	230	22	8000
HPSt150/20-15/25L	Green	21-14/27					
HPSt150/20-15/40H	Gray	20.1-14.9/40.5	50/40	15	150	15	8000
HPSt150/20-15/40L	Green	21-14/40.5					

Drawings





Installation

Epoxy glue can be used to mount piezo stack. The adhesive layer must be thin and cannot be applied to side of piezo stack. CoreMorrow offers this adhesive.





Recommended Controllers

E01.A3	E52	E53
		
1~3 channels Analog and software control Open/servo control Ave. current to 291/58mA	1 channel Analog control Open/servo control Ave. current to 300mA	1 channel Analog and software control Open/servo control Ave. current to 60mA

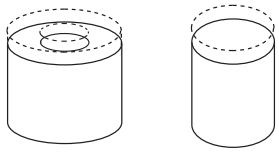
Applications

- Fiber stretching
- Precision positioning
- Active vibration control
- Piezo gripper

High Voltage Piezo Stack







Motion Direction

High voltage piezo stack is a high load cylindrical or ring actuator gotten by stacking monolayers. It features high force generation and high stiffness. Its driving voltage is 0~500V or 0~1000V.

Characteristics

- Large blocking force
- 0~500/1000V drive
- CTE +2ppm/°C
- Exellent dynamics
- 0~0.5mm monolayer thickness
- 100nF/cm^3 El. capacitance

Structure

High voltage piezo stack is a composite structure made of piezo ceramics and metal electrodes. Below figure shows a high voltage piezo stack made by stacking PZT ceramic layers, which are electrically contacted individually resulting in a multilayer capacitor structure.



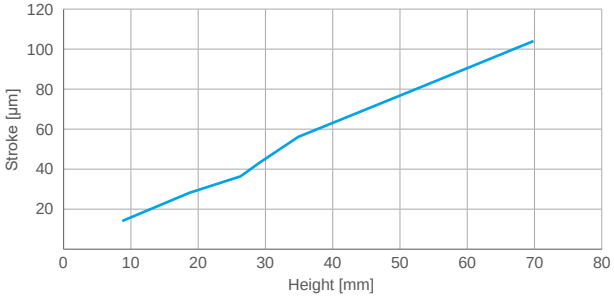
Recommended Controllers

CoreMorrow E00/E01 piezo controllers can output 0~1800V voltage that is very suitable for driving high voltage piezo stack.





Height and Stroke Curve



Applications

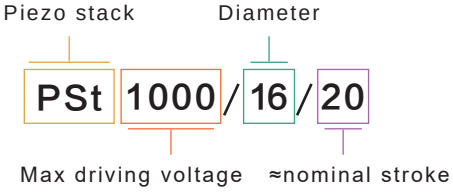
- Nanopositioning
- Optical adjustment
- Cavity tuning
- Active vibration control
- Vibration isolation platform
- Semiconductor processing test

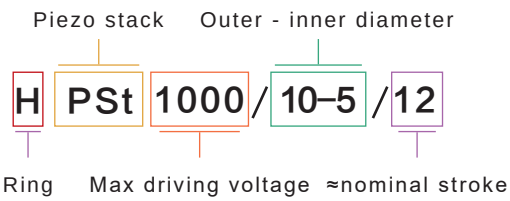
Piezo Material and Mechanical Data

Parameters		Standard HS/HT	Custom HP
Rel. dielectric constant ε_{ref}		1850	3800
Loss factor 10^{-4}		130	160
Coupling factors	K_P	0.62	0.65
	K_{31}	0.34	0.38
	K_{33}	0.72	0.74
Piezoelectric charge coefficients(pm/V)	d_{31}	-190	-275
	d_{33}	440	680
Elast. compliance $10^{-12}m^2/N$	S_{11}^E	18.5	15.8
	S_{33}^E	20.7	23
Frequency constant m/s	Radial	2020	1960
	Thickness	2030	1885
	Transverse	1325	1420
	Longitudinal	1250	1190
Quality factor		80	80
Density g/cm³		7.74	7.83
Curie temperature °C		340	215
Max operating temperature °C		100	90
Spec. heat Ws/°K kg		380	380
Thermal conductivity Ws/m·K(axial)		ca. 1.5	ca. 1.5
CTE ppm/°C		0~2	0~2
Voltage constant g_{33} 10^{-3}Vm/N		26.9	20.6

Note: Above-mentioned parameters varies with operating electrical (small signal, room temperature).

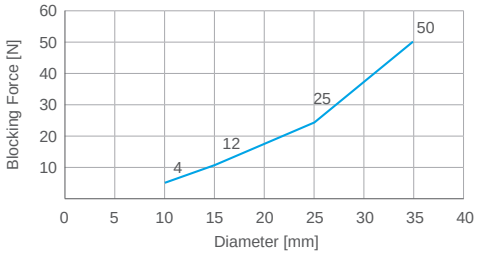
Model Naming Rules





High Voltage Cylindrical Piezo Stack



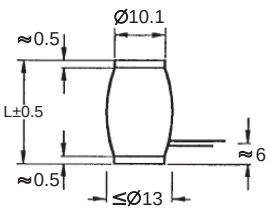


Technical Data

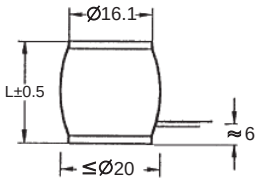
Model	Max./stroke* [μm]±15%	Length L [mm]	El. capacitance [nF]±20%	Stiffness [N/μm]±20%	Resonant frequency[kHz±20%]	Blocking force [N]
PSt1000/10/7	12/7	9	20	300	60	4000
PSt1000/10/20	24/18	18	45	150	40	4000
PSt1000/10/25	35/25	27	85	100	30	4000
PSt1000/10/40	55/40	36	110	75	25	4000
PSt1000/10/60	80/60	54	170	50	20	4000
PSt1000/10/80	105/80	72	220	35	15	4000
PSt1000/16/7	12/7	9	60	800	60	12000
PSt1000/16/20	27/20	18	150	400	40	12000
PSt1000/16/40	55/40	36	360	200	25	12000
PSt1000/16/60	80/60	54	540	120	20	12000
PSt1000/16/80	105/80	72	720	90	15	12000
PSt1000/25/7	12/7	9	140	1800	60	25000
PSt1000/25/20	27/20	18	350	900	40	25000
PSt1000/25/40	55/40	36	800	450	25	25000
PSt1000/25/60	80/60	54	1250	300	20	25000
PSt1000/25/80	105/80	72	1700	200	15	25000
PSt1000/35/7	12/7	9	300	4000	60	50000
PSt1000/35/20	27/20	18	800	2000	40	50000
PSt1000/35/40	55/40	36	1600	1000	25	50000
PSt1000/35/60	80/60	54	2500	600	20	50000
PSt1000/35/80	105/80	72	3300	450	15	50000

*PSt1000: Nominal stroke at 0~1000V, max. Stroke at -200V~1000V. Recommended 0~800V for long-term high-reliable operation.

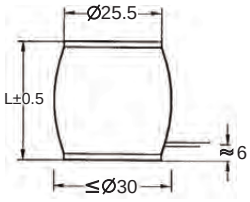
Drawings



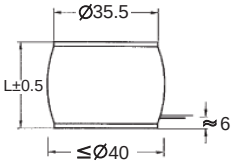
PSt1000/10/xx



PSt1000/16/xx

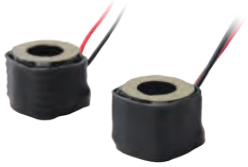


PSt1000/25/xx



PSt1000/35/xx

High Voltage Ring Piezo Stack





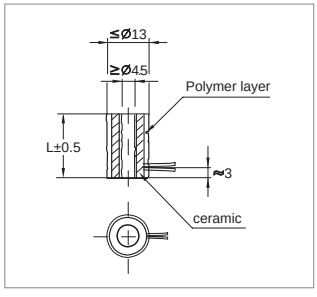
Technical Data

Model	Max./stroke* [µm]±15%	Length L [mm]	El. capacitance [nF]±20%	Stiffness [N/µm]±20%	Resonant [kHz]±20%	Blocking force [N]
HPSt500/10-5/7	12/7	9	65	200	40	2800
HPSt500/10-5/20	25/20	18	180	100	25	2800
HPSt500/10-5/25	35/25	27	260	70	20	2800
HPSt1000/10-5/7	12/7	9	15	210	50	2800
HPSt1000/10-5/20	25/20	18	40	110	35	2800
HPSt1000/10-5/25	35/25	27	65	75	25	2800
HPSt1000/10-5/40	55/40	36	90	55	20	2800
HPSt1000/10-5/60	80/60	54	140	35	15	2800
HPSt500/15-8/7	12/7	9	140	550	40	5500
HPSt500/15-8/20	27/20	18	360	280	25	5500
HPSt500/15-8/25	35/25	27	520	180	20	5500
HPSt500/15-8/40	55/40	36	720	130	15	5500
HPSt500/15-8/60	80/60	54	1100	90	12	5500
HPSt500/15-8/80	105/80	72	1500	60	10	5500
HPSt1000/15-8/7	12/7	9	35	600	50	5500
HPSt1000/15-8/20	27/20	18	90	300	35	5500
HPSt1000/15-8/25	35/25	27	130	200	25	5500
HPSt1000/15-8/40	55/40	36	180	150	20	5500
HPSt1000/15-8/60	80/60	54	270	100	15	5500
HPSt1000/15-8/80	105/80	72	360	70	12	5500
HPSt1000/25-15/7	12/7	9	85	1200	50	13000
HPSt1000/25-15/20	27/20	18	210	600	35	13000
HPSt1000/25-15/25	35/25	27	310	400	25	13000
HPSt1000/25-15/40	55/40	36	420	300	20	13000
HPSt1000/25-15/60	80/60	54	650	180	15	13000
HPSt1000/25-15/80	105/80	72	900	130	12	13000
HPSt1000/35-25/7	12/7	9	120	2000	50	20000
HPSt1000/35-25/20	27/20	18	300	1000	35	20000
HPSt1000/35-25/25	35/25	27	450	700	25	20000
HPSt1000/35-25/40	55/40	36	600	500	20	20000
HPSt1000/35-25/60	80/60	54	900	350	15	20000
HPSt1000/35-25/80	105/80	72	1300	250	12	20000
HPSt1000/35-25/100	130/100	90	1800	160	10	20000

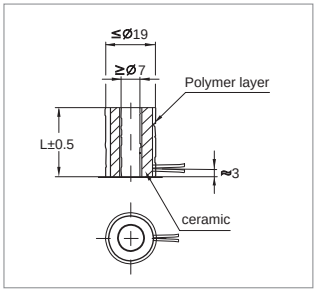
*HPSt500: Nominal stroke at 0~500V, max. Stroke at -100V~500V. Recommended 0~400V for long-term high-reliable operation.

HPSt1000: Nominal stroke at 0~1000V, max. Stroke at -200V~1000V. Recommended0~800V for long-term high-reliable operation.

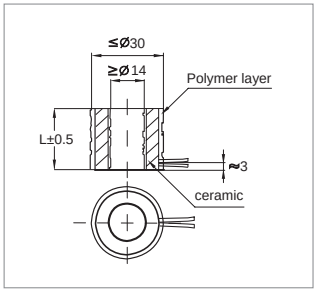
Drawings



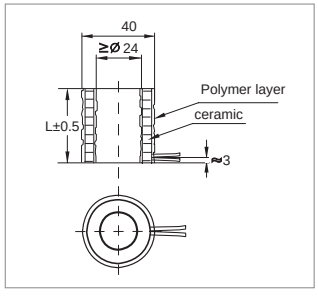
HPSt xxx/10-5/xx



HPSt xxx/15-8/xx

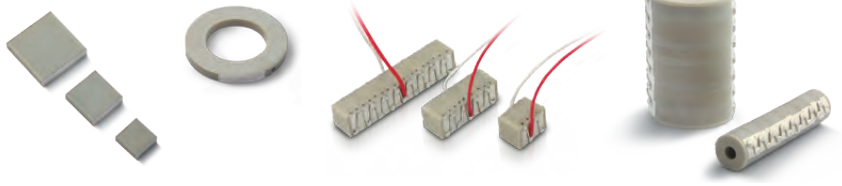


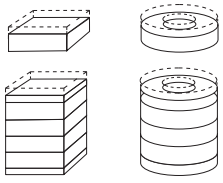
HPSt 1000/25-15/xx



HPSt 1000/35-25/xx

Low Voltage Piezo Plate/Ring Actuator/Stack



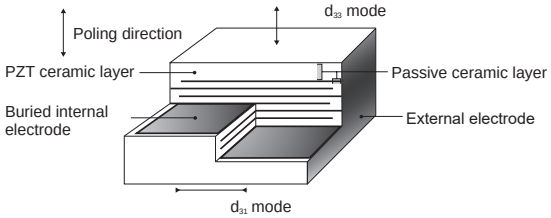


Sheet-shaped piezoelectric ceramics are square or ring sheets with a standard thickness of 2mm. The maximum displacement of a single chip can reach 3.3 μm. The material is PZT5A.

Stacked piezoelectric ceramics are used after stacking multiple piezoelectric ceramic sheets and welding common electrodes. The height is freely selected. The displacement after stacking is the total displacement of each sheet, and the maximum can reach 326.7μm.

Customized UHV version, withstand voltage up to 10^{-10}torr=1.33×10^{-10}mbar.

▸ Structures



▸ Attention in Dynamics Operation

1) Piezo actuator will heat up at high frequencies, if reaching >150°C the electrodes would detach.

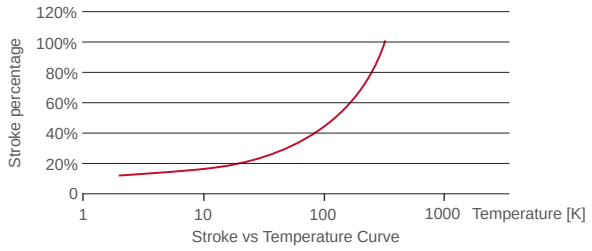
2) High accelerations will imply mechanical stress on the bus-wires. It needs to be determined if standard bus wires are suitable, or another solution is needed (like conductive glue).

3) High frequencies will imply tensile forces in the direction of movement. It is probable that you will need to pre-stress the actuators.

4) High frequency will mean high driving current. It needs to be ensure that the wires can work at the required range. Our standard wires can carry up to 1.4Amps.

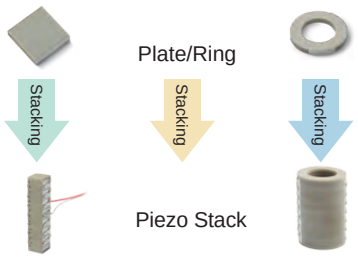
▸ Operating Temperature

Piezo stack can operate at 4mK to 470k (200°C) temperature. When the high temperature exceeds 150°C, the electrode may fall off. When used in a low temperature environment, the performance of piezo stack will be reduced, about 10% at room temperature. When used in dynamics at low temperature, it needs to replace with a low temperature lead.



Stroke vs Temperature Curve

▸ Piezo Stack



Note: There is 2×1mm thickness insulating ceramic on the top and bottom of the stack.

NAC2013 as an example:

NAC2013	Stroke: 3.3μm	Thickness: 2mm
NAC2013-H04	Stroke: 3.3μm	Thickness: 4mm
NAC2013-H06	Stroke: 6.6μm	Thickness: 6mm
NAC2013-H08	Stroke: 9.9μm	Thickness: 8mm
NAC2013-H10	Stroke: 13.2μm	Thickness: 10mm
And so on	⋮	⋮

▸ Power/Current Calculation in Dynamics

Piezo stacks require power/current only during dynamic operation. The amplifier output current and rise time determine the max. operating frequency of piezo stack.

Sinusoidal drive average current: $I_{ave} = f \times C \times U_{p\text{-}p}$, sinusoidal operating peak current: $I_{max} = \pi \times f_{max} \times C \times U_{p\text{-}p}$, where: I_{ave}: amplifier average current, I_{max}: amplifier peak current, f_{max}: maximum operation Frequency, C: capacitance, $U_{p\text{-}p}$: peak-to-peak driving voltage, f: operating frequency.

▸ Custom Product



Electrodes in one side

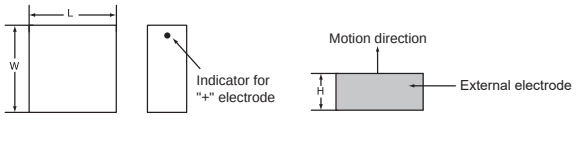
With aperture

5μm parallelism

Plate Piezo Actuator/Stack

Plate Piezo Actuator



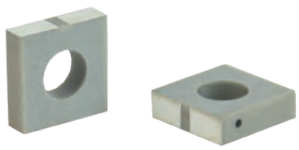


▸ Technical data

Model	Length L × Width W [mm]±0.1	Height H [mm]±0.05	Max. voltage [V]	Stroke [μm]±15%	El. capacitance [nF]±15%	Stiffness [N/μm]±20%	Blocking force [N]±20%	Resonant frequency [kHz]±20%	Weight [g]±5%
NAC2001	2×2	2	60	3	150	56	168	>486	0.07
NAC2002	3×3	2	60	3	400	126	378	>486	0.15
NAC2003	5×5	2	60	3	1080	350	1050	>486	0.37
NAC2011	2×2	2	150	3.3	25	51	168	>486	0.05
NAC2012	3×3	2	150	3.3	65	115	378	>486	0.14
NAC2013	5×5	2	150	3.3	190	318	1050	>486	0.4
NAC2014[1]	7×7	2	150	3.3	380	624	2060	>486	0.79
NAC2015[2]	10×10	2	150	3.3	760	1273	4200	>486	1.58
NAC2021[1]	7×7	2	200	3.3	220	624	2060	>486	0.78
NAC2022[2]	10×10	2	200	3.3	440	1273	4200	>486	1.61
NAC2023[3]	15×15	2	200	3.3	970	2864	9450	>486	3.66
NAC2024	3×3	2	200	1.9	25	161	290	>500	0.14
NAC2025	5×5	2	200	1.9	80	400	800	>500	0.38
012605	3×3	1	200	1.7	25	210	360	-	0.09

Note: Operating frequency up to dozens of kHz under small signal (a few volts). The max. operating temperature up to 200°C.The temperature resistance of standard lead reaches 150°C.
[1]: L/W tolerance: ±0.15mm; [2]: L/W tolerance: ±0.2mm; [3]: L/W tolerance: ±0.3mm.

Plate Piezo Actuator with Aperture



▸ Characteristics

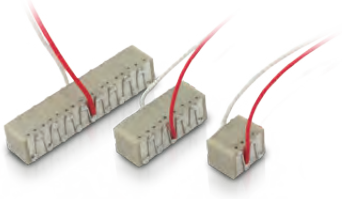
- Electrodes in one side
- With aperture
- Compact
- Large blocking force

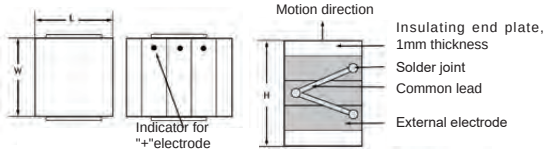
▸ Technical data

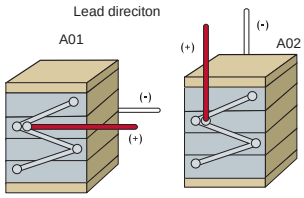
Type	Length L× Width W[1] [mm]±0.15	Height H[1] [mm]±0.05	Inner hole[1] ID[mm]±0.1	Max. voltage[V]	Max. stroke [μm]±20%	Blocking force [N]±20%	El. Capacitance @1V, 1kHz [nF]±25%	External electrode meterial	Max. Operating temperature [°C]
CMAP-NCE51F-7-7-2-150-C01	7	2	3.5	150	2.65	1650	285	Ag	150

Note 1: Ceramic dimensions do not include external electrodes and outer protective resin;
2: The above technical parameters are only applicable to normal temperature environment and static operation conditions. The corresponding parameters for dynamic operation or high-temperature operation must be determined by experiments.

Plate Piezo Stack







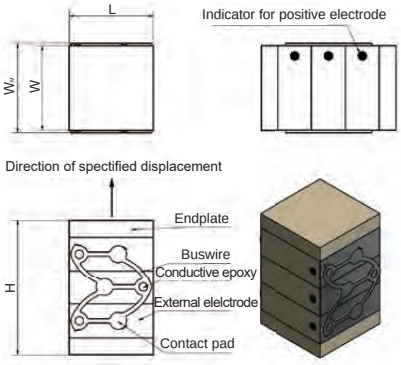
▸ Technical data

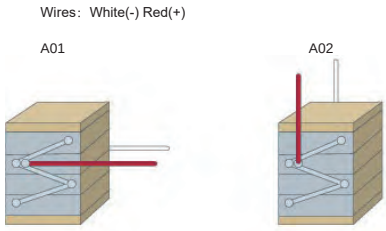
Model	Length L [mm]	Width W [mm]	Height H [mm]	Max. voltage [V]	Stroke [μm]±20%	El. capacitance [nF]±15%	Stiffness [N/μm]±20%	Blocking force [N]±20%	Resonant frequency [kHz]±20%	Max. Operating temperature [°C]
NAC2001-Hxx	2	2	4~20	60	2.6~23	130~1150	66~7	168	>248~52	150
NAC2002-Hxx	3	3	4~30	60	2.9~39.9	360~5040	133~9	378	>248~35	150
NAC2003-Hxx	5	5	4~50	60	3~72	1030~24620	350~15	1050	>248~22	150
NAC2011-Hxx	2	2	4~20	150	2.8~25.2	20~190	60~7	168	>248~52	150
NAC2012-Hxx	3	3	4~30	150	3.14~43.89	59~820	121~9	378	>248~35	150
NAC2013-Hxx	5	5	4~50	150	3.3~79.2	180~4330	318-13	1050	>248~22	150
NAC2014-Hxx	7	7	4~70	150	3.3~112.2	340~11630	624~18	2060	>248~16	150
NAC2015-Hxx	10	10	4~80	150	3.3~128.7	680~26680	1273~33	4200	>248~13.5	150
NAC2021-Hxx	7	7	4~70	200	3.3~112.2	200~6750	624~18	2060	>248~16	150
NAC2022-Hxx	10	10	4~80	200	3.3~128.7	400~15440	1273~33	4200	>248~13.5	150
NAC2023-Hxx	15	15	4~80	200	3.3~128.7	870~34050	2864~73	9450	>248~13.5	150
NAC6024-Hxx	3	3	4~30	200	1.8~25.3	30~350	161~11	290	>250~35	200
NAC6025-Hxx	5	5	4~50	200	1.9~45.6	80~1920	421~18	800	>250~22	200

Note: The height of plate piezo stack can be selected; Hxx: where xx represents the overall height; there is a 1mm thick non-polarized insulating ceramic on the top and bottom of the stack. It is recommended to use it within the specs range. Over-voltage use may cause electrical failure (electric arc discharge) or accelerated aging. The total height of the solder joints on both sides is up to 1.8mm. The height tolerance is ±0.2mm or 1%.

Compact Piezo Stack





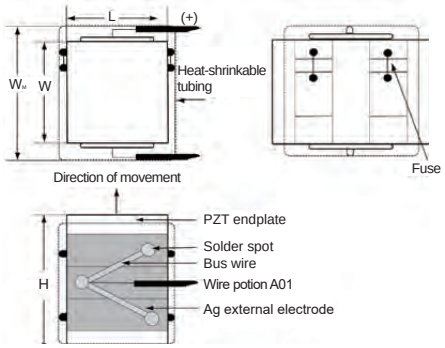


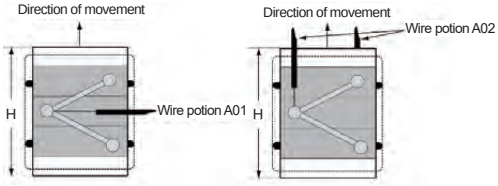
▸ Technical data

Model	Length L[mm]	Width W[mm]	Max.width [mm]	Height H[mm]	Driving voltage[V]	Stroke [μm]±20%	El.capacitance [nF]±20%	Stiffness [N/μm]±20%	Blocking force[N]±20%	Max. Operating temperature[°C]
NAC4001-Hxx	2	2	3	4~20	60	2.6~23	130~1150	64.6~7.3	168	150
NAC4002-Hxx	3	3	4	4~30	60	2.9~39.9	360~5040	130.3~9.5	378	150
NAC4003-Hxx	5	5	6	4~50	60	3~72	1030~24620	350~14.6	1050	150
NAC4011-Hxx	2	2	3	4~20	150	2.8~25.2	20~190	60~6.7	168	150
NAC4012-Hxx	3	3	4	4~30	150	3.1~43.9	60~860	121.9~8.6	378	150
NAC4013-Hxx	5	5	6	4~50	150	3.3~79.2	180~4330	318.2~13.3	1050	150
NAC4014-Hxx	7	7	8	4~70	150	3.3~112.2	340~11630	624.2~18.4	2060	150
NAC4015-Hxx	10	10	11	4~80	150	3.3~128.7	680~26680	1272.7~32.6	4200	150
NAC4024-Hxx	7	7	8	4~70	200	3.3~112.2	200~6730	624.2~18.4	2060	150
NAC4025-Hxx	10	10	11	4~80	200	3.3~128.7	400~15440	1272.7~32.6	4200	150
NAC4026-Hxx	15	15	16	4~80	200	3.3~128.7	870~34050	2863.6~73.4	9450	150

Piezo Stack with Fuse (Damage Tolerant Stacks)







▸ Technical data

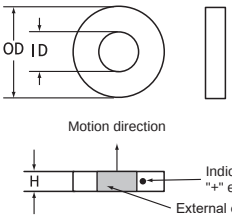
Model	Length L[mm]	Width W[mm]	Max.width [mm]	Height H[mm]	Driving voltage[V]	Stroke [μm]±20%	El.capacitance [nF]±20%	Stiffness [N/μm]±20%	Blocking force[N]±20%	Max. Operating temperature[°C]
NAC5021-Hxx	7	7	9.56	4~70	200	3.3~112.2	200~6730	624.2~18.4	2060	150
NAC5022-Hxx	10	10	12.8	4~80	200	3.3~128.7	400~15440	1272.7~32.6	4200	150
NAC5023-Hxx	15	15	17.9	4~80	200	3.3~128.7	870~34050	2863.6~73.4	9450	150

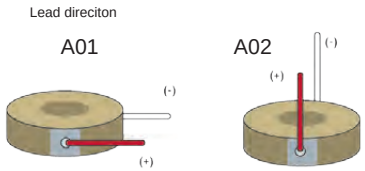
Note: The height of plate piezo stack can be selected; Hxx: where xx represents the overall height; there is a 1mm thick non-polarized insulating ceramic on the top and bottom of the stack. It is recommended to use it within the specs range. Over-voltage use may cause electrical failure (electric arc discharge) or accelerated aging. The height tolerance is ±0.2mm or 1%. More information, please contact with our sales manager.

Ring Piezo Actuator/Stack

Ring Piezo Actuator







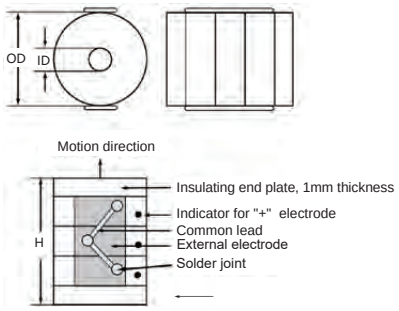
▸ Technical data

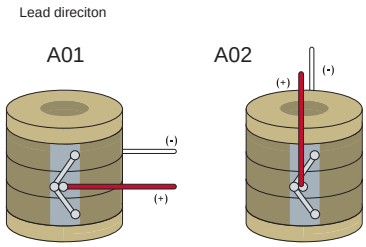
Model	Outer Diameter OD[mm]	Inner diameter ID[mm]	Height H [mm]±0.05	Max. voltage [V]	Stroke [μm]±15%	El. capacitance [nF]±15%	Stiffness [N/μm]±20%	Blocking force [N]±20%	Resonant frequency [kHz]±20%	Weight [g]±5%
NAC2121	6(±0.2)	2(±0.1)	2	200	3.3	105	321	1060	>486	0.38
NAC2122	8(±0.25)	3(±0.1)	2	200	3.3	200	548	1810	>486	0.67
NAC2123	12(±0.4)	6(±0.2)	2	200	3.3	380	1079	3560	>486	1.36
NAC2124	15(±0.45)	9(±0.3)	2	200	3.3	510	1439	4750	>486	1.75
NAC2125	20(±0.6)	12(±0.4)	2	200	3.3	890	2561	8450	>486	3.13

Note: Operating frequency up to dozens of kHz under small signal (a few volts). Under 200V drive, the radial contraction stroke of NAC2121 is about 2.0μm, that of NAC2123 is about 7μm, and that of NAC2125 is about 9.0μm. The max. operating temperature up to 200°C.

Ring Piezo Stack





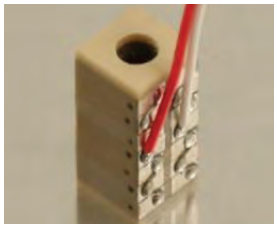


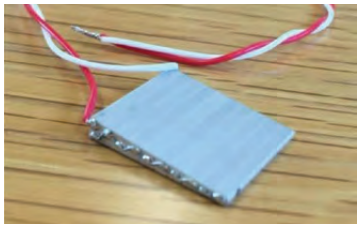
▸ Technical data

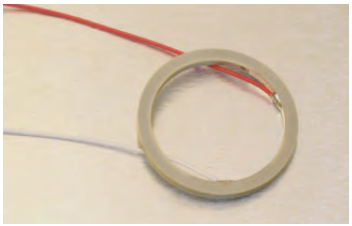
Model	Outer Diameter OD[mm]	Inner diameter [mm]	Height H [mm]	Max.voltage [V]	Stroke [μm]	El. capacitance [nF]±15%	Stiffness [N/μm]±20%	Blocking force [N]±20%	Resonant frequency [kHz]±20%
NAC2121-Hxx	6	2	4~60	200	3.3~95.7	95~2740	321~11	1060	>248~18
NAC2122-Hxx	8	3	4~80	200	3.3~128.7	180~7020	548~14	1810	>248~14
NAC2123-Hxx	12	6	4~80	200	3.3~128.7	340~13340	1079~28	3560	>248~14
NAC2124-Hxx	15	9	4~80	200	3.3~128.7	460~17900	1439~37	4750	>248~14
NAC2125-Hxx	20	12	4~80	200	3.3~128.7	800~31240	2561~66	8450	>248~14

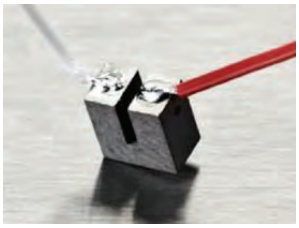
Note: The height of piezo stack can be selected; Hxx: where xx represents the overall height; there is a 1mm thick non-polarized insulating ceramic on the top and bottom of the stack. It is recommended to use it within the specs range. Over-voltage use may cause electrical failure (electric arc discharge) or accelerated aging. The total height of the solder joints on both sides is up to 1.8mm. The height tolerance is ±0.2mm or 1%. Higher height, longer displacement can be customized.

▸ Custom Product









NAC Piezo Actuator Soldering Procedure

Soldering electrical wires to the screen-printed silver electrode makes an excellent and time-stable connection. However, occasionally there can be problems with wetting the solder tin on the silver surface and soldering can therefore be difficult.

This phenomenon is mainly caused by a reaction between sulphuric molecules in the atmosphere with the silver surface and the following formation of a silver-sulphide layer on the surface of the part. The formation and height of this layer is influenced by several factors such as age, pH, humidity, etc.

In order to avoid such problems completely at any time, it can therefore be considered as good practice to gently clean the external electrodes on the part before soldering. A glass brush or steel wool is very useful for this operation.

We recommend using soldering temperatures between 250℃ and 325℃ . Silver is soluble in the solder tin, and if the solder time is too long the electrode will completely dissolve in the solder. In order to increase the possible solder time, we recommend using a solder tin with silver content of 2-4%. Even if the possible solder time is increased with this type of tin, we still recommend that the solder time does not exceed 2-3 seconds, in order to minimize heat transfer to the piezoceramic product an thus avoid the risk of depolarization of the piezoceramic material.

▸ Recommended process

The wire is pre-soldered.

The Ag-electrode surface is cleaned with a glass brush to remove oxidation layer.

Soldering iron temperature is approximately 285℃ .

▸ Solder materials

Soldering material must contain Ag. We recommend the following for standard as well as Ultra-high vacuum applications: 96SC Tin/Silver/Copper with multicore flux (Flux type Crystal 400).

The electrode surface is pre-soldered as follows:

- A small amount of soldering material is melted at the tip of the soldering iron.
- The soldering iron is held at the electrode surface for approximately 1 second
- More soldering material is applied to form a small circular soldering material spot.
- The pre-soldered wire is placed on top of the circular soldering material spot and soldered together.
- If necessary, more soldering material is applied.

Storage and Handling

There are no particular storage restrictions for piezoelectric ceramic components. It is however important to make sure that the components are dry before a voltage is applied, therefore it is recommended to store them in a dry environment or to dry them thoroughly before they are used. Heat drying is well adapted, for example 24h at 110℃ , if possible in low-pressure environment.

Piezoelectric ceramic components are fragile and must be handled with care.

- Prevent the components from hitting each other, keep components separate
- Particularly for tall, narrow stacks, make sure that no bending is induced
- Use plastic tweezers and tools rather than metallic ones
- Use gloves to avoid contamination
- Do not apply excessive force on the pre-attached wires

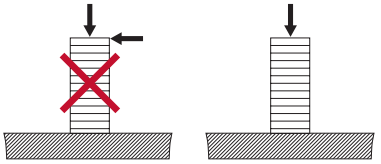
When submitted to a force or to temperature changes, be aware that piezoelectric actuators will generate charge (i.e. voltage), so they must be properly discharged Through a resistor before use. It is recommended to keep larger components short-circuited during shipment and storage.

Cleaning

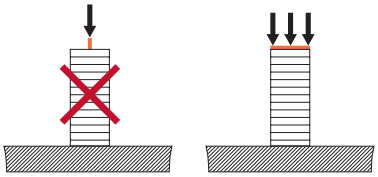
For the cleaning of ceramic components, we recommend isopropyl-alcohol (propanol) or ethanol. The components have to be thoroughly dried before use.

If needed, components can be fully submerged in solvent, however for stacked actuators we recommend to limit the exposure to a few seconds to avoid weakening of the epoxy.

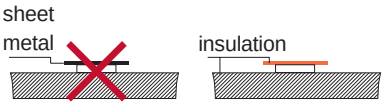
Installation Precautions of Piezo Stack



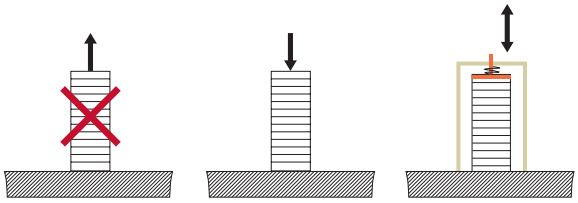
The actuators must only be stressed axially. Tilting and shearing forces must be avoided.



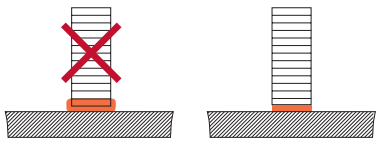
The force must be applied on the full surface of the actuator in order to assure a good load distribution.



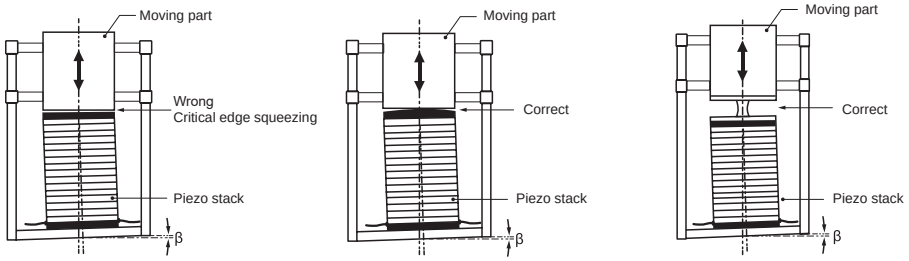
For linear actuators it's recommended not to use a metal plate on top and bottom in order to avoid short circuit.



The actuators without preload are sensitive to pulling forces. It's recommended to apply a pre-load in order to optimize the performances of the actuators.



Epoxy glues are well suited for gluing piezo ceramics.



Piezo stack can't withstand shear, lateral and torsion force. Loading force needs to apply to the center of the moving end of piezo stack in motion direction. And no clamping force in the periphery of piezo stack.



Do not apply a force on a point of Piezo stack. Try to avoid damage to the piezo stack caused by edge extrusion during installation and use.

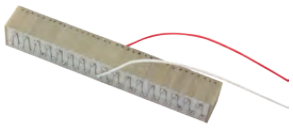
Other Precautions

1. It cannot be used beyond the given voltage range of the parameter table;
2. Do not scrape off the side coating of the stacked ceramic;
3. Piezo stack without preload cannot withstand tension. It is recommended to load preloaded force, which is one-tenth of the output;
4. The environment where piezo stack is located should be kept dry;
5. Temperature changes or load changes will cause internal charging of the ceramic. Before using the ceramic, it is recommended to use a few hundred ohm resistors to discharge the ceramic;
6. To prevent the surface of piezo stack from contacting conductive or corrosive substances, the surface can be cleaned with isopropanol, and avoid contact with isopropanol at high temperatures and excessive ultrasonic cleaning;
7. Connect the red lead to the positive terminal of the power supply. The unleaded piezo actuator is the positive electrode near the dot side electrode;
8. Avoid pulling the lead wire forcefully, and do not move the ceramic by pulling;
9. Do not touch the ceramic surface directly with your hands, so as not to reduce the stability of the ceramic;
10. If you use glue to fix the ceramic, please make sure that the glue between the ceramic and the bonding surface is very thin, press lightly to fix it.

Piezo Stack for Dispensing Valves







This piezo actuators are dedicated to driving piezo micro-dispensing valve. The standard optional sizes include 5×5×20mm, 5×5×36mm, 7×7×36mm, which can be used for various valves. You can choose according to valves' sizes, types, frequency, voltage and etc.

▸ Technical data

Model	Size L×W×H[mm]	Stroke [μm]±15%	El. capacitance [μF]±20%	Stiffness [N/μm]±20%	Unloaded resonant frequency [kHz]	Blocking force [N]	El. capacitance [V]
DJF520	5×5×20	20	1.5	60	50	1600	150V
DJF536	5×5×36	40	3.6	30	25	1600	150V
DJF73601	7×7×36	38	7.2	49	35	1960	120V
DJF73602	7×7×36	56	5.8	36	33	2060	150V
DJF73603	7×7×36	40	7.2	60	25	3500	150V

Note: Mounting preloaded force less than 20% of blocking force.and can be adjusted according to operating frequency.

Piezo Controller for Piezo Micro-Dispensing Valve



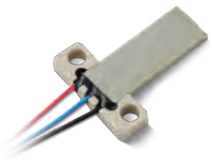
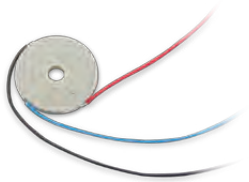
E52 piezo controller is an analog control type piezo injection valve controller independently developed for driving piezo micro-dispensing valves.

When E52 piezo micro dispensing valve controller drives a 10μF load, the step time is only 50μs. The single dispensing time is about 40μs.

▸ Technical Data

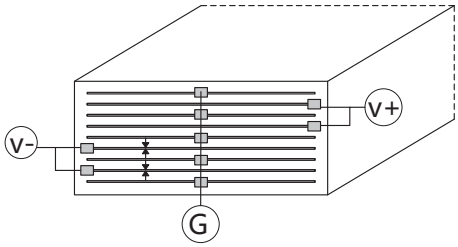
Model	E52
Power supply	220VAC(198V~242V)
Analog input(V)	0~10
Bandwidth(kHz)	10
Operating temperature(°C)	0~50
Output over-current protection	If the ave. output current exceeds 0.3A, the over-current indicator lights
Control input connector	SMB
PZT connector	Single-core

Piezo Bender

Piezo benders are divided into square and ring piezo benders. One end of the square piezo benders is fixed and driven by piezo controller, the other end of piezo benders will swing up and down, and you also can use it only in one direction, swinging up or down. After fixing the outer edge of ring-shaped piezo benders and then applying voltage, the center inner diameter position will move up and down.

▸ Structure



Piezo bender uses the transverse d_{31} piezoelectric effect. When used in a static state, it will show obvious creep characteristics, so piezo bender is mainly used for dynamic applications. The laminated piezo benders is made by stacking and co-firing multilayer piezo bending ceramic. Its output force is far greater than that of ordinary bimorphs.

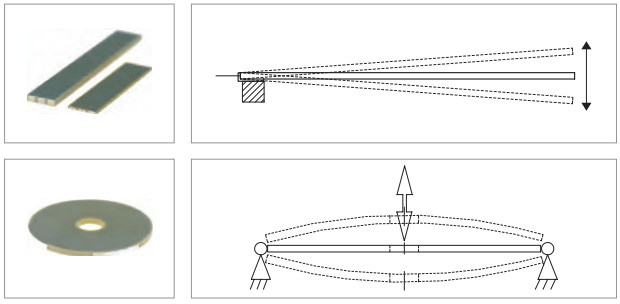
▸ Power Calculation

Current consumptionI=f*C*$U_{p\text{-}p}$, f: the frequency to be reached, C: capacitance (such as NAC2221, its is 2x105nF), $U_{p\text{-}p}$: peak driving voltage. P=U×I, then you can estimate the power required.

▸ Operating Frequency

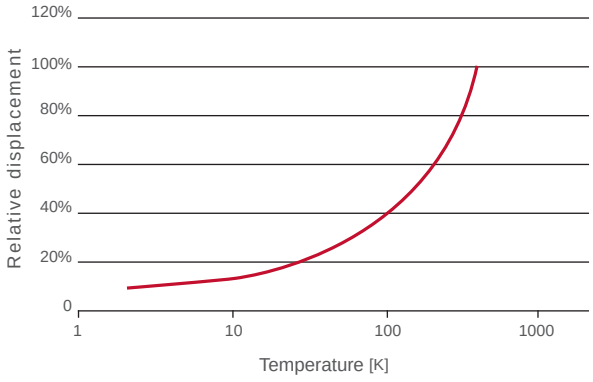
When piezo benders is used at 100% stroke, the maximum operating frequency is much less than 1/3 of the resonance frequency.

▸ Motion Direction



▸ Operating Temperature

The maximum working temperature of the piezoelectric ceramic bending sheet can reach 150°C, and the minimum working temperature can reach several k. At low temperatures, the performance of piezoelectric ceramic bending sheets will decrease, about 10% of that at room temperature. If it is used dynamically at low temperature, the low temperature lead should be replaced.



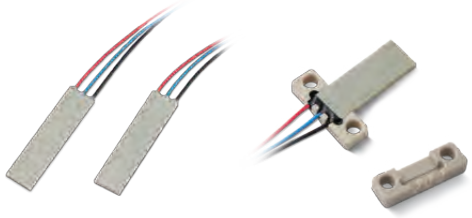
▸ Piezo Controllers for Piezo Benders

3-channel output piezo controller, one channel outputs -100V constant voltage, one channel outputs +100V constant voltage, another channel outputs -100V~+100V variable voltage. Analog and digital control is available.

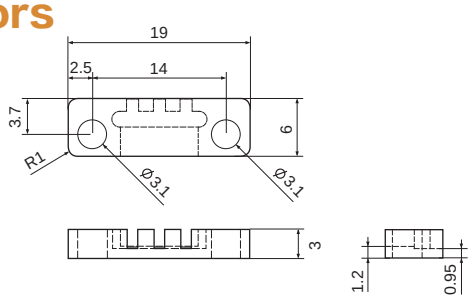

For moving both ways, up and down


For moving one way, up or down

Bending Plate Actuators



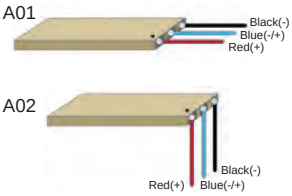
Optional holder



Holder drawing

Lead Direction

Two types lead directions for choice.



Technical Data

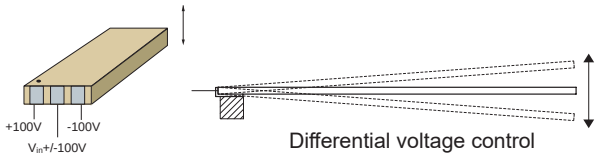
Model	Length L [mm]	Width W [mm]±0.15	Height H [mm]±0.1	Max. voltage [V]	Stroke [μm]±15%	El. capacitance [nF]±15%	Stiffness [N/μm]±20%	Blocking force [N]±20%	Resonant frequency [Hz]±20%
NAC2221	21|(±0.45)	7.8	0.7	±100 or 200	±210	2×105	0.0071	1.5	920
NAC2222	21(±0.45)	7.8	1.3	±100 or 200	±140	2×220	0.0393	5.5	1600
NAC2223	21(±0.45)	7.8	1.8	±100 or 200	±95	2×330	0.109	10.4	2300
NAC2224	32(±0.65)	7.8	0.7	±100 or 200	±530	2×170	0.0017	0.92	340
NAC2225	32(±0.65)	7.8	1.3	±100 or 200	±365	2×350	0.0093	3.4	620
NAC2226	32(±0.65)	7.8	1.8	±100 or 200	±250	2×520	0.0248	6.2	890
NAC2227	50(±1)	7.8	0.7	±100 or 200	±1490	2×280	0.0004	0.58	130
NAC2228	50(±1)	7.8	1.3	±100 or 200	±1000	2×560	0.0021	2.1	230
NAC2229	50(±1)	7.8	1.8	±100 or 200	±700	2×860	0.0057	4	330
017591	10 (±0.2)	5	0.7	±100 or 200	±40	2×31	0.039	1.56	3850
017592	10 (±0.2)	5	1.3	±100 or 200	±27.5	2×63	0.229	6.3	6900

Note: NAC2221's mass is about 0.9g, NAC2222's is about 1.7g, NAC2228's is about 4g, and NAC2229's is about 5.5g. The weight of lead and solder joint material is about 1~2g, and the lead length is 20cm.

Control Instruction

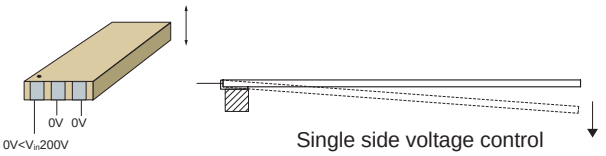
Bending actuator plates can be controlled by:

Differential voltage control: In this mode the bending can be controlled both upwards and downwards. Apply +100V to the positive electrode(indicated by the black dot), -100V to the negative electrode and a voltage Vin to the middle electrodes such as -100V<Vin<100V. If 0V<Vin<100V, the plate will bend up with the black spot facing up. If-100V<Vin<0V, the plate will bend down with the black spot facing up.



Differential voltage control

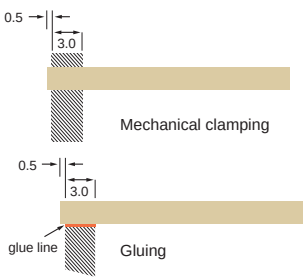
Single side voltage control: In this mode, the bending can be controlled for one side only, i.e. bending down with the black dot facing up. Apply 0V to the negative and middle electrode, and up to 200V to the positive electrode.



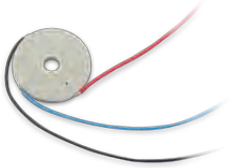
Single side voltage control

Example	Connection	Control	Stroke
Take NAC2227 as an example	 Black: -100V Blue: -100~+100V Red: +100V	3 channels, where, Channel 1: -100~100V output Channel 2: +100V output Channel 3: -100V output	 Upwards: 1490μm Downwards: 1490μm Whole: 2980μm
	 Black: 0V Red: 0~+200V Bule: 0V	1 channel, 0~200V output	 Downwards: 1490μm

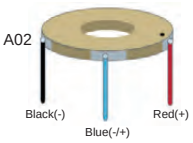
Installation and Fixing



Bending Ring Actuators







Two types lead directions for choice.

▸ Technical Data

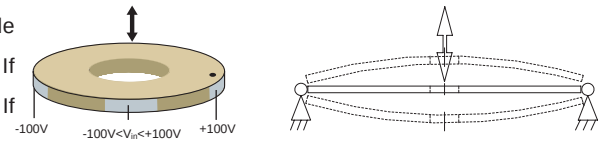
Model	Outer diameter OD[mm]	Inner diameter ID[mm]	Height H [mm]±0.1	Max. voltage [V]	Stroke [μm]±15%	El. capacitance [nF]±15%	Stiffness [N/μm]±20%	Blocking force [N]±20%	Resonant frequency [kHz]±20%
NAC2322	20(±0.6)	4(±0.15)	1.25	±100 or 200	±28.8	2×410	0.84	24.2	8
NAC2323	20(±0.6)	4(±0.15)	1.8	±100 or 200	±22	2×620	1.22	26.8	8.2
NAC2324	30(±0.9)	6(±0.2)	0.7	±100 or 200	±112	2×470	0.12	13.6	3.1
NAC2325	30(±0.9)	6(±0.2)	1.25	±100 or 200	±78	2×980	0.45	35	4.2
NAC2327	40(±1.2)	8(±0.25)	0.7	±100 or 200	±198	2×820	0.06	12.7	1.45
NAC2328	40(±1.2)	8(±0.25)	1.25	±100 or 200	±150	2×1800	0.28	41.4	2.3

Note: NAC2322's mass is about 3g, NAC2328's is about 12g. The weight of lead and solder joint material is about 1~2g, and the lead length is 20cm. Max. operating temperature to 150°C.

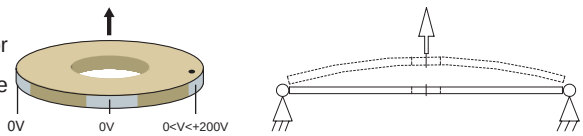
▸ Control Instruction

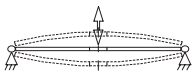
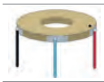
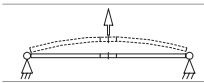
Bending ring actuators can be controlled by:

Differential voltage control: In this mode the bending can be controlled both upwards and downwards. Apply +100V to the positive electrode(indicated by the black dot), -100V to the negative electrode and a voltage Vin to the middle electrodes such as -100V<Vin<100V. If 0V<Vin<100V, the plate will bend down with the black spot facing up. If -100V<Vin<0V, the plate will bend up with the black spot facing up.



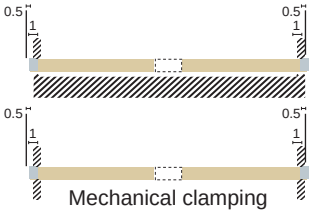
Single side voltage control: In this mode, the bending can be controlled for one side only, i.e. bending up with the black dot facing up. Apply 0V to the negative and middle electrode, and up to 200V to the positive electrode.



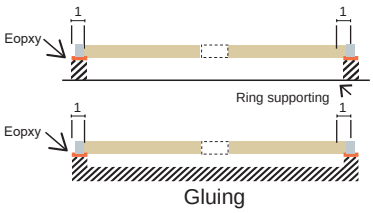
Example	Connection	Control	Stroke
Take NAC2328 as an example	 Black: -100V Blue: -100~+100V Red: +100V	3 channels, where, Channel 1: -100~100V output Channel 2: +100V output Channel 3: -100V output	 Upwards: 150μm Downwards: 150μm Whole: 300μm
	 Black: 0V Red: 0~200V Bule: 0V	1 channel, 0~200V output	 Upwards: 150μm

▸ Installation

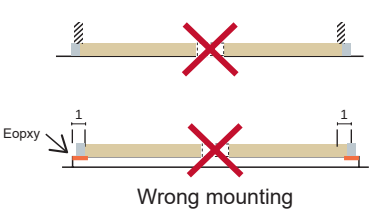
Bending ring actuators may be mounted either by mechanical clamping or gluing. There is 1mm insulation area respectively in the inner and outer diameters, and the maximum clamping area is 2~3mm. A mechanical clamping should be done with moderate force that is about 5 times blocking force, as low as possible to avoid unwanted clamping and thus reduce the maximum stroke, and the material of clamp should be flexible enough to allow movement, and we recommend using plastics like Teflon or PEEK. Please pay attention, it needs to leave enough space not to block stroke. The area that can be clamped and bonded is shown in the figure below.



Mechanical clamping



Gluing



Wrong mounting

Piezo Shear Actuator/Stack

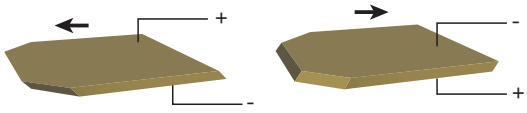


The structure of Piezo Shear Actuator is very compact, the thickness is only 0.5mm, and the resonance frequency is up to 1750kHz. It uses piezoelectric effect d_{15} to make piezo shear actuator generate shear displacement by applying a bipolar voltage. The displacement of a single actuator can reach 1.5μm. The top and bottom are electrodes. It can be stacked to form multi-dimensional motion or obtain longer travel.

▸ Electrode and Motion Direction

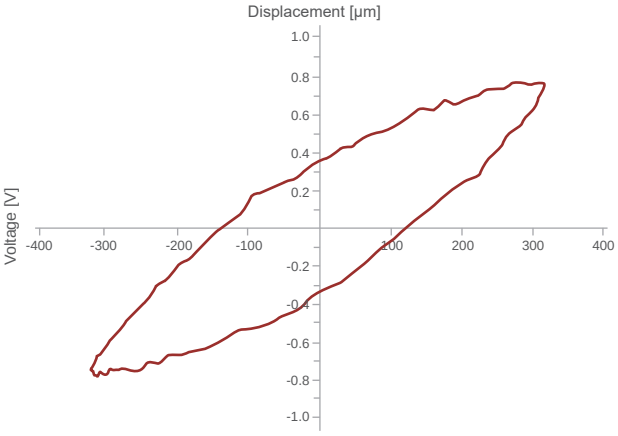
Electrodes: Shear plate actuators present electrodes on top and bottom surfaces.

Motion direction: A positive voltage on one electrode leads to a relative displacement of this electrode towards the chamfered edge.



The upper and lower electrodes are the same, the positive electrode surface moves towards the chamfered direction.

▸ Displacement Curve



▸ Piezo Controller for Shear Actuator

1 channel, output -320V~+320V, analog or digital control (with software) is available.



▸ Load Capacity

Our shear plates are usually tested under 3.5MPa. Piezo elements can withstand high compressive pressures (>50MPa), however in practice, we recommend not to apply more than 5MPa (that is, 20N for CASP01, 125N for CASP02, 500N for CSAP03) on shear elements. This is because small defects in the contact surfaces can lead to stress concentrations and break the element. If high pressure is required, we recommend to use contact surfaces (both on the shear plate and on the structure) with superior flatness.

▸ Installation

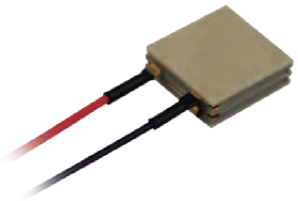
The piezo ceramic sheet can be fixedly installed by mechanical clamping or glue bonding. When using mechanical clamping, a preload force of 1~3MPa is recommended, and it acts on the entire surface of the ceramic. When using glue for bonding, epoxy glue is recommended.

▸ Technical Data

Model	Length L [mm]	Width W [mm]	Height H [mm]±0.05	Chamfer [mm]	Max. voltage [V]	Stroke[μm]* ±20%	El. capacitance [nF]±15%	Resonant [kHz]±20%
CSAP01	2(±0.1)	2(±0.1)	0.5	0.2×45°	±320V	1.5	0.13	1750
CSAP02	5(±0.1)	5(±0.1)	0.5	0.5×45°	±320V	1.5	0.83	1750
CSAP03	10(±0.2)	10(±0.2)	0.5	1×45°	±320V	1.5	3.32	1750
CSAP04	15(±0.3)	15(±0.3)	0.5	1.5×45°	±320V	1.5	7.47	1750
050005	5(±0.15)	5(±0.15)	1.09(±0.1)	0.5×45°	±700	3.28	0.38	800

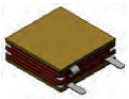
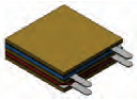
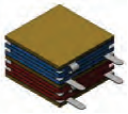
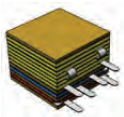
*: At -320V~+320V voltage. Max. operating temperature up to 200°C. Offered with no lead.

Piezo Shear Stack





Shear stacks are available as single-axis and multi-axis actuators with a stroke of up to 6 µm. Their low capacitance results in reduced power requirements for a given generated displacement. The shear stacks are used in nanopositioning, precision mechanics, active vibration cancellation, switches, semiconductor manufacturing and testing.

X motion		XY motion		XYZ motion	
NAC240X-H1.7	NAC240X-H3.4	NAC290X-H2.8	NAC290X-H6.4	NAC340X-H7.4	NAC340X-H33.6
					

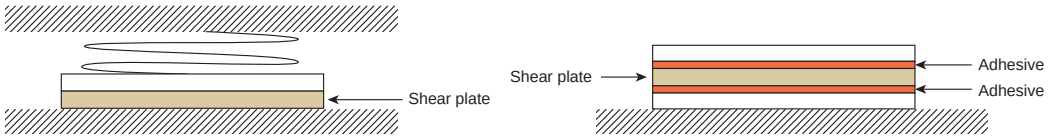
▸ Technical Data

Model	Active axes	Length L [mm]±0.2	Width W [mm]±0.2	Height H [mm]±2%	Stroke [µm]±20%	El. capacitance [nF]±20%	Resonant frequency [kHz]±20%
NAC2402-H1.7	X	5	5	1.7	1.5	0.8	520
NAC2402-H2.3	X	5	5	2.3	3	1.7	700
NAC2402-H3.4	X	5	5	3.4	6	3.3	245*, 415**
NAC2403-H1.7	X	10	10	1.7	1.5	3.3	470
NAC2403-H2.3	X	10	10	2.3	3	6.6	350
NAC2403-H3.4	X	10	10	3.4	6	13.3	148*, 240**
NAC2902-H2.8	X/Y	5	5	2.8	1.5/1.5	0.8/0.8	255/ 255
NAC2902-H4	X/Y	5	5	4.0	3/3	1.7/1.7	220/220
NAC2902-H6.4	X/Y	5	5	6.4	6/6	3.3/3.3	185/185
NAC2903-H2.8	X/Y	10	10	2.8	1.5/1.5	3.3/3.3	290/290
NAC2903-H4	X/Y	10	10	4	3/3	6.6/6.6	148/148*, 240/240**
NAC2903-H6.4	X/Y	10	10	6.4	6/6	13.3/13.3	130/130
NAC3402-H7.4	X/Y/Z	5	5	7.4	1.5/1.5/1.5	0.8/0.8/5.5	102/102/102
NAC3402-H12.6	X/Y/Z	5	5	12.6	3/3/3	1.7/1.7/11.1	106/106/106
NAC3403-H7.4	X/Y/Z	10	10	7.4	1.5/1.5/1.5	3.3/3.3/21.4	150/150/150
NAC3403-H12.6	X/Y/Z	10	10	12.6	3/3/3	6.6/6.6/42.7	107/107/107
NAC3403-H23.1	X/Y/Z	10	10	23.1	6/6/6	13.3/13.3/85.4	60/60/60

*: 1st minor, **2nd major. Note: max. driving voltage is ±320V. Height tolerance is ±0.2mm or 2%. Max. operating temperature is 150°C. Preloaded force to 3MPa.

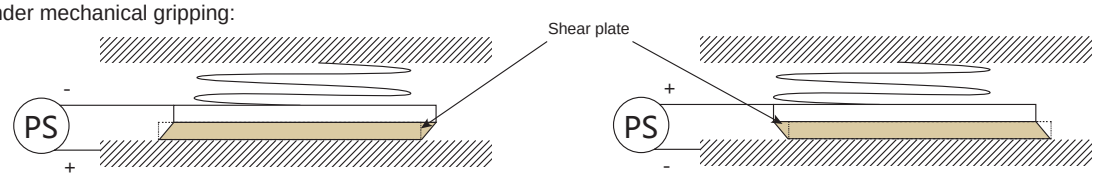
▸ Mounting

Shear plate actuators present electrodes on top and bottom surfaces. They may be mounted either by mechanical clamping or gluing.



In case of clamping, axial stress on shear plate actuators must be controlled. Too low pressure can lead to slippage whereas too high pressure can damage the ceramic. With the appropriate contact surface and in the case of low shear force, a pressure of 1 to 3 MPa can be recommed.

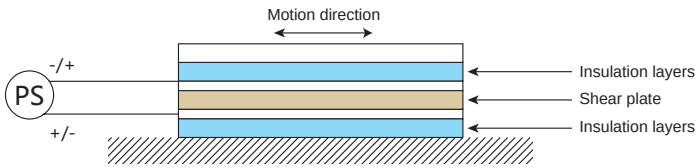
Motion under mechanical gripping:



If clamping is used, the stiffness of the loading mechanism in the actuation direction shall be as low as possible in order not to hinder the movement of the actuator.

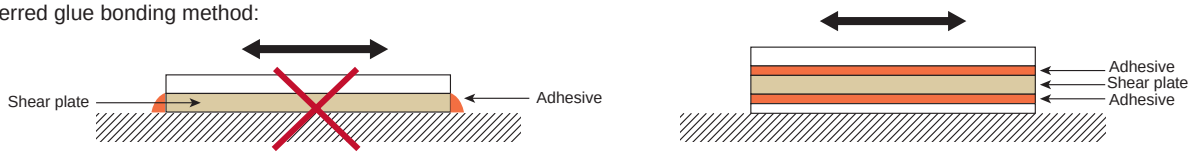


The force must be applied on the full surface of the actuator in order to ensure a good load distribution. In particular when applying the pressure, the contact surfaces have to be sufficiently flat or compliant.



It can be necessary to insulate the contact surfaces from the rest of the structure. This can be achieved by adding inactive ceramic plates in the structure, or polyimide film insulator.

Preferred glue bonding method:



If glued it is important to ensure a very thin glue line between the shear plate actuators and the substrate. This is generally ensured by using low viscosity glue. A pressure, e.g.2-3MPa, should be applied during the curing process.

Epoxy glues are well suited for gluing piezo ceramics.

▸ Electrical Connection

External electrodes: Since shear plate actuators can be used with bipolar symmetrical electrical supply, both electrodes are identical. The direction of operation is indicated by the chamfers. Sign convention: a positive voltage on one electrode leads to a relative displacement of this electrode towards the chamfered edge. Electrical connection to the external electrodes can be achieved by mechanical contacts, soldering, gluing with electrically conductive glues or wire bonding.

Mechanical connections: Mechanical connections can be arranged by e.g. copper springs contacted to the external electrodes. Shear plate actuators are provided with gold plated electrodes for optimal electrical contact and to avoid oxidation of the electrodes. For demanding applications, it might be necessary to have both contacts gold plated.

Ultrasonic/Monolayer Piezo Ceramic



Description

Material: PZT4, PZT5, PZT8

Application: ultrasonic vibration, sensor, transducer, etc.

Electrodes: standard Ag, optional Au, Ni, etc.

Customization: size, shape, frequency, electrodes, etc.

Electrodes



Bulls-eye | Insulation band | Side tab | Wrap-around feedback

Withstand Voltage

Material	PZT4	PZT5	PZT8
AC drive	360~440V/mm	200~280V/mm	360~440V/mm
DC drive	720~880V/mm	400~560V/mm	720~880V/mm
Custom 1000V/mm is available.			

Customization Tolerance

L/W/TH	Flatness	Dielectric constant	Resonance frequency	Coupling coefficient
±0.05mm or ±0.5%**	±0.005mm or ±0.5%	±10%	±5%	±5%

** Max

Displacement Calculation

Ring/Plate/Disc in axial direction[μm]: $\Delta h = d_{33}V$

Tube in axial direction[μm]: $\Delta l = \frac{2d_{31}Vl}{OD-ID}$

Tube radial displacement[μm]: $\Delta h = d_{33}V$

Ring in radial direction[μm]: $\Delta r = \frac{d_{31}V(OD-ID)}{2h}$

Plate in L or W direction[μm]: $\Delta l = \frac{d_{31}Vl}{h}$

Disc in radial direction[μm]: $\Delta r = \frac{2d_{31}Vr}{h}$

d_{33}, d_{31}: piezoelectric coefficients, depending on material

V: Driving voltage[V] OD: Outside diameter[mm]

ID: Inner diameter[mm] h: Thickness or height[mm]

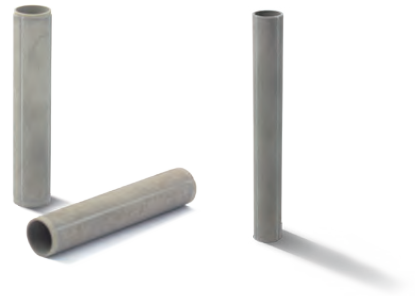
l: L or W[mm] r: Radius[mm]

Recommended Controller



Frequency up to 24MHz, output voltage up to 1600V.

Piezoelectric Tube Scanners



Piezoelectric tube scanners are thin cylinders of radially poled piezoelectric material with four external electrodes and a continuous internal electrode. When a voltage is applied to one of the external electrodes, the actuator wall expands which causes a vertical contraction and a large lateral deflection of the tube tip. A circumferential electrode can be used for vertical or radial extension and contraction.

Piezoelectric tube scanners are used extensively in scanning probe microscopes and applications such as fibre stretching and beam scanning. Customised dimensions and/or specifications are available on request.

▸ Operating Principle

When the base of the tube is fixed, the tip translations Δx and Δy are approximately:

$$\Delta x = Vx \frac{2\sqrt{2}\, d_{31} L^2}{\pi D h} \qquad \Delta y = Vy \frac{2\sqrt{2}\, d_{31} L^2}{\pi D h}$$

Where Δx and Δy are the X and Y axis deflection, d_{31} is the piezoelectric strain constant, L is the length of the tube, D is the outside diameter, h is the tube thickness, and V_X and V_Y are the electrode voltages which are applied oppositely to either side of the tube. The tube deflects in the same direction as the positive electrode voltage.

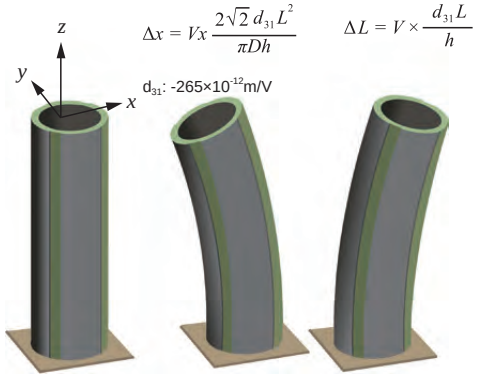
A positive voltage applied to all four quadrants will cause the tube to contract vertically and expand radially. The change in length is:

$$\Delta L = V \times \frac{d_{31} L}{h}$$

The change in outside diameter due to a positive voltage applied to all four quadrants is approximately:

$$\Delta OD = V \times \frac{-d_{31}}{h} \left(OD - \frac{h}{2} \right)$$

The expansion range in the vertical and radial directions can be doubled by driving the internal and external electrodes with opposite voltages.



▸ Size Range

Outer diameter	Wall thickness	Height
1.524mm	0.254mm	3.175mm to 76.2mm
2.54mm	0.3048mm	
3.175mm	0.381mm	
6.35mm	0.508mm	
9.525mm	0.762mm	

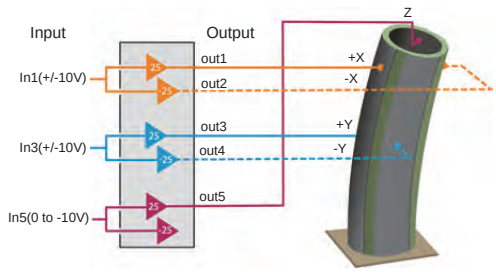
Note: Please consult sales engineer for details.

▸ Technical Data

Model	Length [mm]±0.2	Outer diameter [mm]±0.2	Wall thickness [mm]±0.1	Electrode clearance [mm]±0.3	Max. voltage [V]	Scan range [μm]±30%	Stroke in Z [μm]±30%	Resonant frequency [kHz]±20%	Quadrant Capacitance [nF]±30%	Electrode Material
1005	10	5	0.66	0.7	± 264	3.8	2.1	25	3	Nickel
1006	10	6	0.65	0.7	± 260	3.2	2.1	31	-	Nickel
2006	20	6	0.65	0.7	± 260	13	4.2	7.7	-	Nickel
3006	30	6	0.65	0.7	± 260	29	6.3	3.4	-	Nickel
3507	35	7	0.66	0.7	± 264	39	7.4	3	10	Nickel
4006	40	6	0.65	0.7	± 260	51	7.4	1.9	-	Nickel
5006	50	6	0.65	0.7	± 260	80	11	1.2	-	Nickel
5509	55	9	0.6	0.7	± 250	64	12	1.6	17	Nickel
6006**	60	6	0.65	0.7	± 260	114	13	0.85	12	Nickel
10006	100	6	0.65	0.7	± 260	318	21	0.31	-	Nickel

Note: If operating in resonance, the voltage applied to piezo must be down to below 5% of max. voltage.

** : the recommended load limit for scanning below 100Hz is 10g.



In the driven internal electrode configuration, the X and Y electrodes are driven in the standard way with equal and opposite voltages. This method exploits the higher positive electric field strength of the piezoelectric material, which is usually five times the negative electric field strength. Care must be taken not to apply positive voltages to the internal electrode since this can lead to depolarisation.

Performance	Symbol	Parameters	Units
Piezoelectric constant	d_{33}	600	10^{-12}m/V
	d_{31}	-270	10^{-12}m/V
	g_{33}	19.4	10^{-3}Vm/N
	g_{31}	-9.2	10^{-3}Vm/N
Electro-mechanical coupling factor	K_p	0.65	NA
	K_t	0.37	NA
	K_{31}	0.38	NA
Frequency constant	N_p	1980	Hz-m
	N_t	1950	Hz-m
	N_{31}	1450	Hz-m
Elastic constant	Y_{33}	5.3	10^{10}N/m^2
	Y_{11}	7.2	10^{10}N/m^2
Q factor	Qm	80	NA
Dielectric constant	e_{33}/e_0	3500	@1kHz
Dissipation factor	tan δ	2.5	% @1kHz
Curie temperature	T_c	220	°C
Density	ρ	7.8	g/cm^3

Wiring

Wires can be attached using conductive epoxy(Circuitworks CW2400) or solder and Rosin flux. Piezoelectric tubes can be supplied with wires attached to all external and internal electrodes.

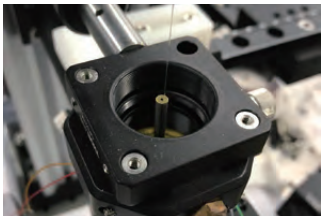
Cryogenic Compatibility

The material PZT-5H works well at cryogenic temperatures. As a guide, the displacement sensitivity is reduced by a factor of 5. However, at cryogenic temperatures, the applied voltage can be increased from +/-250 V to +/-1000 V, which can regain the majority of room temperature deflection but requires a high voltage.

For example, the predicted deflection of the 5509 tube is 66μm with an applied voltage of +/-250 V. At cryogenic temperatures, the displacement will reduce to 66μm×0.2=13.2μm. However, if the voltage is increased to +/-500 V, the deflection will be approximately 66μm×0.2×500/250=26.4μm. If the voltage is increased to +/-1000 V, the displacement will be approximately 66μm×0.2×1000/250=52.8μm.

Application Example

Apply to fiber scanning.



Options / OEM Customization

Custom dimensions and thickness
Custom electrode configurations
Custom dimensions and thickness
Custom electrode configurations

Vacuum Compatibility

Piezoelectric tubes do not contain any outgassing materials and are fully vacuum compatible.

Recommended Controller

Low noise
Six channels
Bipolar
±250V output



Mounting

The most common mounting configuration is the cantilever arrangement with a fixed base and free end. The base can be bonded directly to an insulating surface with a two part epoxy such as Araldite, or a high viscosity Cyanoacrylate such as Loctite Super Glue Gel. Piezoelectric Tubes can also be bonded to a conductive surface by removing a small amount of electrode.

Electrodes

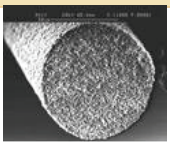
The tubes are supplied with a Nickel thin film electrode. The internal electrode is continuous and the external electrodes are quartered. Electrode area can be removed by etching with dilute Nitric Acid. Custom electrode configurations are available on request. The electrode clearance specification is the length of external electrode removed from both ends, which provides electrical clearance to a mounting surface. The internal electrode is continuous. In applications that require high magnetic fields, the Nickel electrodes can be replaced with Copper or Gold. Copper is an economical choice but Gold provides excellent corrosion resistance and electrical conductivity.

Piezo Ceramic Fibers



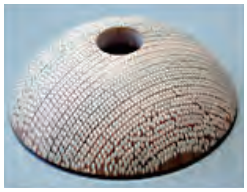
Piezo ceramic fibers are processed adopting cellulose textile spinning technology, with a green forming process, which allows to add PZT powder as a solid load. All piezo ceramics fibers are sold not poled and not electroded.

Utilizing a textile spinning method manufactures green PZT fibers. The manufacturing process constitutes a modified Lyocell fiber manufacturing procedure. The patented manufacturing method allows for the production of green fibers and tubes of various diameters and length with a high PZT material loading factor.

Name	Piezo ceramic fiber
Picture	
Outer diameter	105μm, 250μm, 800μm, customizable
Length	to 150mm, normally 75mm
PZT material	PZT 5A SP505 (Navy type II) Standard inventory
Electrodes	PZT Fibers are shipped with no electrodes and are not poled
Poling	Poling Instructions: 2kV/mm at room temperature for 15min, use ramp-up and ramp-down cycling of > 1min for voltage

Ultrasonic Composites









1~3 Piezo Composites have become the material of choice for many high performance ultrasound transducers. The inside of ultrasonic transducer is composed of piezoelectric ceramic fiber rod and filling material, mainly used in ultrasonic applications. Ultrasonic transducer is a custom-made product, completely customized according to the size and frequency of customer needs. A variety of piezo composite materials can be made by combining piezo ceramic elements with a passive polymer such as epoxy or active polymer.

Type	Frequency	Fill factor	Size range	Operating temperature	Electrode material
 1-3 Dice & Fill	500kHz~15MHz	25%~75%	7.5cm×7.5cm, larger or bender	Standard 90°C, custom 130°C	Au, CuSn
 1-3 Random Fiber	80kHZ~8MHZ	35%, 65%, 80%	10cm×10cm, larger or bender in on request	Standard 90°C, custom 130°C	Au, CuSn
 1-3 Regular Fiber	80kHZ~1MHZ	15%~48%	10cm×10cm, larger or bender in on request	Standard 90°C, custom 130°C	CuSn

MFC Macro Fiber Composite



The Macro Fiber Composite (MFC) is the leading low-profile actuator and sensor offering high performance, flexibility and reliability in a cost-competitive device. Since then, the MFC has been continuously improved and customized to fit customers' specific needs and to meet the requirements for new applications.

As actuators, MFC's displacement is up to several hundreds micrometer, blocking force up to 693N. As sensors, charge quantity generated is related to vibration amplitude, frequency, etc. Output voltage is up to several volts, even 10V, 20V or higher. Output current is μA level.

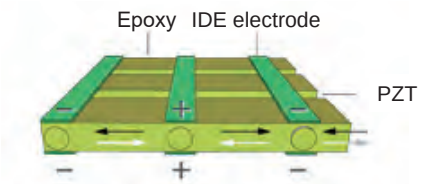
▸ Characteristics

- Flexible, durable and reliable
- Damage-tolerant
- Environmentally sealed package
- Different piezo ceramic materials available
- Increased strain actuator efficiency
- Directional actuation and sensing
- Demonstrated performance
- Available as elongator (d_{33} mode) and contractor (d_{31} mode)
- Conforms to surfaces
- Readily embeddable
- Material: PZT5A

The MFC consists of rectangular piezo ceramic rods sandwiched between layers of adhesive, electrodes, and polyimide film. The electrodes are attached to the film in an interdigitated pattern which transfers the applied voltage directly to and from the ribbon-shaped rods. This assembly enables in-plane poling, actuation, and sensing in a sealed and durable, ready-to-use package. The MFC can also be applied (normally bonded) as a thin, surface-conformable sheet to various types of structures, or embedded in a composite structure. If voltage is applied, it will bend or distort materials, counteract vibrations, or generate vibrations. If no voltage is applied it can work as a very sensitive strain gauge, sensing deformations, noise, and vibrations. The MFC is also an excellent device to harvest energy from vibrations. The MFC is available in d_{33} and d_{31} operational mode, a unique feature of the Macro Fiber Composite.

▸ MFC P1 model

MFC P1 type (d_{33} effect), Elongato



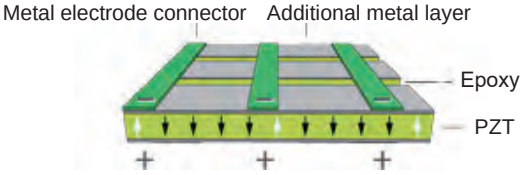
The P1 type MFCs, including the F1 and S1 types, utilize the d_{33} effect for actuation and will elongate up to 1800ppm if operated at the maximum voltage rate of -500V to +1500V. The P1 type MFCs are also very sensitive strain sensors.

▸ Overview of Typical Properties

Max. blocking force	28N to 1kN depending on width of MFC
Max. operating voltage	P1, S1, F1: -500V to +1500V
	P2, P3: -60V to 360V
Max. operating frequency	Actuator: 10kHz
	Sensor, Harvester <1MHz
Typical lifetime	Actuator: 10E+9 cycles
	Sensor: 10E+11 cycles (< 400ppm)
	Harvester: 10E+10 cycles (< 600ppm)
Typical thickness	300μm
Typical capacitance	P1, S1, F1: 2nF to 12nF
	P2, P3: 25nF to 200nF

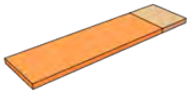
▸ MFC P2 model

MFC P2 type (d_{31} effect), Contractor



The P2 and P3 type MFCs utilize the d_{31} effect for actuation and will contract up to 750ppm if operated at the maximum voltage rate of -60V to +360V. The P2 and P3 type MFCs are mostly used for energy harvesting and as strain sensors.

MFC Working Mode



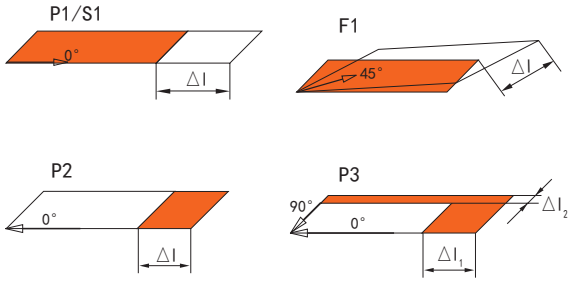
MFC working mode



Bending after attaching on a substrate



Torsion generated by 45°elongation MFC attached on a substrate



Technical Data

Model	Active length [mm]	Active width [mm]	Overall length [mm]	Overall width [mm]	Capacitance [nF]±20%	Displacement [μm]±10%	Blocking force [N]±10%
MFC P1 types, 0° fiber orientation, -500 to 1500V operating voltage							
M2503-P1	25	3	35	9	0.22	19.7	21
M2807-P1	28	7	38	13	0.7	28.98	62
M2814-P1	28	14	38	20	1.9	32.48	146
M4005-P1	40	5	50	11	0.7	35.4	38
M4010-P1	40	10	50	16	1.9	42	90
M4312-P1	43	12	53	18	2.1	45.15	94
M5628-P1	56	28	67	35	4.4	75.6	340
M8503-P1	85	3	106	14	0.9	66.98	21
M8507-P1	85	7	101	13	3.1	87.975	65
M8514-P1	85	14	101	20	4.2	102	152
M8528-P1	85	28	103	35	6.9	114.75	454
M8557-P1	85	57	103	64	16	114.75	693
M14003-P1	140	3	160	10	1.4	147	28
MFC F1 types, 45° fiber orientation, -500 to 1500V operating voltage							
M8528-F1	85	28	105	35	7.4	114.75	364 calc.
M8557-F1	85	57	105	64	15	114.75	710 calc.
MFC P3 types, orthotropic, -60V to 360V operating voltage							
M0714-P2	7	14	16	16	11	-3.78	-57
M2807-P2	28	7	37	10	21.5	-16.8	-35
M2814-P2	28	14	37	18	43	-17.64	-76
M5628-P2	56	28	67	31	175	-41.44	-175
M8503-P2	85	3	94	7	15.5	-36.55	-11
M8507-P2	85	7	100	10	63	-51.424	-38
M8514-P2	85	14	100	18	127	-53.55	-76
M8528-P2	85	28	103	31	258	-62.9	-180
M8557-P2	85	57	103	60	548	-63.75	-385
M8585-P2	85	85	103	88	662	-63.75	-585
M17007-P2(Customized)	170	7	185	11	126	-102	-37
M2814-P3	28	14	37	18	52	length: -17.36/wide: -8.68	-95
M5628-P3	56	28	66	31	130	length: -44.8/wide: -22.4	-240
M8528-P3	85	28	103	31	227	length: -68/wide: -22.4	-240
MFC P2 types, Single Crystal PMN-PT, anisotropic, 0V to 500V operating voltage							
M2814-P2-PMN-PT	28	14	37	18	30	length: -51.8/wide: -25.9	-58
MFC Special types, S1, -500 to 1500V operating voltage							
M8557-S1	85	47	112	75	13	114.75	570 calc.
co-located Sensor	85	5			1.45		

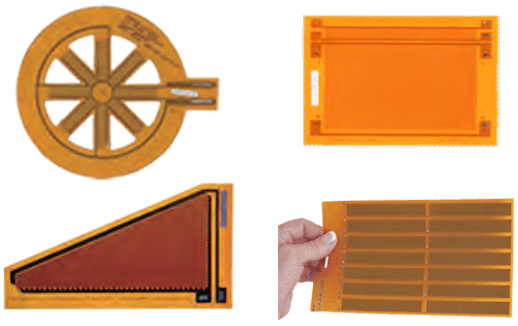
▸ MFC Engineering Properties

High-field (|E| > 1kV/mm), biased-voltage-operation piezoelectric constants:		
d_{33} P1 type, in rod direction		4.6E+02 pC/N
d_{31} P2 type, in electrode direction		-2.1E+02 pC/N
Low-field (|E| < 1kV/mm > 300V), unbiased-operation piezoelectric constants		
d_{33} P1 type, in rod direction		4.0E+02 pC/N
d_{31} P2 type, in electrode direction		-1.7E+02 pC/N
Average free-strain per volt (low-field - high-field) for d_{33} MFC(P1) in rod direction		~0.75 - 0.9 ppm/V
Average free-strain per volt (low-field - high-field) for d31 MFC (P2) in rod direction		~1.1 - 1.3 ppm/V
Free-strain hysteresis in rod direction		~0.2
DC poling voltage, V_{pol} for d_{33} MFC (P1)		+1500V
DC poling voltage, V_{pol} for d_{31} MFC (P2)		+360V
Poled capacitance @ 1kHz, room temp, C_{pol} for d_{33} MFC (P1)		~0.30 nF/cm²
Poled capacitance @ 1kHz, room temp, C_{pol} for d_{31} MFC (P2)		~7.8 nF/cm²
Orthotropic linear elastic properties (constant electric field):		
Tensile modulus, E1 in rod direction		30.336 GPa
Tensile modulus, E1 in electrode direction		15.857 GPa
Poisson's ratio, v_{12}		0.31
Poisson's ratio, v_{21}		0.16
Shear modulus, G_{12} rules of mixture estimate		5.515 GPa
Operational parameters:		
Maximum operational positive voltage, V_{max} for d_{33} MFC (P1)		+1500V
Maximum operational positive voltage, V_{max} for d_{31} MFC (P2)		+360V
Maximum operational negative voltage, V_{min} for d_{33} MFC (P1)		-500V
Maximum operational negative voltage, V_{min} for d_{31} MFC (P2)		-60V
Linear-elastic tensile strain limit		1000 ppm
Maximum operational tensile strain		<2000ppm
Peak work-energy density		~48800Nm/m³
Minimum operating temperature, all Versions		-35°C
Maximum operating temperature - Standard Version		<85°C
Maximum operating temperature - HT Version		<130°C
Operational lifetime (@ $1kV_{p-p}$)		>10E+09 cycles
Operational lifetime (@ $2kV_{p-p}$, 500VDC)		>10E+07 cycles
Operational bandwidth as actuator	High electric field	0~10 kHz
	Low electric field levels (< 33% of max operating voltage)	0~700kHz
Operational bandwidth as sensor		0~1 MHz
Additional mechanical parameters		
Thickness of all MFC types		300µm, ±10%
Volume Density, active area		5.44 g/cm³
Area Density, active area		0.16 g/cm²

Custom MFC

We also offer numerous specialized MFC layouts in addition to manufacturing Macro Fiber Composites in a wide variety of standard sizes. Specialty MFCs have more complex designs, including arrays of single MFCs, and also allow for electronic components to be integrated with the MFC.

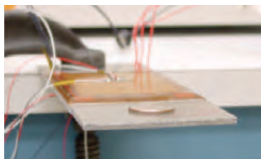
This includes, for example, the Star MFC array for pumps and synthetic jets, the S1 and S2 types (which consist of sensor and actuator elements for a closed loop control), triangular-shaped MFCs for strain adaptation, and several other MFC arrays.



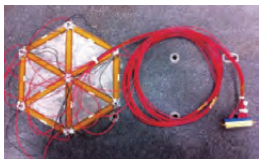
MFC Custom Design Overview

Max. size of custom MFC	400mm by 530mm
MFC types	P1, F1, P2, P3
Typical lead time	7 weeks for < 25 units 8 weeks for > 25 units
Available outer shell materials	polyimide (capton), polyester
Typical thickness	300µm
NRE charges	depending on requested lead time and minimum quantities

Application Examples



Cantilever Beam Vibration Damping



Radar Antenna



Vibration Power Generation



Wing Vibration Damping/Deicing

Application Examples

Aerospace Applications



- De-Icing of composite airplane wings and structures
- Vibration control of helicopter rotor blades
- Rudder control of UAVs
- Structural health monitoring of composite bodies
- Morphing of wings
- Vibration control of satellite booms
- Vibration control of rudders

Applications for Civil Structures



- Structural health monitoring: acoustic spectroscopy, guided waves
- Energy harvesting for structural health monitoring electronics
- Energy harvesting for off-shore applications
- Flexible strain gauges
- Structural health monitoring of pipelines

Consumer goods



- Emerging consumer applications
- Energy harvesting in sporting goods and shoes
- Haptic user interfaces
- Energy autonomous security devices

Cars



- Automotive applications
- Shape control of spoilers
- Haptic for user interfaces and control components
- Vibration control
- Structural health monitoring of rotating components
- Crash sensors

Industrial



- Control for spot welder
- Guided wave based health monitoring
- High frequency valve controls
- Energy harvesting for energy autonomous telemetry devices

E00/E01.A Chassis-type Piezo Controller



E00/E01.A series high voltage piezo amplifier is designed for driving high voltage piezo actuators , like MFC micro fiber composite. Its output range is up to -500 to 1500V, and controlled by analog input signal.

▸ Characteristics

- Output -500~+1500V
- 1 to 6 channels for choice
- Analog input control
- Bandwidth for small signal up to 10kHz

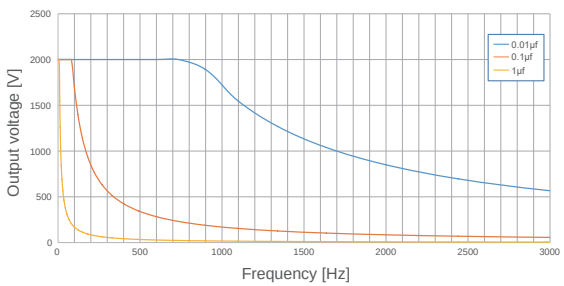
▸ Application

- Driving MFC micro fiber composite
- Driving high voltage piezo stack
- Driving high voltage piezo actuator, etc.

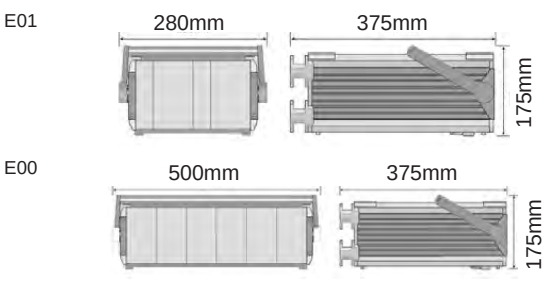
▸ Technical Data

Type	E01.A1	E01.A2	E01.A3	E00.A4	E00.A5	E00.A6
Appearance						
Control	Analog input	Analog input	Analog input	Analog input	Analog input	Analog input
Channels	1	2	3	4	5	6
Input range(V)	-2.5~7.5	-2.5~7.5	-2.5~7.5	-2.5~7.5	-2.5~7.5	-2.5~7.5
Output voltage(V)	-500~1500	-500~1500	-500~1500	-500~1500	-500~1500	-500~1500
Output ripple	50mVp-p(@1μF)	50mVp-p(@1μF)	50mVp-p(@1μF)	50mVp-p(@1μF)	50mVp-p(@1μF)	50mVp-p(@1μF)
Stability	<0.1%F.S./8hours	<0.1%F.S./8hours	<0.1%F.S./8hours	<0.1%F.S./8hours	<0.1%F.S./8hours	<0.1%F.S./8hours
Input impedance(KΩ)	100	100	100	100	100	100
Bandwidth(kHz)	2	2	2	2	2	2
Small signal bandwidth(kHz)	10	10	10	10	10	10
Ave.current	17mA@1000V, 1μF	17mA@1000V, 1μF	17mA@1000V, 1μF	17mA@1000V, 1μF	17mA@1000V, 1μF	17mA@1000V, 1μF
Peak current(mA)	55	55	55	55	55	55
Short-circuited proof(mA)	26	26	26	26	26	26
Control input connector	BNC-50KY female BNC	BNC-50KY female BNC	BNC-50KY female BNC	BNC-50KY female BNC	BNC-50KY female BNC	BNC-50KY female BNC
Voltage output connector	EGG.2B.302.CLL	EGG.2B.302.CLL	EGG.2B.302.CLL	EGG.2B.302.CLL	EGG.2B.302.CLL	EGG.2B.302.CLL
Power supply	AC 220V±10%, 50Hz±10%	AC 220V±10%, 50Hz±10%	AC 220V±10%, 50Hz±10%	AC 220V±10%, 50Hz±10%	AC 220V±10%, 50Hz±10%	AC 220V±10%, 50Hz±10%
Current limit	Short-circuited proof	Short-circuited proof	Short-circuited proof	Short-circuited proof	Short-circuited proof	Short-circuited proof
Size L×H×D(mm)	280×175×375	280×175×375	280×175×375	500×175×375	500×175×375	500×175×375
Heat dissapation	Fan	Fan	Fan	Fan	Fan	Fan

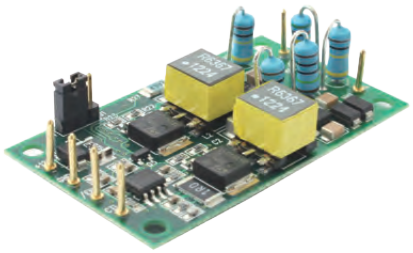
▸ Frequency vs Load Curve



▸ Drawing



Board-Type MFC Piezo Controller



AMD is a dual output high voltage power supply with one fixed 500 volt output, and one variable output from 0 Volt to 2KV. This power supply is specifically designed for the Macro Fiber Composite (MFC) actuator. Use of the bias supply allows a range of -500 volts to +1500 volts to be applied to the MFC. The AMD2012-CE has two modes of operation: control of the output voltage with one analog inputs or using the PWM input interface. It is designed to be operated in mobile environments where size, weight and battery operation is required.

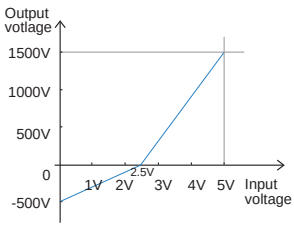
▸ Performance

Charge time with 5 nf capacitance load is less than 10 ms from 0V to 2000V (-500 to +1500V across the MFC). (This requires about 4 watts of peak input power during charging.)

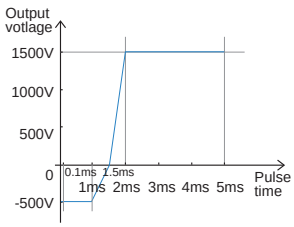
Input voltage: 8 to 15 volts. Reverse polarity protected. Includes a self-resetting (thermal) fuse and output short circuit protection (between the bias supply and the HV outputs).

Mechanical dimensions are 2.2"x 1.8". Height will not exceed 0.75 inch for the tallest components. Components are mounted on both sides of the PCB. CAUTION - High voltages are present on both sides of the PCB.

Input connections are Through a 6 pin Hirose connector. Output connections are Through PCB holes for connection with high voltage leads. An active discharge circuit is employed for removal of the charge stored by the MFC when the control voltage is altered. The charge removal time is matched to the charging time. (Switched 510 kohm resistor) An enable line will be provided to shut down all power supplies to save power consumption, and for safety.

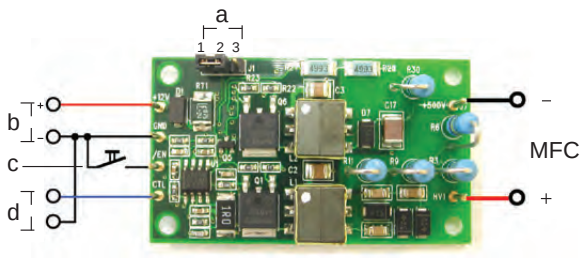


Analog control



PWM control

▸ Pin Definition



WARNING: High voltages are present on both sides of the PCB.

MFC +, -: can't connect with GND or instruments connecting GND to avoid the short circuit of output.

a: Mode selection jumper — 1-2: voltage input; 2-3 PWM input

b: 8VDC...15VDC — 12VDC Typically

c: Interlock

d: Input signal — Voltage:0...5V; PWM: 1ms...2ms/3V

Model	AMD
Channels	2
Nominal output voltage(V)	-500V~1500V
Input analog signal(V)	0~5 or PWM
Output power(W)	3/Channels
Unloaded resonant frequency(Hz)	<30
Power supply(V)	DC 12-16
Operating temperature(°C)	-40~75
Size(mm)	32×55×20

▸ Applications

High voltage power supply for Piezo ceramic and piezo composites

Applications requiring structural deformation (Morphing), i.e. spoiler, rudders, valves etc.

Small UAVs, flight control surfaces

RF-models, flight models, ship models

E69.charge-H2/H3 Smart Charge



The store&hold technique which transfers the generated charge to a high-end, leakage free capacitor, while the charge proportional voltage across the capacitance can be measured closely load-free with a special designed high impedance operational amplifier. This guarantees constant output signals over up to 3 minutes without any significant drift.

Start-up Procedure

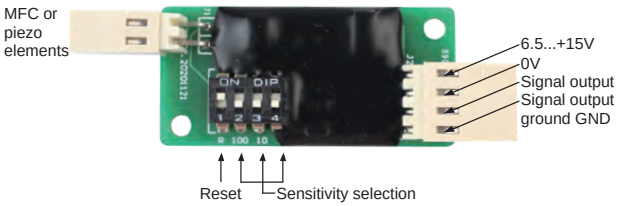
At first please switch ON the DC power supply and a measurement device, e.g. an oscil-loscope. At this point normally one can observe a certain DC output with the scope due to a possible remaining charge inside the integration capacitor. Setting the on-board re-set switch to ON will short this capacitor and reset the output voltage to zero. After this step you can connect the MFC or any other piezoelectric sensor. Make sure that the piezo element was discharged before (short its contacts), otherwise the module might be damaged. Set the sensitivity selector x1 to ON and switch OFF the reset switch. Now your SMARTCharge is ready to measure any deformation of the MFC sensor in a quasi-static or dynamic manner. The sensitivity can be adjusted selecting one of the three sensitivity switches (x1/ x10/x100). A smaller long term DC drift of the output signal is normal and typical for this type of charge related measurement circuits. Therefore the SMARTCharge system can be set back to its initial stage at any time using the on-board reset switch.

Suitable Sensor Types

- P1 MFC (d_{33} effect)
- P2 MFC (d_{31} effect)
- Monolithic piezo-elements
- Sensors with charge output

Termination and Pin

DC power supply and signal output need to be connected to the SMARTCHARGE module Through a connector. Please do not connect to MFC at this time. Please make sure that the pin configuration of the 4 connectors is shown in the figure below, otherwise the module may be damaged. And please note that the 0V and signal ground pins are not at the same potential internally and may not be connected in principle.

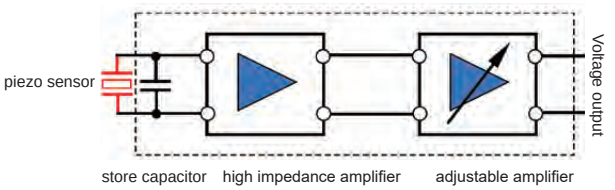


Note: Power supply 0V and signal output ground is not connnected in priciple!

Technical Data

Input channel	one, optimized for the MFC M2807P2 and M8503P2
Gain	1/10/100 gain selectable with onboard dip switches
Output voltage	max. ± 2.5V analog typical ± 1.7V analog
Power supply	6.5V to 15V DC
Size	H2:40mm×25mm printed circuit board H3:60mm×42mm×22mm

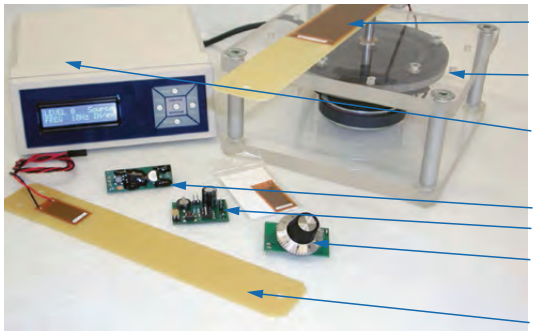
Drive Principle



Sensitivity

Identifier	Sensitivity
1	~0.45μV/pC
10	~4.5μV/pC
100	~45μV/pC

Energy Harvesting Kit



MFC
Macro fiber composite low-profile actuator and sensor

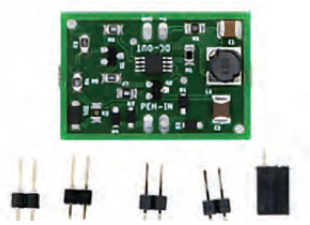
Shaker
Utilize to shake the cantilever; includes controller

Amplifier module
Utilize to control the shaker

4 modules
1 for energy harvesting
1 for measuring energy output
1 LED module
1 CL-51-3.3V DC(in black conductive bag)

Cantilever
Glassfiber composite with MFC bonded to it

CL Energy Harvesting



CL51



CL54

Macro fiber composite MFC Sensors produce a charge which is proportional to strain.

These energy can be collected and provided to defined electrical application requirement. Therefore the module is an interface between the high impedance source characteristic of the MFC and the user application. In most cases this application is microcontroller based.

▸ Technical Data

Model	CL51
Upper limit of input voltage	± 95V AC
Upper limit of outputvoltage	50mA
Upper limit of output current	57mA
Output voltage	3.3V DC(CL51-3.3 version) or 5V DC(CL51-5 version), ±0.1% line regulation
Typical output power	0-148mW@3.3V, 0-225mW@5V, depending on available, collectible input energy
Typical efficiency	When the output current is 1 Ma, 82% ; when the output current is the maximum, 86%
The minimum amount of energy required to activate the output	~ 2.9 MJ (CL51 complete discharge)
Minimum available energy	> 2.4mJ
Input voltage clamp	43V (Bridge rectifier DC side)
Minimum input current	0.9μA
Size	20mm×30mm×7mm
Mass	About 7g

▸ Technical Data

Model	CL54
Upper limit of input voltage	± 95V AC
Upper limit of outputvoltage	50mA out-1; 800ma Out-2
Upper limit of available input current	57mA
PEH input	Two independent PEHA/C inputs, allowing two univariant PEH, or a bivariant or a trivariant PEH
Output voltage	3.3 VDC, ± 0.1% line adjustment rate
Typical output power	0-148mW output OUT-1,0-2.7 W output OUT-2, depending on the available captured input energy
Typical efficiency	81% to 92% depends on the output current and jumper position J2
The minimum amount of energy required to activate the output	>0.3mJ Out-1, >6.5mJ Out-2
Minimum available energy	>0.28mJ Out-1, >2.2mJ Out-2
Input voltage clamp	>900nA
Minimum input current	43V (bridge rectifier DC side)
Size	40mm×70mm×14mm
Mass	About 25g

EH300/EH301 Energy Harvesting Modules



EH300/EH301 energy harvesting modules can accept energy from many types of electrical energy sources and store this energy to power conventional 3.3V and 5.0V electrical circuits and systems. EH300/EH301 Series Modules are completely self-powered and always in the active mode. They are intended for low power intermit

▸ Use

- Max. Instantaneous Input Voltage: +/- 500V
- Max. Instantaneous Input Current: 400mA
- Max. Input Power: 500mW
- Internal Voltage Clamp: 7.0V@10mA
- Min. Input: 0.0V@1nA Max. Output Current: 1 amp
- Operating Life Cycles: Virtually unlimited
- Outline Dimensions(W x L x H) : 14x51x18mm
- Operating Temperature Range: 0 to 70° C
- Max. Average Operating Temperature: 50° C
- Storage Temperature: -40 to +85° C
- Humidity: To 90% (no condensation)
- Protection: Conformal and Epoxy coated

Note: ESD sensitive devices.Use the static control program in the ESD control environment.

▸ Applications

- Extreme life-span power source
- EH energy capture, storage and power management from: mechanical, thermal, chemical, solar, biological and human body sources
- Wireless sensor network remote node power supply
- EH based battery substitution and/or remote battery charging systems
- Hybrid or alternative power source conditioning
- Condition based monitoring systems
- Self-powered remote control switching systems
- Hybrid power (dual power) systems with extended operating life
- System power reliability enhancement
- Most intermittent duty cycle remote-site applications

▸ Technical Data

Model	EH300	EH300A	EH301	EH301A	Units
Output low level V_L	1.8		3.1		V
Output high Leve V_H	3.6		5.2		V
Charging input V_{in}	4.0/200		6.0/300		V@nA, lower limit
Power dissipation P_D	0.4/0.8	1/2	0.9/1.8	1.5/3	μW typical/upper limit
Useful energy outpu E	4.6	30	3.9	55	mJ 1 cycle
Output on-time rating t×I	68/25	75/150	80/25	88/150	msec@mA 1 cycle
V_P output resistance R_{VP}	0.15(V_P=3.5V)		0.1(V_P=5V)		Ω
V_R output sink curren I_{Rsink}	2.5(V_P=3.5V,V_R=3.5V)		5(V_P=5V,V_R=5V)		mA
V_R output source current $I_{Rsource}$	-1.0(V_P=3.5V,V_R=0V)		-2(V_P=5V,V_R=0V)		mA
Output load R_{load}	3.5		5		Ω, lower limit I_{out}=1A
Output current I_{out}	1(R_{load}=3.5Ω)		1(R_{load}=5Ω)		A, upper limit
Environment	T_A=25°C, undefined, V_{IN}=4.0V		T_A=25°C, undefined, V_{IN}=6.0V		

H-60 AB Glue/High Temperature Glue



AB glue (high temperature glue) is a two-component epoxy adhesive with a wide operating temperature range and easy to use.

▸ Technical Data

Model	H-60AB
Net weight	A: 10g, B: 5g
Operating temperature range	Long term: -269~260°C; Short term: -269~370°C;
Storage	After preparation, the sealed glue can be stored at room temperature for 7 to 10 days, and the storage period is about 1 month at 4°C.
Instructions	• Treat the bonding surface and clean it with a cleaning solvent; • Apply a very thin layer on the bonding part (when coating, try to shape it once to avoid repeated operations), and bond within 2 minutes; • Keep applying a constant pressure of 0.1~0.3MPa, and then put it in the oven for curing; • Curing treatment: heat up from room temperature to 135 degrees at a constant rate (about 1 hour), keep it for 2 hours, and release the pressure after the oven is cooled to room temperature.
Precautions	• Take it out of the refrigerator, wait for the glue temperature to balance with the outside temperature (at least 2 hours), then open the bottle cap; • During use, keep away from heat sources to avoid rapid volatilization at higher temperatures; • After use, the bottle cap should be tightened in time to avoid volatilization and precipitation of the curing agent, which may cause small particles in the glue to affect future use; • Gluing tools should be cleaned after use to avoid bringing external impurities into the glue bottle and causing glue contamination; • When each bottle of glue is about to be used up, the glue will become thicker due to the solvent volatilization during use, or the dust in the air will fall into the glue bottle and there will be fine particles in the glue; • Suitable for use in environments where the relative humidity is less than 60%; • Please store out of reach of children.

Strong Quick-Drying Glue



▸ Technical Data

Model	Strong Quick-Drying Glue
Net weight	3g
Operating temperature range	-30~80°C
Storage	Please keep the nozzle clean after use and store in a cool and dry place.
Instructions	Both surfaces to be bonded must be clean, smooth and dry; apply super glue to one of them, immediately fix the bonding position, apply a little pressure for 10 seconds or wait until it is firmly adhered.
Precautions	Super glue has strong adhesion and will stick the leather tightly within a few seconds. Please wipe off the glue sticking to your finger with a paper towel or cloth. Please store out of reach of children.

Preloaded Piezo Actuators

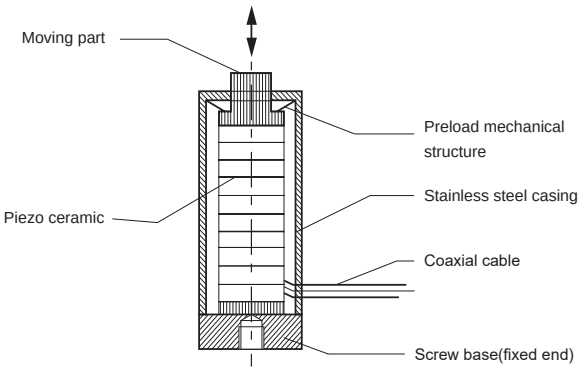


Preloaded piezo actuators are piezo stack actuators with mechanical load and casing, which can not only output the performance of piezo stacks, but also protect them and make them suitable for dynamic applications.

Preloaded Piezo Actuators

Preloaded piezo actuators offer nanometer resolution with stroke up to 260μm, microsecond response time. The high internal mechanical preload force is suitable for high load, high dynamic applications. The blocking force is up to 50,000 N, making it ideal for machine tools, active vibration insulation or adaptive mechanics. Its small size and high resonant frequency make it suitable for applications such as scanning microscopy, laser tuning, beam deflection, patch clamp or microlithography.

▸ Structure



▸ Heat Management "Thermostable"



It can increase 2~3 times power and realize higher frequency motion.

▸ Product Customization



Anti-torque



Custom lead



Custom cooling

▸ Multiple Ends



Plane



Spherical



Internal thread

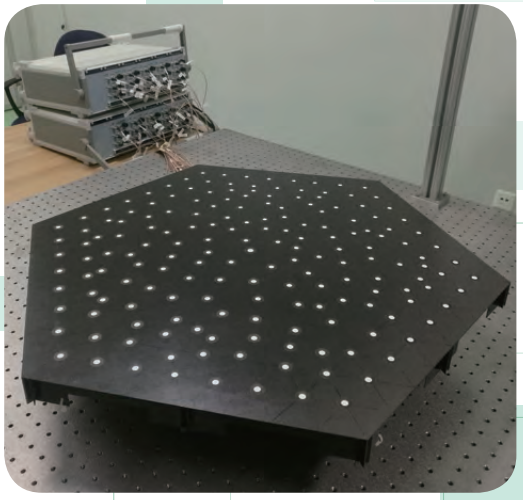


External thread

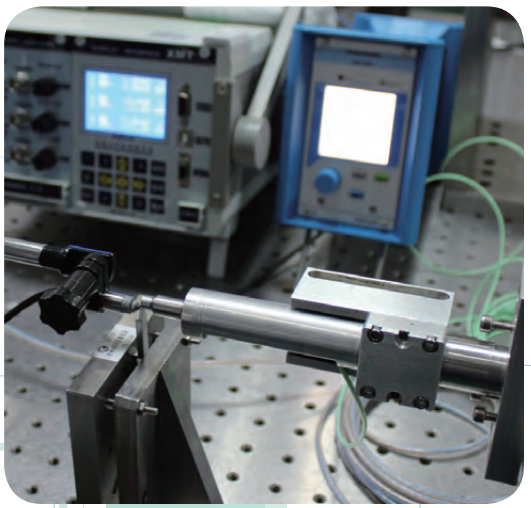
▸ Product List

Models	Mechanism	Characteristics	Voltage	Page
Pst150... Low voltage	Direct Drive	Travel to 190μm, blocking force to 25000N, open/closed loop.	0~150V	54
VS6		Travel to 40μm, blocking force to 300N, high-accuracy.	0~150V	57
VH13		Travel to 46μm, blocking force to 800N, high reliability.	0~150V	58
Metal-sealed		Travel to 140μm, blocking force to 3600N, wide operating temperature range.	0~150V	59
N82.16K		Coarse adjustment stroke 9.53mm, fine adjustment stroke 16μm, blocking force to 200N.	0~150V	61
N82K16T25		Hand-adjusted ±4°/axis, piezo-adjusted 0.5mrad/axis, Φ25.4mm lens.	0~150V	62
HPst150... Low voltage ring		Travel to 47μm, aperture to 14mm, blocking force to 5300N.	0~150V	63
H13.Z50K-C		Travel to 50μm, blocking force to 1000N, open loop .	0~200V	64
FPst150... External-thread		Travel to 114μm, open/closed loop, optional low temperature version.	0~150V	65
Cage structure		Travel to 114μm, hand-adjusted 2 axis deflection, piezo driven linear motion.(suitable for cage structure)	0~150V	66
H80K1T25/T35		Travel to 0.7μm, hand-adjusted ±4°/axis, Φ25.4/Φ35 lens.	0~150V	68
H80K1T25/T35-C		Travel to 0.65μm, hand-adjusted ±3°/axis, Φ25.4/Φ35 lens.	0~150V	69
Pst150...VT... Anti-torque		Anti-torque, travel to 95μm, blocking force to 1200N .	0~150V	70
High dynamic-XD700		Travel to 85μm, High precision of closed loop positioning, open/closed loop.	0~150V	71
HPst1000... High voltage		Travel to 260μm, blocking force to 50000N, Open/closed loop.	0~1000V	72
HPst1000/500... High voltage ring		Travel to 130μm, aperture to 24mm, blocking force to 20000N.	0~500V 0~1000V	75
Contraction type		Contraction displacement up to 40μm, contraction force up to 2000N, contraction motion.	0~200V	77

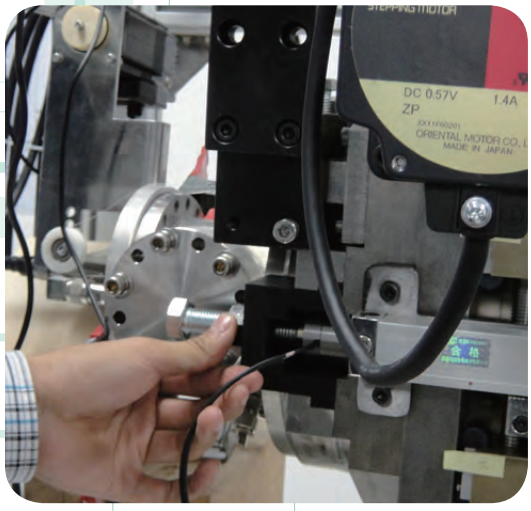
▸ Applications



Phased Array Antenna



Stiffness Detection



Cavity Tuning



Fiber End Inspection

Low Voltage Cylindrical Preloaded Piezo Actuators



Low voltage cylindrical preloaded piezo actuator is preloaded low-voltage piezo stack inside, and the outside is protected by a cylindrical stainless steel shell. The preloaded piezo actuator can withstand a certain pulling force, and is suitable for high-load and high-dynamic applications.

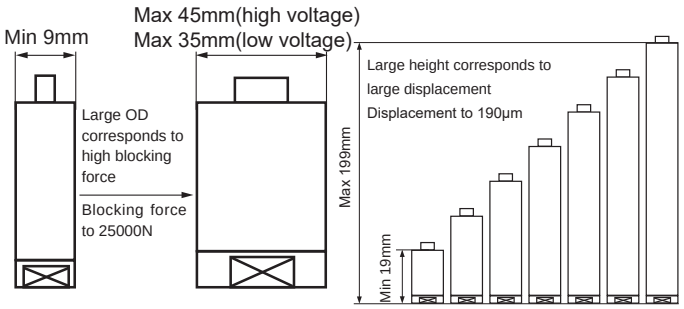
▸ Characteristics

- Nanoscale resolution
- Optional closed-loop sensor
- Travel to 190μm
- Blocking force to 25000N

▸ Closed Loop and Open Loop

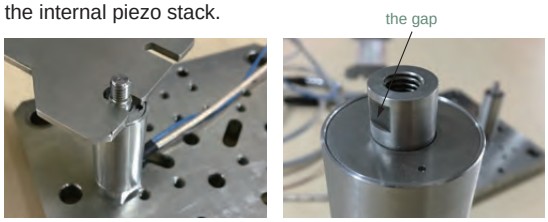
Preloaded piezo actuators are available in open loop (no position feedback sensor) and closed loop (integrated position feedback sensor) versions. In its open-loop mode, the resolution is infinitely high, limited only by the noise of the controller, and it also features the hysteresis and creep. In its closed-loop model, the hysteresis, creep and non-linearity are ruled out to make it linear.

▸ OD vs Force; Height vs Travel

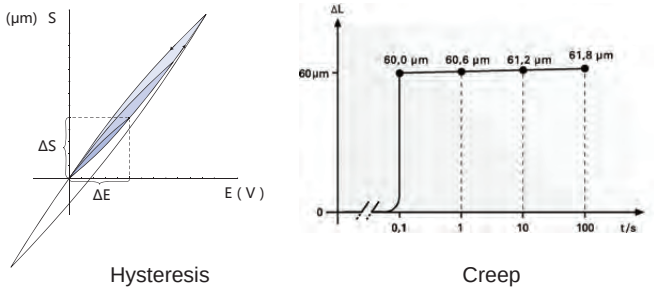


▸ Attention

Before installing the load, please clamp the gap with a plier to prevent the rotation of the moving end from damaging the internal piezo stack.



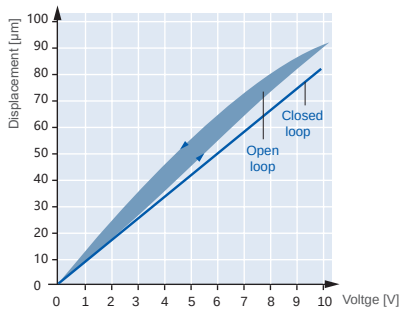
▸ Hysteresis and Creep



Hysteresis Creep

Notes: Nonlinearity are ruled out in closed-loop mode.

▸ Closed Loop for High Accuracy



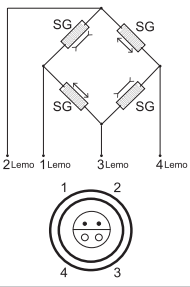
Closed-loop linearity 0.1%F.S., Repeatability 0.05%F.S.

▸ Recommended Controllers

E01	E53	E63.C
		
1~9 channels Analog digital Open/closed loop Ave. current: 291/58mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA	1 channel Open loop Software control Bandwidth: 700Hz(-3dB)
Note: Please see" Piezo controller" for detailed information.		

▸ Sensor Connector





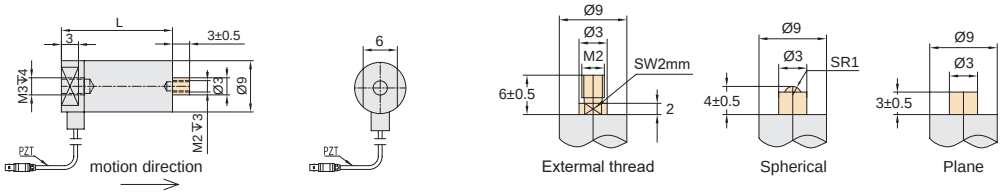
Number	Description
1	+10V
2	Sensor feedback signal +
3	Sensor feedback signal -
4	GND
Shell	GND(protect)

1, 4 Supply voltage
2, 3 Sensor signal out

▸ Drawing

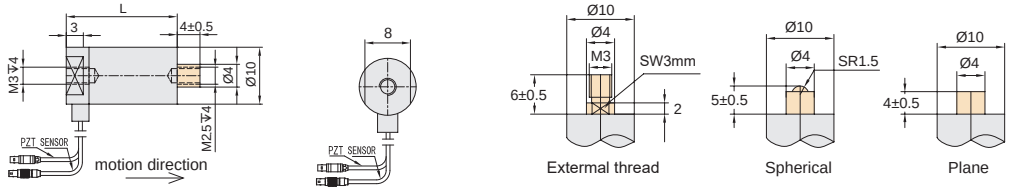
VS9





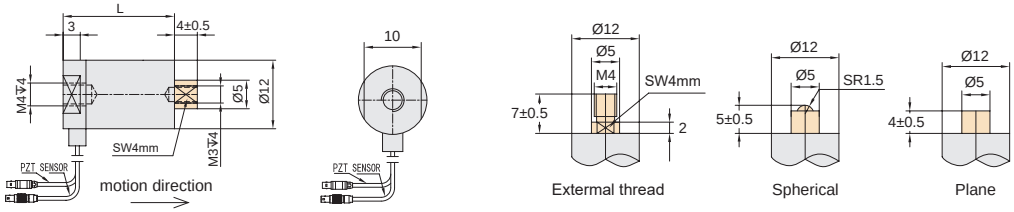
VS10





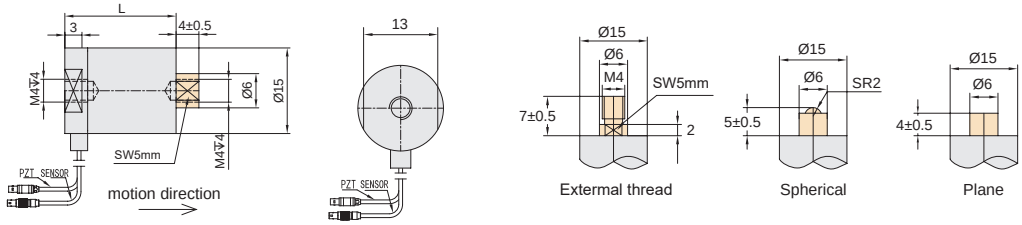
VS12





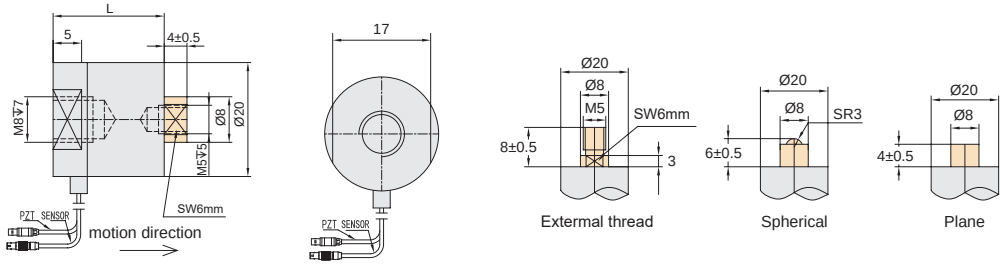
VS15





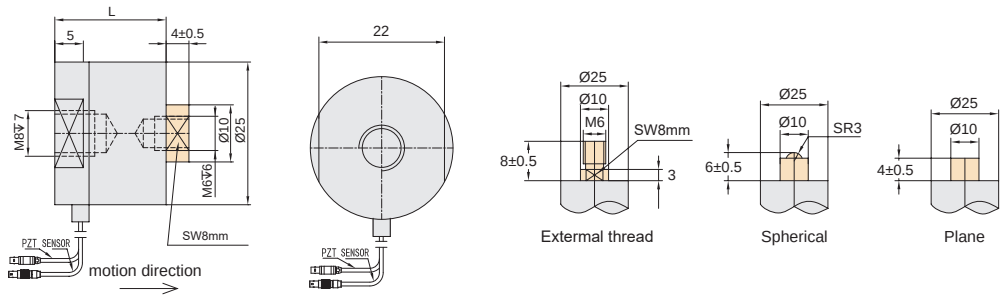
VS20





VS25





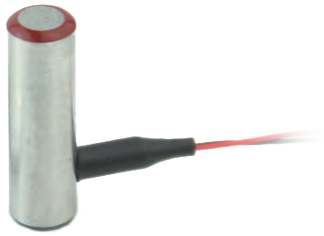
Notes: 1.5m cable length; LEMO connector; Optional heat sink, thermal stability, open/closed loop versions. (VS9 has only open-loop version). Internal thread as default.

▸ Technical Data

Type	Closed loop: end with S Open loop: end with K	Stroke [µm]±10%*	Stiffness [N/µm]±20%	Push/pull force [N]	El. capacitance [µF]±20%	Resonant frequency [kHz]±20%	Length L [mm]±0.3
PSt150/4/7 VS9		8	25	200/30	0.17	40	19.2
PSt150/4/20 VS9		16	12	200/30	0.34	30	28.2
PSt150/5/7 VS10		9	50	550/100	0.35	40	19.5
PSt150/5/20 VS10		19	25	550/100	0.8	30	28.5
PSt150/5/40 VS10		38	12	550/100	1.6	20	46.5
PSt150/5/60 VS10		57	8	550/100	2.4	15	64.5
PSt150/5/80 VS10		76	6	550/100	3.2	12	82.5
PSt150/5/100 VS10		95	5	550/100	4	10	100.6
PSt150/7/7 VS12		9	120	1200/200	0.7	40	19.5
PSt150/7/20 VS12		19	60	1200/200	1.8	30	28.5
PSt150/7/40 VS12		38	25	1200/200	3.6	20	46.5
PSt150/7/60 VS12		57	15	1200/200	5.4	15	64.5
PSt150/7/80 VS12		76	12	1200/200	7.2	12	82.5
PSt150/7/100 VS12		95	10	1200/200	9	10	100.6
PSt150/7/120 VS12		114	8	1200/200	11	8	118.6
PSt150/7/140 VS12		133	7	1200/200	13	6	136.6
PSt150/7/160 VS12		152	6	1200/200	15	5	154.6
PSt150/10/7 VS15		9	240	2300/250	1.8	40	19.5
PSt150/10/20 VS15		19	120	2300/250	3.6	30	28.5
PSt150/10/40 VS15		38	60	2300/250	7.2	20	46.5
PSt150/10/60 VS15		57	35	2300/250	11	14	64.5
PSt150/10/80 VS15		76	25	2300/250	14	12	82.5
PSt150/10/100 VS15		95	20	2300/250	18	10	100.6
PSt150/10/120 VS15		114	15	2300/250	21	8	118.6
PSt150/10/140 VS15		133	14	2300/250	25	7	136.6
PSt150/10/160 VS15		152	13	2300/250	28	6	154.6
PSt150/10/180 VS15		171	11	2300/250	33	5	172.6
PSt150/10/200 VS15		190	10	2300/250	37	4	190.6
PSt150/14/7 VS20		9	350	4700/700	3.6	40	26
PSt150/14/20 VS20		19	250	4700/700	7	30	35
PSt150/14/40 VS20		38	120	4700/700	14	20	53
PSt150/14/60 VS20		57	70	4700/700	22	14	71
PSt150/14/80 VS20		76	50	4700/700	30	12	89
PSt150/14/100 VS20		95	40	4700/700	39	10	107
PSt150/14/120 VS20		114	35	4700/700	47	8	125
PSt150/14/140 VS20		133	30	4700/700	55	7	143
PSt150/14/160 VS20		152	25	4700/700	63	6	161
PSt150/14/180 VS20		171	22	4700/700	71	5	179
PSt150/14/200 VS20		190	20	4700/700	80	4	197
PSt150/20/20 VS25		19	500	7300/1000	14.5	28	37
PSt150/20/40 VS25		38	250	7300/1000	29	18	55
PSt150/20/60 VS25		57	160	7300/1000	43.5	13	73
PSt150/20/80 VS25		76	100	7300/1000	58	11	91
PSt150/20/100 VS25		95	80	7300/1000	72.5	9	109
PSt150/20/120 VS25		114	65	7300/1000	87	7	127
PSt150/20/140 VS25		133	55	7300/1000	101.5	6	145
PSt150/20/160 VS25		152	50	7300/1000	116	5	163
PSt150/20/180 VS25		171	45	7300/1000	130.5	4	181
PSt150/20/200 VS25		190	40	7300/1000	145	3	199

* At 0~150V, recommended voltage 0~120V for high-reliability and long-term operation. Closed-loop version for high linearity and repeatability.

VS6 Low Voltage Cylindrical Piezo Actuators



The VS6 series is an open-loop version of low voltage piezo actuators with special design modifications based on conventional preloaded piezo actuators. Unlike conventional preloaded piezo actuators, the VS6 series does not have mechanical interfaces, bottom fixing also abandons commonly threaded fixing, instead, it is fixed by direct placement or positioning with auxiliary components, and is designed to lead out the sheath and leads from the side. This series of actuators has a very compact appearance and is very suitable to use in space efficient environments.

▸ Characteristics

• Fast response • High precision • High reliability • Low power consumption • Miniaturized • No electromagnetic interference

▸ Application

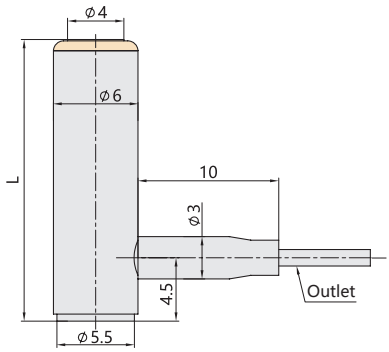
• TDLAS gas detection • MEMS • Optical field • Medical field • Intelligent materials field

▸ Technical Data

Type	5VS6	9VS6	20VS6	40VS6	Units
Active axes	Z	Z	Z	Z	
Nominal travel range(0~120V)	4	7	16	32	μm±10%
Max.travel range(0~150V)	5	9	20	40	μm±10%
Stiffness	45	22	12	6	N/μm±20%
Unloaded resonant frequency	130	80	40	30	kHz±20%
Blocking force	300	300	300	300	N
El. capacitance	0.07	0.18	0.47	0.94	μF±20%
Material	Steel	Steel	Steel	Steel	
Size	Φ6×7	Φ6×12	Φ6×20	Φ6×38	mm

*:Max. driving voltage could be 0~150V, recommended voltage 0~120V for long-term, high-reliability operation. Measured by CoreMorrow E00/E01 series piezo controller. Custom is available.

▸ Drawing



Model	L/mm
5VS6	7
9VS6	12
20VS6	20
40VS6	38

▸ Recommended Controllers

E01.C1	E53.C1	E63.C
		
1 ~9 channels Analog,digital Open loop Ave. current: 291/58mA	1 channel Analog, digital Open loop Ave. current: 60mA	1 channel Open loop Software control Bandwidth: 700Hz(-3dB)
Note: Please see "Piezo Controller" for detailed information.		

VH13 Metal-sealed Preloaded Piezo Actuator



VH13 series is a Z-axis metal-sealed preloaded piezo actuator, with two ranges available: 42μm and 46μm. It is less affected by environmental humidity because of the Isolation from the atmosphere. It has a longer service life and higher performance, suitable for various applications such as semiconductor device manufacturing equipment and optical communication equipment that require high reliability.

▸ Characteristics

• High reliability • Easy to install • Low mechanical wear • Blocking force to 800N • Nanoscale positioning

▸ Application

• Precision XY step adjustment of various worktable
• Fluid flow control valve drive
• Mirror/prism Positioning
• Vibration source
• Linear motion
• Manipulator, etc.

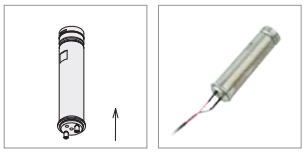
▸ Technical Data

Type	PSt150/7/40 VH13K	PSt150/7/55 VH13K	Units
Active axes	Z	Z	
Nominal travel range(0~120V)*	33.6	37	μm±20%
Max.tavel range(0~150V)	42	46	μm±20%
Unloaded resonant frequency	15	12	kHz±20%
Blocking force	800	800	N±20%
Stiffness	19	17	N/μm±20%
El. Capacitance	3.5	4.2	μF±20%
Material	Steel	Steel	
Size	Φ11.5×44.4	Φ11.5×54.5	
Mass	25	30.6	g±5%

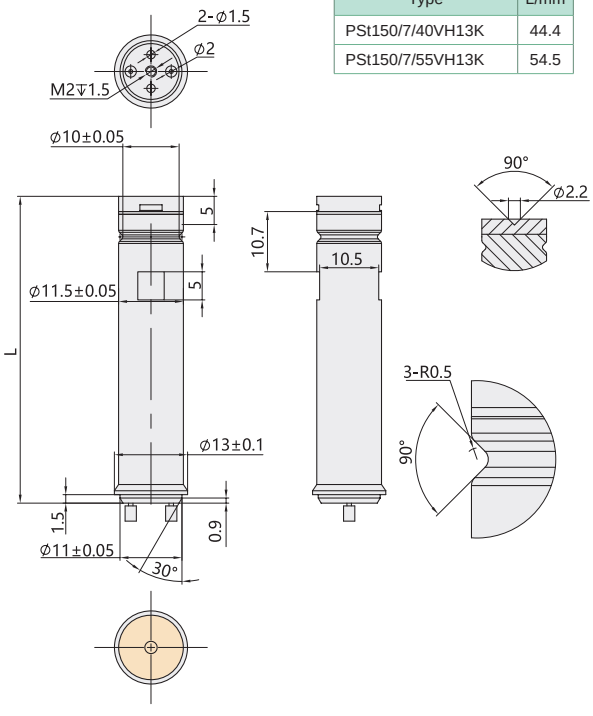
Note: Nominal stroke at 0~120V, Mounting preloaded force less than 20% of blocking force. Connector or wire connection.

▸ Drawing

VH13 Metal-sealed Preloaded Piezo Actuator



Type	L/mm
PSt150/7/40VH13K	44.4
PSt150/7/55VH13K	54.5



Metal-sealed Preloaded Piezo Actuator



Metal-sealed preloaded piezo actuators have a fully sealed casing, achieving insulation from the atmospheric environment and being less affected by environmental humidity. They have a longer service life and higher performance, making them very suitable for various applications such as semiconductor device manufacturing equipment and optical communication equipment that require high reliability.

▸ Characteristics

- High reliability: Realization of MTTF=36,000 hours at 85°C and 100 V
- Operation temperature:−25℃ ~+85℃ (H&S series) or -40~150℃ (T series)
- Built-in pre-load mechanism and mounting attachments allowing for easier installation into equipment
- Minimum mechanical abrasion
- Accurate nanometer positioning
- Blocking force to 3600N
- Driving Voltage: 0~150V

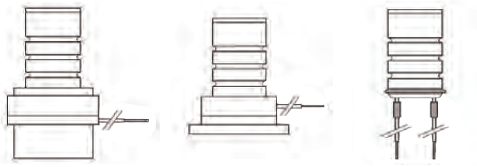
Note:MTTF:Mean Time To Failures

▸ Application

Fine adjustment of various X-Y table steppers, Mirror/prism positioning, Linear motors, Fluid flow control valve drive,Vibration source, Manipulators.

▸ Connection Type

Female Thread Type | Flange Type | Without Flange Type

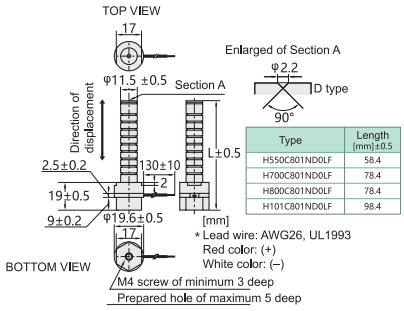


▸ Technical Data

Type	Nominal travel range [μm]	Push/pull force [N]	El. capacitance [μF]±20%	Resonant frequency [kHz]±20%	Connection type	Mass[g]	Operating temperature [℃]	Length [mm]±0.5
H550C801ND0LF	55±8	800/-	6.4	12	Female Thread	50	-25~85	58.4
H700C801ND0LF	70±15	800/-	8.2	8	Female Thread	56	-25~85	78.4
H800C801ND0LF	80±15	800/-	9.3	8	Female Thread	56	-25~85	78.4
H101C801ND0LF	103±15	800/-	11	8	Female Thread	61	-25~85	98.4
H550C801FD0LF	55±8	800/-	6.4	12	Flange	54	-25~85	52.4
H700C801FD0LF	70±15	800/-	8.2	8	Flange	60	-25~85	72.4
H800C801FD0LF	80±15	800/-	9.3	8	Flange	60	-25~85	72.4
H101C801FD0LF	103±15	800/-	11	8	Flange	65	-25~85	92.4
H500C451WD1-A0LF	52±8	450/-	3.3	22	Without Flange	8	-25~85	44.5
H550C801WD1-A0LF	55±8	800/-	6.4	18	Without Flange	16	-25~85	44.4
H700C801WD1-A0LF	70±15	800/-	8.2	10	Without Flange	22	-25~85	64.4
H800C801WD1-A0LF	80±15	800/-	9.3	10	Without Flange	22	-25~85	64.4
H101C801WD1-A0LF	103±15	800/-	11	9	Without Flange	27	-25~85	84.4
H550C172WD1-A0LF	52±8	1700/-	12	20	Without Flange	26	-25~85	44.4
H550C302WD1-A0LF	52±8	3000/-	26	18	Without Flange	55	-25~85	45.4
H700C302WD1-A0LF	68±15	3000/-	32	12	Without Flange	76	-25~85	65.4
H101C302WD1-A0LF	95±15	3000/-	44	9	Without Flange	91	-25~85	85.6
H101C362WD1-A0LF	95±15	3600/-	54	9	Without Flange	113	-25~85	85.6
H151C362WD1-A0LF	140±18	3600/-	85	7	Without Flange	154	-25~85	125.4
T170C801ND0LF	19±3	800/-	1.3	14	Female Thread	46	-40~150	38.4
T340C801ND0LF	39±6	800/-	2.6	12	Female Thread	50	-40~150	58.4
T510C801ND0LF	58±9	800/-	3.9	10	Female Thread	56	-40~150	78.4
T680C801ND0LF	77±12	800/-	5.1	8	Female Thread	61	-40~150	98.4
T170C801FD0LF	19±3	800/-	1.3	14	Flange	50	-40~150	32.4
T340C801FD0LF	39±6	800/-	2.6	12	Flange	54	-40~150	52.4
T510C801FD0LF	58±9	800/-	3.9	10	Flange	61	-40~150	72.4
T680C801FD0LF	77±12	800/-	5.1	8	Flange	65	-40~150	92.4
T170C801WD1-A0LF	19±3	800/-	1.3	32	Without Flange	12	-40~150	24.4
T340C801WD1-A0LF	39±6	800/-	2.6	18	Without Flange	16	-40~150	44.4
T510C801WD1-A0LF	58±9	800/-	3.9	12	Without Flange	22	-40~150	64.4
T680C801WD1-A0LF	77±12	800/-	5.1	9	Without Flange	47	-40~150	84.4
S170C201WP1-A0LF	20±3	200/-	0.5	35	Without Flange	4	-25~85	24.5
S170C801FD0LF	17±3	800/-	1.5	20	Flange	50	-25~85	32.4
S170C801ND0LF	17±3	800/-	1.5	20	Female Thread	46	-25~85	38.4
S170C801WD1-A0LF	17±3	800/-	1.5	32	Without Flange	12	-25~85	24.4
S340C801FD0LF	34±6	800/-	3	12	Flange	-	-25~85	52.4
S340C801ND0LF	34±6	800/-	3	12	Female Thread	-	-25~85	58.4
S510C801FD0LF	51±9	800/-	4.5	10	Flange	-	-25~85	72.4
S510C801ND0LF	51±9	800/-	4.5	10	Female Thread	-	-25~85	78.4
S680C801FD0LF	68±12	800/-	6	8	Flange	-	-25~85	92.4
S680C801ND0LF	68±12	800/-	6	8	Female Thread	-	-25~85	98.4

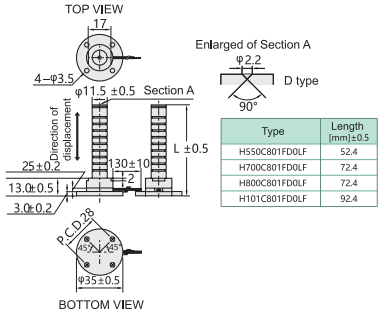
► Drawing

H***C801ND0LF



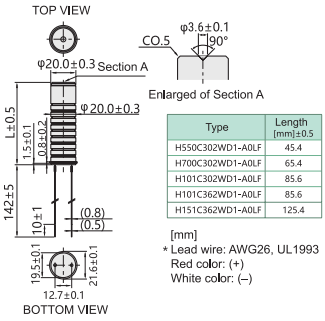
Type	Length [mm]±0.5
H550C801ND0LF	58.4
H700C801ND0LF	78.4
H800C801ND0LF	78.4
H101C801ND0LF	98.4

H***C801FD0LF



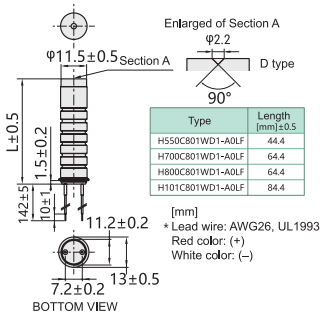
Type	Length [mm]±0.5
H550C801FD0LF	52.4
H700C801FD0LF	72.4
H800C801FD0LF	72.4
H101C801FD0LF	92.4

H***C302WD1-A0LF &H***C362WD1-A0LF



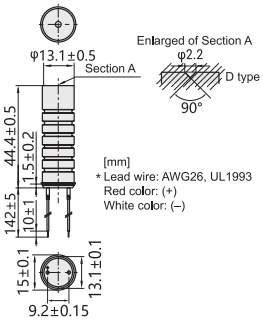
Type	Length [mm]±0.5
H550C302WD1-A0LF	45.4
H700C302WD1-A0LF	65.4
H101C302WD1-A0LF	85.6
H101C362WD1-A0LF	85.6
H151C362WD1-A0LF	125.4

H***C801WD1-A0LF

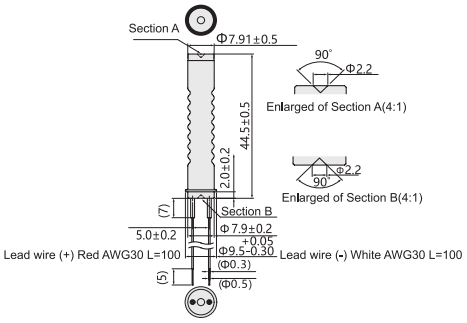


Type	Length [mm]±0.5
H550C801WD1-A0LF	44.4
H700C801WD1-A0LF	64.4
H800C801WD1-A0LF	64.4
H101C801WD1-A0LF	84.4

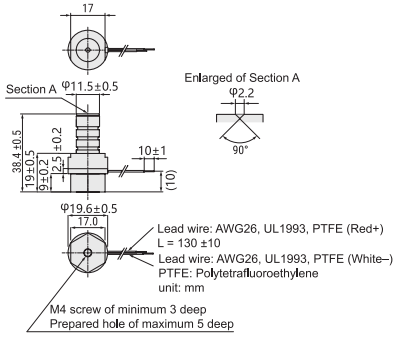
H550C172WD1-A0LF



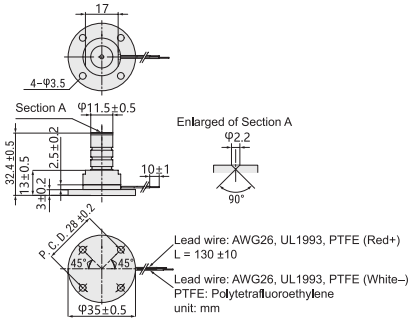
H500C451WD1-A0LF



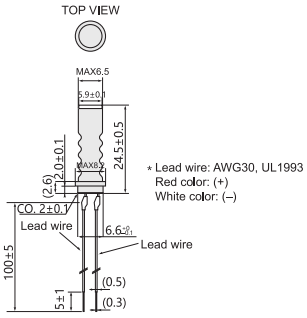
S170C801ND0LF



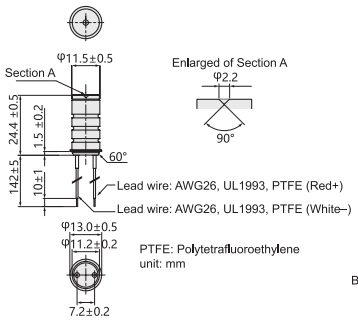
S170C801FD0LF



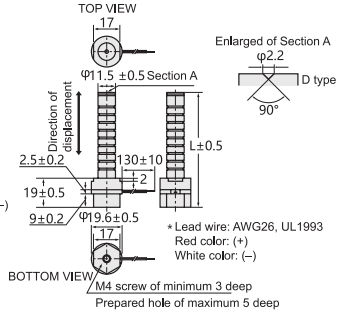
S170C201WP1-A0LF



S170C801WD1-A0LF

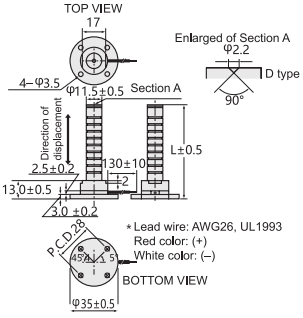


T***C801ND0LF



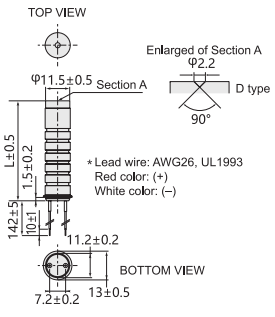
Type	Length [mm]±0.5
T170C801ND0LF	38.4
T340C801ND0LF	58.4
T510C801ND0LF	78.4
T680C801ND0LF	98.4

T***C801FD0LF



Type	Length [mm]±0.5
T170C801FD0LF	32.4
T340C801FD0LF	52.4
T510C801FD0LF	72.4
T680C801FD0LF	92.4

T***C801WD1-A0LF



Type	Length [mm]±0.5
T170C801WD1-A0LF	24.4
T340C801WD1-A0LF	44.4
T510C801WD1-A0LF	64.4
T680C801WD1-A0LF	84.4

N82 Macro-micro complex Piezo Actuator



The N82.16K combines manual coarse adjustment and piezo fine adjustment. The manual adjustment stroke can reach 9.53mm and the fine adjustment stroke is 16μm.

▸ Characteristics

- Combination of manual and piezo adjustment
- Fine adjustment stroke 16μm
- Coarse adjustment stroke 9.53mm
- Small volume linear motion

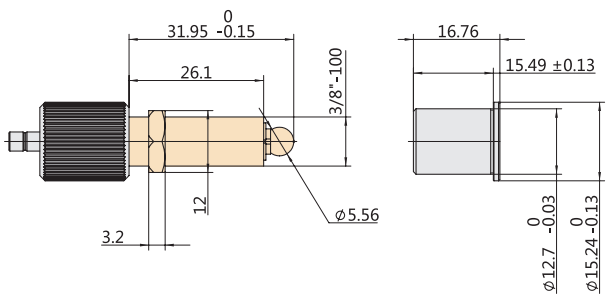
▸ Application

- Mirror adjustment frame
- Precision positioning
- Motion platform driver
- Scientific research, etc.
- Nano-motion control

▸ Technical Data

Type	N82.16K	Units
Manual motion range	9.53	mm
Piezo motion range (0~150V)	16	μm±20%
Piezo drive voltage	0~150	V
Force	200	N
El.capacitance	0.8	μF±20%
Operating temperature	-25~85	°C
Material	Steel	
Mass	60	g±5%

▸ Drawing



▸ Recommended controller

E53.A	E53.C	E63.C
		
Single channel output Output voltage 0~150V Analog control	1 channel output Output voltage 0~150V Analog & digital control	Single channel output Output voltage 0~150V Digital control

N82K16T25 Macro&Micro 2-Axis Deflection Mirror Mount





The N82K16T25 is a 2-axis deflection mirror mount, it is a combination of two linear piezo actuators combined with manual coarse adjustment and piezo fine adjustment to achieve high-precision angle adjustment of the lens. Macro coarse adjustment is realized through the high-precision micro-thread on the external case by manually rotating the knurled part, and macro adjustment Angle up to ±4°/ axis. The macro adjustment is equipped with locking nuts, which can lock the position of macro adjustment. The piezo fine-tuning part is driven by PZT piezo actuator, and it can achieve precise motion under voltage control. The micro-adjusting angle can be to 0.5mrad/ axis (≈103 seconds). Large stroke adjustment can be achieved by manual adjustment, and then nano-level displacement and accuracy can be achieved by piezo adjustment, which is widely used in large stroke and high-precision applications.

▸ Characteristics

- Manual adjustment and piezo adjustment
- Single axis manual adjustment angle range of 0~±4°
- Standard loadable lens diameter of 25.4mm(1 inch), customized
- Manual adjustment of θx θy two-axis deflection angle
- Single axis piezo adjustment angle range of 0~0.5mrad
- Vacuum version optional

▸ Application

- Laboratory system construction
- Scientific research
- Optics
- Two-dimensional deflection adjustment of mirror, etc.

▸ Technical Data

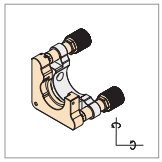
Type	N82K16T25	Units
Active axes	θx,θy	
Macro tilt angle (manual)	±4/axis	°
Micro tilt angle (piezo)	0.5/axis	mrad±20%
Piezo drive voltage	0~150	V
Resolution	0.7	μrad
Mirror diameter	25.4(1 inch)	mm
Operating temperature	-25~85	°C
El.capacitance	1/axis	μF±20%
Material	Steel	
Mass	227	g±5%

▸ Recommended controller

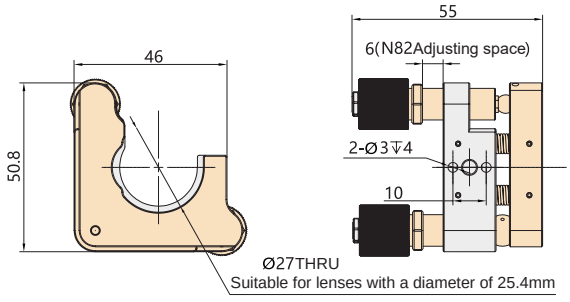
E00/E01	E70	E80
		
1~3 channels Digital, analog knob adjustment Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

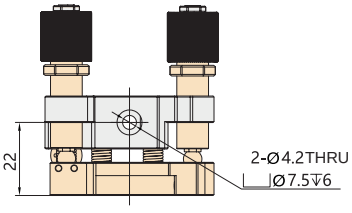
▸ Drawing

N82K16T25



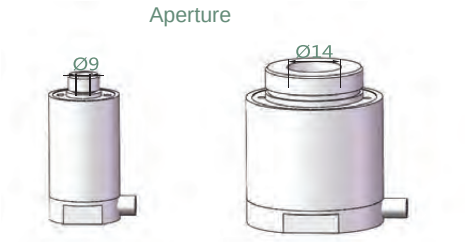






Low Voltage Ring Preloaded Piezo Actuator





Low voltage ring preloaded piezo actuator is ring piezo stack actuator with mechanical preload. There is an aperture of 9mm or 14mm diameter through it, which can be used in optical positioning systems. It is fixed by a thread on the bottom, and load is mounted via the top thread. Standard products are equipped with lens fixing caps.

▸ Characteristics

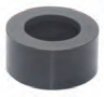
- Stroke to 47μm
- High precision of closed loop positioning
- Blocking force to 5300N
- Aperture: Ø9mm/Ø14mm

▸ Installation

There are screw base at the bottom for fixing, and screw head at the top connected to load. There is a fixing cap for installing of mirror.

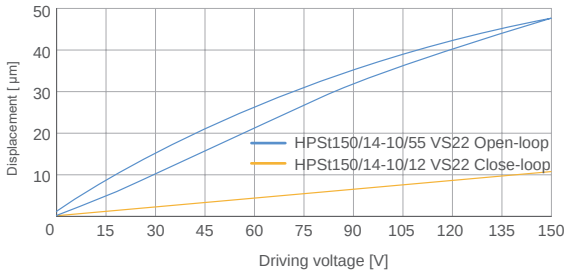


Bottom view



Fixing cap

▸ Input Voltage vs Displacement Curve

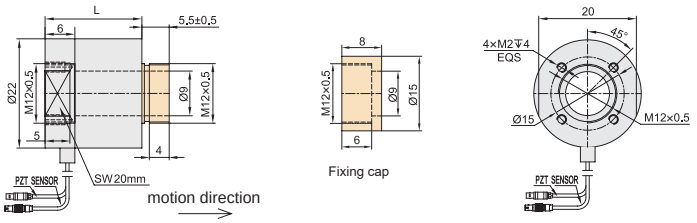


▸ Drawings

VS22



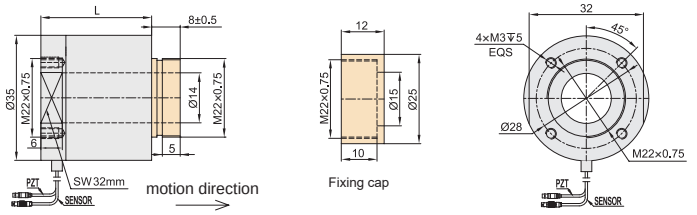
Model	L
HPSt150/14-10/12 VS22	31
HPSt150/14-10/25 VS22	44
HPSt150/14-10/40 VS22	58
HPSt150/14-10/55 VS22	71



VS35



Model	L
HPSt150/20-15/12 VS35	31
HPSt150/20-15/25 VS35	44
HPSt150/20-15/40 VS35	58
HPSt150/20-15/55 VS35	71

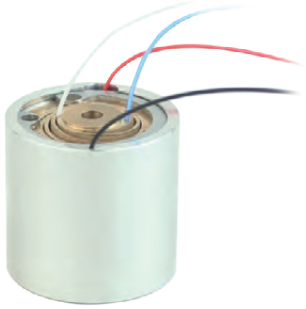


▸ Technical Data

Type	Closed loop: end with S Open loop: end with K	Stroke [μm]±10%*	Stiffness [N/μm]±20%	Push/pull force [N]	El. capacitance [μF]±20%	Resonant frequency[kHz]±20%	Length L [mm]±0.3
HPSt150/14-10/12 VS22		11	250	3000/250	2.6	30	31
HPSt150/14-10/25 VS22		23	120	3000/250	5.2	20	44
HPSt150/14-10/40 VS22		38	70	3000/250	7.8	14	58
HPSt150/14-10/55 VS22		47	50	3000/250	11	9	71
HPSt150/20-15/12 VS35		11	450	5300/450	5	30	31
HPSt150/20-15/25 VS35		23	230	5300/450	10	20	44
HPSt150/20-15/40 VS35		38	150	5300/450	15	17	58
HPSt150/20-15/55 VS35		47	100	5300/450	20	15	71

*At 0~150V, recommended voltage 0~120V for high-reliability and long-term operation. Closed-loop version for high linearity and repeatability.

H13 Customized Low Voltage Ring Preloaded Piezo Actuator



The H13 actuator is an open-loop version specially designed according to users' needs. It features a center aperture of Φ3mm, and has a blocking force to 1000N. The parameters can be customized according to customer needs.

▸ Characteristics

- Travel range to 50μm
- Blocking force to 1000N
- Aperture size of Φ3mm
- Customizable

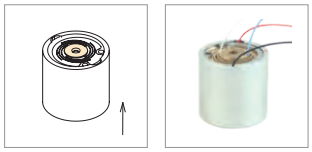
▸ Technical Data

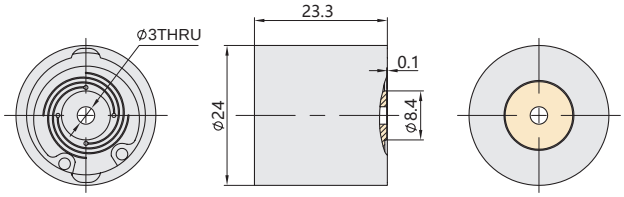
Type	Stroke [μm]±10%*	Stiffness [N/μm]±20%	Push/pull force [N]	El. capacitance [μF]±20%	Resonant frequency [kHz]±20%	Length [mm]±0.3	Driving source
H13.Z50K-C	50	30	1000/-	8	8	23.3	Piezo Stack

* At 0~200V.

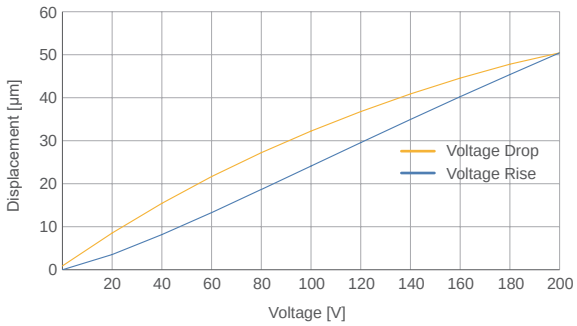
▸ Drawing

H13.Z50K-C





▸ Voltage vs Displacement Curve



▸ Recommended Controllers

E00/E01

1~3 channels, Analog, digital analog Open loop, servo, Ave. current: 291mA/58mA
Note: Please see" Piezo controller" for detailed information.

Preloaded Piezo Actuators with Front Mount Thread





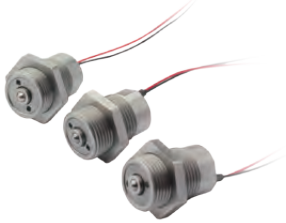
M14 and M22 preloaded piezo actuator with front mount thread has thread on its shell. It is easy to install and fix with external mechanical screw. It is mainly used for beam deflection, optical adjustment, lens adjustment, angular motion applications, etc. For high stiffness, the piezo actuator uses lock nut.

▸ Characteristics

- With front mount thread
- Fast response
- Bocking force to 4700N
- Linear nanometer motion
- Displacement to 114μm
- Custom is available

▸ Front Mount Thread

The thread size on the M14 housing is M14 × 1 and the thread length is 20mm. The thread size can be customized.



▸ Locknut

There is a standard locknut with actuator to increase the stiffness.



▸ Load Connection

Plane, spherical, internal thread, external thread are optional and custom is available.

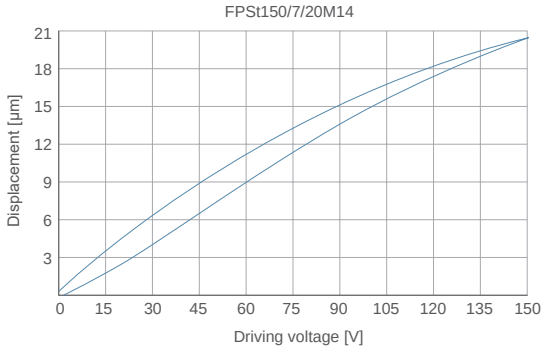
▸ Application

Beam deflection, optical path adjustment, inteference, active and adaptive optics, shock absorption, precision machining, etc.

▸ Coarse and Fine Adjustment

The external thread on the casing is used for installation and coarse adjustment. When the voltage is applied, the piezo actuator can follow the voltage signal to generate an elongation, contraction and reciprocating motion with nanoscale accuracy.

▸ Voltage vs Displacement



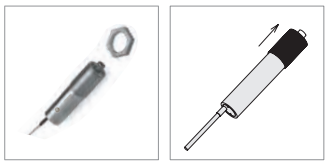
▸ Customization

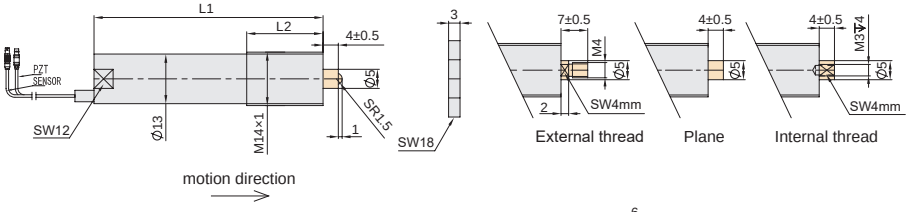
Custom size, connection, displacement, voltage and etc. are available manufactured to your specifications.



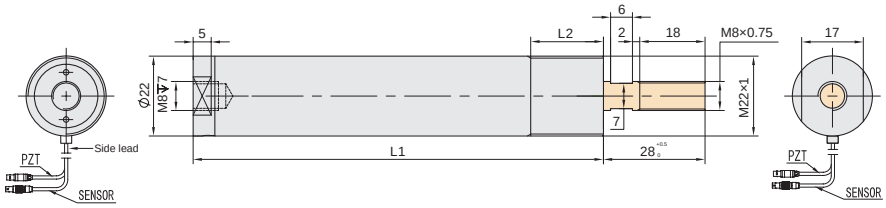
▸ Drawings

M14





FPSt150/14/100 M22



▸ Technical Data

Type	Closed loop: end with S Open loop: end with K	Stroke* [μm]±10%	Stiffness [N/μm]±20%	Push/pull force [N]	El. capacitance [μF]±10%	Resonant frequency [kHz]±20%	Length L1 [mm]±0.3	Length L2 [mm]
FPSt150/7/7 M14		9	120	1200/200	0.7	40	21	15
FPSt150/7/20 M14		19	60	1200/200	1.8	30	28	20
FPSt150/7/40 M14		38	25	1200/200	3.6	20	46	20
FPSt150/7/60 M14		57	15	1200/200	5.4	15	64	20
FPSt150/7/80 M14		76	12	1200/200	7.2	12	82	20
FPSt150/7/100 M14		95	10	1200/200	9	10	100	20
FPSt150/7/120 M14		114	8	1200/200	11	8	118	20
FPSt150/14/100 M22		95	40	4700/700	39	10	113	20

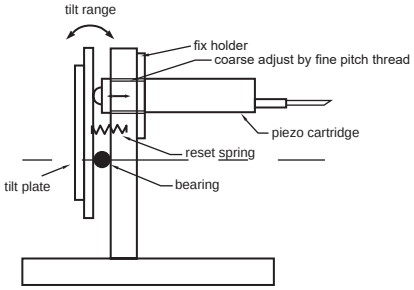
*At 0~150V, recommended voltage 0~120V for high-reliable and long-term operation. Custom is available. Mounting preloaded force<20% of blocking force.

▸ Application of Mirror Deflection

The outer thread piezoelectric actuator is used for adjusting the two-axis lens frame, the fine thread on the outer shell is installed and coarse-adjusted, and the piezoelectric actuation of the inner piezoelectric ceramic is precision adjusted at nanometer level, which can be used for laser resonator.



Frame deflection structure



▸ Recommended Controllers

E53.A	E63.A	E63.C
		
1 channel Open loop Analog control Ave. current 60mA	1 channel Open loop Analog control Ave. current 20mA	1 channel Open loop Software control Ave. current 2.5mA
Note: See "Piezoelectric Ceramic Controller" for detailed parameters.		

M14 Integrated Mirror Mounts Piezo Actuator



The M14 integrated mirror mounts piezo actuator is designed for optical cage applications and can be installed directly in the cage structure. The M14 Piezoelectric actuator integrates the piezoelectric actuator into a hand-adjusted two-dimensional lens regulator, wherein the lens can be pasted on the surface of the lens holder at the moving end of the piezoelectric actuator. First, the orientation of the lens is adjusted manually by the two-dimensional lens adjusting frame, and then the linear piezoelectric actuator is controlled by the electrical signal to make the linear motion with nanometer precision. The piezoelectric actuator has a variety of models and can be selected among various displacements.

▸ Characteristics

- Manual deflection and piezo-drive linear motion
- Piezo's travel range up to 114μm
- Optional closed loop sensor
- θx θy deflection of ±3°/axis by manual
- Suitable for cage structure

▸ Application

- Cage structure
- Optical phase shift
- Light path adjustment
- Nano motion control
- Optical detection

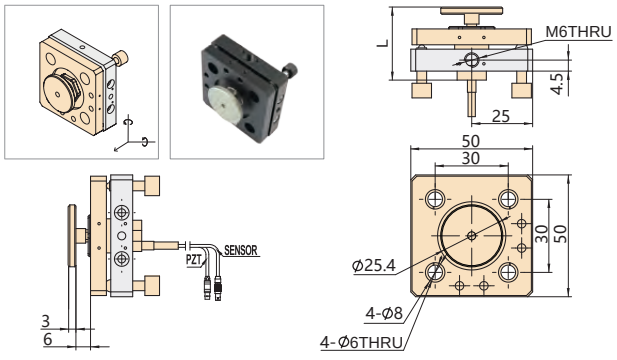
▸ Technical Data

Type	Sensor	Travel * [μm]±10%	Stiffness [N/μm]±20%	Push/pull [N]	El. capacity [μF]±10%	Resonant frequency [kHz]±20%	L [mm]±0.3
M14S7T50	SGS	9	120	1200/200	0.7	40	30
M14K7T50	-	9	120	1200/200	0.7	40	30
M14S20T50	SGS	19	60	1200/200	1.8	30	39
M14K20T50	-	19	60	1200/200	1.8	30	39
M14S40T50	SGS	38	25	1200/200	3.6	20	57
M14K40T50	-	38	25	1200/200	3.6	20	57
M14S60T50	SGS	57	15	1200/200	5.4	15	75
M14K60T50	-	57	15	1200/200	5.4	15	75
M14S80T50	SGS	76	12	1200/200	7.2	12	93
M14K80T50	-	76	12	1200/200	7.2	12	93
M14S100T50	SGS	95	10	1200/200	9	10	111
M14K100T50	-	95	10	1200/200	9	10	111
M14S120T50	SGS	114	8	1200/200	11	8	129
M14K120T50	-	114	8	1200/200	11	8	129

*: At 0~150V. Max. driving voltage could be 0~150V, recommended voltage 0~120V for long-term, high-reliability operation. Measured by CoreMorrow E00/E01 series piezo controller. Custom is available.

▸ Drawing

M14



▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Digital analog Open/closed loop Ave. current: 291mA/58mA	3 channels Digital analog Open/closed loop Ave. current: 70mA	1 channel Digital analog Open/closed loop Ave. current: 60mA
Note: Please see "Piezo Controller" for detailed information.		

H80K1T25/T35 Integrated Mirror Mounts Piezo Actuator



The H80K1 integrated mirror mounts piezo actuator has two models to choose from, namely H80K1T25 (standard lens diameter of 25.4mm) and H80K1T35 (standard lens diameter of 35mm). It is driven internally by piezo ceramic tubes and can be controlled through DC voltage signals, and has displacement of about 0.7μm@150V, which can be used for fast step phase shifting applications.

It is designed for image shifting applications and can realize ultrafast(μs-level) step-by-step adjustment by voltage control. At the same time, the angle of θx, θy deflection can be adjusted manually with deflection range up to ±4°. Combining lens adjustment with image shift stepping makes it more convenient for applications such as image shift and interferometry.

▸ Characteristics

- Manual deflection and piezo-drive linear motion
- With 0~150V voltage drive, the travel range is about 0.7μm
- Manual adjustment of θx θy two-axis deflection angle
- Single axis adjustment angle range is 0~±4°
- Standard loadable lens diameter is 25.4mm or 35mm,customized

▸ Applications

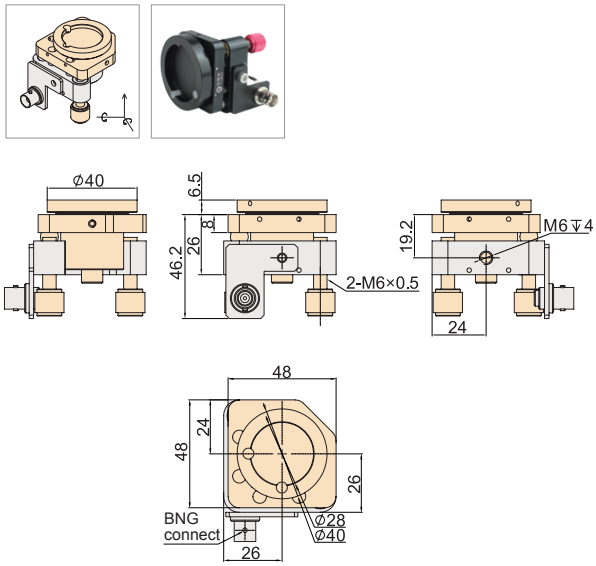
Fast nano-stepping, phase shifting, optical path adjustment, interferometry, fast step adjustment, etc. CoreMorrow can provide a variety of piezoelectric phase shifters for phase shifting, stepping, interference, metering, etc., such as the types of ultra-small volume, clear aperture, large load type, large aperture diameter and other customized design based on the customer's actual application.

▸ Technical Data

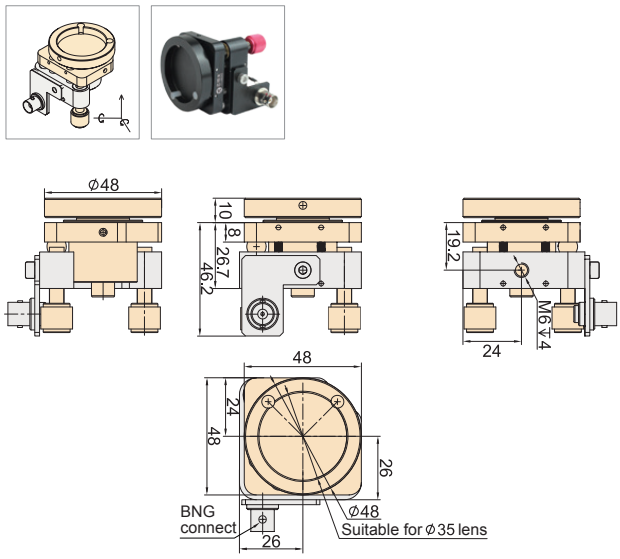
Types		H80K1T25	H80K1T35	Units
Active axes	Piezo drive	Z	Z	
	Manual	θx,θy	θx,θy	
Travel (piezo)		0.7@150V	0.7@150V	μm±10%
Manual θx θy tilt angle		±4	±4	°/axis
Unloaded resonant frequency		47.8	47.8	kHz±20%
El.capacitance		48	48	nF±20%
Standard loadable lens diameter		Φ25.4 (Customizable)	Φ35 (Customizable)	mm
Max.driving voltage		0~150	0~150	V
Mass		170	175	g±5%

▸ Drawing

H80K1T25



H80K1T35



H80K1-C Integrated Mirror Mounts Piezo Actuator



The H80K1-C integrated mirror mounts piezo actuator has two models to choose from, namely H80K1T25-C (standard lens diameter of 25.4mm) and H80K1T35-C (standard lens diameter of 35mm). It is driven internally by piezo ceramic tubes and can be controlled through DC voltage signals, and has displacement of about 0.65μm@150V, which can be used for fast step phase shifting applications.

It is designed for image shifting applications and can realize ultrafast(μs-level) step-by-step adjustment by voltage control. At the same time, the angle of θx, θy deflection can be adjusted manually with deflection range up to ±3°. Combining lens adjustment with image shift stepping makes it more convenient for applications such as image shift and interferometry.

▸ Characteristics

- Manual deflection and piezo-drive linear motion
- With 0~150V voltage drive, the travel range is about 0.65μm
- Manual adjustment of θx θy two-axis deflection angle
- Single axis adjustment angle range is 0~±3°
- Standard loadable lens diameter is 25.4mm or 35mm, customized

▸ Application

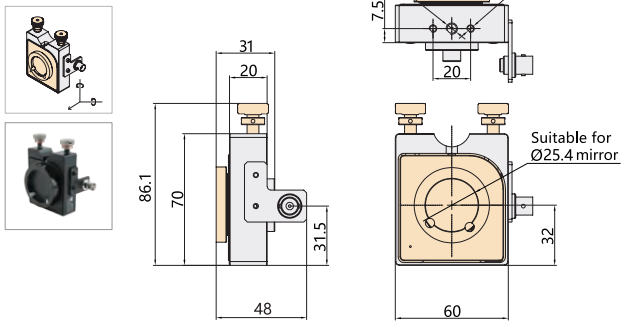
- Fast nano-stepping
- Phase shifting
- Optical path adjustment
- Interferometry
- Fast step adjustment

▸ Technical Data

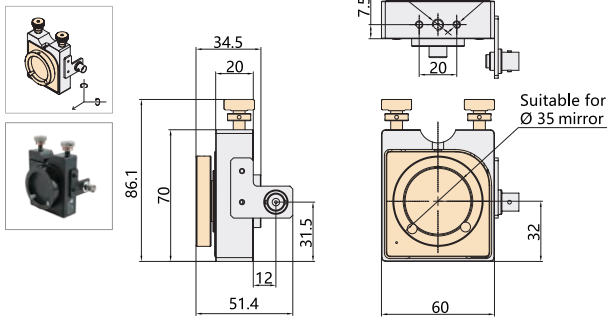
Types		H80K1T25-C	H80K1T35-C	Units
Active axes	Piezo drive	Z	Z	
	Manual	θx,θy	θx,θy	
Travel (piezo)		0.65	0.65	μm±20%
Manual θx θy tilt angle		±3	±3	°/axis
Unloaded resonant frequency		47.8	47.8	kHz±20%
El.capacitance		40	40	nF±20%
Standard loadable lens diameter		Φ25.4	Φ35	mm
Max.driving voltage		0~150	0~150	V
Mass		265	270	g±5%

▸ Drawing

H80K1T25-C



H80K1T35-C



Anti-Torque Preloaded Piezo Actuators



This preloaded piezo actuator with anti-torque design can effectively eliminate a certain amount of torsion in the process of mounting or others.

▸ Characteristics

- Withstand torque
- Max displacement to 95μm
- Blocking force 1200N
- Sub-millimeter response time

▸ Anti-Torque Design



Anti-torque preloaded piezo actuator is compact and easy to integrate. Its design optimizes its performance of load capacity, travel range, dynamics and overall dimension.

▸ Technical Data

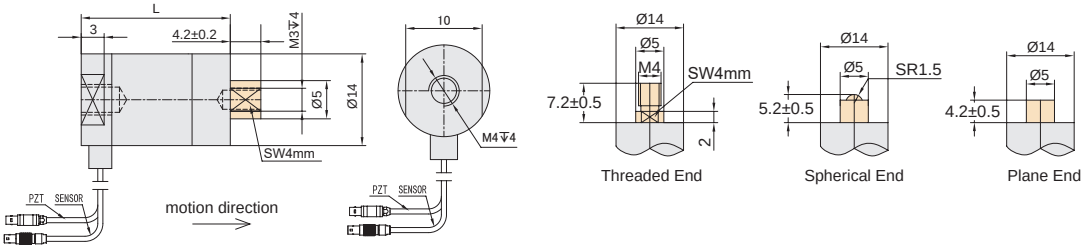
Type Closed loop: end with S Open loop: end with K	Stroke* [μm]±10%	Stiffness [N/μm]±20%	Push/pull force [N]	El. capacitance [μF]±20%	Resonant frequency [kHz]±20%	Length L [mm]±0.3
PSt150/7/7 VT14	9	120	1200/200	0.7	40	19.4
PSt150/7/20 VT14	19	60	1200/200	1.8	30	28.4
PSt150/7/40 VT14	38	25	1200/200	3.6	20	46.4
PSt150/7/60 VT14	57	15	1200/200	5.4	15	64.4
PSt150/7/80 VT14	76	12	1200/200	7.2	12	82.4
PSt150/7/100 VT14	95	10	1200/200	9	10	100.4
PSt150/7/20 VT17	19	60	1200/350	1.8	30	35.5

*: At 0~150V. Max. driving voltage could be -20V~150V, recommended voltage 0~120V for long-term, high-reliability operation. Measured by CoreMorrow E00/E01 series piezo controller. Custom is available.

▸ Drawings

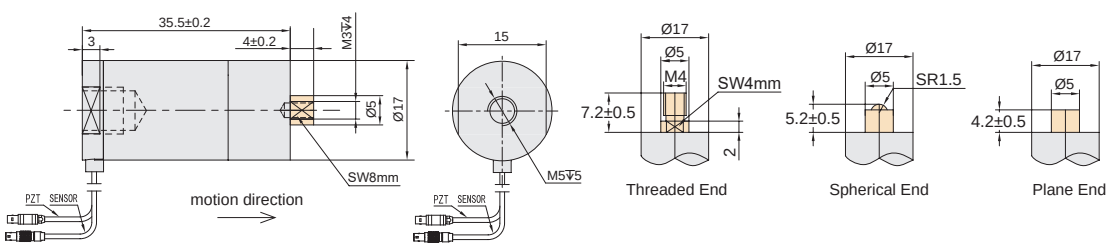
VT14





VT17

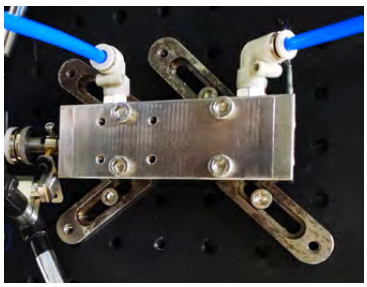




Note: 1.5m cable length; LEMO connector; Optional heat sink, thermal stability, integrated sensor.

XD700.100 Anti-Torque Preloaded Piezo Actuators





Custom cooling

The XD700 series piezo actuators are piezoelectric actuators with a mechanically packaged shell and an air-cooled heat dissipation interface. It is easy to install and fix with the external mechanical structure, and is suitable for dynamic application scenarios.

▸ Characteristics

• Z-direction motion • High precision of closed loop positioning • Fast response • Custom cooling • Customizable

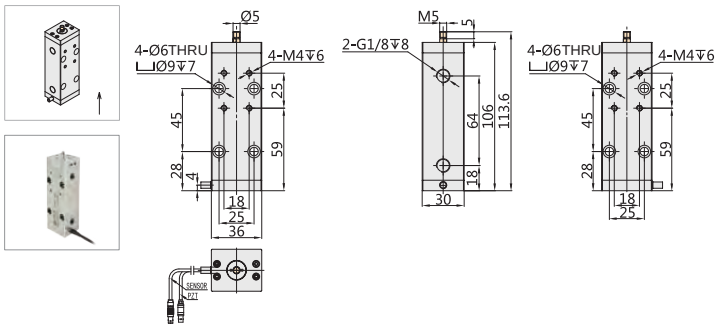
▸ Technical Data

Type	XD700.100S	XD700.100K	Units
Active axes	Z	Z	
Travel range(0~120V)	68	68	μm±10%
Max.travel range(0~150V)	85	85	μm±10%
Integrated sensor	SGS	-	
Resolution	2.5	1	nm
Closed-loop linearity	0.3	-	%F.S.
Repeatability	0.2	-	%F.S.
Push/pull force capacity	1200/200	1200/200	N
Stiffness	10	10	N/μm±20%
Unloaded resonant frequency	5000	5000	Hz±20%
El. capacitance	9	9	μF±10%
Material	Steel	Steel	
Cable length	1.5	1.5	m±10mm

* Note: recommended voltage 0~120V for high-reliability and long-term operation. Closed-loop version for high linearity and repeatability. The installation pre-tightening force generally does not exceed 20% of the output. Parameters and dimensions can be customized according to customer requirements.

▸ Drawing

XD700.100S/K



▸ Customization

Custom size, connection, displacement, voltage and etc. are available according to your requirements.



High Voltage Cylindrical Preloaded Piezo Actuators



High voltage cylindrical preloaded piezo actuators is a high voltage piezo stack actuator with mechanical preload and driving voltage of 1000V. It could withstand some certain pulling force, built-in piezo stack with large blocking force up to 50000N, mainly used for dynamic applications of large loads.

▸ Characteristics

• 1000V driving • Stroke to 260μm • Load capacity to 70000N • Open/closed loop • Customizable

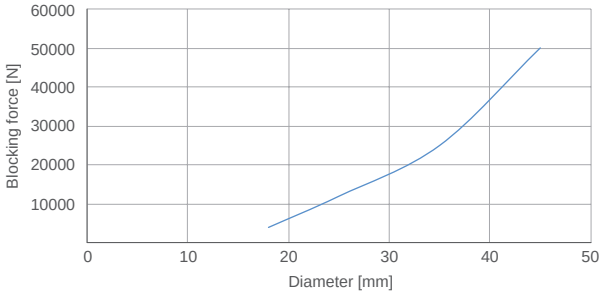
• Outer diameter Ø18mm, Ø25mm, Ø35mm, Ø45mm

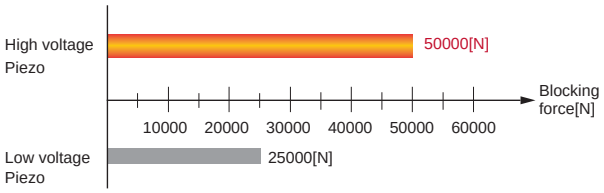
▸ Applications

Shock wave generation, stabilization, test and acceleration sensors, active vibration reduction and applications requiring high load or acceleration.

▸ High Blocking Force

The blocking force of high voltage piezo actuator is proportional to its cross-sectional area. The larger of diameter, the greater of blocking foce. VS45 series can reach 50000N and load capacity can reach 70000N.





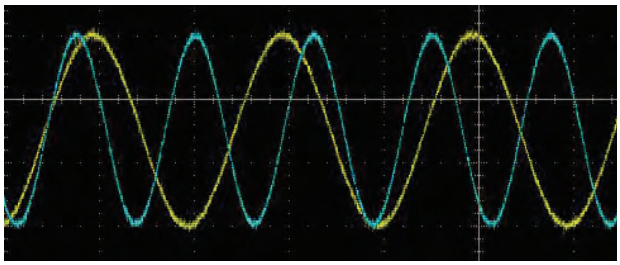
▸ Heat Management "Thermostable"

It can increase 2 to 3 times power and realize high-frequency motion.



▸ High Dynamic

The capacity of high voltage piezo actator is relatively small, so the operating frequency is relatively high. More suitable for high dynamic application.



High voltage piezo stack
Low voltage piezo stack

Operating frequency

▸ Open/Closed Loop Version

High voltage cylindrical preloaded piezo actuators has open-loop and closed-loop versions. Open-loop version has fast response time, but has hysteresis and creep. Closed-loop version has built-in strain sensor to eliminate hysteresis and creep.

▸ Attention

Before installing the load, please clamp the gap with plier to prevent the rotation of the moving end from causing torsion to the internal piezo stack.





Recommended Piezo Controller

CoreMorrow's E00/E01 series high voltage piezo controller could output voltage to 0~1000V to drive high voltage piezo actuator.



E01.D1



E00.D3

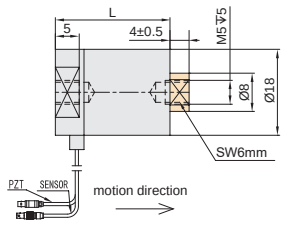


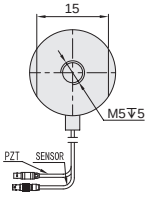
E80.D4S

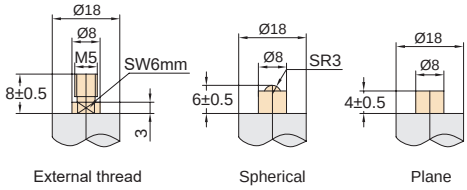
Drawings

VS18



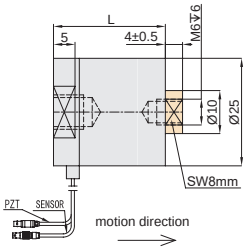


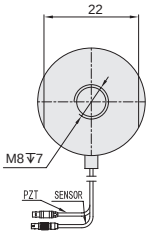


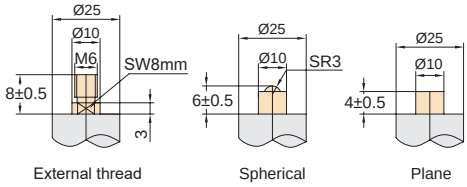


VS25



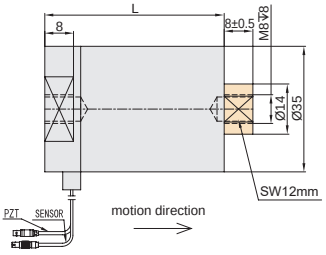


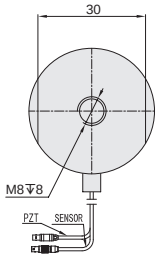


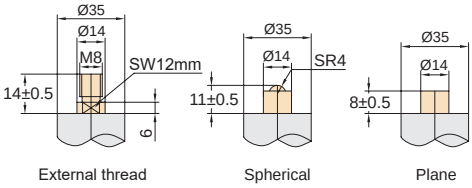


VS35



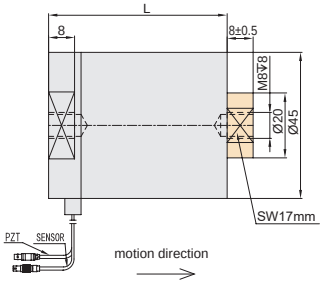


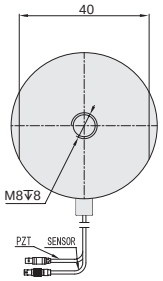


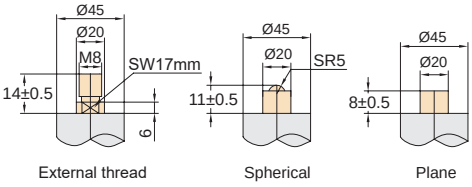


VS45









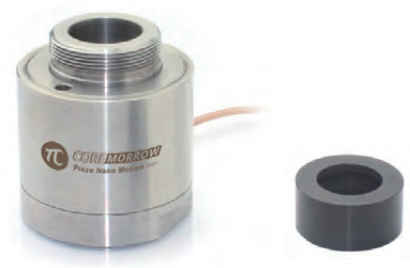
Notes: 1.5m cable length; LEMO connector; Optional heat sink, thermal stability, open/closed loop. Internal thread as default.

▸ Technical Data

Type	Closed loop: end with S Open loop: end with K	Max./Stroke [μm]±15%*	Length L [mm]±0.3	Capacitance [nF]±20%	Stiffness [N/μm]±20%	Resonant frequency [kHz]±20%	Push/pull force [N]
PSt1000/10/7 VS18		12/7	24	20	300	40	4000/700
PSt1000/10/20 VS18		27/20	33	45	150	35	4000/700
PSt1000/10/25 VS18		35/25	42	85	100	30	4000/700
PSt1000/10/40 VS18		55/40	51	110	75	27	4000/700
PSt1000/10/60 VS18		80/60	69	170	50	23	4000/700
PSt1000/10/80 VS18		105/80	87	220	35	20	4000/700
PSt1000/10/100 VS18		130/100	105	270	30	15	4000/700
PSt1000/10/125 VS18		160/125	125	330	25	10	4000/700
PSt1000/10/150 VS18		200/150	145	390	17	5	4000/700
PSt1000/10/200 VS18		260/200	185	510	10	3	4000/700
PSt1000/16/7 VS25		12/7	26	60	800	40	12000/1500
PSt1000/16/20 VS25		27/20	35	150	400	35	12000/1500
PSt1000/16/40 VS25		55/40	53	360	200	30	12000/1500
PSt1000/16/60 VS25		80/60	71	540	120	27	12000/1500
PSt1000/16/80 VS25		105/80	89	720	90	23	12000/1500
PSt1000/16/100 VS25		130/100	107	900	75	20	12000/1500
PSt1000/16/125 VS25		160/125	127	1100	60	15	12000/1500
PSt1000/16/150 VS25		200/150	147	1400	50	7	12000/1500
PSt1000/16/200 VS25		260/200	187	1900	35	4	12000/1500
PSt1000/25/7 VS35		12/7	33	140	1800	40	25000/4000
PSt1000/25/20 VS35		27/20	42	350	900	35	25000/4000
PSt1000/25/40 VS35		55/40	60	800	450	30	25000/4000
PSt1000/25/60 VS35		80/60	78	1250	300	27	25000/4000
PSt1000/25/80 VS35		105/80	96	1700	200	23	25000/4000
PSt1000/25/100 VS35		130/100	114	2150	180	20	25000/4000
PSt1000/25/125 VS35		160/125	134	2500	150	15	25000/4000
PSt1000/25/150 VS35		200/150	154	3200	120	7	25000/4000
PSt1000/25/200 VS35		260/200	194	3700	90	4	25000/4000
PSt1000/35/7 VS45		12/7	33	300	4000	40	50000/6000
PSt1000/35/20 VS45		27/20	42	800	2000	35	50000/6000
PSt1000/35/40 VS45		55/40	60	1600	1000	30	50000/6000
PSt1000/35/60 VS45		80/60	78	2500	600	27	50000/6000
PSt1000/35/80 VS45		105/80	96	3300	450	23	50000/6000
PSt1000/35/100 VS45		130/100	114	4100	350	20	50000/6000
PSt1000/35/125 VS45		160/125	134	4900	300	15	50000/6000
PSt1000/35/150 VS45		200/150	154	5700	220	7	50000/6000
PSt1000/35/200 VS45		260/200	194	6500	150	4	50000/6000

*PSt1000: Nominal stroke corresponding drive voltage 0~1000V, max stroke is at -200~1000V, recommended voltage 0~800V for long-term and high-reliable operation. Closed-loop version for linearity and repeatability.

High Voltage Ring Preloaded Piezo Actuator



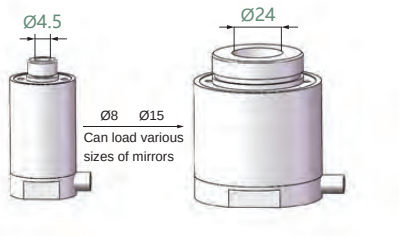
High voltage ring preloaded piezo actuator is a ring actuator with a Through hole in the center and an outer metal shell encapsulation. The driving voltage is 500V or 1000V. The interior of the high voltage ring preloaded piezo actuator is preloaded with a mechanical spring, making it an ideal choice for dynamic applications. It can also be equipped with a strain sensor to form a closed-loop servo control.

Characteristics

- Travel to 130μm
- Blocking force to 20000N
- Aperture to Ø24mm
- With mirror fixing cap

Aperture

There are four aperture sizes for light Through: 4.5mm, 8mm, 15mm and 24mm.



Recommended Controller

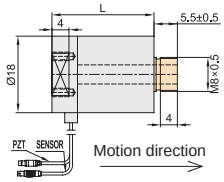
The high-voltage piezo stacks are driven by high voltage controllers. CoreMorrow's E00/E01 series high voltage piezo controllers can output 0~1000V high voltage.

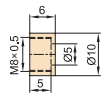


Drawings

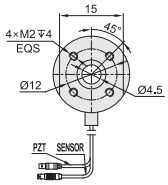
VS18





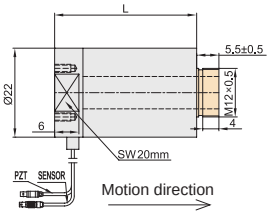


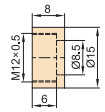
Mirror fixing cap



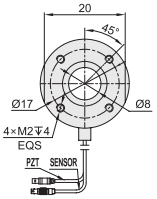
VS22





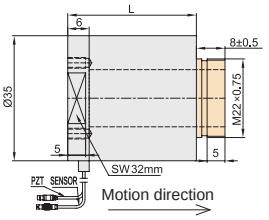


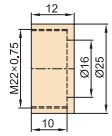
Mirror fixing cap



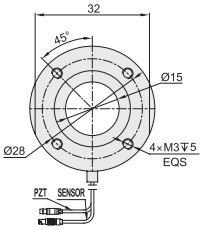
VS35





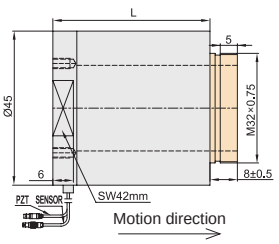


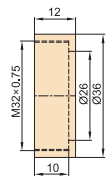
Mirror fixing cap



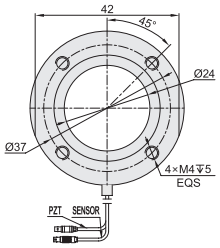
VS45







Mirror fixing cap



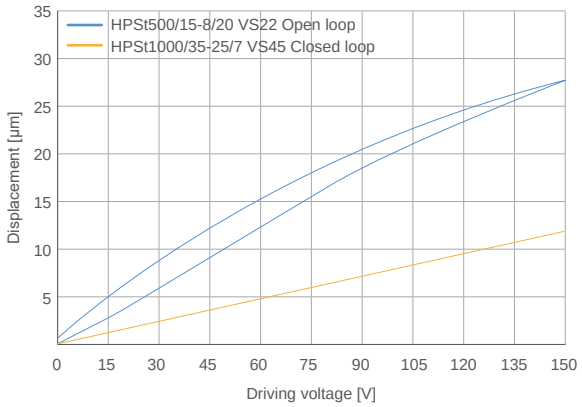
▸ Open/Closed Loop

High voltage ring preloaded piezo actuator has open/closed-loop versions. The open-loop version has a fast response speed, and also has the hysteresis and creep of PZT; The closed-loop version integrates closed-loop strain sensor to rule out hysteresis, creep and non-linearity.

▸ Application

Low temperature applications, laser adjustment, shock wave generation, sensor testing, testing and acceleration damping, active vibration elimination, fuel injection, active engine installation, and various positioning tasks that require high loads and/or extreme accelerations.

▸ Voltage vs Displacement



Note: Voltage applied to PZT is about 10 times of input control voltage.

▸ Technical Data

Type	Closed loop: end with S Open loop: end with K	Max. Stroke [μm]±15%*	Length L [mm]±0.3	El. capacitance [nF]±20%	Stiffness [N/μm]±20%	Resonant frequency [kHz]±20%	Push/pull force [N]
HPSt500/10-5/7 VS18		12/7	24	65	200	30	2800/200
HPSt500/10-5/20 VS18		27/20	33	180	100	25	2800/200
HPSt500/10-5/25 VS18		35/25	42	260	70	20	2800/200
HPSt1000/10-5/7 VS18		12/7	24	15	210	50	2800/200
HPSt1000/10-5/20 VS18		27/20	33	40	110	35	2800/200
HPSt1000/10-5/25 VS18		35/25	42	65	75	25	2800/200
HPSt1000/10-5/40 VS18		55/40	54	90	55	20	2800/200
HPSt1000/10-5/60 VS18		80/60	69	140	35	15	2800/200
HPSt500/15-8/7 VS22		13/7	26	140	550	30	5500/400
HPSt500/15-8/20 VS22		27/20	35	360	280	25	5500/400
HPSt500/15-8/25 VS22		35/25	44	520	180	20	5500/400
HPSt500/15-8/40 VS22		55/40	53	720	130	15	5500/400
HPSt500/15-8/60 VS22		80/60	71	1100	90	12	5500/400
HPSt500/15-8/80 VS22		105/80	89	1500	60	10	5500/400
HPSt1000/15-8/7 VS22		13/7	26	35	600	35	5500/400
HPSt1000/15-8/20 VS22		27/20	35	90	300	27	5500/400
HPSt1000/15-8/25 VS22		35/25	44	130	200	22	5500/400
HPSt1000/15-8/40 VS22		55/40	53	180	150	17	5500/400
HPSt1000/15-8/60 VS22		80/60	71	270	100	14	5500/400
HPSt1000/15-8/80 VS22		105/80	89	360	70	12	5500/400
HPSt1000/25-15/7 VS35		13/7	26	85	1200	40	13000/2000
HPSt1000/25-15/20 VS35		27/20	35	210	600	30	13000/2000
HPSt1000/25-15/25 VS35		35/25	44	310	400	25	13000/2000
HPSt1000/25-15/40 VS35		55/40	53	420	300	20	13000/2000
HPSt1000/25-15/60 VS35		80/60	71	650	180	15	13000/2000
HPSt1000/25-15/80 VS35		105/80	89	900	130	12	13000/2000
HPSt1000/35-25/7 VS45		12/7	26	120	2000	40	20000/500
HPSt1000/35-25/20 VS45		27/20	35	300	1000	30	20000/500
HPSt1000/35-25/25 VS45		35/25	44	450	700	25	20000/500
HPSt1000/35-25/40 VS45		55/40	53	600	500	20	20000/500
HPSt1000/35-25/60 VS45		80/60	71	900	350	15	20000/500
HPSt1000/35-25/80 VS45		105/80	89	1300	250	12	20000/500
HPSt1000/35-25/100 VS45		130/100	107	1800	160	10	20000/500

*HPSt500: Max. stroke at -100V~500V, nominal stroke at 0~500V. Recommended 0~400V for long-term and high-reliable operation. HPSt1000: Max. stroke at -200V~1000V, nominal stroke at 0~1000V. Recommended 0~800V for long-term and high-reliable operation. Closed-loop version for high linearity, repeatability. Mounting preload force must be less than 20% of blocking force.

Contraction Piezo Actuator





When appling a voltage, the contraction piezo actuator generates contraction. The contraction piezo actuator features nanoscale step, and millisecond, even sub-millisecond response.

▸ Characteristics

• Contraction motion • High pull force • Optional sensor • High accuracy • Available custom design

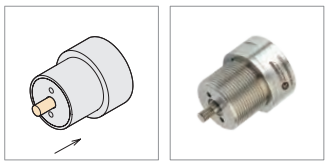
▸ Technical Data

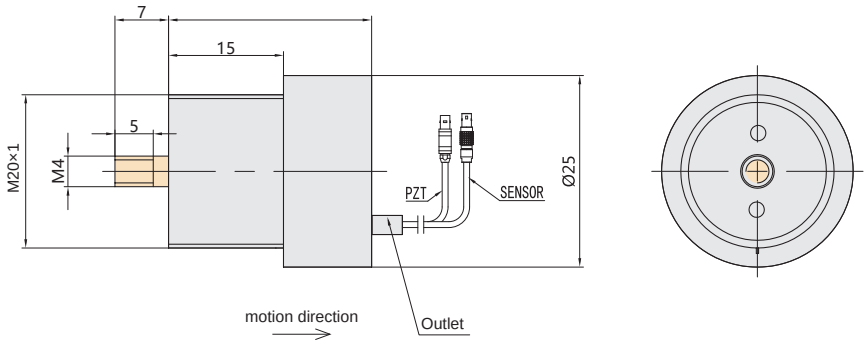
Type	Nominal travel range * [μm]±10%	Sensor type	Stiffness [N/μm]±20%	Pull force [N]	Resonant frequency [kHz]±20%	El.capacitance [μF]±10%	Mass [g]±5%	Material	Driving source
7M25	9 (contract)	SGS	150	2000	15	1.52	98.5	Steel	Piezo Stack
40M25	40 (contract)	SGS	50	2000	5	5.7	165	Steel	Piezo Stack

*: Nominal travel range is at 0~200V driving voltage.

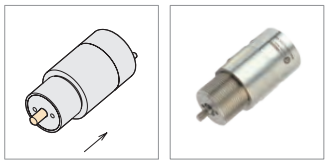
▸ Drawings

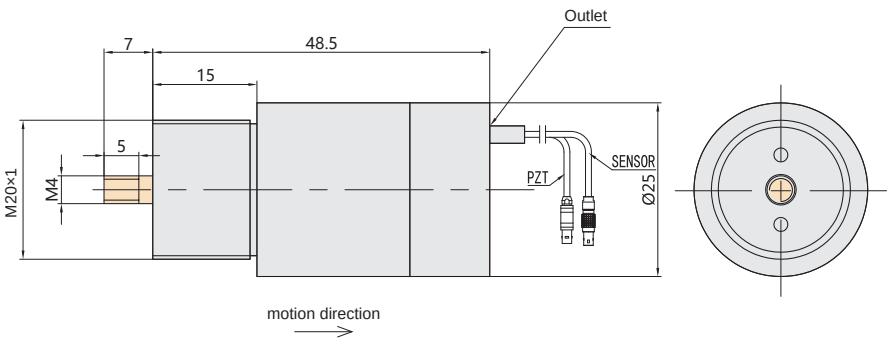
7M25





40M25





Precautions for Installation and Use of Piezo Actuators

If use the piezoelectric ceramic actuators according to the following text and illustrations, the effect of piezoelectric ceramic actuators can be achieved.

1. Do not use over voltage range specified in the parameter table to drive the piezoelectric actuator.

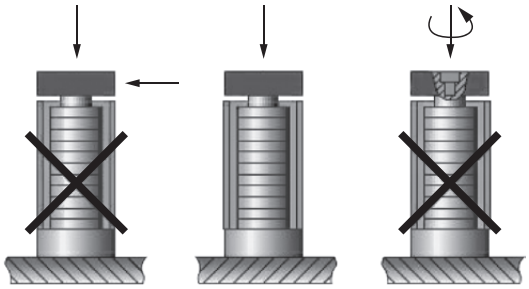
2. The environment where the piezoelectric actuator is placed should be kept dry and it should be avoided long-term in an environment with high DC electric field and high relative humidity.

3. Do not disassemble the piezoelectric ceramics. (Warning: Electric shock may result!)

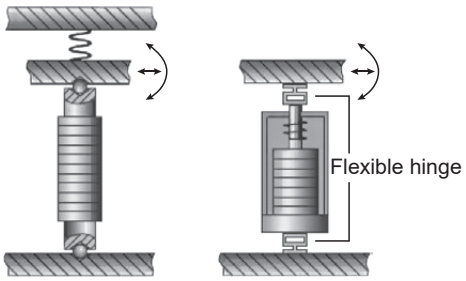
4. Do not drop the actuator and avoid any form of mechanical impact.

5. Before operating, it is very important to short-circuit the piezoelectric actuator. Temperature changes and load changes will cause the electrodes of the piezoelectric actuator to charge, without short-circuiting the leads, it may generate a high-voltage electric field, that is, the actuator will charge and discharge quickly, especially for actuators without preload, which may lead to damage. It is recommended to use a resistor for discharge.

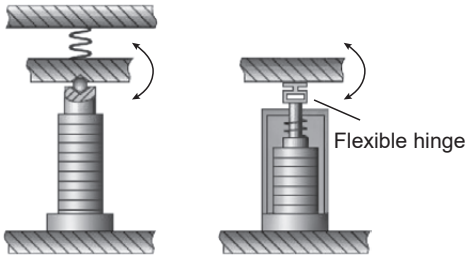
6. Preloaded piezoelectric actuator can withstand a certain amount of tensile force, but can't withstand torsion, bending or lateral force. These forces can directly damage the actuator and must be avoided. The lateral force can be removed by flexible ball joints or appropriate guiding mechanisms.
(As shown on the right)



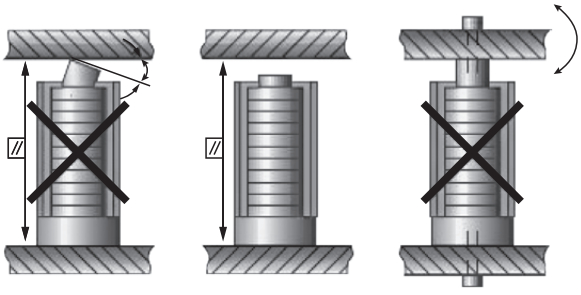
Prohibit lateral force and torque



Lateral force or bending force can be avoided by ball head or flexible hinge



Ball head or flexible hinge avoids bending force



It is not recommended to use bolts when installed between two plates

Amplified Piezo Actuators

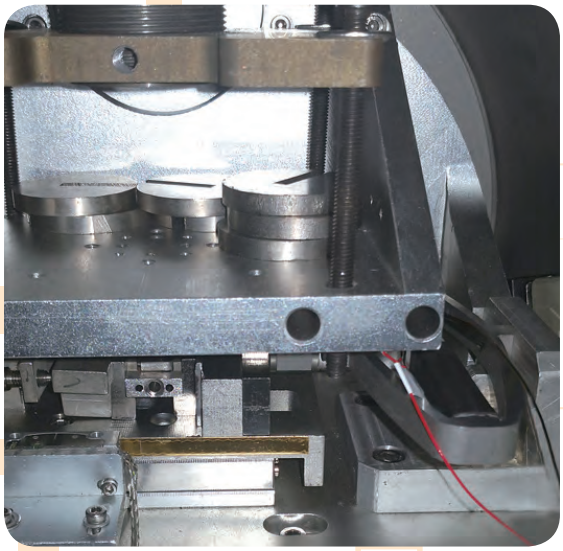


The amplified piezo actuators adopt amplifying mechanism design to amplify the displacement of piezo stacks and output.

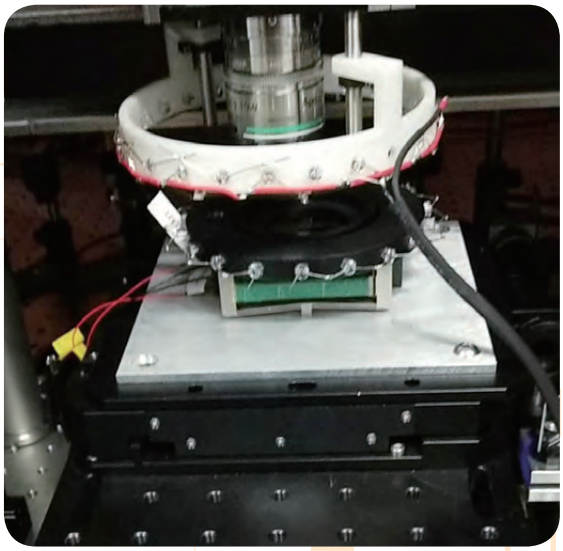
Applications

- Optics: probe scanning, optical lens positioning, optical switch, shutter/shutter stabilization, micro-scanning, wafer testing, astronomy, focus positioning, laser cavity tuning, optical fiber coupling and deformation, FBG (fiber Bragg grating) deformation, chopper, interferometer, PDP crystal cutting, modulator, etc.
- Mechanics: fiber stretching, tool positioning, pick and place tools, diamond turning, elliptical piston processing, damping, dynamic control, new generation ultrasonic or sonic vibration, NDT, instrument fatigue monitoring, etc.
- Fluidics: proportional valves, pumps, flow measurement technology, inkjet technology, syringes, droplet generators, etc.

Application Example



Friction Measurement



Microscopic Imaging

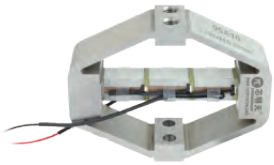
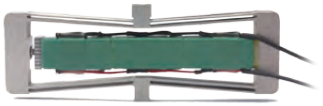
Product List

Type	Appearance	Mechanism	Axis	Stroke [μm]±20%	Blocking force[N]	Driving voltage[V]	Page
A		Magnifying mechanism	Contract in X	30~1900	3.6~1000	0~150	81
R			Expand in X	40~500	15~90	0~150	81
P87.X38S			X	38	-	0~150	87
XD011			X	6.2	-	0~150	88

Amplified Piezo Actuators




P06.xxAx

P06.xxRx

The amplified piezo actuator is an actuator that amplifies and outputs the displacement generated by low-voltage piezo stacks preloaded by a mechanical amplifying structure.

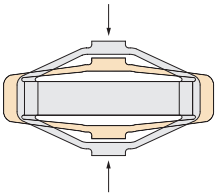
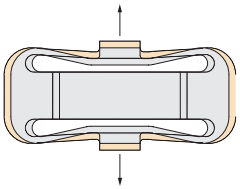
The amplified structure is an mechanical shell, and its material is generally steel. In addition to providing optimized pre-tightening force for piezo stacks, it also protects piezo stacks from tensile forces that can cause irreversible or even fatal damage to piezo stacks. The mechanical amplified structure also provides the user with mechanical interface, easy to integrate.

Characteristics

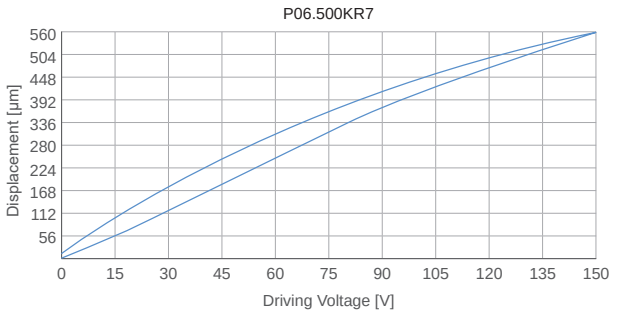
- 30μm to 1.9mm travel
- Blocking force to 1000N
- Unloaded resonant frequency to 3900Hz
- Nanoscale resolution

Principle

Piezo stacks produce deformation and displacement along the main axis, that is, the long axis direction, and the elliptical mechanical structure amplifies and outputs the displacement along the short axis direction.

Type A: P06.xxAx	Type R: P06.xxRx
Outward ellipse	Inward ellipse
 X Contraction	 X Elongation

Voltage vs Stroke



Recommended Controller



E53.A

Application

Probe scanning, optical mirrors positioning, optical switch, shutter, wafer testing, astronomy, focus positioning, laser cavity tuning, fiber coupling and deformation, FBG deformation, chopper, interferometer, piston machining, damping, dynamic control, valves, inkjet technology, droplet generators, etc.

Type A Technical Data

Type	Active axes	Stroke * [µm]±20%	Blocking force [N]	Stiffness [N/µm]±20%	El. capacitance [µF]±20%	Unloaded resonant frequency[Hz]±20%	Material	Sensor
P06.30KA [1]	X	30	6	0.2	0.075	3150	steel	optional
P06.35KA2	X	35	9	0.26	0.17	1900	steel	optional
P06.40S/KA5	X	40	76	1.9	1.8	3900	steel	optional
P06.50KA2 [1]	X	50	7	0.14	0.125	2000	steel	optional
P06.60S/KA5	X	60	43.2	0.72	1.8	2500	steel	optional
P06.70S/KA5	X	70	49	0.7	1.8	900	steel	optional
P06.80S/KA5	X	80	32	0.4	1.8	700	steel	optional
P06.80S/KA14	X	105	1000	13	44	1700	steel	optional
P06.95S/KA10	X	95	540	5.7	21.6	350	steel	optional
P06.100S/KA5	X	100	67.0	0.67	3.6	1850	steel	optional
P06.100S/KA7	X	100	155.0	1.55	7.2	1950	steel	optional
P06.115S/KA10	X	115	253	2.2	21.6	1050	steel	optional
P06.120S/KA14	X	120	54	0.45	29	400	steel	optional
P06.125S/KA5	X	125	25	0.2	3.6	1150	steel	optional
P06.130S/KA5	X	130	7.8	0.06	1.8	900	steel	optional
P06.150S/KA5	X	150	39.0	0.26	3.6	1250	steel	optional
P06.180S/KA5	X	180	18	0.1	3.6	750	steel	optional
P06.200S/KA5	X	200	20.0	0.1	3.6	850	steel	optional
P06.200S/KA10	X	200	60	0.3	21.6	600	steel	optional
P06.230S/KA10	X	230	59.8	0.26	43	200	steel	optional
P06.240S/KA5	X	240	12	0.05	3.6	600	steel	optional
P06.300S/KA10	X	300	69	0.23	21.6	450	steel	optional
P06.400S/KA5	X	400	16.0	0.04	3.6	470	steel	optional
P06.400S/KA7	X	400	16	0.04	10.8	300	steel	optional
P06.500S/KA10	X	500	22.5	0.045	43	390	steel	optional
P06.550S/KA14	X	550	126.5	0.23	130	210	steel	optional
P06.700S/KA7	X	600	3.6	0.006	10.8	530	steel	optional
P06.900S/KA10	X	720	36	0.05	43	280	steel	optional
P06.1000S/KA14	X	800	112	0.14	130	220	steel	optional
P06.1500S/KA10	X	1200	12	0.01	43	160	steel	optional
P06.2000S/KA10	X	1900	38	0.02	47	125	steel	optional

[1] The driving source of P06.30KA/P06.50KA2 is Piezo Stack.

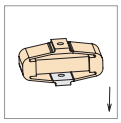
Type R Technical Data

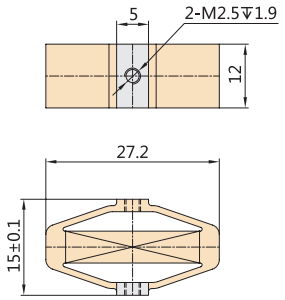
Type	Active axes	Stroke * [µm]±20%	Blocking force [N]	Stiffness [N/µm]±20%	El. capacitance [µF]±20%	Unloaded resonant frequency[Hz]±20%	Material	Sensor
P06.40S/KR5	X	40	46.4	1.16	1.8	2200	steel	optional
P06.100S/KR7	X	100	80	0.8	7.2	530	steel	optional
P06.150S/KR5	X	140	48.2	0.412	3.6	900	steel	optional
P06.200S/KR7	X	200	25	0.15	6.8	600	steel	optional
P06.500S/KR7	X	500	15.0	0.03	10.8	260	steel	optional
P06.500S/KR10	X	500	90	0.18	26	350	steel	optional

*Nominal Stroke at 0~150V, Max. stroke at -20~150V. Recommended voltage 0~120V for long-term and high-reliable operation.

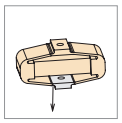
Drawings

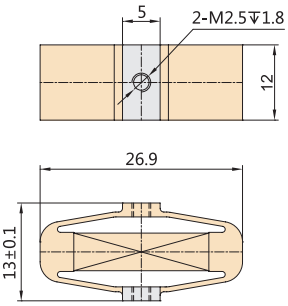
P06.40S/KA5



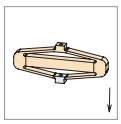


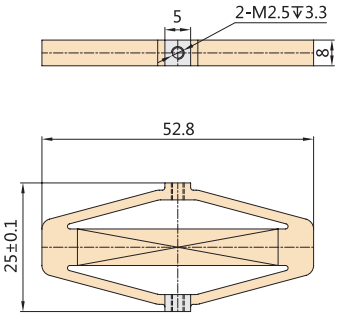
P06.60S/KA5





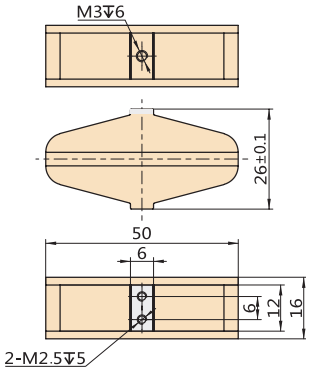
P06.100S/KA5



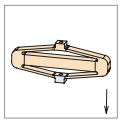


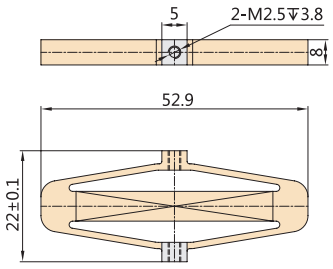
P06.100S/KA7



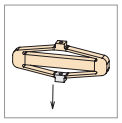


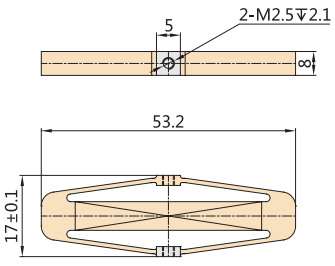
P06.150S/KA5



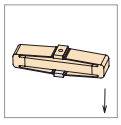


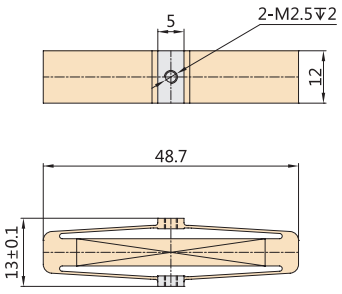
P06.200S/KA5





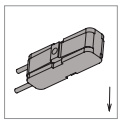
P06.400S/KA5

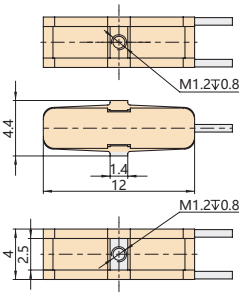




▸ Drawings

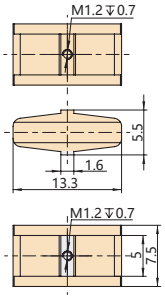
P06.30KA





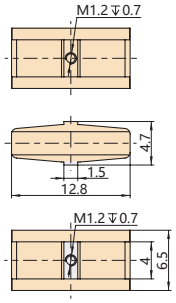
P06.35KA2





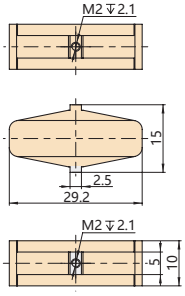
P06.50KA2





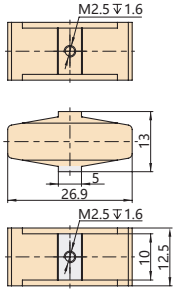
P06.70S/KA5



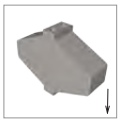


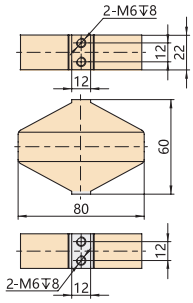
P06.80S/KA5



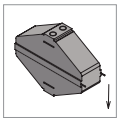


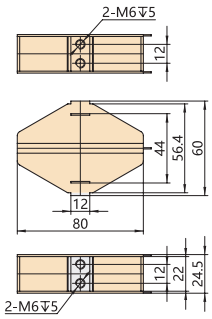
P06.80S/KA14





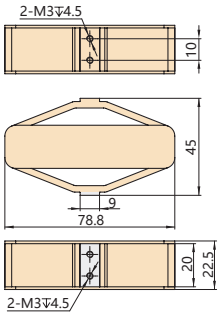
P06.95S/KA10





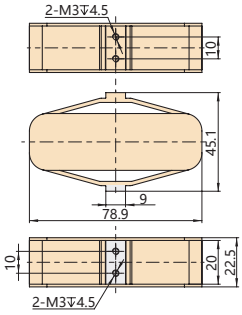
P06.115S/KA10





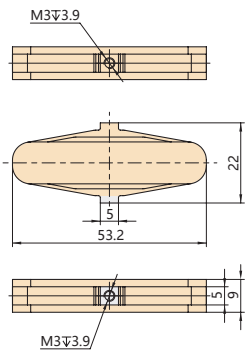
P06.120S/KA14





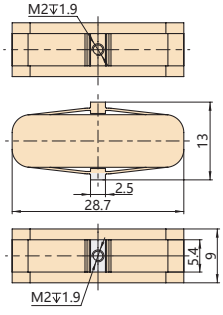
P06.125S/KA5





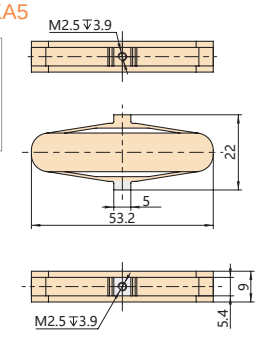
P06.130S/KA5





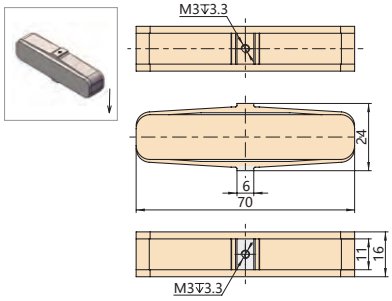
P06.180S/KA5



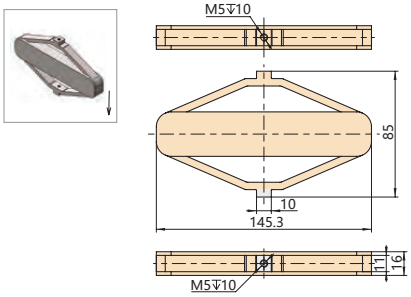


Drawings

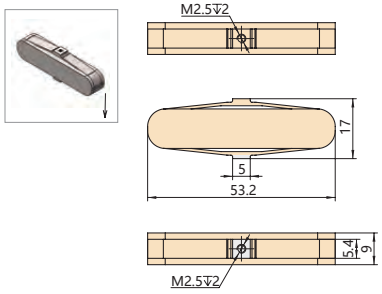
P06.200S/KA10



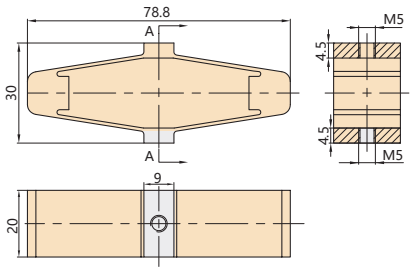
P06.230S/KA10



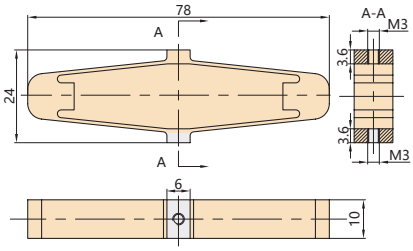
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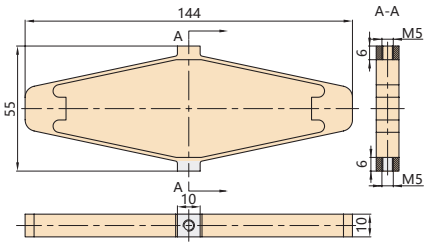
P06.300S/KA10



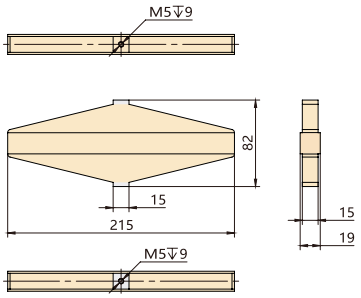
P06.400S/KA7



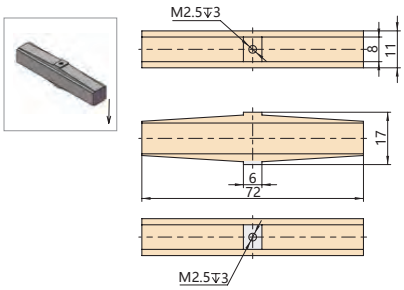
P06.500S/KA10



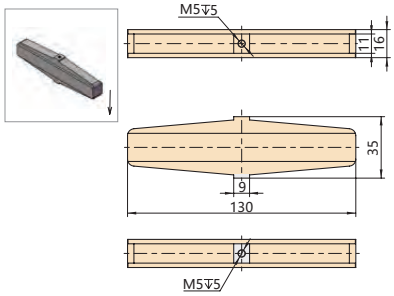
P06.550S/KA14



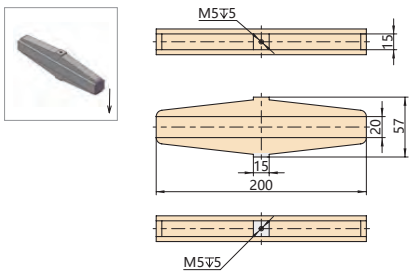
P06.700S/KA7



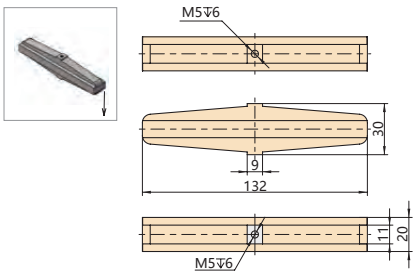
P06.900S/KA10



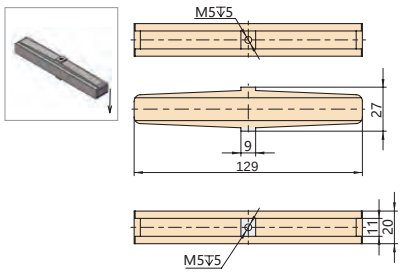
P06.1000S/KA14



P06.1500S/KA10



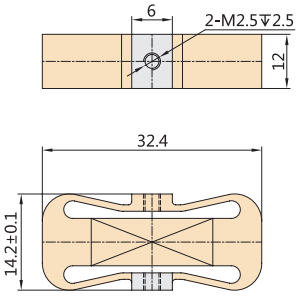
P06.2000S/KA10



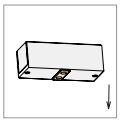
▸ Drawings

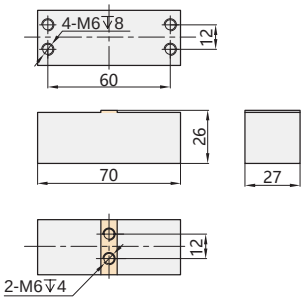
P06.40S/KR5



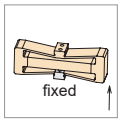


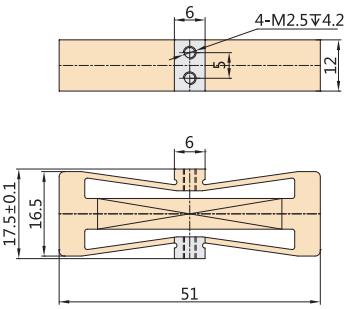
P06.100S/KR7



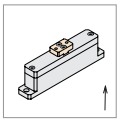


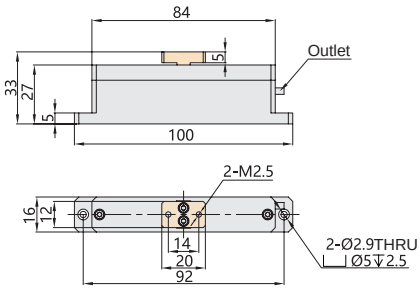
P06.150S/KR5



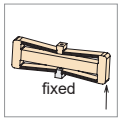


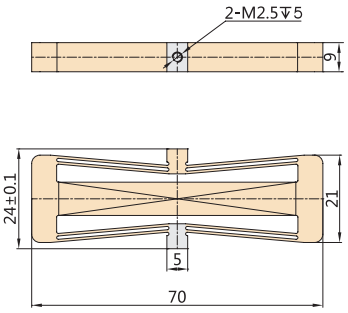
P06.200S/KR7



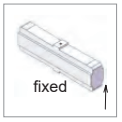


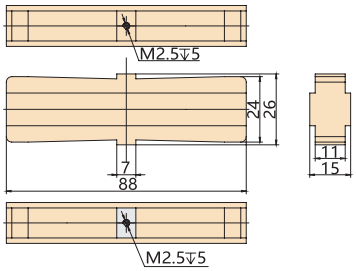
P06.500S/KR7





P06.500S/KR10





P87 Amplified Piezo Actuators





P87 amplified piezo actuator is specially designed for space-limited applications. It is compact, small size, and equipped with closed-loop sensors. It is ideal for high-precision, space-limited applications, such as small-volume fiber end-face detectors.

Characteristics

- Displacement to 38μm
- Closed-loop sensor
- Small size
- Suitable for fiber end detection

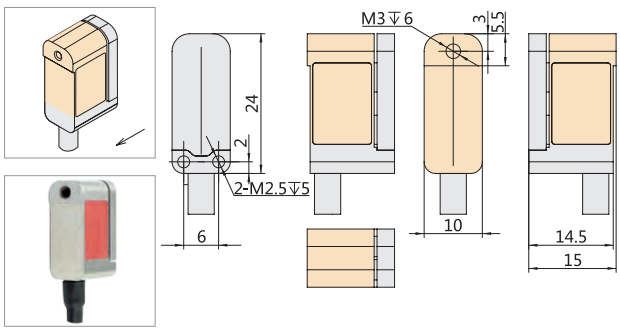
Technical Data

Type	P87.X38S	Units
Travel range	38	μm±10%
Driving voltage	150	V
Sensor	SGS	
Closed-loop resolution	1.3	nm(5mV ripple)
Unload resonant frequency	1200	Hz±20%
Capacitance	0.8	μF±20%
Material	stainless steel, aluminium	

*Nominal Stroke at 0~150V, Max. stroke at -20~150V. Recommended voltage 0~120V for long-term and high-reliable operation.

Drawing

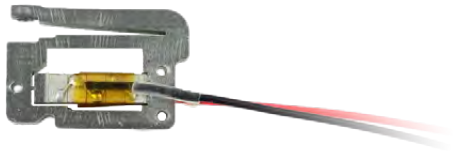
P87.X38S



Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Digital analog Open/closed loop Ave. current:291mA/58mA	3 channels Digital analog Open/closed loop Ave. current:70mA	1 channel Digital analog Open/closed loop Ave. current:60mA
Note: Please see "Piezo Controller" for detailed information.		

XD011 Amplified Piezo Actuators



The XD011 amplified piezo actuators is an open-loop actuator designed specifically for applications with limited space. It has a compact appearance, small size, and an overall size of only 19.5×13×5mm^3.

Characteristics

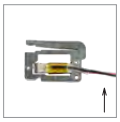
•X motion •Displacement up to 6.2μm •Open loop •Small size •Unloaded resonant frequency to 5.5kHz

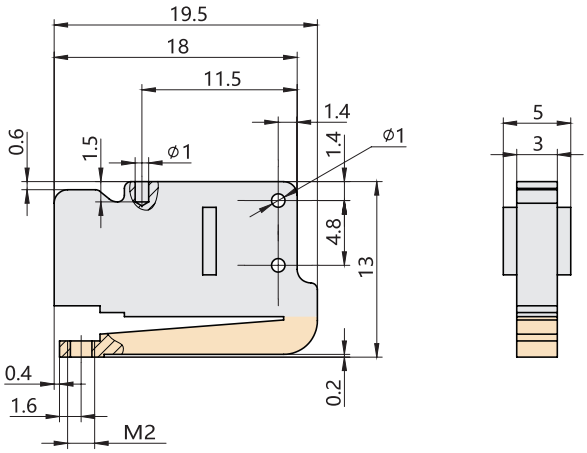
Technical Data

Type	XD011	Units
Active axes	X	
Nominal travel range(0~120V)	5	μm±10%
Max.travel range(0~150V)	6.2	μm±10%
Unloaded resonant frequency	5.5	kHz±20%
El. Capacitance	0.3	μF±20%
Material	Steel	
Mass(including wires and connectors)	20	g±5%

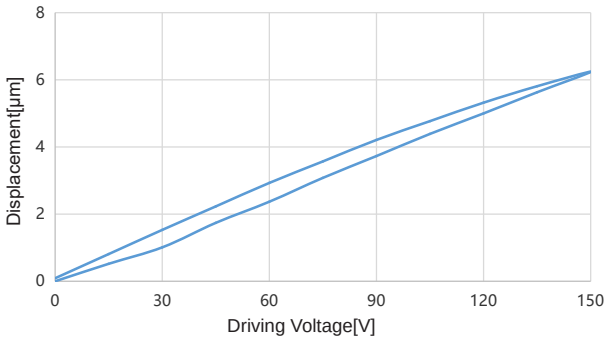
Drawing

XD011





Displacement vs Voltage Curve



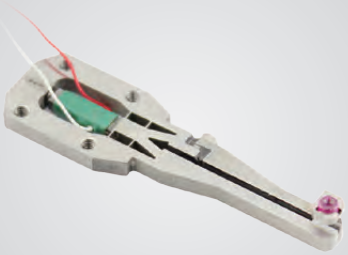
Recommended Controllers

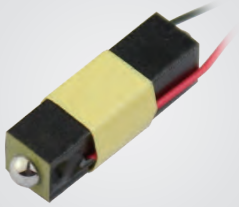
E00/E01	E70	E53
		
1~3 channels Digital analog Open loop, servo Ave. current:291mA/58mA	3 channels Digital analog Open loop, servo Ave. current:70mA	1 channel Digital analog Open loop, servo Ave. current:60mA

Note: Please see "Piezo Controller" for detailed information.

Piezo Clamp

Piezo clamp is one of the key components in wire bonding machine, and control the pass or clamping of leads made of Au, Cu. or others.





Piezo Clamp



According to the requirements of automatic wire bonding machine, CoreMorrow produces piezo clamp, which is designed and developed for clamping wire. It feaures a simple structure, fast response and high resolution.

Characteristics

- Displacement to ±190μm
- Multiple models available
- Resonant frequency to 42kHz
- Small size

Principle

The structure of piezo clamp is composed of piezo stack, flexible mechanical structure, fixed jaw and adjustable jaw. Piezo stack is installed between clamping jaw and the base. When voltage is applied to piezo stack, the output displacement of the piezo stack is amplified by the lever arm of the clamping jaw and outputed in the top end of the closed. After the voltage is removed, the of clamp jaws return to initial position.

Recommended Controller

E53.A piezo controller is ideal for driving piezo clamp, ensuring fast response time and stability of the piezo clamp. E53 is very compact and easy to integrate.



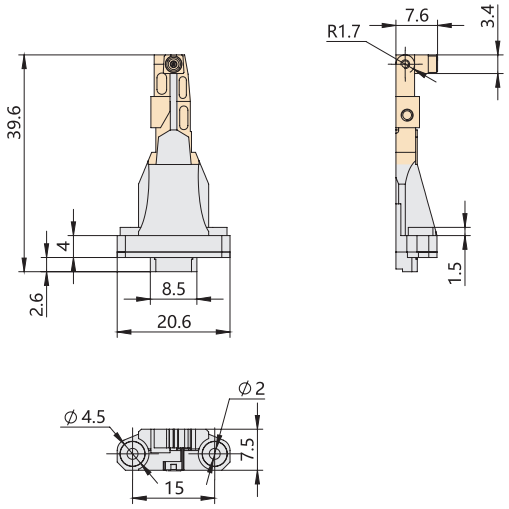
Technical Data

Type	XD002.80K	XD002.90K	XD002.100K	XD002.150K	XD002.200S	XD002.250K	Units
Active axes	X	X	X	X	X Closed-loop	X	
Travel range (0~120V)	±32	±36	±40	±60	±80	±150	μm±20%
Max.travel range (0~150V)	±40	±45	±50	±75	±100	±190	μm±20%
Push/pull force capacity	-	10/1	-	-	4/-	-	N
Stiffness	-	0.04	-	-	0.04	-	N/μm±20%
Unloaded resonant frequency	42000	1500	1050	1100	400	660	Hz±20%
Unloaded step time	0.075	0.7	-	-	-	-	ms±20%
Unloaded operating frequency	-	300	-	-	-	-	Hz
Load capacity	0.05	0.05	0.05	0.05	0.05	0.1	kg
El. capacitance	0.18	0.18	0.18	0.17	7.2	4.85	μF±20%
Material	Ti	Steel	Steel	Steel	Steel	Steel	
Mass	12(Cable included)	10	10	8.7	305	215(Cable included)	g±5%
Power-on jaw status	Open	Open	Open	Open	Close	Close	

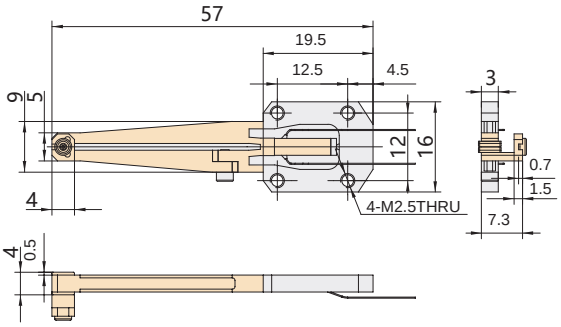
Note: Customizable clamping displacement up to 500μm and 1000μm types.

Drawing

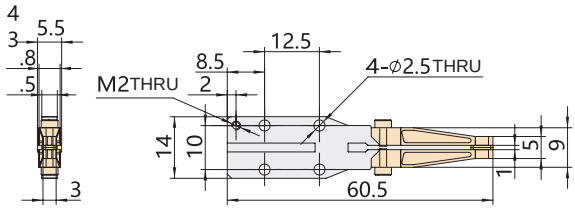
XD002.80K



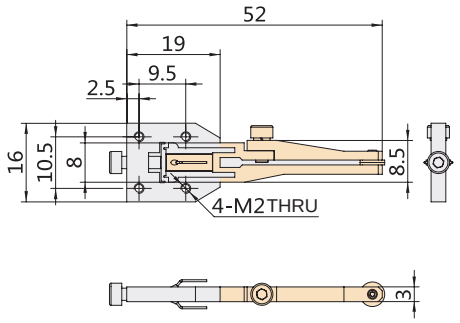
XD002.90K



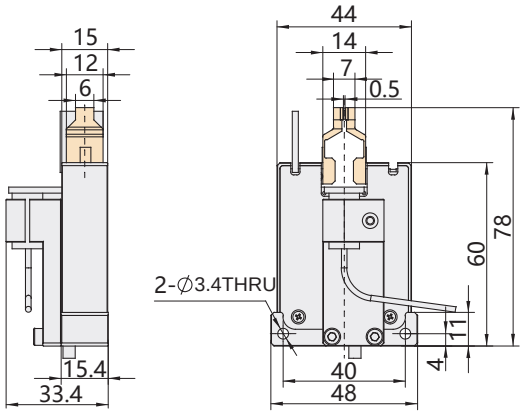
XD002.100K



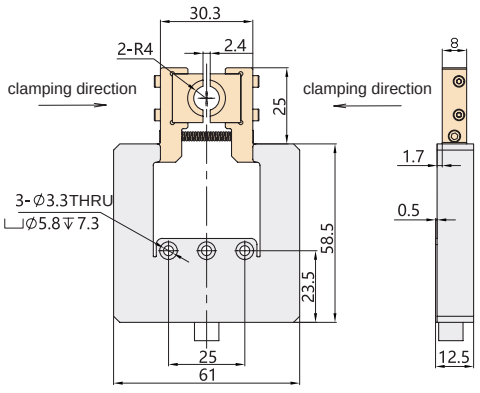
XD002.150K



XD002.200S

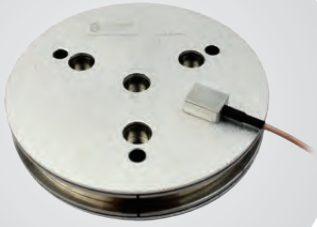


XD002.250K



Piezo Fiber Stretchers





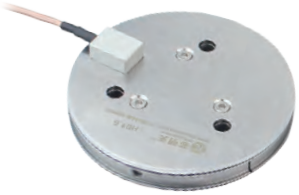


Piezo fiber stretcher is a piezo stack assembled into a flexible hinge structure. The optical fiber could be wound in the groove on the outer diameter edge, piezo stack generates displacement and stretches the fiber.

H01 Piezo Fiber Stretchers


H01.80


H01.20


H01.6K


H01.3K

H01 piezo fiber stretcher is designed for fiber stretching applications. Its principle is to cause the hinge structure outward expansion by the action of three piezo stacks placed at 120 degrees thereby stretching the optical fiber wound in the outer diameter groove.

▸ Ave.Power Calculation

Piezo fiber stretcher' formulas of dynamic application: $P=U_{p\text{-}p}^{2} \cdot f \cdot c$

P: Ave. power(W) $U_{p\text{-}p}$: Peak to peak driving voltage(V)

f: Output frequency(Hz) **C**: El.capacitance(F)

For no heat sink, the ave. power should be≤5W.

In dynamic application, if the ave. power is over 5W, it needs to be installed heat sink on outer shell.

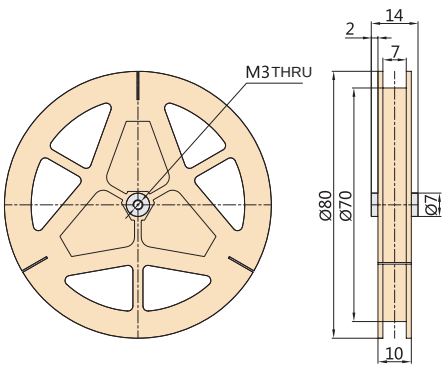
The outer shell temperature could not to be over 60°C, otherwise, the piezo stacks would be permanently damaged.

▸ Wound Optical Fiber

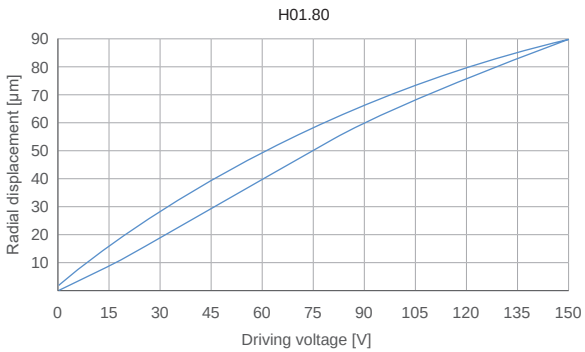


▸ Drawing

H01.80



▸ Displacement vs Voltage



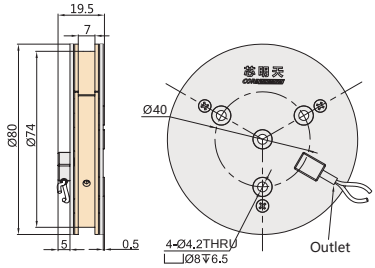
▸ Technical Data

Type		H01.80	H01.20	H01.6K	H01.3K	Units
Motion		Radial expansion				
Travel range (0~120V)*	Radial	64	15	5.6	2.4	μm±20%
	Fiber/circle	336	80	28	12	μm±20%, Cal.
Max.travel range (0~150V)	Radial	80	18.5	7	3	μm±20%
	Fiber/circle	420	100	35	15	μm±20%, Cal.
Resolution	Radial	4	1	0.5	0.3	nm
	Fiber/circle	20	5	2.5	1.5	nm, Cal.
Radial max. blocking force		160	600	250	120	N
Unloaded resonant frequency		740	3975	9500	3000	Hz±20%
Stiffness		3	30	30	30	N/μm±20%
El. capacitance		5.4	5.4	1.2	0.3	μF±20%
Material		Steel	Steel	Titanium, al	Steel	
Mass		220	280	60	32	g±5%
Size		Ø80×14	Ø80×19.5	Ø55×13.3	Ø30×13	mm

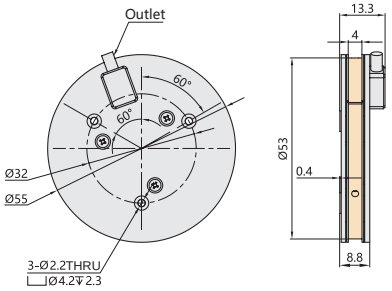
*Max driving voltage -20~150V, recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00 series piezo controller.

▸ Drawings

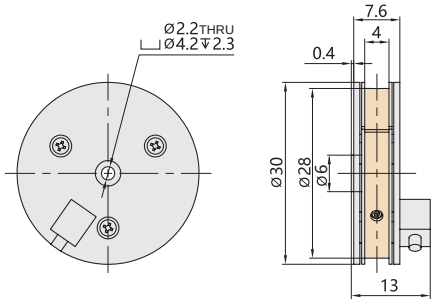
H01.20



H01.6K



H01.3K



▸ Other Fiber Stretching Solutions

Piezo Stacks



When apply voltage to piezo stack, it will elongate in the direction of polarization, and the elongation is about 1.5‰ of the piezo stack length.

The fiber can be attached to piezo stack surface or to both ends. When the piezo stack elongates, the fiber will be stretched evenly.

The gray-colored piezo stack is very thin, the surface is smooth and easy to bond optical fiber.

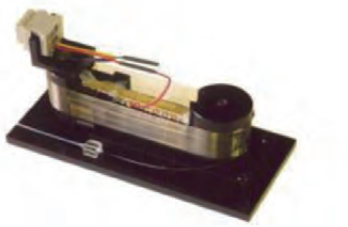
Tube Piezo Components



When the voltage is applied to tube piezo component, it expands in the direction of polarization(radial), so the optical fiber wound around the outer surface can be stretched.

We offer a wide range of standard size tube piezo components, as well as custom sizes and materials.

Fiber Stretching Structure



Optical fiber is evenly wound around the fixed end and the moving end, and the piezo stack is connected to the controller Through connector. When het voltage signal is applied to piezo stack, the piezo stack elongates, thereby push the moving end to move and increase the distance between the moving end and the fixed end to stretch the fiber.

The stretching length depends on the displacement of the piezo stack used.

▸ Notice

1. Optical fiber is made of glass fiber. When winding the fiber, please be careful not to touch the bare fiber to avoid the fiber from piercing the skin.
2. When winding the fiber, the force should be used properly, and the fiber should be wound on the surface in a natural tight state without slipping.
3. When winding the fiber, the fiber array should be neat, uniform and tight to facilitate uniform stretching of the fiber.
4. When fixing the fiber Through glue, we recommend to use high-strength epoxy glue, which could fix the fiber without affecting the stretching of the fiber; and the volume of glue should be appropriate, not placed too much.

H01.9K Fiber Phase Modulator



Characteristics

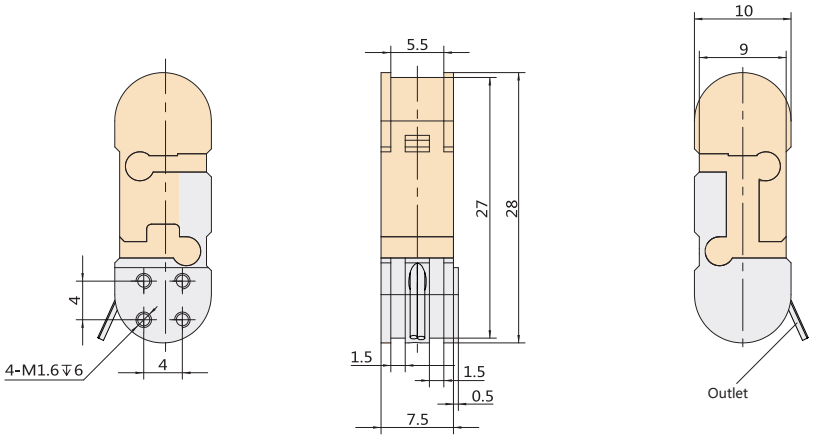
- Linear displacement up to 7μm
- About 14μm stretching length for one single-turn fiber
- Driving voltage 0~120V/150V
- Light weight
- Suitable for fiber stretching applications, such as optical phase shifting, optical delay, etc.

Technical Data

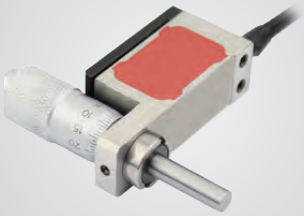
Type	H01.9K	Units
Active axes	X	
Nominal travel range	7	μm±20%
Fiber stretching length	14	μm±20%
Fiber bend radius	4.5	mm
Fiber wind	4	turns
Driving voltage	0~150	V
Open-loop resolution	0.1	nm
Unloaded step time	0.2	ms±20%
El.capacitance	0.18	μF±20%
Material	Steel	
Mass	25	g±5%

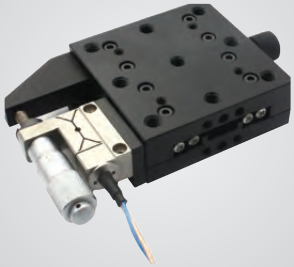
Note: The above parameters are measured using E00 piezo controllers. The max driving voltage can be -20~150V; For high-reliability long-term use, the recommended driving voltage is 0~120V.

Drawing

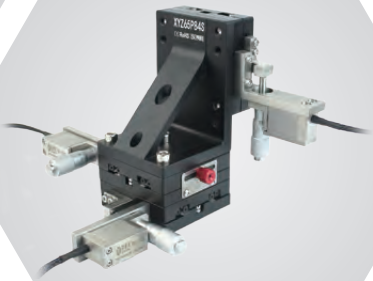


Piezo Micrometers



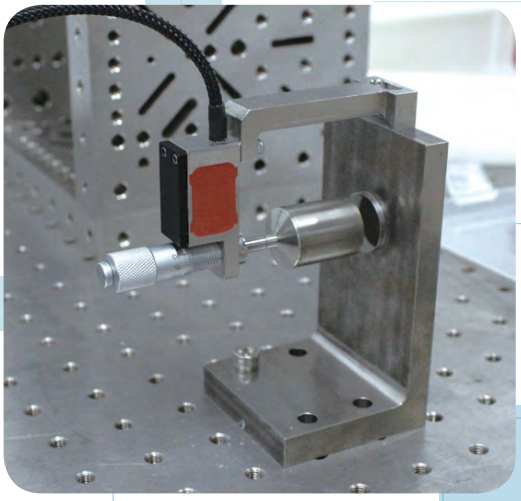




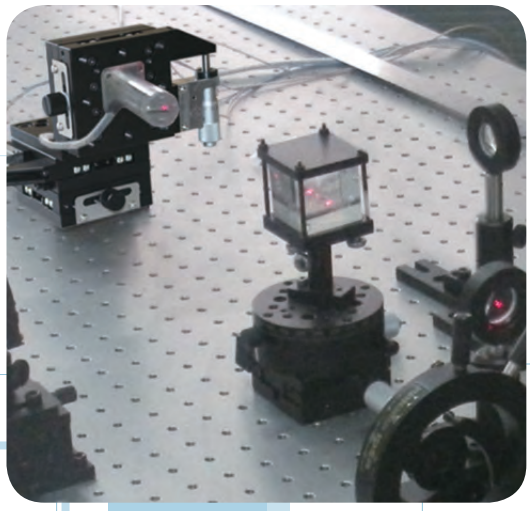


Piezo micrometer combines piezo micro-motion stage with a micrometer, which could be coarsely adjusted by micrometer, and finely adjusted by piezo stage, a loading platform is available.

Applications



Oil Film Thickness Measurement



Optical Alignment

Product List

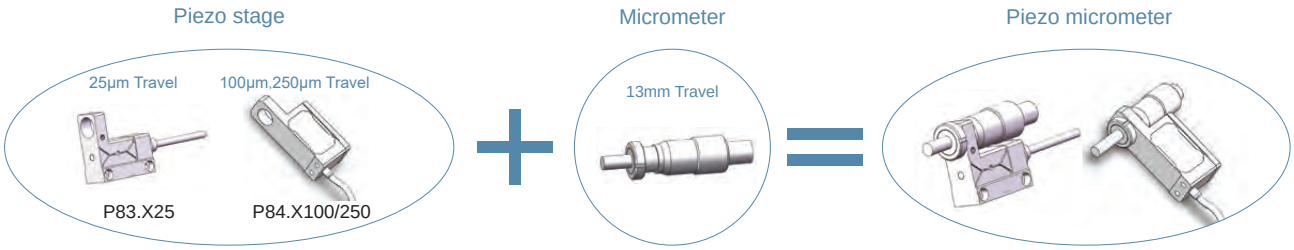
Type	Mechanism	Active Axes	Manual travel[mm]	Piezo travel[μm]	Moving platform	Mass[g±5%]	Page
P83.X25S/K	Amplifying structure	X	13	25	No	-	98
P83S/KX65		X	13	25	Yes	400	98
P83S/KXY65		X, Y	13/axis	25/axis	Yes	800	98
P83S/KXZ65		X, Z	13/axis	25/axis	Yes	1000	98
P83S/KXYZ65		X, Y, Z	13/axis	25/axis	Yes	1400	98
P84.X100S/K		X	13	100	No	100	98
P84.X250S/K		X	13	250	No	-	98
P84S/KX65		X	13	100	Yes	400	98
P84S/KXY65		X, Y	13/axis	100/axis	Yes	800	98
P84S/KXZ65		X, Z	13/axis	100/axis	Yes	1000	98
P84S/KXYZ65		X, Y, Z	13/axis	100/axis	Yes	1550	98
P84S/K250X65		X	13	250	Yes	500	98
P84S/K250XY65		X, Y	13/axis	250/axis	Yes	1000	98
P84S/K250XZ65		X, Z	13/axis	250/axis	Yes	1200	98
P84S/K250XYZ65		X, Y, Z	13/axis	250/axis	Yes	1850	98
H81A.XYZ20S/K		X, Y, Z	4/axis	18/axis	Yes	1000	106

Piezo Micrometers



Piezo micrometer refers to integrating piezo stage on manual micrometer. The manual micrometer has 13mm displacement. The piezo stage features 25μm,100μm or 250μm displacement. The accuracy of micrometer is within the adjustment range of piezo stage, thus ensuring the accuracy and convenience of the adjustment.

▸ Composition



▸ Characteristics

- X axis, 1~3 axes are available
- Selectable sensor
- Manual micrometer displacement to 13mm, resolution to 10μm
- Piezo displacement up to 25μm, 100μm or 250μm, reslution to 0.5nm

▸ Two Types

There are 2 types of piezo micrometers, P83's displacement is 25μm and P84's is 100μm or 250μm.



P83



P84

▸ Optional Loading Platform, vacuum version





Standard technical data:

Flatness: <3μm/13mm

Dimensions: 65mm×65mm

Slide way: Cross roller

▸ 1~3 Axes

After the piezo micrometer is equipped with a movable table, you can choose free combination of 1~3 dimensions.



P83S/KX65

Load: 1.5kg

Mass: 400g



P83S/KXY65

Load: 1.2kg

Mass: 800g



P83S/KXYZ65

Load: 0.5kg

Mass: 1400g



P84S/KX65

Load: 1.3kg

Mass: 400g



P84S/KXY65

Load: 1kg

Mass: 800g



P84S/KXYZ65

Load: 0.3kg

Mass: 1550g

Applications

• Optical alignment • Cell manipulation • Precision positioning of CCD camera focus lens • Micromachining/precision control

Technical Data

Type	S-Closed loop K-Open loop	P83.X25S P83.X25K	P84.X100S P84.X100K	P84.X250S P84.X250K	Units
Active axes		X	X	X	
Travel range(coarse+fine)		13mm+25μm	13mm+100μm	13mm+250μm	
Material		Steel	Steel, Aluminum	Steel, Aluminum	
Manual Adjustment - Micrometer					
Travel range		13	13	13	mm
Resolution		10	10	10	μm
Driving mode		Screw thread pair	Screw thread pair	Screw thread pair	
Sensitivity		<2	<2	<2	μm
Least count		10	10	10	μm/div
Screw pitch		0.5	0.5	0.5	mm/rev.
Piezo Adjustment - Piezo					
Travel range	0~120 V	20	80	200	μm±20%
	0~150 V	25	100	250	μm±20%
Sensor		SGS/-	SGS/-	SGS/-	
Resolution		1/0.5	3/1	7/2	nm, typ.
Closed-loop linearity		0.2/-	0.1/-	0.1/-	%F.S.
Repeatability		0.1/-	0.05/-	0.05/-	%F.S.
Push force capacity		20	16	8	N
Stiffness		2	1	0.03	N/μm±20%
Unloaded resonant frequency		-	380	210	Hz±20%
Load (Z axis)		500	500	200	g
Operating temperature		-20~80	-20~80	-20~80	°C
Electrical capacitance		1.8	1.8	7.2	μF±20%
Cable		1.5	1.5	1.5	m±10mm
Mass		-	100	-	g±5%

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation to extend lifetime. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▶ Technical Data

Type	S-Closed loop K-Open loop	P83SX65 P83KX65	P83SXY65 P83KXY65	P83SXZ65 P83KXZ65	P83SXYZ65 P83KXYZ65	Units
Active axes		X	X, Y	X, Z	X, Y, Z	
Travel range(coarse+fine)		13+25	13+25/axis	13+25/axis	13+25/axis	mm+µm
Material		Steel, Al	Steel, Al	Steel, Al	Steel, Al	
Manual Adjustment - Micrometer						
Travel range		13	13/axis	13/axis	13/axis	mm
Resolution		10	10	10	10	µm
Driving mode		Screw thread pair	Screw thread pair	Screw thread pair	Screw thread pair	
Sensitivity		<2	<2	<2	<2	µm
Least count		10	10	10	10	µm/div
Screw pitch		0.5	0.5	0.5	0.5	mm/rev.
Piezo Adjustment - Piezo						
Travel range	0~120 V	20	20/axis	20/axis	20/axis	µm±20%
	0~150 V	25	25/axis	25/axis	25/axis	µm±20%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	
Resolution		1/0.5	1/0.5	1/0.5	1/0.5	nm, typ.
Closed-loop linearity		0.2/-	0.2/-	0.2/-	0.2/-	%F.S.
Repeatability		0.1/-	0.1/-	0.1/-	0.1/-	%F.S.
Push force capacity		20	20	20	20	N
Stiffness		2	2	2	2	N/µm±20%
Unloaded resonant frequency		1.5	1.2	0.5	0.5	kg
Load (Z axis)		400	800	1000	1400	g±5%
Operating temperature		1.8	1.8/axis	1.8/axis	1.8/axis	µF±20%
Electrical capacitance		-20~80	-20~80	-20~80	-20~80	°C
Cable		1.5	1.5	1.5	1.5	m±10mm

Technical Data

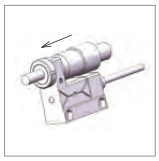
Type	S-Closed loop K-Open loop	P84SX65 P84KX65	P84SXY65 P84KXY65	P84SXZ65 P84KXZ65	P84SXYZ65 P84KXYZ65	Units
Active axes		X	X, Y	X, Z	X, Y, Z	
Travel range(coarse+fine)		13+100	13+100/axis	13+100/axis	13+100/axis	mm+μm
Material		Steel, Al	Steel, Al	Steel, Al	Steel, Al	
Manual Adjustment - Micrometer						
Travel range		13	13/axis	13/axis	13/axis	mm
Resolution		10	10	10	10	μm
Driving mode		Screw thread pair	Screw thread pair	Screw thread pair	Screw thread pair	
Sensitivity		<2	<2	<2	<2	μm
Least count		10	10	10	10	μm/div
Screw pitch		0.5	0.5	0.5	0.5	mm/rev.
Piezo Adjustment - Piezo						
Travel range	0~120 V	80	80/axis	80/axis	80/axis	μm±20%
	0~150 V	100	100/axis	100/axis	100/axis	μm±20%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	
Resolution		3/1	3/1	3/1	3/1	nm, typ.
Closed-loop linearity		0.1/-	0.1/-	0.1/-	0.1/-	%F.S.
Repeatability		0.05/-	0.05/-	0.05/-	0.05/-	%F.S.
Push force capacity		16	16	16	16	N
Stiffness		1	1	1	1	N/μm±20%
Unloaded resonant frequency		1.3	1	0.5	0.3	kg
Load (Z axis)		400	800	1000	1550	g±5%
Operating temperature		1.8	1.8/axis	1.8/axis	1.8/axis	μF±20%
Electrical capacitance		-20~80	-20~80	-20~80	-20~80	°C
Cable		1.5	1.5	1.5	1.5	m±10mm

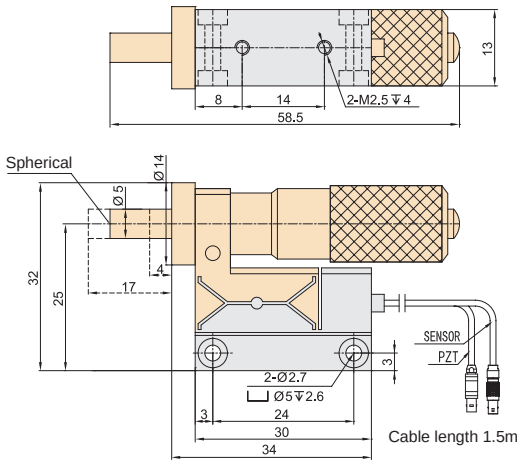
▶ Technical Data

Type	S-Closed loop K-Open loop	P84S250X65 P84K250X65	P84S250XY65 P84K250XY65	P84S250XZ65 P84K250XZ65	P84S250XYZ65 P84K250XYZ65	Units
Active axes		X	X, Y	X, Z	X, Y, Z	
Travel range(coarse+fine)		13+250	13+250/axis	13+250/axis	13+250/axis	mm+μm
Material		Steel, Al	Steel, Al	Steel, Al	Steel, Al	
Manual Adjustment - Micrometer						
Travel range		13	13/axis	13/axis	13/axis	mm
Resolution		10	10	10	10	μm
Driving mode		Screw thread pair	Screw thread pair	Screw thread pair	Screw thread pair	
Sensitivity		<2	<2	<2	<2	μm
Least count		10	10	10	10	μm/div
Screw pitch		0.5	0.5	0.5	0.5	mm/rev.
Piezo Adjustment - Piezo						
Travel range	0~120 V	200	200/axis	200/axis	200/axis	μm±20%
	0~150 V	250	250/axis	250/axis	250/axis	μm±20%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	
Resolution		7/2	7/2	7/2	7/2	nm, typ.
Closed-loop linearity		0.1/-	0.1/-	0.1/-	0.1/-	%F.S.
Repeatability		0.05/-	0.05/-	0.05/-	0.05/-	%F.S.
Push force capacity		8	8	8	8	N
Stiffness		0.03	0.03	0.03	0.03	N/μm±20%
Unloaded resonant frequency		1.3	1	0.5	0.3	kg
Load (Z axis)		500	1000	1200	1850	g±5%
Operating temperature		7.2	7.2/axis	7.2/axis	7.2/axis	μF±20%
Electrical capacitance		-20~80	-20~80	-20~80	-20~80	°C
Cable		1.5	1.5	1.5	1.5	m±10mm

Drawings

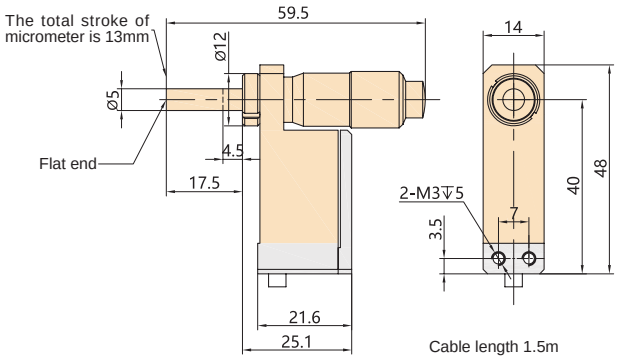
P83.X25 (X axis, no loading platform)



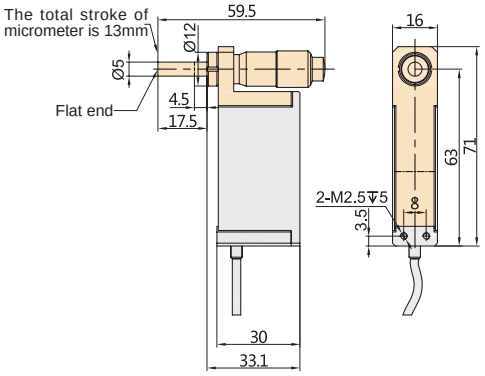



P84.X100 (X axis, no loading platform)

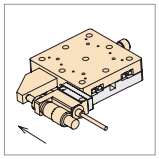


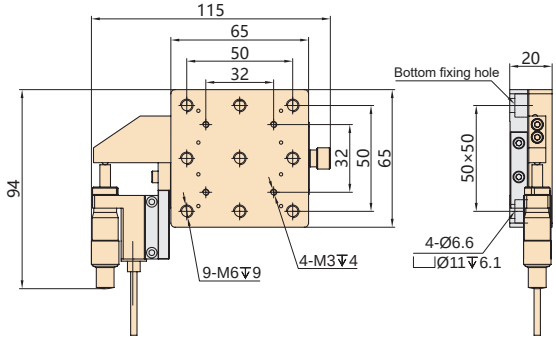



P84.X250S/K (X axis, no loading platform)

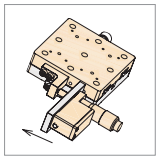
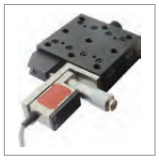


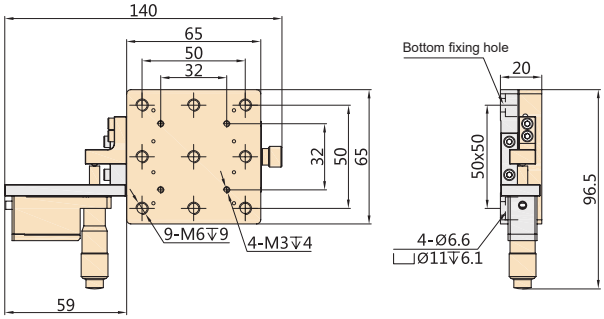
P83S/KX65 (X axis, with moving stage)



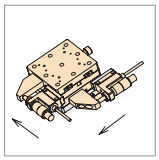



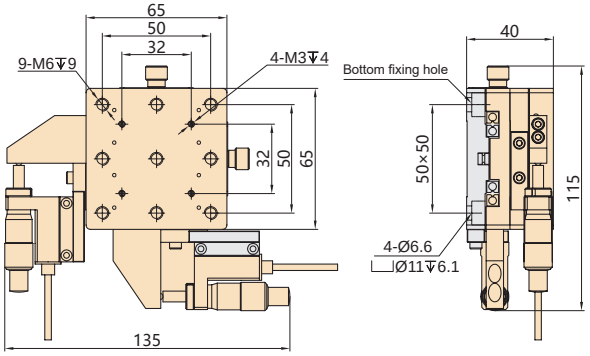
P84S/KX65 (X axis, with moving stage)

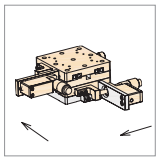


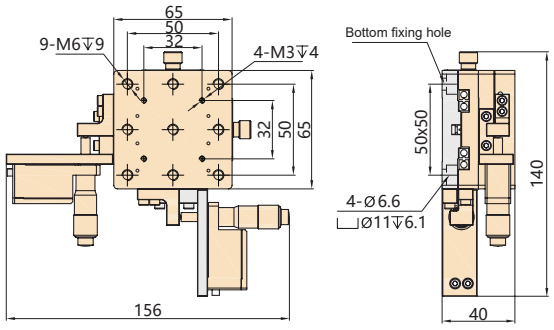
P83S/KXY65 (XY axes, with loading platform)



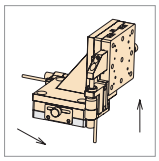



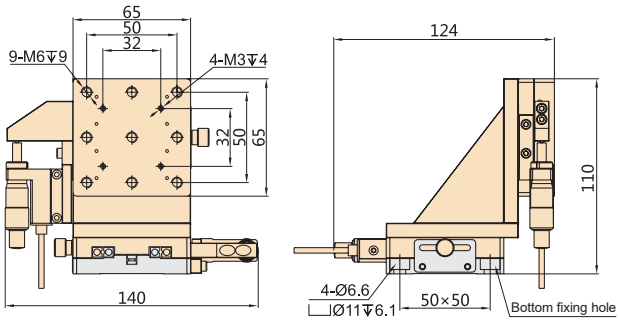
P84S/KXY65 (XY axes, with loading platform)



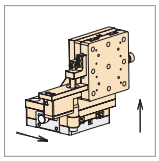



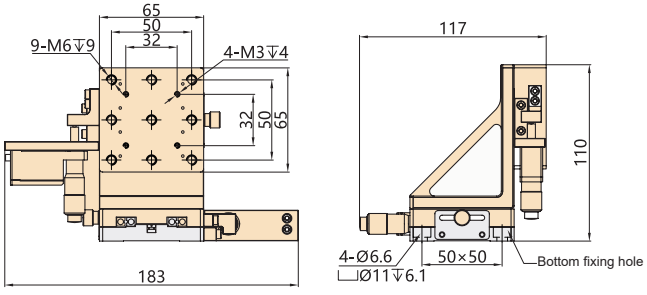
P83S/KXZ65 (XZ axes, with loading platform)



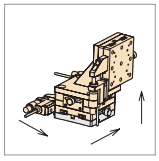



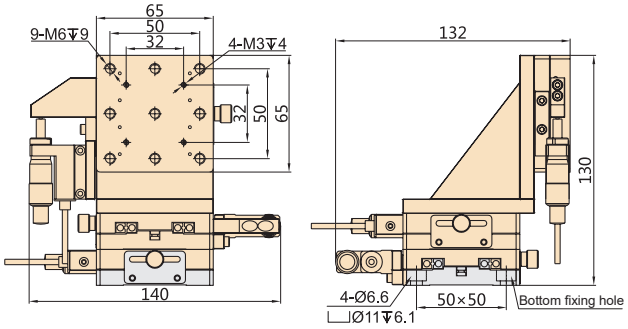
P84S/KXZ65 (XZ axes, with loading platform)



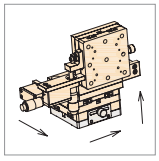



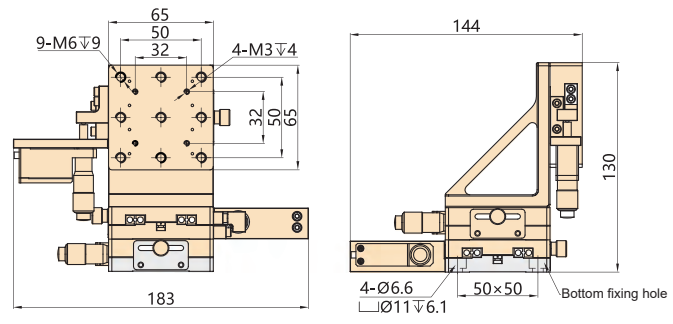
P83S/KXYZ65 (XYZ axes, with loading platform)



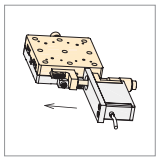



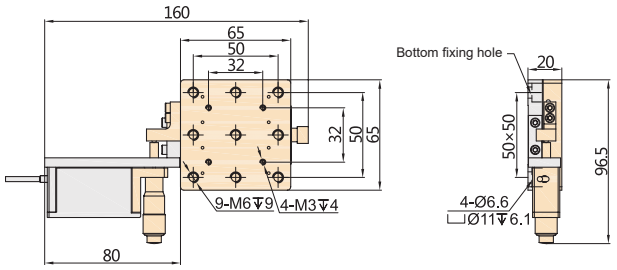
P84S/KXYZ65 (XYZ axes, with loading platform)



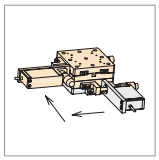



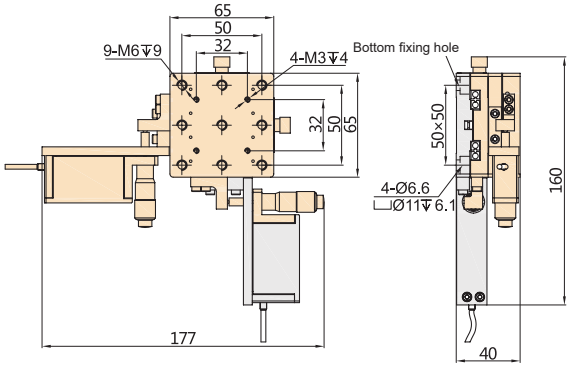
P84S/K250X65 (X axis, with moving stage)



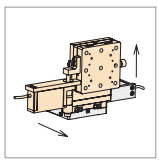



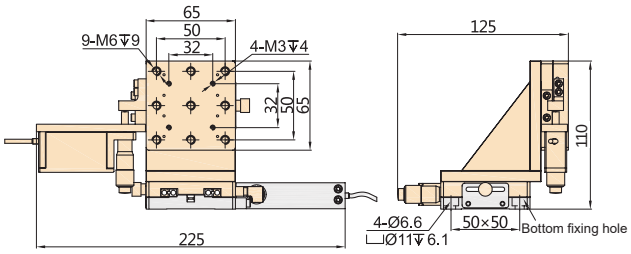
P84S/K250XY65 (XY axes, with loading platform)



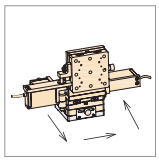



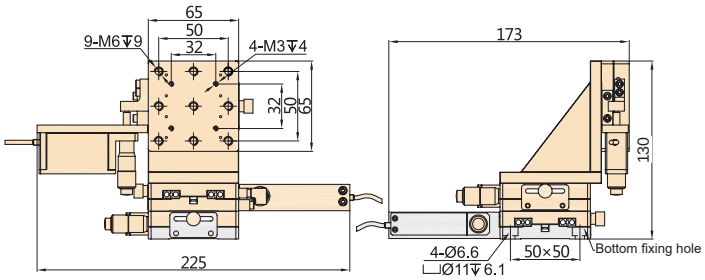
P84S/K250XZ65 (XZ axes, with loading platform)



P84S/K250XYZ65 (XYZ axes, with loading platform)



H81A.XYZ20S/K Long Travel Piezo Stage



Characteristics

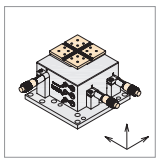
• 3 axes motion • Coarse and fine adjustment combination • Coarse travel to 4mm • Piezo travel to 18μm • With sensor

Technical Data

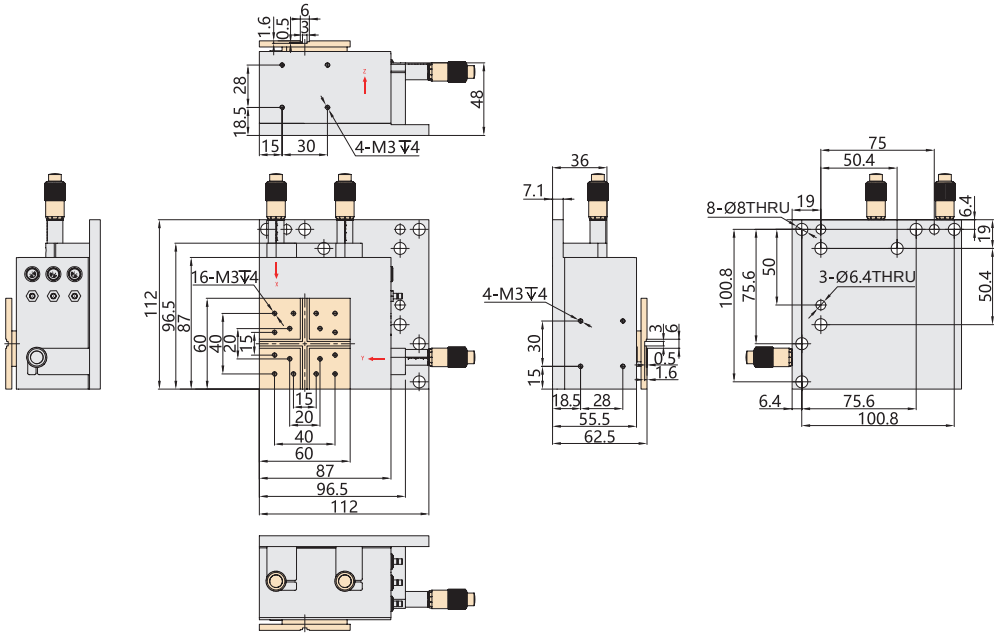
Type	S - closed loop K - open loop	H81A.XYZ20S	H81A.XYZ20K	Units
Active axes		X, Y, Z	X, Y, Z	
Manual Adjustment - Micrometer				
Travel range		4	4	mm±10%
Accuracy		500	500	μm/turn±10%
Fine Adjustment - Piezo				
Travel range(0~150V)		18	18	μm±20%
Sensor		SGS	-	
Resolution		1	0.2	nm
Linearity		0.3	-	%F.S.
Repeatability		0.2	-	%F.S.
Load capacity		1	1	kg
El.capacitance		1.8	1.8	μF/axis±20%
Material		Steel, Al	Steel, Al	
Mass		1(Cable not included)	1(Cable not included)	kg±5%
Driving control		3 driving channels 3 sensing channels	3 driving channels	

Drawings

H81A.XYZ20S/K

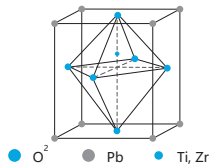




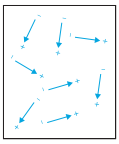


Properties of Piezoelectric Stack

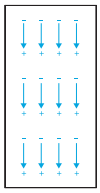
Piezoelectric ceramics are functional materials that can convert electrical energy into displacement. When the piezoelectric crystal deforms under the action of external force, a charge proportional to the external force can be generated on the crystal surface. This phenomenon of polarized charge on the crystal surface due to the action of mechanical force is called the positive piezoelectric effect. At the same time, when apply a electric field to the piezoelectric crystal, the crystal will deform due to the electric field. The magnitude of the deformation is proportional to the strength of the external electric field. This phenomenon of the piezoelectric crystal being deformed due to the action of the electric field is called the inverse piezoelectric effect.



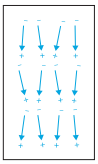
Below the Curie temperature, the crystal unit deforms spontaneously with four corners polarization.



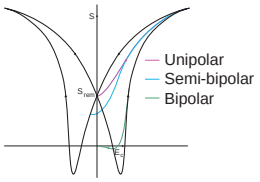
(1) Unpolarized ceramics



(2) During polarization



(3) After polarization



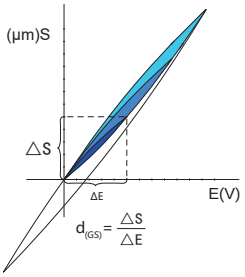
The curves of piezoelectric ceramics in the polarization direction and different voltage amplitudes

The upper right picture shows the displacement curve of piezoelectric ceramics driven by unipolar, semi-bipolar and bipolar voltages.

▸ Hysteresis

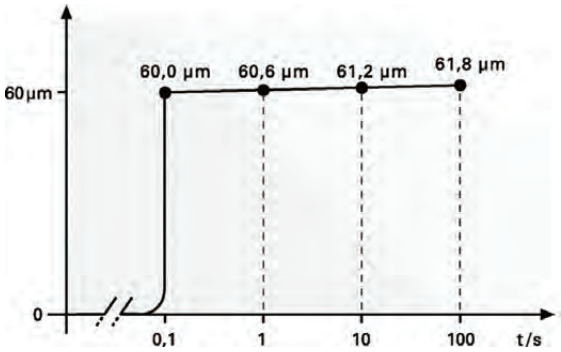
There is a displacement difference between the piezoelectric ceramic rising and falling voltage and displacement curve. Under the same voltage value, the displacement value on the rising curve and the falling curve has a significant displacement difference, and this displacement difference will change with the change of the voltage variation range. The smaller the driving voltage, the smaller the displacement difference will be. The hysteresis of piezoelectric ceramics is generally about 10%~15% of the displacement value under a given voltage. The slope between the switching points of the local hysteresis curve is defined as the piezoelectric large-signal deformation coefficient$d_{(GS)}$:

$$d_{(GS)} = \frac{\triangle S}{\triangle E} \ (\mu m/V)$$



▸ Creep

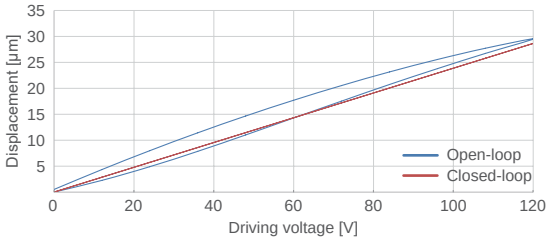
Creep means that the voltage value applied to the piezoelectric ceramic does not change, the displacement value is not stable at a fixed value, but slowly changes with time, and will reach a stable value after a certain period of time, as shown in the below figure. Generally, the creep within 10s is about 1%~2% of the elongation.



Remarks: Selecting closed-loop piezoelectric actuators can remove hysteresis and creep characteristics.

▸ Linearity and Nonlinearity

The hysteresis and creep of PZT can be effectively eliminated Through closed-loop control. You can choose Coremorrow's closed-loop actuators and servo controller products.



Eliminate hysteresis and creep Through closed-loop control

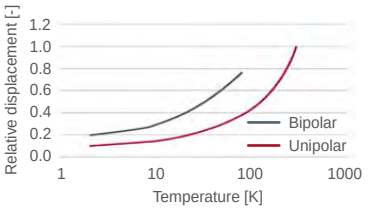


E00/E01 Closed-Loop Controllers

▸ Temperature Characteristic

Temperature change is a very important factor that affects the nano-positioning accuracy of piezoelectric ceramics. The performance of piezoelectric ceramics will change significantly with temperature changes. The operating temperature of stacked co-fired piezoelectric ceramics is -25°C~+80°C. If use it above 100°C, the performance of ceramics will greatly decrease. The displacement of the piezoelectric ceramics will be affected to a certain extent if the temperature increases, depending on the difference in temperature from the Curie temperature. If the ceramic is heated to the Curie temperature, depolarization will occur, and the piezoelectric effect will disappear, and it will not be restored. When the temperature decreases compared to room temperature, the piezoelectric effect decreases. When the low temperature is less than 260K, the loss is about 0.4% per K. In the environment of liquid nitrogen, the elongation of the ceramic is about 10% of that in the room temperature environment.

The axial thermal expansion coefficient: about -5ppm/°C for low voltage PZT, +2ppm/°C for high voltage .



Compared with the room temperature environment, the displacement corresponding to different voltages in the low temperature environment is relatively reduced.

▸ Preload and Load Capacity

The tensile strength of piezoelectric ceramics is very low, about 5MPa, so it is recommended to add a certain preload force during installation and use. Based on the experience, 7MPa can compensate for the tensile force generated by high dynamics. If it is a constant force, it is better not to exceed 15MPa. The preload force is generally one-tenth of the maximum load of the actuator. For ceramics with a small height, the lateral force produces a shearing force, and a relatively high ceramic produces a bending force. During use, it is necessary to avoid these two forces from causing damage to the ceramic. Preloaded force limitation: when ceramics are subjected to a pressure greater than tens of MPa, mechanical depolarization begins to occur, which can be re-polarized Through a large voltage signal, but the effective energy is lost, which will be detrimental to the service life of the component. Preloaded force will also generate tension, so when a high load acting on the ceramic exceeds the PZT's tensile strength, it will reduce the service life or damage the ceramic.

▸ Stiffness

The stiffness of piezoelectric ceramics is an important parameter for calculating blocking force, resonant frequency and other operating conditions. The stiffness of piezoelectric ceramics can be up to several hundred Newtons/micron. Calculated as follows:

$$K_{AStack} = \frac{E * A}{l}$$

K_{AStack} : The stiffness of piezoelectric ceramics

E : Effective modulus of elasticity

l : Length of piezoceramic

A : Cross-sectional area of piezoelectric ceramics

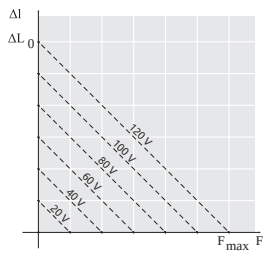
The stiffness of the piezoelectric benders is very low, which is several orders of magnitude lower than that of ordinary stacked ceramics.

▸ The Relationship between Displacement and Blocking Force

Displacemen ΔL_0: The displacement produced by piezoelectric ceramics. This value is measured under no-load conditions, that is, there is no resistance during the deformation process of piezoelectric ceramics. After applying voltage to the ceramic, the corresponding displacement is measured. Blocking force F_{max}: the maximum blocking force produced by piezoelectric ceramics. This value is the measured output force of piezoelectric ceramics under the maximum driving voltage and at the same time the displacement is 0, that is, the force that resists a large-stiffness load.

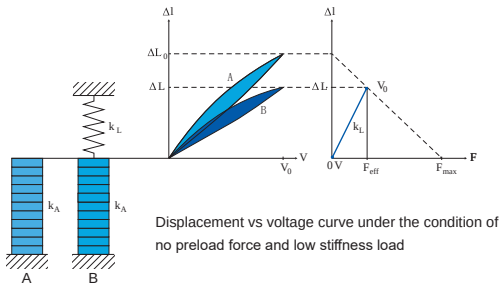
$$k_A = \frac{F_{max}}{\Delta L_0}$$

Suppose that piezo is fixed between two walls and the maximum voltage is applied to piezo. Due to the high stiffness of the two walls, piezo cannot be extended and the displacement is zero. At this time, the output force is the maximum blocking force. But in fact, any object will exhibit a certain modulus of elasticity. When the stiffness of the external mechanical structure is zero, the maximum voltage is applied to piezo, and piezo produces the maximum displacement. At this time, the blocking force is zero. The relationship between blocking force and displacement is shown on the right.



As long as there is stiffness in the external connection mechanical structure, there must be loss of displacement of the ceramic. The magnitude of the displacement loss depends on the stiffness of the external mechanical structure. The greater the stiffness of the external mechanical structure, the greater the loss of displacement. When the stiffness is the same as the stiffness of the ceramic, the displacement and blocking force are half of the maximum displacement and the maximum blocking force, and the ceramic energy efficiency is maximized.

The figure below shows the relationship diagram of the displacement of piezoelectric ceramics under different load.



Displacement vs voltage curve under the condition of no preload force and low stiffness load

Under the condition of no preload force and low stiffness load:

$$\Delta L \approx \Delta L_0 \left(\frac{k_A}{k_A + k_L}\right)$$

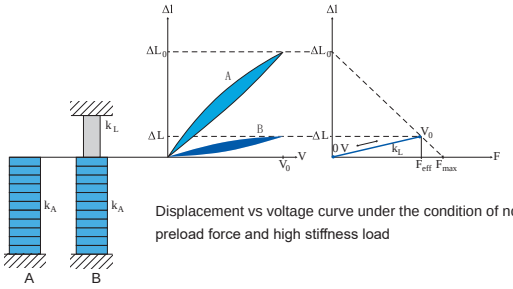
ΔL: Displacement

ΔL_0: Nominal displacement

k_A: Piezoelectric ceramic stiffness

k_L: Stiffness of the load

When subjected to a variable force, the displacement of the piezoelectric ceramics will have a certain loss. The specific loss depends on the stiffness of the external mechanical spring.



Displacement vs voltage curve under the condition of no preload force and high stiffness load

Under the condition of no preload force and high stiffness load:

$$F_{\text{eff}} \approx F_{\max} \left(\frac{k_L}{k_A + k_L}\right)$$

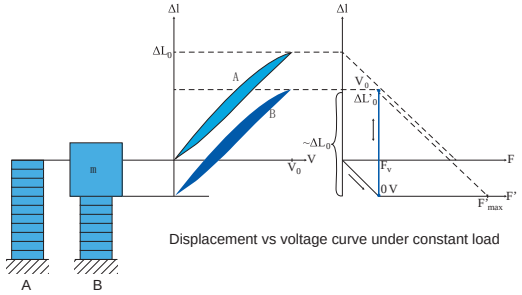
F_{eff}: Effective blocking force

F_{max}: Maximum blocking force

k_L: Stiffness of the load

k_A: Stiffness of piezoelectric ceramic

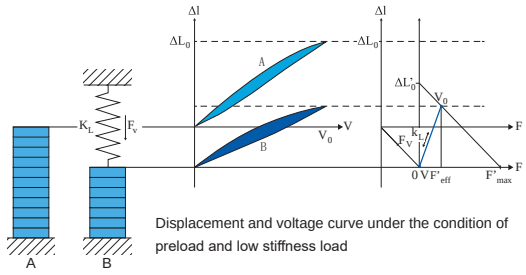
When it is necessary to produce greater blocking force, the stiffness of the load is greater than the stiffness of the ceramic.



Displacement vs voltage curve under constant load

Under constant load conditions:

When the load is a constant force, the piezoelectric ceramic will be compressed (the amount of compression depends on the stiffness of the ceramic and the magnitude of the load force), a nominal voltage is applied, and the piezoelectric ceramic will extend the nominal displacement on the basis of being compressed.



Displacement and voltage curve under the condition of preload and low stiffness load

Under the condition of preload force and low stiffness load:

For a low-stiffness load, the preloaded force of piezoelectric ceramic like a heavy object will cause the ceramic to be compressed, and the stiffness of the load will cause the ceramic to lose part of the displacement. Therefore, the stiffness of the load must be an order of magnitude smaller than that of the ceramic.

▸ Resonant Frequency

The resonance frequency of piezoelectric ceramics reflects the response time of ceramics and cannot be used as a frequency for ceramics. The resonant frequency is usually measured under a small driving signal when both ends are not fixed. When one end is fixed, the resonant frequency can be calculated by the formula on the right:

$$f_0' = f_0 \sqrt{\frac{m_{eff}}{m_{eff}'}}$$

f_0' : Loaded resonant frequency, Hz

f_0 : Unloaded resonant frequency, Hz

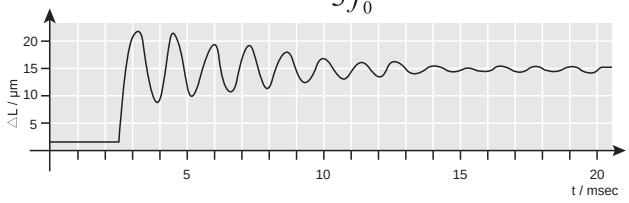
m_{eff} : Effective mass of piezoelectric ceramic, kg

m_{eff}' : Effective mass of load and piezoelectric ceramic, kg

▸ Response Time

Due to its high response frequency, piezoelectric ceramics rapidly expand and contract with changes in driving voltage. Therefore, piezoelectric ceramics are widely used in valve and shutter technology. The fastest response time of piezoelectric ceramics depends on its resonant frequency. Generally, the corresponding displacement is reached within 1/3 of the resonance time of the piezoelectric ceramic.

$$T_{\min} \approx \frac{1}{3 f_0}$$



▸ Dynamic Force

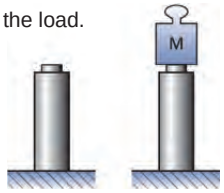
In dynamic applications, the push and pull force of piezoelectric ceramics exist at the same time, and the push force is far greater than the tension, and the tension has a great influence on piezoelectric ceramics. When piezoelectric ceramics are used in dynamic applications, the two forces alternately appear. Even if there is no external load, dynamic forces must still be considered. Therefore, it is necessary to choose ceramics with preload in dynamic applications.

When the piezoelectric ceramic is used at the frequency Fdyn of the sinusoidal signal, the dynamic force estimation formula is:

$$F_{\text{dyn}} \approx \pm 4\pi^2 m_{eff} \frac{\Delta L}{2} f^2$$

F_{dyn} : Blocking force, N
m_{eff} : Effective mass, kg
f : Operating frequency, Hz
ΔL : Peak-to-peak displacement, m

The effective mass m_{eff} is equal to 1/3 of the mass of the ceramic itself plus the weight of the load.



$m_{eff} \approx m/3$ $m_{eff} \approx m/3 + M$

Constant load is fixed on the moving end

▸ Resolution

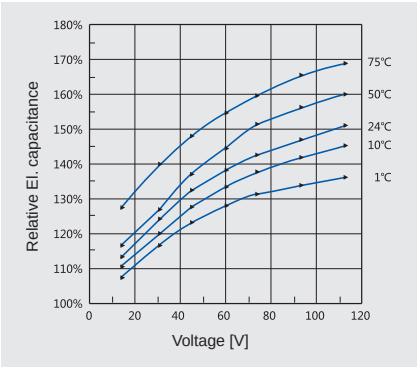
Piezoelectric ceramics have a very high resolution. The resolution of piezoelectric ceramics measured by the laser interferometer is 0.01nm, and the resolution that piezoelectric ceramics can show depends on the minimum output signal of the driving power supply. CoreMorrow E00/E01 piezoelectric controller can reach a resolution of one hundred thousandth of the full amplitude.

▸ Vacuum Compatibility

The piezoelectric effect is compatible with vacuum environments. For vacuum and ultrahigh-vacuum applications, a vacuum compatible version can be selected.

▸ Driving

Our company has many types of piezoelectric ceramics with operating voltage ranging from 60V to 1000V. Operating below the resonance frequency, the performance of the piezoelectric ceramic is equivalent to a capacitor, and the displacement depends on the amount of charge stored in the piezoelectric ceramic. The capacitance depends on the cross-sectional area, thickness, and piezoelectric material. The capacitance value in the parameter table is measured under very small voltage, low frequency, 20°C, and no load. It will change with changes in voltage amplitude, temperature and mechanical load. When the temperature rises to 80°C, the capacitance increases by about 70% compared with room temperature and small signal.



Piezoelectric ceramics can be regarded as capacitors under small signals, which can be calculated by the following formula.

$$C = n\,\varepsilon_{33}^{T} \frac{A}{h_L}$$

$$n \approx l / h_L$$

$$C = l\,\varepsilon_{33}^{T} \frac{A}{h_L^2}$$

C : El.capacitance, C
n : Number of piezoelectric ceramic layer
ε_{33}^{T} : Dielectric constant, As/Vm
A : Cross-sectional area of piezo, m^2
l : Length of piezo, m
h_L : Thickness of piezo, m

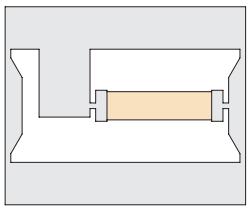
▸ Curie Temperature

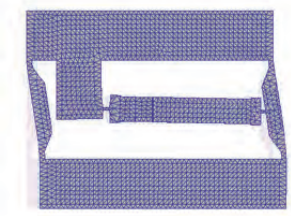
When the temperature of piezoelectric ceramic reaches the Curie temperature point, the piezoelectric ceramic will be depolarized. Therefore, in the process of using piezoelectric ceramics, keep it far below the Curie temperature. Generally, the Curie temperature of low-voltage piezoelectric ceramics is about 150~360°C, and that of high-voltage ceramics is about 215~340°C.

Piezo Technology

▸ Flexure Hinge Mechanism

1. Generally, the impact of rebound and friction of flexible hinges is negligible, but it is quite important in nano-positioning requirements and cannot be ignored. The nanopositioning stage adopts the elastic deformation of the flexible hinge mechanism and the mechanical amplification mechanism. The following figure shows the application of flexible hinges in piezoelectric mechanisms to achieve high resolution and large displacement. The magnifying mechanism and elastic load mechanism can achieve ultra-low tilt to ensure straightness.





2.The main materials of piezo stages are aluminum alloy, stainless steel, etc.

1) Our main aluminum alloy is lightweight and high-strength super-duralumin. It is suitable for high dynamic and lightweight applications;

2) Our main steel is pre-hardened steel with a higher yield point. Since the Young's modulus of this material is 3 times that of aluminum alloy, high-rigidity piezoelectric platforms of different volumes can be produced;

3) In addition to conventional materials, materials with lower thermal expansion rates are also used. Because of their low thermal expansion rate, they are especially used to reduce the effects of temperature changes.

In addition to the above materials, other materials and surface treatments can also be customized.

▸ Integrated Sensor

SGS Resistive Sensor

The displacement is detected by the change in resistance after the deformation of the SGS sensor.

Function

Correct the hysteresis and creep of the piezoelectric element in the process of elongation and contraction.

Capacitive Sensor

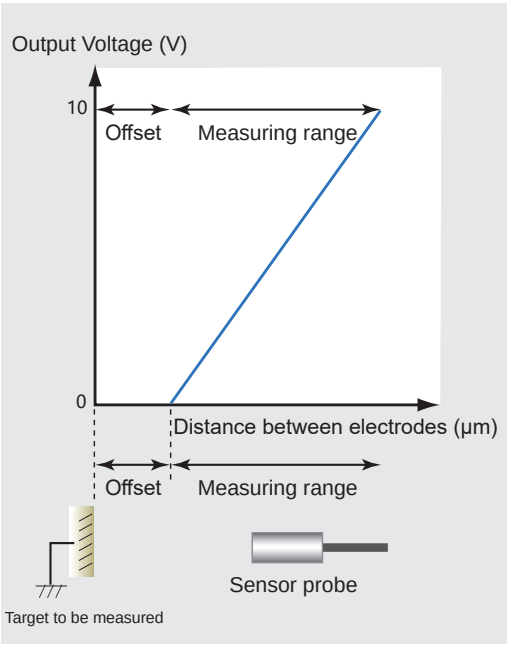
The capacitive sensor is composed of two parallel electrode plates. The two electrode plates are respectively on the measuring terminal and the measured target, and the change of the capacitance between the two electrode plates is converted into displacement. The sensor has the characteristics of high resolution, high reproducibility and high stability.

Function

When the distance between the sensor probe and the measured target is a certain distance, the sensor output is zero. The distance is called "offset". Set the measurement range according to the offset distance.

The offset is usually equivalent to 5~10% of the measurement range. The selectable measurement range varies according to the outer diameter of the measuring probe. The displacement resolution of the sensor is calculated by the following formula:

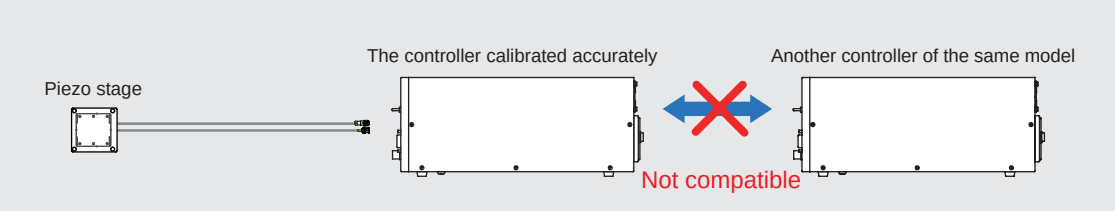
Resolution = Measurement Range/Output Voltage Width × Noise Level



▸ Servo Control

The sensor and the controller need to be calibrated, so the sensor and the controller must be used in one-to-one correspondence, and the wrong connection may cause damage.

For multi-axis piezo actuator, the corresponding axis must be connected with the output channel that has been calibrated with it, so be sure to pay attention to the corresponding connection.



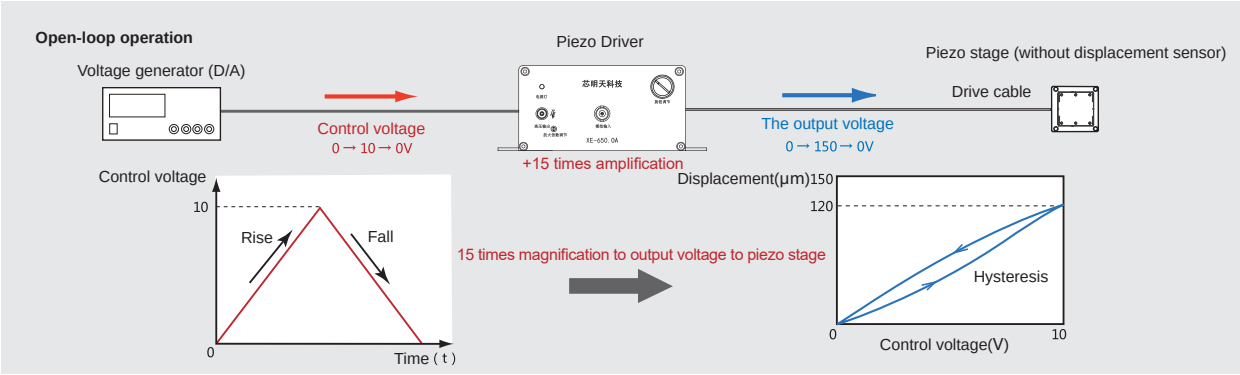
Open-loop operation output magnification is 15 times, inputting 0~10V analog signal, that is, applying 0~150V driving voltage to the nanopositioning stage, and the creep, hysteresis, and nonlinear characteristics of the piezoelectric element will cause the positioning to be not too accurate. In closed-loop operation, the piezoelectric controller can always detect the position signal in the nanopositioning stage, compensate and correct, so the 0~10V command signal and 0 to maximum displacement always maintain linearity.

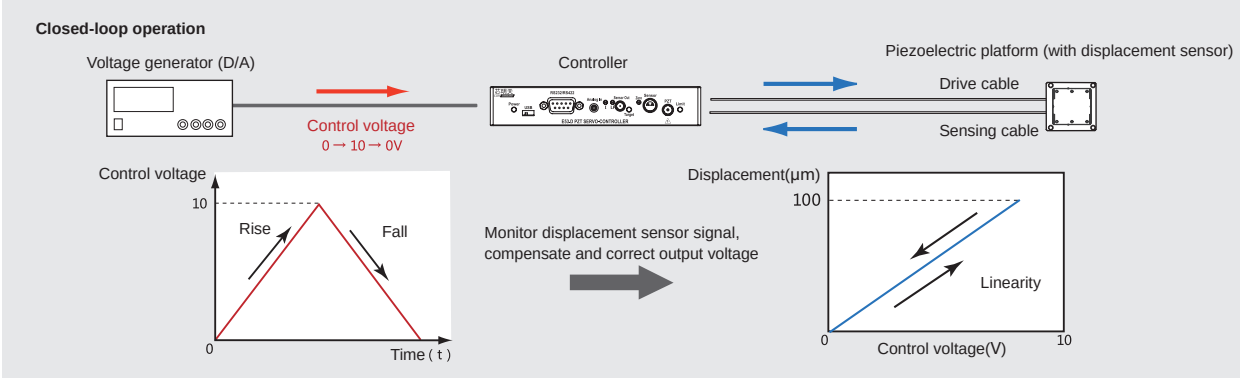
Example: The following describes that the analog signal voltage is linearly applied to the piezoelectric nanopositioning stage in open-loop and closed-loop operation. The following analog input values are in the order of 0V→10V→0V

Stroke range: 120μm, open loop

100μm, closed loop

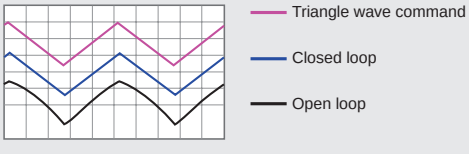
Input control voltage: 0V→10V→0V





※ The movement of the platform when input the triangular wave voltage

Comparison of open-loop and closed-loop motion of piezoelectric platform



Piezo Nanopositioning Stages



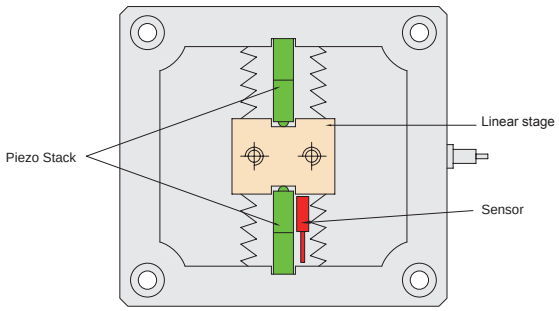
Piezo nanopositioning stage outputs displacement and force generated by piezo stacks Through mechanical flexible hinge, and is divided into two structures: direct drive and amplified drive.

Piezo Nanopositioning Stages

Piezo nanopositioning stages are drived by piezo actuators, combined with flexible hinge mechanism to realize X/Z/XY/ XZ/XYZ motion. The max travel range is up to 1mm. It has the characteristics of small size, fast response, etc. The high-precision sensor can be integrated to achieve nano-resolution and positioning accuracy with extremely high reliability.

▸ Characteristics

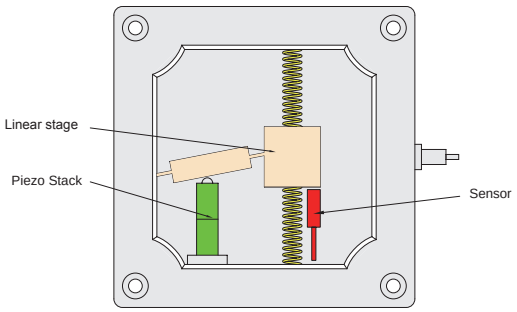
Direct-drive



Direct-drive

- High resolution, fast response
- Large stiffness, large load capacity

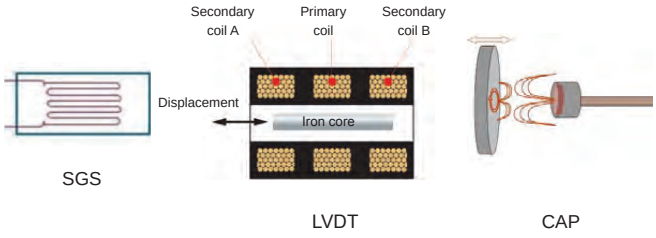
Amplified-drive



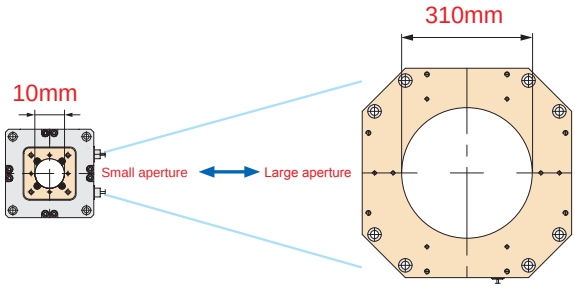
Amplified-drive

- Large displacement
- High resolution
- High accuracy of closed-loop repeatability

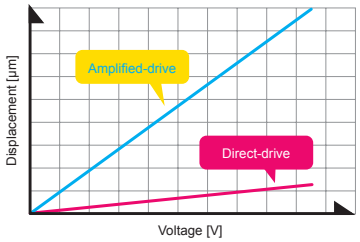
▸ Sensor Types



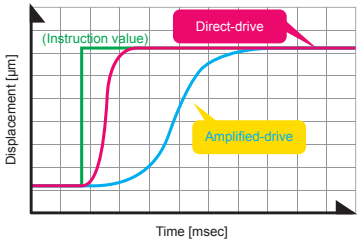
▸ Various Aperture Sizes



▸ Comparison of Direct Drive and Amplified Drive



In the same applied voltage, the displacement of the amplified-drive stage is several times to over ten times longer than that of direct-drive stage.



Response time affects positioning time

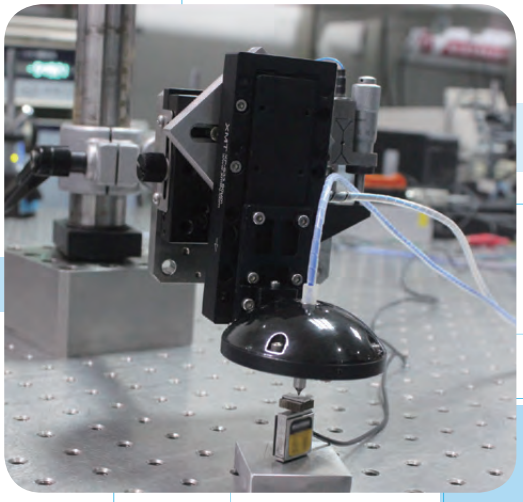
	Direct-drive	Amplified-drive
Resolution	A	A
Repeatability	A	A
Load capacity	A	B
Blocking force	A	B
Response time	A	B

Both drive modes have high accuracy for closed loop

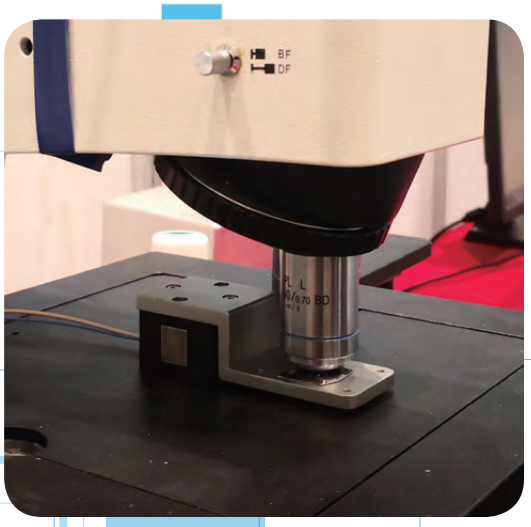
▸ Application

- Scanning microscope
- Optical path adjustment
- Nanometer manipulation technology
- CCD image processing
- Laser interference
- Nano-lithography, biotechnology
- Optical Communication
- Nano-measurement
- Nano imprint

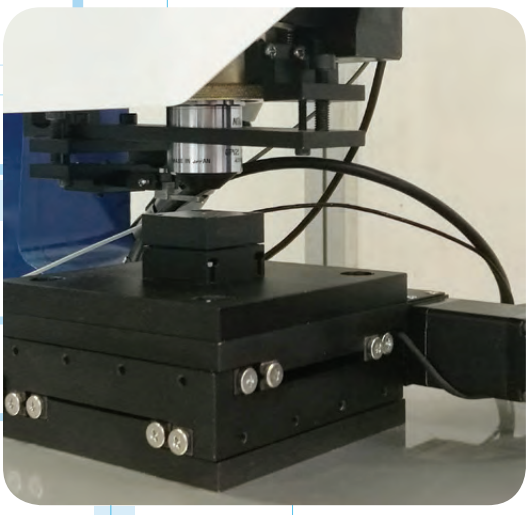
▸ Applications



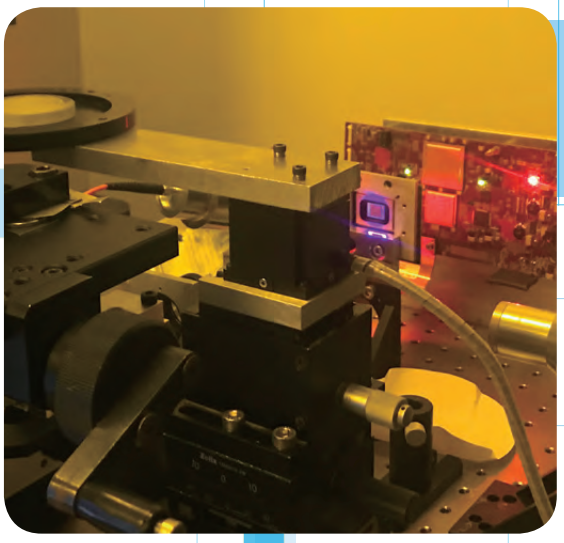
Aluminum Surface Processing



Structural Optical Tomography



Scanning Microscope

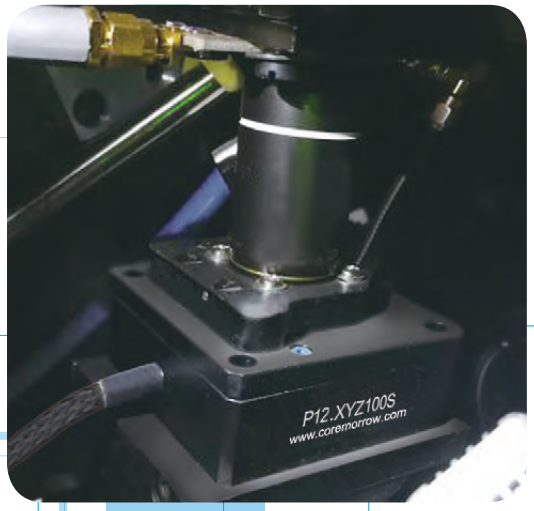


3D Micro-Nano Printing

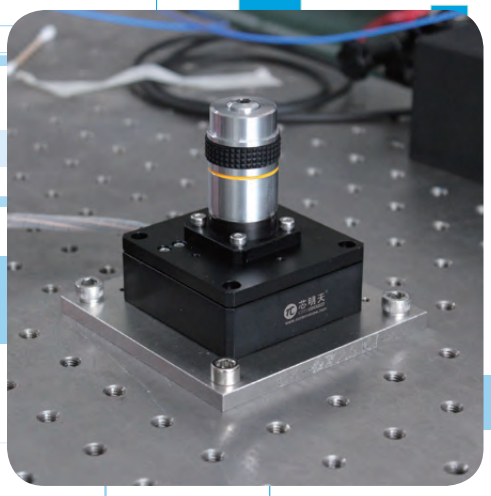
▸ Applications



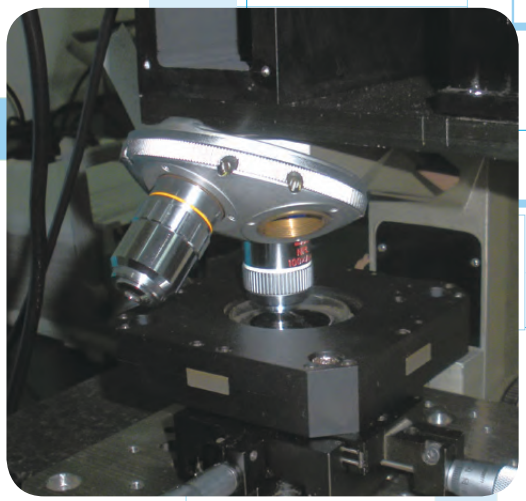
Microscopic imaging



Fluorescence Microscopy



Inverted Microscopy



Lithography

▸ Application

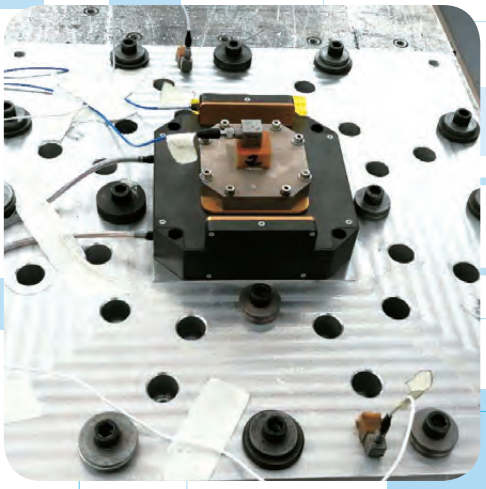
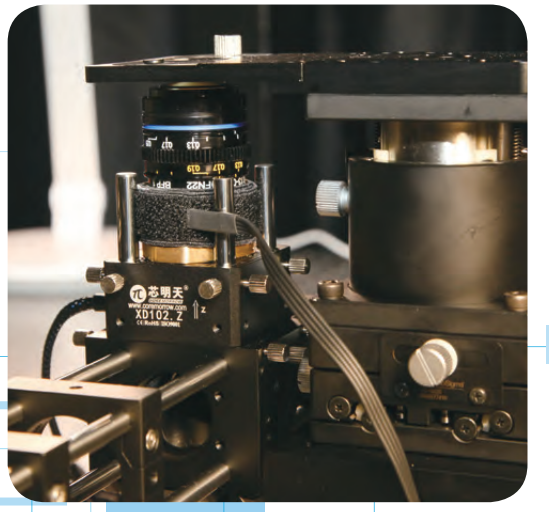
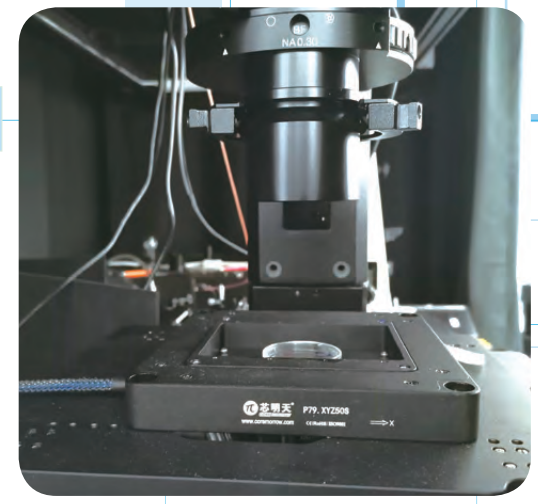


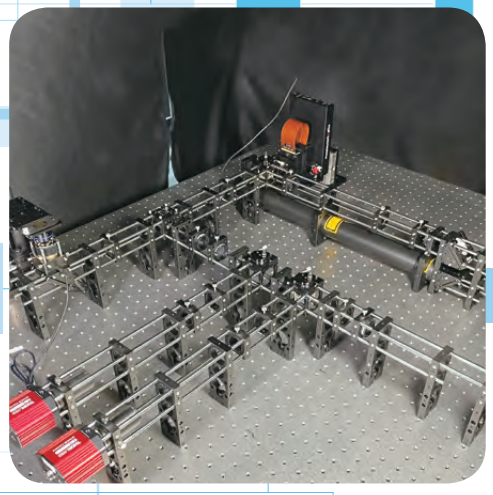
Image Stabilization



SPR Surface Plasmon Resonance



XYZ Positioning and Focusing



Nanopositioning

▸ Product List – No Aperture

Type	Models	Axes	Max.stroke [μm]	Load[kg] Horizontal/Vertical/ Inverted	Resonant frequency[kHz]	Resolution [nm]	Mechanism	Page
P11	P11.X100	X	100	0.8/0.05/0.8	0.3	1	Amplified	122
	P11.X200	X	200	0.5/0.03/0.5	0.3	2	Amplified	124
	P11.Z100	Z	100	0.8/0.05/0.05	0.7	1	Amplified	122
	P11.Z200	Z	200	0.5/0.03/0.03	0.18	2	Amplified	124
	P11.Z300	Z	300	0.4/0.02/0.02	0.12	2.5	Amplified	122
	P11.XY100	XY	100/axis	0.7/0.03/0.7	X0.2/Y0.3	1	Amplified	122
	P11.XY200	XY	200/axis	0.3/0.03/0.3	0.1	5	Amplified	124
	P11.XZ100	XZ	100/axis	0.7/0.04/0.05	X0.2/Z0.3	1	Amplified	122
	P11.XYZ100	XYZ	100/axis	0.6/0.04/0.04	X0.2/Y0.3/Z0.18	1	Amplified	122
	P11.XY200Z300	XYZ	XY180/Z300	0.2/0.03/0.05	X0.2/Y0.18/Z0.2	XY1.5,Z2.5	Amplified	125
P13	P13.XY30	XY	45/axis	0.2/0.1/0.2	0.6	0.5	Amplified	126
	P13.XY50	XY	43/axis	0.8/0.02/0.5	X0.55/Y0.52	0.5	Amplified	126
	P13.XYZ40	XYZ	48/axis	0.2/0.1/0.1	0.6	3	Amplified	126
	P13.XY50Z7	XYZ	XY43/Z8	0.8/0.02/0.05	X0.55/Y0.52/Z8.7	XY0.5,Z0.1	Amplified	126
	P13.XY100Z10	XYZ	XY115/Z10	0.8/0.8/0.8	-	XY0.5/Z0.1	Amplified	126
P60	P60.X200	X	200	5/3/5	0.37	2	Amplified	128
	P60.X250	X	±165	1/0.5/1	0.49	3	Amplified	129
	P60.Z250	Z	250	1/0.05/0.1	0.26	2	Amplified	130
	P60.Z500	Z	500	2/0.03/0.07	0.29	4	Amplified	130
	P60.Z1000-C	Z	1000	1.5/0.02/0.05	0.08	10	Amplified	130
	P60.Z500-C	Z	500	2.5/1.5/1.5	0.26	4	Amplified	131
	P60.XYZ200	XYZ	200	0.3/0.1/0.1	0.27	2	Amplified	132
P63	P63.X7	X	6.8	0.8/0.1/0.8	2	0.1	Direct	133
	P63.Z7	Z	6.8	0.8/0.05/0.1	2.5	0.1	Direct	133
	P63.XY7	XY	6.8/axis	0.5/0.1/0.5	X1.3/Y1.9	0.1	Direct	133
	P63.XZ7	XZ	6.8/axis	0.5/0.05/0.1	X1.5/Z1.6	0.1	Direct	133
	P63.XYZ7	XYZ	6.8/axis	0.4/0.05/0.1	X0.9/Y0.95/Z1.2	0.1	Direct	133
	P63.X18	X	18	0.5/0.1/0.5	2	0.2	Direct	135
	P63.Z8	Z	8	0.5/0.05/0.1	1	0.1	Direct	135
	P63.XY18	XY	18/axis	0.5/0.1/0.5	2	0.2	Direct	135
	P63.X18Z8	XZ	X18/Z8	0.5/0.05/0.1	X2/Z1	X0.2,Z0.1	Direct	135
	P63.XY18Z8	XYZ	XY18/Z8	0.5/0.05/0.1	X2/Y2/Z1	XY0.2,Z0.1	Direct	135
P65	P65.XY200Z50	XYZ	XY200/Z50	1/0.1/0.2	X0.26/Y0.22/Z0.28	XY1/Z0.6	Amplified	134

▶ Product List – No Aperture

Type	Models	Axes	Max.stroke [µm]	Load[kg] Horizontal/Vertical/ Inverted	Resonant frequency[kHz]	Resolution [nm]	Mechanism	Page
P66	P66.X2K	X	2.4	1/1/1	12	0.5	Direct	137
	P66.X30	X	30	8/0.3/8	5	0.5	Direct	138
	P66.X30-C	X	38	1/0.3/1	2	0.5	Direct	140
	P66.X60	X	60	6/0.1/6	2.8	0.5	Direct	138
	P66.Z30	Z	30	1/0.05/0.1	1.4	0.5	Amplified	138
	P66.XY30	XY	30/axis	5/0.3/5	X0.9/Y1.6	0.5	Direct	138
	P66.XY60	XY	60/axis	4/0.1/4	X0.9/Y1.2	0.5	Direct	138
	P66.XZ30	XZ	30/axis	1/0.05/0.1	X1.5/Z0.8	0.5	Direct	138
	P66.XYZ30	XYZ	30/axis	1/0.05/0.1	X0.6/Y0.7/Z1.2	0.5	Direct	138
	P66.X90	X	95	10/5/10	0.6	1	Direct	141
	P66.XZ100Y30	XYZ	X125/Y35/ Z105	1/0.5/0.5	X0.27/Y0.475/ Z0.56	XZ1.5/Y0.5	Amplified +Direct	142
XD604	XD604.XZ8	XZ	8/axis	80/10/10	0.56	0.1	Direct	143
XD611	XD611.Z300	Z	300	0.3/0.02/0.02	0.105	3	Amplified	144
	XD611.XYZ500	XYZ	500/axis	0.2/0.02/0.02	X0.08/Y0.13/Z0.08	7	Amplified	145
XD731	XD731.XYZ100	XYZ	100/axis	0.5/0.2/0.4	0.4	1	Amplified	146
XD770	XD770.300	Z	300	5/0.08/0.4	0.38	3	Amplified	147
XD780	XD780.50	X	50	5/5/5	2.2	0.5	Direct	148
	XD780.150	X	150	5/5/5	0.76	1.5	Amplified	148
	XD780.200	X	200	5/5/5	0.7	2	Amplified	148
XP-611	XP-611.X100	X	100	0.8/-/-	0.28	1	Amplified	150
	XP-611.Z100	Z	100	1.2/-/-	0.28	1	Amplified	150
P13.XYZ	P13.XYZ180K	XYZ	180/axis	0.1/0.05/0.05	0.1	5	Amplified	152
20059	20059	Z	1000	0.7/-/-	-	8	Amplified	152
20090	20090	XY	30/axis	2/-/-	>0.18	-	Amplified	152
20100	20100	XYZ	XY400Z100	-	-	-	Amplified	153
20136	20136	XZ	100/axis	10/-/-	-	-	Amplified	153
21001	21001	XYZ	20/axis	5/-/-	-	1	Amplified	153
21099	21099	XZ	200/axis	3/-/-	0.25	10	Amplified	154
21136	21136	X	±50	2/-/-	-	-	Amplified	154
21147	21147	XYZ	500/axis	0.1/-/-	-	better than the 70	Amplified	154
21210	21210	X	250	0.3/-/-	0.26	better than the 42	Amplified	155
22025	22025	Z	100	5/-/-	0.68	-	Amplified	155

▸ Product List – With Aperture

Type	Models	Axes	Max.stroke [μm]	Aperture [mm]	Load[kg] Horizontal/Vertical/ Inverted	Resonant frequency[kHz]	Resolution [nm]	Mechanism	Page
P12	P12.X100	X	100	Φ25/Φ35	0.8/0.05/0.8	0.23	1	Amplified	156
	P12.Z100	Z	100	Φ25/Φ35	0.8/0.05/0.05	0.22	1	Amplified	156
	P12.Z200	Z	200	Φ25/Φ35	0.5/0.04/0.04	0.15	2	Amplified	156
	P12.Z300	Z	300	Φ25/Φ35	0.4/0.03/0.03	0.1	2.5	Amplified	156
	P12.XY100	XY	100/axis	Φ25/Φ35	0.7/0.04/0.7	X0.18/Y0.23	1	Amplified	156
	P12.XZ100	XZ	100/axis	Φ25/Φ35	0.6/0.04/0.04	0.2	1	Amplified	156
	P12.XYZ100	XYZ	100/axis	Φ25/Φ35	0.6/0.03/0.03	X0.23/Y0.18/Z0.15	1	Amplified	156
	P12.XY500Z800	XYZ	XY500/Z800	Φ18	0.02/0.02/0.25	-	XY4/Z6.5	Amplified	158
P12A	P12A.X100	X	100	45×45	0.7/0.05/0.7	0.23	1	Amplified	159
	P12A.X200	X	200	45×45	0.5/0.03/0.5	0.16	2	Amplified	159
	P12A.Z100	Z	100	45×45	0.7/0.03/0.05	0.2	1	Amplified	159
	P12A.Z200	Z	200	45×45	0.5/0.03/0.03	0.16	2	Amplified	159
	P12A.Z400	Z	400	45×45	0.4/0.02/0.02	0.13	3.5	Amplified	159
	P12A.Z600	Z	600	45×45	0.3/0.01/0.01	0.08	5	Amplified	159
	P12A.XY100	XY	100/axis	45×45	0.6/0.03/0.6	X0.17/Y0.2	1	Amplified	159
	P12A.XY200	XY	200/axis	45×45	0.4/0.02/0.4	X0.16/Y0.14	2	Amplified	159
	P12A.XZ100	XZ	100/axis	45×45	0.6/0.02/0.04	X0.2/Z0.15	1	Amplified	159
	P12A.XZ200	XZ	200/axis	45×45	0.4/0.01/0.02	X0.16/Y0.14	2	Amplified	159
	P12A.XYZ100	XYZ	100/axis	45×45	0.5/0.02/0.02	X0.2/Y0.15/Z0.12	1	Amplified	159
	P12A.XYZ200	XYZ	200/axis	45×45	0.3/0.01/0.01	X0.15/Y0.13/Z0.09	2	Amplified	159
	P12A.XY200Z100	XYZ	XY250/Z100	45×45	0.5/0.02/0.05	XY0.24/Z0.15	XY3/Z1	Amplified	162
P12B	P12B.XYZ100	XYZ	100/axis	Φ10	0.2/0.03/0.03	0.03	1	Amplified	163
P13A	P13A.XY90	XY	90/axis	10×10	0.15/0.1/0.15	0.45	0.3	Amplified	164
	P13A.XYZ80	XYZ	80/axis	5×5	0.2/0.05/0.05	0.35	0.3	Amplified	164
	P13A.XY180	XY	180/axis	15×15	0.2/0.05/0.05	-	1	Amplified	164
P15	P15.XY50	XY	60/axis	50×50	0.5/0.1/0.5	0.27/0.325	1	Amplified	166
	P15.XY100	XY	100/axis	65×55	0.5/0.08/0.5	0.49	1	Amplified	165
	P15.XYZ100	XYZ	120/axis	60×60	1/0.5/0.5	X0.3/Y0.35/Z0.4	1	Amplified	166
	P15.XYZ120	XYZ	120/axis	60×60	2/1/1	X0.389/Y0.355/Z0.4	1	Amplified	166
	P15.XY100-C	XY	100/axis	66×66	6/0.5/6	0.2	1	Amplified	166
	P15.XYZ300	XYZ	300/axis	66×66	0.5/0.05/0.5	X0.14/Y0.17/Z0.22	2.5	Amplified	166
	P15.XYZ300-A	XYZ	XY±150/Z300	66×66	5/1/1	X0.18/Y0.2/Z0.2	5	Amplified	166
	P15.XYZ300-C	XYZ	XY±150/Z300	66×66	3/0.5/0.5	X0.19/Y0.145/Z0.249	2.5	Amplified	166
P16	P16.XY15	XY	±8/axis	Φ37	1/0.2/1	1.5	0.2	Amplified	168
	P16.XY20	XY	±8/axis	Φ26	1/0.2/1	2	0.2	Amplified	169
	P16.XY20Z7	XYZ	XY±12.5/Z8.5	Φ26	0.5/0.1/0.1	XY1.7/Z1.4	XY0.3/Z0.2	Amplified	169
	P16.XY50	XY	50/axis	Φ20	1.5/0.05/1.5	0.5	0.5	Amplified	171
	P16.XY80	XY	±40/axis	Φ43	0.5/0.3/0.5	0.7	1	Amplified	171
	P16.XY100	XY	±40/axis	Φ20	1.5/0.4/1.5	0.6	1	Amplified	171
P17	P17.XY15	XY	15/axis	25×27.5	0.2/0.05/0.2	1	0.2	Direct	173
	P17.XY200	XY	187.5/axis	60×60	1/0.07/1	X0.24/Y0.4	1.5	Amplified	175
P18	P18.X200	X	250	Φ35	2/1/1	0.5	2	Amplified	177
	P18.X300	X	±187.5	Φ35	3.5/1.5/2	0.6	3	Amplified	177
	P18.Z200	Z	200	Φ35	1/0.5/0.5	0.3	2	Amplified	177
	P18.XY200	XY	250/axis	Φ35	1.5/0.8/1.5	X0.2/Y0.45	2	Amplified	177
	P18.XY300	XY	±187.5/axis	Φ35	3/1.5/3	X0.25/Y0.5	3	Amplified	177
	P18.XZ200	XZ	200/axis	Φ35	1/0.5/0.5	X0.2/Z0.3	2	Amplified	177
	P18.XYZ200	XYZ	200/axis	Φ35	0.8/0.4/0.4	X0.12/Y0.2/Z0.3	2	Amplified	177
P18A	P18A.X200	X	200	25×25	5/3/5	0.53	3	Amplified	179
P70	P70.XY20	XY	±8.5/axis	Φ10	0.3/0.1/0.3	1.2	0.2	Amplified	180
	P70.Z8	Z	8	Φ12	0.2/0.03/0.05	3.6	0.1	Direct	180
	P70.Z200	Z	170	Φ10	0.5/0.02/0.02	0.5	2	Amplified	181
P77	P77.S/K36-C	Z	17.5	Φ36	7/1/5	0.3	0.2	Direct	182
	P77.50S/K85	Z	50	Φ85	3/0.8/2	1.1	0.4	Direct	182
	P77.100S/K85	Z	100	Φ85	3/1/1	0.19	1.5	Amplified	182
	P77.S/K106	Z	17.5	Φ106	15/5/10	0.3	0.2	Direct	182
	P77.S/K106-A	Z	17.5	Φ106	10/5/5	0.15	0.2	Direct	182

▸ Product List – With Aperture

Type	Models	Axes	Max.stroke [μm]	Aperture [mm]	Load[kg] Horizontal/Vertical/ Inverted	Resonant frequency [kHz]	Resolution [nm]	Mechanism	Page
P77	P77.30S/K140	Z	16/32	Φ140	-/5/-	0.2	0.2	Direct	182
	P77.S/K155	Z	17	Φ155	25/20/20	1.3	0.2	Direct	182
	P77.S/K160	Z	17.5	Φ160	10/5/5	0.14	0.2	Direct	182
	P77.S/K160-A	Z	17.5	Φ160	10/5/2	0.12	0.2	Direct	182
	P77.S/K210	Z	17.5	Φ210	10/5/5	0.1	0.2	Direct	182
	P77.S/K242	Z	17.5	Φ242	15/1/10	3.09	0.2	Direct	182
	P77.S/K310	Z	17	Φ310	22/22/22	1.5	0.2	Direct	182
P77A	P77A.S/K50	Z	17	Φ49	5/1/2	3	0.2	Direct	186
	P77A.S/K65	Z	17	Φ65	5/2/3	1.4	0.2	Direct	186
	P77A.50S/K65	Z	43	Φ65	3/1/2	1.4	0.5	Direct	186
	P77A.100S/K75	Z	100	Φ75	1/1/3	0.35	1	Amplified	186
P78	P78.Z100-D	Z	100	120×70	1/0.03/0.3	0.4	1	Amplified	188
	P78.Z200	Z	187.5	64×64	1/0.01/0.1	0.27	1.5	Amplified	189
	P78.Z300	Z	262.5	64×64	0.5/0.01/0.1	0.2	2.5	Amplified	189
P78A	P78A.Z200	Z	200	Φ25	0.2/0.02/2	-	3	Amplified	190
P79	P79.Z100	Z	100	83×65	2/0.15/0.3	0.2	1	Amplified	191
	P79.Z200	Z	187.5	83×65	1.5/0.1/0.2	0.15	1.5	Amplified	191
	P79.Z200S/ K86-D	Z	200	86.5×128.5	1.5/0.05/0.2	0.1	2	Amplified	191
	P79.XYZ50	XYZ	50/axis	84×65	0.5/0.05/0.1	X0.52/Y0.63/Z0.49	0.5	Amplified	191
	P79.XYZ50-C	XYZ	50/axis	84×65	0.5/0.05/0.1	X0.499/Y0.589/Z0.47	0.5	Amplified	191
XD106	XD106.XYZ60	XYZ	70/axis	Φ10	0.2/0.1/0.1	X0.415/Y0.465/Z0.497	2	Amplified	193
	XD106.XYZ200	XYZ	XY±100/Z100	Φ50	0.7/0.1/0.1	X0.18/Y0.18/Z0.25	2	Amplified	193
XD107	XD107.XY100Z80	XYZ	XY100/Z80	50×50	0.4/0.03/0.04	XY0.22/Z0.16	1	Amplified	194
XD108	XD108.X30	X	30	11×11	0.1/0.03/0.1	3.3	0.3	Amplified	195
	XD108.X40	X	37	11×11	0.1/0.02/0.1	2.2	0.4	Amplified	195
XD110	XD110.Z50	Z	50	66×66	5/0.1/0.5	0.37	0.5	Amplified	196
XD781	XD781.50	Z	60	Φ28	0.4/0.15/0.15	0.22	1	Amplified	197
	XD781.100	Z	100	191.2×140.4	1/0.03/0.2	0.3	1	Amplified	198
XP-780	XP-780.X	X	200	25×25	5/-/-	0.2	2	Amplified	199
18130	18130	Z	90	128×60	-	-	-	Amplified	201
19113	19113	Z	500	127×87	0.6/-/-	-	-	Amplified	201
20142	20142	XY	10/axis	Φ33	0.15/-/-	≥ 0.5	-	Amplified	201
20180	20180	XYZ	XY80Z15	20×20	0.5/-/-	X0.47/Y0.59/Z0.9	better than the 10.7	Amplified	202
20190	20190	XY	200/axis	86×86	40/-/-	0.16	-	Amplified	202
21041	21041	Z	80	156×132	3/-/-	-	-	Amplified	202
21125	21125	Z	250	Φ22	2/-/-	0.24	better than the 35	Amplified	203
22071	22071	XY	45/axis	80×80	0.2/-/-	X0.5/Y0.8	2	Amplified	203
22078	22078	XY	±200/axis	120×60	1.5/-/-	>0.04	<100	Amplified	203
22097	22097	XYZ	XY1000/Z100	45×45	0.05/-/-	0.15	1	Amplified	204
22099	22099	Z	500	116×80	0.2/-/-	-	9	Amplified	204

P11 Piezo Nanopositioning Stage(Amplified Drive)





Vacuum version

P11 is a small-volume 1~3 axes piezo nanopositioning stage. It adopts a no-friction flexible hinge guiding mechanism and amplified-drive mechanism to ensure 100μm displacement. Closed-loop version could achieve positioning accuracy up to nano-scale. It has excellent control precision, the resolution and stability could reach nanometer level, stabilization time is only milliseconds, the stage is non-magnetic material, and is not affected by the magnetic field in operating.

▸ Characteristics

• 1~3 axes motion • XYZ stroke to 300μm/axis • Small size • Fast response time • Vacuum version available

▸ 1~3 Axes

P11 includes X, Z, XY, XZ, XYZ versions. Precise motion of 100μm can be achieved.

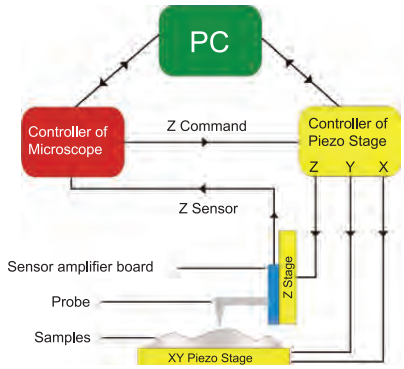
▸ Applications

• Nanopositioning • Quality assurance test
• Biotechnology • Micromachining / precision control

▸ Combination with Manual Micrometer



▸ AFM



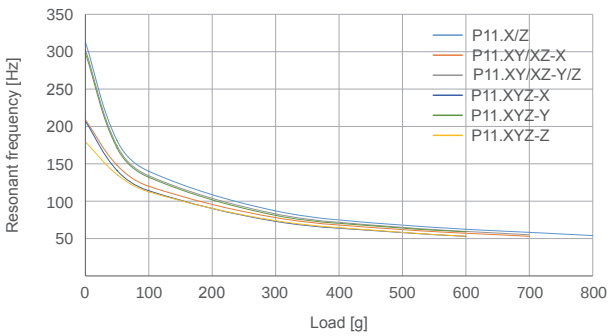
▸ Fast Response Time, Large Stroke

P11 adopts amplified mechanism and built-in high-reliability piezo actuator, which could realize precise motion of 100μm.

There are open-loop and closed-loop versions. Closed-loop version integrates high-precision sensors to detect and feedback the position in real time. CoreMorrow E00/E01, E52/E53 piezo servo controllers are ideal for driving PZT.

P11 has very fast response time, and the step time could be up to 0.8ms with E52 piezo controller.

▸ Frequency vs Load Curve



▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers".		

▸ Technical Data

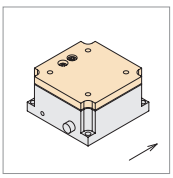
Type	S-Closed loop K-Open loop	P11.X100S P11.X100K	P11.Z100S P11.Z100K	P11.Z300S P11.Z300K	P11.XY100S P11.XY100K	P11.XZ100S P11.XZ100K	P11.XYZ100S P11.XYZ100K	Units
Active axes		X	Z	Z	X, Y	X, Z	X, Y, Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		80	80	240	80/axis	80/axis	80/axis	μm±10%
Max.travel range(0~150V)		100	100	300	100/axis	100/axis	100/axis	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Closed/open loop resolution		3/1	3/1	8/2.5	3/1	3/1	3/1	nm
Linearity		0.05/-	0.05/-	0.5/-	0.1/-	0.1/-	0.1/-	%F.S.
Repeatability		0.02/-	0.02/-	0.12/-	0.03/-	0.03/-	0.05/-	%F.S.
Pitch/yaw/roll		<10	<10	<10	<10	<10	<10	μrad
Push/pull force		30/10	30/10	50/4	25/10	25/10	30/5	N
Stiffness		0.3	0.3	0.25	X0.25/Y0.3	X0.25/Z0.3	X0.25/Y0.3/Z0.2	N/μm±20%
Unloaded resonant frequency		0.3	0.7	0.12	X0.2/Y0.3	X0.2/Z0.3	X0.2/Y0.3/Z0.18	kHz±20%
Closed/open-loop unloaded step time		10/0.8	10/0.8	10/0.8	15/0.8	15/0.8	20/0.8	ms±20%
Closed-loop operating frequency (-3dB)		70 (@100g load)	50 (@100g load)	-	50 (unloaded)	-	-	Hz±20%
Load capacity	Horizontal	0.8	0.8	0.4	0.7	0.7	0.6	kg
	Vertical	0.05	0.05	0.02	0.03	0.04	0.04	
	Inverted	0.8	0.05	0.02	0.7	0.05	0.04	
El. capacitance		1.8	1.8	5.4	1.8/axis	1.8/axis	1.8/axis	μF±20%
Material		Steel, Aluminum						
Mass		100	100	185	170	170	230	g±5%

Note: Max driving voltage could be -20V~150V, Recommended voltage 0~120V for long-term operation to extend lifetime.

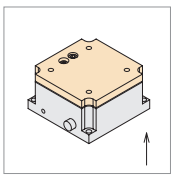
Technical data is measured by CoreMorrow E00/E01 series piezo controller.

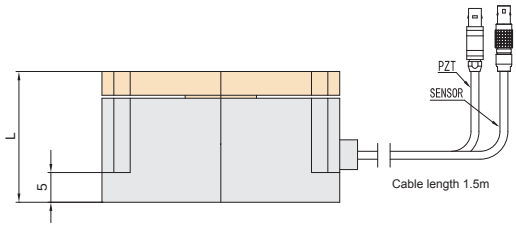
▸ Drawings

P11.X100

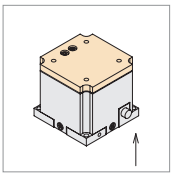


P11.Z100

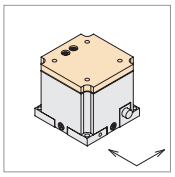


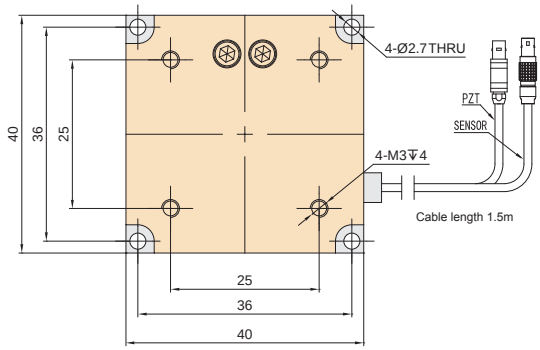


P11.Z300

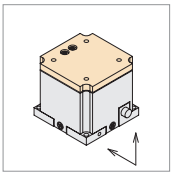


P11.XY100

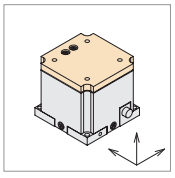




P11.XZ100



P11.XYZ100



Models	L(mm)
P11.X100	22
P11.Z100	22
P11.Z300	36.5

Models	L(mm)
P11.XY100	36.5
P11.XZ100	36.5
P11.XYZ100	36.5

P11.X/Z200 Piezo Nanopositioning Stage



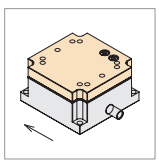
P11.X/Z/XY200 is a small-volume piezo nanopositioning stage, its travel range can reach 200μm, and a closed-loop feedback sensor can be selected to obtain higher precision. Custom low temperature vacuum versions are available.

▸ Technical Data

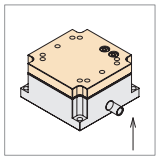
Type	S-Closed loop K-Open loop	P11.X200S	P11.X200K	P11.Z200S	P11.Z200K	P11.XY200S	P11.XY200K	Units
Active axes		X	X	Z	Z	X,Y	X,Y	
Drive control		1 driving channel 1 sensing channel	1 driving channel	1 driving channel 1 sensing channel	1 driving channel	2 driving channels 2 sensing channels	2 driving channels	
Travel range(0~120V)		160	160	160	160	160/axis	160/axis	μm±20%
Max.travel range(0~150V)		200	200	200	200	200/axis	200/axis	μm±20%
Sensor		SGS	-	SGS	-	SGS	-	
Closed/open loop resolution		5.5	2	5.5	2	10	5	nm
Linearity		0.05	-	0.15	-	0.05	-	%F.S.
Repeatability		0.02	-	0.06	-	0.02	-	%F.S.
Pitch/yaw/roll		<20	<20	<10	<10	-	-	μrad
Push/pull force		-	-	70/6	70/6	-	-	N
Vacuum compatible		10^-4	10^-4	-	-	-	-	Pa
Stiffness		-	-	0.45	0.45	-	-	N/μm±20%
Unloaded resonant frequency		0.3	0.3	0.18	0.18	0.1	0.1	kHz±20%
Closed/open-loop unloaded step time		20	0.8	10	0.8	-	-	ms±20%
Load capacity	Horizontal	0.5	0.5	0.5	0.5	0.3	0.3	kg
	Vertical	0.03	0.03	0.03	0.03	0.03	0.03	
	Inverted	0.5	0.5	0.03	0.03	0.3	0.3	
El. capacitance		3.6	3.6	3.6	3.6	3.6/axis	3.6/axis	μF±20%
Material		Steel, Al	Steel, Al	Steel, Al	Steel, Al	Steel, Al	Steel, Al	
Mass		-	-	170	170	-	-	g±5%

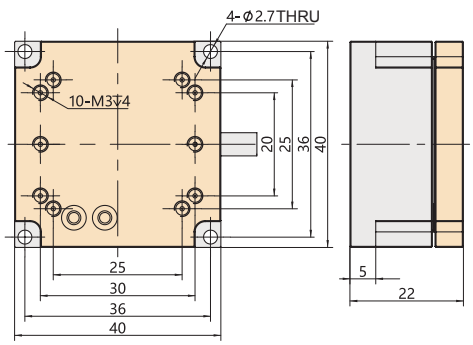
▸ Drawing

P11.X200S/K

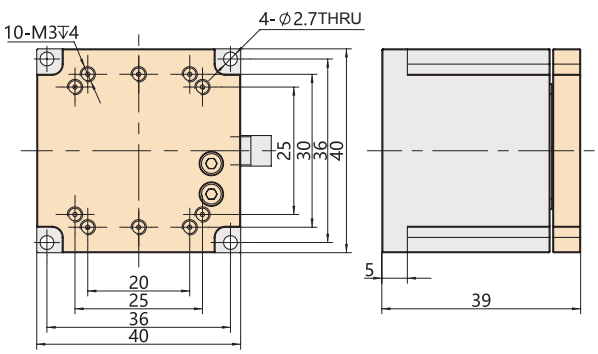


P11.Z200S/K





P11.XY200S/K



P11.XY200Z300S/K Piezo Nanopositioning Stage



▸ Characteristics

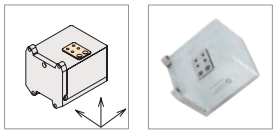
• XYZ motion • Stroke to X180/Y180/Z300μm • Load capacity to 200g • Open/closed-loop versions • Vacuum version available

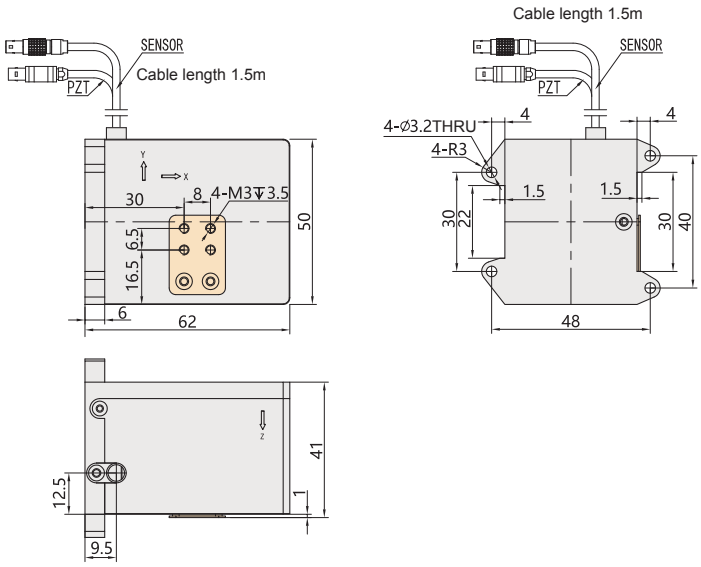
▸ Technical Data

Type		P11.XY200Z300S	P11.XY200Z300K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		3 driving channels, 3 sensing channels	3 driving channels	
Driving source		Piezo Stack	Piezo Stack	
Travel range(0~120V)		X130/Y130/Z250	X130/Y130/Z250	μm±10%
Max.travel range(0~150V)		X180/Y180/Z300	X180/Y180/Z300	μm±10%
Sensor		SGS	-	
Resolution		XY4.5, Z8.5	XY1.5, Z2.5	nm
Linearity		0.4	-	%F.S.
Repeatability		0.1	-	%F.S.
Unloaded resonant frequency		X200/Y180/Z200	X200/Y180/Z200	Hz±20%
Closed-loop operating frequency (-3dB)		40 (@50g load)	-	Hz±20%
Load capacity	Horizontal mounting	0.2	0.2	kg
	Vertical mounting	0.03	0.03	
	Inverted mounting	0.05	0.05	
EI. capacitance		X2.2/Y2.2/Z7	X2.2/Y2.2/Z7	μF±20%
Material		Steel, Aluminum	Steel, Aluminum	

▸ Drawing

P11.XY200Z300S/K





P13 Piezo Nanopositioning Stage(Amplified Drive)



P13 is an XY or XYZ piezo stage. It adopts parallel kinematic mechanism with built-in high-performance piezo actuator with displacement of 115μm/axis. Open loop or Closed loop version is available.

▸ Characteristics

- 2~3 axes
- Small size
- Vacuum version available
- Max stroke to 115μm
- Fast response time
- Open/closed-loop versions

▸ Typical Application

- 2D/3D scanning
- Semiconductor
- AFM
- Optical path adjustment
- Micromanipulation
- Nanopositioning

▸ Ultra-Small Size, High Resolution

It has very high resolution and good linearity of motion.

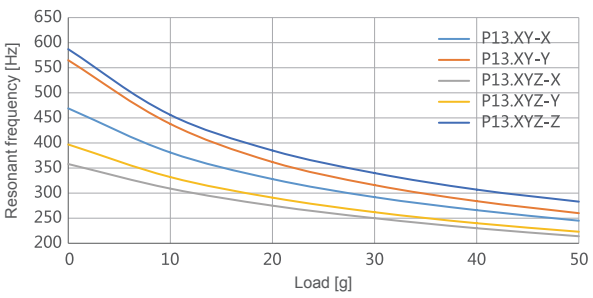
P13 could be easily mounted to other positioning systems and could be equipped with sensor to eliminate the hysteresis and creep of piezoelectric ceramics.

P13 Piezo Stage is ideal for dynamic and scanning applications.

▸ P13.XY50Z7



▸ Frequency vs Load Curve (P13.XY/XYZ)



▸ 2~3 Axes

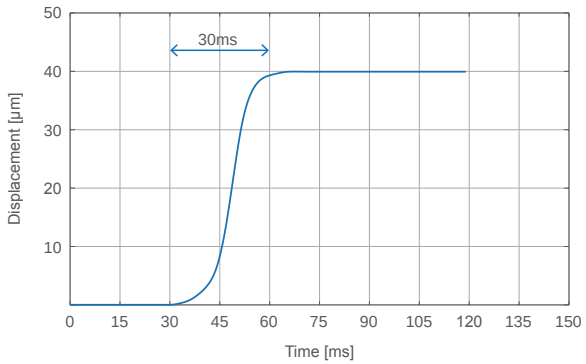
P13 piezo nanopositioning stage includes two specifications of XY axis and XYZ axis.





▸ Closed Loop Stabilization Time

Settling time of the P13.XY50S at full stroke is about 30ms.



▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

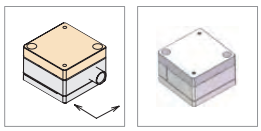
▸ Technical Data

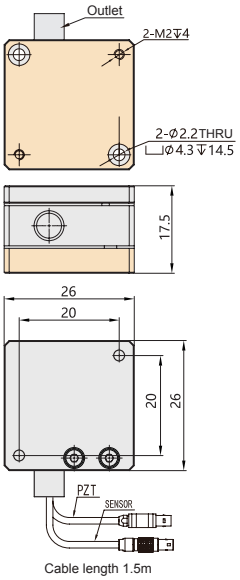
Type	S-Closed loop K-Open loop	P13.XY30S P13.XY30K	P13.XYZ40S P13.XYZ40K	P13.XY50S P13.XY50K	P13.XY50Z7S P13.XY50Z7K	P13.XY100Z10S P13.XY100Z10K	Units
Active axes		X, Y	X, Y, Z	X, Y	X, Y, Z	X, Y, Z	
Drive control		2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		36/axis	38.4/axis	34/axis	XY34/Z6	XY92/Z8	μm±20%
Max.travel range(0~150V)		45/axis	48/axis	43/axis	XY43/Z8	XY115/Z10	μm±20%
Integrated sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Resolution		1/0.5	5/3	1.5/0.5	XY1.5/0.5, Z0.5/0.1	XY1.5/0.5, Z0.5/0.1	nm
Closed-loop linearity		0.2/-	0.2/-	0.2/-	0.2/-	X0.05/-, Y0.02/-, Z0.3/-	%F.S.
Repeatability		0.1/-	0.1/-	0.1/-	0.1/-	X0.008/-, Y0.013/-, Z0.055/-	%F.S.
Pitch/yaw/roll		<30	<50	-	-	-	μrad
Push/pull force capacity		5/2	10/3	-	-	-	N
Stiffness		X0.15/Y0.2	0.5	-	-	-	N/μm±20%
Unloaded resonant frequency		0.6	0.6	X0.55/Y0.52	X0.55/Y0.52/Z8.7	XY0.06/Z0.16@500g	kHz±20%
Unloaded step time		20/3	20/3	30/3	30/3	XY30@1μm, 500g/3 Z10@1μm, 500g/1	ms±20%
Load capacity	Horizontal	0.2	0.2	0.8	0.8	0.8	kg
	Vertical	0.1	0.1	0.02	0.02	0.8	
	Inverted	0.2	0.1	0.5	0.05	0.8	
El. capacitance		0.4/axis	0.2/axis	0.8/axis	0.8/axis	XY1.6/Z0.8	μF±20%
Material		Steel, Aluminum	Steel, Aluminum	Steel, Aluminum	Steel, Aluminum	Steel, Al	
Mass		110	55(with no cable)	120	200	230	g±5%

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation.
Technical data is measured by CoreMorrow E00/E01 series piezo controller.

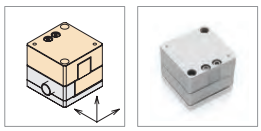
▸ Drawings

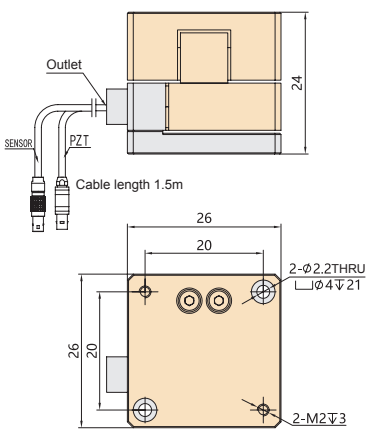
P13.XY30S/K



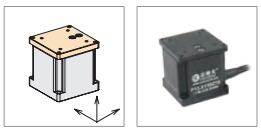


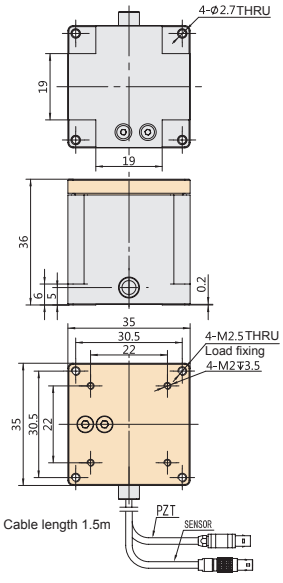
P13.XYZ40S/K



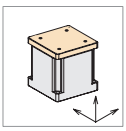


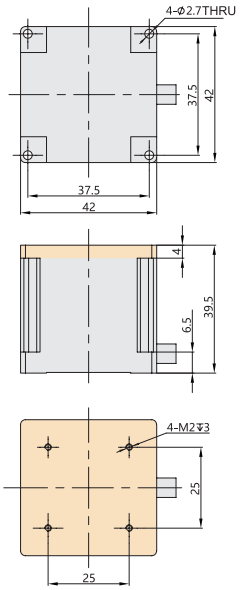
P13.XY50Z7S/K,P13.XY50S/K





P13.XY100Z10S/K





P60.X200 Piezo Nanopositioning Stage



P60.X200 piezo nanopositioning stage adopts amplification mechanism, flexible hinge design and high-reliability piezo actuator to realize displacement of X-axis up to 200μm, and could be configured with closed-loop sensor for high-precision scanning and positioning. It could realize 2 or 3 axes motion by combining multiple stages.

▸ Characteristics

• X motion • Max stroke to 200μm • Open/closed loop version optional • Available UHV version • Optional 2 or 3 axes motion version

▸ Applications

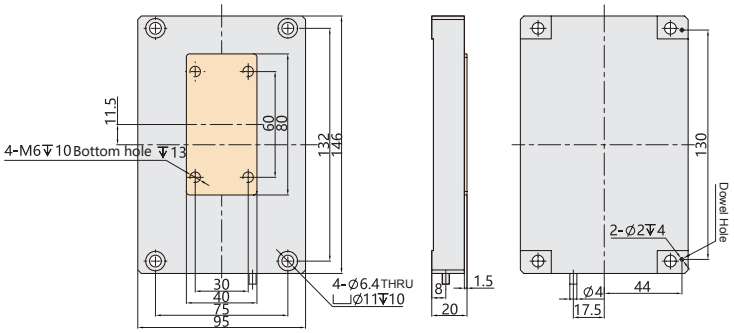
• Biotechnology • Interference • Wafer positioning • SPM • Measurement • Surface structure analysis

▸ Technical Data

Type	S-Closed loop K-Open loop	P60.X200S	P60.X200K	Units
Active axes		X	X	
Drive control		1 driving channel ,1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		160	160	μm±10%
Max. travel range(0~150V)		200	200	μm±10%
Sensor type		SGS	-	
Resolution		7	2	nm
Linearity		0.02	-	%F.S.
Repeatability		0.01	-	%F.S.
Pitch/yaw/roll		< 15	< 15	μrad
Step time		50@20μm,1300g	30	ms±20%
Unloaded resonant frequency		370	370	Hz±20%
Resonant frequency@1300g		120	120	Hz±20%
El.capacitance		10.8	10.8	μF±20%
Operating temperature		-20~80	-20~80	℃
Load capacity	Horizontal	5	5	kg
	Vertical	3	3	
	Inverted	5	5	
Material		Stainless steel, aluminum alloy		
Mass		630	630	g±5%

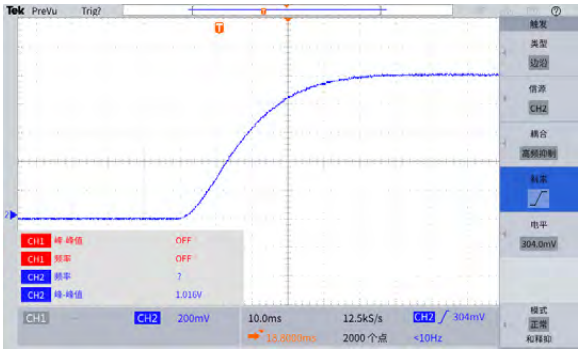
▸ Drawing

P60.X200

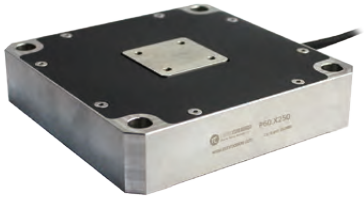


▸ Loaded Step Time

P60.X200S step time of about 50ms @ loading 1300g&1/10 of travel range



P60.X250 Piezo Nanopositioning Stage



▸ Characteristics

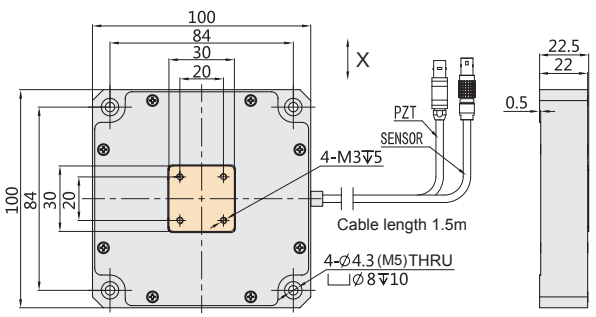
- Closed-loop version for high accuracy
- Anti-vibration design
- Differential drive
- High/low-temperature available
- Fast response
- Vacuum version available

▸ Technical Data

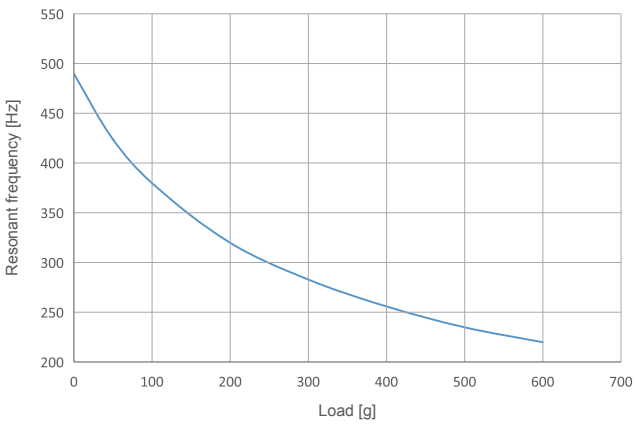
Type		P60.X250S	P60.X250K	Units
Active axes		X	X	
Drive control		2 driving channels 1 sensing channel	2 driving channels	
Travel range(0~120V)		±130	±130	μm±10%
Max.travel range(0~150V)		±165	±165	μm±10%
Sensor		SGS	-	
Resolution		9	3	nm
Linearity		0.1	-	%F.S.
Repeatability		0.04	-	%F.S.
Pitch/yaw/roll		<10	<10	μrad
Push/pull force		300/30	300/30	N
Stiffness		1.2	1.2	N/μm±20%
Unloaded resonant frequency		490	490	Hz±20%
Unloaded step time		80	40	ms±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.5	0.5	
	Inverted	1	1	
El. capacitance		24.6	24.6	μF±20%
Operating temperature		-40~+80	-40~+80	°C
Anti-vibration design	Half sine wave	15g, 11ms	15g, 11ms	
	Back peak sawtooth wave	20g, 11ms	20g, 11ms	
Material		Steel, Aluminum	Steel, Aluminum	
Mass		950	950	g±5%

▸ Drawing

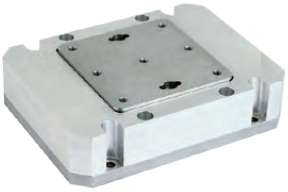
P60.X250S/K



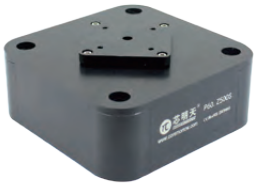
▸ Frequency vs Load Curve



P60.Z250/500/1000 Piezo Nanopositioning Stage



P60.Z250



P60.Z500 standard version



P60.Z500 vacuum version



P60.Z1000-C

▸ Characteristics

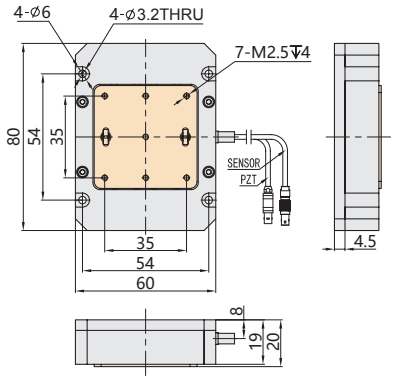
- Motion in Z
- Travel to 250, 500 or 1000μm
- Load capacity up to 2kg
- Optional vacuum version

▸ Technical Data

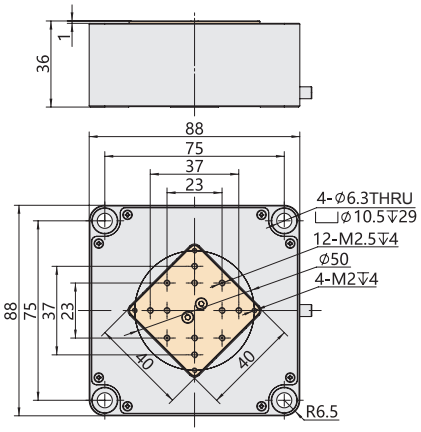
Type	S-Closed loop K-Open loop	P60.Z250S	P60.Z250K	P60.Z500S	P60.Z500K	P60.Z1000S-C	P60.Z1000K-C	Units
Active axes		Z	Z	Z	Z	Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel	1 driving channel 1 sensing channe	1 driving channel	1 driving channel 1 sensing channe	1 driving channel	
Travel range(0~120V)		200	200	400	400	800	800	μm±10%
Max.travel range(0~150V)		250	250	500	500	1000	1000	μm±10%
Sensor		SGS	-	SGS	-	SGS	-	
Resolution		7	2	13.5	4	35	10	nm
Linearity		0.4	-	0.1	-	0.2	-	%F.S.
Repeatability		0.1	-	0.05	-	0.1	-	%F.S.
Unloaded resonant frequency		260	260	290	290	80	80	Hz±20%
Load capacity	Horizontal	1	1	2	2	1.5	1.5	kg
	Vertical	0.05	0.05	0.03	0.03	0.02	0.02	
	Inverted	0.1	0.1	0.07	0.07	0.05	0.05	
El. capacitance		21.6	21.6	28.8	28.8	72	72	μF±20%
Material		Steel, Aluminum	Steel, Aluminum	Steel, Aluminum	Steel, Aluminum	Titanium, Aluminum	Titanium, Aluminum	
Mass(with no cable)		0.4	0.4	0.65	0.65	1.46(including wires and connectors)		kg±5%
Vacuum		1×10^(-5)	1×10^(-5)	-	-	-	-	mbar

▸ Drawings

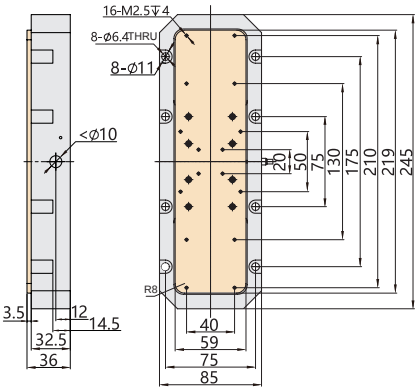
P60.Z250S/K



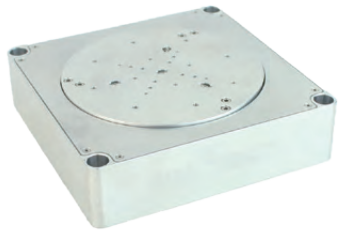
P60.Z500S/K



P60.Z1000S/K-C



P60.Z500 S/K-C Piezo Nanopositioning Stage(Vacuum, Non-Magnetic)



To meet the needs of customers for the use of piezo nanopositioning stage in vacuum non-magnetic environments, CoreMorrow has developed and designed the P60.Z500S/K-C Z-axis piezo nanopositioning stage. It adopts a frictionless flexible hinge guide mechanism and an integrated structural design internally. The positioning platform is equipped with high-performance piezoelectric actuator, which can achieve a displacement of 500μm. The closed-loop version with the full bridge design avoids temperature drift and ensures nanometer level positioning accuracy. Its structure adopts special material and has undergone special treatment, which makes it suitable for vacuum non-magnetic environments.

▸ Characteristics

- Z motion
- Max. stroke to 500μm
- Horizontal installation with a load capacity of 2.5kg
- Size of 138×138×36mm
- Vacuum and non-magnetic

▸ Application

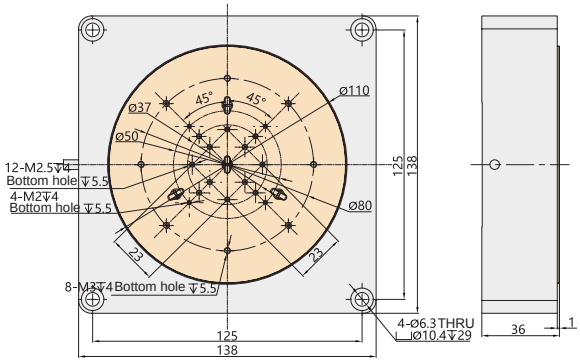
- Biotechnology
- Wafer positioning
- SPM
- Surface structure analysis

▸ Technical Data

Type	S-Closed loop K-Open loop	P60.Z500S-C	P60.Z500K-C	Units
Active axes		Z	Z	
Drive control		1 driving channel ,1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		400	400	μm±10%
Max. travel range(0~150V)		500	500	μm±10%
Sensor type		SGS	-	
Resolution		13.5	4	nm
Linearity		0.078	-	%F.S.
Repeatability		0.03	-	%F.S.
Unloaded resonant frequency		260	260	Hz±20%
Resonant frequency@1100g		120	120	Hz±20%
Load capacity	Horizontal	2.5	2.5	kg
	Vertical	1.5	1.5	
	Inverted	1.5	1.5	
Step time		120@1100g,30μm	10	ms±20%
El.capacitance		58.5	58.5	μF±20%
Operating temperature		-20~65	-20~65	℃
Material		Ti, Al	Ti, Al	
Mass		950	950	g±5%

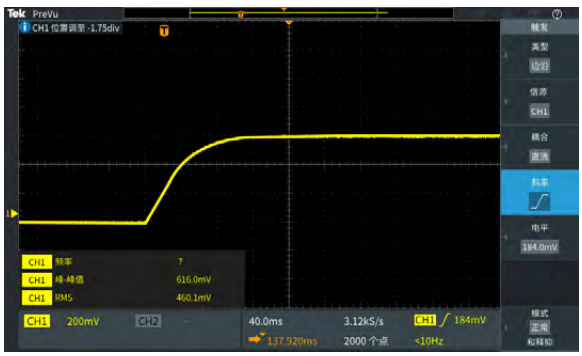
▸ Drawing

P60.Z500S/K-C



▸ Loaded Step Time

P60.Z500S-C step time of about 120ms @ loading 1100g&30μm of travel range



P60.XYZ200 Piezo Nanopositioning Stage



Characteristics

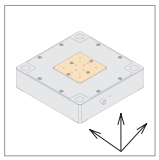
• XYZ motion • Stroke to 200μm/axis • Load capacity to 300g • Closed-loop version for high accuracy • Available UHV version

Technical Data

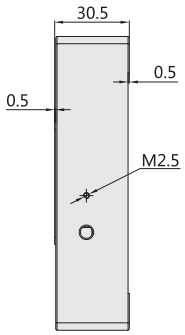
Type		P60.XYZ200S	P60.XYZ200K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		4 driving channels 3 sensing channels	4 driving channels	
Travel range(0~120V)		160/axis	160/axis	μm±10%
Max.travel range(0~150V)		200/axis	200/axis	μm±10%
Sensor		SGS	-	
Resolution		5.5	2	nm
Linearity		0.2	-	%F.S.
Repeatability		0.1	-	%F.S.
Unloaded resonant frequency		270	270	Hz±20%
Resonant frequency@100g		110	110	Hz±20%
Unloaded resonant frequency@50% travel range		20	20	Hz±20%
El. capacitance		14/14/7.2	14/14/7.2	μF±20%
Material		Aluminum	Aluminum	
Operating temperature		-20~80	-20~80	°C
Load capacity	Horizontal	0.3	0.3	kg
	Vertical	0.1	0.1	
	Inverted	0.1	0.1	
Mass		740	740	g±5%

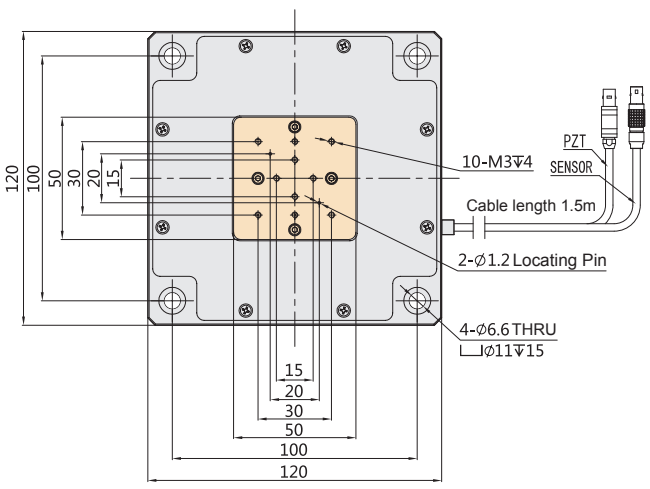
Drawing

P60.XYZ200









P63 Piezo Nanopositioning Stage(Direct Drive)



P63 is a small-volume 1~3 axes piezo nanopositioning stage. It features ultra-precision and very compact. The size of XYZ version is only 30×30×42mm (only 30×30×21mm for X version) and is very easy to integrate into any scanning instrument.

P63 is an ultra-high precision nanopositioning system. It is designed for AFM, SPM, STM and other micro-scanning nano-operations.

▸ Characteristics

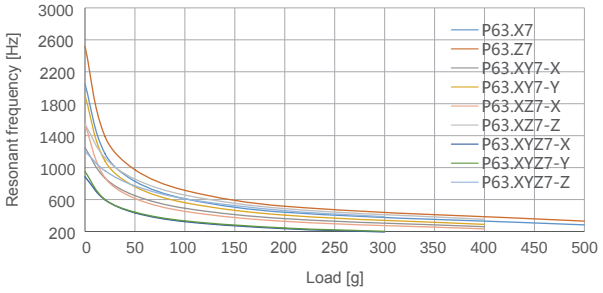
- 1~3 axes motion
- Fast response time
- Displacement to 18μm/axis
- Max load capacity to 0.8kg

▸ 1~3 Axes

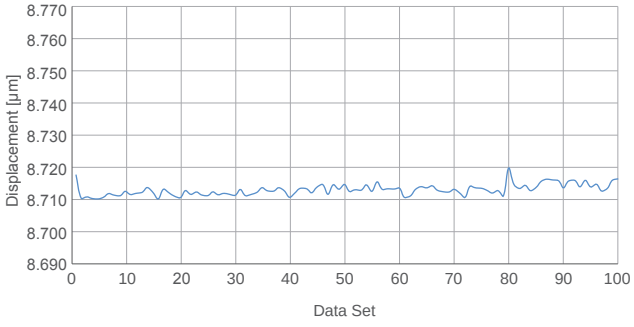
P63 piezo nanopositioning stage include X, Z, XY, XZ, XYZ versions. Ultra-small size is easy to integrate.



▸ Frequency vs Load Curve



▸ Displacement Stability at 150V

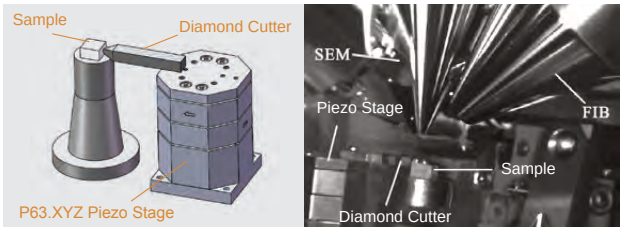


▸ Applications

- Microscopic imaging
- Nanopositioning
- 3-axis micro turning
- AFM

▸ Application Example

P63.XYZ applies to cutting force test based on SEM online nano cutting stage.



▸ Fast Response, Available Sensor

P63 piezo stage is an ultra-high-precision nano-positioning system designed for AFM, SPM, STM and other micro-scanning and nano-operation applications. It has ultra-low inertia, response time up to 0.3ms, available integrated sensor for high-accuracy scanning.

▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	1~3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers".		

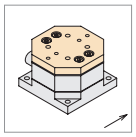
▸ Technical Data

Type	S-closed loop K-open loop	P63.X7S P63.X7K	P63.Z7S P63.Z7K	P63.XY7S P63.XY7K	P63.XZ7S P63.XZ7K	P63.XYZ7S P63.XYZ7K	Units
Active axes		X	Z	X, Y	X, Z	X, Y, Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		5.5	5.5	5.5/axis	5.5/axis	5.5/axis	μm±10%
Max.travel range(0~150V)		6.8	6.8	6.8/axis	6.8/axis	6.8/axis	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Closed/open-loop resolution		0.2/0.1	0.2/0.1	0.2/0.1	0.2/0.1	0.2/0.1	nm
Closed-loop linearity		0.4/-	0.4/-	0.4/-	0.4/-	0.4/-	%F.S.
Repeatability		0.2/-	0.2/-	0.2/-	0.2/-	0.2/-	%F.S.
Pitch/yaw/roll		<5	<5	<10	<10	<15	μrad
Push/pull force capacity		10/2	12/2	8/2	9/2	7/2	N
Stiffness		1.5	2	X1.2/Y1.4	X1.2/Z1.5	X0.9/Y1/Z1.2	N/μm±20%
Unloaded resonant frequency		2	2.5	X1.3/Y1.9	X1.5/Z1.6	X0.9/Y0.95/Z1.2	kHz±20%
Closed/open-loop unloaded step time		1.5/0.3	1.5/0.3	1.5/0.3	1.5/0.3	1.5/0.3	ms±20%
Load capacity	Horizontal	0.8	0.8	0.5	0.5	0.4	kg
	Vertical	0.1	0.05	0.1	0.05	0.05	
	Inverted	0.8	0.1	0.5	0.1	0.1	
El. capacitance		0.8	0.8	0.8/axis	0.8/axis	0.8/axis	μF±20%
Material		Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	
Mass		70	70	120	120	160	g±5%

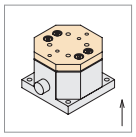
Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation to extend lifetime. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▸ Drawing

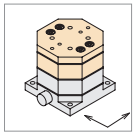
P63.X7



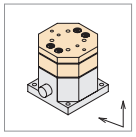
P63.Z7



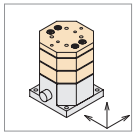
P63.XY7

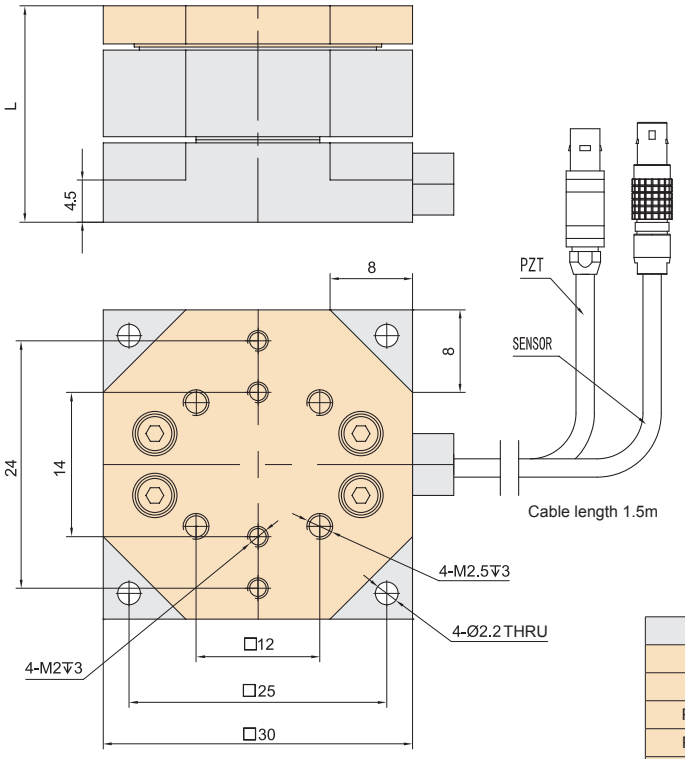


P63.XZ7



P63.XYZ7





Models	L(mm)
P63.X7	21
P63.Z7	24
P63.XY7	30
P63.XZ7	33
P63.XYZ7	42

▸ Technical Data

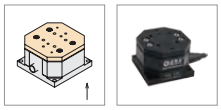
Type	S-closed loop K-open loop	P63.X18S P63.X18K	P63.Z8S P63.Z8K	P63.XY18S P63.XY18K	P63.X18Z8S P63.X18Z8K	P63.XY18Z8S P63.XY18Z8K	Units
Active axes		X	Z	X, Y	X, Z	X, Y, Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		16	6	16/axis	X16, Z6	XY16, Z6	μm±10%
Max.travel range(0~150V)		18	8	18/axis	X18, Z8	XY18, Z8	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Closed/open loop resolution		0.6/0.2	0.2/0.1	0.6/0.2	X0.6/0.2, Z0.2/0.1	XY0.6/0.2, Z0.2/0.1	nm
Closed-loop linearity		0.3/-	1/-	0.3/-	X0.3/-	XY0.3/-	%F.S.
Repeatability		0.25/-	0.25/-	0.25/-	0.25/-	0.25/-	%F.S.
Pitch/yaw/roll		≤15	≤15	≤15	≤15	≤15	μrad
Unloaded resonant frequency		2	1	2	X2/Z1	X2/Y2/Z1	kHz±20%
Closed/open-loop unloaded step time		8/0.5	8/0.5	8/0.5	8/0.5	8/0.5	ms±20%
Load capacity	Horizontal	0.5	0.5	0.5	0.5	0.5	kg
	Vertical	0.1	0.05	0.1	0.05	0.05	
	Inverted	0.5	0.1	0.5	0.1	0.1	
El. capacitance		1.8	0.8	1.8	X1.8, Z0.8	XY1.8, Z0.8	μF±20%
Operating temperature		-20~80	-20~80	-20~80	-20~80	-20~80	°C
Material		Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	
Mass		-	112	-	-	235	g±5%
Cable length		1.5	1.5	1.5	1.5	1.5	m±10mm

▸ Drawings

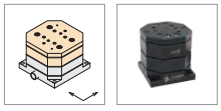
P63.X18



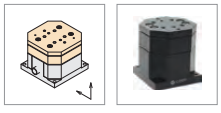
P63.Z8



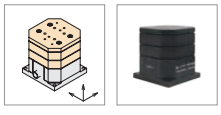
P63.XY18

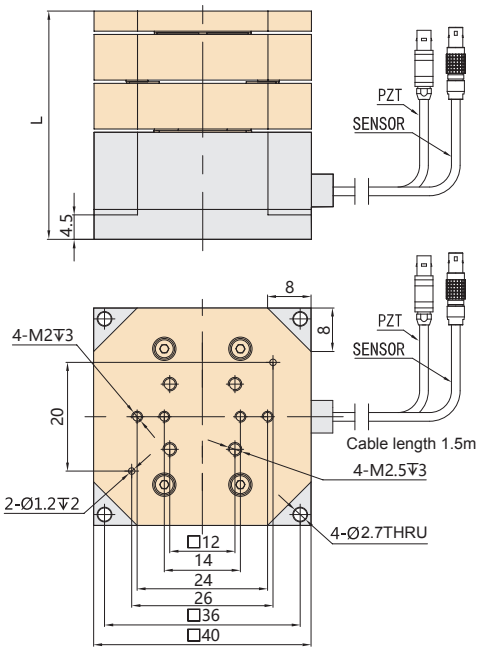


P63.X18Z8



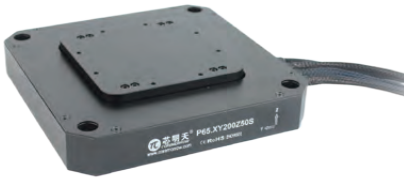
P63.XY18Z8





Models	L(mm)
P63.X18	21
P63.Z8	24
P63.XY18	30
P63.X18Z8	33
P63.XY18Z8	42

P65.XY200Z50 Piezo Nanopositioning Stage(Amplified Drive)



P65 piezo nanopositioning stage is drived by piezo actuators, combined with flexible hinge mechanism to realize XYZ motion. It is equipped with high-performance piezo actuators and amplified-drive mechanism to ensure XY200μm,Z50μm displacement. Open/closed loop versions available, vacuum and larger stroke version customizable. Closed-loop version for high accuracy, suitable for high-precision positioning applications.

▸ Characteristics

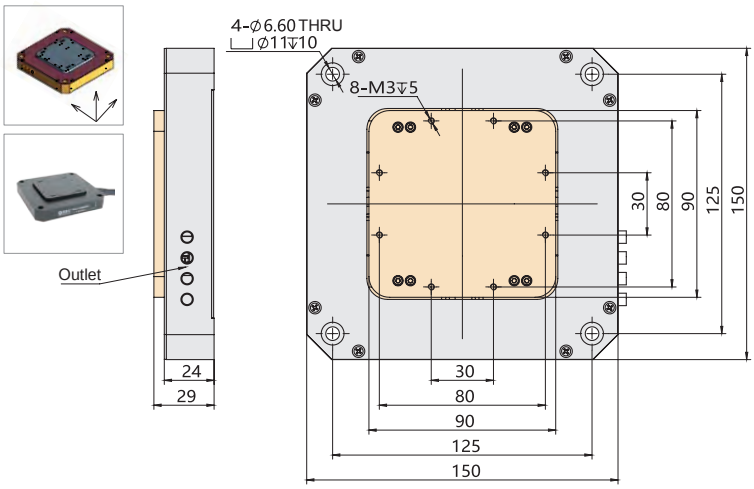
• XYZ motion • Travel range:XY200μm/Z50μm • Load capacity to 1kg • Open/closed loop • Vacuum version optional and customizable

▸ Technical Data

Type		P65.XY200Z50S	P65.XY200Z50K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		8 driving channels 8 sensing channels	8 driving channels	
Nominal travel range(0~120V)		XY160/Z40	XY160/Z40	μm±10%
Max.travel range(0~150V)		XY200/Z50	XY200/Z50	μm±10%
Sensor type		SGS	-	
Resolution		XY3/Z2	XY1/Z0.6	nm
Linearity		XY0.015/Z0.007	-	%F.S.
Repeatability		XY0.017/Z0.006	-	%F.S.
Pitch/Yaw/Roll		< 10	< 10	μrad
Unloaded resonant frequency		X260/Y220/Z280	X260/Y220/Z280	Hz±20%
Resonant frequency@500g		150	150	Hz±20%
Step time		100@500g	10	ms±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.1	0.1	
	Inverted	0.2	0.2	
El. capacitance		XY13.6/Z3.2	XY13.6/Z3.2	μF±20%
Material		Steel, Al	Steel, Al	
Mass(Cable included)		1.24	1.24	kg±5%

▸ Drawing

P65.XY200Z50S/K



▸ Recommended Controllers

E00.D12AL-V4



8 channels, analog, digital, servo control

P66.X2K Piezo Nanopositioning Stage(Direct Drive)



P66.X2K is a X-axis vacuum piezo nanopositioning stage from CoreMorrow. This product adopts a direct drive structure and can achieve a maximum displacement of 2.4μm in the X-axis, with a load capacity of up to 1kg. It measures 70mm×85mm×20.5mm and has a very compact size, suitable for the applications with limited spaces. It has a customized connectors which makes it to be used in a vacuum environment.

▸ Characteristics

- X motion
- Resolution to 0.5nm
- Load capacity to 1kg
- Unloaded resonant frequency to 12kHz
- Vacuum version
- Millisecond response time
- Customized connector

▸ Applications

- Interference microscopy
- Scanning
- Optical measurement
- Micro machining
- Precision control measurement

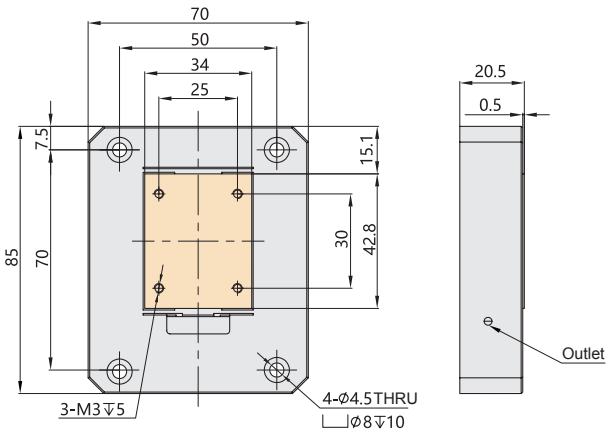
▸ Technical Data

Type		P66.X2K	Units
Active axes		X	
Drive control		1 driving channel	
Nominal travel range(0~120V)		1.9	μm±10%
Max. travel range(0~150V)		2.4	μm±10%
Resoluition		0.5	nm
Unloaded resonant frequency		12	kHz±20%
Resonant frequency@20g		10@20g	kHz±20%
Step time		2	ms±20%
El.capacitance		0.58	μF±20%
Operating temperature		-20~80	℃
Load capacity	Horizontal	1	kg
	Vertical	1	
	Inverted	1	
Material		Steel, Aluminum	
Mass		310	g±5%

▸ Drawing

P66.X2K





P66 Piezo Nanopositioning Stage(Direct Drive or Amplified Drive)



P66 is a piezo nanopositioning stage with 1~3 axes motion using a direct-drive mechanism or amplified-drive mechanism. It is a nanopositioning system combining piezo and flexible hinges, which could reach millisecond response time, sub-nano accuracy, and optional high-precision sensors for closed-loop control. It is ideal for positioning applications such as optical path length correction in interference, sample positioning in microscopy or scanning applications, etc.

▸ Characteristics

• Optional 30μm/60μm displacement • Load to 8kg • Repeatability to 12nm • Open/closed loop • UHV version is available

▸ 1~3 Axes

P66 family include: P66.X(X axis), P66.Z(Z axis), P66.XY(XY axes), P66.XZ(XZ axes), P66.XYZ(XYZ axes).



P66.X P66.Z P66.XY P66.XZ P66.XYZ

▸ Open/Closed-Loop Version

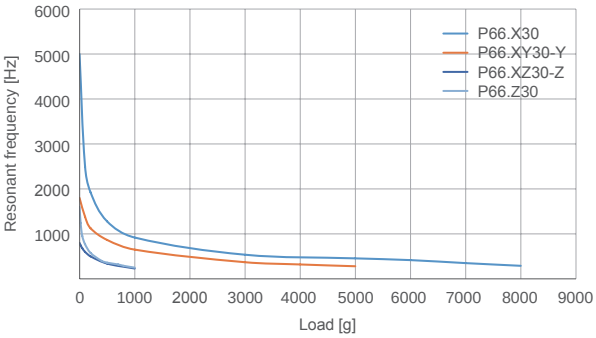
P66 could be selected as an open-loop or closed-loop version. Closed-loop version is equipped with high-resolution and fast-responding strain sensor (SGS). The sensor feedbacks high-bandwidth, high-precision voltage signals.

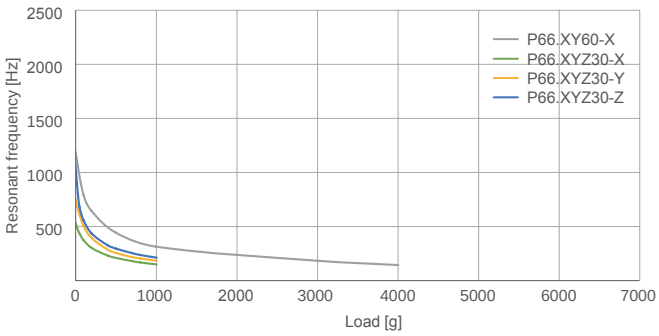
The sensor uses full-bridge configuration to eliminate thermal drift, allowing piezo nanopositioning stages to achieve high linearity and repeatability.

▸ Applications

• Interference / scanning • Metering • Micromachining / precision control • CD disc test

▸ Frequency vs Load Curve





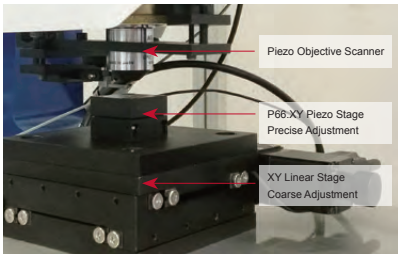
▸ Connectors

The standard connectors for driving and sensing are LEMO connectors, and could be customized according to the interface type of the piezo controller.



▸ Application Example-AFM

P66.XY piezo nanopositioning stage is widely used in AFM for its high response frequency, high precision and high reliability.



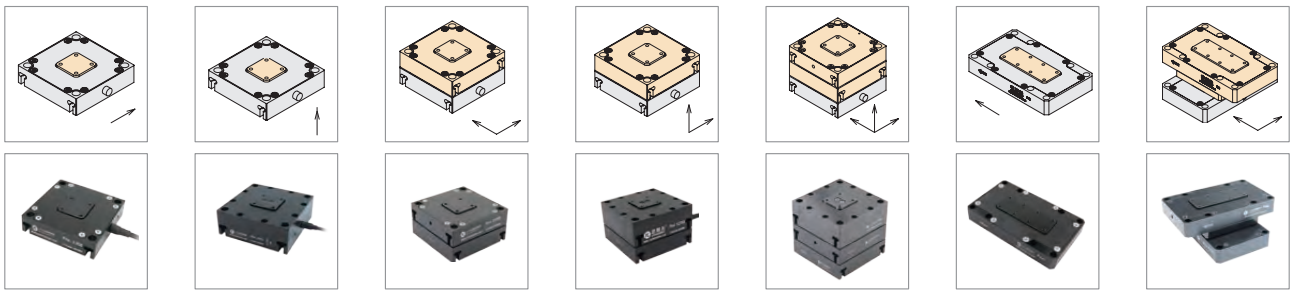
▸ Technical Data

Type	S-Closed loop K-Open loop	P66.X30S P66.X30K	P66.X60S P66.X60K	P66.Z30S P66.Z30K	P66.XY30S P66.XY30K	P66.XY60S P66.XY60K	P66.XZ30S P66.XZ30K	P66.XYZ30S P66.XYZ30K	Units
Active axes		X	X	Z	X, Y	X, Y	X, Z	X, Y, Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		24	48	24	24/axis	48/axis	24/axis	24/axis	μm±10%
Max.travel range(0~150V)		30	60	30	30/axis	60/axis	30/axis	30/axis	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Closed/open loop resolution		1/0.5	2/0.5	1/0.5	1/0.5	2/0.5	1/0.5	1/0.5	nm
Closed-loop linearity		0.1/-	0.1/-	0.1/-	0.1/-	0.15/-	0.1/-	0.15/-	%F.S.
Repeatability		0.05/-	0.05/-	0.05/-	0.08/-	0.1/-	0.08/-	0.1/-	%F.S.
Pitch/yaw/roll		<15	<20	<15	<15	<20	<15	<15	μrad
Push/pull force capacity		120/15	160/16	30/10	100/15	120/12	30/10	30/10	N
Stiffness in motion direction		4.4	2.8	1.1	3.3	2.1	1.1	1.1	N/μm±20%
Unloaded resonant frequency		5	2.8	1.4	X0.9/Y1.6	X0.9/Y1.2	X1.5/Z0.8	X0.6/Y0.7/ Z1.2	kHz±20%
Closed/open-loop unloaded step time		5/0.8	10/1.6	15/1	8/0.8	20/1.6	20/1	30/1	ms±20%
Closed-loop operating frequency (-3dB)		600 (unloaded)	500 (unloaded)	-	-	-	-	100 (unloaded)	Hz±20%
Load capacity	Horizontal	8	6	1	5	4	1	1	kg
	Vertical	0.3	0.1	0.05	0.3	0.1	0.05	0.05	
	Inverted	8	6	0.1	5	4	0.1	0.1	
El. capacitance		3.6	7.2	3.6	3.6/axis	7.2/axis	3.6/axis	3.6/axis	μF±20%
Material		Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	
Mass		120	190	200	260	450	320	460	g±5%

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation to extend lifetime. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

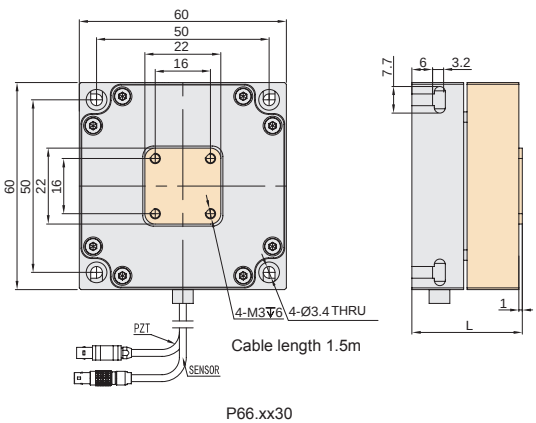
▸ Drawings

P66.X30 P66.Z30 P66.XY30 P66.XZ30 P66.XYZ30 P66.X60 P66.XY60

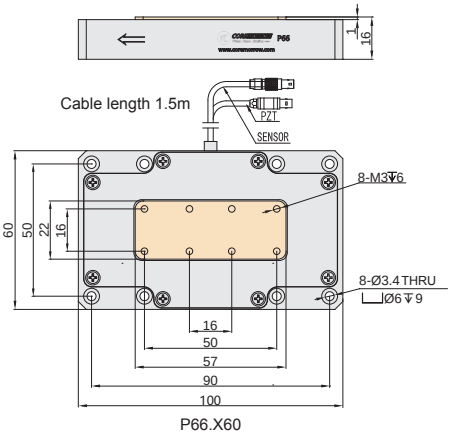


The overall size of L100×W100×H39mm for P66.XY, please refer to www.coremorrow.com.

Models	L(mm)
P66.X30	16
P66.Z30	23
P66.XZ30	39
P66.XYZ30	55
P66.XY30	32



P66.xx30



P66.X60

P66.X30S/K-C Piezo Nanopositioning Stage



P66.X30S/K-C piezo nanopositioning stage moves in X direction, and its travel is up to 38μm.

▸ Characteristics

- Motion in X
- Travel to 38μm
- Load capacity to 1kg
- Closed-loop or UHV version available

▸ Applications

- Micromachining
- Micromanipulation
- Scanning microscopy
- Nano positioning/measurement

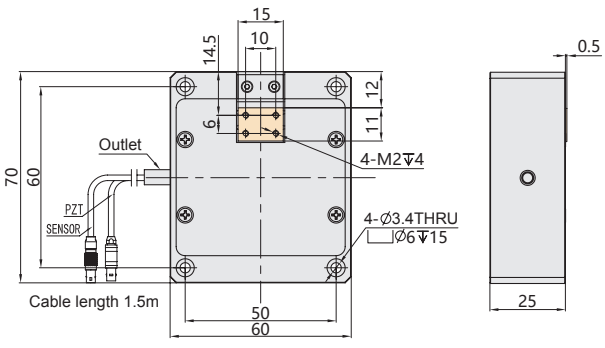
▸ Technical Data

Types	S-Closed loop K-Open loop	P66.X30S-C	P66.X30K-C	Units
Active axes		X	X	
Drive control		1 driving channel , 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		30	30	μm±10%
Max.travel range(0~150V)		38	38	μm±10%
Sensor type		SGS	-	
Resolution		1	0.5	nm
Linearity		0.1	-	%F.S.
Repeatability		0.1	-	%F.S.
Push/pull force		200/10	200/10	N
Stiffness in motion direction		10	10	N/μm±20%
Unloaded resonant frequency		2000	2000	Hz±20%
Step time		5	1.5	ms±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.3	0.3	
	Inverted	1	1	
El.capacitance		3.6	3.6	μF±10%
Material		Al	Al	
Mass		193	193	g±5%
Cable length		1.5	1.5	m±10mm

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation to extend lifetime. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

Note: The appearance color of the product is subject to the actual product.

▸ Drawing



▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	1~3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA

Note: For technical data, please refer to "Piezo Controllers".

P66.X90C/K Piezo Nanopositioning Stage (CAP Sensor)



P66.X90C/K is an X-axis piezo nanopositioning stage, with a displacement up to 95μm. Its closed-loop version integrates CAP sensors to detect and feedback the position in real time, with E53.D1C-H piezo controller developed by CoreMorrow, and it can achieve higher precision motion control.

▸ Characteristics

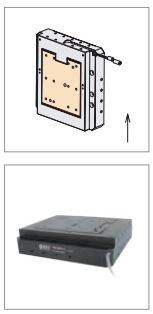
- X motion
- Optional horizontal, vertical, inverted mounting
- Nanoscale resolution
- Optional CAP sensor

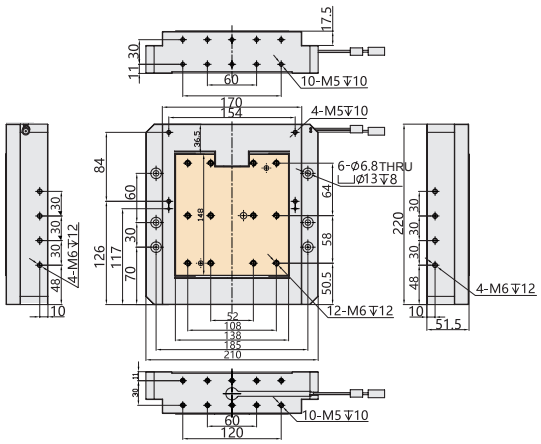
▸ Technical Data

Type	C-Closed loop K-Open loop	P66.X90C	P66.X90K	Units
Active axes		X	X	
Drive control		1 driving channel 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		76	76	μm±10%
Max.travel range(0~150V)		95	95	μm±10%
Sensor type		CAP	-	
Resolution		3	1	nm
Linearity		0.021	-	%F.S.
Repeatability		0.005	-	%F.S.
Unloaded resonant frequency		615	615	Hz±20%
Resonant frequency@5kg		310	310	Hz±20%
Step time@5kg		8@20μm	6	ms±20%
Load capacity	Horizontal	10	10	kg
	Vertical	5	5	
	Inverted	10	10	
El. capacitance		37	37	μF±20%
Material		Al	Al	
Mass(Cable included)		4.9	4.9	kg±5%

▸ Drawing

P66.X90C/K





▸ Recommended Controllers

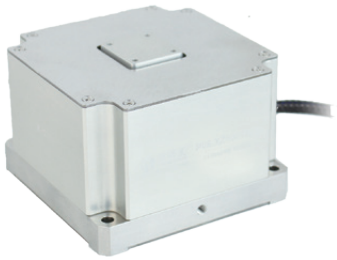
E53.D1C-H



1 channel,
Driving piezo products with capacitive sensors,
Digital, analog, servo
Ave. current: 60mA

Note: Please see "Piezo Controller" for detailed information.

P66.XZ100Y30 High-resolution Piezo Nanopositioning Stage



The P66.XZ100Y30 high-resolution piezo nanopositioning stage is equipped with high-performance piezoelectric ceramics, enabling it to achieve displacements of X125μm/Y35μm/Z105μm in three-dimensional space. The stage adopts a no-friction flexible hinge guiding mechanism and integrated structural design. In the closed-loop version, the sensor employs a full-bridge configuration to eliminate thermal drift, thereby ensuring nanoscale positioning accuracy and repeatability.

▸ Characteristics

- XYZ motion
- Load capacity up to 1kg
- Nanometer resolution
- Square-shaped lateral outlet

▸ Applications

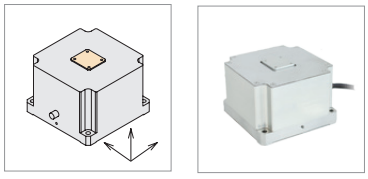
- Micromachining
- Micromanipulation
- Scanning microscopy
- Nano positioning/measurement

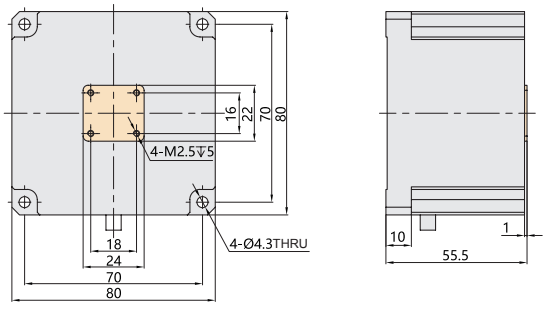
▸ Technical Data

Type	S-Closed loop K-Open loop	P66.XZ100Y30S	P66.XZ100Y30K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		3 driving channels 3 sensing channels	3 driving channels	
Nominal travel range(0~120V)		X100/Y28/Z85	X100/Y28/Z85	μm±10%
Max. travel range(0~150V)		X125/Y35/Z105	X125/Y35/Z105	μm±10%
Sensor type		SGS	-	
Resolution		XZ4/Y1.2	XZ1.5/Y0.5	nm
Linearity		X0.036/Y0.019/Z0.15	-	%F.S.
Repeatability		X0.017/Y0.022/Z0.165	-	%F.S.
Pitch/yaw/roll		XY < 5, Z < 25	XY < 5, Z < 25	μrad
Unloaded resonant frequency		X270/Y475/Z560	X270/Y475/Z560	Hz±20%
Resonant frequency@300g (vertical mounting)		X140/Y230/Z400	X140/Y230/Z400	Hz±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.5	0.5	
	Inverted	0.5	0.5	
Step time		XZ40/Y10@300g	XZ15/Y5	ms±20%
El.capacitance		XY7/Z14	XY7/Z14	μF±20%
Operating temperature		-20~65	-20~65	℃
Material		Stainless steel, aluminum alloy		
Mass		800	800	g±5%

▸ Drawing

P66.XZ100Y30





XD604 Large Load XZ Piezo Nanopositioning Stage



▸ Characteristics

- XZ movement
- 8 μm/axis travel
- Load capacity up to 80kg
- 0~1000V drive

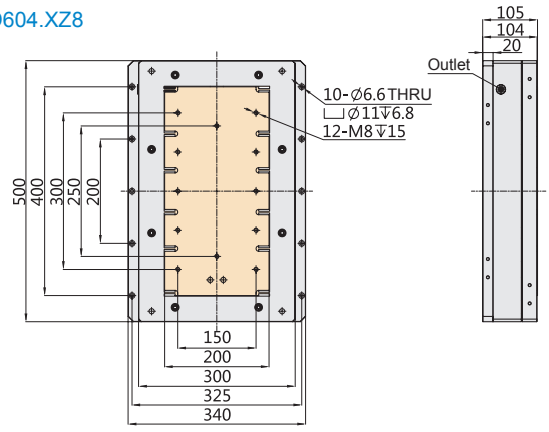
▸ Technical Data

Type		XD604.XZ8S	XD604.XZ8K	Units
Active axes		X, Z	X, Z	
Drive control		2 driving channels , 2 sensing channels	2 driving channels	
Travel range in X(0~1000V)		8	8	μm±10%
Travel range in Z(0~1000V)		8	8	μm±10%
Sensor		SGS	-	
Resolution		0.5	0.1	nm
Linearity		0.19	-	%F.S.
Repeatability		0.13	-	%F.S.
Unloaded resonant frequency		560	560	Hz±20%
Resonant frequency@80kg load		340	340	Hz±20%
Resonant frequency@80kg load & 200nm travel		20	20	Hz±20%
Load step time		15	<10	ms±20%
El. capacitance		X0.44/Z1.33	X0.44/Z1.33	μF±20%
Material		Steel, Aluminum	Steel, Aluminum	
Load capacity	Horizontal	80	80	kg
	Vertical	10	10	
	Inverted	10	10	
Mass		63	63	kg±5%
Cable lenght		1.5	1.5	m±10mm

Note: The above parameters are measured by E00.D2 piezoelectric controller. The maximum driving voltage can be -200V~1000V; For high reliability and long term use, it is recommended that the driving voltage be between 0 and 800V.

▸ Drawing

XD604.XZ8



▸ Recommended Controllers

E00.D2



CoreMorrow E00/E01 high-voltage piezo controllers can output a high voltage of 0~1000V.

XD611.Z300 Piezo Nanopositioning Stage (Cryo-Vacuum)



XD611.Z300 piezo nanopositioning stage moves in Z, its travel is up to 300μm, and it's designed for the applications in cryo and vacuum environment.

▸ Characteristics

• Motion in Z • Travel up to 300μm • Suitable for cryo and vacuum environment • Closed-loop version for high accuracy

▸ Applications

• Surface inspection • Microscopy imaging • Cyro and vacuum application • Semiconductor processing and test

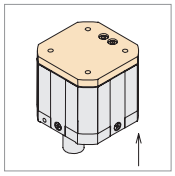
▸ Technical Data

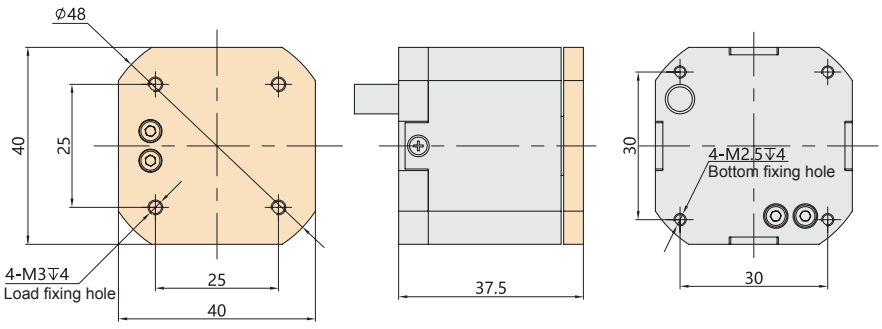
Type		XD611.Z300S	XD611.Z300K	Units
Active axes		Z	Z	
Drive control		1 driving channel , 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		240	240	μm±20%
Max.travel range(0~150V)		300	300	μm±20%
Unloaded resonant frequency		105	105	Hz±20%
Loaded resonant frequency		30 (@300g)	30 (@300g)	Hz±20%
Sensor		SGS	-	
Resolution		10	3	nm
Linearity		0.5	-	%F.S.
Repeatability		0.15	-	%F.S.
El.capacitance		5.4	5.4	μF±20%
Load capacity	Horizontal	0.3	0.3	kg
	Vertical	0.02	0.02	
	Inverted	0.02	0.02	
Material		Ti	Ti	

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation to extend lifetime. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▸ Drawing

XD611.Z300S/K





XD611.XYZ500 Piezo Nanopositioning Stage



XD611.XYZ500 piezo nanopositioning stage moves in XYZ, and its travel is up to 500μm. It's ideal for 3 axes nanopositioning.

▸ Characteristics

• XYZ motion • Optional sensor • Long travel • Nanometer resolution • High accuracy

▸ Applications

• Microscopic Imaging • Nanopositioning • Biotechnology
• Semiconductor Technology • Fine Positioning • Micromanipulation

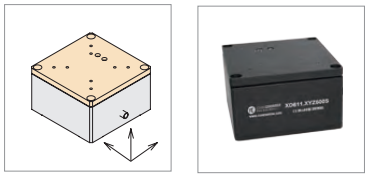
▸ Technical Data

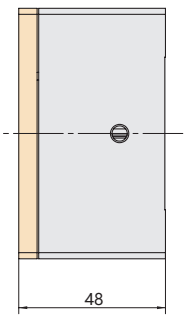
Type		XD611.XYZ500S	XD611.XYZ500K	Units
Active axes		X,Y,Z	X,Y,Z	
Drive control		3 driving channels , 3 sensing channels	3 driving channels	
Nominal travel range(0~120V)		400/axis	400/axis	μm±20%
Max.travel range(0~150V)		500/axis	500/axis	μm±20%
Sensor		SGS	-	
Closed/open-loop resolution		18	7	nm
Linearity		0.1	-	%F.S.
Repeatability		0.05	-	%F.S.
Unloaded resonant frequency		X0.08/Y0.13/Z0.08	X0.08/Y0.13/Z0.08	kHz±20%
Load capacity	Horizontal	0.2	0.2	kg
	Vertical	0.02	0.02	
	Inverted	0.02	0.02	
El.capacitance		14.4/axis	14.4/axis	μF±20%
Mass		850	850	g±5%
Material		Steel, Al	Steel, Al	

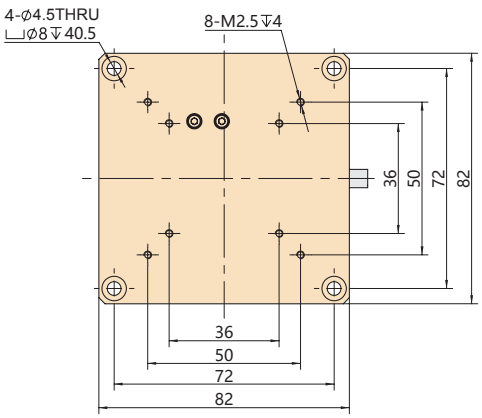
Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation to extend lifetime. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▸ Drawing

XD611.XYZ500S/K







XD731.XYZ100S/K Series XYZ Piezo Stage(Vaccum-Compatible)



XD731 Series XYZ piezo stage is designed for the application in vacuum, and it has vacuum compatibility up to 10E-7mbar.

Characteristics

- XYZ motion
- Vacuum compatibility
- Very compact
- Optional feedback sensor

Application

- Nano positioning
- XYZ fast scanning in vacuum
- Biotechnology
- Quantum measurement

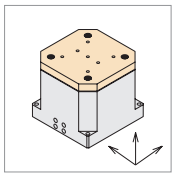
Technical Data

Types	S-Closed loop K-Open loop	XD731.XYZ100S	XD731.XYZ100K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		4 driving channels , 3 sensing channels	4 driving channels	
Nominal travel range(0~120V)		XY±40, Z80	XY±40, Z80	μm±10%
Max.travel range (0~150V)		XY±50, Z100	XY±50, Z100	μm±10%
Sensor type		SGS	-	
Resolution		3	1	nm
Linearity		0.07	-	%F.S.
Repeatability		0.03	-	%F.S.
Pitch/yaw/roll		≤35	≤35	μrad
Push/pull force		50/15	50/15	N
Stiffness in motion direction		1.5/1.5/0.9	1.5/1.5/0.9	N/μm±20%
Unloaded resonant frequency		400	400	Hz±20%
Resonant frequency @250g		150	150	Hz±20%
Unloaded step time		20	<20	ms±20%
Step time @250g		30	-	ms±20%
Load capacity	Horizontal	0.5	0.5	kg
	Vertical	0.2	0.2	
	Inverted	0.4	0.4	
El.capacitance		7.2/axis	7.2/axis	μF±20%
Material		Steel, Al	Steel, Al	
Mass		680	680	g±5%
Vacuum compatibility		10E-7	10E-7	mbar

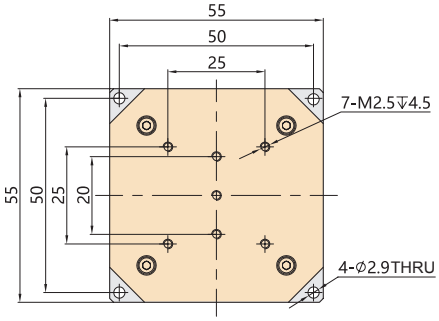
Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

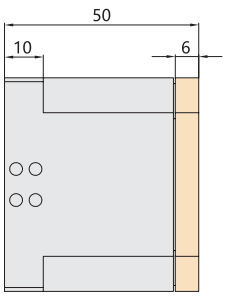
Drawing

XD731.XYZ100S/K









XD770.300 Large Load Z Piezo Nanopositioning Stage



Piezo nanopositioning stage plays an important role in the field of precision positioning. It can be integrated into all kinds of high precision equipment to provide nanoscale motion control, and is widely used.

The XD770.300 series piezo stage moves in Z, can reach 300μm travel, and the load capacity can reach 5kg. It can realize the double improvement of the travel range and load capacity, providing a high-quality solution for the applications that need of large travel and large load at the same time. With CoreMorrow's piezo controller, high resolution, fast response.

▸ Characteristics

- Z axis motion
- Max stroke to 300μm
- Load capacity up to 5kg
- Customizable
- Vacuum version available

▸ Applications

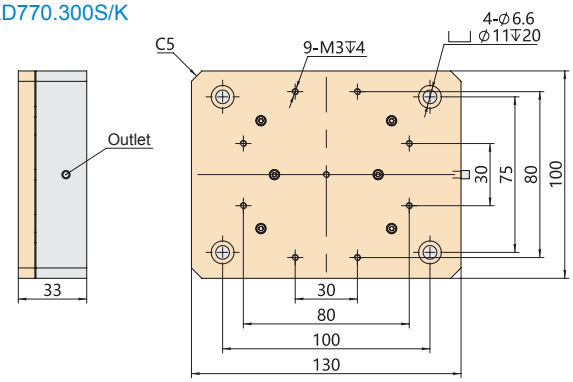
- Microscanning
- Optical path adjustment
- Nanomanipulation technology
- Laser interference
- Nanolithography
- Biotechnology
- Optical communication
- Nanomeasurement
- Micromanipulation
- Nanoimprint, etc.

▸ Technical Data

Type		XD770.300S	XD770.300K	Units
Active axes		Z	Z	
Drive control		1 driving channel, 1 sensing channel	1 driving channel	
Nominal travel range (0~120V)		240	240	μm±10%
Max.travel range (0~150V)		300	300	μm±10%
Sensor		SGS	-	
Resolution		10	3	nm
Linearity		0.08	-	%F.S.
Repeatability		0.02	-	%F.S.
Pitch/yaw/roll		< 15	< 15	μrad
Unloaded resonant frequency		380	380	Hz±20%
Resonant frequency		110@5kg	110@5kg	Hz±20%
Unloaded step time		300	10	ms±20%
Load capacity	Horizontal	5	5	kg
	Vertical	0.08	0.08	
	Inverted	0.4	0.4	
El. capacitance		40.8	40.8	μF±20%
Operating temperature		-20~80	-20~80	℃
Material		Steel, Aluminum	Steel, Aluminum	
Mass (no cable)		1	1	kg±5%

▸ Drawing

XD770.300S/K



▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA

Note: For technical data, please refer to "Piezo Controllers".

XD780 Piezo Nanopositioning Stage



XD780.50



XD780.150/200

XD780 is an X-axis piezo nanopositioning stage, with 50μm, 150μm or 200μm travel. It adopts a no-friction flexible hinge guiding mechanism and integrated structural design. It is equipped with high-performance piezo actuators to ensure 200μm displacement. The closed-loop version has a full bridge design which avoids temperature drift and ensures that the positioning accuracy is nanoscale.

▸ Characteristics

- X motion
- Optional horizontal, vertical, inverted mounting
- Resolution to 0.5nm
- Travel range to 200μm
- Load capacity to 5kg
- UHV version available

▸ Application

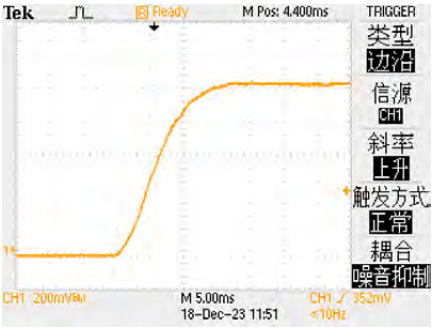
- Optical detection
- Surface inspection
- Optical field
- Nanopositioning
- Semiconductor

▸ Recommended Controllers

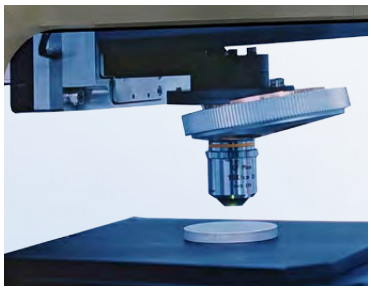
E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers".		

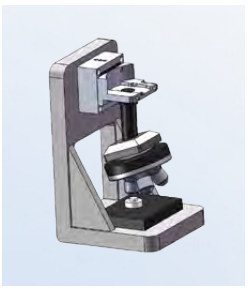
▸ Loaded Step Time

XD780.50S loading 5kg(1V), the step time is about 15ms.

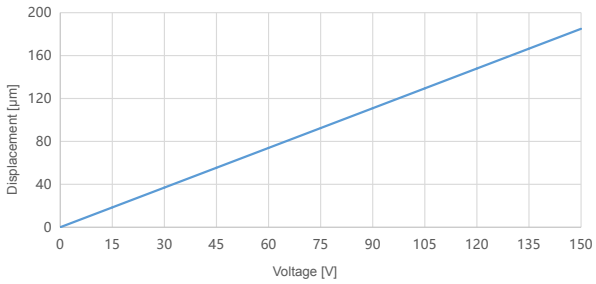


▸ Z-direction multi head objective focusing



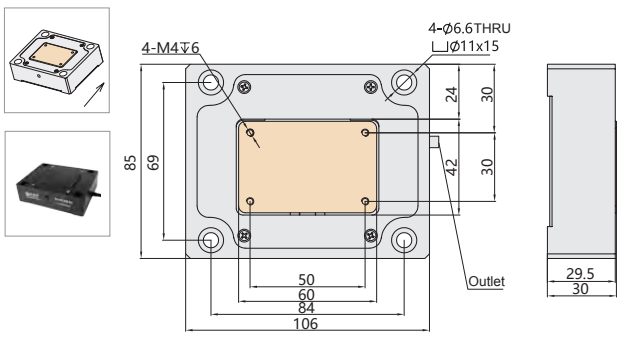


▸ Closed-Loop Curve-XD780.150S

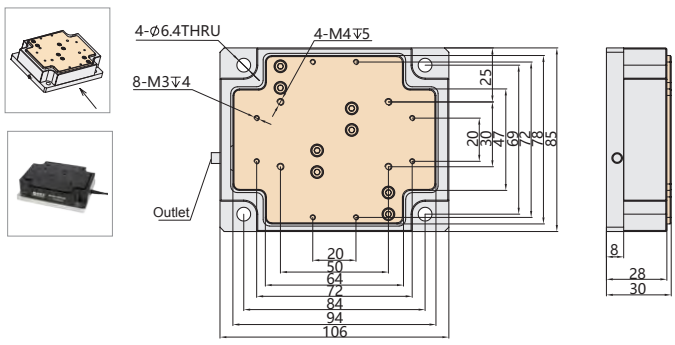


▸ Drawings

XD780.50



XD780.150/200



▶ Technical Data

Type	S-Closed loop K-Open loop	XD780.50S XD780.50K	XD780.150S XD780.150K	XD780.200S XD780.200K	Units
Active axes		X	X	X	
Drive control		1 driving channel, 1 sensing channel			
Nominal travel range(0~120V)		40	120	160	μm±10%
Max.travel range(0~150V)		50	150	200	μm±10%
Mechanism		Direct Drive	Amplified Drive	Amplified Drive	
Sensor type		SGS/-	SGS/-	SGS/-	
Resolution		2/0.5	5/1.5	7/2	nm
Linearity		0.01/-	0.03/-	0.05/-	%F.S.
Repeatability		0.02/-	0.01/-	0.02/-	%F.S.
Load capacity	Horizontal	5	5	5	kg
	Vertical	5	5	5	
	Inverted	5	5	5	
Unloaded resonant frequency		2200	760	700	Hz±20%
Resonant frequency@5kg		160	100	85	Hz±20%
Step time		15@5kg(1V)/7.5	30/4	50@5kg(1V)/10	ms±20%
El. capacitance		10.2	27.2	27.2	μF±20%
Material		Steel, Al	Steel, Al	Steel, Al	
Mass(Cable included)		450	1000	1051	g±5%

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

XP-611 Piezo Nanopositioning Stage(Amplified Drive)



XP-611 is an X-axis or Z-axis piezo nanopositioning stage. It adopts amplified mechanism and built-in high-performance piezo actuator. It could realize 100μm displacement in X-axis or Z-axis. Closed-loop version has high positioning accuracy and is ideal for precision positioning and scanning.

▸ Characteristics

• X/Z axis motion • Small size • Max stroke to 100μm • Fast response time • Vacuum version available

▸ X/Z-Axis Motion

XP-611 is a one-dimensional motion piezo stage in X or Z.



XP-611.X



XP-611.Z

▸ High Precision and High Reliability

CoreMorrow XP-611 has excellent design structure, small size, 100μm stroke, built-in high-reliability piezo actuators, and configured with high-precision sensor. Positioning accuracy could reach nanometer level, it has been applied to industry precision automated processing.

CoreMorrow offers customized service. The following image shows the customized XYZ axes piezo stage based on XP-611.



▸ Applications

- Microscopic imaging
- Biotechnology
- Precision positioning
- Nanopositioning
- Semiconductor technology
- Micromanipulation

▸ Small Size, Short Settling Time

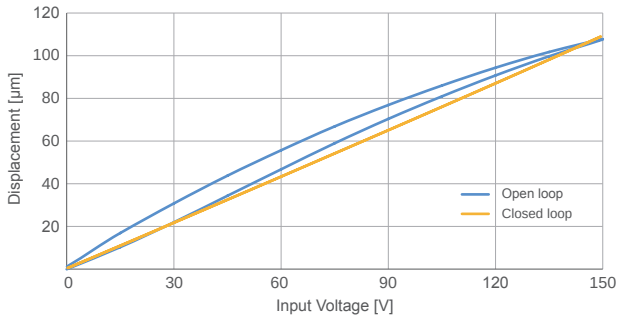
XP-611 adopts the principle of mechanism amplification design. It is small in size and compact in structure. The size of XP-611.X is only 35×35×20mm, which is easy to integrate with other equipment.

The max displacement coud be up to 100μm, the unloaded resonant frequency is high, the response speed is fast, and the step time of 100μm is 0.8ms. This product has won the favor of industrial users with its high reliability and high cost performance.

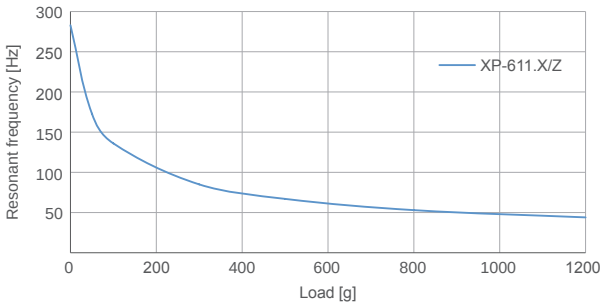
▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers".		

▸ Open/Closed-Loop Curve



▸ Frequency vs Load Curve



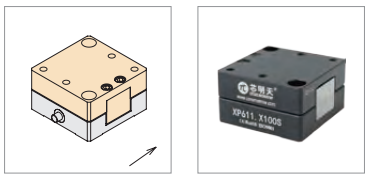
▸ Technical Data

Type	S-Closed loop K-Open loop	XP-611.X100S XP-611.X100K	XP-611.Z100S XP-611.Z100K	Units
Active axes		X	Z	
Drive control		1 driving channel , 1 sensing channel	1 driving channel , 1 sensing channel	
Travel range(0~120V)		80	80	µm±10%
Max.travel range(0~150V)		100	100	µm±10%
Sensor		SGS/-	SGS/-	
Closed/open loop resolution		3/1	3/1	nm
Closed-loop linearity		0.2/-	0.2/-	%F.S.
Repeatability		0.05/-	0.05/-	%F.S.
Pitch/yaw/roll		<15	<15	µrad
Push/pull force capacity		30/10	30/10	N
Stiffness		0.3	0.3	N/µm±20%
Unloaded resonant frequency		0.28	0.28	kHz±20%
Closed/open-loop unloaded Step time		10/0.8	10/0.8	ms±20%
Closed-loop operating frequency (-3dB)		50 (unloaded)	-	Hz±20%
Load capacity	Horizontal	0.8	1.2	kg
	Vertical	-	-	
	Inverted	-	-	
El. capacitance		1.8	1.8	µF±20%
Material		Steel, Aluminum	Steel, Aluminum	
Mass		80	80	g±5%

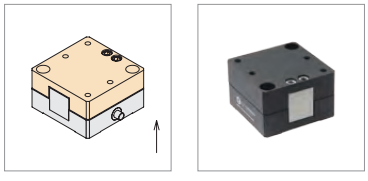
Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

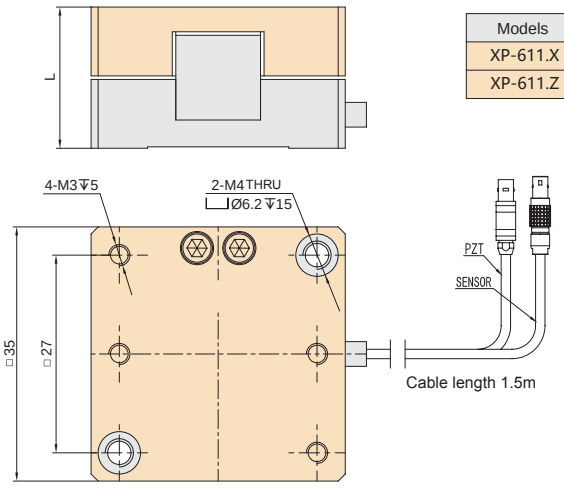
▸ Drawings

XP-611.X



XP-611.Z





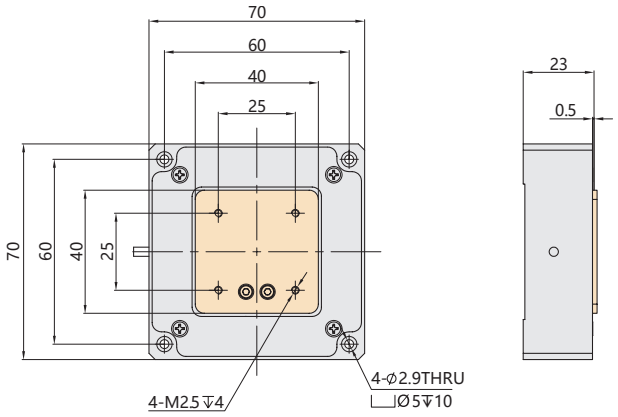
Models	L(mm)
XP-611.X	20
XP-611.Z	22

P13.XYZ180K Low Temperature Piezo Stage

▸ Technical Data

Type		P13.XYZ180K	Units
Active axes		X,Y,Z	
Drive control		3 driving channels	
Travel in 300K(0~60V)		180	μm±20%
Travel in 4K(0~150V)		80	μm±20%
Resolution		5	nm
Load capacity	Horizontal	0.1	kg
	Vertical	0.05	
	Inverted	0.05	
Unloaded resonant frequency		100	Hz±20%
Mass (not include cable)		300	g±5%
El. capacitance		12.3/axis	μF±20%

▸ Drawing



20059 Piezo Nanopositioning Stage(Custom Version)

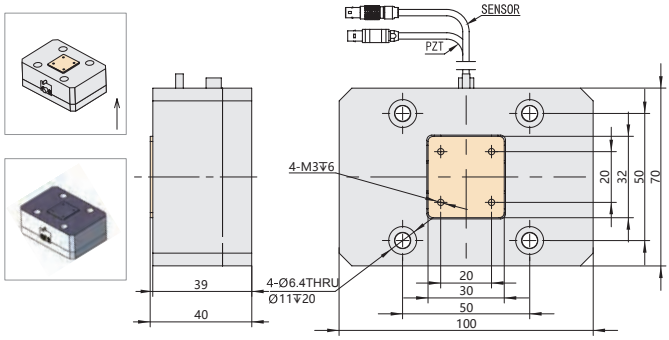
▸ Technical Data

Type	20059	Units
Active axes	Z	
Travel range(0~120V)	800	μm±20%
Travel range(0~150V)	1000	μm±20%
Sensor	CAP capacitance	
Closed-loop resolution	27	nm(Under 5mV ripple)
Open-loop resolution	8	nm
Linearity	0.1	%F.S.±20%
Repeatability	0.02	%F.S.±20%
Load capacity	700	g
El. capacitance	58	μF±20%

▸ Characteristics

• 1mm travel in Z • Load capacity up to 700g • Resolution up to 8nm
• Vacuum version available • Capacitive closed loop sensor

▸ Drawing

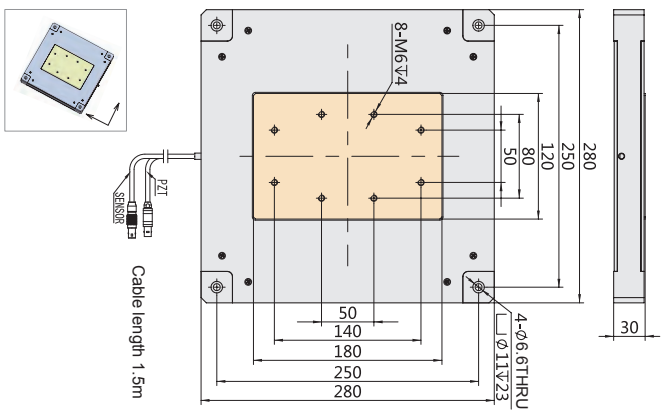


20090 XY Piezo Stage

▸ Technical Data

Type	20090	Units
Active axes	X, Y	
Travel range	30	μm/axis±20%
Driving voltage	0~150	V
Resonant frequency@2kg load	180	Hz±20%
El. capacitance	14.5	μF/axis±20%
Load capacity	2	kg
Materials	aluminum	
Mass (not include cable)	5.3	kg±5%

▸ Drawing

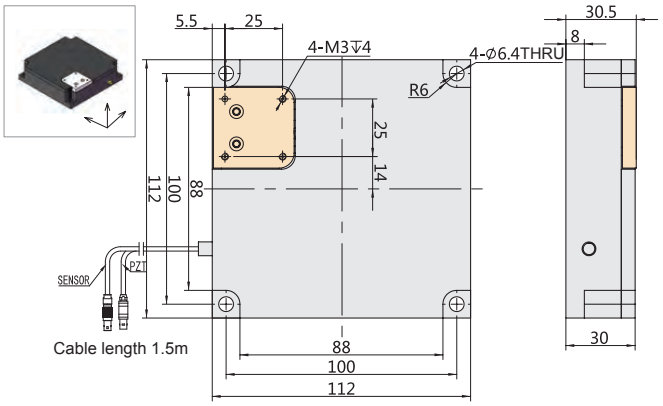


20100 XYZ Piezo Stage

▸ Technical Data

Type	20100	Units
Active axes	X, Y, Z	
XY Travel range(0~150V)	400	μm/axis±20%
Z Travel range(0~150V)	100	μm±20%
X, Y capacitance	10.8	μF/axis±20%
Z capacitance	3.6	μF±20%

▸ Drawing

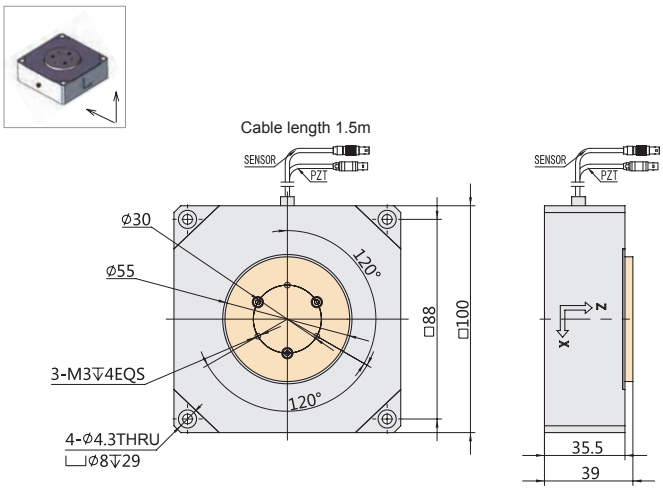


20136 Piezo Nanopositioning Stage(For Static Application)

▸ Technical Data

Type	20136-100μm	Units
Active axes	X, Z	
Travel range in X	±50	μm±20%
Travel range in Z	100	μm±20%
Driving voltage	0~150	V
Sensor	SGS	
Load capacity	10	kg

▸ Drawing

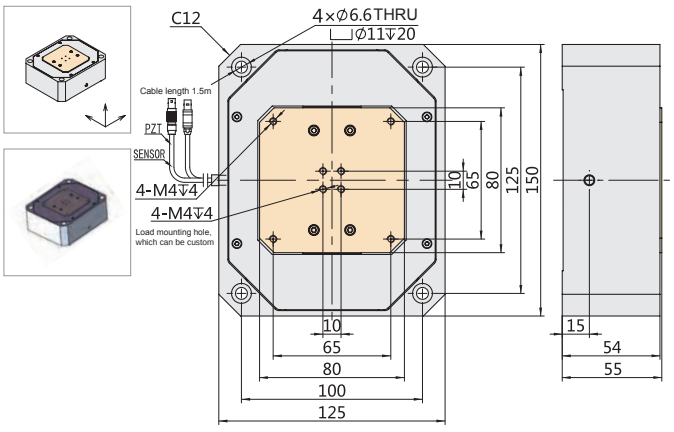


21001 XYZ Piezo Stage

▸ Technical Data

Type	21001	Units
Active axes	X, Y, Z	
Travel range(0~150V)	20/axis	μm±20%
Sensor	SGS	
Open-loop resolution	1	nm
Resolution	20	%F.S.
El. capacitance	13.2/axis	μF±20%
Load capacity	5	kg
Material	Steel, Aluminum	

▸ Drawing

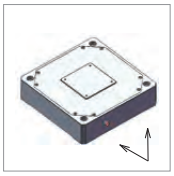


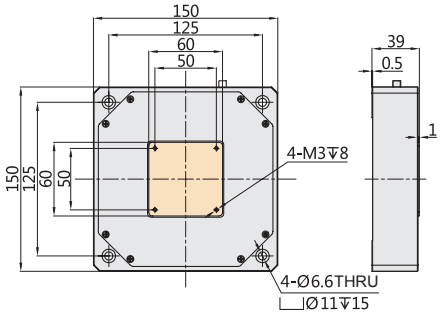
21099 Piezo Nanopositioning Stage

▸ Technical Data

Type	21099	Units
Active axes	X, Z	
Nominal travel(0~150V)	200/axis	μm±20%
Sensor	SGS	
Size	150×150×39	mm
Closed/open resolution	20/10	nm
Linearity	0.25	%F.S.±20%
Repeatability	0.15	%F.S.±20%
Pitch/yaw/roll	<60	μrad±20%
Unloaded resonant frequency	250	Hz±20%
Resonance @3kg load	70	Hz±20%
Operating frequency @3kg load	5	Hz
Step time @3kg load	80	ms±20%
Load capacity	3	kg
El.capacitance	21.6/28.8	μF±20%
Material	Steel, Aluminum	

▸ Drawing



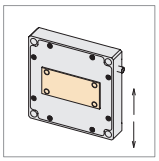


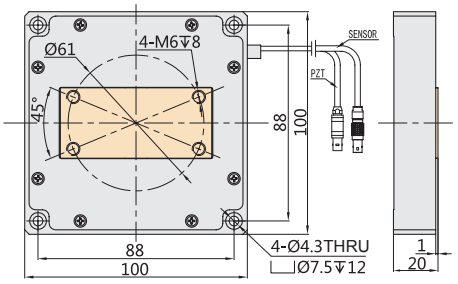
21136 X Piezo Stage

▸ Technical Data

Type	21136	Units
Active axes	X	
Travel range(0~120V)	±40	μm±20%
Travel range(0~150V)	±50	μm±20%
Sensor	SGS	
Closed-loop resolution	0.1	%F.S.
Repeatability	0.05	%F.S.
El. capacitance	7.2	μF±20%
Material	Steel, Aluminum	
Load capacity(Vertical)	2	kg
Operating temperature	0~+80	°C

▸ Drawing



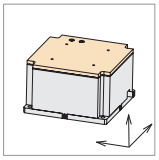


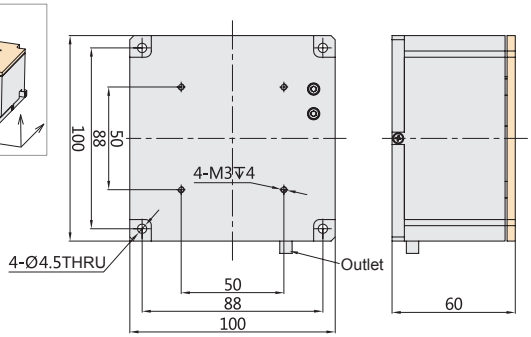
21147 Piezo Nanopositioning Stage

▸ Technical Data

Type	21147	Units
Active axes	X Y Z	
Nominal travel(0~120V)	400/axis	μm±20%
Travel range(0~150V)	500/axis	μm±20%
Sensor	SGS	
Resolution	70@20mV ripple	nm
Linearity	0.3	%F.S.
Repeatability	0.15	%F.S.
El.capacitance	21.6/axis	μF±20%
Load capacity	100	g
Material	Steel, Aluminum	

▸ Drawing



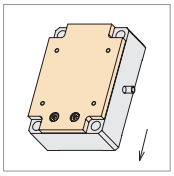


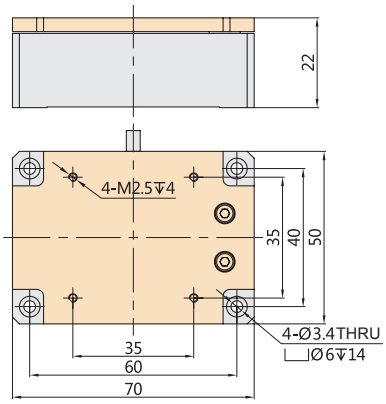
21210 Piezo Nanopostioning Stage

▸ Technical Data

Type	21210	Units
Active axes	X	
Travel range(0~150V)	250	μm±20%
Sensor	SGS, high accuracy	
Closed-loop resolution	42@20mV	nm
Unloaded resonant frequency	260	Hz±20%
Load capacity	0.3	kg
El.capacitance	7.2	μF±20%
Material	Steel, Aluminum	

▸ Drawing



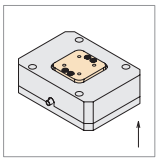


22025 Piezo Nanopositioning Stage

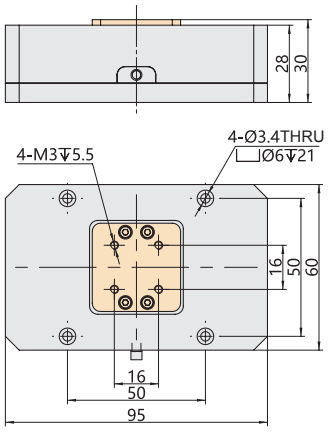
▸ Technical Data

Type	22025	Units
Active axes	Z	
Sensor	SGS	
Nominal travel(0~120V)	80	μm±20%
Travel(0~150V)	100	μm±20%
Load capacity	5	kg±5%
Open/closed-loop resolution	1/4	nm±20%
Unloaded resonant frequency	680	Hz±20%
Resonant frequency @ 5kg load	80	Hz±20%
Linearity	0.2	%F.S.
Repeatability	0.1	%F.S.
Mass(no cable)	<0.6	kg±5%
El.capacitance	21.6	μF±20%
Material	Steel, Al	

▸ Drawing







P12 Piezo Nanopositioning Scanners(Amplified Drive)



P12 is a 1~3 axes piezo scanning stage. The aperture diameter could be selected as 25mm or 35mm, which is suitable for light-transmitted applications such as microscopy. The piezo scanner could realize single axis displacement of 300μm. Integrated structure makes multidimensional motion uncoupled and could be selected in various specifications to meet the needs of different applications.

▸ Characteristics

- 1~3 axes motion
- Load capacity to 0.8kg
- With Ø25 or Ø35 aperture
- Optional UHV compatible version
- Closed-loop version for high repeatability
- Z travel to 300μm
- XYZ travel to 100μm/axis

▸ Applications

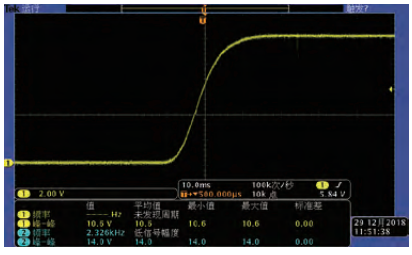
- Scanning interference
- Confocal microscopy
- Surface measurement
- Wafer positioning
- Image processing and stabilization
- Optical capture

▸ 1~3 – Axis Scanning Stage

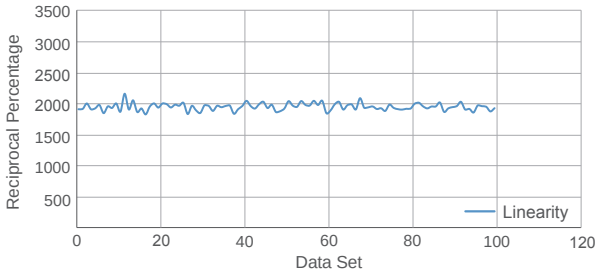
P12 piezo nanopositioning stage is a 1~3-axis linear piezo scanning stage, including X, Z, XY, XZ, XYZ motion versions. A variety of specifications and models for choice with optional aperture diameter of 25mm or 35mm.

▸ Loaded Step Time

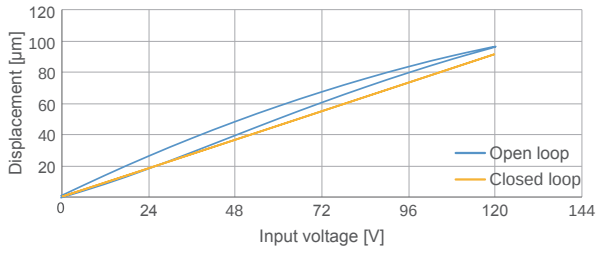
The figure shows the closed-loop stabilization time of P12.X100S is about 20ms at loading 125g, 100% travel.



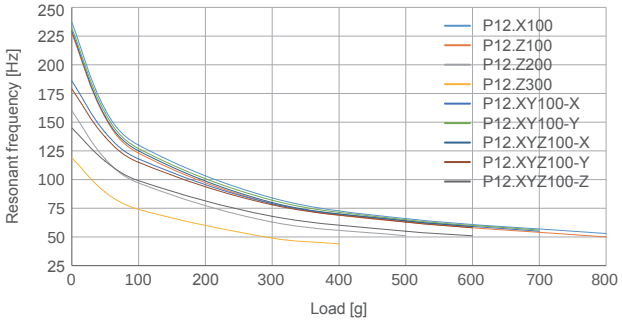
▸ Linearity



▸ Open/Closed Loop Curve



▸ Frequency vs Load Curve



▸ Compatible Piezo Controllers

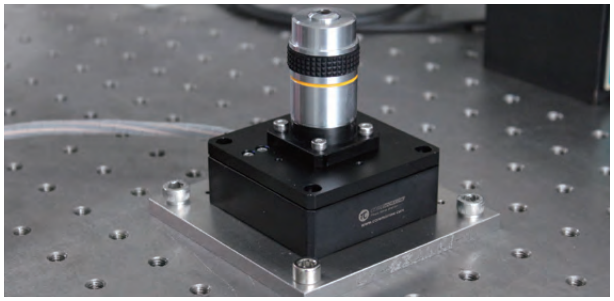
E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

▸ Technical Data

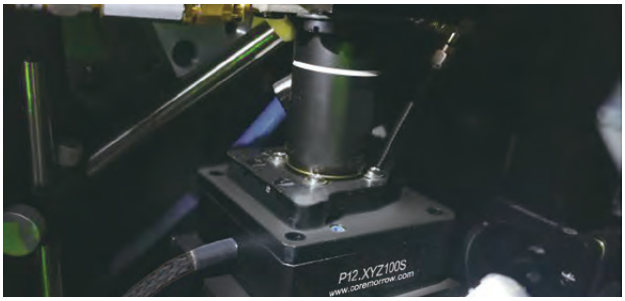
Type	S-Closed loop K-Open loop	P12.X100S P12.X100K P12.X100S-D P12.X100K-D		P12.Z100S P12.Z100K P12.Z100S-D P12.Z100K-D		P12.Z200S P12.Z200K P12.Z200S-D P12.Z200K-D		P12.Z300S P12.Z300K P12.Z300S-D P12.Z300K-D		P12.XY100S P12.XY100K P12.XY100S-D P12.XY100K-D		P12.XZ100S P12.XZ100K P12.XZ100S-D P12.XZ100K-D		P12.XYZ100S P12.XYZ100K P12.XYZ100S-D P12.XYZ100K-D		Units
Aperture		Ø25	Ø35	Ø25	Ø35	Ø25	Ø35	Ø25	Ø35	Ø25	Ø35	Ø25	Ø35	Ø25	Ø35	mm
Active axes		X		Z		Z		Z		X,Y		X,Z		X,Y,Z		
Drive control		1 driving channel 1 sensing channe		1 driving channel 1 sensing channe		1 driving channel 1 sensing channe		1 driving channel 1 sensing channe		2 driving channels 2 sensing channels		2 driving channels 2 sensing channels		3 driving channels 3 sensing channels		
Travel range(0~120V)		80		80		160		240		80/axis		80/axis		80/axis		μm±10%
Max.travel range(0~150V)		100		100		200		300		100/axis		100/axis		100/axis		μm±10%
Sensor		SGS/-		SGS/-		SGS/-		SGS/-		SGS/-		SGS/-		SGS/-		
Resolution		3/1		3/1		5.5/2		8/2.5		3/1		3/1		3/1		nm
Linearity		0.05/-		0.05/-		0.1/-		0.15/-		0.1/-		0.12/-		0.1/-		%F.S.
Repeatability		0.02/-		0.02/-		0.05/-		0.1/-		0.05/-		0.08/-		0.05/-		%F.S.
Pitch/yaw/roll		<10		<10		<15		<15		<10		<10		<15		μrad
Push/pull force		30/10		30/10		30/10		30/10		25/8		25/8		20/4		N
Stiffness		0.3		0.3		0.2		0.1		X0.25/Y0.3		0.25		X0.3/Y0.25/Z0.2		N/μm±20%
Unloaded resonant frequency		230		220		150		100		X180/Y230		200		X230/Y180/Z150		Hz±20%
Closed/open-loop unloaded step time		10/0.8		10/0.8		15/1.6		30/2.4		15/0.8		30/0.8		30/0.8		ms±20%
Closed-loop operating frequency (-3dB)		-		-		-		-		50 (unloaded)		-		-		Hz±20%
Load capacity	Horizontal	0.8		0.8		0.5		0.4		0.7		0.6		0.6		kg
	Vertical	0.05		0.05		0.04		0.03		0.04		0.04		0.03		
	Inverted	0.8		0.05		0.04		0.03		0.7		0.04		0.03		
El. capacitance		1.8		1.8		3.6		5.4		1.8/axis		1.8/axis		1.8/axis		μF±20%
Material		Steel, Aluminum														
Mass		140		140		200		260		200		200		260		g±5%

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term, high-reliability operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▸ Application Examples



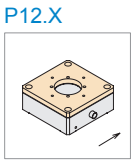
Inverted Piezo Scanner



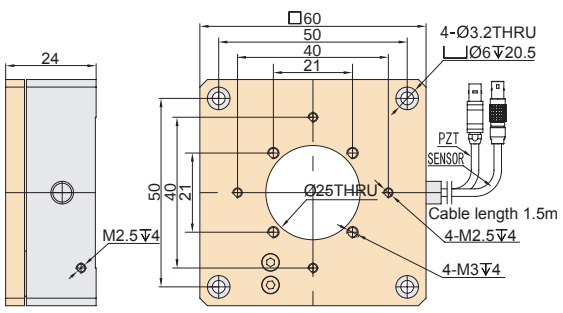
P12.XYZ100S applied to fluorescence microscopy

▸ Drawings

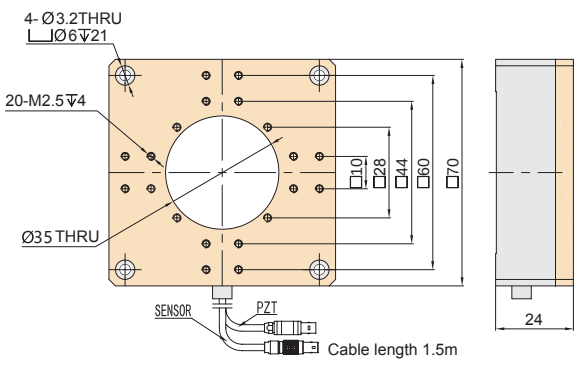
P12.X P12.Z P12.XY P12.XZ P12.XYZ







Ø25mm Aperture Version



Ø35mm Aperture Version

P12.XY500Z800S/K Piezoelectric Scanning Stage



▸ Characteristics

• XYZ linear motion • XY travel to 500μm, Z travel to 800μm • For objective XYZ positioning adjustment • Vacuum version available

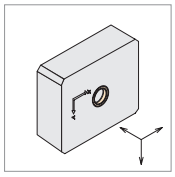
▸ Technical Data

Type		P12.XY500Z800S	P12.XY500Z800K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		3 driving channels,3 sensing channels	3 driving channels	
XY Travel range(0~150V)		500	500	μm/axis±10%
Z Travel range(0~150V)		800	800	μm±10%
Integrated sensor		SGS	-	
XY resolution		14	4	nm
Z resolution		22	6.5	nm
Load capacity	Horizontal	0.02	0.02	kg
	Vertical	0.02	0.02	
	Inverted	0.25	0.25	
XY capacitance		28.8	28.8	μF/axis±20%
Z capacitance		43.2	43.2	μF±20%
Mass		1000(with no cable)	1000(with no cable)	g±5%

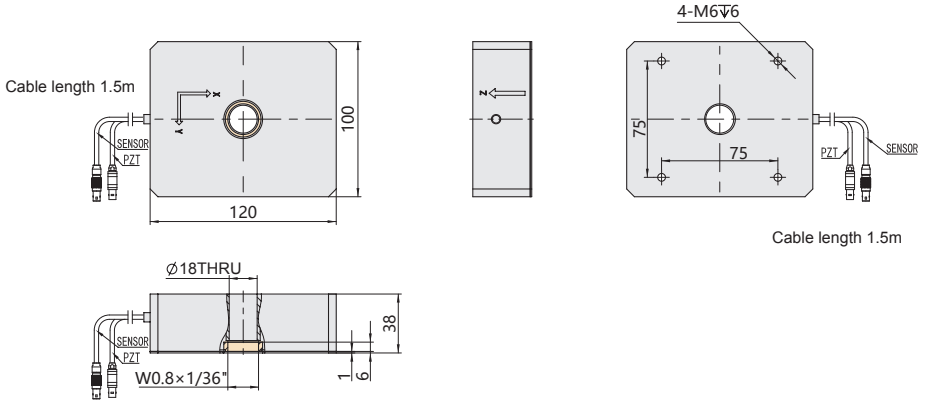
Note: Above are measured using E00/E01 piezo controllers. The maximum driving voltage can be -20V~150V; Recommended 0~120V for high-reliability and long-term use.

▸ Drawing

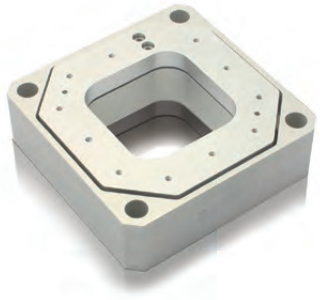
P12.XY500Z800S/K







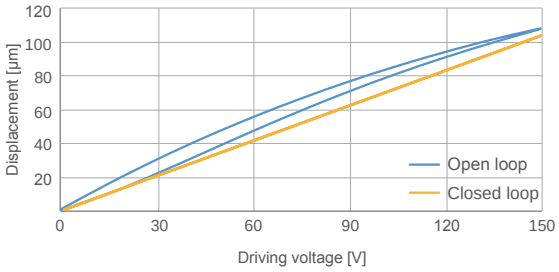
P12A Piezo Nanopositioning Scanners(Amplified Drive)



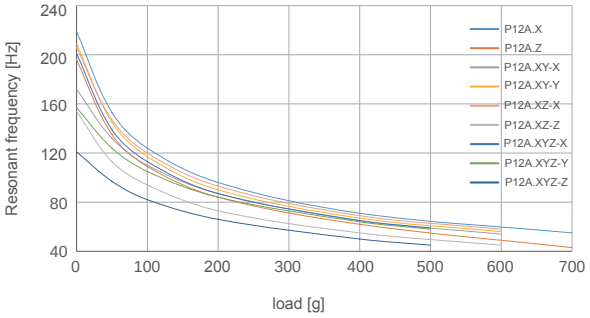
▸ Characteristics

- Travel to 100μm/axis
- Load capacity to 0.7kg
- Aperture: 45×45mm
- Closed-loop version for high repeatability
- Open/closed loop optional
- Optional UHV compatible version

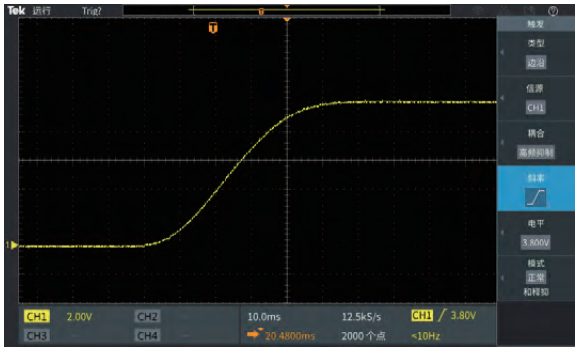
▸ Open/Closed Loop Curve



▸ Frequency vs Load Curve



▸ Loaded Step Time



P12A.XYZ100S loading 200g, the step time is about 50ms.

▸ Applications

- Scanning microscopy
- Confocal microscopy
- Surface measurement
- Semiconductor test

▸ High Precision of Sensor Positioning

The P12A piezo scan stage is equipped with a high-resolution sensor, which detects the position in real time and feeds it back to the piezo controller. The controller adjusts the voltage to correct the displacement Through the PID algorithm to achieve high-precision positioning.

P12A piezo scan stage, matched with CoreMorrow E70 modular controller, is applied to optical microscopy imaging to realize XYZ axis precision scanning.



▸ Compatible Piezo Controllers

E00/E01	E70	E80
		
1~3 channels Digital, analog knob adjustment Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

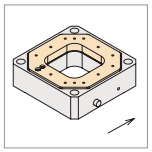
▸ Technical Data

Type	S-Closed loop K-Open loop	P12A.X100S P12A.X100K	P12A.Z100S P12A.Z100K	P12A.XY100S P12A.XY100K	P12A.XZ100S P12A.XZ100K	P12A.XYZ100S P12A.XYZ100K	Units
Active axes		X	Z	X, Y	X, Z	X, Y, Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		80	80	80/axis	80/axis	80/axis	μm±10%
Max.travel range(0~150V)		100	100	100/axis	100/axis	100/axis	μm±10%
Integrated sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Aperture		45×45	45×45	45×45	45×45	45×45	mm
Resolution		3/1	3/1	3/1	3/1	3/1	nm
Linearity		0.1/-	0.1/-	0.1/-	0.1/-	0.15/-	%F.S.
Repeatability		0.04/-	0.04/-	0.05/-	0.05/-	0.1/-	%F.S.
Pitch/yaw/roll		<10	<10	<15	<15	<20	μrad
Push/pull force		30/10	30/10	25/8	25/8	20/4	N
Stiffness		0.3	0.3	X0.25/Y0.3	X0.3/Z0.25	X0.3/Y0.25/Z0.2	N/μm±20%
Unloaded resonant frequency		230	200	X170/Y200	X200/Z150	X200/Y150/Z120	Hz±20%
Closed/open-loop unloaded step time		10/0.8	10/0.8	15/0.8	15/0.8	30/0.8	ms±20%
Load capacity	Horizontal	0.7	0.7	0.6	0.6	0.5	kg
	Vertical	0.05	0.03	0.03	0.02	0.02	
	Inverted	0.7	0.05	0.6	0.04	0.02	
El. capacitance		3.6	3.6	3.6/axis	3.6/axis	3.6/axis	μF±20%
Material		Steel, Aluminum					
Mass		240	240	290	290	350	g±5%

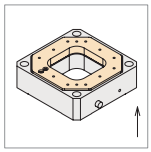
Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term, high-reliability operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

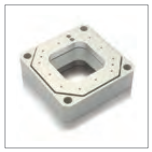
▸ Drawing

P12A.X

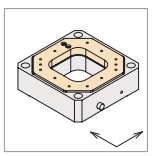


P12A.Z

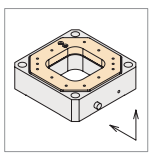




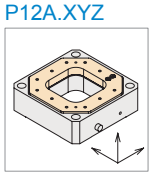
P12A.XY

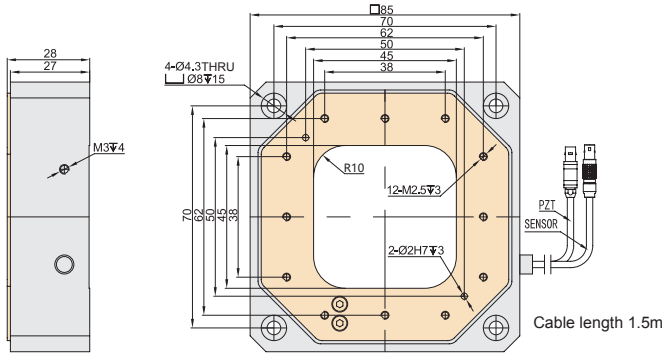


P12A.XZ



P12A.XYZ





Note: Different models, the threaded holes on the moving surface will be different, please refer to the official website of CoreMorrow or consult our sales engineer.

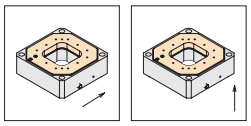
▸ Technical Data

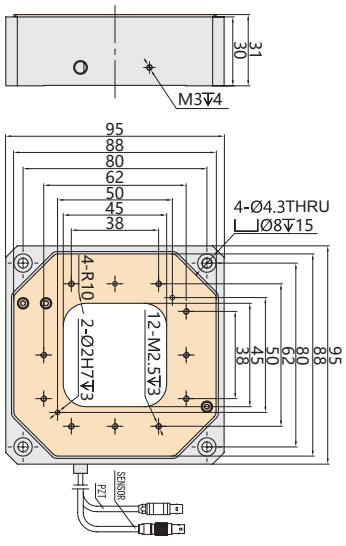
Types	S-Closed loop K-Open loop	P12A.X200S P12A.X200K	P12A.Z200S P12A.Z200K	P12A.Z400S P12A.Z400K	P12A.Z600S P12A.Z600K	P12A.XY200S P12A.XY200K	P12A.XZ200S P12A.XZ200K	P12A.XYZ200S P12A.XYZ200K	Units
Active axes		X	Z	Z	Z	X, Y	X, Z	X, Y, Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channe	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	
Nominal travel (0~120V)		160	160	320	480	160/axis	160/axis	160/axis	μm±20%
Max.travel range(0~150V)		200	200	400	600	200/axis	200/axis	200/axis	μm±20%
Sensor type		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Resolution		5.5/2	5.5/2	11/3.5	16/5	5.5/2	5.5/2	5.5/2	nm
Linearity		0.3/-	0.3/-	0.4/-	0.5/-	0.4/-	0.4/-	0.5/-	%F.S.
Repeatability		0.2/-	0.2/-	0.3/-	0.4/-	0.3/-	0.3/-	0.4/-	%F.S.
Unloaded resonant frequency		160	160	130	80	X160/Y140	X160/Z140	X150/Y130/Z90	Hz±20%
Load capacity	Horizontal	0.5	0.5	0.4	0.3	0.4	0.4	0.3	kg
	Vertical	0.03	0.03	0.02	0.01	0.02	0.01	0.01	
	Inverted	0.5	0.03	0.02	0.01	0.4	0.02	0.01	
El.capacitance		7.2	7.2	14.4	21.6	7.2/axis	7.2/axis	7.2/axis	μF±20%
Material		Steel, Al	Steel, Al	Steel, Al	Steel, Al	Steel, Al	Steel, Al	Steel, Al	

Note: Above are measured using E00/E01 piezo controllers. The max driving voltage can be -20V~150V; Recommended voltage 0~120V for high-reliability and long-term use.

▸ Drawings

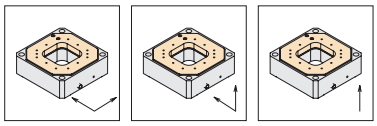
P12A.X200 P12A.Z200

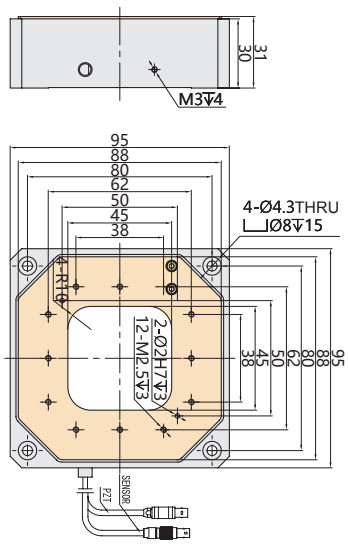




Cable length 1.5m

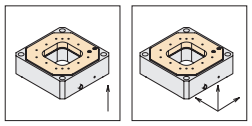
P12A.XY200 P12A.XZ200 P12A.Z400

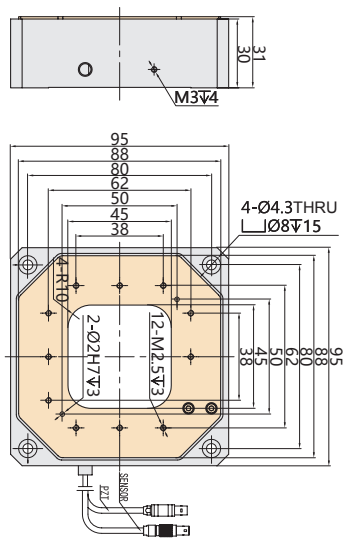




Cable length 1.5m

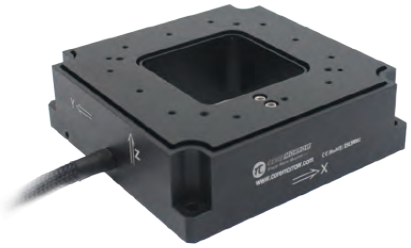
P12A.Z600 P12A.XYZ200





Cable length 1.5m

P12A.XY200Z100 Piezo Nanopositioning Scanners



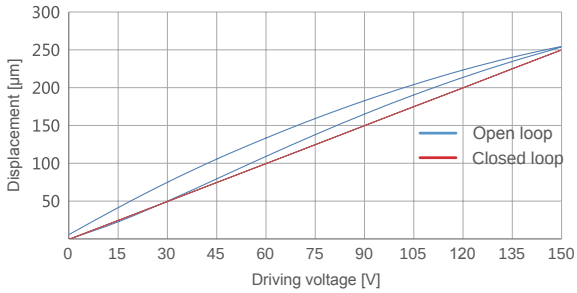
▸ Characteristics

• High accuracy • XYZ motion • Travel to X250/Y250/Z100μm • Aperture: 45×45mm • Vacuum version available

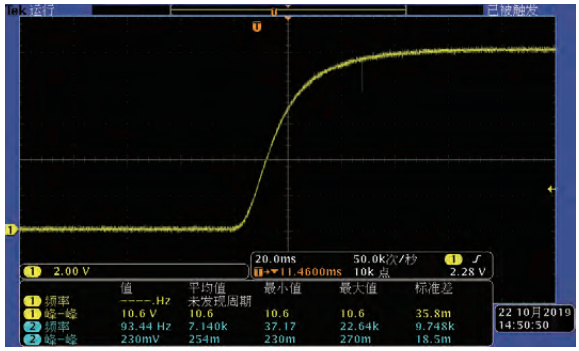
▸ Technical Data

Type		P12A. XY200Z100S	P12A. XY200Z100K	Units
Active axes		X, Y, Z	X ,Y, Z	
Drive control		3 driving channels 3 sensing channels	3 driving channels	
Travel range (0~120V)		XY200/Z80	XY200/Z80	μm±10%
Max.travel range (0~150V)		XY250/Z100	XY250/Z100	μm±10%
Sensor		SGS	-	
Resolution		XY7/Z3	XY3/Z1	nm
Linearity		XY0.1/Z0.2	-	%F.S.
Repeatability		XY0.05/Z0.1	-	%F.S.
Unloaded resonant frequency		XY240/Z150	XY240/Z150	Hz±20%
Load capacity	Horizontal	0.5	0.5	kg
	Vertical	0.02	0.02	
	Inverted	0.05	0.05	
El. capacitance		XY7.2/Z1.8	XY7.2/Z1.8	μF±20%
Material		Steel, Aluminum		

▸ Displacement vs Voltage Curve



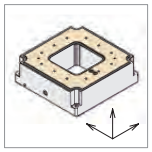
▸ Loaded Step Time

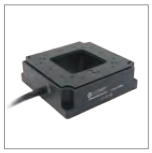


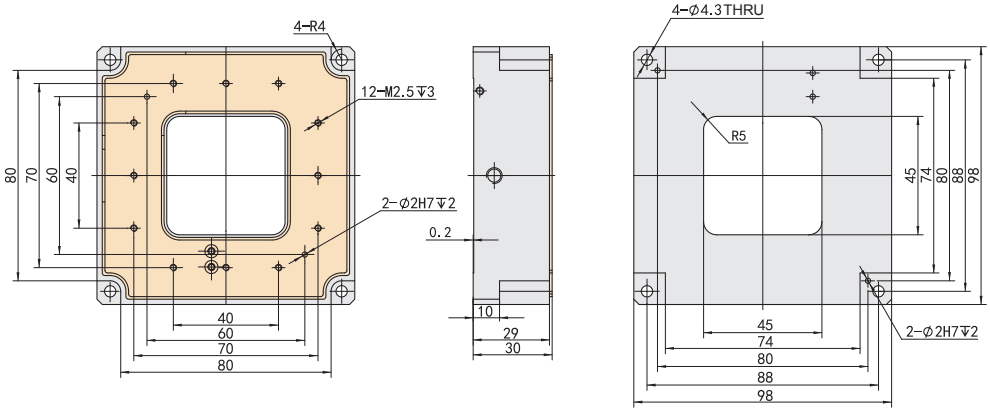
P12A.XY200Z100 loading 100g, step time of about 60ms

▸ Drawing

P12A.XY200Z100







P12B.XYZ100 Low Temperature Vacuum XYZ Piezo Stage





Vacuum version

▸ Characteristics

- XYZ motion
- 100μm/axis travel
- Aperture: Ø10mm
- Suitable for vacuum application

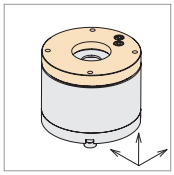
▸ Technical Data

Type		P12B.XYZ100S	P12B.XYZ100K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		3 driving channels , 3 sensing channels	3 driving channels	
Travel range(0~150V)		100/axis	100/axis	μm±20%
Sensor		SGS	-	
Resolution		3	1	nm
Aperture		Ø10	Ø10	mm
Unloaded resonant frequency		0.03	0.03	kHz±20%
El. capacitance		3.6/axis	3.6/axis	μF±10%
Load capacity	Horizontal	0.2	0.2	kg
	Vertical	0.03	0.03	
	Inverted	0.03	0.03	
Material		Steel, Aluminum	Steel, Aluminum	
Mass		250	250	g±5%

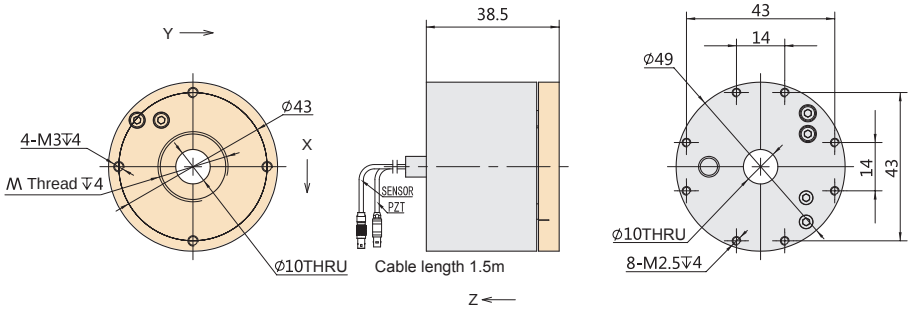
Note: Above are measured using E00/E01piezo controller. The maximum driving voltage can be -20V~150V; Recommended 0~120V for high-reliability and long-term use.

▸ Drawing

P12B.XYZ100







(Type)M
M26x0.75
M26x1/36“
M25x0.75
W0.8x1/36“

P13A Low Temperature Piezo Stage



P13A piezo stage is specially designed for extremely low temperature and strong magnetic field. It adopts low-temperature piezo drive with light shell and is in XY scanning motion. Its volume is small and the size is only 33×33×14.6mm, with a 10×10mm Through hole in the center.

All components adopt low temperature and strong magnetic compatible version to ensure its performance under low temperature and strong magnetic environment.

Characteristics

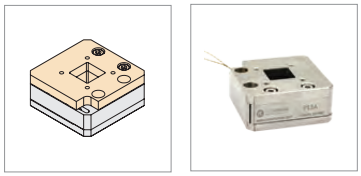
- Low temperature 4K
- Strong magnetic resistance
- Displacement up to 30μm@150V at 4K
- Resolution to 0.3nm
- Open-loop drive, quick response
- Vacuum version available

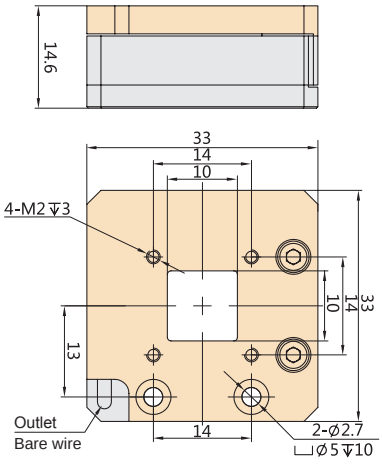
Technical Data

Type		P13A.XY90K		P13A.XYZ80K		P13A.XY180K		Units
Operating temperature		Room	4K	Room	4K	Room	4K	
Active axes		X, Y	X, Y	X, Y, Z	X, Y, Z	X, Y	X, Y	
Drive control		2 driving channels		3 driving channels		2 driving channels		
Travel range		90 (0~60V)	30(0~150V)	80(0~60V)	25(0~150V)	180(0~60V)	80(0~150V)	μm±20%
Open-loop resolution		1	0.3	1	0.3	2	1	nm
Unloaded resonant frequency		450	450	350	350	-	-	Hz±20%
Resonant frequency@150g		160	160	-	-	-	-	Hz±20%
El. capacitance		5.5/axis	0.75/axis	XY5.5, Z11	XY0.75, Z1.5	12.1/axis	1.65/axis	μF±20%
Mainbody		Stainless steel	Ti	Stainless steel	Ti	Stainless steel	Ti	
Load capacity	Horizontal	0.15	0.15	0.2	0.2	0.2	0.2	kg
	Vertical	0.1	0.1	0.05	0.05	0.05	0.05	
	Inverted	0.15	0.15	0.05	0.05	0.05	0.05	
Mass		88	88	168	168	-	-	g±5%
Wires		Standard wire	Phosphor Bronze Twisted Paired Wire	Standard wire	Phosphor Bronze Twisted Paired Wire	Standard wire	Phosphor Bronze Twisted Paired Wire	
Operating environment		-20~80	Temperature to 4K, Max.magnetic field to 30T, Vacuum degree to 2E-11mbar	-20~80	Temperature to 4K, Max.magnetic field to 30T, Vacuum degree to 2E-11mbar	-20~80	Temperature to 4K, Max.magnetic field to 30T, Vacuum degree to 2E-11mbar	

Drawings

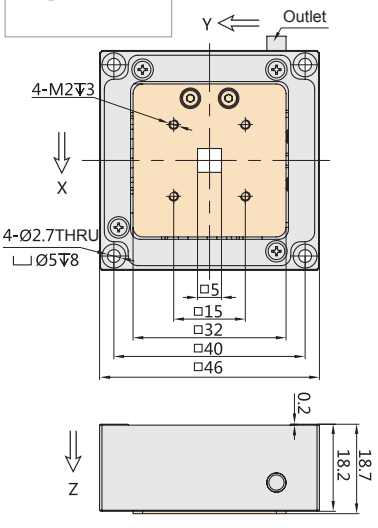
P13A.XY90



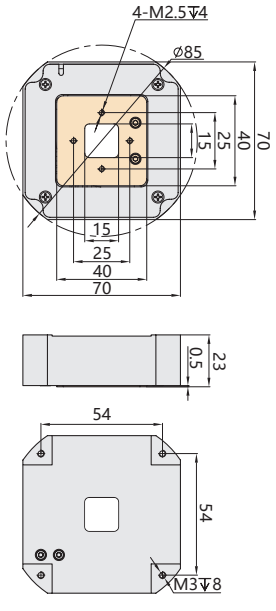


P13A.XYZ80

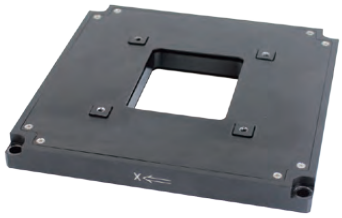




P13A.XY180



P15.XY100S/K Piezo Nanopositioning Stage



P15.XY100S/K piezo nanopositioning stage moves in XY axes, features 100μm/axis travel and very low profile, and SGS sensor is available for high accuracy. Vacuum suction cup can be installed on it.

▸ Characteristics

• XY motion • Travel to 100μm/axis • Load capacity to 500g • Very low profile • Optional sensor

▸ Applications

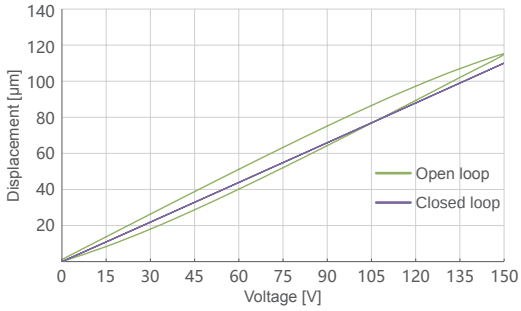
• Surface inspection • Microscopy imaging • Laser technology • Semiconductor processing and test

▸ Technical Data

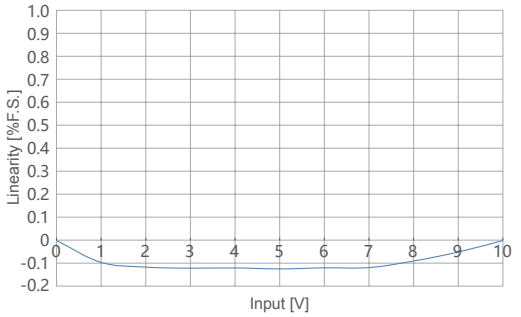
Types		P15.XY100S	P15.XY100K	Units
Active axes		X, Y	X, Y	
Drive control		2 driving channels 2 sensing channels	2 driving channels	
Nominal travel(0~120V)		80/axis	80/axis	μm±10%
Max.travel(0~150V)		100/axis	100/axis	μm±10%
Sensor type		SGS	-	
Resolution		3	1	nm
Linearity		0.15	-	%F.S.
Repeatability		0.05	-	%F.S.
Pitch/yaw/roll		≤10	≤10	μrad
Unloaded resonant frequency		490	490	Hz±20%
Unloaded step time		50	20	ms±20%
Load capacity	Horizontal	0.5	0.5	kg
	Vertical	0.08	0.08	
	Inverted	0.5	0.5	
El.capacitance		14.5	14.5	μF±10%
Material		Al	Al	
Mass		730	730	g±5%
Cable length		1.5	1.5	m±10mm

Note: Above are measured using E00/E01 piezo controllers. The max driving voltage can be -20V~150V; Recommended voltage 0~120V for high-reliability and long-term use.

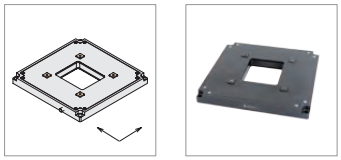
▸ Travel vs Voltage Curve

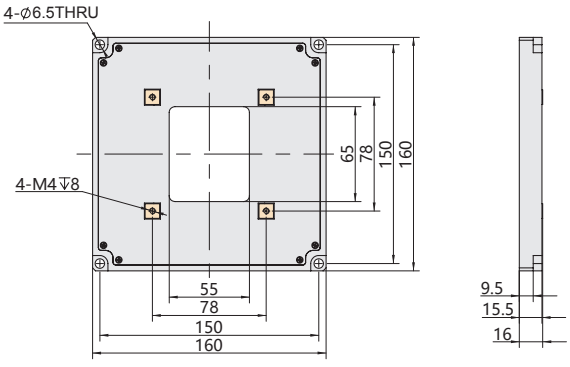


▸ Linearity

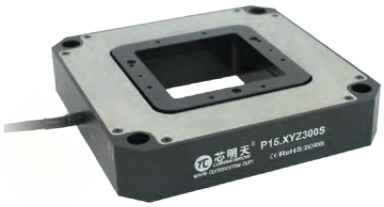


▸ Drawing





P15 Piezo Nanopostioning Scanners(Amplified Drive)



P15 is a fast, high-precision scanning and nanopositioning stage with very high straightness. It has multiple sizes of aperture which is ideal for transmitted-light applications such as near field scanning, confocal microscopy and mask positioning. P15 has 300μm displacement and its internal finite element analysis (FEA) optimized wire-cut flexural hinge structure. FEA gives it the design with the highest possible stiffness and minimizes linear and angular runout.

▸ Characteristics

- 2 axes or 3 axes, travel to 300μm/axis
- High scanning flatness
- Frictionless, high precision flexible guiding system
- Multiple sizes of aperture available
- Closed-loop sensor available
- UHV version available

▸ Application

- 3D nano scanning
- Mask/wafer Positioning
- Microscopic imaging
- Metrology
- Lens 3D alignment
- Biotechnology
- 3D microassembly
- Micromanipulation, etc.

▸ Technical Data

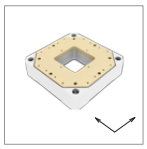
Type		P15.XY50S P15.XY50K	P15.XY100S-C P15.XY100K-C	P15.XYZ100S P15.XYZ100K	P15.XYZ120S P15.XYZ120K	P15.XYZ300S P15.XYZ300K	P15.XYZ300S-A P15.XYZ300K-A	P15.XYZ300S-C P15.XYZ300K-C	Units
Active axes		X, Y	X,Y	X,Y,Z	X,Y,Z	X,Y,Z	X,Y,Z	X,Y,Z	
Drive control		2 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	4 driving channels 3 sensing channels	3 driving channels 3 sensing channels	4 driving channels 3 sensing channels	4 driving channels 3 sensing channels	
Travel(0~120V)		50/axis	80/axis	100/axis	XY±50 Z100	240/axis	XY±120/axis Z240	XY±120/axis Z240	μm±10%
Max.travel(0~150V)		60/axis	100/axis	120/axis	XY±60 Z120	300/axis	XY±150/axis Z300	XY±150/axis Z300	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Aperture		50×50	66×66	60×60	60×60	66×66	66×66	66×66	mm
Size		120×120×30	150×150×30	140×140×36	140×140×36	150×150×30	150×150×35	150×150×35	mm
Resolution		2.5/1	3.5/1	3.5/1	3.5/1	8/2.5	10/5	8/2.5	nm
Linearity		0.03/-	0.15/-	0.2/-	0.2/-	0.2/-	0.2/-	0.2/-	%F.S.
Closed loop repeatability		0.03/-	0.1/-	0.1/-	0.1/-	0.1/-	0.15/-	0.15/-	%F.S.
Pitch/yaw/roll		<10	<30	<30	<30	<30	<100	<150	μrad
Push/pull force		-	60/10	100/20	XY150/20 Z100/20	50/10	200/10	200/10	N
Stiffness		-	0.6	0.8	1.6/1.6/0.8	0.1	1	1	N/μm±20%
Unloaded resonant frequency		270/325	200	300/350/400	389/355/400	140/170/220	180/200/200	190/145/249	Hz±20%
Resonant frequency at loading		220/245 (@200g)	45(@6kg)	-	-	-	49/49/69(@5kg)	145/110/145 (@300g)	Hz±20%
Closed/open-loop unloaded step time		40@200g/10	-	-	-	60/10	-	-	ms±20%
Load capacity	Horizontal	0.5	6	1	2	0.5	5	3	kg
	Vertical	0.1	0.5	0.5	1	0.05	1	0.5	
	Inverted	0.5	6	0.5	1	0.5	1	0.5	
El. capacitance		5.4/axis	10.8/axis	XY7.2,Z14.4	14.4	XY10.8,Z13.2	XY21.6, Z43	21.6/axis	μF±20%
Material		Aluminum alloy	Aluminum	Steel, Aluminum	Steel, Aluminum	Aluminum	Steel, Aluminum	Steel, Aluminum	
Mass(no cable)		0.8	1.1	0.7	0.75	0.83	-	-	kg±5%

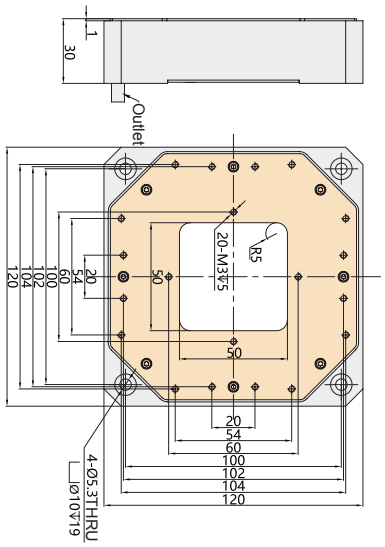
Note: Max driving voltage could be -20V~150V, Recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

Note: The appearance color of P15.XYZ300S/K is subject to the actual product.

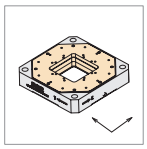
▸ Drawing

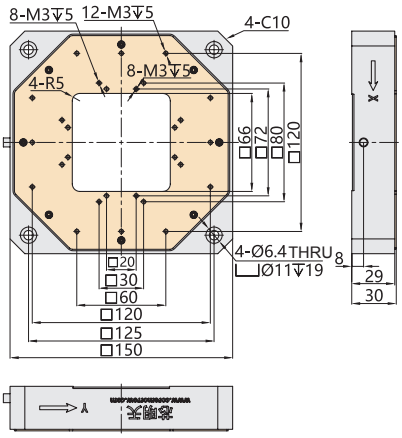
P15.XY50S/K



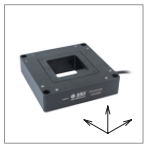


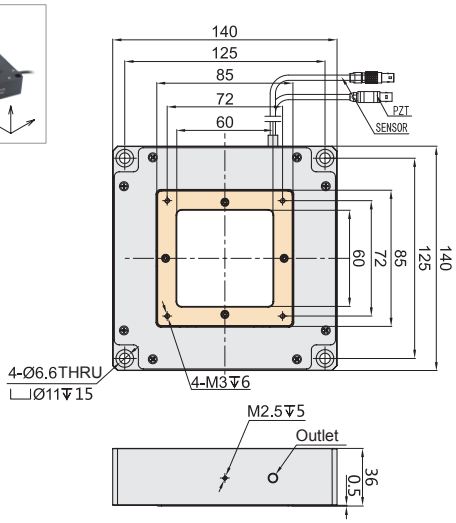
P15.XY100S/K



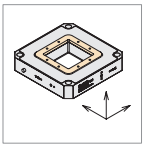


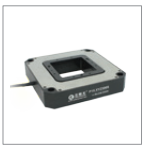
P15.XYZ100/P15.XYZ120

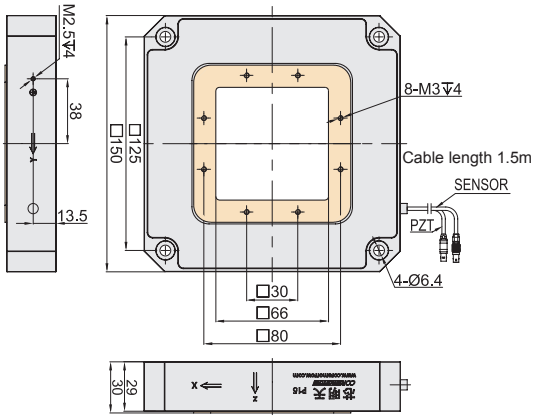




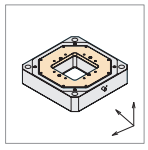
P15.XYZ300

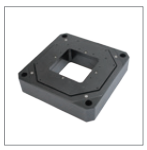


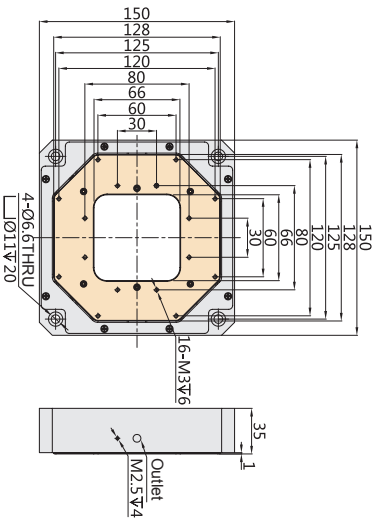




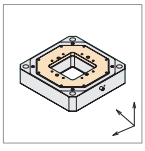
P15.XYZ300S/K-A

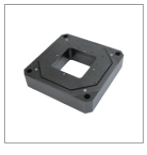


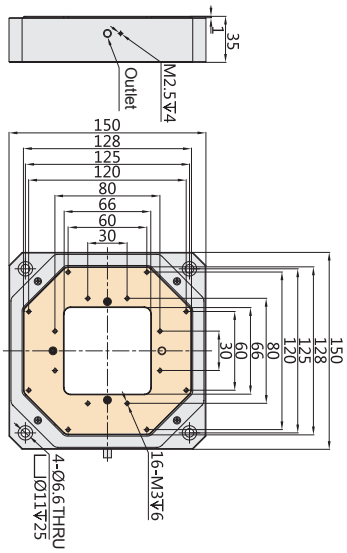




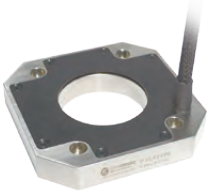
P15.XYZ300S/K-C







P16.XY15 Piezo Scanner (Amplified Drive)



P16.XY15 Piezo Scanner is an XY axis motion scanning platform, mechanism amplification design principle, central aperture size is Φ37mm, can achieve ±8μm travel in XY. It is designed specifically for imaging applications. The product is compact, easy to integrate and install.

▸ Characteristics

• Travel to ±8μm • Load capacity to 1kg • Aperture: Ø37mm • Closed loop for high accuracy • Available UHV • Custom is available

▸ Applications

• Image stabilization • Microscopic imaging • Surface inspection • Interference/metering • Precision positioning • Photoelectric aiming pod

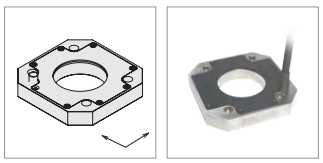
▸ Technical Data

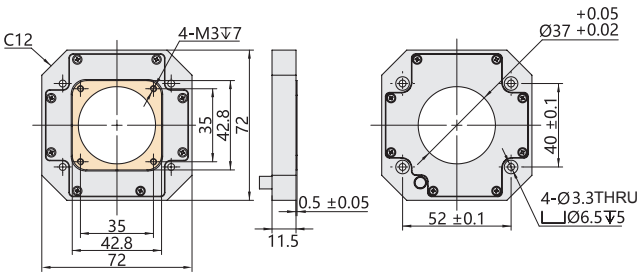
Type		P16.XY15S	P16.XY15K	Units
Active axes		X,Y	X,Y	
Drive control		3 driving channels , 2 sensing channels	3 driving channels	
Travel range(0~120V)		±6.6/axis	±6.6/axis	μm±10%
Max.travel range(0~150V)		±8/axis	±8/axis	μm±10%
Sensor		SGS	-	
Aperture		Ø37	Ø37	mm
Resolution		0.5	0.2	nm
Linearity		0.3	-	%F.S.
Closed loop repeatability		0.1	-	%F.S.
Pitch/yaw/roll		<10	<10	μrad
Push/pull force		44/44	44/44	N
Stiffness		X2.2/Y2.2	X2.2/Y2.2	N/μm±20%
Unloaded resonant frequency		1500	1500	Hz±20%
Closed/open-loop unloaded step time		1.5	0.7	ms±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.2	0.2	
	Inverted	1	1	
El. capacitance		1.6/axis	1.6/axis	μF±20%
Material		Steel, Aluminum	Steel, Aluminum	
Mass(no cable)		235	235	g±5%

Note: Max driving voltage could be -20V~150V, Recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▸ Drawings

P16.XY15S/K



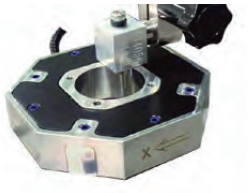


▸ Board-type Piezo Controller



P16.XY20/P16.XY20Z7 Piezo Scanner(Amplified Drive)



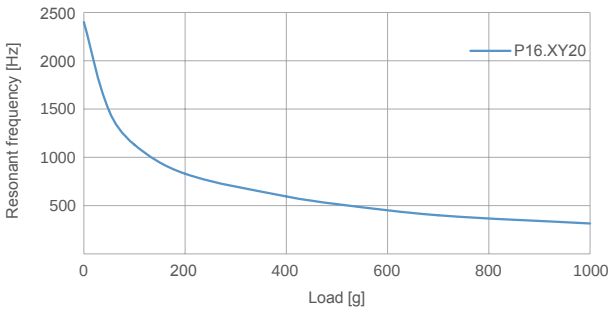


P16.XY20/P16.XY20Z7 piezo scanner is an XY or XYZ motion scanning platform, adopting amplification mechanism. It features a center aperture diameter of 26mm, and P16.XY20Z7 can achieve ±12.5μm travel in XY-axis and 8.5μm travel in Z-axis. The product is very compact and easy to integrate.

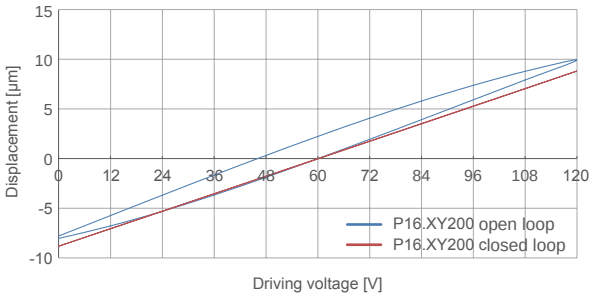
▸ Characteristics

- Travel to ±12.5μm@XY,8.5μm@Z
- 1kg load capacity
- Aperture: Ø26mm
- Closed loop for high accuracy
- Optional vacuum version
- Open/closed loop
- Custom is available

▸ Frequency vs Load Curve



▸ Open/Closed Loop Curve



▸ Application Example

P16.XY20 piezoelectric scanning stage is applied to the infrared camera with its high frequency and high resolution, which greatly improves the resolution of the imaging.



▸ Typical Applications

- Microscopic imaging
- Surface inspection
- Interference/metering
- Precision positioning
- Photoelectric aiming pod

▸ Exellent Dynamics



Displacement curve of P16.XY20 with 10g load at 500Hz

▸ High Dynamics and Accuracy

P16.XY20/P16.XY20Z7 piezo scanner is a small-volume high-precision translation scanning stage. It moves in X,Y and Z-axis, specially designed for high-resolution, high-dynamic, high-positioning precision applications. It has built-in high-reliability piezoelectric ceramics and P16.XY20 can realize XY axes ±8μm displacement, the resolution can reach 0.5nm, and the full-stroke repeatability accuracy is up to nanometer.

The product is made of stainless steel and has a special structural design to make it have a very high stiffness. The unloaded resonant frequency is 2000Hz, which meets the industrial demand for high frequency and high precision applications.

▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

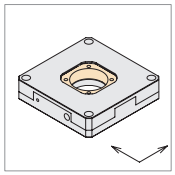
▸ Technical Data

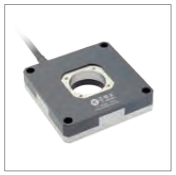
Type	S-Closed loop K-Open loop	P16.XY20S	P16.XY20K	P16.XY20Z7K	Units
Active axes		X, Y	X, Y	X, Y, Z	
Drive control		3 driving channels , 2 sensing channels	3 driving channels	4 driving channels	
Nominal travel range(0~100V)		±6.6/axis	±6.6/axis	-	μm±10%
Nominal travel range(0~120V)		-	-	XY±10/Z6.8	μm±10%
Travel range(0~120V)		±8/axis	±8/axis	-	μm±10%
Max.travel range(0~150V)		-	-	XY±12.5/Z8.5	μm±10%
Sensor		SGS	-	-	
Aperture		Ø26	Ø26	Ø26	mm
Resolution		0.5	0.2	XY0.3/Z0.2	nm
Linearity		0.3	-	-	%F.S.
Repeatability		0.1	-	-	%F.S.
Pitch/yaw/roll		<10	<10	<10	μrad
Push/pull force		44/44	44/44	-	N
Stiffness in motion direction		X2.2/Y2.2	X2.2/Y2.2	-	N/μm±20%
Unloaded resonant frequency		X2000/Y2000	X2000/Y2000	XY1700/Z1400	Hz±10%
Unloaded step time		1.5	0.7	XY0.2/Z0.4	ms±10%
Load capacity	Horizontal	1	1	0.5	kg
	Vertical	0.2	0.2	0.1	
	Inverted	1	1	0.1	
El. capacitance		1.6/axis	1.6/axis	XY1.6/Z3.2	μF±10%
Material		Steel, Al	Steel, Al	Al, Steel	
Mass		180	180	600	g±10%

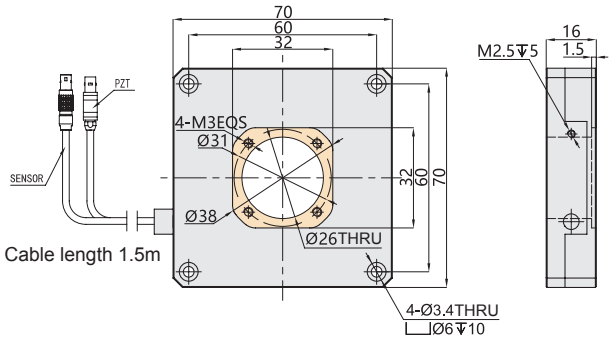
Note: Above parameters are measured with E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high reliability and long-term use, the recommended driving voltage is 0~120V.

▸ Drawing

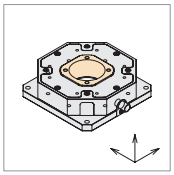
P16.XY20

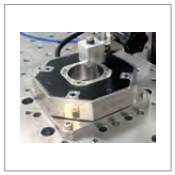


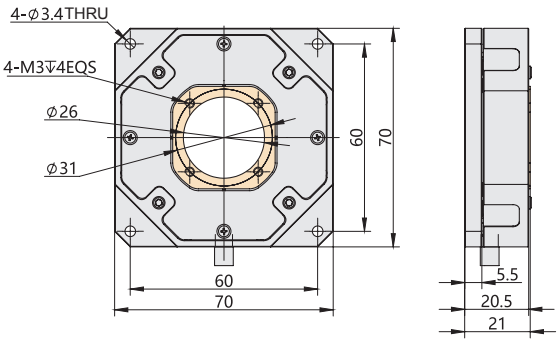




P16.XY20Z7K







P16 XY Piezo Scanner(Amplified Drive)



P16 series piezoelectric scanner is an XY-axis translation scanning platform adopting amplifying mechanism. The travel can be up to 80μm, and the open-loop/closed loop is optional.

▸ Characteristics

• Travel to 80μm • Load capacity to 1.5kg • Closed loop for high repeatability • Optional vacuum version

▸ High Stiffness, Large Load Capacity

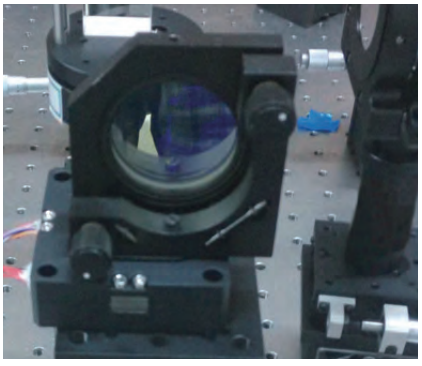
P16 series piezoelectric scanner adopts the principle of mechanism amplification design and built-in high-performance piezo actuator. The scanner can realize the travel of 50μm or 80μm.

P16.XY100 requires a three-channel piezoelectric controller with one constant-voltage output channel.

P16 XY piezo scanner is differentially controlled and widely used in microscopic imaging and other fields due to its small size, large load and high dynamics.

▸ Application Example

P16.XY piezo scanner is used in optical path adjustment experiment , carrying mirror frame to move precisely in XY axes.



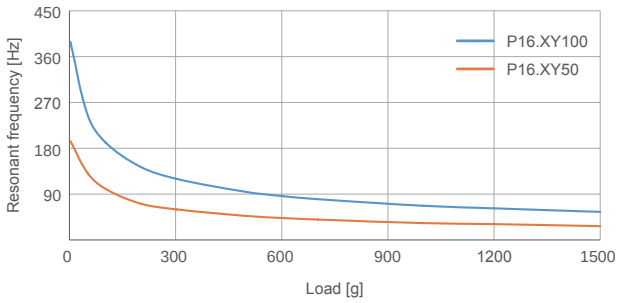
▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

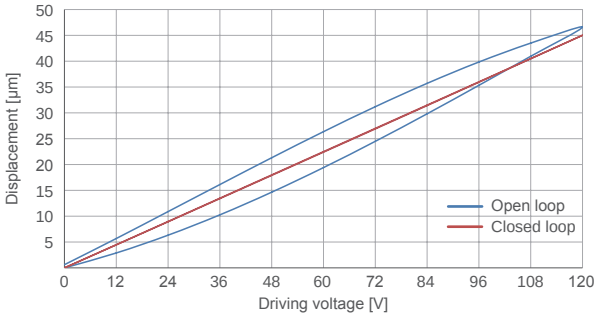
▸ Typical Applications

• Precision positioning • Microscopic imaging • Optical
• Interference/metering • Surface inspection • Micro-operation

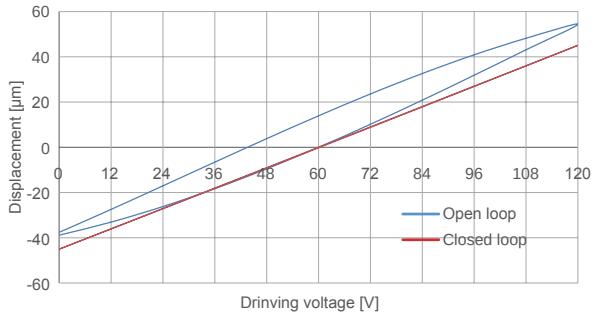
▸ Frequency vs Load Curve



▸ P16.XY50 Curve



▸ P16.XY100 Curve



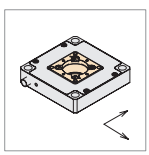
Technical Data

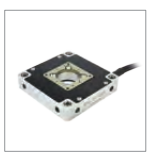
Type	S-Closed loop K-Open loop	P16.XY50S P16.XY50K	P16.XY80S P16.XY80K	P16.XY100S P16.XY100K	Units
Active axes		X, Y	X, Y	X, Y	
Drive control		2 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Travel range	0~100V	-	±33/axis	±33/axis	μm±10%
	0~120V	40/axis	-	-	
Max.travel range	0~120V	-	±40/axis	±40/axis	μm±10%
	0~150V	50/axis	-	-	
Sensor		SGS/-	SGS/-	SGS/-	
Aperture size		Ø20	Ø43	Ø20	mm
Resolution		1.5/0.5	2.5/1	2.5/1	nm
Linearity		1/-	X0.3Y1/-	1/-	%F.S.
Repeatability		1/-	X0.1Y0.5/-	0.5/-	%F.S.
Pitch/yaw/roll		<20	<10	<25	μrad
Push/pull force		30/10	50/15	30/30	N
Stiffness in motion direction		0.5	1	0.5	N/μm±20%
Unloaded resonant frequency		500	700	600	Hz±20%
Unloaded step time		10/0.8	5/1.5	10/1.6	ms±20%
Load capacity	Horizontal	1.5	0.5	1.5	kg
	Vertical	0.05	0.3	0.4	
	Inverted	1.5	0.5	1.5	
El. capacitance		1.8/axis	3.6/axis	3.6/axis	μF±20%
Material		Steel, Al	Steel, Al	Steel, Al	
Mass		200	470	220	g±5%

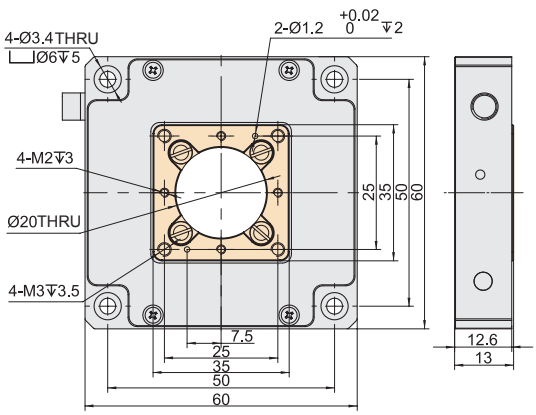
Note: Above parameters are measured with the E00/E01 series piezo controller. The maximum driving voltage can be -20V~150V; For high reliability long-term use, the recommended driving voltage is 0~120V.

Drawings

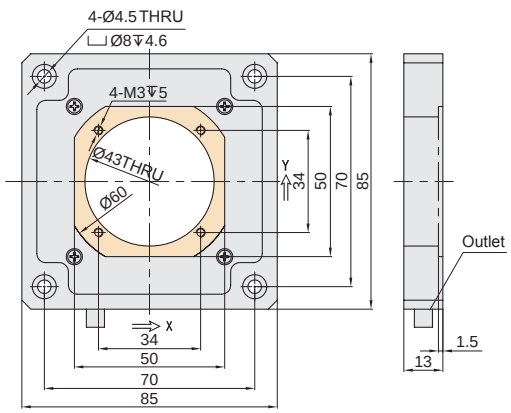
P16.XY50/100







P16.XY80S/K



P17.XY15 Piezo Scanner(Direct Drive)

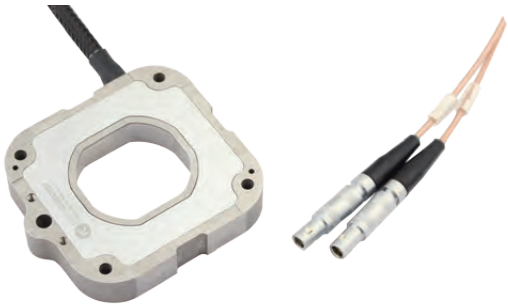


P17.XY15 piezoelectric scanning stage is an XY-axis translation scanning platform. The center has a aperture size of 25×27.5mm. The product is small in size and stable in performance. P17.XY15 scanning platform is an open-loop version and has excellent dynamics, suitable for dynamic scanning applications.

▸ Characteristics

• Travel to 15μm • Load capacity to 0.2kg • Aperture size: 25×27.5mm • Sub-nm resolution • Available UHV version

▸ XY Motion



▸ High Stiffness, Resolution and Frequency

P17.XY15 series piezo scanner adopts direct-drive mechanism design and built-in high-performance piezoelectric ceramics. The product is very compact, and the Through holes at the four corners of the stage are convenient for integration and installation.

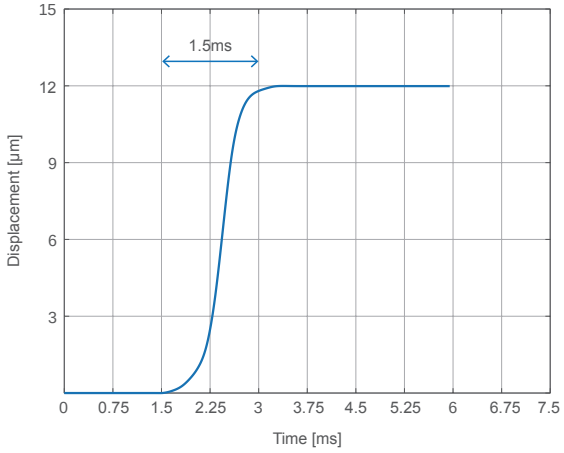
P17.XY15 piezo scanning stage is based on an open-loop version with ultra-high resolution of 0.2nm. The excellent structural design makes it have a high stiffness of 3N/μm, and the XY axis unloaded resonant frequency can reach 1kHz. This product is ideal for high-speed scanning applications.

▸ Typical Applications

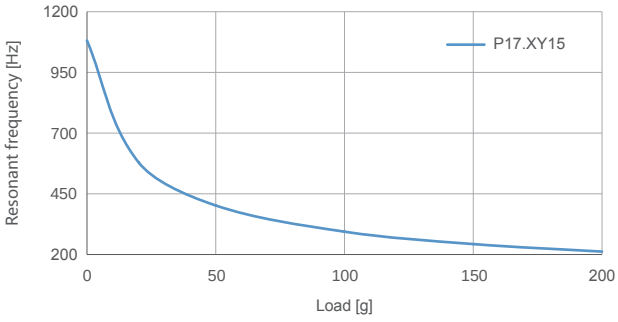
- Microscopic imaging
- Interference/metering
- Infrared thermal imaging
- Surface inspection
- Precision positioning
- Semiconductor testing

▸ Step Time

P17.XY15 piezoelectric scanning stage is drived with CoreMorrow high-power E00/E01 piezo controller, which can realize a step time of 1.5ms.



▸ Frequency vs Load Curve



▸ Applications Example

P17.XY15 features small size, fast response and aperture design, which makes it very suitable for image stabilization in photoelectric pod.



Photoelectric pod

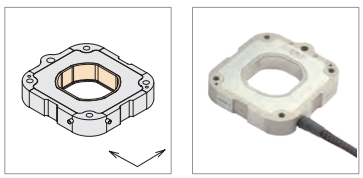
▸ Technical Data

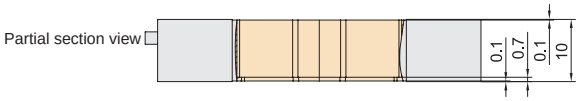
Type	K-Open loop	P17.XY15K	Units
Active axes		X, Y	
Drive control		2 driving channels	
Travel range(0~120V)		12/axis	μm±10%
Max.travel range(0~150V)		15/axis	μm±10%
Aperture		25×27.5(See Drawing)	mm
Resolution		0.2	nm
Pitch/yaw/roll		<5	μrad
Push/pull force		30/3	N
Stiffness		X3/Y3	N/μm±20%
Unloaded resonant frequency		X1000/Y1000	Hz±20%
Unloaded step time		1.5	ms±20%
Load capacity	Horizontal	0.2	kg
	Vertical	0.05	
	Inverted	0.2	
El. capacitance		0.7/axis	μF±20%
Material		Aluminum	
Mass		55	g±5%

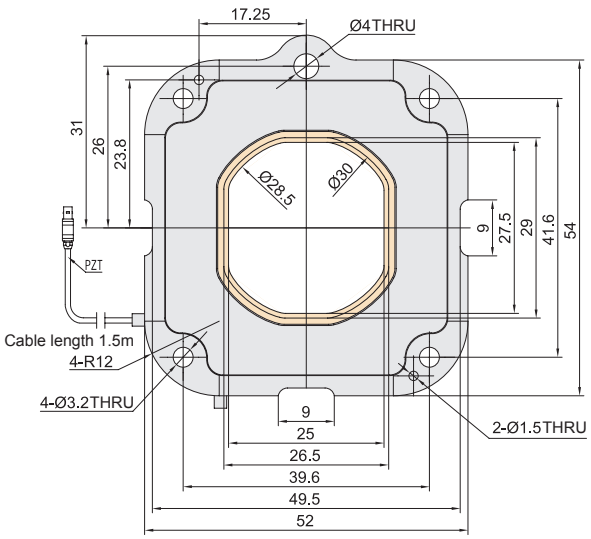
Note: Above parameters are measured with the E00/E01 series piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term use, the recommended driving voltage is 0~120V.

▸ Drawing

P17.XY15







▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

P17.XY200 Piezo Scanners(Amplified Drive)



P17 is an XY scanning stage specially developed for applications requiring large aperture and large displacement. The scanner adopts amplification mechanism and built-in high-reliability piezo actuators, which could realize the scanning range of 187.5μm. It has been widely used in the fields of precise positioning and scanning microscopy .

▸ Characteristics

- Max stroke to 187.5μm
- Load capacity to 1kg
- Aperture: 60×60mm
- Closed loop for high Repeatability
- Fast response time
- Available UHV version

▸ XY axes

P17 moves in XY axes with the displacement of 187.5μm/axis.

▸ Large Aperture, Large Displacement

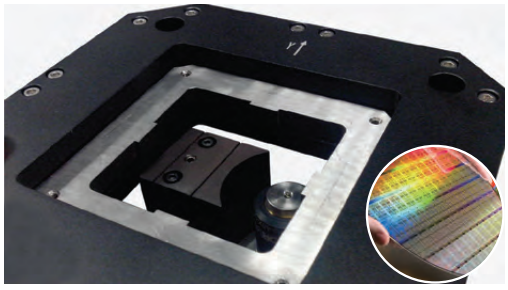
P17.XY200 fast high-precision scanning stage could realize stroke of 187.5μm/axis with excellent structural design of no friction, high guiding precision and fast response time to 5ms. Closed-loop version uses high-precision feedback sensor. 60×60mm aperture of the scanner is suitable for wafer positioning or micro-operation in industrial automation.

▸ Applications

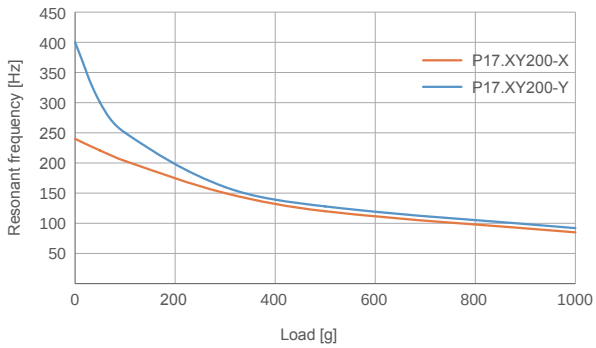
- Image processing and stabilization
- Interference
- Scanning microscopy
- Surface inspection
- Wafer positioning
- Micromanipulation

▸ Application Example

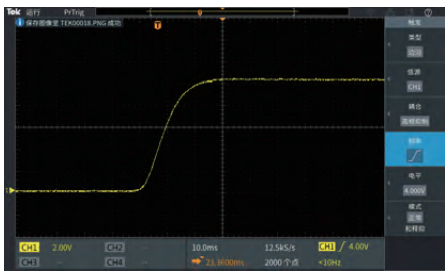
P17.XY200 has been successfully used in semiconductor testing, surface structure analysis, microscopic imaging.
P17.XY200 used in conjunction with CoreMorrow piezo objective scanner for wafer positioning, could perform nano-scale precision positioning of wafer.



▸ Frequency vs Load Curve

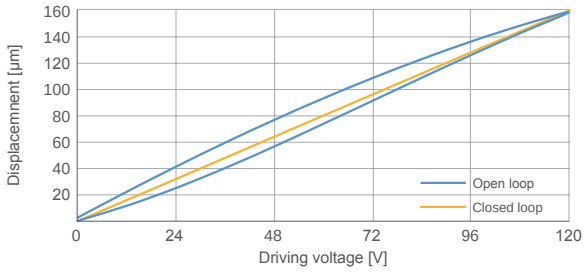


▸ Step Time



Step time of P17.XY200S loading 10g to full stroke is about 30ms.

▸ Open/Closed Loop Curve



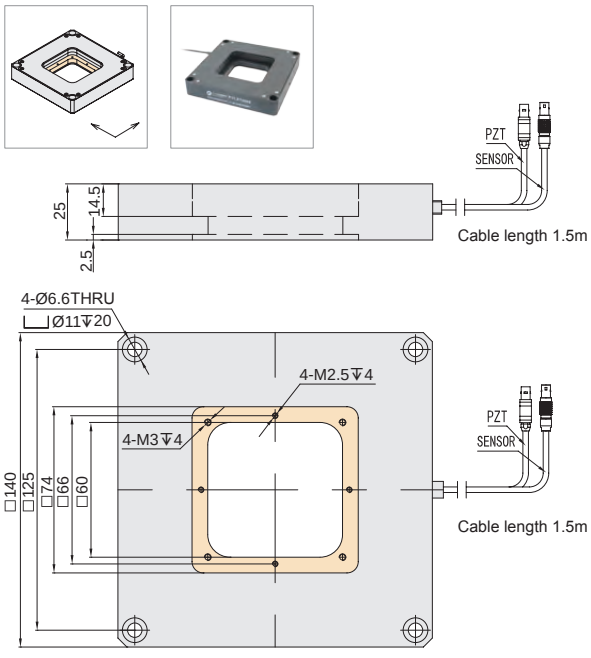
▸ Technical Data

Type	S-Closed loop K-Open loop	P17.XY200S	P17.XY200K	Units
Active axes		X, Y	X, Y	
Drive control		2 driving channels , 2 sensing channels	2 driving channels	
Travel range(0~120V)		150/axis	150/axis	μm±10%
Max.travel range(0~150V)		187.5/axis	187.5/axis	μm±10%
Sensor		SGS	-	
Aperture		60×60	60×60	mm
Resolution		5	1.5	nm
Closed-loop linearity		0.1	-	%F.S.
Repeatability		0.05	-	%F.S.
Pitch/yaw/roll		<15	<15	μrad
Push/pull force capacity		40/15	40/15	N
Stiffness		X0.2/Y0.2	X0.2/Y0.2	N/μm±20%
Unloaded resonant frequency		X240/Y400	X240/Y400	Hz±20%
Closed/open-loop unloaded step time		30	5	ms±20%
Closed-loop operating frequency (-3dB)		25 (@28g load)	-	Hz±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.07	0.07	
	Inverted	1	1	
El. capacitance		3.6/axis	3.6/axis	μF±20%
Material		Steel, Aluminum	Steel, Aluminum	
Mass		660	660	g±5%

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▸ Drawing

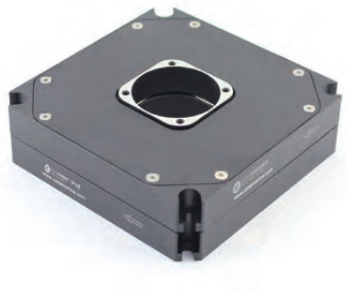
P17.XY200



▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

P18 Piezo Scanners(Amplified Drive)



P18 1~3 axes piezo linear scanner adopts amplified mechanism and built-in high-reliability piezo actuators, which could realize high-speed scanning up to 375μm. The aperture is Ø35mm, and various displacements and specifications are available for selection. It is suitable for long-travel multi-dimensional scanning applications.

▸ Characteristics

- Max stroke to 375μm
- Aperture: Ø35mm
- Fast response time
- Max load to 3.5kg
- Available UHV version
- 1~3 axes motion

▸ Applications

- Surface inspection
- Interference/metering
- Optical metrology
- Scanning microscopy
- Image processing and stabilization
- Semiconductor measurement

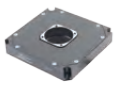
▸ Large Stroke, Large Load Capacity

P18 built with high-reliability PZT could achieve the displacement up to 375μm. Closed-loop version could be selected to achieve excellent linearity and repeatability.

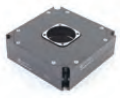
Max load capacity is up to 3.5kg and unloaded resonant frequency could be up to 600Hz. Matching CoreMorrow piezo controller, the step time could be up to 5ms. It is ideal for applications such as precision machining, semiconductor manufacturing, and scanning microscopy.

▸ 1~3 axes

P18 includes X/XY/XYZ versions, which could meet the application requirements of 1~3 axes large stroke scanning or positioning.



P18.X

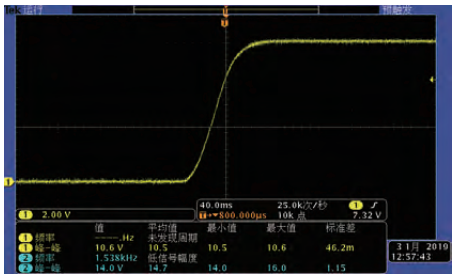


P18.XY



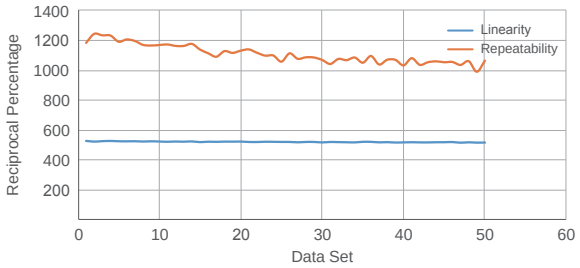
P18.XYZ

▸ Step Time

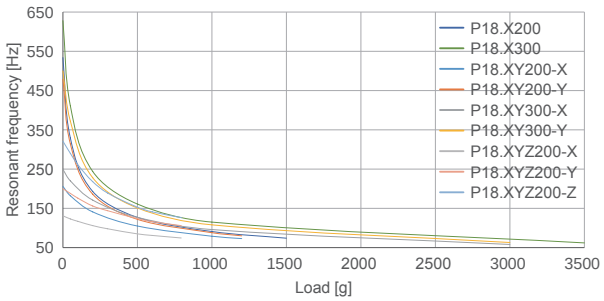


The step time of P18.XY300S is about 60ms loading 100g.

▸ Accuracy (P18.XY300S)



▸ Frequency vs Load Curve



▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	1~3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers".		

Technical Data

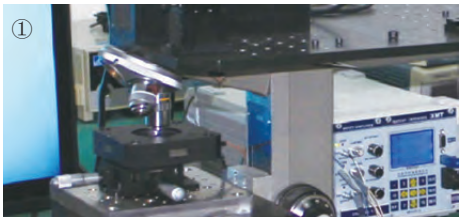
Type	S-Closed loop K-Open loop	P18.X200S P18.X200K	P18.X300S P18.X300K	P18.Z200S P18.Z200K	P18.XY200S P18.XY200K	P18.XY300S P18.XY300K	P18.XZ200S P18.XZ200K	P18.XYZ200S P18.XYZ200K	Units
Active axes		X	X	Z	X, Y	X, Y	X, Z	X, Y, Z	
Driving control		1 driving channel 1 sensing channel	2 driving channels 1 sensing channel	1 driving channel 1 sensing channel	2 driving channels 2 sensing channels	3 driving channels 2 sensing channels	2 driving channels 2 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		200	±150	160	200/axis	±150/axis	160/axis	160/axis	μm±10%
Max.travel range(0~150V)		250	±187.5	200	250/axis	±187.5/axis	200/axis	200/axis	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Aperture		Ø35	Ø35	Ø35	Ø35	Ø35	Ø35	Ø35	mm
Closed/open loop resolution		7/2	10/3	7/2	7/2	10/3	7/2	7/2	nm
Closed-loop linearity		0.2/-	0.2/-	0.2/-	0.2/-	0.2/-	0.2/-	0.4/-	%F.S.
Repeatability		0.15/-	0.15/-	0.15/-	0.15/-	0.15/-	0.15/-	0.2/-	%F.S.
Pitch/yaw/roll		<10	<15	<20	<10	<15	<20	<25	μrad
Push/pull force		60/20	150/150	50/10	60/20	150/150	30/10	30/10	N
Stiffness		0.3	0.5	0.3	0.3	0.5	0.3	0.1	N/μm±20%
Unloaded resonant frequency		500	600	300	X200/Y450	X250/Y500	X200/Z300	X120/Y200/Z300	Hz±20%
Closed/open-loop unloaded step time		30/5	30/10	30/5	50/5	50/10	50/5	80/10	ms±20%
Closed-loop operating frequency (-3dB)		-	-	-	-	10 (@30g load)	-	-	Hz±20%
Load capacity	Horizontal	2	3.5	1	1.5	3	1	0.8	kg
	Vertical	1	1.5	0.5	0.8	1.5	0.5	0.4	
	Inverted	1	2	0.5	1.5	3	0.5	0.4	
El. capacitance		11	21.6	21.6	11/axis	21.6/axis	11/axis	11/axis	μF±20%
Material		Aluminum							
Mass		200	220	400	360	380	550	750	g±5%

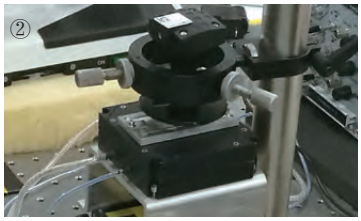
Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

Application Examples–Nanolithography and Scanning Imaging

① CoreMorrow P18.XY300 featuring large displacement, high precision and high stability is applied to nanolithography experiments .

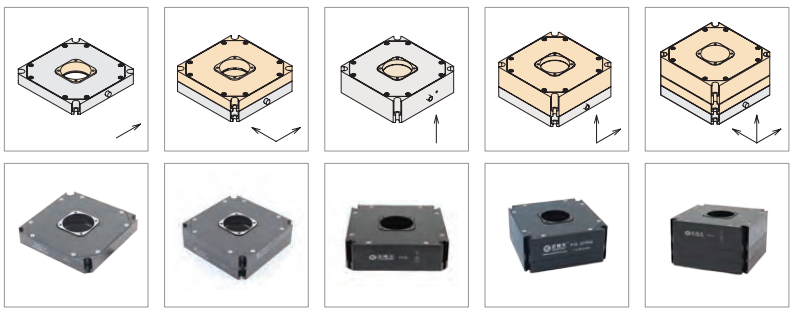
② P18.XY300 is applied to 2D scanning imaging.



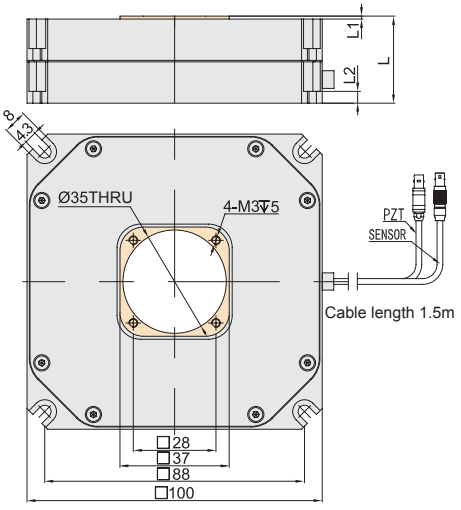


Drawing

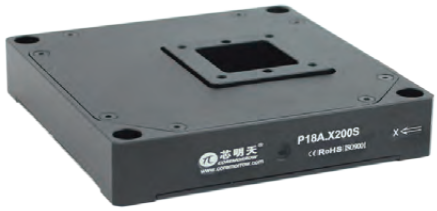
P18.X P18.XY P18.Z P18.XZ P18.XYZ



Type	L(mm)	L1(mm)	L2(mm)
P18.X	15	1	4
P18.XY	29.5	1	4
P18.Z	31	0.5	10.5
P18.XZ	43	0.5	4
P18.XYZ	57.5	0.5	4



P18A.X200 Piezo Scanners(Amplified Drive)



P18A.X200 piezo scanner adopts amplification mechanism, flexible hinge design and high-reliability piezo actuator to realize displacement of up to 200μm in X, and could be configured with closed-loop sensor for high-precision scanning and positioning. The size of aperture is 25mm×25mm. It could realize 2 or 3 axes motion by combining multiple stages.

▸ Characteristics

- X motion
- Max stroke to 200μm
- Aperture: 25×25mm
- Open/closed loop version optional
- Optional 2 or 3 axes
- Available UHV version

▸ Applications

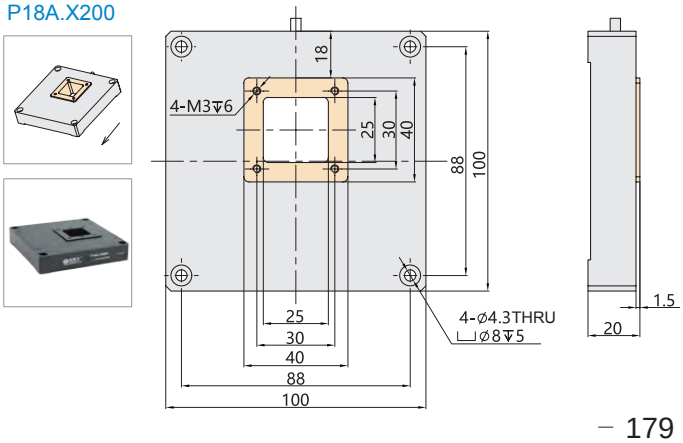
- Biotechnology
- Interference
- Wafer positioning
- SPM
- Measurement
- Surface structure analysis

▸ Technical Data

Type	S-Closed loop K-Open loop	P18A.X200S	P18A.X200K	Units
Active axes		X	X	
Drive control		1 driving channel,1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		160	160	μm±10%
Max. travel range(0~150V)		200	200	μm±10%
Sensor type		SGS	-	
Aperture		25×25	25×25	mm
Resolution		8	3	nm
Linearity		0.08	-	%F.S.
Repeatability		0.05	-	%F.S.
Step time		50@1000g	15	ms±20%
Unloaded resonant frequency		530	530	Hz±20%
Resonant frequency@1000g		140	140	Hz±20%
Pitch/yaw/roll		< 10	< 10	μrad
El.capacitance		11	11	μF±20%
Operating temperature		-20~80	-20~80	℃
Load capacity	Horizontal	5	5	kg
	Vertical	3	3	
	Inverted	5	5	
Material		Aluminum alloy		
Mass(Cable included)		560	560	g±5%

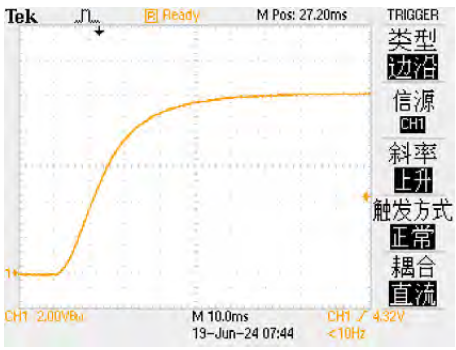
▸ Drawing

P18A.X200



▸ Loaded Step Time

P18A.X200S loading 1000g, step time of about 50ms.

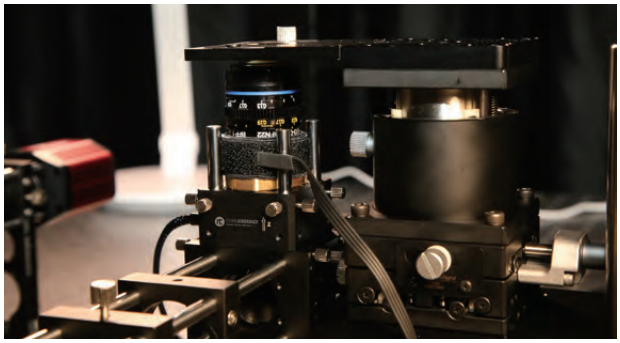


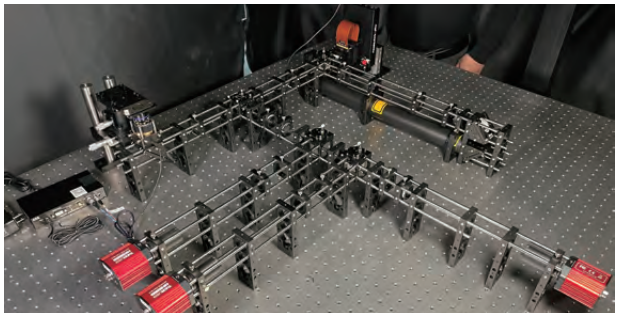
P70 Piezoelectric Nanopositioning Scanner



P70 piezo nanopositioning scanner has two versions, XY-motion and Z-motion version. Both versions have four Through holes at the four corners, and the hole center distance is 30mm, which is very suitable for the installation of cage structures.

▸ Applied to Cage Structures



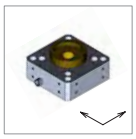


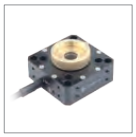
▸ Technical Data

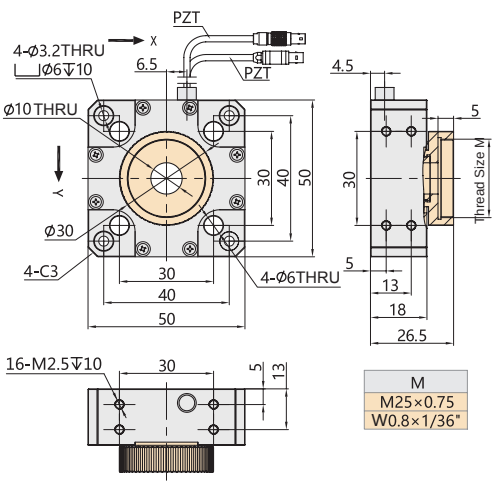
Type	S-Closed loop K-Open loop	P70.XY20S P70.XY20K (amplified)	P70.Z8S P70.Z8K (direct-drive)	Units
Active axes		X, Y	Z	
Driving control		3 driving channels 2 sensing channels	1 driving channel 1 sensing channel	
Travel range		±7/axis (@100V)	6.4 (@120V)	μm±10%
Max.travel range		±8.5/axis (@120V)	8 (@150V)	μm±10%
Sensor		SGS/-	SGS/-	
Resolution		0.6/0.2	0.3/0.1	nm
Linearity		0.3/-	0.25/-	%F.S.
Repeatability		0.2/-	0.16/-	%F.S.
Pitch/yaw/roll		<15	<10	μrad
Load capacity	Horizontal	0.3	0.2	kg
	Vertical	0.1	0.03	
	Inverted	0.3	0.05	
Closed-loop unloaded response		30	20	ms±20%
Unloaded resonant frequency		1.2	3.6	kHz±20%
Loaded resonance		0.4(53g)	1.5(200g)	kHz±20%
El. capacitance		0.8/axis	1.6	μF±20%
Mass		175	128.5	g±5%

▸ Drawing

P70.XY20

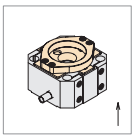


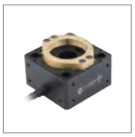


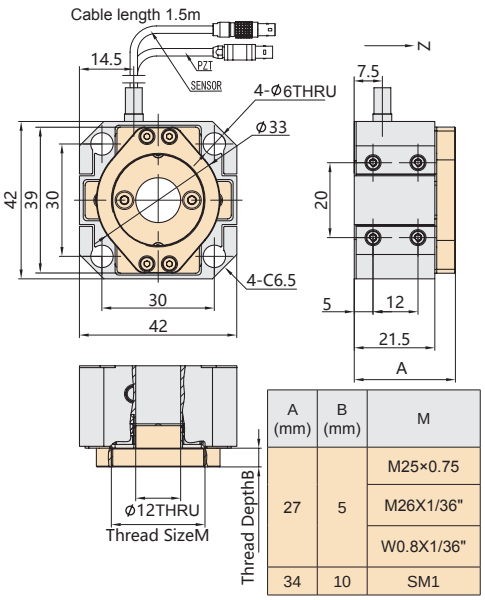


M
M25×0.75
W0.8×1/36"

P70.Z8







A (mm)	B (mm)	M
27	5	M25×0.75
		M26X1/36"
		W0.8X1/36"
34	10	SM1

P70.Z200 Piezo Nanopositioning Scanner



The P70.Z200 can achieve one-dimensional Z-direction movement, and the max stroke can reach 170μm under a driving voltage of 150V. Its built-in sensors are connected through a full bridge method, without drift, and can achieve precise positioning within the nanometer range. Its load capacity is up to 500g,which is ideal for large load applications.

▸ Characteristics

- Z motion
- Max stroke to 170μm
- Load capacity to 500g
- Closed loop for high Repeatability

▸ Applications

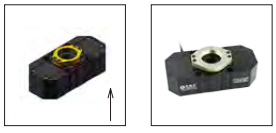
- Biotechnology
- Optical Inspection
- Microscopy Imaging
- Image processing

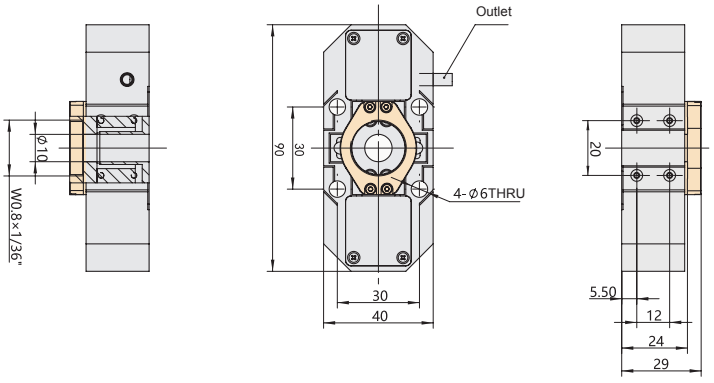
▸ Technical Data

Type	S-Closed loop K-Open loop	P70.Z200S	P70.Z200K	Units
Active axes		Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		136	136	μm±10%
Max.travel range(0~150V)		170	170	μm±10%
Sensor		SGS	-	
Closed/open-loop resolution		6	2	nm
Linearity		0.05	-	%F.S.
Repeatability		0.02	-	%F.S.
Unloaded resonant frequency		500	500	Hz±20%
Resonant frequency@200g		250	250	Hz±20%
Step Time		20	2	ms±20%
Load capacity	Horizontal	0.5	0.5	kg
	Vertical	0.02	0.02	
	Inverted	0.02	0.02	
El.capacitance		7.2	7.2	μF±20%
Material		Steel,Al	Steel,Al	
Mass(Cable included)		240	240	g±5%

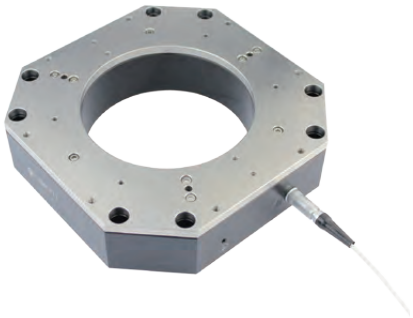
▸ Drawing

P70.Z200S/K





P77 Piezo Phase Shifter (Direct Drive)



P77 piezo phase shifters are specially designed for optical detection and phase shifting applications, with travel range of up to 100μm and load capacity of up to 25kg, which is very suitable for large-aperture optical inspection equipment, like laser interferometer, for various lenses. Custom versions are available.

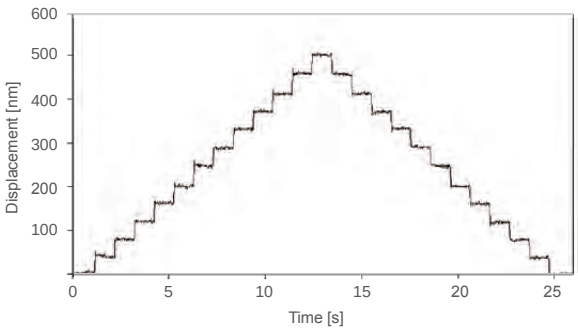
▸ Characteristics

- Load capacity to 25kg
- Travel range: 0~100μm
- Vacuum version is optional
- Aperture: Ø36~Ø310mm
- Optional horizontal, vertical, inverted mounting

▸ Applications

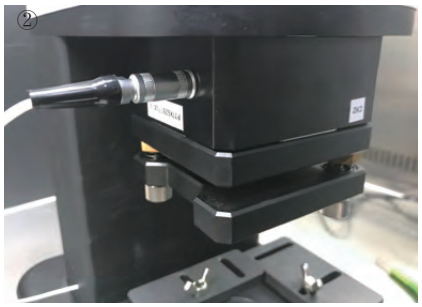
- Microscopic imaging
- Precision positioning
- Optical interference / measurement
- Surface inspection
- Optical capture
- Phase shifter

▸ 40nm Step(P77.K36-C)



▸ Application Examples





① : P77.S106 applied for small interferometer.

② : P77.K36-C applied to Michelson Interferometer for optical phase shifter.

▸ Recommended Controllers

E70	E53
	
3 channels Analog and digital control Optional servo control Ave. current: 70mA	1 channel, small size Analog and digital control Optional servo control Ave. current: 60mA

Note: For technical data, please refer to "Piezo Controllers".

▸ P77 Family


P77.S/K36-C


P77.50S/K85


P77.100S/K85


P77.S/K106


P77.S/K106-A


P77.30S/K140


P77.S/K155


P77.S/K160


P77.S/K160-A


P77.S/K210


P77.S/K242


P77.S/K310

▸ Technical Data

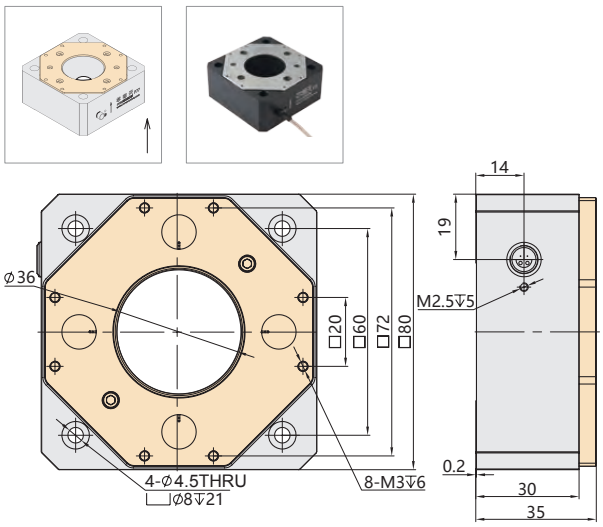
Type		P77.S36-C P77.K36-C	P77.50S85 P77.50K85	P77.100S85 P77.100K85	P77.S106 P77.K106	P77.S106-A P77.K106-A	P77.30S140 P77.30K140	Units
Active axes		Z	Z	Z	Z	Z	Z	
Travel range (0~120V)		14	40	80	14	14	12.8/25.6	μm±10%
Max.travel range (0~150V)		17.5	50	100	17.5	17.5	16/32	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Aperture		Φ36	Φ85	Φ85	Φ106	Φ106	Φ140	mm
Resolution		0.5/0.2	1.5/0.4	5/1.5	0.5/0.2	0.5/0.2	0.5/0.2	nm
Pitch/yaw/roll		<10	-	< 5	<10	<10	<15	μrad
Push/pull force		100/50	-	-	100/100	100/50	80/15	N
Unloaded resonant frequency		300	1100	190	300	150	200	Hz±20%
Unloaded step time		2	15@10μm	20@10μm, 1.2kg/5	5/2.5	3.5	14/7	ms±20%
Load capacity	Horizontal	7	3	3	15	10	-	kg
	Lateral	1	0.8	1	5	5	5	
	Inverted	5	2	1	10	5	-	
El. capacitance		3.6	30.6	14.4	5.4	6.8	26	μF±20%
Material		Al, steel	Al, steel	Al, copper	Al	Al, steel	Al, steel	
Mass		565 (not include cable)	2100	2000	1600	1900 (not include cable)	4200	g±5%
Operating temperature		-20~80	-20~80	-20~80	-20~80	-20~80	-20~80	°C
Cable length		1.5	1.5	1.5	1.5	1.5	1.5	m±10mm

Type		P77.S155 P77.K155	P77.S160 P77.K160	P77.S160-A P77.K160-A	P77.S210 P77.K210	P77.S242 P77.K242	P77.S310 P77.K310	Units
Active axes		Z	Z	Z	Z	Z	Z	
Travel range(0~120V)		13.5	14	14	14	14	13.5	μm±10%
Max.travel range(0~150V)		17	17.5	17.5	17.5	17.5	17	μm±10%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Aperture		Φ155	Φ160	Φ160	Φ210	Φ242	Φ310	mm
Resolution		0.5/0.2	0.5/0.2	0.5/0.2	0.5/0.2	0.5/0.2	0.5/0.2	nm
Pitch/yaw/roll		<10	<10	<10	<10	<15	-	μrad
Push/pull force		50/200	100/50	100/20	100/50	100/100	100/220	N
Unloaded resonant frequency		1300	140	120	100	3090	1500	Hz±20%
Unloaded step time		3.5/2	2.5	3.5	2.5	20	-	ms±20%
Load capacity	Horizontal	25	10	10	10	15	22	kg
	Lateral	20	5	5	5	1	22	
	Inverted	20	5	2	5	10	22	
El. capacitance		13.6	5.4	6.8	5.4	13.6	19.5	μF±20%
Material		Al, steel	Al, steel	Al, steel	Al, steel	Al, steel	Al, steel	
Mass		3020	2400	2900	2890 (not include cable)	3800 (not include cable)	4200	g±5%
Operating temperature		-20~80	-20~80	-20~80	-20~80	-20~80	-20~80	°C
Cable length		1.5	1.5	1.5	1.5	1.5	1.5	m±10mm

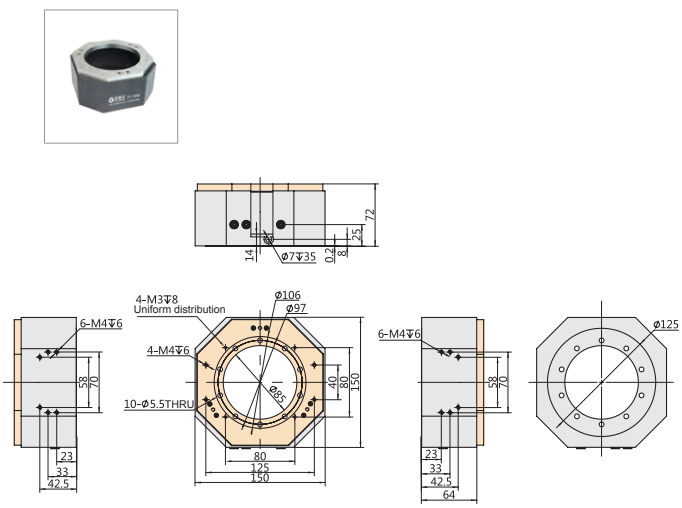
Note: P77 S106 closed loop linearity: 0.2% F.S., closed loop repetitive positioning accuracy: 0.1% F.S., motion direction stiffness: 8N/μm. The above parameters are measured by E00 / E01 series piezoelectric controller. The maximum driving voltage can be - 20V ~ 150V; For highly reliable long-term use, the driving voltage is recommended to be 0~120V.

▸ Drawings

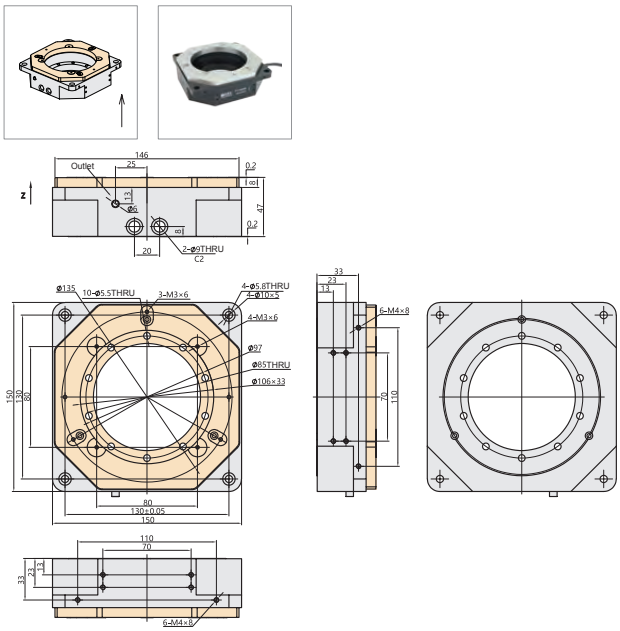
P77.S/K36-C



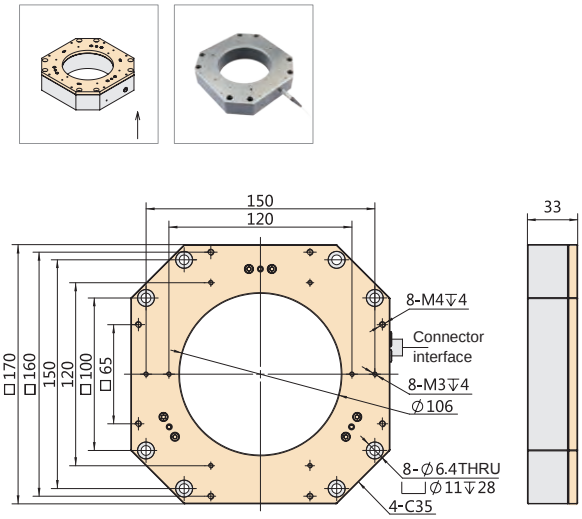
P77.50S/K85



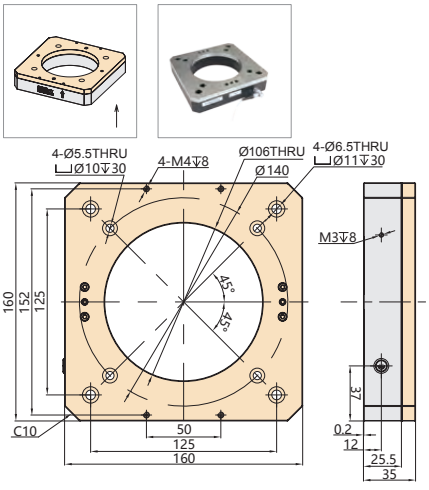
P77.100S/K85



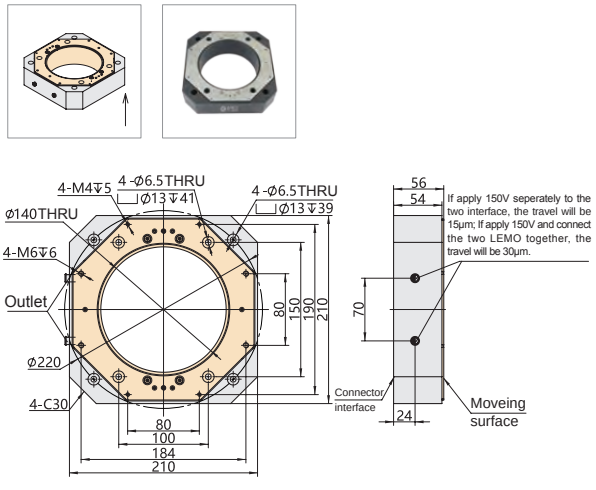
P77.S/K106



P77.S/K106-A

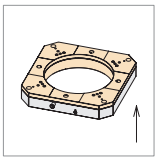


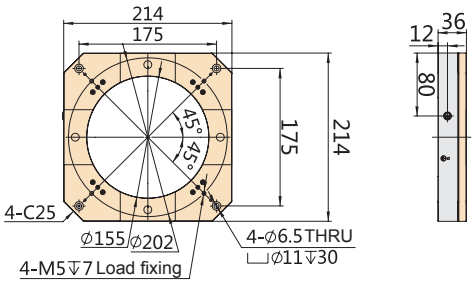
P77.30S/K140



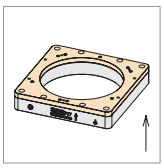
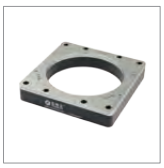
▸ Drawings

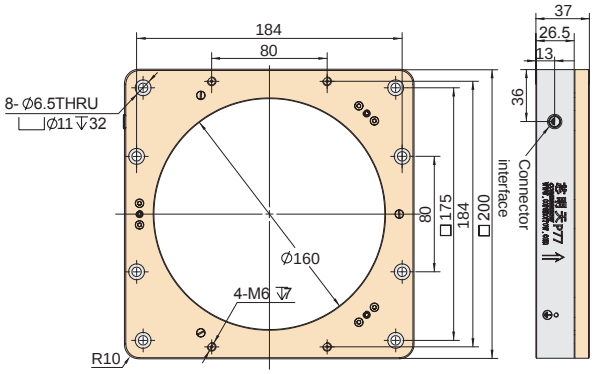
P77.S/K155



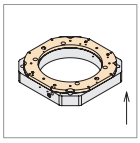



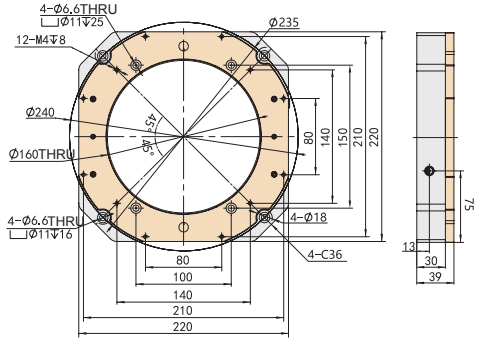
P77.S/K160

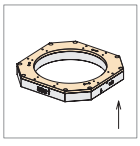
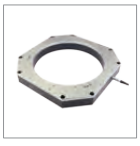


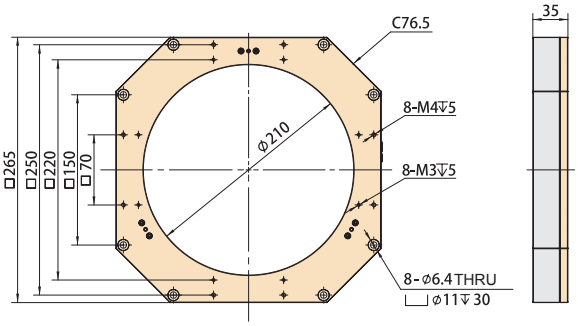
P77.S/K160-A



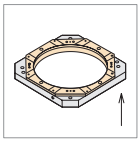



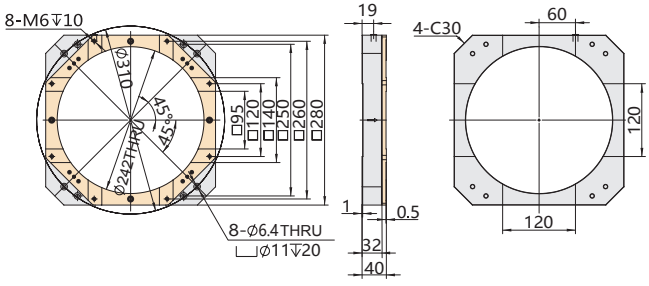
P77.S/K210

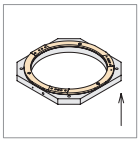


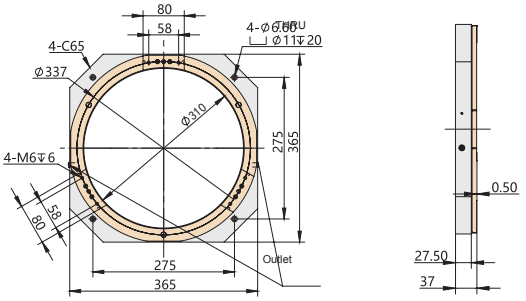
P77.S/K242



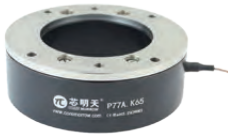
P77.S/K310



P77A Piezo Phase Shifter





P77A piezo phase shifters are specially designed for optical detection and phase shifting applications, with travel range of up to 100μm and load capacity of up to 5kg, which is very suitable for large-aperture optical inspection equipment, like laser interferometer, for various lenses. Custom versions are available.

Characteristics

- Travel range: 0~100μm
- Aperture: Ø49~ Ø75mm
- Load capacity to 5kg
- Optional horizontal, vertical, inverted mounting
- Customizable
- Vacuum version is optional

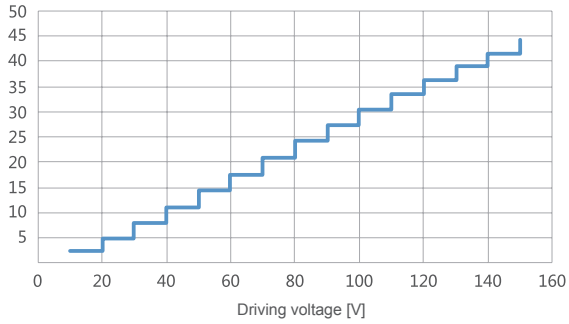
Applications

- Microscopic imaging
- Surface inspection
- Precision positioning
- Optical capture
- Optical interference/measurement
- Phase shifter

Technical Data

Type	S-Closed loop K-Open loop	P77A.S50 P77A.K50	P77A.50S65 P77A.50K65	P77A.S65 P77A.K65	P77A.100S75 P77A.100K75	Units
Active axes		Z	Z	Z	Z	
Sensor type		SGS/-	SGS/-	SGS/-	SGS/-	
Nominal travel range(0~120V)		13.5	35	13.5	80	μm±20%
Max.travel range(0~150V)		17	43	17	100	μm±20%
Aperture		Φ49	Φ65	Φ65	Φ75	mm
OD		Φ85	Φ105	Φ105	Φ145	mm
Height		42.5	72.5	35	33	mm
Resolution		0.5/0.2	1.5/0.5	0.5/0.2	3/1	nm
Pitch/yaw/roll		< 10	< 10	< 10	-	μrad
Push/pull force		-	50/20	100/30	-	N
Unloaded resonant frequency		3000	1400	1400	350	Hz±20%
Unloaded Step time		18@100g	2.5	1	30@3kg	ms±20%
Load capacity	Horizontal	5	3	5	1	kg
	Vertical	1	1	2	1	
	Inverted	2	2	3	3	
El. Capacitance		3.6	10.8	3.6	19.2	μF±20%
Material		Al, Steel	Al, Steel	Al, Steel	Al, Steel	
Mass		420(Cable included)	1100	670	1260	g±5%
Operating temperature		-20~80	-20~80	-20~80	-20~80	℃
Connector		LEMO	LEMO	LEMO	LEMO	
Cable length		1.5	1.5	1.5	1.5	m±10mm

▶ 10V Step(P77A.50K65)

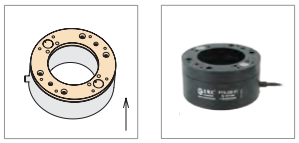


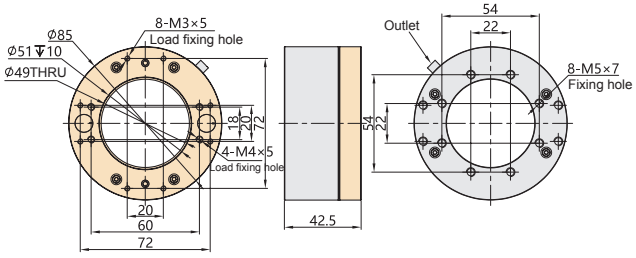
▶ Recommended Controllers

E70	E53
	
3 channels Analog and digital control Optional servo control Ave. current: 70mA	1 channel, small size Analog and digital control Optional servo control Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers".	

▶ Drawing

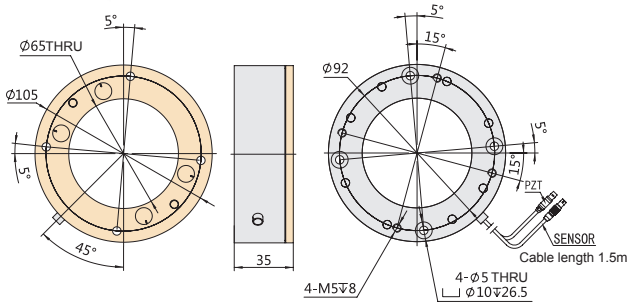
P77A.S/K50



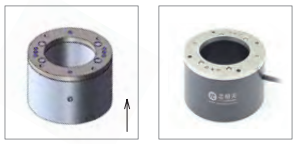


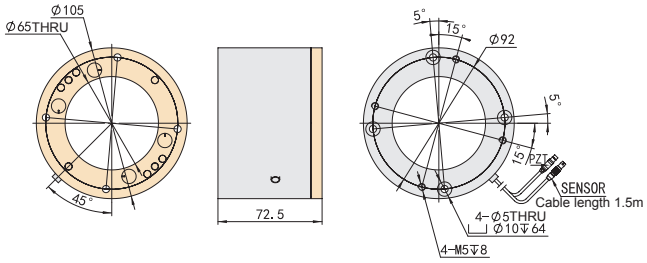
P77A.S/K65



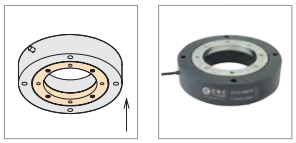


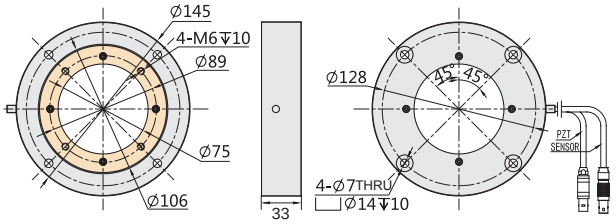
P77A.50S/K65





P77A.100S/K75





P78.Z100S/K-D Piezo Z Microscope Scanner



P78.Z100-D piezo microscope scanner is a Z-axis piezoelectric scanning stage designed for biomedical microscopy applications. It is easy to integrate into microscopic instruments.

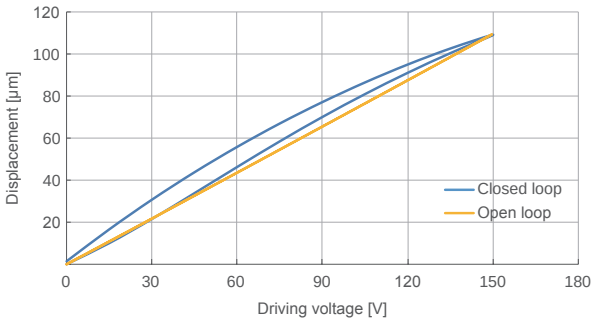
Characteristics

• Z motion • Travel range to 100μm • Resolution to 1nm • Aperture: 120×70mm • UHV version available

Applications

Microscopic imaging, biotechnology, super-resolution microscopy, 3D imaging, interferometry, measurement techniques, autofocus systems etc.

Open/Closed Loop Curve

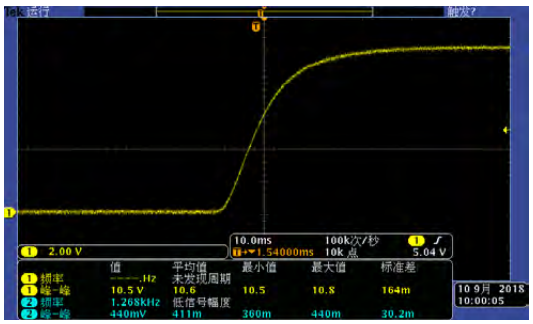


Technical Data

Type	S-Closed loop K-Open loop	P78.Z100S -D P78.Z100K-D	Units
Active axes		Z	
Drive control		1 driving channel 1 sensing channel	
Travel range(0~120 V)		80	μm±10%
Max.travel range(0~150 V)		100	μm±10%
Sensor type		SGS/-	
Aperture size		120×70	mm
Resolution		3/1	nm
Linearity		0.3/-	%F.S.
Repeatability		0.1/-	%F.S.
Pitch/yaw/roll		<25	μrad
Push/pull force		120/15	N
Stiffness		1.5	N/μm±20%
Unloaded resonant frequency		400	Hz±20%
Unloaded step time		30/5	ms
Load capacity	Horizontal	1	kg
	Vertical	0.03	
	Inverted	0.3	
El. capacitance		5.4	μF±20%
Operating temperature		-20~80	°C
Material		Steel, Al	
Mass		560	g±5%
Cable length		1.5	m±10mm
Sensor/voltage connector		LEMO	

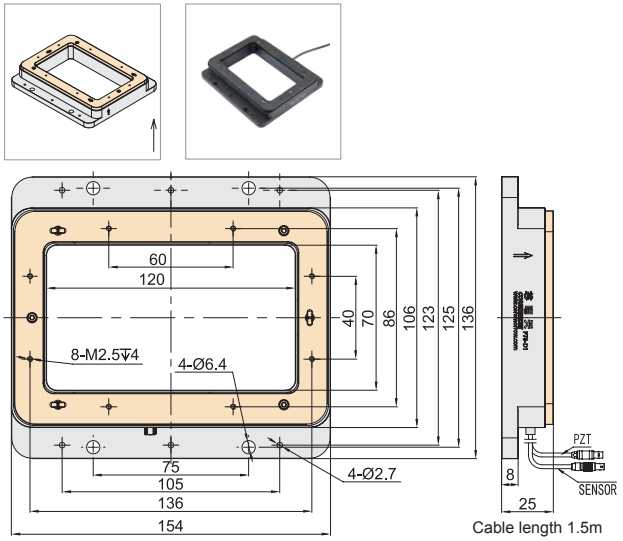
Note: Above parameters are measured with the E00/E01 series piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term use, the recommended driving voltage is 0~120V.

Step Time



Drawing

P78.Z100S/K



Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Digital, analog Open/colsed loop Ave. current 291/58mA	3 channels Digital, analog Open/colsed loop Ave. current 70mA	1 channels Digital, analog Open/colsed loop Ave. current 60mA

Note: Please see "Piezo Controller" for detailed information.

P78.Z200/300 Piezo Z Microscope Scanner

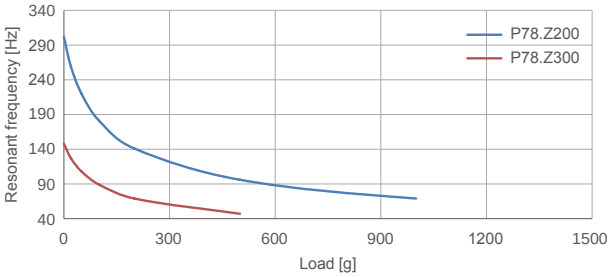


P78 piezo scanner is ideal for applications such as nanoscale alignment and measurement. Closed-loop sensor with bridge configuration can be selected to eliminate temperature drift and ensure the positioning stability in the nanometer range.

▸ Characteristics

• Z motion • Travel range to 187.5/262.5μm • Resolution to 1.5nm • Aperture: 64×64mm • UHV version available

▸ Frequency vs Load Curve



▸ Technical Data

Type	S-Closed loop K-Open loop	P78.Z200S P78.Z200K	P78.Z300S P78.Z300K	Units
Active axes		Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	
Travel range (0~120V)		150	210	μm±10%
Max.travel range (0~150V)		187.5	262.5	μm±10%
Sensor		SGS/-	SGS/-	
Aperture		64×64	64×64	mm
Resolution		5/1.5	7/2.5	nm
Linearity		0.1/-	0.15/-	%F.S.
Repeatability		0.05/-	0.1/-	%F.S.
Pitch/yaw/roll		<20	<30	μrad
Push/pull force		50/8	30/5	N
Stiffness		0.35	0.15	N/μm±20%
Unloaded resonant frequency		270	200	Hz±20%
Unloaded step time		15/3.2	50/6.4	ms
Load capacity	Horizontal	1	0.5	kg
	Vertical	0.01	0.01	
	Inverted	0.1	0.1	
El. capacitance		14.4	14.4	μF±20%
Operating temperature		-20~80	-20~80	°C
Material		Aluminum	Aluminum	
Mass		340	340	g±5%
Cable length		1.5	1.5	m±10mm
Connector		LEMO	LEMO	

Note: Above parameters are measured with the E00/E01 series piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term use, the recommended driving voltage is 0~120V.

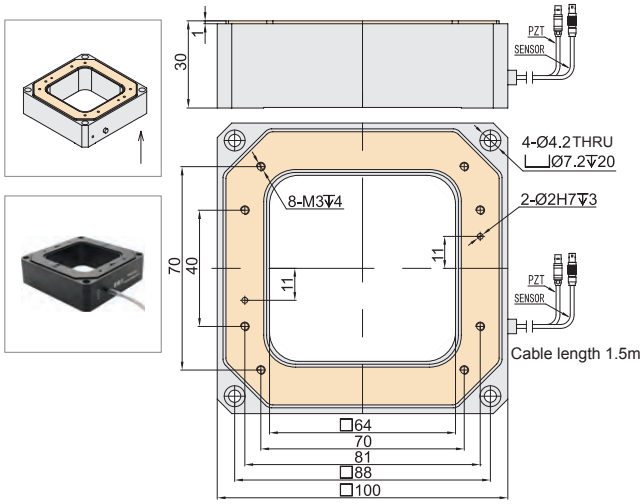
▸ Long Travel, High Resolution

P78 adopts amplification mechanism to realize stroke of 187.5/262.5μm. Excellent flexible hinge guiding mechanism is optimized by FEA to achieve nanometer resolution and millisecond response time.

Aperture in the center is 64×64mm, which is suitable for applications such as interference and surface inspection.

▸ Drawing

P78.Z200/300

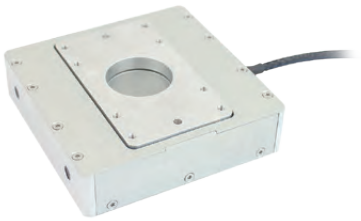


▸ Recommended Controllerss

E00/E01	E70	E53
		
1~3 channels Digital, analog Open/colsed loop Ave. current 291/58mA	1 channels Digital, analog Open/colsed loop Ave. current 70mA	1 channels Digital, analog Open/colsed loop Ave. current 60mA

Note: Please see "Piezo Controller" for detailed information.

P78A.Z200 Piezo Nanopositioning Scanners



P78A.Z200 piezo scanner moves in Z, its travel is up to 200μm, and it features a Ø25mm aperture that is suitable for light-transmitted application.

▸ Characteristics

• Z motion, travel to 200μm • Optional horizontal, vertical, inverted mounting • Optional vacuum version

▸ Applications

• Surface inspection • Microscopic imaging • Optical interference • Semiconductor processing and testing • Vacuum environment

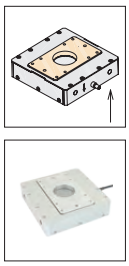
▸ Technical Data

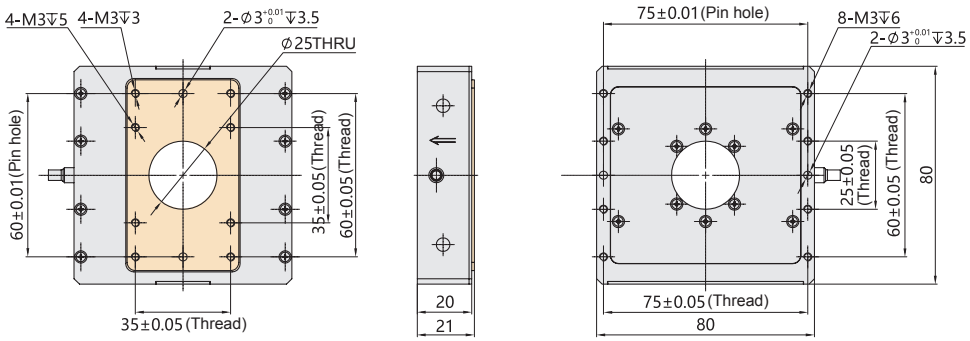
Type		P78A.Z200S	P78A.Z200K	Units
Active axes		Z	Z	
Drive control		1 driving channel , 1 sensing channel	1 driving channel	
Sensor		SGS	-	
Travel range (0~120V)		160	160	μm±10%
Max.travel range (0~150V)		200	200	μm±10%
Resolution		10	3	nm
Linearity		0.2	-	%F.S.
Repeatability		0.15	-	%F.S.
Load capacity	Horizontal	0.2	0.2	kg
	Vertical	0.02	0.02	
	Inverted	2	2	
Mass		260	260	g±5%
El. capacitance		28.8	28.8	μF±20%
Material		Steel, Aluminum	Steel, Aluminum	

Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term, high-reliability operation. Technical data is measured by CoreMorrow E00/E01 series piezo controller.

▸ Drawing

P78A.Z200S/K





P79 Piezo Z Microscope Scanner(Amplified Drive)



P79 series piezoelectric Z microscope scanner is a Z-axis micro-motion platform, mainly used for supporting macro-motion XY-axis micro-scanning stages and piezoelectric motor platforms on the market. P79 platform can perform fast Z-axis focus adjustments with milliseconds step time.

▸ Characteristics

- 50 to 200μm travel for choice
- Large aperture
- High closed-loop repeatability
- Load capacity to 2kg
- Z or XYZ version
- UHV version available

▸ Typical Applications

- Fluorescence/confocal microscopy
- Biotechnology
- Sample detection
- 3D imaging
- Autofocus system

▸ Customized Petri Dish Rack



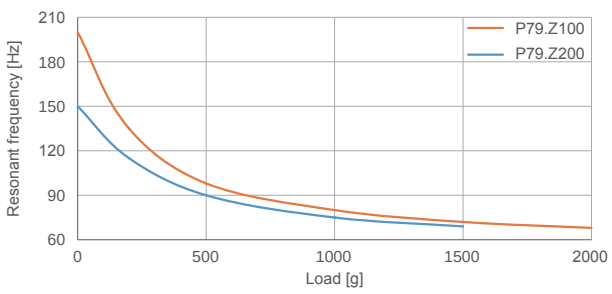
▸ Surface-Insulated Piezo Actuator

The Z piezoelectric scanner adopts high-consistent and high-stability surface-insulated piezoelectric actuator with high ability to resist the external environment and there is no leakage.





▸ Frequency vs Load Curve



▸ Fast Focusing, Ultra High Precision

P79 has a large-aperture design that is mainly to meet a variety of sample clamping structure, such as multi-well control panel. Piezoelectric ceramic drive has an ultra-fast response speed, and the Z-axis stepping speed and settling time are only 1/20 of the motor drive, which greatly improves the imaging capture capability and productivity.

For applications requiring positioning accuracy and stability, SGS sensor can be configured to fit in the most suitable position of the platform to provide high-resolution, fast-responding sensing voltage signals to the piezo controller. The full bridge design avoids temperature drift and ensures that the positioning accuracy is nanoscale.

▸ Recommended Controllers

E01	E52	E53
		
1~3 channels Digital, analog Open/colsed loop Ave. current 291/58mA	1 channel Analog control Open/closed loop Ave. current 300mA	1 channels Digital, analog Open/colsed loop Ave. current 60mA
Note: Please see "Piezo Controller" for detailed information.		

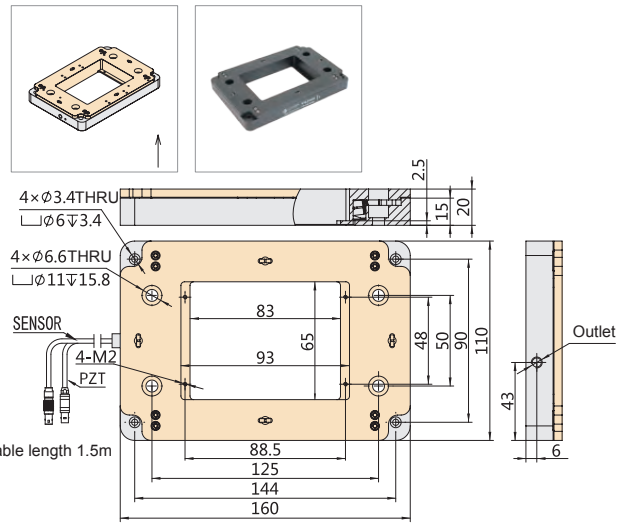
▸ Technical Data

Type	S-Closed loop K-Open loop	P79.Z100S P79.Z100K	P79.Z200S P79.Z200K	P79.Z200S86-D P79.Z200K86-D	P79.XYZ50S P79.XYZ50K	P79.XYZ50S-C P79.XYZ50K-C	Units
Active axes		Z	Z	Z	X, Y, Z	X, Y, Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	3 driving channels 3 sensing channels	3 driving channels 3 sensing channels	
Travel range(0~120V)		80	150	160	40/axis	40/axis	μm±20%
Max.travel range(0~150V)		100	187.5	200	50/axis	50/axis	μm±20%
Sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Aperture		83×65	83×65	86.5×128.5	84×65	84×65	mm
Resolution		3/1	5/1.5	6/2	1.5/0.5	1.5/0.5	nm
Linearity		0.1/-	0.15/-	0.15/-	0.1/-	0.1/-	%F.S.
Repeatability		0.05/-	0.1/-	0.1/-	0.05/-	0.05/-	%F.S.
Picth/yaw/roll		<15	<20	<20	<20	<20	μrad
Push/pull force		30/15	42/18	-	25/-	25/-	N
Stiffness		0.3	0.2	0.2	0.5	0.5	N/μm±20%
Unloaded resonant frequency		200	150	100	X525/Y630/Z490	X499/Y589/Z470	Hz±20%
Unloaded step time		15/3.2	25/5	-/5	30/6	30/6	ms±20%
Load capacity	Horizontal	2	1.5	1.5	0.5	0.5	kg
	Vertical	0.15	0.1	0.05	0.05	0.05	
	Inverted	0.3	0.2	0.2	0.1	0.1	
El. capacitance		7.2	19.2	21.6	3.2/axis	3.2/axis	μF±20%
Material		Steel, Al	Steel, Al	Steel, Al	Steel, Al	Steel, Al	
Mass		590	800	770	720	1400	g±5%

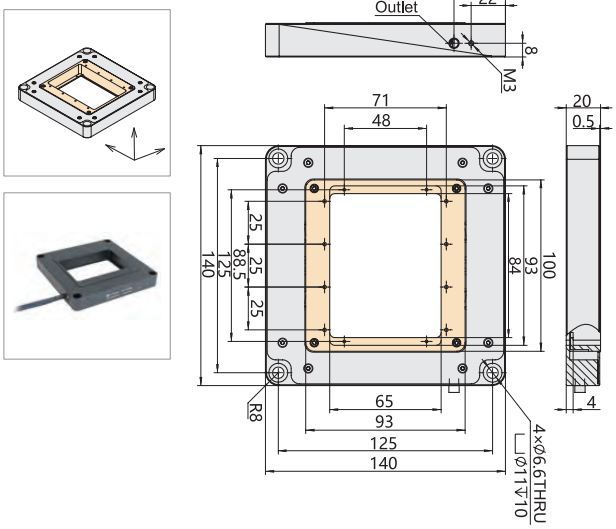
Note: Above parameters are measured with the E00/E01 series piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term use, the recommended driving voltage is 0~120V.

▸ Drawings

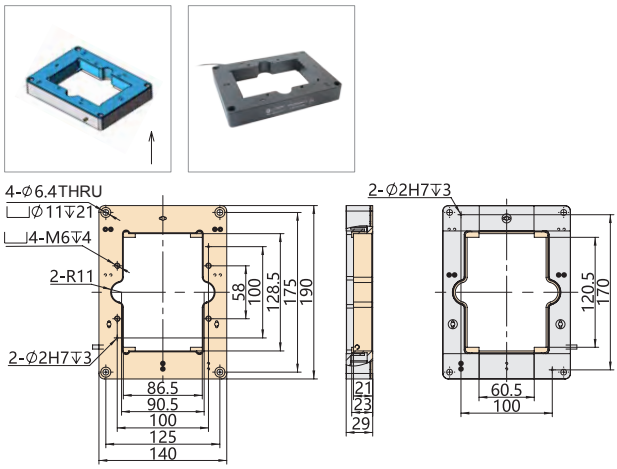
P79.Z100/200S/K



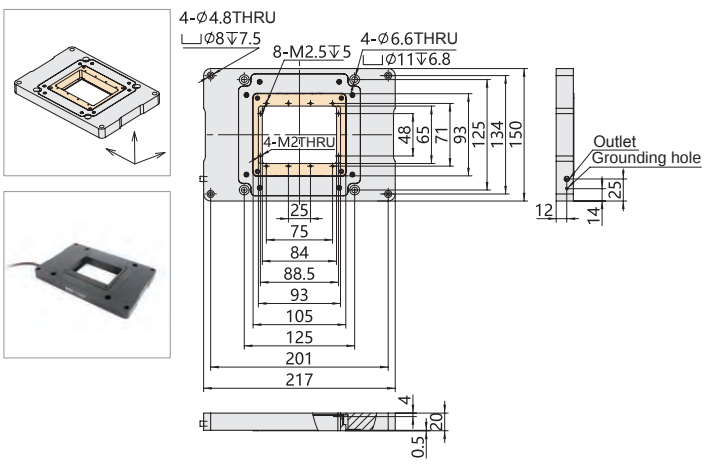
P79.XYZ50S/K



P79.Z200S/K86-D



P79.XYZ50S/K-C



XD106 Cryogenic, Vacuum, Non-Magnetic Piezo Stage



XD106 piezo stage moves in XYZ, and is designed for cryogenic, vacuum and non-magnetic environment applications. It also features a 10mm or 50mm diameter aperture.

▸ Characteristics

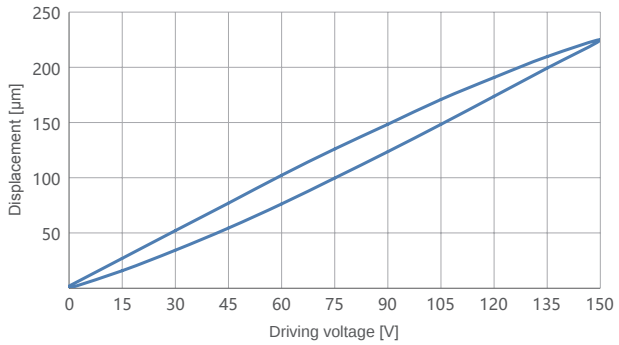
• Low Temperature Vacuum-compatible Non-Magnetic • XYZ motion • With aperture • Open-loop motion control

▸ Applications

• Semiconductor processing • Semiconductor inspection • High precision testing and operation

• Other nano motion control that requires vacuum and non-magnetic requirements, etc.

▸ Voltage vs Travel Curve (XD106.XYZ200K)

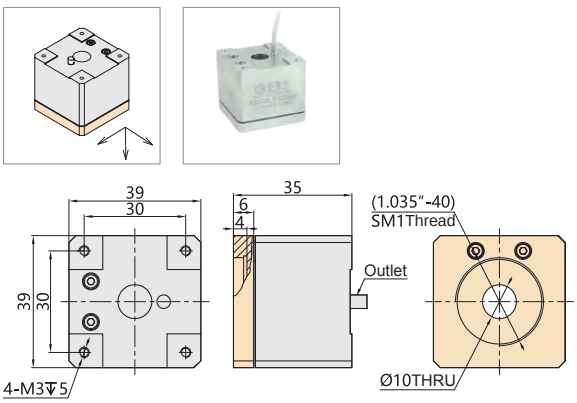


▸ Technical Data

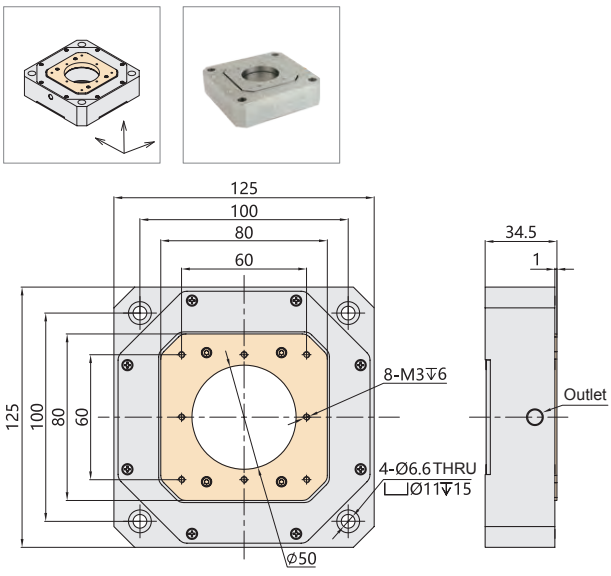
Type		XD106.XYZ60K	XD106.XYZ200K	Units
Active axes		X, Y, Z	X, Y, Z	
Drive control		3 driving channels	4 driving channels	
Driving source		Piezo Stack	Piezo Stack	
Driving Voltage		0~60@room temperature 0~150@4K temperature	0~150@room temperature, 100K temperature	V
Nominal travel range(room temperature)		70@60V	XY±100/ Z100@150V	µm/axis±10%
Nominal travel range(low temperature)		30@150V @4K temperature	XY±40/Z50@150V @100K temperature	µm/axis±20%
Aperture diameter		10	50	mm
Resolution		2	2	nm
Unloaded resonant frequency		X415/Y465/Z497	XY180/Z250	Hz±20%
Resonant frequency @200g		XY105/Z229	XY140/Z200	Hz±20%
El.capacitance		XY5.4/Z10.9	XY3.6/Z7.2	µF±20%
Material		Titanium	Titanium	
Load capacity	Horizontal	0.2	0.7	kg
	Vertical	0.1	0.1	
	Inverted	0.1	0.1	
Mass		220	1360	g±5%
Usage direction		Inverted	Horizontal	

▸ Drawing

XD106.XYZ60K



XD106.XYZ200K



XD107 Piezo Scanner



XD107 piezo scanner moves in XYZ, it has a large square aperture, and is ideal for sample microscopy imaging applications.

▸ Characteristics

- XYZ motion
- Travel up to 100μm
- Load capacity to 0.4kg
- Aperture of 50×50mm

▸ Applications

- Scanning microscopy
- Mask/wafer positioning
- Interferometry
- Metrology
- Biotechnology
- Micromanipulation, etc.

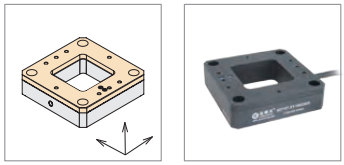
▸ Technical Data

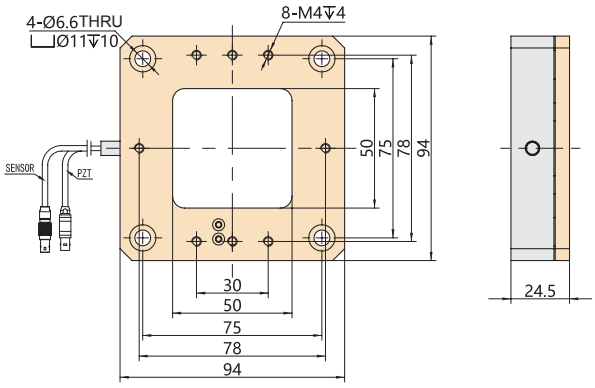
Types		XD107.XY100Z80S	XD107.XY100Z80K	Units
Active axes		X Y Z	X Y Z	
Drive control		3 driving channels ,3 sensing channels	3 driving channels	
Nominal travel range(0~120V)		XY80/Z64	XY80/Z64	μm±10%
Max.travel range(0~150V)		XY100/Z80	XY100/Z80	μm±10%
Sensor		SGS	-	
Aperture		50×50	50×50	mm
Size		94×94×24.5	94×94×24.5	mm
Resolution		3	1	nm
Linearity		XY0.2/Z0.1	-	%F.S.
Repeatability		XY0.02/Z0.02	-	%F.S.
Pitch/yaw/roll		≤30	≤30	μrad
Unloaded resonant frequency		XY220/Z160	XY220/Z160	Hz±20%
Loaded resonant frequency @400g		XY110/Z80	XY110/Z80	Hz±20%
Load capacity	Horizontal	0.4	0.4	kg
	Vertical	0.03	0.03	
	Inverted	0.04	0.04	
El.capacitance		XY3.6/Z1.8	XY3.6/Z1.8	μF±20%
Material		Steel, Al	Steel, Al	
Mass(no cable)		420	420	g±5%

Note: Above parameters are measured with the E00/E01 series piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term use, the recommended driving voltage is 0~120V.

▸ Drawing

XD107.XY100Z80S/K





XD108 Piezo Nanopositioning Scanner



XD108 is a customized version of X-axis piezo nanopositioning scanner, with two ranges available: 30μm and 37μm. It adopts a no-friction flexible hinge guiding mechanism and integrated structural design. It is equipped with high-performance piezo actuators to ensure 37μm displacement.

▸ Characteristics

- Moves in X
- Travel up to 37μm
- High resolution
- Open/closed loop

▸ Applications

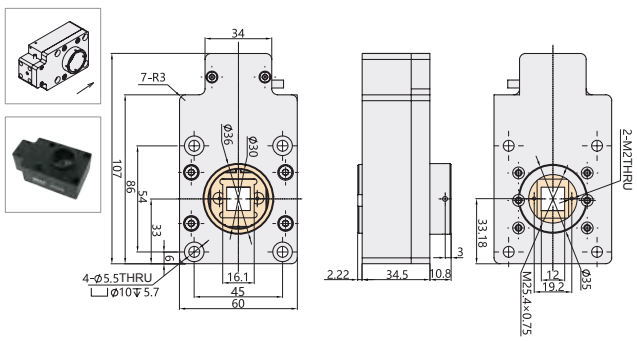
- Optical phase shift
- Nano positioning
- Biotechnology
- Quality assurance test
- Micromachining/precision control

▸ Technical Data

Type		XD108.30S XD108.30K	XD108.40S XD108.40K	Units
Active axes		X	X	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	
Nominal travel range(0~120V)		24	30	μm±10%
Max.travel range(0~150V)		30	37	μm±10%
Sensor type		SGS/-	SGS/-	
Resolution		1/0.3	2/0.4	nm
Linearity		0.302/-	0.03/-	%F.S.
Repeatability		0.021/-	0.01/-	%F.S.
Unloaded resonant frequency		3300	2200	Hz±20%
Loaded resonant frequency		1200@17g	1000@74g	Hz±20%
Load capacity	Horizontal	0.1	0.1	kg
	Vertical	0.03	0.02	
	Inverted	0.1	0.1	
Step time		5@17g/1	5@74g/1	ms±20%
El. Capacitance		2.5	3.6	μF±20%
Material		Al, Steel	Al, Steel	
Mass		600	620	g±5%

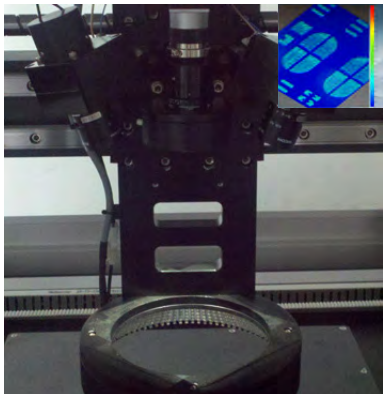
▸ Drawing

XD108

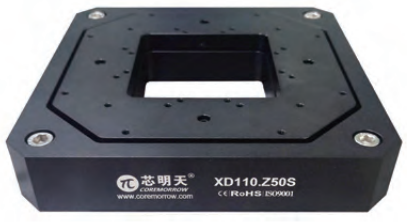


▸ Application Example

Application of XD108.30 piezo scanner for SPI 3D solder paste thickness detection.



XD110.Z50 Piezo Scanner



XD110.Z50 piezo scanner moves in Z, its travel is up to 50µm. It has a large square aperture, and is ideal for sample microscopy imaging applications.

▸ Characteristics

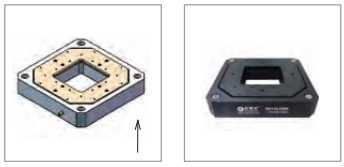
- Z motion
- Load capacity to 5kg
- Nanoscale resolution
- Travel up to 50µm

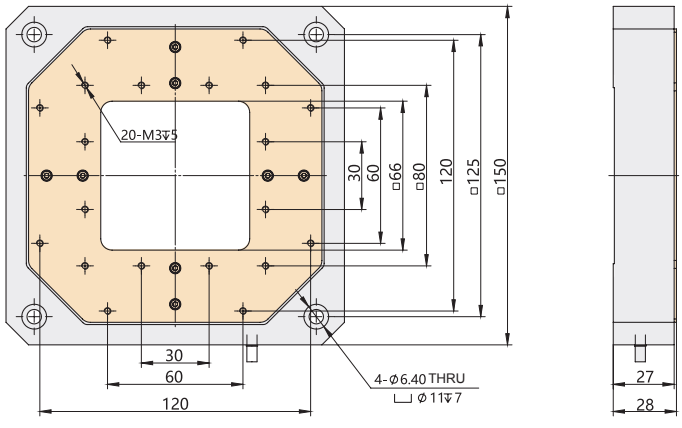
▸ Technical Data

Type		XD110.Z50S	XD110.Z50K	Units
Active axes		Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		40	40	µm±10%
Max.travel range(0~150V)		50	50	µm±10%
Sensor type		SGS	-	
Resolution		2	0.5	nm
Linearity		0.27	-	%F.S.
Repeatability		0.023	-	%F.S.
Unloaded resonant frequency		370	370	Hz±20%
Resonant frequency@5kg		100	100	Hz±20%
Load capacity	Horizontal	5	5	kg
	Vertical	0.1	0.1	
	Inverted	0.5	0.5	
Step time		60@5kg	10	ms±20%
El. Capacitance		5.6	5.6	µF±20%
Material		Al, Steel	Al, Steel	
Mass		1.1	1.1	kg±5%

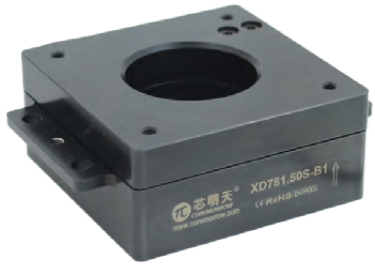
▸ Drawing

XD110.Z50S/K





XD781.50 Piezo Scanner



XD781.50 is a one-dimensional piezo scanner, which can achieve a displacement of 60μm in the Z direction and its load capacity is up to 400g. The central through-hole size is φ28mm, which is very easy to integrate and is ideal for applications such as Z-direction sample microscopy imaging.

▸ Characteristics

- Z motion
- Stroke up to 60μm
- Aperture:Φ28mm
- Easy to integrate

▸ Applications

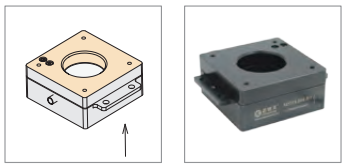
- Microscopic imaging/focusing
- Nanopositioning in Z
- Surface inspection
- Optics
- Micro-nano processing, etc.

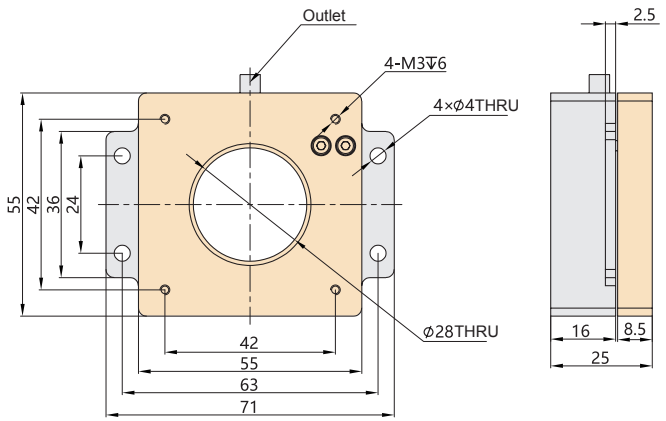
▸ Technical Data

Type	S-Closed loop K-Open loop	XD781.50S	XD781.50K	Units
Active axes		Z	Z	
Drive control		1 driving channel ,1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		48	48	μm±10%
Max. travel range(0~150V)		60	60	μm±10%
Sensor type		SGS	-	
Resolution		3	1	nm
Linearity		0.015	-	%F.S.
Repeatability		0.012	-	%F.S.
Step time		40@400g	15	ms±20%
Unloaded resonant frequency		220	220	Hz±20%
Resonant frequency@400g		100	100	Hz±20%
El.capacitance		1.8	1.8	μF±20%
Operating temperature		-20~80	-20~80	℃
Load capacity	Horizontal	400	400	g
	Vertical	150	150	
	Inverted	150	150	
Material		Steel		
Mass		355	355	g±5%

▸ Drawing

XD781.50S/K





XD781.100 Piezo Nanopositioning Scanner



XD781.100 piezo nanopositioning scanner moves in Z, and features large aperture. Its frame design makes it easy to integrate, and it's very suitable for microscopic imaging of samples in the Z direction.

▸ Characteristics

- Moves in Z
- With large aperture
- Nanometer accuracy
- Easy to integrate

▸ Applications

- Microscopic imaging/focusing
- Nanopositioning in Z
- Surface inspection
- Optics
- Micro-nano processing, etc.

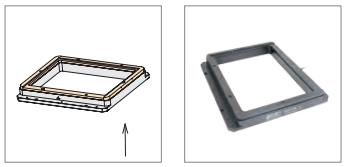
▸ Technical Data

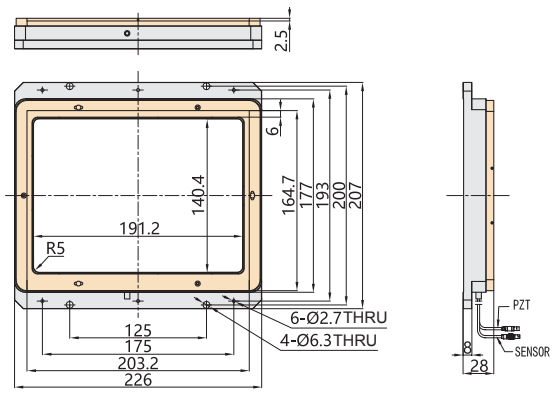
Type		XD781.100S	XD781.100K	Units
Active axes		Z	Z	
Drive control		1 driving channel ,1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		80	80	μm±10%
Max.travel range(0~150V)		100	100	μm±10%
Sensor type		SGS	-	
Resolution		3	1	nm
Linearity		0.2	-	%F.S.
Repeatability		0.1	-	%F.S.
Unloaded resonant frequency		300	300	Hz±20%
Resonant frequency @100g load		200	200	Hz±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.03	0.03	
	Inverted	0.2	0.2	
El.capacitance		5.4	5.4	μF±20%
Material		Steel, Al	Steel, Al	
Mass		875	875	g±5%

Note: Above parameters are measured with the E00/E01 series piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term use, the recommended driving voltage is 0~120V.

▸ Drawing

XD781.100S/K





XP-780 Piezo Scanners(Amplified Drive)



XP-780 piezo scanner adopts amplification mechanism, flexible hinge design and high-reliability piezo actuator to realize displacement of X-axis up to 200μm, and could be configured with closed-loop sensor for high-precision scanning and positioning. The size of aperture is 25mm × 25mm. It could realize 2 or 3 axes motion by superimposing.

▸ Characteristics

- Max stroke to 200μm
- Max load to 5kg
- Aperture: 25×25mm
- Available UHV version
- Open/closed loop is optional
- Closed-loop version for high repeatability

▸ Applications

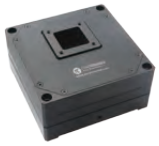
- Biotechnology
- Interference
- Wafer positioning
- SPM
- Measurement
- Surface structure analysis

▸ 1~3 axes

There are X, XY, XZ, XYZ versions in XP-780 family.



XP-780.X

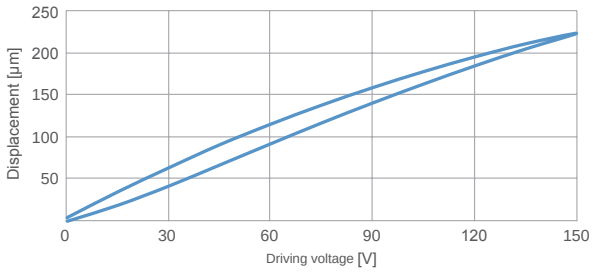


XP-780.XY

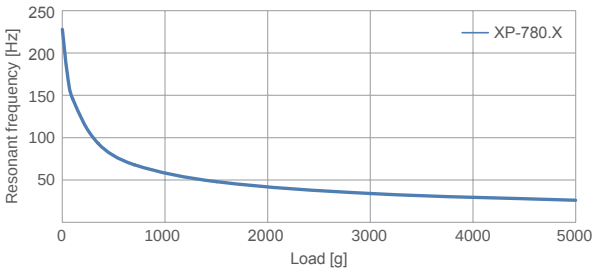


XP-780.XYZ

▸ Open Loop Curve



▸ Frequency vs Load Curve



▸ Large Stroke, Large Load Capacity

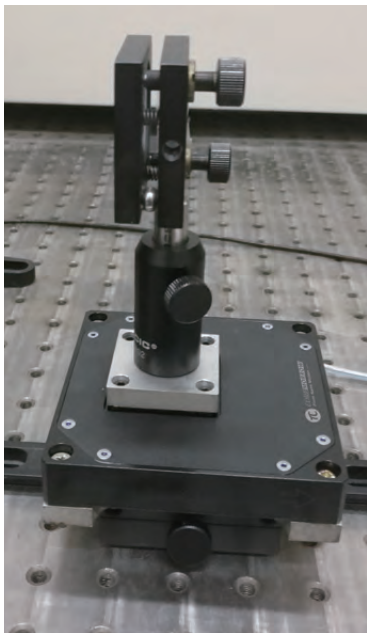
XP-780 adopts amplification mechanism, which could realize stroke up to 200μm. Flexible guide mechanism without friction makes it have high resolution. The aperture makes it suitable for applications such as optical micro scanning.

The excellent structure features very high rigidity and large load capacity, and could load 5kg for precise positioning.

▸ Recommended Controllers

E00/E01	E70	E53
		
1~3 channels Analog, digital Open/closed loop Ave. current: 291/58mA	1~ 3 channels Analog, digital Open/closed loop Ave. current: 70mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers".		

▸ Application Example



Michelson interferometer

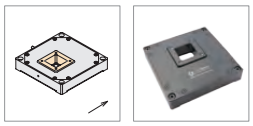
▸ Technical Data

Type	S-Closed loop K-Open loop	XP-780.XS	XP-780.XK	Units
Active axes		X	X	
Drive control		1 driving channel 1 sensing channel	1 driving channel	
Travel range(0~120V)		160	160	μm±10%
Max.travel range(0~150V)		200	200	μm±10%
Sensor		SGS	-	
Aperture		25×25	25×25	mm
Closed/open loop resolution		5.5	2	nm
Closed-loop linearity		0.1	-	%F.S.
Repeatability		0.05	-	%F.S.
Pitch/yaw/roll		<50	<50	μrad
Push/pull force		80/40	80/40	N
Stiffness		0.5	0.5	N/μm±20%
Unloaded resonant frequency		200	200	Hz±20%
Closed/open-loop unloaded step time		20	5	ms±20%
Load capacity	Horizontal	5	5	kg
	Vertical	-	-	
	Inverted	-	-	
El. capacitance		11	11	μF±20%
Material		Aluminum	Aluminum	
Mass		240	240	g±5%

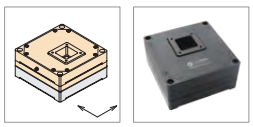
Note: Max driving voltage could be -20V~150V, recommended voltage 0~120V for long-term and high-reliable operation. Technical data are measured by CoreMorrow E00/E01 series piezo controller.

▸ Drawing

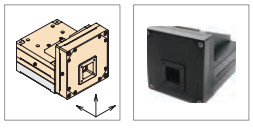
XP-780.X

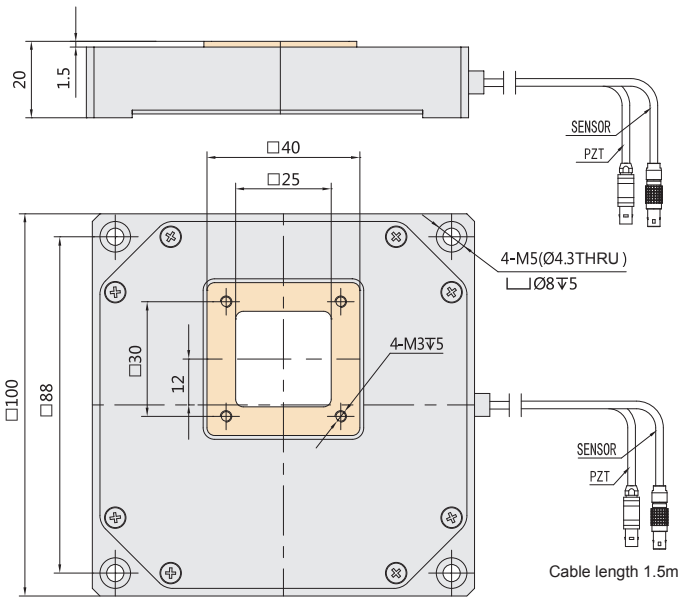


XP-780.XY



XP-780.XYZ





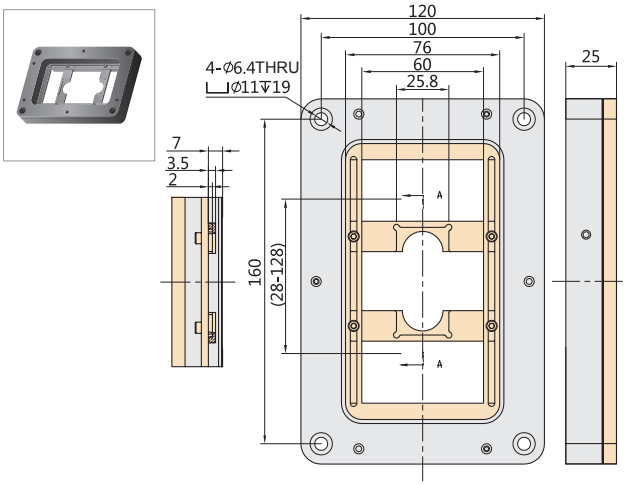
* For drawings of XP-780.XY, XP-780.XYZ, please refer to CoreMorrow website or consult sales engineer.

18130 Piezo Stage

▸ Technical Data

Type	18130	Units
Active axes	Z	
Travel (@150V)	90	μm±20%
Sensor	SGS	
El. capacitance	5.4	μF±20%

▸ Drawing

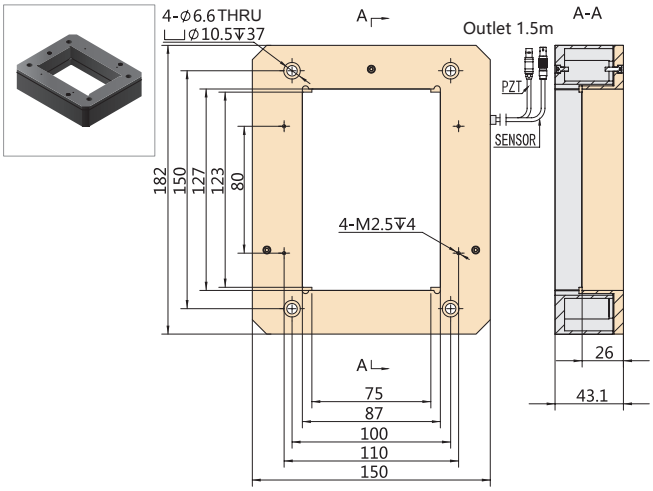


19113 Piezo Stage

▸ Technical Data

Type	19113	Units
Active axes	Z	
Travel (150V)	500	μm±20%
El. capacitance	16	μF±20%
Load capacity	600	g

▸ Drawing

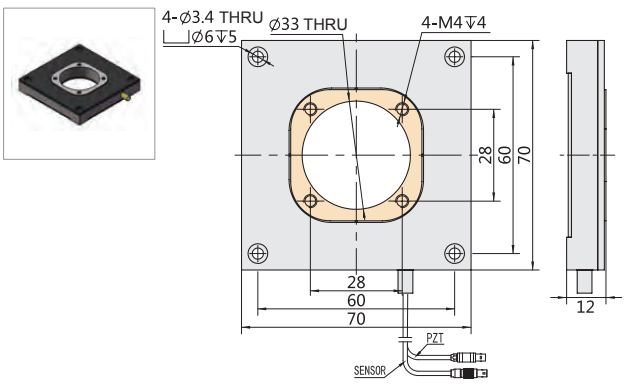


20142 XY Piezo Scanner

▸ Technical Data

Type	20142	Units
Active axes	X, Y	
Travel range(0~150V)	10/axis	μm±20%
Unloaded resonant frequency	≥500	Hz±20%
Resonant frequency@100g load	≥200	Hz±20%
El. capacitance	1.6/axis	μF±20%
Load capacity	150	g
Response time@100g load	≤2.5	ms±20%
Material	Steel, Aluminum	
Mass(with no cable)	250	g±5%

▸ Drawing

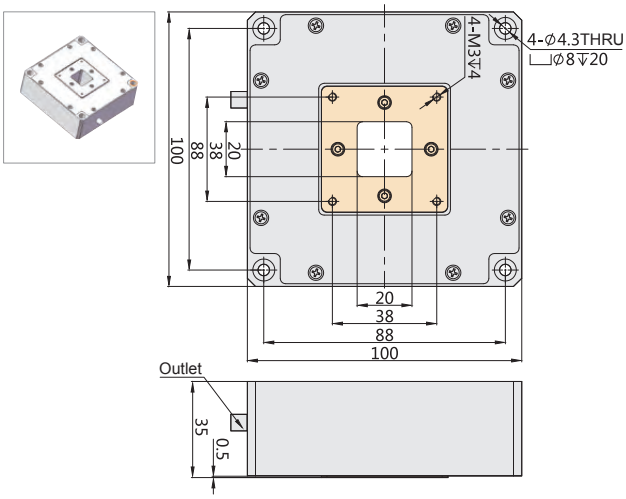


20180 XYZ Piezo Stage

▸ Technical Data

Type	20180	Units
Active axes	X, Y, Z	
X/Y/Z travel range(0~150V)	±40/±40/15	μm±20%
Integrated sensor	SGS	
Resolution	10.7(@20mV ripple)	nm
Closed-loop linearity	0.2	%F.S.
Repeatability	0.1	%F.S.
X/Y/Z Unloaded resonant frequency	470/590/900	Hz±20%
X/Y/Z resonant frequency@120g load	300/340/600	Hz±20%
Load capacity	500	g
Step time @120g load	<30	ms±20%
X/Y/Z El. capacitance	5.4/5.4/3.6	μF±20%
Material	Steel, Aluminum	

▸ Drawing

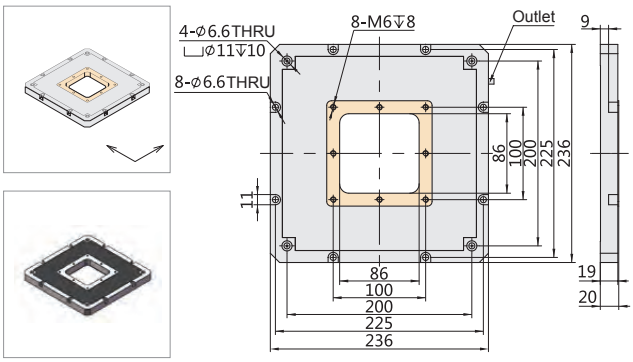


20190 XY Large Load Piezo Scanner

▸ Technical Data

Type	20190	Units
Active axes	X, Y	
Travel range(0~150V)	200/axis	μm±20%
Unloaded resonant frequency	160	Hz±20%
Resonant frequency @ 40kg load	30	Hz±20%
El. capacitance	43.2/axis	μF±10%
Load capacity	40	kg
Material	Steel, Aluminum	
Mass	4.7	kg±10%

▸ Drawing

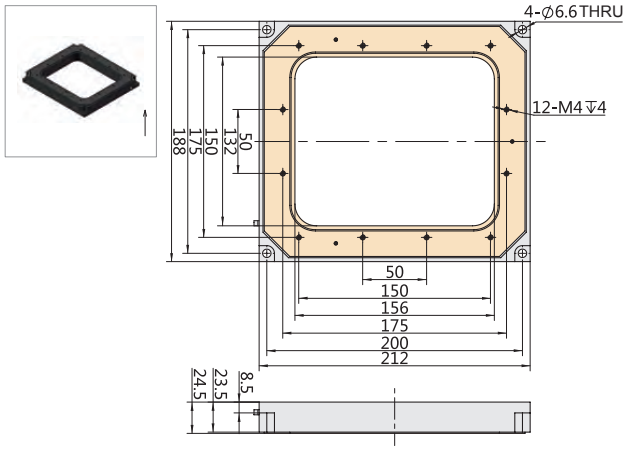


21041 Z Piezo Scanner

▸ Technical Data

Type	21041	Units
Active axes	Z	
Travel(0~150V)	80	μm±20%
Size	212×188×24.5	mm
Aperture	132×156	mm
Step time	50	ms±20%
El. capacitance	10.8/axis	μF±10%
Load capacity	3	kg
Material	Steel, aluminum	
Mass	0.6	kg±10%

▸ Drawing

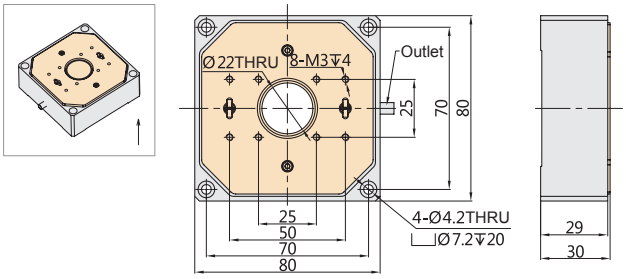


21125 Piezo Nanopostioning Stage

▸ Technical Data

Type	21125	Units
Active axes	Z	
Nominal travel(0~120V)	200	μm±20%
Travel range(0~150V)	250	μm±20%
Sensor	SGS, high accuracy	
Closed-loop resolution	35@20mV	nm
Linearity	0.25	%F.S.
Repeatability	0.15	%F.S.
Unloaded resonant frequency	240	Hz±20%
Resonant frequency@2kg load	50	Hz±20%
Load capacity	2	kg
El.capacitance	18	μF±20%

▸ Drawing

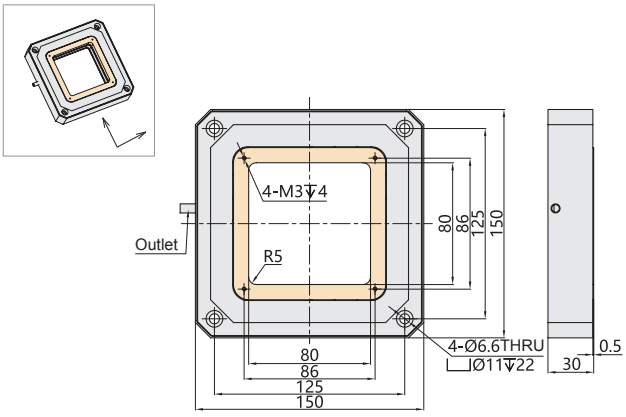


22071 Piezo Nanopositioning Stage

▸ Technical Data

Type	22071	Units
Active axes	X, Y	
Travel(0~150V)	45/axis	μm±20%
Unloaded resonant frequency	X500/Y800	Hz±20%
Loaded resonant frequency@200g	X350/Y560	Hz±20%
Sensor	SGS	
Closed-loop resolution	2	nm
Linearity	0.2	%F.S.
Repeatability	0.1	%F.S.
El.capacitance	14.4/axis	μF±20%
Load capacity	200	g
Material	Al	

▸ Drawing

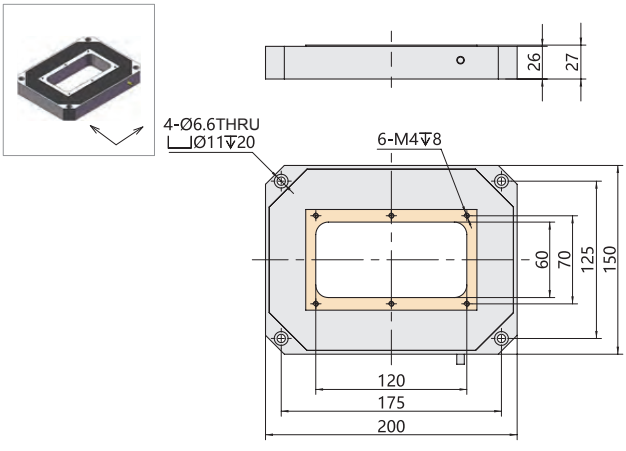


22078 Piezo Nanopositioning Scanner

▸ Technical Data

Type	22078	Units
Active axes	X, Y	
Sensor	SGS	
Nominal travel(0~120V)	±160/axis	μm±20%
Travel(0~150V)	±200/axis	μm±20%
Load capacity	1.5	kg±5%
Resonant frequency @1.5kg	X40/Y50	Hz±20%
Closed-loop resolution	<100	nm
El.capacitance	42.3/axis	μF±20%
Mass(no cable)	<1.5	kg
Material	Steel, Al	
Aperture	120×60	mm

▸ Drawing

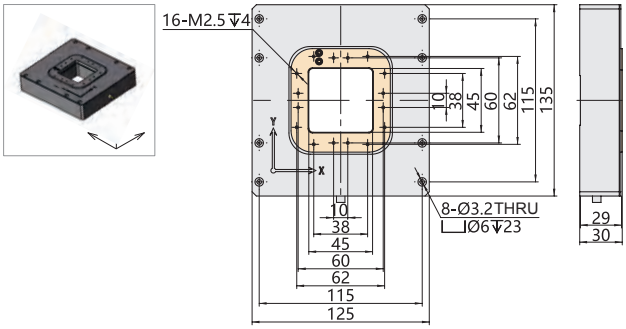


22097 Piezo Scanner

▸ Technical Data

Type	22097	Units
Active axes	X, Y, Z	
Sensor	SGS	
Travel (0~150V)	XY1000/Z100	μm±20%
Load capacity	50	g±5%
Closed/open-loop resolution	XY34/10,Z4/1	nm±20%
Unloaded resonant frequency	150	Hz±20%
Resonant frequency @50g load	110	Hz±20%
Linearity	0.15	%F.S.
Repeatability	0.1	%F.S.
Mass(no cable)	<1	kg±5%
El.capacitance	XY43.2/axis, Z1.8	μF±20%
Mass	Steel, Al	

▸ Drawing

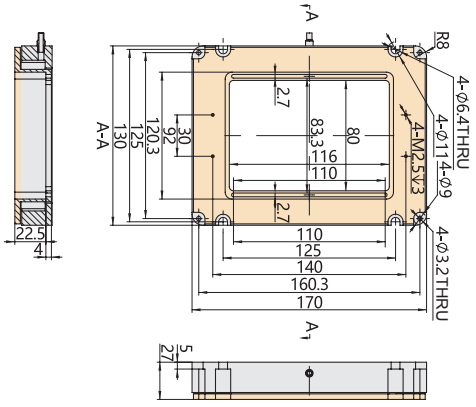


22099 Piezo Scanner (Z axis)

▸ Technical Data

Type	22099	Units
Active axes	Z	
Sensor	SGS	
Travel range(0~150V)	500	μm±20%
Load capacity	200(Horizontal)	g±5%
Open-loop resolution	9	nm±20%
Closed-loop resolution (@5mV ripple)	30	nm±20%
Linearity	0.15	%F.S.
Repeatability	0.1	%F.S.
Mass(not include cable)	<1	kg±5%
El.capacitance	28.8	μF±20%
Material	Steel, Al	

▸ Drawing



Linear/Angular Piezo Motor

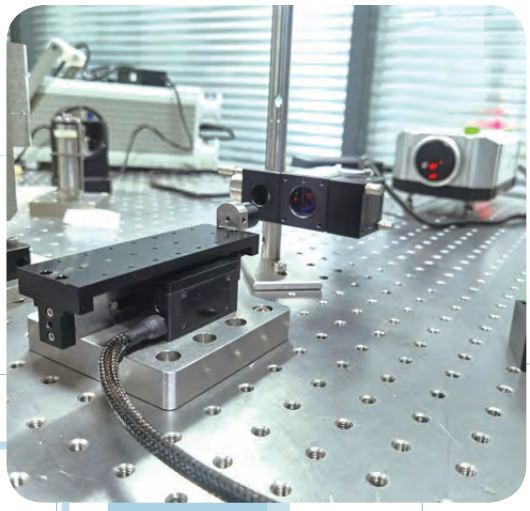


Piezo motor is driven by piezo ceramics, using special mechanical structure design to convert the linear micro-displacement generated by the piezo ceramics into macroscopic linear (or angular) motion of the mechanical plane, with stroke of up to tens of millimeters (or 360°).

▸ Applications



Automatic Mirror Alignment



Micro, Nano-Motion Control

▸ N31.50 Motor & E71 Controller



▸ Vacuum Tilt/Tip Mirror & Controller



▸ Ultra-Small 3.6mm Travel Linear Motor



▸ Closed-Loop Linear Motor & Controller



▶ Product List

Type	Model		Active axes	Travel	Speed	Load capacity	Resolution	Vacuum version	Sensor	Page
Linear/ Multi Axes	MN		1~3	3.5~30mm	1.2~1.5mm/s	3~4.5N	10~900nm	Optional	Optional	208
	N11		1~3	3.6mm	2 mm/s	0.1kg	20nm	Optional	No	209
	N31		1~3	6~100mm	2.5~5mm/s	2.5~5kg	1~80nm	Customizable	Optional	210
	N52		1~2	90mm	5mm/s	0.2~1kg	10nm	Optional	Optional	213
	N56		1~3	3~50mm	3mm/s	0.1~0.5kg	5nm	Optional	Optional	214/238
	N59		X	9mm	25mm/s	0.2kg	50nm	No	No	216
	N81	Linear Actuator	X	8~26mm	1~3mm/min	10~25N	<30nm	Optional	Customizable	217
		Platform with Central Hole	1~3	XY±5mm Z8μm	-	0.2~0.5kg	<30nm 0.1~0.3nm	No	No	218
		Platform	1~3	25.4mm	-	15~50N	<30nm	Optional	No	219
		Platform	3	X25mm YZ12.5mm	-	15~20N	<30nm	Yes	No	221
		Platform (Closed-loop)	1~3	±12.5mm	50μm/s	1.5~5kg	80nm	Optional	Yes	222
Mirror Mounts	N71		θx,θy	±2°	1.5°~2°/s	-	2μrad	No	No	223
	N81		θx,θy	±2°~±5°	-	-	0.2~0.7μrad	Optional	Customizable	224
Leveling Platform	N81K8ZT50		θx,θy Z	±1.5° 3mm	-	2kg	0.3μrad <20nm	Optional	No	229
Tilt Stage	N70		θx	±5°	3° /s	0.15~0.5kg	1~10μrad	Optional	Optional	230
	N25		θx,θy	6°	25mrad/s	100g	0.3~28μrad	Optional	No	231
Driven Rotation	N61		θz	360°	15 ° /s	1kg	1~10μrad	Optional	Optional	232
	N61-C		θz	360°	5 ° /s	1kg	1~5μrad	Optional	Optional	234
	N61.K20H		θz	360°	20°/s	0.5kg	10μrad	Optional	No	235
	N61.E/K56		θz	360°	5°/s	1kg	1~5μrad	Optional	Optional	236
	N69		θz	360°	220rpm	0.2kg	30μrad	Optional	No	237
6 Hexapod	N56.XYZTR20		6	XY20mm/Z10mm θxθy20°/θz35°	-	0.5kg	-	Optional	Optional	238
	N91.XYZTR4K		6	XYZ3mm θxθyθz±2°	-	1.2kg	<30nm 0.2μrad	-	Customizable	239
Custom	Custom		1~6	±3.5°~360° 25~100mm	20°/s	5N	<5μrad	Customizable	Customizable	240

▶ Recommended Controller

Model	Channels	Power	Open loop	Servo control	Communication control	Page
E53.C4K-H/E53.C1K-K	1~4	24VDC/1A(20V~30V)	√	×	√	241
E53.C80K-H	80	24VDC/15A(20V~30V)	√	×	√	242
E53.D1E/C1K-J	1	24VDC/1A(20V~30V)	√	√	√	243
E53.D2E-H/E53.C2K-J	2	24VDC/1A(20V~30V)	√	√	√	244
E71	3~4	24VDC/4A(20V~30V)	√	√	√	245
E71.SERVO-H Board-type	1	24VDC/1A(20V~30V)	√	√	√	246
E66.A2K-H Board-type	1	+5V/1A	√	×	×	246

MN Linear Piezo Motor



▸ Characteristics

• Piezo drive •Small size • Nanometer resolution • 3.5 to 30mm travel optional • Optional closed-loop version, vacuum version

▸ Small Size



▸ Optional Vacuum



▸ Optional Sensor



▸ Optional Multi Axes



▸ Technical Data

Type	MN15-3.5mm	MN15-10mm	MN30-8mm	MN30-18mm	MN30-30mm	Units
Width	15	22	30	40	52	mm
Height	7	7	12.5	12.5	12.5	mm
Depth	15	15	30	30	30	mm
Travel	3.5	10	8	18	30	mm
Speed	1.5	1.5	1.2	1.2	1.2	mm/s±20%
Mass	6	20	32	38	54	g
Load capacity						
Torque Mx	4	4.5	5	5	5	N·cm
Torque My	4	1.5	5	5	5	N·cm
Torque Mz	4	3.2	5	5	5	N·cm
Blocking force Fx	3	3	4.5	4.5	4.5	N
Fy, Fz	20	20	30	30	30	N
Resolution(cal.)						
Single step	~450	-	~450	~450	~450	nm±20%
1/16 step	~30	-	~30	~30	~30	nm±20%
1/64 step	~10	-	~10	~10	~10	nm±20%
1/2 step	~250	-	~250	~250	~250	nm±20%
Double step	~900	-	~900	~900	~900	nm±20%
Guiding accuracy (unloaded)						
Yaw angle	20	20	120	150	170	arc sec
Pitch angle	60	60	60	120	170	arc sec
Vertical deviation	1	1	1	2	3	μm
Lateral deviation	2	2	2	2	3	μm

Note: Closed-loop version available with larger size. The closed-loop accuracy is up to ±1μm/m. The frequency is up to 400kHz. Communication via RS-422 port. Operating temperature is 0~55°C. 2-axis or 3-axis motion version available.

▸ Recommended Controller

MN piezo motor type		Recommended controll	MN piezo motor type		Recommended controll
1-axis motion	Open loop	E53.C1K-J	2 or 3-axis motion	Open loop	E71.C3K-J
	Closed loop	E53.D1E-J		Closed loop	E71.D3E-J

N11 Linear Piezo Motor



N11 vacuum version

The N11 series linear piezo motor adopts the principle of stick-slip and convert the micro -movement of PZT piezo actuator into a millimeter -level long travel. It is very small, only 15 × 15 × 7mm^3. However, its travel can be as high as 3.6mm, which is very suitable for adjustment and application of the millimeter range in the limited space.

▸ Characteristics

• Travel to 3.6mm • 1 to 3 axes for choice • Speed up to 2mm/s • Small size, light weight • Self-locking at rest, requires no current

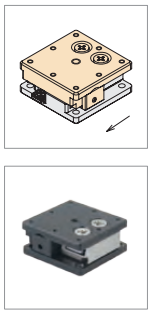
▸ Application

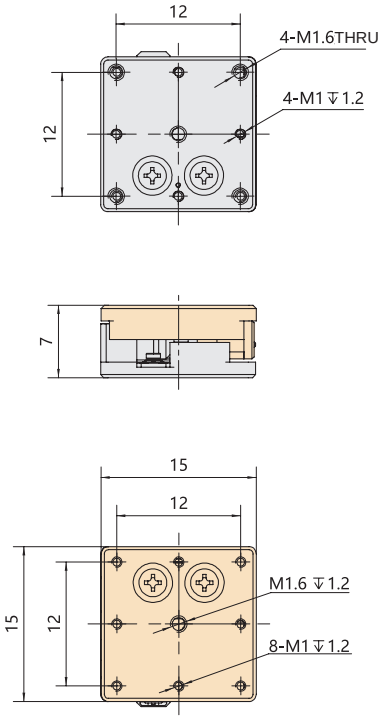
• Sample movement in super resolution imaging
• Integrated circuit manufacturing and testing
• Large-scale electronic bundle direct writing (EBL)
• Nano -focus and scanning
• Micro -nano equipment and manufacturing
• Scanning electron microscopy (SEM) sample manipulation
• High vacuum sample high-precision alignment and tuning posture
• Active optics
• Micro and nano CT

▸ Technical Data

Type	N11.X3.5K	Units
Active axes	X	
Nominal travel range	3.6/±1.8	mm
Max speed	2	mm/s±20%
Resolution	20	nm±20%
Max force	0.5	N
Holding force(Passivity)	1.5	N
Max load (horizontal direction)	0.1	kg
Max load (vertical direction)	0.02	kg
Axial stiffness	1	N/μm±20%
Vertical stiffness	2	N/μm±20%
Operating temperature	0~50	°C
Cable length	1.5	m±10mm
Material	Al, stainless steel	
Mass (not include cable)	6	g±10%
Recommended controller	E53.C1K-J	

▸ Drawing





N31 Linear Piezo Motor



N31 linear piezoelectric motor adopts stick-slip principle, and piezo step direct drive. The linear motion range can be 6, 10, 25, 50 or 100mm, and the resolution can reach nanometer level. Closed-loop servo sensors (grating sensor) for high positioning accuracy and motion platform are available.

▸ Characteristics

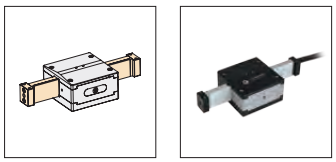
- Large blocking force
- Automatic zero position by software operation
- Optional grating sensor
- Optional 2 or 3 axes
- Wear-resistant material
- Optional vacuum version
- Closed-loop automatic return after accidental touch
- Self-locking at rest, requires no current

▸ Technical Data

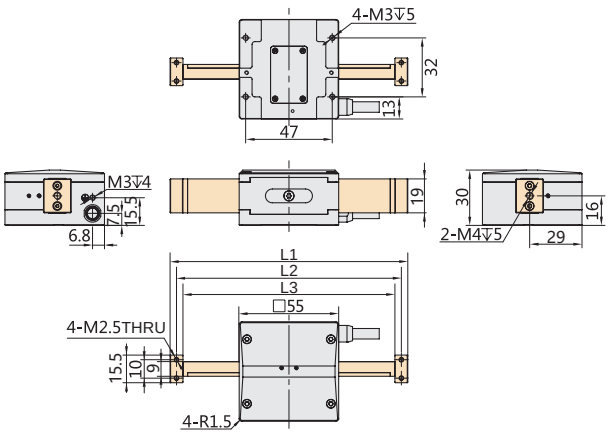
Type	N31.6E N31.6K	N31.10E N31.10K	N31.25E N31.25K	N31.50E N31.50K	N31.100E N31.100K	Units
Active axes	X	X	X	X	X	
Integrated sensor	Grating sensor	Grating sensor	Grating sensor	Grating sensor	Grating sensor	
Travel range	6 or ±3	10 or ±5	25 or ±12.5	50 or ±25	100 or ±50	
Speed limit	5	5	5	5	5	mm/s±20%
Resolution	<50/1	<50/1	<50/1	<50/1	<50/1	nm±20%
Linearity	1/-	1/-	1/-	1.5/-	2/-	μm±20%
Repeatability	0.5/-	0.5/-	1/-	1.5/-	2/-	μm±20%
Push/pull force(Active)	30	30	30	30	30	N
Holding force(Passivity)	40	40	40	40	40	N
Max load (horizontal direction)	5	5	5	5	5	kg
Operating temperature	0~50	0~50	0~50	0~50	0~50	°C
Mass with cable	545	550	565	590	640	g±5%
Material	Al, Steel	Al, Steel	Al, Steel	Al, Steel	Al, Steel	
Cable length	1.5	1.5	1.5	1.5	1.5	m±10mm
Recommended controller	E71.D4E/C4K-H	E71.D4E/C4K-H	E71.D4E/C4K-H	E71.D4E/C4K-H	E71.D4E/C4K-H	

▸ Drawing

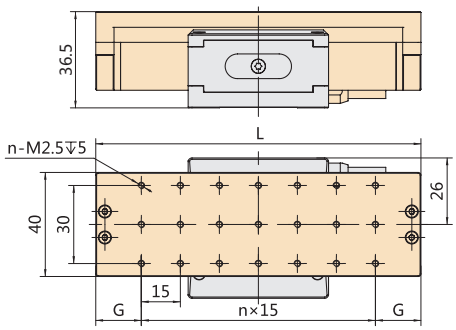
N31



Type	L1	L2	L3
N31.6E/K	76	69	62
N31.10E/K	80	73	66
N31.25E/K	95	88	81
N31.50E/K	120	113	106
N31.100E/K	170	163	156



Drawing(With moving surface)



Type	L	G	n×15	n×M2.5
N31.6E/K	76	8	4×15	15×M2.5
N31.10E/K	80	10	4×15	15×M2.5
N31.25E/K	95	17.5	4×15	15×M2.5
N31.50E/K	120	15	6×15	21×M2.5
N31.100E/K	170	10	10×15	33×M2.5

N31 Three-axis Linear Piezo Motor with Sensor







The N31 series three-axis linear piezo motor can move in XYZ and is equipped with a grating sensor for servo control. It adopts PZT piezo drive and can achieve nanoscale resolution. The stroke for each axis can be selected 25, 50, 100mm.

▸ Characteristics

- Optional 25, 50 or 100mm travel per axis
- Nanoscale resolution
- Load capacity up to 2.5kg
- With grating sensor
- Self-locking at rest, requires no current

▸ Application

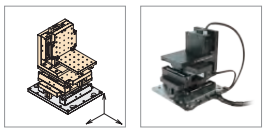
- Sample movement of super-resolution imaging
- Micro-nano equipment and manufacturing
- Nano-focusing and scanning
- Large range electron beam direct writing (EBL)
- Integrated circuit manufacturing and testing
- Microscopic and nano-CT
- Sample manipulation of scanning electron microscopy (SEM)
- Precision alignment and orientation of high vacuum samples
- Active optics

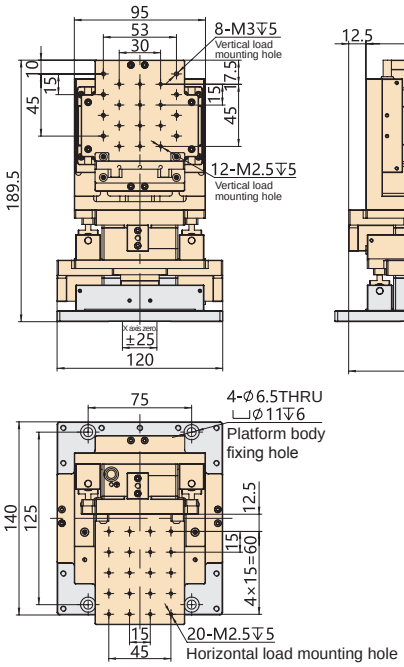
▸ Technical Data

Type / E-Closed loop K-Open loop	N31.XY50Z25E	N31.XY50Z100E	N31.XY100Z25E	Units
Active axes	X,Y,Z	X,Y,Z	X,Y,Z	
Integrated sensor	Grating sensor	Grating sensor	Grating sensor	
Nominal travel range	XY±25, Z±12.5	XY±25, Z±50	XY±50, Z±12.5	mm
Max speed	2.5	2.5	2.5	mm/s±20%
Resolution	80	80	80	nm±20%
Bidirectional Repeatability	3	3	3	μm±20%
Load capacity	2.5	2.5	2.5	kg
Operating temperature	0~40	0~40	0~40	°C
Mass(excluding cable)	4.2	4.7	5.3	kg±5%
Material	Aluminium, steel	Aluminium, steel	Aluminium, steel	
Cable length	1.5	1.5	1.5	m±10mm
Recommended controller	E71.D4E-H	E71.D4E-H	E71.D4E-H	

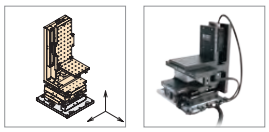
▸ Drawing

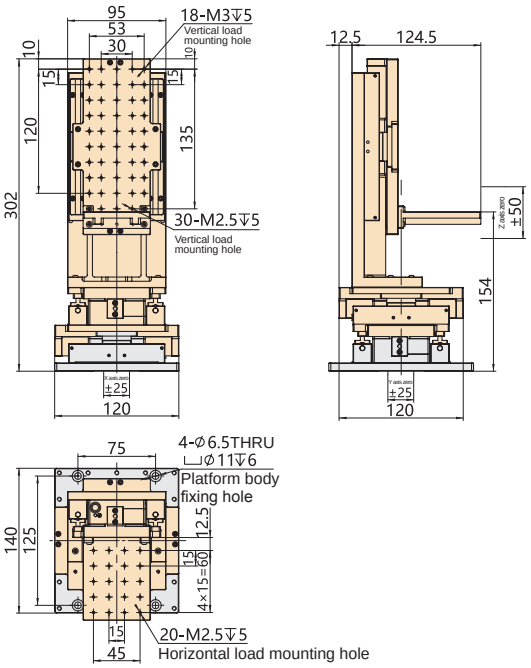
N31.XY50Z25E



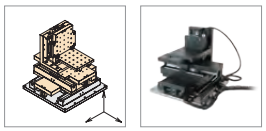


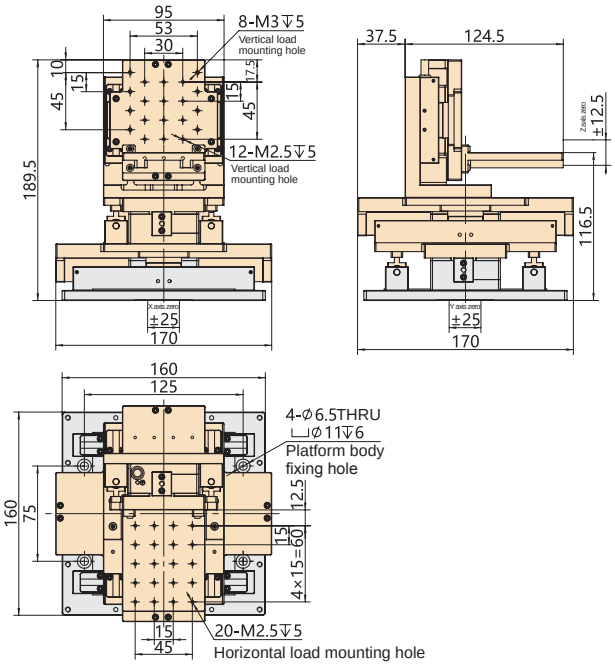
N31.XY50Z100E





N31.XY100Z25E



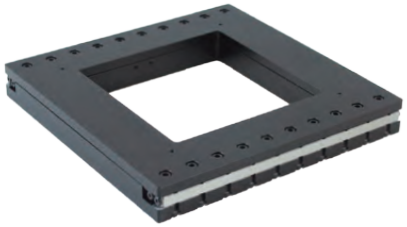


▸ Recommended Controller

E71.D4E-H

4 channels, Computer software control, USB, RS-422, RS-232 communication

N52 Linear Piezo Motor



N52 linear piezo motor adopts stick-slip principle, and piezo step direct drive. The linear motion range can be 90mm, with a high resolution. Closed-loop sensors (Grating sensor) for high positioning accuracy.

▸ Characteristics

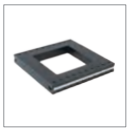
- Travel to 90mm/axis
- 1 to 2 axes for choice
- Self-locking at rest, requires no current
- High resolution
- Open/closed loop
- Optional vacuum version

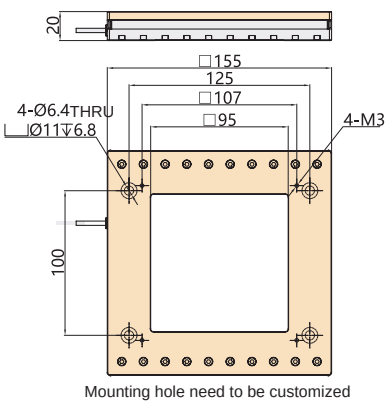
▸ Technical Data

Type	E-Closed loop K-Open loop	N52.X90E N52.X90K	N52.XY90E N52.XY90K	Units
Active axes		X	X,Y	
Integrated sensor		Grating sensor/-	Grating sensor/-	
Travel range		90 or ±45	90 or ±45/axis	mm
Speed limit		5	5	mm/s±20%
Resolution		10	10	nm±20%
Max force		3	3	N
Repeatability		1/-	1/-	μm±20%
Holding force		5	5	N
Max load (horizontal direction)		1	0.2	kg
Aperture		95×95	95×95	mm
Minimum aperture		50×95	50×50	mm
Operating temperature		0~50	0~50	°C
Cable length		1.5	1.5	m±10mm
Material		Al, Steel	Al, Steel	
Mass (not include cable)		820/800	1640/1600	g±5%
Recommended Controller		E53.D1E/C1K-J	E53.D1E/C1K-J	

▸ Drawing

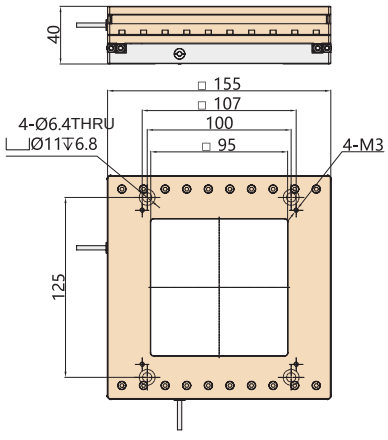
1-axis version





Mounting hole need to be customized

2-axis version



N56 Linear Piezo Motor



The N56 linear piezo motor adopts piezo micro-drive technology, which uses piezo micro-displacement actuators to achieve high-precision positioning and movement technology. Macro motion linear millimeter-level stroke is achieved after mechanical structure conversion of the micro-deformation of piezo actuator under electric field.

▸ Characteristics

• Piezo drive • High resolution •Stroke up to 50mm • Small size • Optional XY, XYZ version
•Open/closed loop version and vacuum version optional

▸ Application

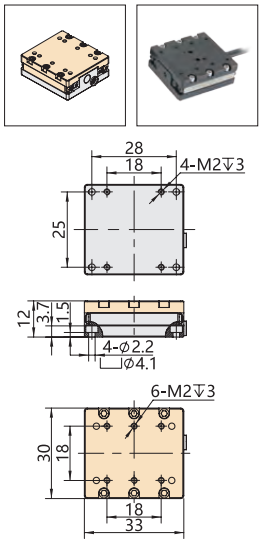
• Atomic force microscope • Scientific research • Fiber optic docking • Microfabrication
• Nano positioning with small load & large travel • Precision positioning & micro-nano operation of semiconductors, etc.

▸ Technical Data

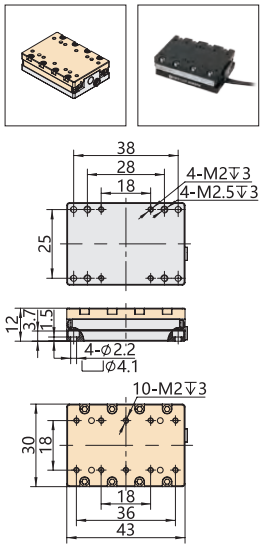
Type	E-Closed loop K-Open loop	N56.10E N56.10K	N56.20E N56.20K	N56.30E N56.30K	N56.50E N56.50K	Units
Active axes		X	X	X	X	
Integrated sensor		Grating sensor	Grating sensor	Grating sensor	Grating sensor	
Travel range		10 or ±5	20 or ±10	30 or ±15	50 or ±25	mm
Speed limit		3	3	3	3	mm/s±20%
Resolution		5	5	5	5	nm±20%
Max force		3	3	3	3	N
Repeatability		0.1/-	0.12/-	0.15/-	0.2/-	μm±20%
Push/pull force(Active)		3/-	3/-	3/-	3/-	N
Holding force(Passivity)		4.5	4.5	4.5	4.5	N
Max load (horizontal direction)		0.5	0.5	0.5	0.5	kg
Max load (vertical direction)		0.1	0.1	0.1	0.1	kg
Axial stiffness		1.5	1.5	1.5	1.5	N/μm±20%
Vertical stiffness		9	9	9	9	N/μm±20%
Operating temperature		0~50	0~50	0~50	0~50	°C
Cable length		1.5	1.5	1.5	1.5	m±10mm
Material		Al, Steel	Al, Steel	Al, Steel	Al, Steel	
Mass (not include cable)		58/40	75/50	85/60	140/82	g±10%
Recommended Controller		E53.D1E/C1K-J	E53.D1E/C1K-J	E53.D1E/C1K-J	E53.D1E/C1K-J	

▸ Drawing

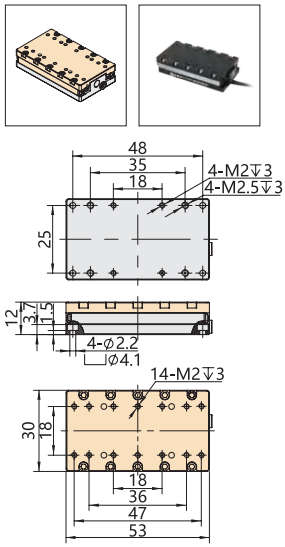
N56.10K



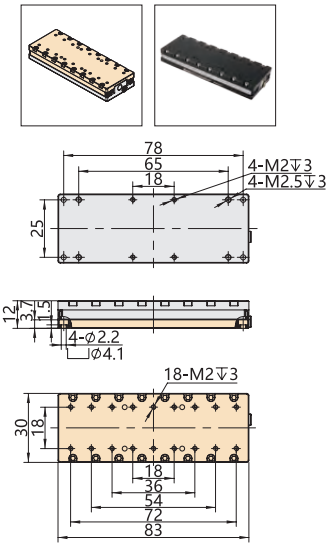
N56.20K



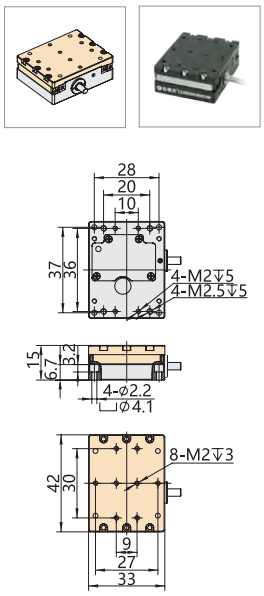
N56.30K



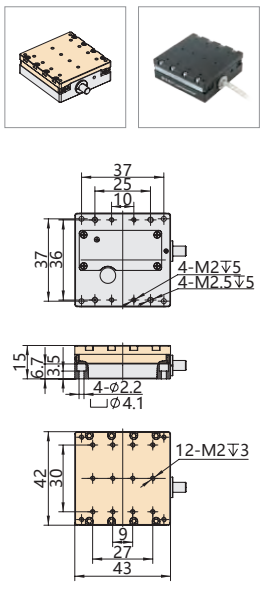
N56.50K



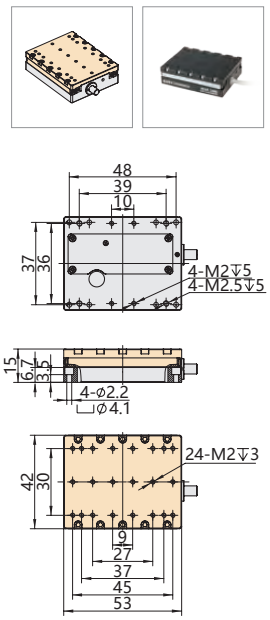
N56.10E



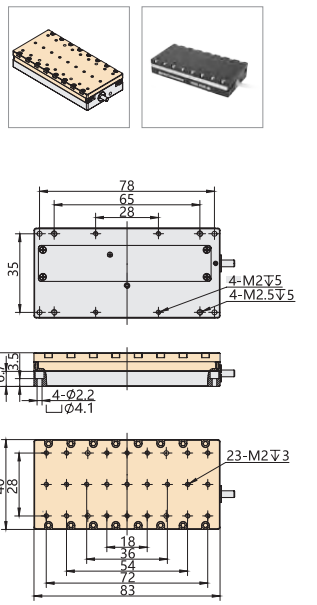
N56.20E



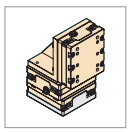
N56.30E

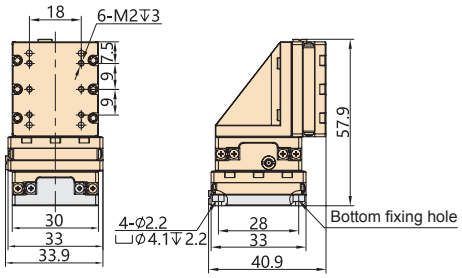


N56.50E



N56.XYZ10K





N59 Linear Piezo Motor



N59 piezo motor is an open-loop version of piezo motor by piezo actuator. It uses special mechanical structure design to convert linear microdisplacement by piezo actuator into macroscopic linear motion in a mechanical plane.

The N59 can achieve ± 4.5mm displacement in the X direction with a resolution of up to 50nm. It features compact in structure, very suitable for integration. it has minimal impact on external electromagnetic interference and noise. Also it has fast speed, small step size and is uniform and stable. With E66.A2K-H piezo motor control module, it can be controlled by external PWM signal, which is more convenient.

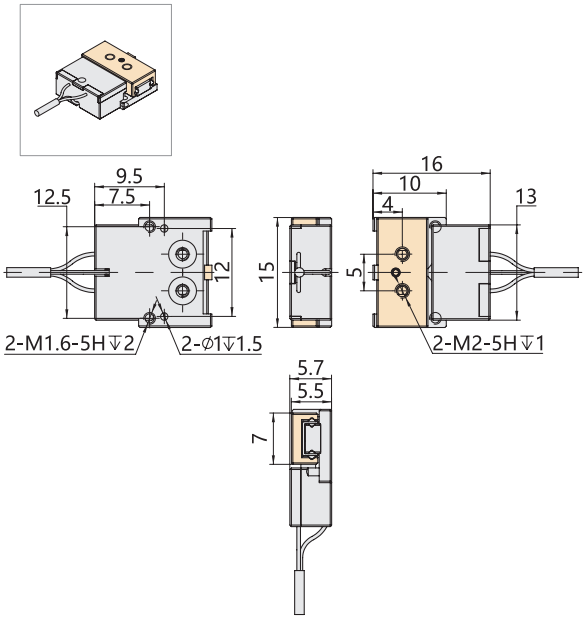
▸ Characteristics

- Piezo resonance principle
- Motion in X
- Travel to ±4.5mm
- Speed up to 25mm/s
- Resolution to 50nm
- Load capacity to 0.2kg
- Power off self-locking

▸ Technical Data

Type	N59.9K	Units
Active axes	X	
Travel range	9/±4.5	mm
Speed limit	25	mm/s±20%
Resolution	50	nm±20%
Load capacity	0.2	kg
Operating temperature	0~50	
Mass	4	g±5%
Material	Al, Stainless steel	
Cable length	1.5	m

▸ Drawing



▸ Recommended controller

E66.A2K-H

1 channel, open loop, 38mm×27mm×12mm

N81 Piezo Motor Driven Linear Actuator





Optional vacuum version

The linear piezo motor has the resolution of more than 20nm in full stroke,rated load of 25N, compact design, excellent long-term stability, and can continue to remain at the set position in the event of a power failure. It can be used for touch-free adjustment of hard-to-reach optical adjustment frames, and adjustment of optical frames that are sensitive to force when turning the knob (such as laser cavity adjustment or longdistance beam pointing adjustment).

▸ Characteristics

• Resolution to <20 nm • Compact design • Self-locking at rest, requires no current • Lifetime>1 billion steps • Optional vacuum version

▸ Technical Data

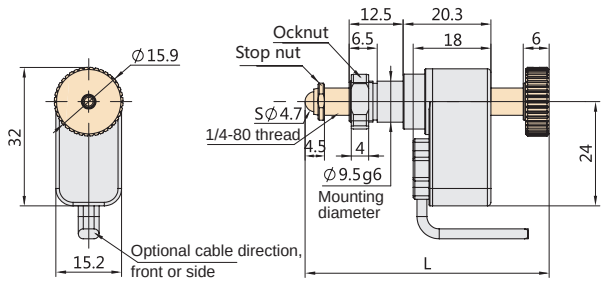
Type	N81.8K	N81.13K	N81.26K	N81A.8K	Units
Travel	8	13	26	8	mm
Resolution	<20	<20	<20	<30	nm±20%
Load capacity	25	25	25	10	N
Speed	3	3	3	1	mm/min±20%
Position hold deviation at power up or down	<20	<20	<20	-	nm
Operating temperature	10~40	10~40	10~40	10~40	°C
Mass with cable	80	82	85	22 (not include cable)	g±5%
Material	Steel, Aluminum	Steel, Aluminum	Steel, Aluminum	Copper alloy, Aluminum	
Cable length	2	2	2	1.5	m±10mm
Recommended controller	E53.C4K-H	E53.C4K-H	E53.C4K-H	E53.C4K-H	
PZT connector	RJ11	RJ11	RJ11	RJ11	

Note: UHV version is available.

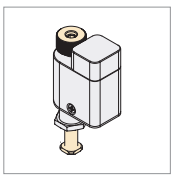
▸ Drawing

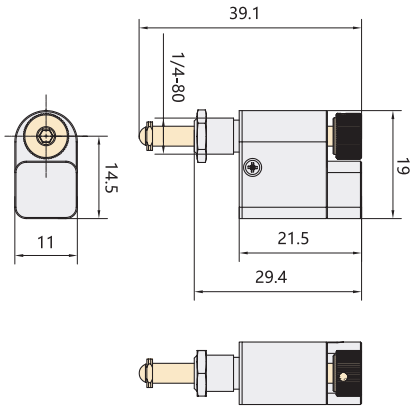
N81.8/13/26K

Type	N81.8K	N81.13K	N81.26K
L	51.8mm	56.5mm	69.5mm



N81A.8K





XY/XYZ72 Piezo Motor Stage

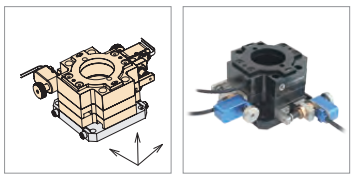


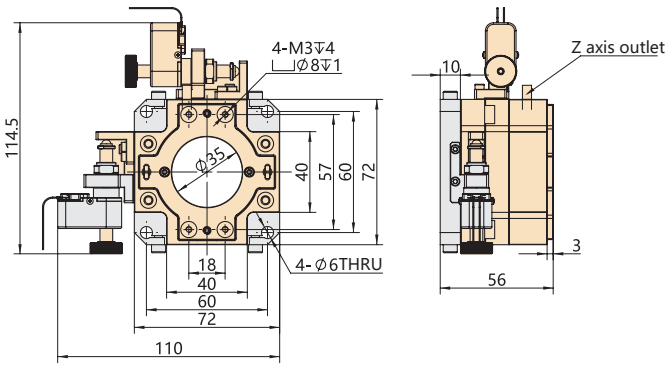
▸ Technical Data

Type	N81K13XY72	N81K13XY72P70S	N81K13XY72P70K	Units
Active axes	X, Y	X, Y, Z	X Y Z	
XY travel range	±5	±5	±5	mm
Z travel range	-	8@150V	8@150V	μm
XY resolution	<30	<30	<30	nm±20%
Z resolution	-	0.3	0.1	nm±20%
Z sensor	-	SGS	-	
Z linearity	-	0.25	-	%F.S.
Z repeatability	-	0.25	-	%F.S.
Z unloaded resonant frequency	-	2.5	2.5	kHz
Load	500	Horizontal: 500 Side:200	Horizontal: 500 Side:200	g
Aperture	Φ35	Φ35	Φ35	mm
Mass	-	695	695	g±5%
PZT connector	RJ11	RJ11	RJ11	

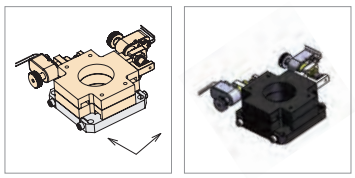
▸ Drawing

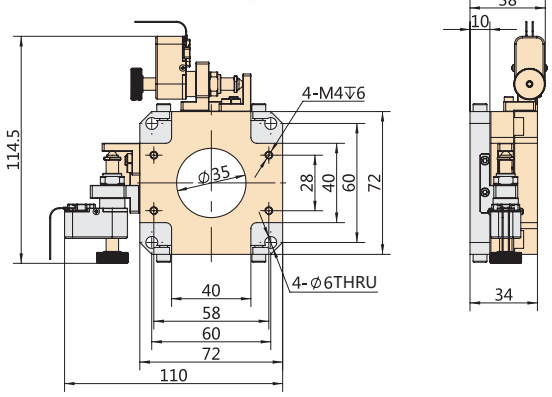
XYZ Version





XY Version





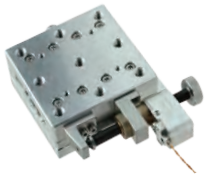
Technical description:

This outline drawing is the overall dimension without movement displacement, and some components will produce ± 5mm displacement in the actual movement process.

Linear Piezo Nanopositioning Stage



Standard edition





Vacuum version



This linear piezo nanopositioning stage is piezoelectric screw motion platform, with a combination of linear motor piezoelectric screws and a sliding stage, and the high-precision motion of the piezoelectric screw is used to control the movement of the sliding stage. Two-dimensional or three-dimensional motion control can be formed with multiple piezoelectric screw motion platforms.

▸ Characteristics

- Travel up to 25.4mm/axis
- 1 to 3 axes motion
- Resolution to <30nm
- Standard and vacuum versions are available
- Self-locking at rest, requires no current

▸ Technical Data

Type		N81K26X65	N81K26XY65	N81K26XYZ65	Units
Active axes		X	X, Y	X, Y, Z	
Travel range		25.4	25.4/axis	25.4/axis	mm
Resolution		<30	<30	<30	nm±20%
Center load	Horizontal	50	50	20	N
	Vertical	20	20	15	
Bearing		Ball	Ball	Ball	
Material		Aluminum	Aluminum	Aluminum	
Operating temperature		10~40	10~40	10~40	°C
Port		4-Pin	4-Pin	4-Pin	
Cable length		2	2	2	m±10mm
Mass		350	700	1220	g±5%
PZT connector		RJ11	RJ11	RJ11	

Remark: UHV version available. Custom closed-loop version available.

▸ Recommended Controller

E53.C4K



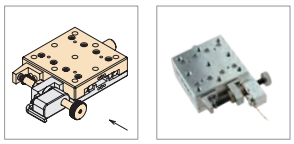
E53 series piezoelectric motor controller, digital control, USB, serial communication.

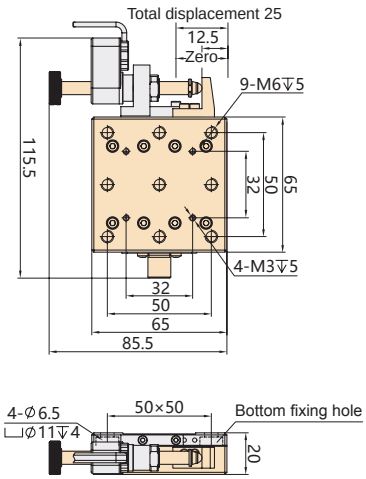
▸ Optional Version with Central Hole



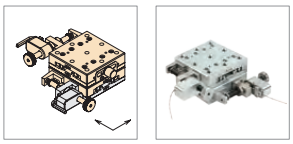
▸ Drawings

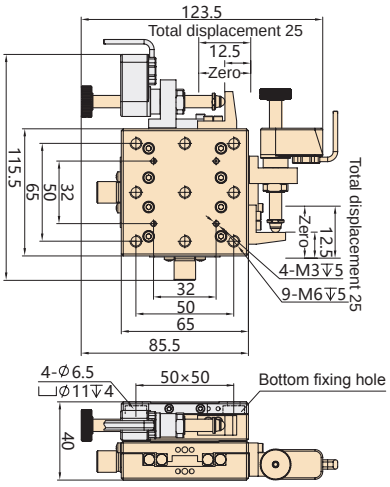
N81K26X65 Vacuum version



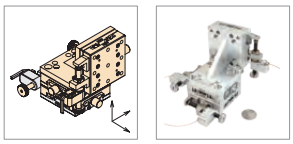


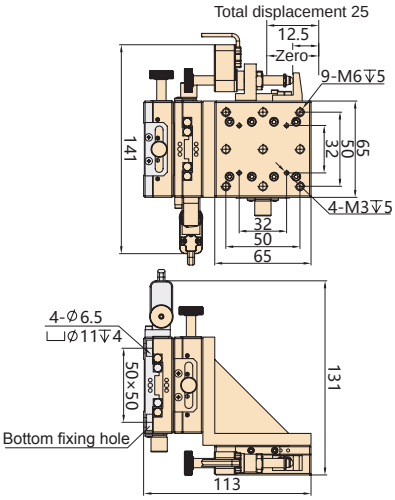
N81K26XY65 Vacuum version



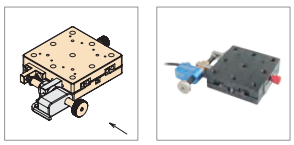


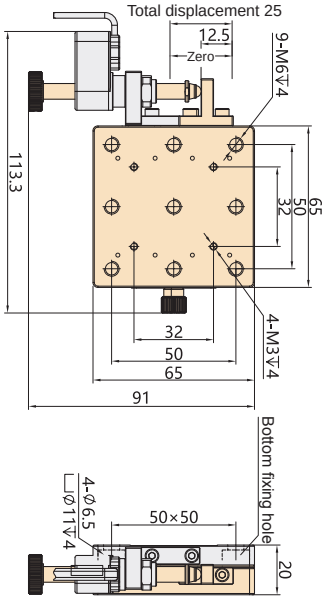
N81K26XYZ65 Vacuum version



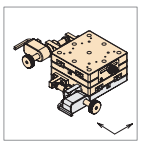


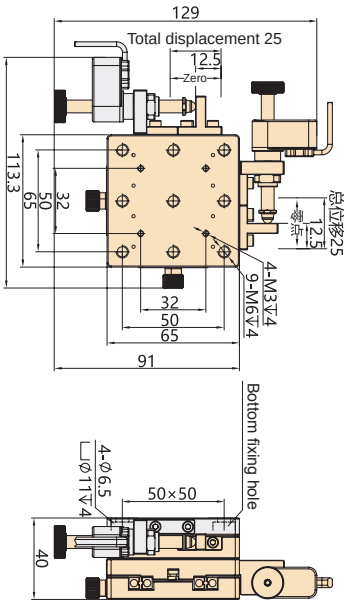
N81K26X65 Standard edition



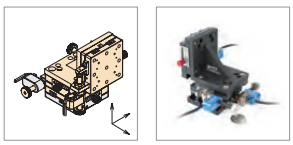


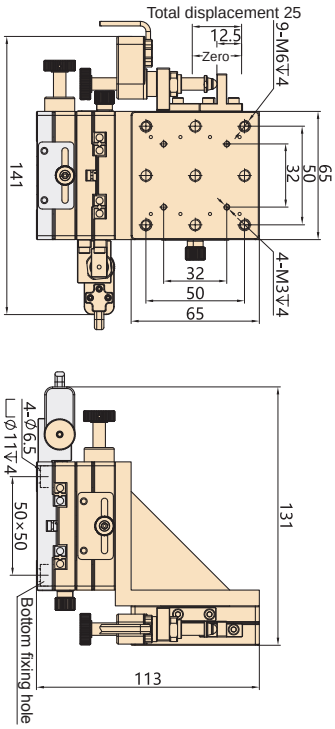
N81K26XY65 Standard edition



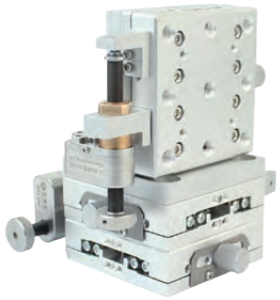


N81K26XYZ65 Standard edition





N81K26XYZ65-A Vacuum Version Piezo Screw Motion Platform



N81K26XYZ65-A piezo screw motion platform is an three-dimensional piezo nanopositioning stage with 3-axis motion of X, Y, Z and is driven by piezo screw actuators.

Characteristics

- Motion in X, Y, Z
- Nanometer Resolution
- Power off self-locking
- More flexible with motorized operation

Application

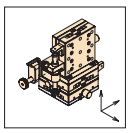
- Scientific research
- Laboratory system construction
- Optics
- Optical fiber application
- Vacuum environment

Technical Data

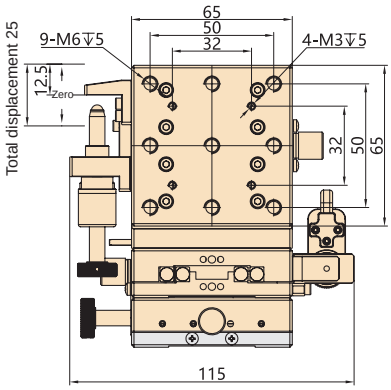
Type	N81K26XYZ65-A	Units
Active axes	X, Y, Z	
Travel range	X: 25, Y: 12.5, Z: 12.5	mm
Resolution	<30	nm±20%
Center load	Horizontal: 20, Vertical: 15	N
Material	Aluminum	
Operating temperature	10~40	°C
Mass	1160	g±5%
Recommended Controller	E53.C4K	
PZT connector	RJ11	

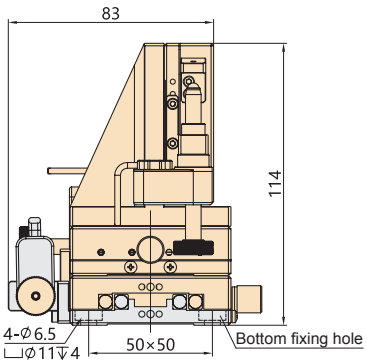
Drawing

N81K26XYZ65-A









Linear Piezo Nanopositioning Stage (Closed-loop)



Considering the user's requirement of high precision and long travel, the N81E26XYZ65 piezo screw motion platform has been specially designed and developed by CoreMorrow. The platform is equipped with a grating sensor, which can precisely control the travel and accuracy, and the accuracy can reach 1.5μm.

Characteristics

- Motion in X, Y, Z
- Closed-loop servo sensor (grating sensor)
- Travel to ±12.5mm/axis
- Nanoscale resolution
- Accuracy up to 1.5μm
- Self-locking at rest, requires no current

Application

- Semiconductor testing
- Wafer testing
- Nano imprint
- Nano metering
- Industrial precision positioning, etc

Recommended controller

E53.D1E Piezo Servo Controller is developed and produced by CoreMorrow to drive piezo motor products like N81E26XYZ65 Linear piezo nanopositioning Stage. E53.D1E Piezo Servo Controller can be connected and communicated with the upper computer via serial port. Users can set speed and other parameters via software.

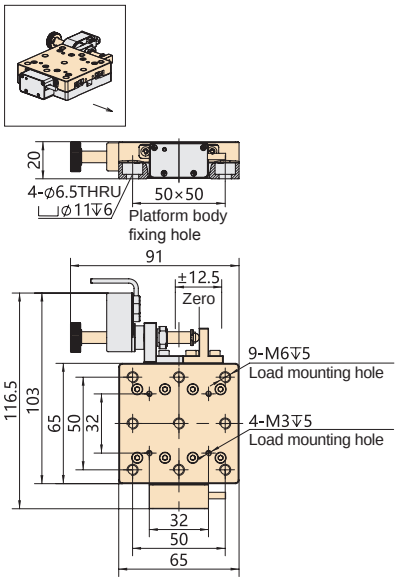


Technical Data

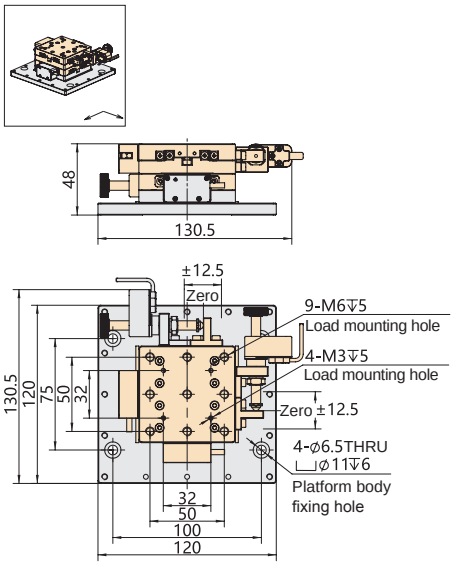
Type	N81E26X65	N81E26XY65	N81E26XYZ65	Units
Active axes	X	X, Y	X, Y, Z	
Integrated sensor	Grating sensor	Grating sensor	Grating sensor	
Travel range	±12.5	±12.5/axis	±12.5/axis	mm
Speed limit	50	50	50	μm/s±20%
Resolution	80	80	80	nm±20%
Linearity	1.5	1.5	1.5	μm±20%
Repeatability	1.5	1.5	1.5	μm±20%
Load capacity	5	5	1.5	kg
Temperature	0~50	0~50	0~50	°C
Mass with cable	0.4	1.7	2.6	kg±5%
Material	Al, Steel	Al, Steel	Al, Steel	
Cable length	1.5	1.5	1.5	m±10mm
Recommended Controller	E53.D1E	E53.D1E	E53.D1E	

Drawings

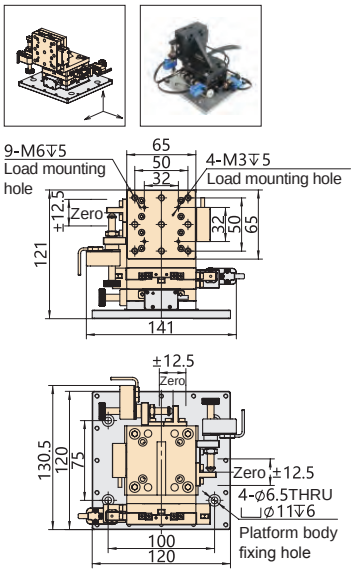
N81E26X65



N81E26XY65



N81E26XYZ65



N71 Piezo Motorized Mirror Mounts





The N71 mirror mounts can tilt in θx, θy, drived by two linear piezo screw actuators, and the adjusting range can reach ±2°. There are two models to choose from N71.T3K and N71.T4K. The N71.T4K has a mounting diameter of Φ25.4mm, which is suitable for loading Φ25.4mm, Φ25mm optical device. The resolution of N71 can reach 2μrad, and can achieve self-locking when power off.

▸ Characteristics

- Two-dimensional deflection
- Speed up to 2°/s
- Resolution to 2μrad
- Self-locking at rest, requires no current

▸ Application

- Scientific research
- Optics
- Laboratory system construction
- Two-dimensional deflection adjustment of mirror, etc.

▸ Technical Data

Type	N71.T3K	N71.T4K	Units
Active axes	θx, θy	θx, θy	
Travel range	±2	±2	°
Mounting diameter	12.7	25.4	mm
Speed limit	1.5	2	°/s±20%
Resolution	2	2	μrad±20%
Operating temperature	10~40	10~40	°C
Storage Tempreture	-10~40	-10~40	°C
Mass(with cable)	60	150	g±5%
Material	Al, Steel	Al, Steel	
PZT connector	RJ11	RJ11	
Cable length	1.5	2	m±10mm
Recommended controller	E53.C4K-H	E53.C4K-H	

▸ Recommended Controller

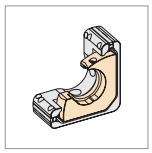
E53.C4K-H



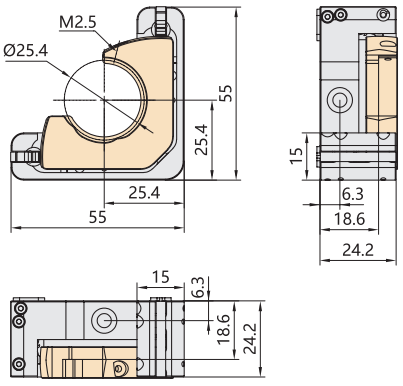
E53.C4K-H with 4 output channels switchable control, digital control, USB and serial port communication.

▸ Drawing

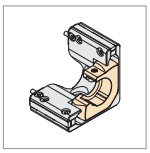
N71.T4K

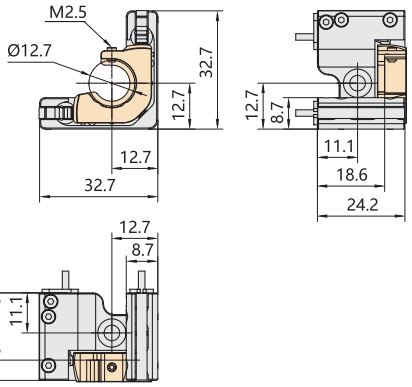






N71.T3K





N81K8T25 Optical Mount with Piezo Linear Actuator





The Mirror Mount with Piezo Linear Motor can move in θx, θy two-dimensional deflection, and the adjusting range can reach ±5°. Each axis is drived by a single piezo linear motor, and there is a common deflection axis between the two axes, and no coupling.

▸ Characteristics

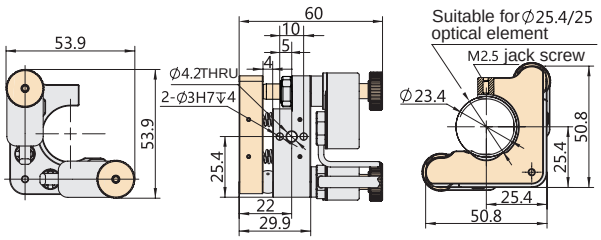
- Compact size, easy to control
- Self-locking at rest, requires no current
- Lifetime>1 billion steps

▸ Technical Data

Type	Mounting diameter(mm)	Active axes	Resolution(μrad)	Tilt range(°)	Mass(g±5%)	PZT connector
N81K8T25	25.4	θx, θy	0.7	±5	220	RJ11

Note: UHV version is available.

▸ Drawing



▸ Recommended Controller

E53.C4K

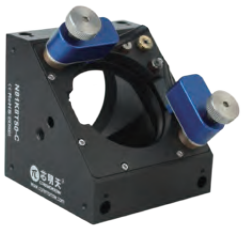


4 control interfaces, digital control, USB and serial portcommunication.

N81K8T25-C/N81K8T50-C Optical Mount with Piezo Linear Actuator



N81K8T25-C



N81K8T50-C

The N81K8T25-C/N81K8T50-C piezoelectric mirror mount is specially designed for automatic angular deflection of mirror in cage structure. It has two linear actuation points for two-dimensional θx θy deflection motion adjustment of the mirror.

▸ Characteristics

- Two-dimensional deflection motion
- Sub-micro-radian angular resolution
- Power-off self-locking
- Suitable for cage structure
- More flexible with motorized operation

▸ Application

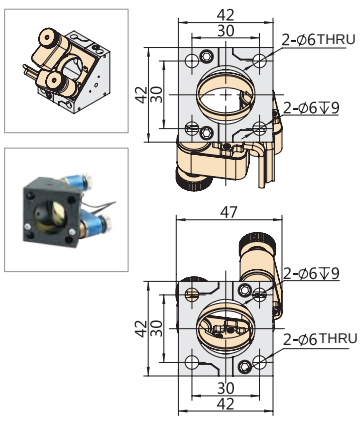
• Laboratory system construction • Scientific research • Optics • Two-dimensional deflection adjustment of mirror in cage structure, etc.

▸ Technical Data

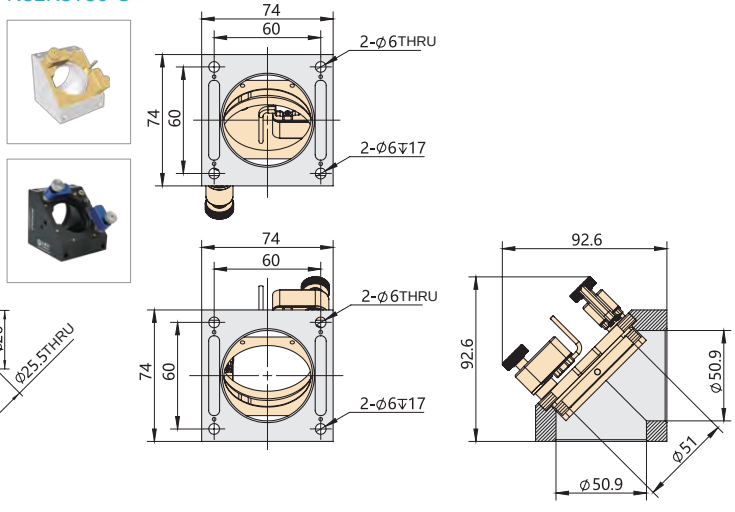
Type	N81K8T25-C	N81K8T50-C	Units
Mirror diameter	25.4	50	mm
Motorized axes	2	2	pcs
Travel range	±2	±2	°
Resolution	0.7	0.6	μrad±20%
Actuator	Piezo screw actuator	Piezo screw actuator	
Operating temperature	10~40	10~40	°C
Recommended controller	E53.C4K-H/E53.C1K-K		
PZT connector	RJ11	RJ11	

▸ Drawing

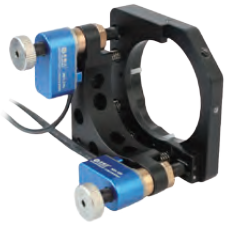
N81K8T25-C



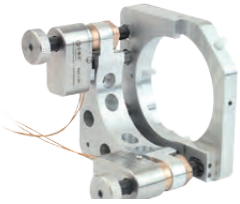
N81K8T50-C



N81K13T50/N81K13T100 Motorized Optical Mounts



N81K13T50 standard version



N81K13T50 Vacuum version



N81K13T100

The N81K13T50/N81K13T100 piezoelectric mirror mount is specially designed for automatic angular deflection of large mirror. It has two linear actuation points for two-dimensional θx θy deflection motion adjustment of the mirror.

▸ Characteristics

- Two-dimensional deflection motion
- Sub-micro-radian angular resolution
- Power-off self-locking
- Suitable for large lenses
- More flexible with motorized operation

▸ Application

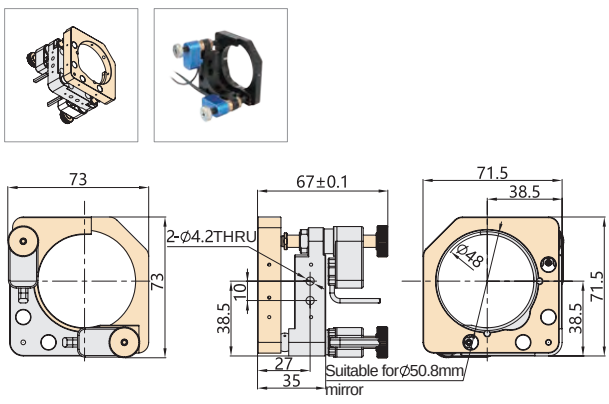
• Laboratory system construction • Scientific research • Optics • Two-dimensional deflection adjustment of mirror in cage structure, etc.

▸ Technical Data

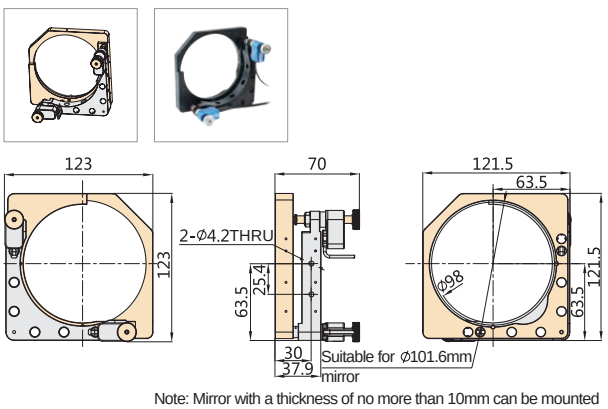
Type	N81K13T50	N81K13T100	Units
Type	Center mount	Center mount	
Active axes	θx, θy	θx, θy	
Mirror diameter	50.8	101.6	mm
Motorized axes	2	2	pcs
Travel range	±5	±3.5	°
Resolution	0.6	0.3	μrad±20%
Actuator	Piezo screw actuator	Piezo screw actuator	
Operating temperature	10~40	10~40	°C
Mass	285	460	g±5%
Recommended controller	E53.C4K	E53.C4K	
PZT connector	RJ11	RJ11	

▸ Drawing

N81K13T50

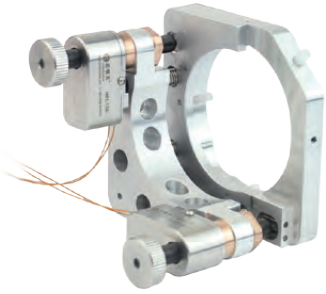


N81K13T100



Note: Mirror with a thickness of no more than 10mm can be mounted

N81K13T60 Optical Mount with Piezo Linear Actuator



N81K13T60 optical mount with piezo linear actuator can move in θx, θy two-dimensional deflection, and the adjusting range can reach ±4°. Each axis is drived by a single piezo linear motor, and there is a common deflection axis between the two axes, and no coupling.

▸ Characteristics

- Two-dimensional deflection motion
- Sub-microradian angular resolution
- Self-locking at rest, requires no current
- Suitable for loading Φ50.8mm, Φ63.5mm optical lens
- More flexible with motorized operation

▸ Technical Data

Type	N81K13T60	Units
Mirror diameter	63.5	mm
Active axes	θx,θy	
Tilt range	±4	°
Resolution	0.4	μrad
Motorized axes	2	pcs
Actuator	Piezo screw actuator	
Operating temperature	10~40	°C
Mass	300	g±5%
Recommended controller	E53.C4K-H	
PZT connector	RJ11	

Note: UHV version is available.

▸ Recommended Controller

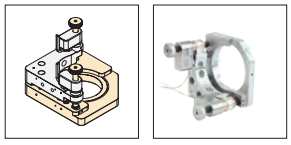
E53.C4K-H

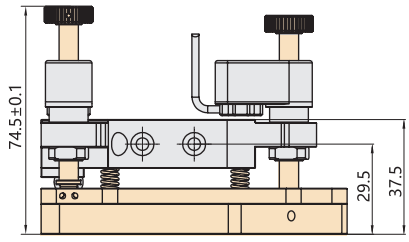


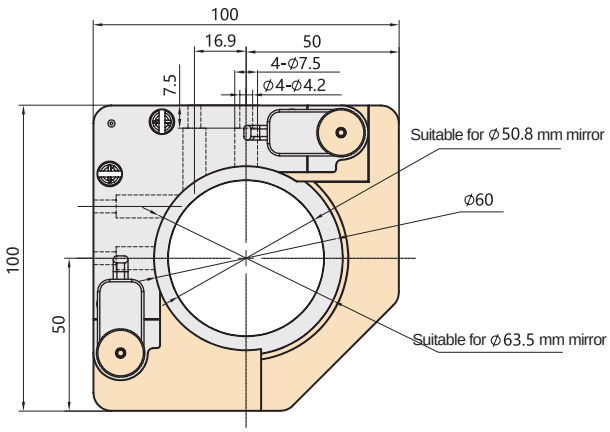
4 control interfaces, digital control, USB and serial portcommunication.

▸ Drawing

N81K13T60







N81K13T116 Piezo Mirror Mount



N81K13T116



N81K13T116-C

The N81K13T116 piezo mirror mount is specially designed for automatic angular deflection of large reflecting mirror. It has two linear actuators for two-dimensional θx, θy deflection of the mirror. Special model versions can be customized according to customer requirements (such as the C1 version not equipped with a reflector and adding a carrier disc).

Characteristics

- Two-dimensional deflection motion
- Sub-micro-radian angular resolution
- Power-off self-locking
- More flexible with motorized operation
- Special version customizable

Application

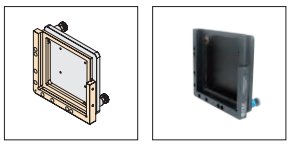
- Laboratory system construction
- Scientific research
- Optics
- Two-dimensional deflection adjustment of large reflecting mirror

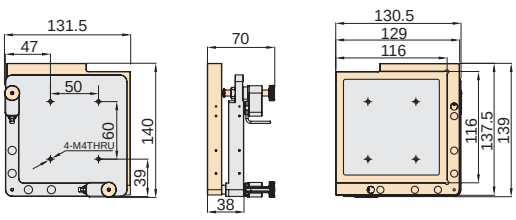
Technical Data

Type	N81K13T116	N81K13T116-C	Units
Active axes	θx, θy	θx, θy	
Mirror size (reflector)	116×116×10	-	mm
Travel range	±3.5	±3	°
Resolution	0.2	0.2	μrad±20%
Actuator	Piezo screw actuator	Piezo screw actuator	
Operating temperature	10~40	10~40	°C
Recommended controller	E53.C4K	E53.C4K	
PZT connector	RJ11	RJ11	

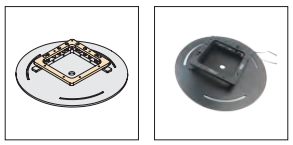
Drawing

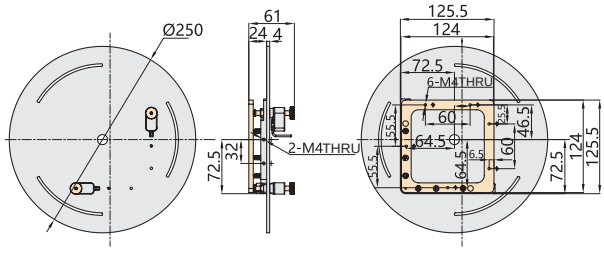
N81K13T116





N81K13T116-C





N81K8ZT50 Piezoelectric Screw Leveling Platform



N81K8ZT50 piezoelectric screw leveling platform is designed specifically for three-axis leveling. It has 3 linear actuation points, for θx, θy deflection and Z-direction lifting to adjust the platform, It can be applied to different applications under various conditions.

▸ Characteristics

• Three-dimensional deflection motion • Sub-μrad angular resolution • Power-off self-locking • More flexible with motorized operation

▸ Application

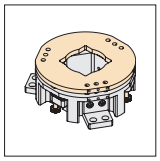
• Scientific research • Optics • Laboratory system construction • Three-axis leveling • Wafer leveling • Industrial application

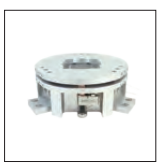
▸ Technical Data

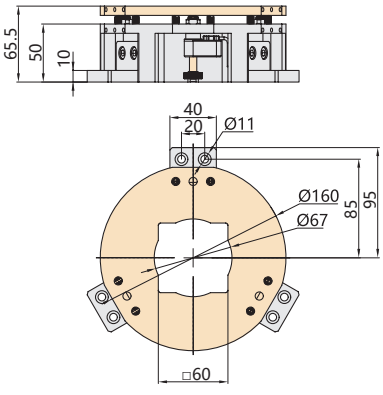
Type	N81K8ZT50	Units
Platform diameter	160	mm
Active axes	θx,θy,Z	
Actuator number	3	pcs
Tilt range	±1.5	°
Linear travel	3	mm
Motion direction	Z	
Resolution	0.3	μrad±20%
Load capacity	2	kg
Actuator type	Piezo screw actuator	
Operating temperature	10~40	°C
Mass	1800	g±5%
Recommended controller	E53.C4K	
PZT connector	RJ11	

▸ Drawing

N81K8ZT50







▸ Recommended Controllers

E53.C4K



4 control interfaces, digital control, USB and serial port communication.

N70 Piezo Tilt Stage



N70.U10E/K is a 1-axis θx piezo stage with a travel range of ±5°, and the closed-loop repeatability can reach 0.001°, It is very suitable to use in high precision application field.

▸ Characteristics

• θx deflection • Speed up to 3°/s • Closed-loop version for high accuracy • Optional vacuum version • Power-off self-locking

▸ Applications

• Laser scanning • Communication field • Image processing and stabilization • Laser beam deflection

▸ Technical Data

Type	N70.U10E	N70.U10K	Units
Active axes	θx	θx	
Integrated sensor	Grating sensor	-	
Speed limit	3	3	°/s±20%
Travel range	±5	±5	°
Horizontal central load capacity	0.5	0.5	kg
Vertical central load capacity	0.15	0.15	kg
Resolution	1	10	μrad±20%
Closed-loop repeatability	0.001	-	°±20%
Operating temperature	10~40	10~40	°C
Storage temperature	-10~40	-10~40	°C
Mass	135	120	g±5%
Material	Al, Steel	Al, Steel	

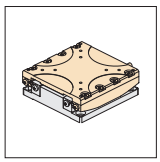
▸ Recommended Controllers

E53.D1E-J

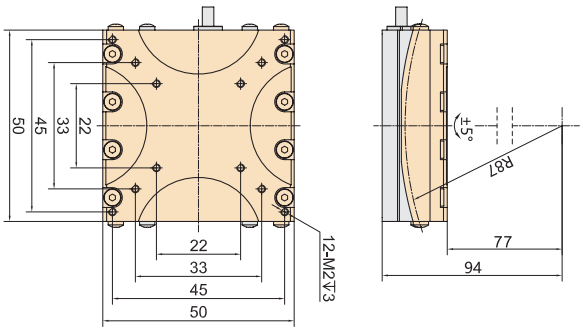
1 channel, digital, servo control

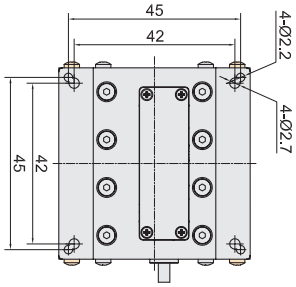
▸ Drawing

N70.U10E/K









N25.T6K Piezo Motor Driven Tip/Tilt Stage



▸ Characteristics

- Low hysteresis
- Light height 11.5mm
- Custom options
- Stable hinge
- Deflection range ±3°/axis
- Speed up to 25mrad/s(≈1.43°/s)
- Self-locking at rest, requires no current
- Minimum step can reach 0.3μrad
- For dia. 12.7mm mirror

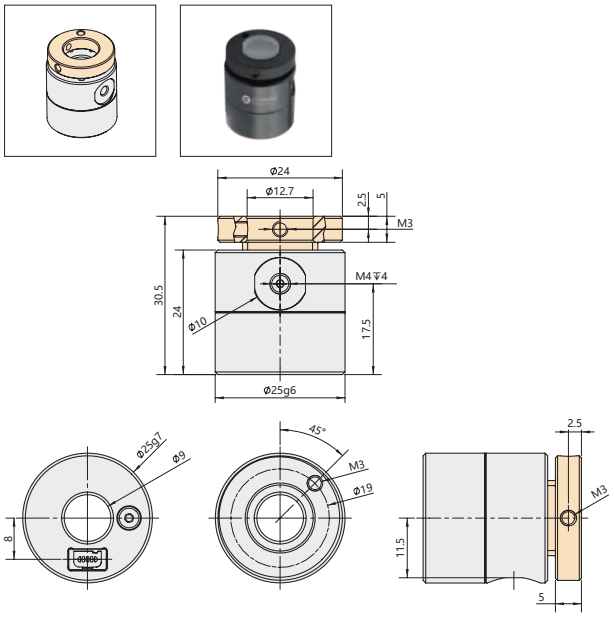
(With lens adapter to carry larger lenses)

▸ Optional vacuum version



▸ Drawing

N25.T6K



▸ Technical Data

Type	N25.T6K	Units
Active axes	θx, θy	
Travel range	6/±3	°
Speed	25	mrad/s±20%
Mirror mount	Ø12.7	mm
Transmittance aperture	9	mm
Dimensions (diameter × height)	25×30.5	mm
Mass	46	g±5%
Load capacity	100	g
Resolution		
Single step	14	μrad±20%
1/16 step	1	μrad±20%
1/64 step	0.3	μrad±20%
1/2 step	7	μrad±20%
Double step	28	μrad±20%
Recommended controller	E53.C4K-H/C1K-J	

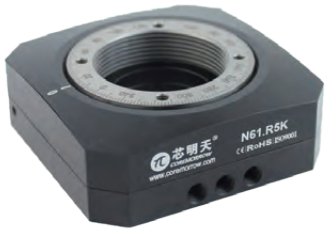
▸ Recommended Controller

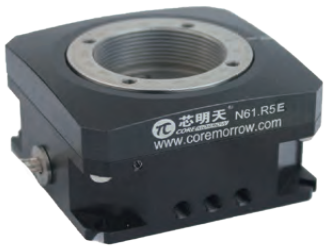
E53.C4K-H/C1K-K



E53.C4K-J with 4 output channels E53.C1K-J with 1 output channnel switchable control, digital control, USB and serial port communication.

N61 Piezo Motor Driven Rotation Stage





N61 piezo motor is a piezo motor direct-driven by piezo ceramics. It uses special mechanical structure design to convert linear micro-displacement by piezo ceramics into macro-angle rotation motion of mechanical platform.

It has 360° rotary motion and has ultra-high rotation resolution. It is small in size and compact in structure, very suitable for integration. With E53.C piezo controller, and it can be operated by PC software, which is more convenient.

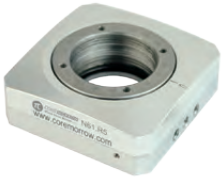
▸ Characteristics

• 360° rotation • Resolution of 1μrad • Speed up to 15°/s • PC control • Power-off self-locking

▸ Technical Data

Type	N61.R5E	N61.R5K	Units
Active axes	360, Two-way	360, Two-way	°
Integrated sensor	Grating sensor	-	
Speed limit	15	15	°/s±20%
Central loading	1	1	kg
Resolution	1	10	μrad±20%
Repeatability	0.001	-	°±20%
Eccentricity	0.02	0.02	mm
Cable length	1.5	2	m±10mm
Operating temperature	10~40	10~40	°C
Storage temperature	-10~40	-10~40	°C
Material	Steel, Al	Steel, Al	
Mass	230	130	g±10%
Recommended controller	E53.D1E-J	E53.C1K-J	

▸ Optional Vacuum



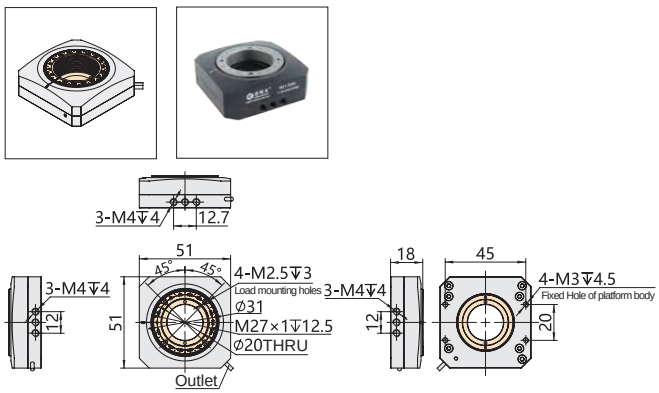
N61.R5K



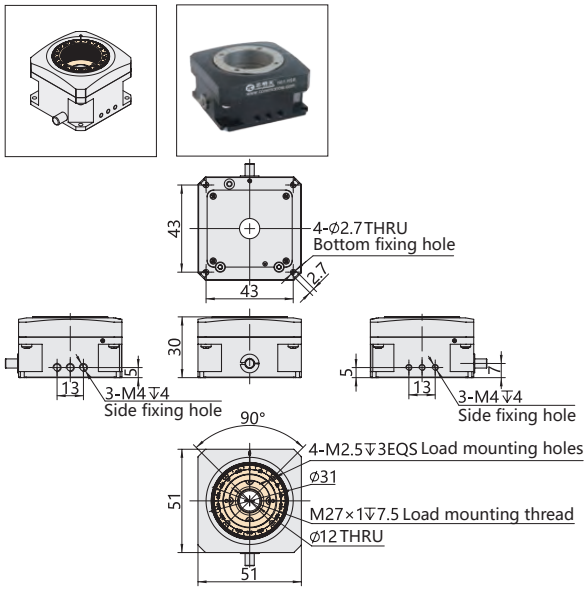
N61.R5E

▸ Drawing

N61.R5K



N61.R5E



N61.R5E/KG Piezo Aperture Stop



The N61.R5E/KG is a piezo aperture stop designed based on CoreMorrow N61.R5E/K piezo motor driven rotation stage, integrated aperture stop for adjusting the aperture diameter from 1mm to 12mm.

Characteristics

- Aperture diameter Ø1mm~Ø12mm adjustable
- PC Control
- Adjustment speed of aperture diameter to 2mm/s
- Optional grating sensor
- Power-off self-locking

Application

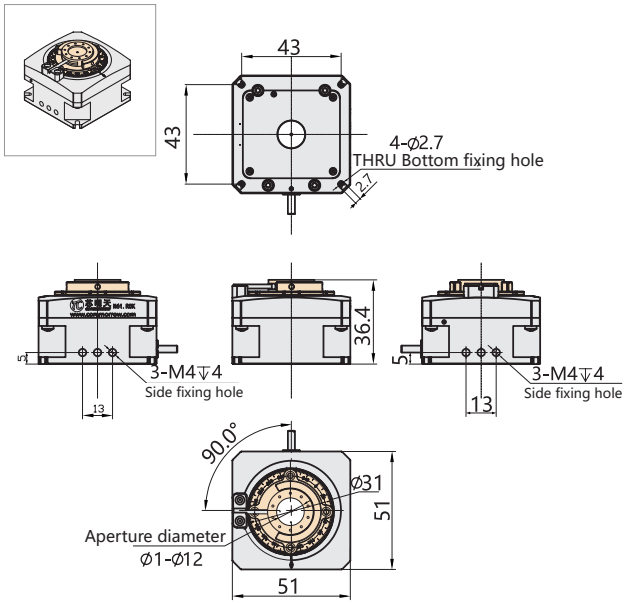
- Semiconductor technology
- Image processing
- Medical biological microscopy equipment
- Optical instruments
- Interferometer

Technical Data

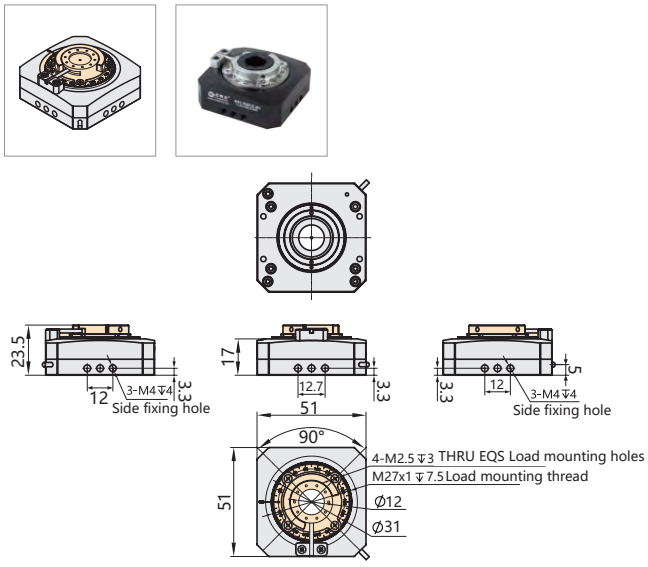
Type	N61.R5EG	N61.R5KG	Units
Integrated sensor	Grating sensor	-	
Aperture diameter	Ø1~Ø12	Ø1~Ø12	mm
Adjustment speed of aperture diameter	2	2	mm/s ±20%
Cable length	1.5	2	m±10mm
Operating temperature	10~45	10~45	°C
Storage temperature	-10~45	-10~45	°C
Material	Steel,Al	Steel,Al	
Mass	280	185	g±10%
Recommended controller	E53.D1E-J	E53.C1K-J	

Drawing

N61.R5EG



N61.R5KG



N61.R5E/K-C Piezo Motor Driven Rotation Stage



N61 piezo motor is a piezo motor direct-driven by piezo ceramics. It uses special mechanical structure design to convert linear micro-displacement by piezo ceramics into macro-angle rotation motion of mechanical platform.

It has 360° rotary motion and has ultra-high rotation resolution. It is small in size and compact in structure, very suitable for integration. With E53.C piezo controller, and it can be operated by PC software, which is more convenient.

▸ Characteristics

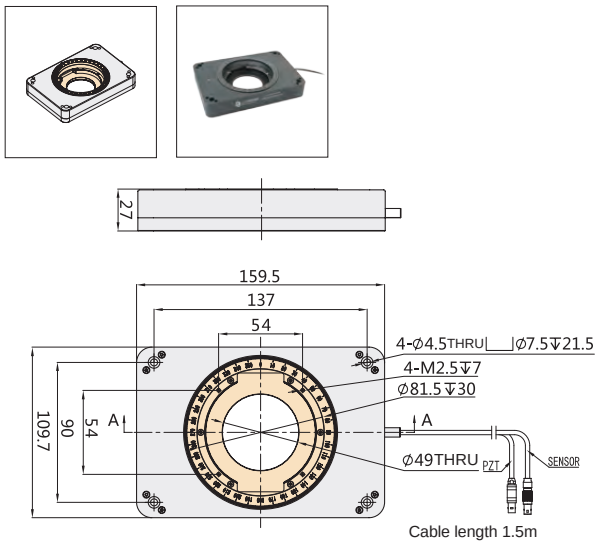
- 360° rotation
- Resolution of 1μrad
- PC control
- Speed up to 5°/s
- Self-locking at rest, requires no current

▸ Technical Data

Type	N61.R5E-C	N61.R5K-C	Units
Active axes	360, Two-way	360, Two-way	°
Integrated sensor	Grating sensor	-	
Speed limit	5	5	°/s±20%
Max. Central loading	1	1	kg
Resolution	1	5	μrad±20%
Repeatability	0.001	-	°±20%
Eccentricity	0.02	0.02	mm
Cable length	1.5	2	m±10mm
Operating temperature	10~40	10~40	°C
Storage temperature	-10~40	-10~40	°C
Material	Steel, Al	Steel, Al	
Mass	750	750	g±10%
Recommended controller	E53.D1E-J	E53.C1K-J	

▸ Drawing

N61.R5E/K-C



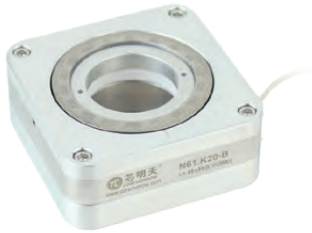
Cable length 1.5m

▸ Recommended Controllers

E53.D1E/C1K-J

1 channel, digital, servo control or open loop

N61.K20H Piezo Motor Driven Rotation Stage



N61.K20H piezo motor is an open loop version piezo motor direct-driven by piezo actuators. It uses special mechanical structure design to convert linear micro displacement by piezo actuators into macro-angle rotation motion of mechanical platform. It has 360° rotary motion and has an ultra-high rotation resolution of 10μrad.

▸ Characteristics

- 360° rotation
- Speed up to 20°/s
- Self-locking at rest, requires no current
- Customizable
- Optional vacuum version

▸ Recommended Controllers

E53.C1K-J

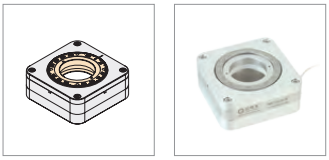
1 channel, digital, open loop

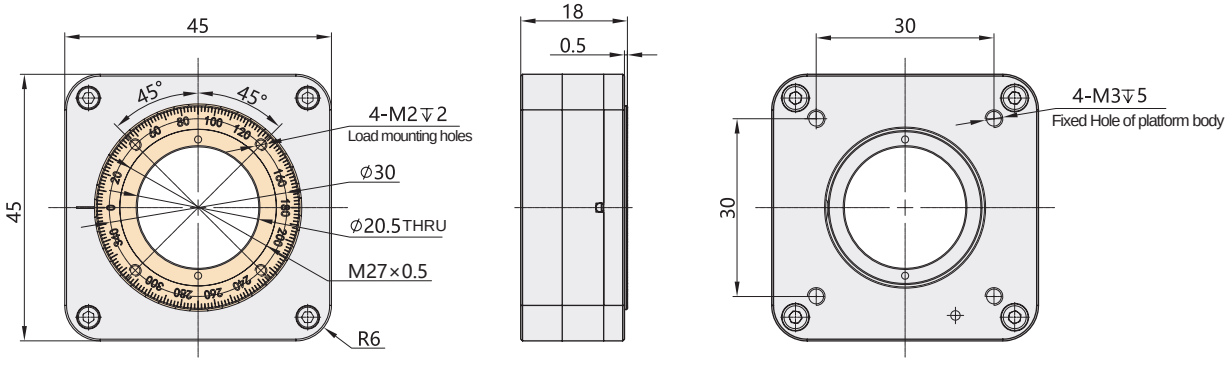
▸ Technical Data

Type	N61.K20H	Units
Active axes	360,Two-way	°
Speed limit	20	°/s±20%
Max. Central loading	0.5	kg
Resolution	10	μrad±20%
Eccentricity	0.02	mm
Cable length	1.5	m±10mm
Operating temperature	10~40	°C
Storage temperature	-10~40	°C
Material	Al, Steel	
Mass(including wires and connectors)	165	g±5%
Recommended Controller	E53.C1K-J	

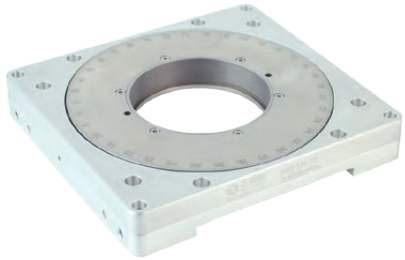
▸ Drawing

N61.K20H





N61.E/K56 Piezo Motor Driven Rotation Stage



N61.E/K56 piezo motor is a piezo motor direct-driven by piezo ceramics. It uses special mechanical structure design to convert linear microdisplacement by piezo ceramics into macro-angle rotation motion of mechanical platform. It has 360° rotary motion and has a 1μrad rotation resolution. Its low profile is suitable for integration. With E53 piezo controller, it can be operated by PC software, which is more convenient. Custom and UHV version are available.

▸ Characteristics

- 360° rotation
- Speed up to 5°/s
- PC control
- Custom and UHV version are available
- Self-locking at rest, requires no current

▸ Recommended Controllers

E53.D1E/C1K-J

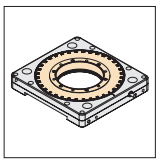
1 channel, PC Control, servo control or open loop

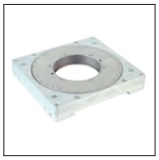
▸ Technical Data

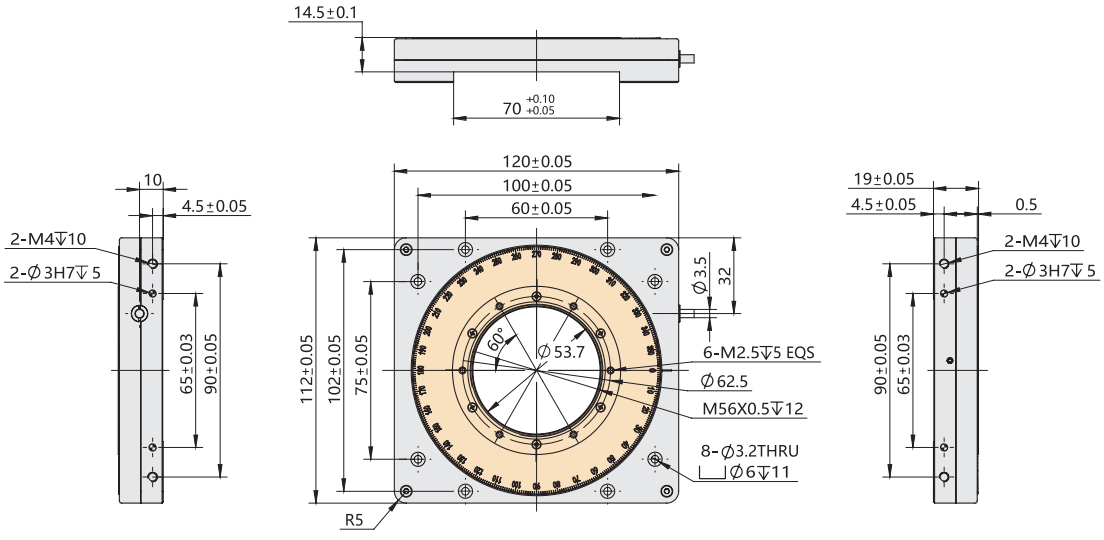
Type	N61.E56	N61.K56	Units
Active axes	360, Two-way	360, Two-way	°
Integrated sensor	grating sensor	-	
Speed limit	5	5	°/s±20%
Central loading	1	1	kg
Resolution	1	5	μrad±20%
Repeatability	0.001	-	°±20%
Eccentricity	0.02	0.02	mm
Cable length	1.5	2	m±10mm
Operating temperature	10~40	10~40	°C
Storage temperature	-10~40	-10~40	°C
Material	Steel, Al	Steel, Al	
Mass	640	615	g±5%
Recommended controller	E53.D1E-J	E53.C1K-J	

▸ Drawing

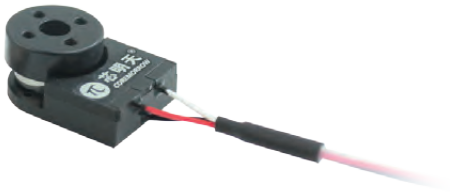
N61.E/K56







N69 Piezo Motor Driven Rotation Stage



N69 piezo motor is an open-loop version of piezo motor direct-driven by piezo ceramics. It uses special mechanical structure design to convert linear microdisplacement by piezo ceramics into macro-angle rotation motion of mechanical platform.

It has 360° rotary motion and has ultra-high rotation resolution. It is small in size and compact in structure, very suitable for integration. it has minimal impact on external electromagnetic interference and noise. Also it has fast speed, small step size and is uniform and stable. With E66.A2K-H piezo controller, it can be controlled by external PWM signal, which is more convenient.

▸ Characteristics

• Speed up to 220rpm • 360° rotation • Piezo resonance ultrasonic excitation • Optional vacuum version • Power-off self-locking

▸ Applications

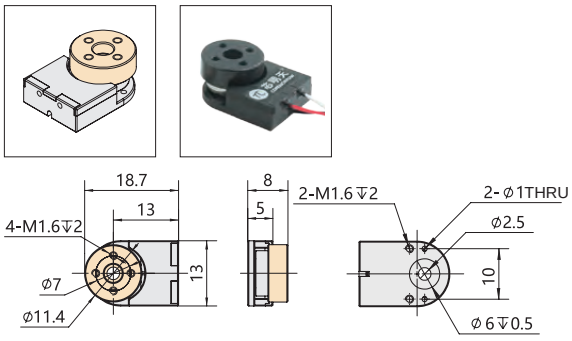
• Optical instrument • Precise instrument • Medical equipment • Micro-dosing/injector

▸ Technical Data

Type	N69.K2	Units
Active axes	360, Two-way	°
Speed limit	220	rpm±10%
Resolution	30	μrad±20%
Torque	1	mN·m
Maximum axial load	0.2	kg
Operating temperature	0~50	°C
Mass	3.5	g±5%
Material	Al, Steel	
Cable length	0.1	m±10mm
Recommended controller	E66.A2K-H	

▸ Drawing

N69.K2



▸ Recommended Controllers

E66.A2K-H



1 channel, open loop, 38mm×27mm×12mm

N56.XYZTR20 Series 6 Hexapod Piezo Motor Stage



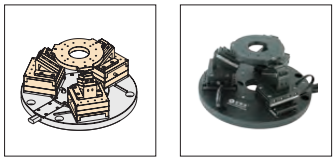
The N56.XYZTR20 stage has 6-axis motion of θx, θy, θz, X, Y, and Z based on CoreMorrow N56 series linear piezo motor. Collaborate with precision algorithms, it is able to achieve high precision 6-axis motion control.

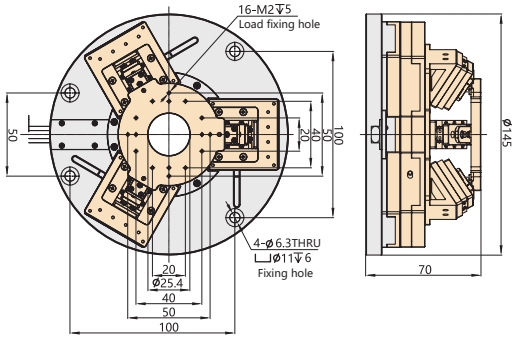
Characteristics

- Active axes: X, Y, Z, θx, θy, θz
- Travel range in XY20mm/Z10mm
- Travel range in θxθy20°/θz35°
- Power off self-locking
- Optional closed-loop sensor
- Load capacity: 0.5kg
- Recommended Controllers : E53.D1E/C1K-J

Drawing

N56.XYZTR20E/K





N56.2K Linear Piezo Motor

Characteristics

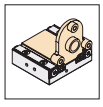
- Two versions available
- Power off self-locking
- Sticky slip principle driven
- Open loop
- Vacuum version optional

Technical Data

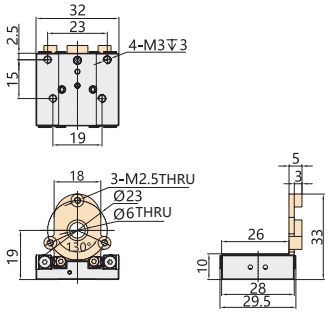
Type	N56.2K/N56.2K-A	Units
Active axes	X	
Nominal travel range	3/±1.5	mm
Speed limit	3	mm/s±20%
Resolution	5	nm±20%
Push/pull force(Active)	3	N
Holding force(Passivity)	4.5	N
Max load (horizontal direction)	0.5	kg
Max load (vertical direction)	0.1	kg
Operating temperature	0-50	
Mass (not include cable)	70	g±10%
Material	Steel	
Cable length	1.5	m
Recommended Controlle	E53.C1K-J	

Drawing

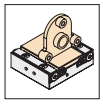
N56.2K



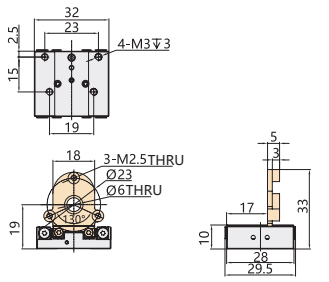




N56.2K-A







N91.XYZTR4K 6-Axis Motion Piezo Motor Stage



The N91.XYZTR4K is a high-precision platform that can move in six dimensions: X, Y, Z, θx, θy, and θz. With precise algorithms, it can achieve high-precision motion control of six axes. It features a displacement of 3mm/axis in the straight direction, and a deflection stroke of ±2°/axis. Its low profile is suitable for integration. With E53 piezo controller, it can be operated by PC software, which is more convenient.

▸ Characteristics

- Active axes: X, Y, Z, θx, θy, θz
- ±2°/axis travel range in θxθyθz
- Load capacity(horizontal mounting) to 1.2kg
- 3mm/axis travel range in XYZ
- Self-locking at rest, requires no current
- Custom UHV version.

▸ Technical Data

Type	N91.XYZTR4K	Units
Active axes	X, Y, Z, θx, θy, θz	
Travel in XYZ	3/axis	mm
Travel in θxθyθz	±2/axis	°
XYZ resolution	<30	nm
θxθyθz resolution	0.2	μrad
Operating temperature	0~40	°C
Material	Steel, Al	
Load capacity(horizontal)	1.2	kg
Mass	1.7	kg±5%
Cable length	1.5	m±10mm
Recommended Controllers	E53.C4K-H/E53.C1K-K	

▸ Recommended Controllers

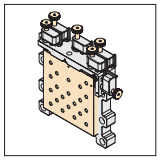
E53.C4K-H/E53.C1K-K

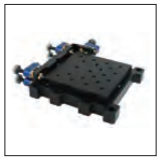


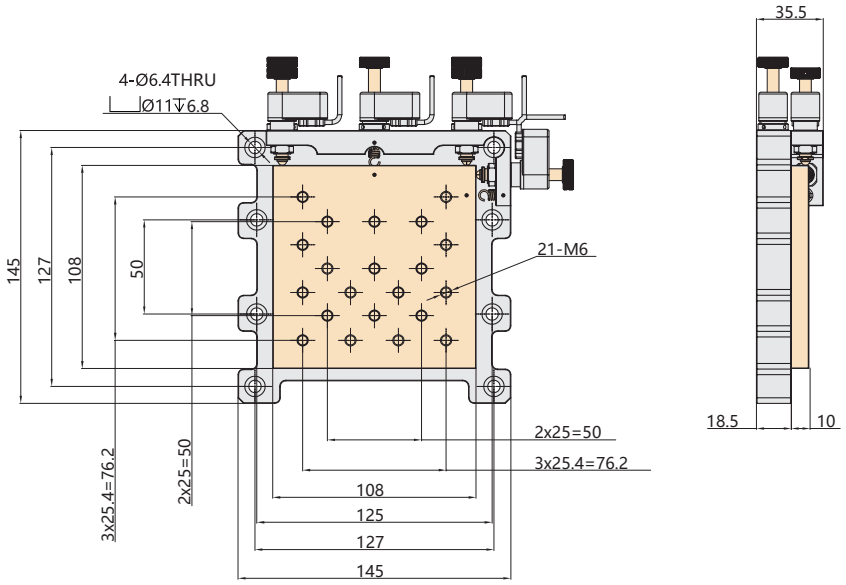
E53.C4K-H with 4 output channels (E53.C1K-K with 1 output channnel) switchable control, digital control, USB and serial port communication.

▸ Drawing

N91.XYZTR4K





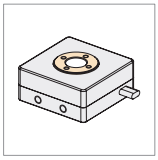


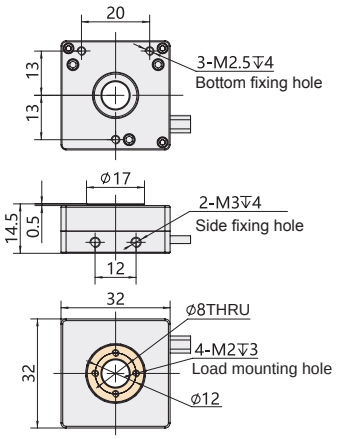
21228 Piezo Motor Rotation Stage

▸ Technical Data

Type	21228	Units
Active axes	θz, 360°, two ways	
Speed limit	20	°/s±10%
Central load capacity	5	N±10%
Open-loop resolution	<5	μrad±10%
Operating temperature	0~40	°C±10%
Mass(no cable)	70	g±5%
Material	Steel, Al	
Cable length	2	m±10mm

▸ Drawing



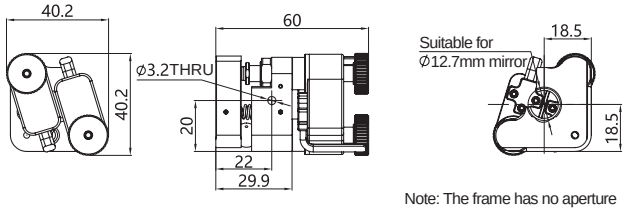


22029 Piezo Mirror Mount without Aperture

▸ Technical Data

Type	22029	Units
Active axes	θx, θy	
Mirror diameter	12.7	mm
Sensitivity	0.7	μrad
Tilt range	±3.5	°

▸ Drawing



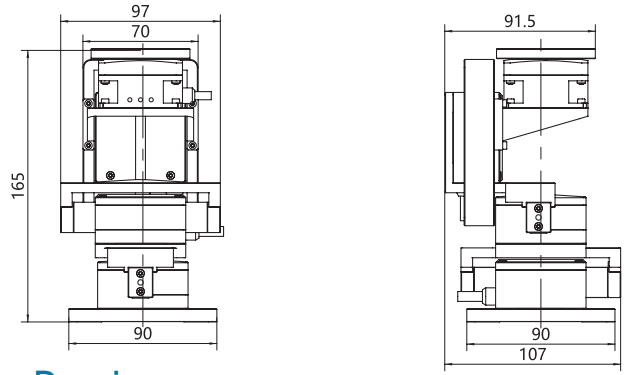
Note: The frame has no aperture

22053 4−Axis Piezo Stage

▸ Technical Data

Type	22053	Units
Active axes	X, Y, Z, θz	
Linear travel	25/axis	mm
Rotation travel	360	°

▸ Drawing

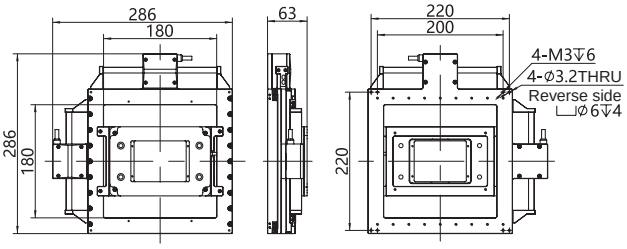


22060 XY Linear Piezo Stage

▸ Technical Data

Type	22060	Units
Active axes	X, Y	
Linear travel	100/axis	mm

▸ Drawing



E53.C4K-H/E53.C1K-K Compact Piezo Motor Controller



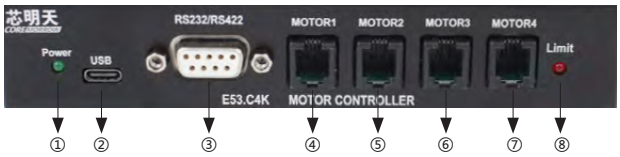
Characteristics

- 1 or 4 control interfaces
- Open loop
- RS-232, RS-422, TYPE-C
- Windows DLL

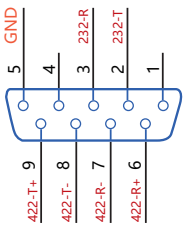
Technical Data

Type	E53.C4K-H	E53.C1K-K
Channels	4	1
Power supply	24VDC/1A(20V~30V)	
Static power consumption(W)	<5	
Processor	32bit 480MHz	
D/A converter	16bit	
Communication interface	TYPE-C, RS-422, RS-232	
Rated output power(W)	9	
Operating temperature range(°C)	0~50	
PZT connector	RJ11	
Communication	DB9, TYPE-C	
Size(mm³)	150×80×27.5	
Mass(kg)	0.36	

Panel Introduction

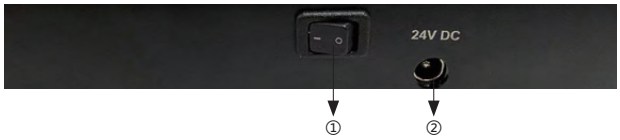


Number	Function	Description
①	Power indicator	Lights when power
②	USB	TYPE-C
③	RS-232/422	See pin definition
④	PZT motor connector1	RJ11,Connecting piezo motor
⑤	PZT motor connector2	RJ11,Connecting piezo motor
⑥	PZT motor connector3	RJ11,Connecting piezo motor
⑦	PZT motor connector4	RJ11,Connecting piezo motor
⑧	Over-current indicator	Light on when controller in overcurrent state



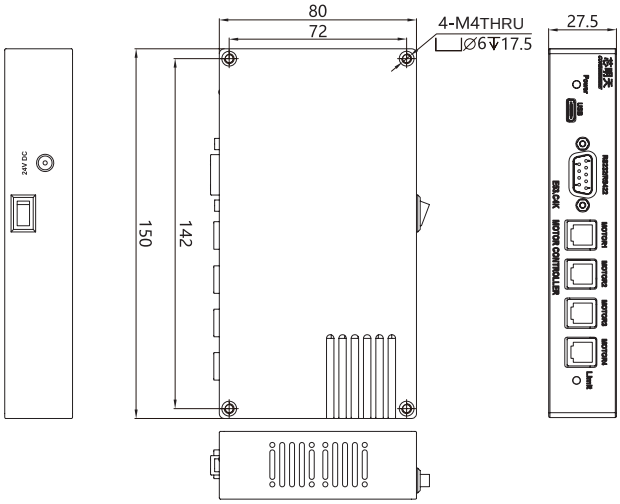
RS-232/422 Pin Definition

Note: E53.C1K-K has only one PZT interface.



Number	Function	Description
①	Switch	Power switch
②	Power port	24VDC/1A

Drawing



E53.C80K-H Multi-channel Piezo Motor Controller



The E53.C80K-H multi-channel piezo motor controller is an 80-channel piezo screw actuator drive controller independently developed, designed, and produced by CoreMorrow. It can drive up to 80 piezo screw actuators through switching modes, and can drive up to 20 piezo screw actuators simultaneously. Not only it has 80 output channels, but also a compact size with a maximal dimension of 470×156×113 mm^3, which is suitable for batch driving piezo motors in space-limited environments. The body has a heat-dissipating area that quickly conducts the heat generated.

Characteristics

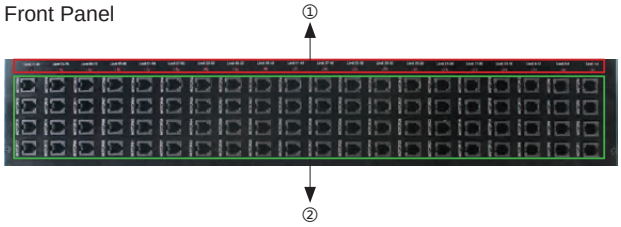
- 80 channels output
- Open loop controller
- Compact size
- Computer software control

Technical Data

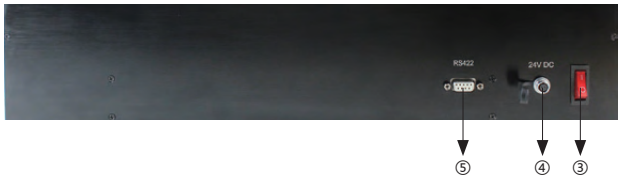
Type	E53.C80K-H
Function	Digital controller
Channels	80
Static power consumption(W)	80
Processor	32bit 168MHz
D/A converter	16bit
Communication interface	RS-422
Rated output power(W)	180
Operating temperature(℃)	0~50
PZT connector	RJ11
Communication connector	DB9
Current limit	Short-circuited proof
Power supply	24VDC/15A(20V~30V)
Size(mm^3)	470×156×113
Mass(kg)	6.4

Panel Introduction

Front Panel

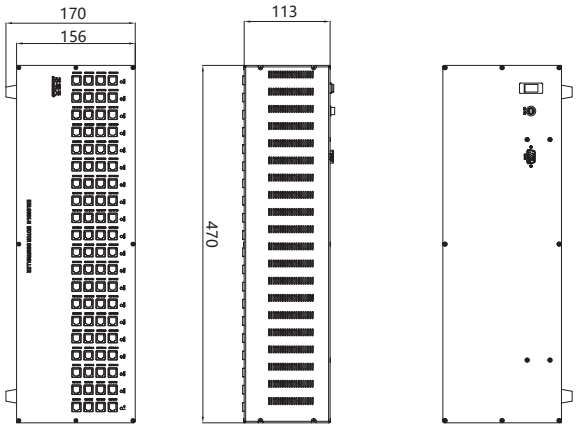


Rear Panel



No.	Function	Description
1	Over-current indicator	Light on when controller in overcurrent state
2	PZT interface	Actuator connector, channel 1 to 80
3	Power switch	Power on and off
4	Power interface	Power supply connector,24V DC
5	RS-422	Software control

Drawing



E53.D1E/C1K-J Compact Piezo Motor Controller



E53.D1E/C1K-J compact piezo motor controller is designed for driving CoreMorrow piezo motor, digital control, and features small size.

▸ Characteristics

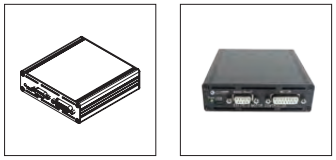
- Digital control
- Single channel output
- Servo control or open loop
- Suitable for driving piezo motor

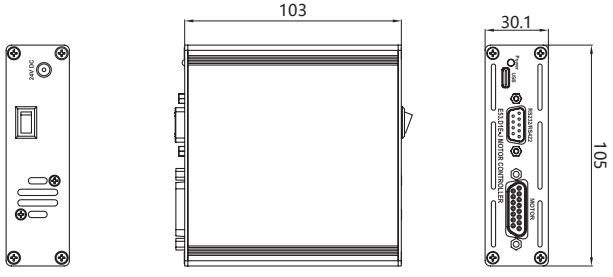
▸ Technical Data

Types	E53.D1E-J	E53.C1K-J	Units
Servo control	Servo control	Open loop	
Input supply	24VDC/1A(20~30V)	24VDC/1A(20~30V)	
Static dissipation	<5	<5	W
Master control			
Processor	32bit 480MHz	32bit 480MHz	
D/A converter	16bit	16bit	
Communication interface	TYPE-C, RS-422, RS-232	TYPE-C, RS-422, RS-232	
Protection			
Rated output	9	9	W
Operating temperature	0~50	0~50	°C
Output short-circuited current	60	60	mA
Appearance			
PZT connector	DB15	DB15	
Communication connector	DB9, TYPE-C	DB9, TYPE-C	
Size	105×103×30.1	105×103×30.1	mm^3
Mass	310	310	g±5%

▸ Drawing

E53.D1E/C1K-J





E53.D2E-H/E53.C2K-JCompact Piezo Motor Controller



E53.D2E-H/E53.C2K-J compact piezo motor controller is designed for driving CoreMorrow piezo motor, and can drive up to 2 piezo motors simultaneously. It is controlled by digital signal, and features small size.

Characteristics

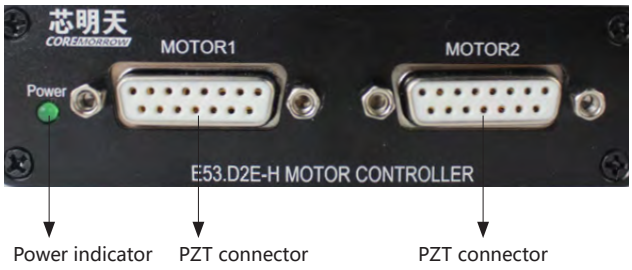
- Digital control
- 2 channels output
- Servo control or open loop
- Suitable for driving piezo motor

Technical Data

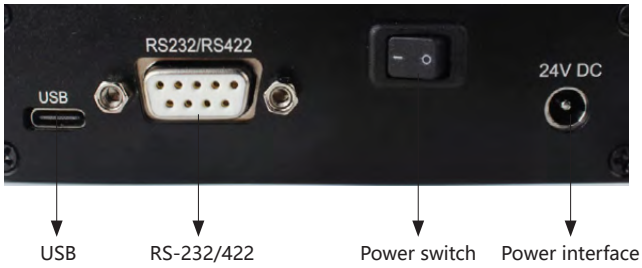
Type	E53.D2E-H	E53.C2K-J	Units
Servo control	Servo control	Open loop	
Channels	2	2	
Power supply	24VDC/1A (20~30V)	24VDC/1A (20~30V)	
Static dissipation	< 5	< 5	W
Processor	32bit 480MHz	32bit 480MHz	
D/A converter	16bit	16bit	
Communication interface	Type-C, RS-232/422	Type-C, RS-232/422	
Rated output	9	9	W
Operating temperature	0~50	0~50	°C
Output short-circuited current	60	60	mA
PZT connector	DB15	DB15	
Communication connector	DB9,Type-C	DB9,Type-C	
Size	105×103×30.1	105×103×30.1	mm^3
Mass	260	260	g±5%

Panel Introduction

Front Panel

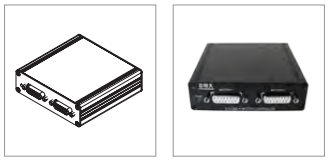


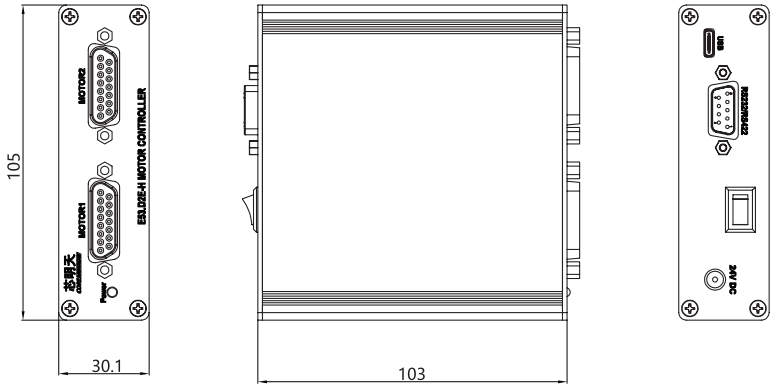
Rear Panel



Drawing

E53.D2E-H/E53.C2K-J





E71 Multi-channel Piezo Motor Controller



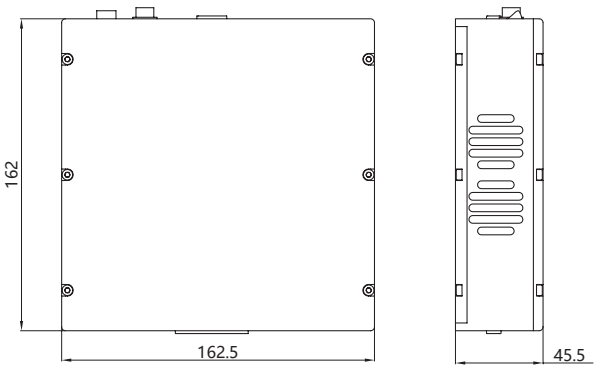
▸ Characteristics

• 3 or 4 channels • Computer software control • USB, RS-422, RS-232 communication • Suitable for driving piezo motor

▸ Technical Data

Type	E71.D4E-H	E71.C4K-H	E71.D3E-J	E71.C3K-J
Servo control	Servo control	Open loop	Servo control	Open loop
Power supply	24VDC/4A(20V~30V)	24VDC/4A(20V~30V)	24VDC/4A(20V~30V)	24VDC/4A(20V~30V)
Static power consumption (W)	<10	<10	<10	<10
Master-Control				
Processor	32bit 480MHz	32bit 480MHz	32bit 168MHz	32bit 168MHz
D/A converter	16bit	16bit	16bit	16bit
Serial port baud rate	115200	115200	115200	115200
Communication Interface	USB, RS-422, RS-232	USB, RS-422, RS-232	USB, RS-422, RS-232	USB, RS-422, RS-232
Drive				
Peak current (A)	1	1	1	1
Average current (mA)	75	75	75	75
Ripple (mVpp)	10(@ 2.2μF)	10(@ 2.2μF)	10(@ 2.2μF)	10(@ 2.2μF)
Rated output power (W)	50	50	50	50
Operating temperature range (°C)	0~50	0~50	0~50	0~50
Output short-circuit current (mA)	60	60	60	60
Appearance				
PZT connector	DB25	DB25	DB37	DB37
Communication connector	DB9, Type-C	DB9, Type-C	DB9, Type-C	DB9, Type-C
Size (mm^3)	162.5×162×45.5	162.5×162×45.5	162.5×162×45.5	162.5×162×45.5
Mass (kg)	1.3	1.3	1.3	1.3

▸ Drawing



▸ Driving N31 Linear Piezo Motor



E71.SERVO-H Piezo Motor Control Module



E71.SERVO-H piezo motor control module is a small volume controller specially designed for driving piezo motor. It is easy to integrate and can be used to drive various piezo motors.

Characteristics

- Board-type, easy to integrate
- For driving piezo motor
- Suits for grating sensor
- Customizable

Technical Data

Type	E71.SERVO-H
Control way	Servo control
Power supply(V)	24VDC/1A(20~30)
Static dissipation(W)	<5
Processor	32bit 168MHz
D/A converter	16bit
Communication port	RS-422,RS-232
Rated output power(W)	9
Operating temperature(℃)	0~50
Short-circuited current(mA)	60
PZT connector	DB9
Sensor connector	DB9
Communication connector	DB9
Size(mm^3)	118×100×22.5
Mass(g±5%)	175

E66.A2K-H Piezo Motor Control Module



E66.A2K-H piezo motor control module is designed to drive N69 piezo motor driven rotation stage and N59 Linear Piezo Motor.It is small in size and easy integration, ideal for space-limited applications. It can be controlled by button operation or external input PWM signal.

Characteristics

- Board card type, easy integration
- Driving piezo motor
- Suitable for industrial and medical applications
- Button operation ,external input PWM signal control

Technical Data

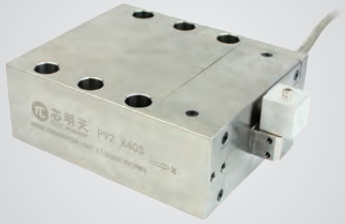
Type	E66.A2K-H
Channels	1
Control mode	Open loop ,button operation, external input PWM signal control
Power supply(V)	+5V/1A
Static power(W)	<0.03
Processor	32bit 48M
Operating temperature(℃)	0~50
PZT connector	Single row pressure needle, 2.54mm
Size(mm^3)	38×27×12
Mass(g±5%)	11

Fast Tool Positioning Stages









Fast Tool Positioning Stage is designed for ultra-precision turning. It features high frequency, large stiffness, high precision. The stage can complete rapid micro-feed motion, and achieve precision machining of complex shapes or structures.



Fast Tool Positioning Stages

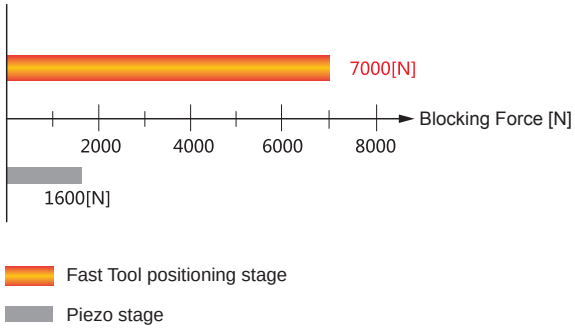
Fast Tool Positioning Stage is designed for ultra-precision turning. It has the characteristics of high frequency, large stiffness, high precision to drive the tool to quickly feed in the direction of motion, achieving precision machining of complex surface parts or structures.

Characteristics

- Ultra high precision
- Large load capacity
- Fast response time
- Large stiffness

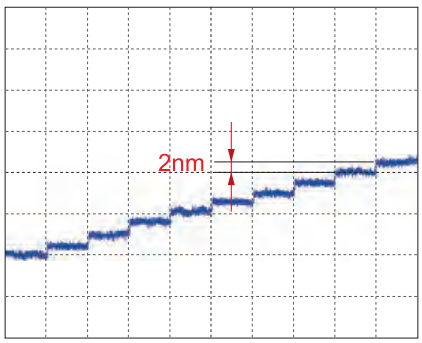
Large Blocking Force

The blocking force of piezo actuator in fast tool positioning stage is several times that of other piezo actuator in piezo stage.



Closed loop Resolution

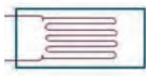
Unlike vibration machining, the tool position could be feedbacked by sensor integrated, which can offer nanometer resolution.



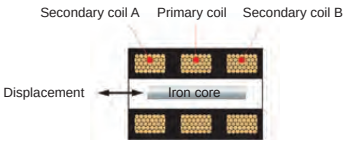
Resolution

Sensors Type

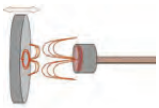
SGS/LVDT/CAP



SGS



LVDT



CAP

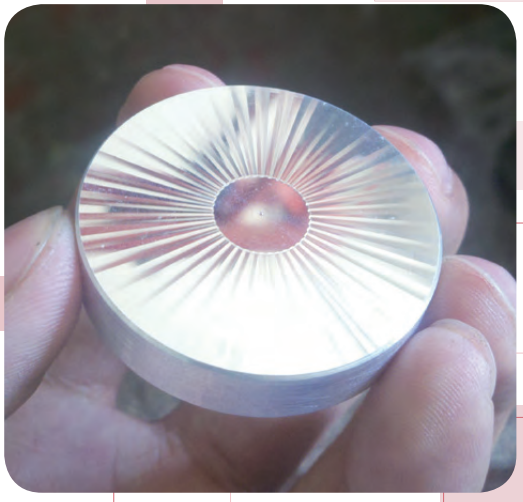
Applications

- Diamond micro-feeding
- Precision processing
- High-speed tool control
- Precision machining and grinding

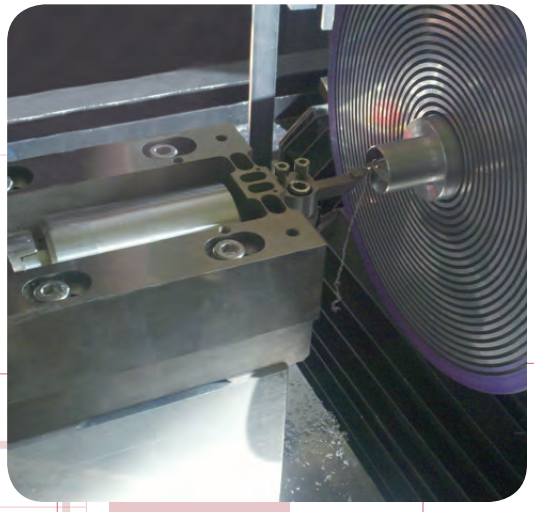
Product List

Axes	Mechanism	Type	Max.displacement [μm]	Resolution [nm]	Resonant frequency[kHz]	Load capacity[kg] Horizontal/Vertical/Inverted	Page
X	Direct drive	P91.X20	12.5	0.5	15	0.3/0.5/0.3	250
		P92.X20	18	0.2	4	0.3/0.5/0.3	251
		P92.X25	28	0.5	5	0.3/0.5/0.3	252
		P92.X30	30	0.5	1.8	0.3/0.5/0.3	253
		P92.X40	40	0.5	3.975	0.3/0.5/0.3	255
		P92.X70	75	1	1.6	5/-/-	253
		21137	>10	5	>4	-	259
	Amplified	P93.X70	81	1	0.15	20/-/-	257
		P93.X100	118	1	0.2	20/-/-	257
		22007	80	10	0.8	1/-/-	259

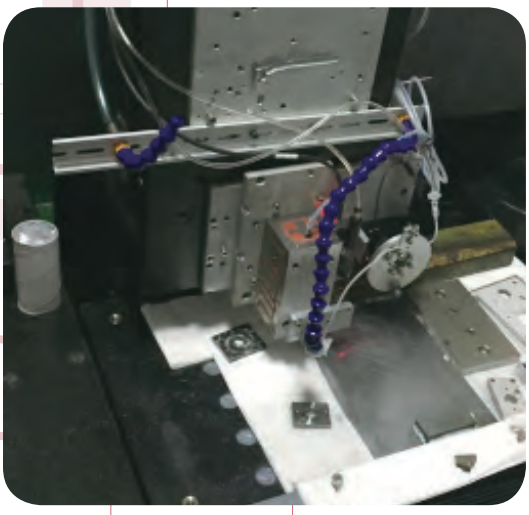
▸ Applications



Processed optical component



Precision turning



Light guide plate processing



Processed optical component

P91. X20K Fast Tool Positioning Stages



P91.X20K fast tool positioning stage is designed for microfeeding in ultra-precision turning. There is a temperature sensor installed inside. The stage can be cooled down through oil cooling to achieve high-frequency vibration, and its unloaded resonant frequency is up to 15kHz.

Characteristics

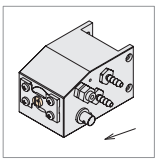
- Stroke to 12.5μm
- Blocking force to 2500N
- Oil cooling, built-in temperature sensor
- Open loop version
- Suitable for high-frequency vibration

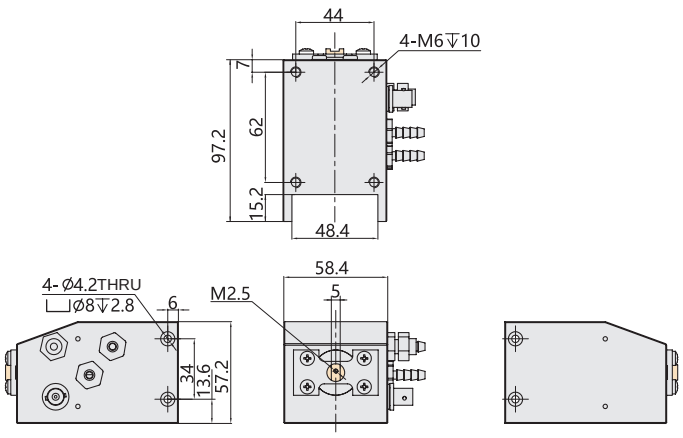
Technical Data

Type		P91.X20K	Units
Active axes		X	
Drive control		1 driving channel	
Nominal travel range(0~400V)		10	μm±10%
Max.travel range(0~500V)		12.5	μm±10%
Resolution		0.5	nm
Unloaded resonant frequency		15	kHz±20%
Blocking force		2500	N
Stiffness		250	N/μm±20%
Load capacity	Horizontal	0.3	kg
	Vertical	0.5	
	Inverted	0.3	
Operating temperature		-20~80	°C
El. capacitance		0.314	μF±20%
Material		Steel, Al	
Mass		1.75	kg±5%

Drawing

P91.X20K





P92.X20S/K Fast Tool Positioning Stages

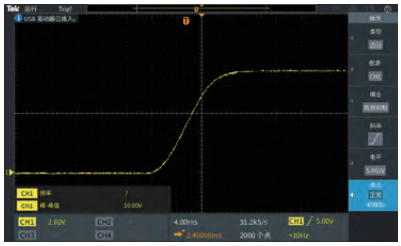


P92.X20S/K fast tool positioning stage is a fast tool micro-feed stage designed for ultra-precision turning. It adopts direct-driving structure, features large load capacity, high frequency, and optional capacitive sensor with nano-scale positioning accuracy.

Characteristics

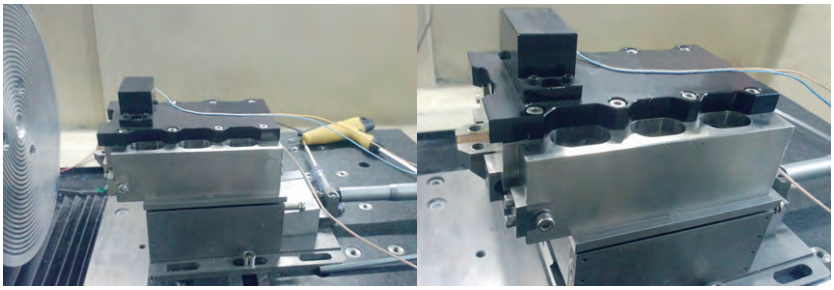
• Max stroke to 18μm • Operating frequency to 95Hz • Horizontal load capacity to 300g • Optional sensor • Direct drive

Phase shift time



160μs at 18μm, 95Hz

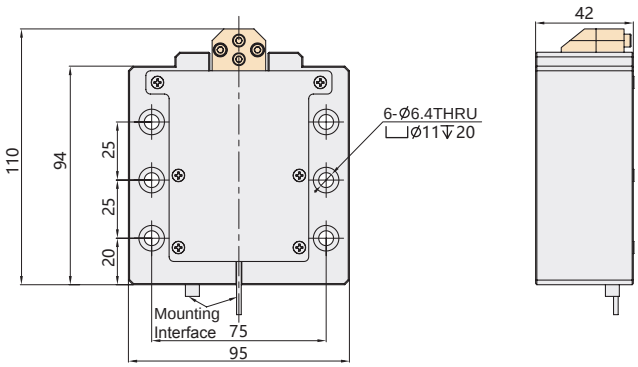
Processing Show



Applications

- Diamond micro-feeding
- Precision processing
- High-speed tool control
- Precision machining and grinding
- Workpiece positioning
- FTS fast tool servo turning system

Drawing



Technical Data

Type		P92.X20S	P92.X20K	Units
Active axes		X	X	
Travel range		18@95Hz (0~150V)	18@95Hz (0~150V)	μm ±10%
		9@190Hz	9@190Hz	
		1@600Hz	1@600Hz	
Drive control		1 driving channel , 1 sensing channel	1 driving channel	
Sensor		SGS	-	
Resolution		0.5	0.2	nm
Linearity		0.1	-	%F.S.
Repeatability		15	-	nm
Load capacity	Horizontal	0.3	0.3	kg
	Vertical	0.5	0.5	
	Inverted	0.3	0.3	
Stiffness		120	120	N/μm±20%
Unloaded resonant frequency		4000	4000	Hz±20%
El. capacitance		14.4	14.4	μF±20%
Size		L110 × W95 × H42	L110 × W95 × H42	mm
Mass		2100	2100	g±5%
Operating temperature		-20~80	-20~80	°C
Cable length		1.5m or longer	1.5m or longer	m±10mm

Note: Max driving voltage could be 0V~150V, 0~120V is recommended for long-term and high-reliable operation. Technical data are measured by CoreMorrow E00/E01 series piezo controller.

P92.X25 Fast Tool Positioning Stages

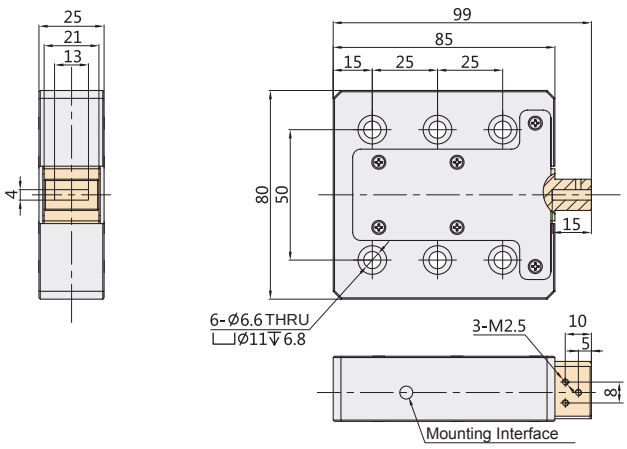


Technical Data

Type		P92.X25S	P92.X25K	Units
Active axes		X	X	
Drive control		1 driving channel , 1 sensing channel	1 driving channel	
Travel range(0~120V)		22	22	μm±10%
Max.travel range(0~150V)		28	28	μm±10%
Integrated sensor		SGS	-	
Resolution		1	0.5	nm
Unloaded resonant frequency		5000	5000	Hz±20%
Load capacity	Horizontal	0.3	0.3	kg
	Vertical	0.5	0.5	
	Inverted	0.3	0.3	
Unloaded step time		2	0.3	ms±20%
Stiffness		50	50	N/μm±20%
Blocking force		1000	1000	N
El. capacitance		7.2	7.2	μF±10%
Material		Aluminium, steel	Aluminium, steel	
Mass		1080	1080	g±5%
Operating temperature		-25~+80	-25~+80	°C

Note: The above parameters are measured using E00/E01 piezo controllers. The max driving voltage can be -20~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

Drawing



Recommended Controllers

E00/E01	E52	E53
		
1 channel Analog, digital Open/closed loop Ave. current: 291mA	1 channe Analog Open/closed loop Ave. current: 300mA	1 channe Analog, digital Open/closed loop Ave. current: 60mA

Note: For detailed parameters, see "Piezo Controllers".

P92.X30/70 Fast Tool Positioning Stages



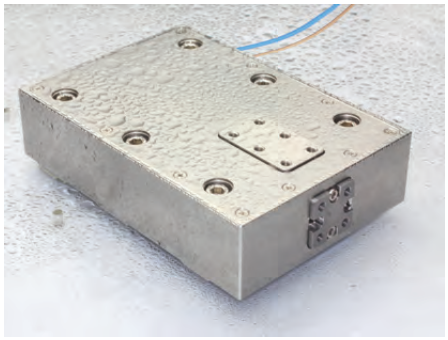


P92 offers two displacement ranges (30μm and 75μm) for choice, and the corresponding models are P92.X30 and P92.X70.

▸ Characteristics

- Ultra high precision
- Large load capacity
- Fast response time
- High stiffness

▸ Dust and Droplet Proof on Request



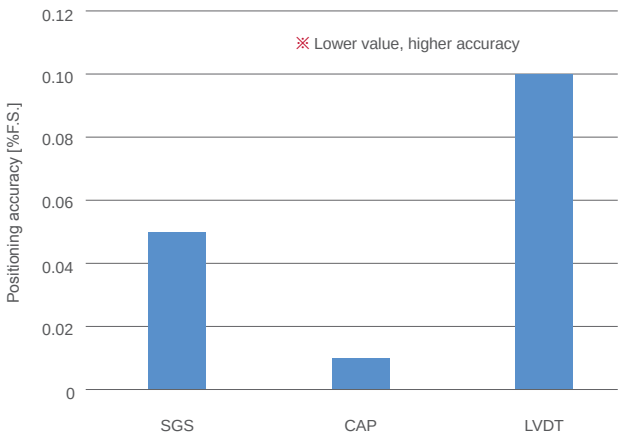
▸ High Stiffness

The stage body material is made of stainless steel to ensure the stability during processing, the structure is stable and reliable, and the machining accuracy is not affected by the vibration.

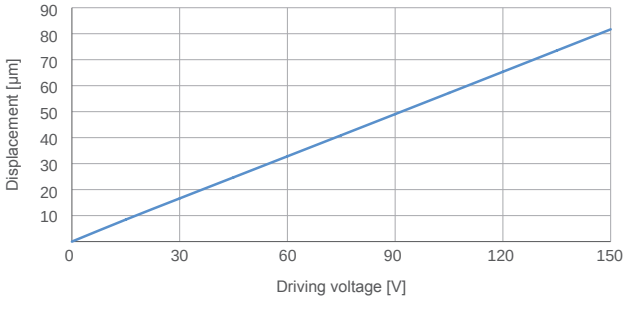
The stiffness of the fast tool positioning stage is much greater than the conventional piezo nanopositioning stage.

▸ Sensor Type

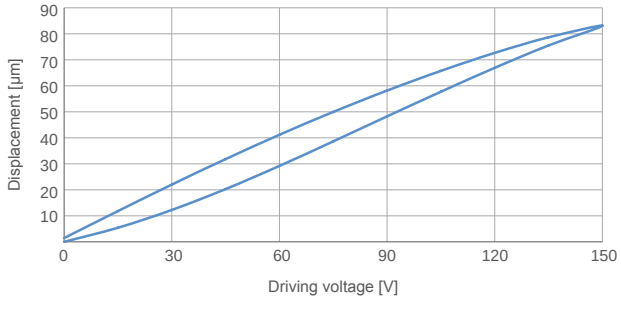
P92 could be optionally equipped with SGS sensor, LVDT sensor or CAP sensor to eliminate the hysteresis and creep of piezo actuator, and input control voltage is linear with output displacement.



▸ Closed-Loop Curve

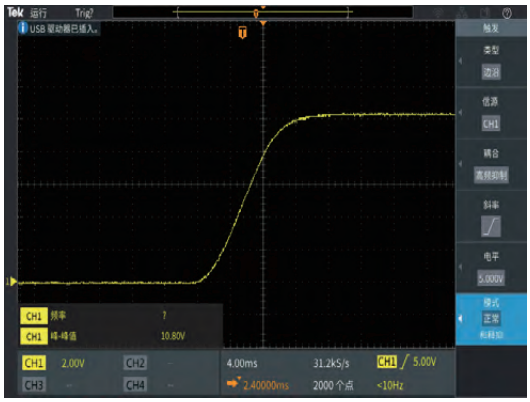


▸ Open-Loop Curve

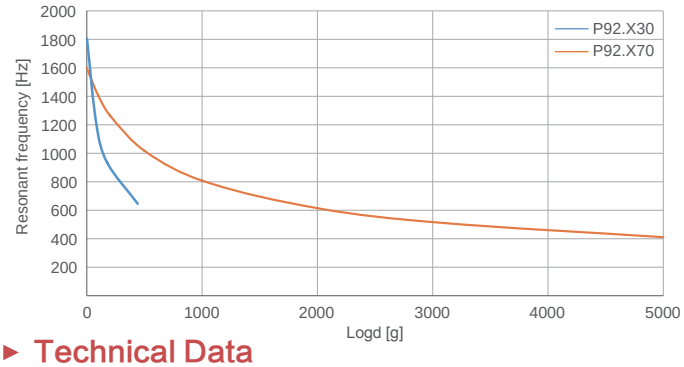


Step Time

The step time with load of P92.X70C is about 12ms. Custom step time is available.



Frequency vs Load Curve



Recommended Controllers

E00/E01	E52	E53
		
1~3 channel Analog, digital Open/closed loop Ave. current: 291/58mA	1 channel Analog Open/closed loop Ave. current: 300mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA
Note: For technical data, please refer to "Piezo Controllers"		

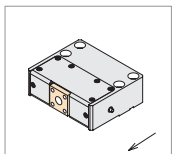
Technical Data

Type	S/C/L-Closed loop K-Open loop	P92.X30S P92.X30K	P92.X70C P92.X70L P92.X70K	Units
Active axes		X	X	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	
Travel range(0~120V)		24	60	μm±10%
Max.travel range(0~150V)		30	75	μm±10%
Integrated sensor		SGS/-	CAP/LVDT/-	
Resolution		1/0.5	2.5/10/1	nm
Closed-loop linearity		0.1/-	0.1/0.2/-	%F.S.
Repeatability		0.05/-	0.01/0.1/-	%F.S.
Pitch/yaw/roll		<10	<15	μrad
Push/pull force		300/100	550/240	N
Stiffness		10	8	N/μm±20%
Unloaded resonant frequency		1.8	1.6	kHz±20%
Unloaded step time		5/3	10/5	ms±20%
Closed-loop operating frequency (-3dB)		-	110@500g	Hz±20%
Load capacity	Horizontal	0.3	5	kg
	Vertical	0.5	-	
	Inverted	0.3	-	
El. capacitance		7.2	18	μF±20%
Material		Steel, Al	Steel	
Mass		1450	3125	g±5%
Operating temperature		CAP 10~50, LVDT 10~40, other -20~80		°C
Cable length		1.5		m±10mm

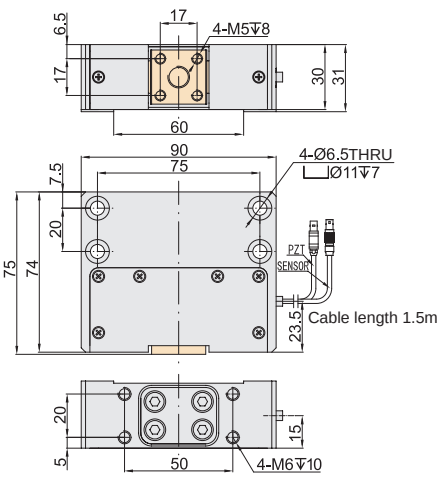
Note: Max driving voltage could be -20V~150V, 0~120V is recommended for long-term and high-reliable operation. Technical data are measured by CoreMorrow E00/E01 series piezo controller.

Drawings

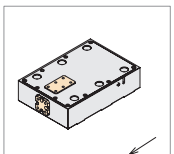
P92.X30



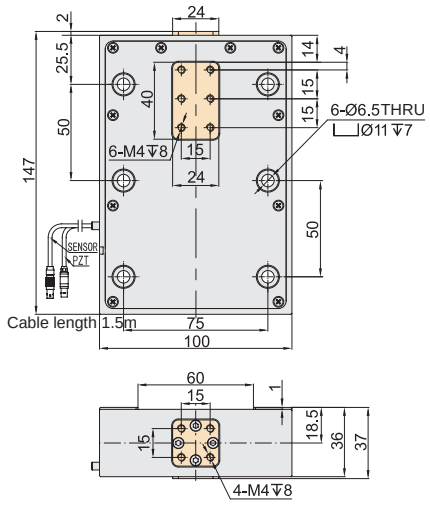




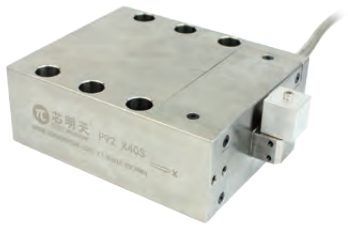
P92.X70







P92.X40 Fast Tool Positioning Stages(High Voltage Drive)



P92.X40 fast tool positioning stage is driven by high-voltage piezoelectric actuator, the driving voltage is 0~1000V, and the blocking force can reach 3000N.

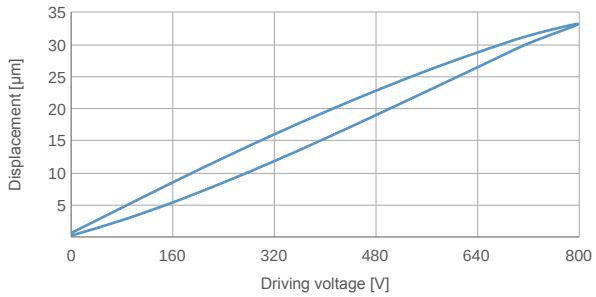
▸ Characteristics

- 0~1000V
- Stroke to 40μm
- Heat emission hole
- Blocking force to 3000N
- With sensor

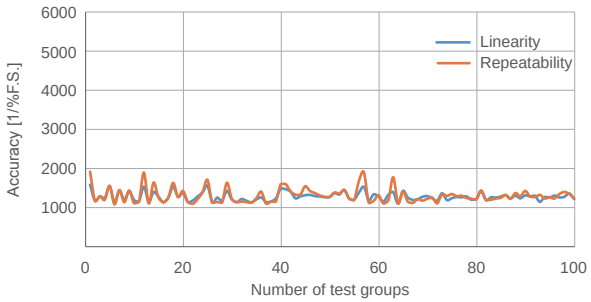
▸ Technical Data

Type		P92.X40S P92.X40K	Units
Active axes		X	
Drive control		1 driving channel 1 sensing channel	
Travel range(0~800V)		32	μm±10%
Max.travel range(0~1000V)		40	μm±10%
Integrated sensor		SGS	
Resolution		1.5/0.5	nm
Lag phase(1μm/1Khz)		<20	°±20%
Lag phase(5μm/500hz)		<10	°±20%
Push force		3000	N
Stiffness		100	N/μm±20%
Unloaded resonant frequency		3975	Hz±20%
Closed-loop linearity		<0.1/-	%F.S.
Repeatability		<0.1/-	%F.S.
Load capacity	Horizontal	0.3	kg
	Vertical	0.5	
	Inverted	0.3	
El. capacitance		540	nF±20%
Material		Steel	
Operating temperature		10~50	°C
Mass		2780	g±5%
Cable length		1.5, customizable	m±10mm

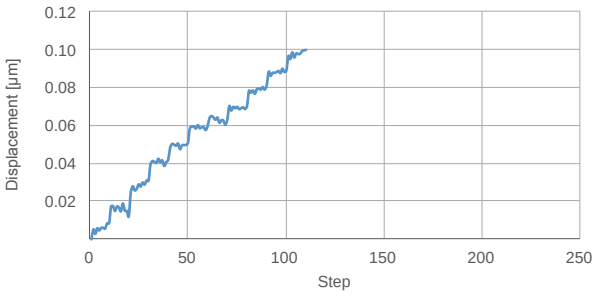
▸ Open-Loop Curve



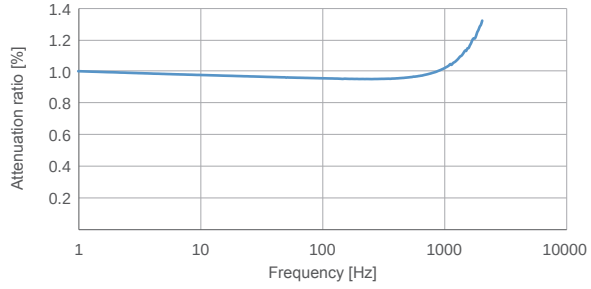
▸ Closed-Loop Accuracy Curve



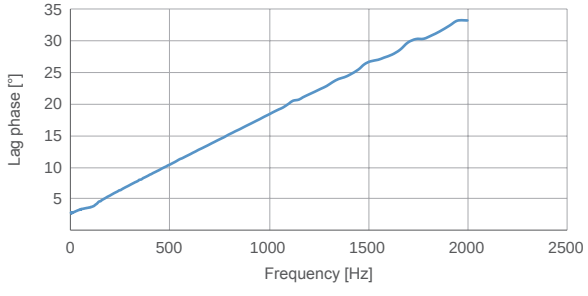
▸ Closed-Loop Resolution



▸ Gain



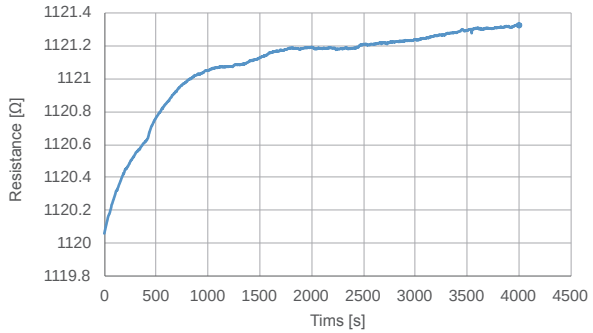
▸ Phase



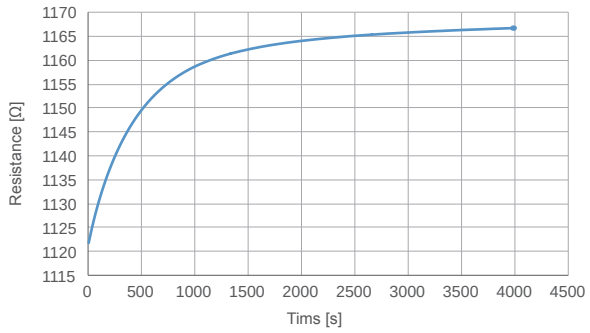
▸ Temperature Rise Curve

Operating conditions	Temperature rise
1kHz, 1μm	0.32°C
500Hz, 5μm	11.56°C
20W(P=U^2FC)	45.85°C

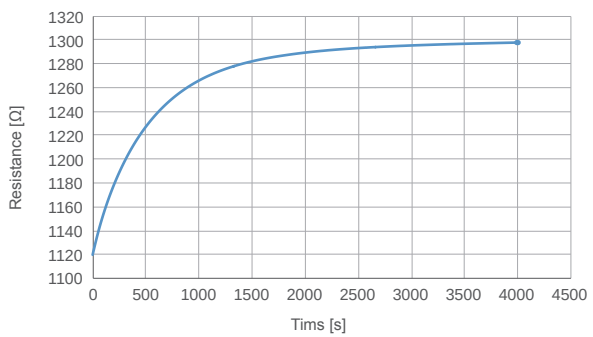
1)Temperature rise@1kHz, 1μm



2)Temperature rise@500Hz, 5μm



3)Temperature rise@200Hz, 400V



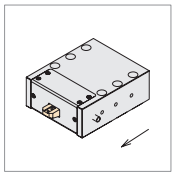
▸ Recommended Controllers

E00/E01	E52	E53
		
1~3 channel Analog, digital Open/closed loop Ave. current: 291mA	1 channel Analog Open/closed loop Ave. current: 300mA	1 channel Analog, digital Open/closed loop Ave. current: 60mA

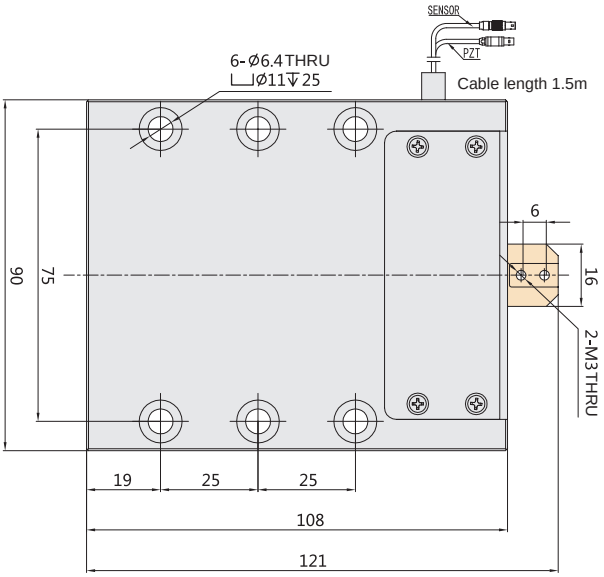
Note: For technical data, please refer to "Piezo Controllers".

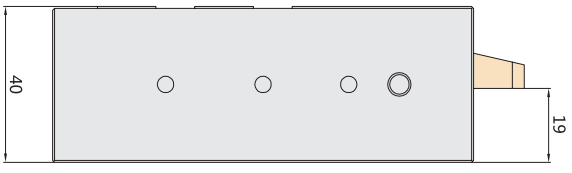
▸ Drawing

P92.X40









P93 Fast Tool Positioning Stages





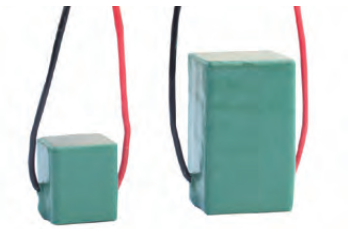
P93 could realize max stroke to 118μm. It could be equipped with LVDT sensor or CAP sensor. The sensor outputs 0~10V voltage signal corresponding to zero to full stroke of the stage.

▸ Characteristics

- Ultra high precision
- Max stroke to 118μm
- Load capacity to 20kg
- Response time to 7ms

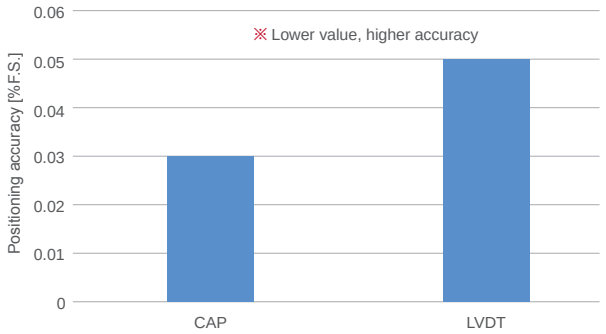
▸ Principle

P93 is driven by piezo actuators. Using inverse piezo effect, voltage is applied to PZT, and PZT generates micro-deformation. They have the characteristics of high resolution, high response time, large blocking force, and have been widely used in applications of micro-feeding.



▸ Sensor Type

P93 could be optionally equipped with LVDT sensor or CAP sensor to eliminate the hysteresis and creep of piezo actuator.



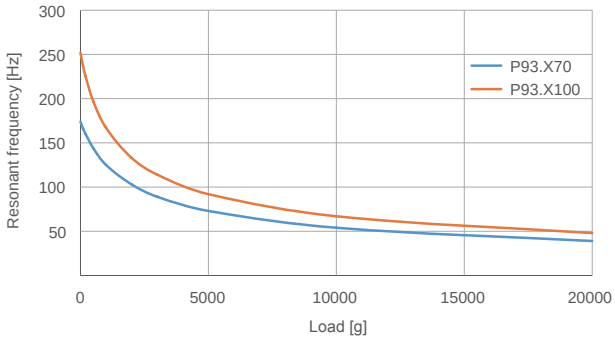
▸ Customized Temperture Sensor

Customized temperture sensor is available for over-temperature protection and safety protection.

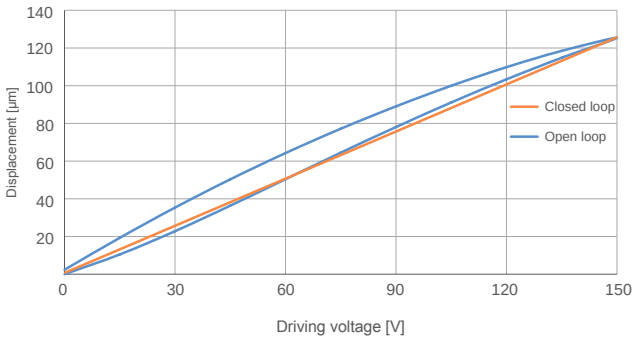
▸ Applications

- Diamond micro-feeding
- Precision processing
- High speed tool control
- Precision machining and grinding

▸ Frequency vs Load Curve

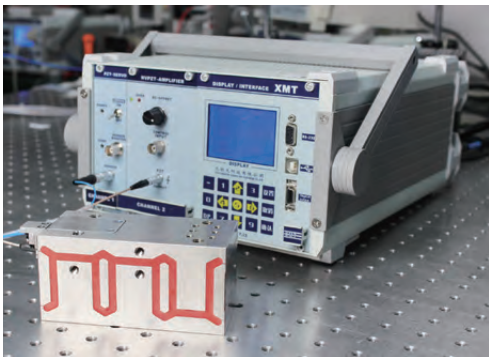


▸ Open/Closed-Loop Curve



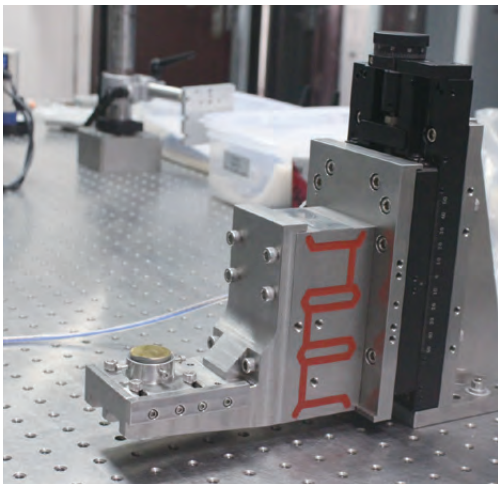
Piezo Controller

E01.D1 piezo controller(please refer to piezo controller) have the characteristics of high power, high current to be suitable for driving fast tool positioner.

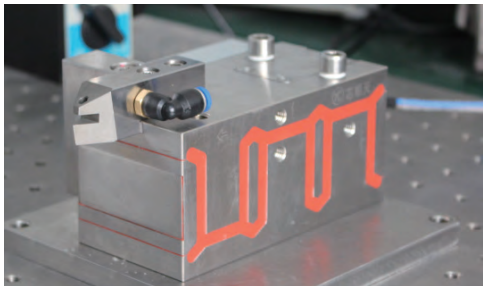


Customized Macro Micro Stage

Combination with manual plaform.



Tool Holder Installment



Technical Data

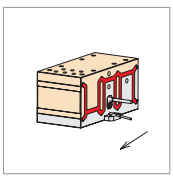
Type	C/L-Closed loop K-Open loop	P93.X70C P93.X70L P93.X70K	P93.X100C P93.X100L P93.X100K	Units
Active axes		X	X	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	
Travel range(0~120V)		65	95	μm±10%
Max.travel range(0~150V)		81	118	μm±10%
Integrated sensor		CAP/LVDT/-	CAP/LVDT/-	
Resolution		2.5/10/1	3.5/10/1	nm
Closed-loop linearity		0.05/0.1/-	0.1/0.15/-	%F.S.
Repeatability		0.03/0.05/-	0.03/0.05/-	%F.S.
Pitch/yaw/roll		<15	<20	μrad
Push/pull force		400/50	300/25	N
Stiffness		5	3	N/μm±20%
Unloaded resonant frequency		0.15	0.2	kHz±20%
Unloaded step time		10/7	30/7	ms±20%
Load capacity	Horizontal	20	20	kg
	Vertical	-	-	
	Inverted	-	-	
El. capacitance		15	15	μF±20%
Material		Steel	Steel	
Mass		4000	3500	g±5%
Operating temperature		CAP 10~50, LVDT 10~40, other -20~80		°C
Cable length		1.5		m±10mm

Note: Max driving voltage could be -20V~150V, 0~120V is recommended for long-term and high-reliable operation.

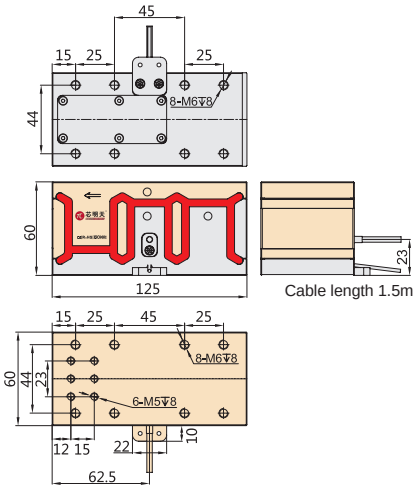
Technical data are measured by CoreMorrow E00/E01 series piezo controller.

Drawings

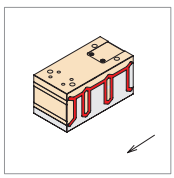
P93.X70



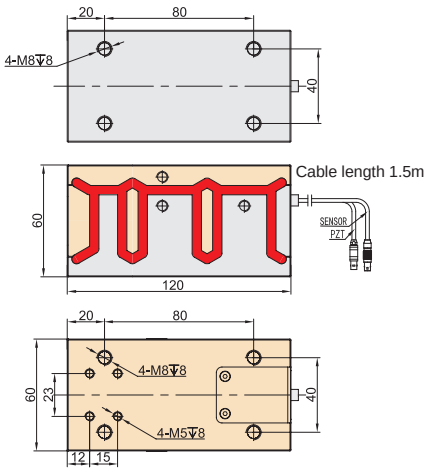




P93.X100





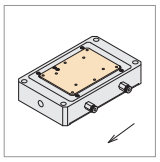


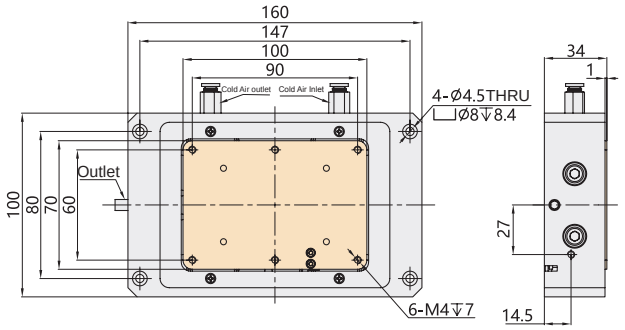
22007 Fast Tool Positioner

▸ Technical Data

Type	22007	Units
Active axes	X	
Nominal travel(0~120V)	64	μm±20%
Travel(0~150V)	80	μm±20%
Size	160×100×34	mm^3
Sensor	SGS/CAP	
Closed/open-loop resolution	15/10	nm
Linearity	0.03	%F.S.
Repeatability	0.05	%F.S.
Push/pull force	3000/20	N
Unloaded resonant frequency	800	Hz±20%
Load capacity	1	kg
El.capacitance	36	μF±20%
Material	Steel	

▸ Drawing





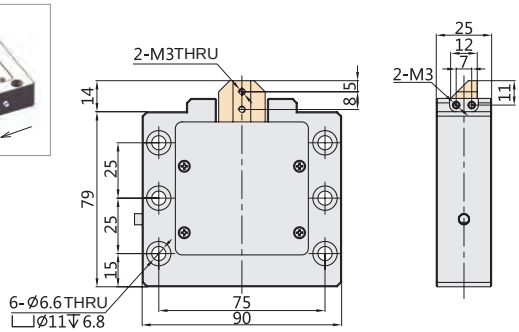
21137 Fast Tool Positioning Stages

▸ Technical Data

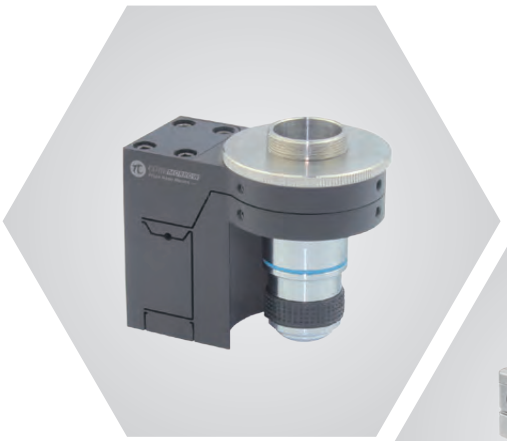
Type	21137	Units
Active axes	X	
Travel range(0~150V)	>10	μm±20%
Resolution	5	nm±20%
Operating frequency(@1μm)	4000	Hz±20%
Stiffness	150	N/μm±20%
Blocking force	2000	N
El. capacitance	7.2	μF±20%
Material	Steel, Aluminum	

▸ Drawing

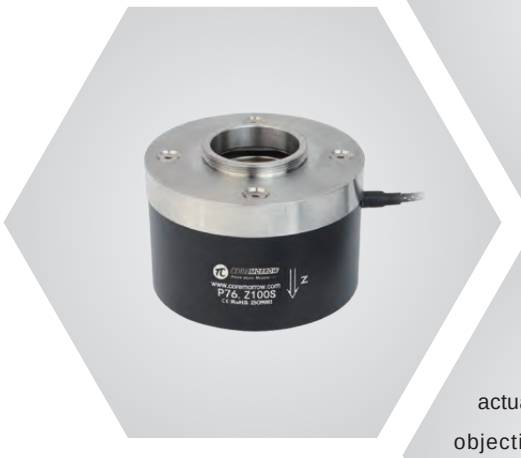


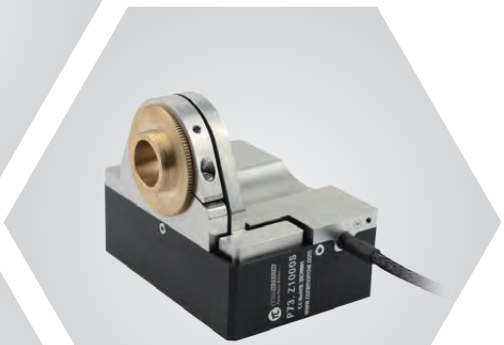


Piezo Objective Scanner Series









Based on piezoelectric actuators as driving sources, piezo objective scanner is mainly used for driving objective lens to make nano-stepping motion in microscope or laser processing system.

Piezo Objective Scanner

Piezo objective scanner is specially designed for focusing and microscopy of objective lens. It is designed with a frictionless flexible hinge parallel guide mechanism design, and has ultra-high focus stability. The piezo objective scanner can be integrated into the microscope inspection/measurement or the observation device to improve accuracy, and can be used in conjunction with a variety of high-resolution microscopes.

▸ Highlights

High Dynamics

The low-profile objective positioner adopts the parallelogram design principle, high rigidity, and can move at high speed with a load of 400g.



Long Travel

This scanner features long travel and high precision, and its travel can reach 1000μm.

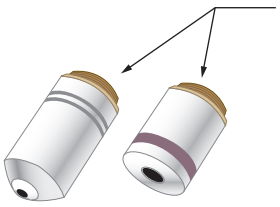


Large Load Capacity

This large-load piezo objective scanner features large load capacity, fast response, and excellent linearity of Z-axis motion. It can be loaded with 900g load at high frequency.



▸ Adapters Compatible



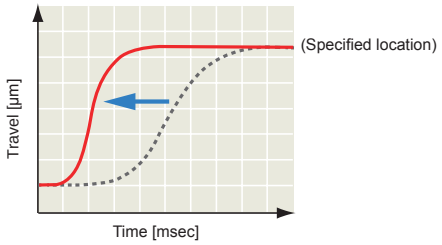
Thread sizes

- M27×0.75
- M26×0.75
- M26×1/36"
- M25×0.75
- W0.8×1/36"

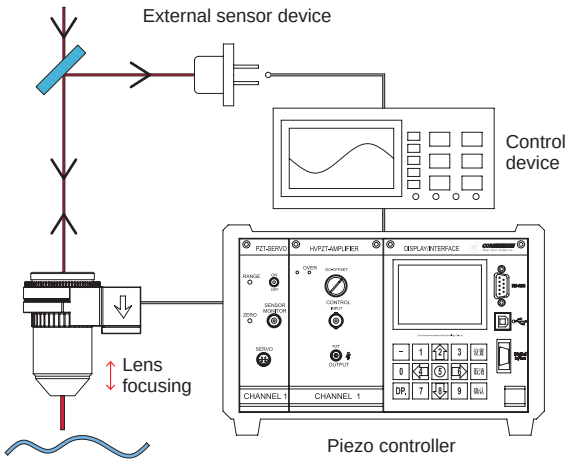
A variety of thread sizes are available, and can be configured with different brands of objective lenses, as well as threaded adapters for transfer.

▸ Adjustable Response Time

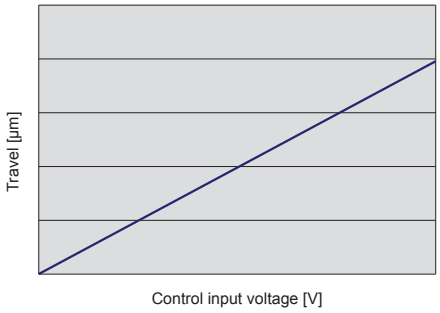
With different controllers and loads, the response time can be adjusted.



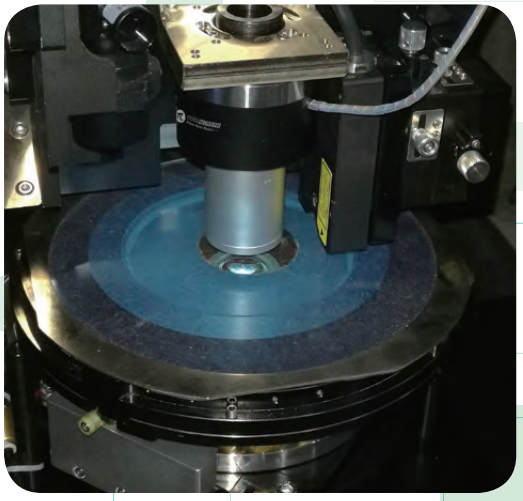
▸ Driving and Control



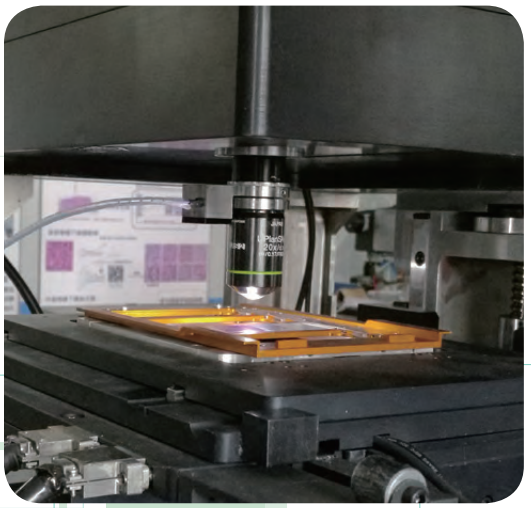
▸ Closed-Loop Curve



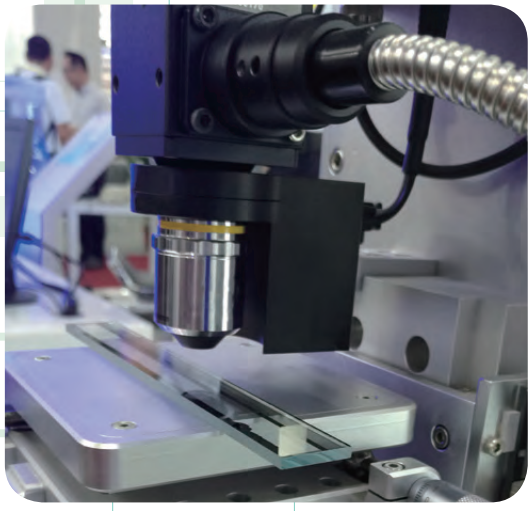
▸ Applications



Laser Processing–Wafer Cutting



Microscope Step Imaging

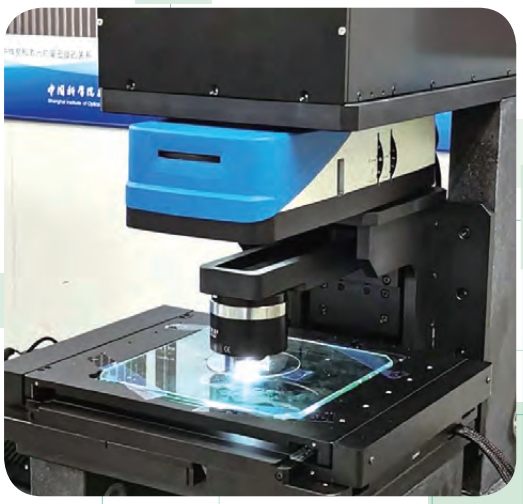


White Light Interferometer

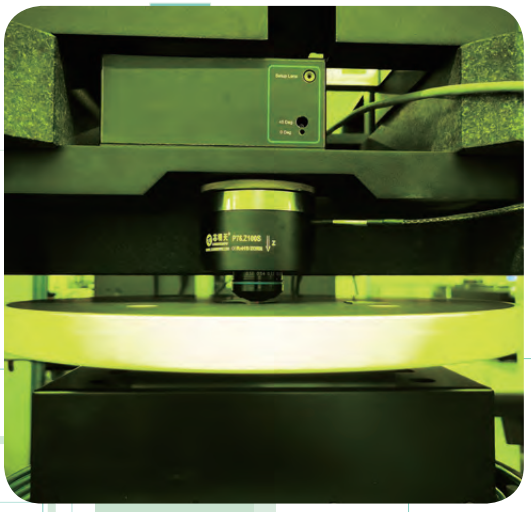


Inverted Microscope Imaging

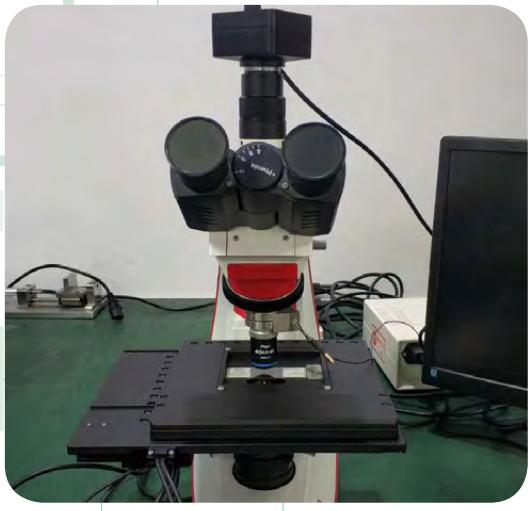
▸ Applications



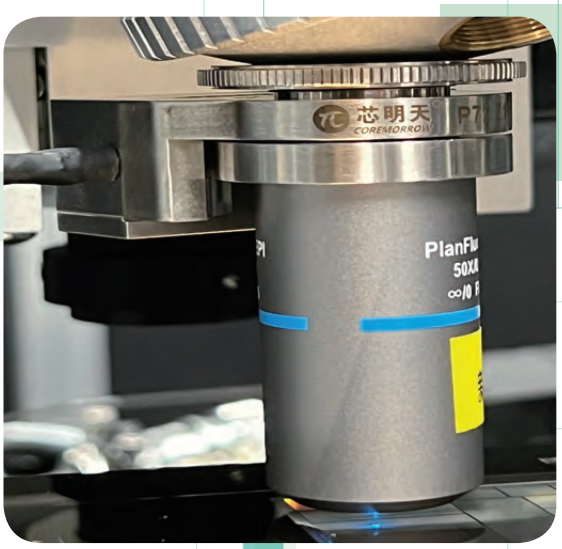
Lithography



Laser Direct Writing



Biological Microscope



Microscopy

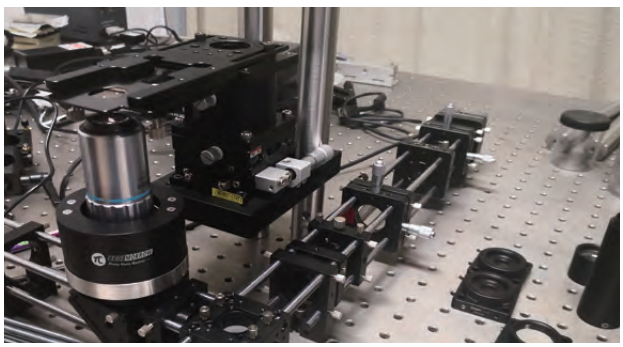
▸ Applications

- Adjustment focus
- Semiconductor inspection
- Image processing
- Laser processing
- Confocal microscope
- Interference /metrology

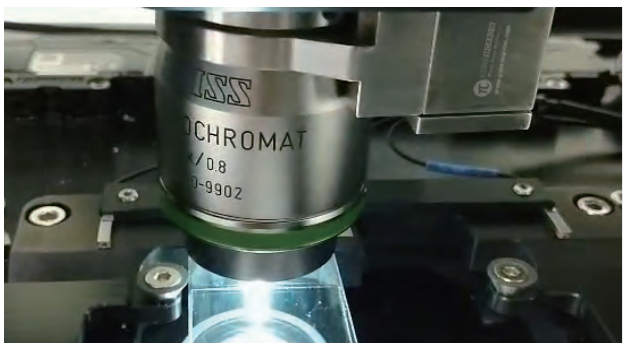
▸ Product List

Type	Type	Axes	Max.travel[μm]	Resolution[nm]	Resonant frequency[kHz]	Load capacity[kg]	Page
P72	P72.Z80	Z	80	1	0.7	0.4	265
	P72.Z100	Z	100	1	0.35	0.2	265
P73	P73.Z200	Z	200	2	0.21	0.2	267
	P73.Z500-C	Z	500	4	0.17	0.4	267
	P73.Z1000	Z	1000	8	0.11	0.2	267
P75	P75.Z200	Z	250	2.5	0.389	0.2	269
P76	P76.Z50	Z	50	0.5	0.8	0.5	270
	P76.Z70	Z	75	1	1.8	0.5	270
	P76.Z80	Z	80	1	1.7	0.9	270
	P76.Z100	Z	100	1	0.8	0.5	270
	P76.Z150S/K44	Z	135	1.5	0.89	0.5	270
	P76.Z200	Z	200	2	0.9	0.5	270
	P76F.Z80S/K60-C	Z	90	1	0.75	0.9	272
XD730	XD730.100	Z	100	1	0.45	0.5	273
	XD730.400	Z	400	4	0.15	0.5	274
	XD730.500	Z	500	5	0.31	0.5	275
XP-721	XP-721	Z	100	1	0.5	0.2	276
H11	H11.X150	Z	150	2	0.4	2	278
21062	21062	Z	7	0.2	6	0.5	278
22129-1	22129-1	Z	200	3	0.1	2	278

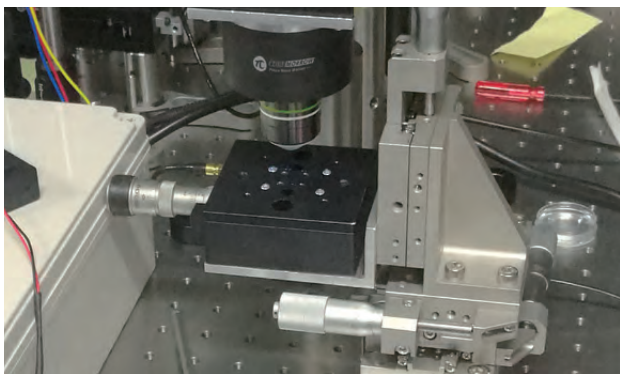
▸ Nanostructure Scan Measurement



▸ Optical Inspection–Wafer Inspection



▸ Microscan Imaging



▸ Sample Scan Imaging



P72 Piezo Objective Scanner





P72 piezoelectric objective scanner is a Z-axis motion piezo positioner specially designed for objective lens focusing microscopy. It adopts a frictionless flexible hinge parallel guiding mechanism, with ultra-high focusing stability. The objective positioner is loaded with a microscopic detection/measurement or observation device to improve accuracy.

▸ Characteristics

• Travel to 100μm • Load capacity to 0.4kg • Millisecond response time • Closed loop for high repeatability

▸ Typical Applications

• 3D imaging • Interference/metering • Surface structure analysis • Confocal microscope • Biotechnology • Semiconductor test

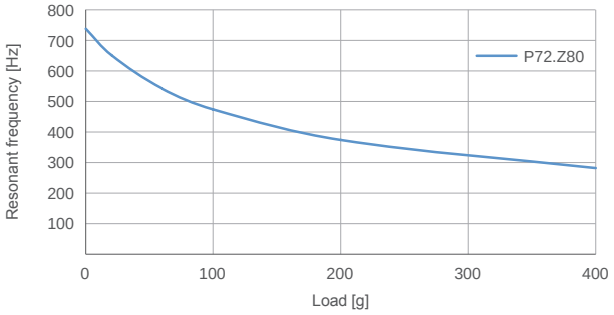
▸ Adapter Compatible

P72 objective positioner is connected to the objective lens through an adapter to quickly make the objective lens in the desired position. A variety of thread adapters are available, such as M27×0.75, M26×0.75, M26×1/36″, M25×0.75, W0.8×1/36″, etc., and custom is available.

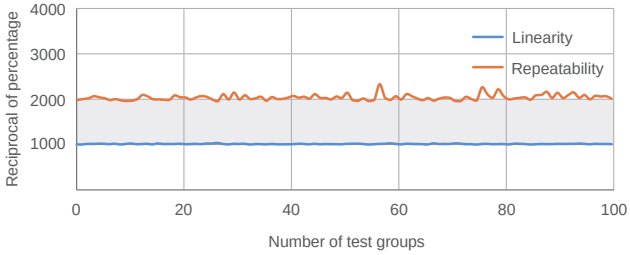
▸ Small Size, High Dynamics

P72 Piezo Objective Scanner is very compact. Its body uses a flexible hinge mechanism, which is frictionless and has a very high resolution and it can carry 400g load for high-speed precision motion, it has been widely used in optical scanning, confocal microscopy and other fields.

▸ Frequency and Load Curve

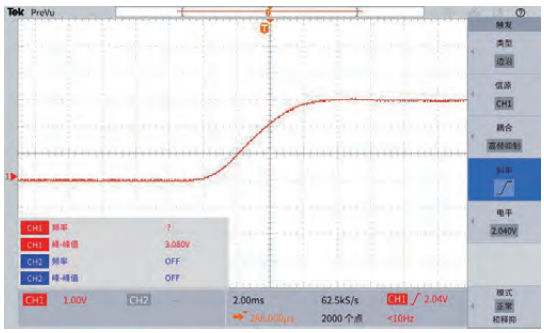


▸ Positioning Accuracy



▸ Closed-Loop Step Time（P72.Z80S）

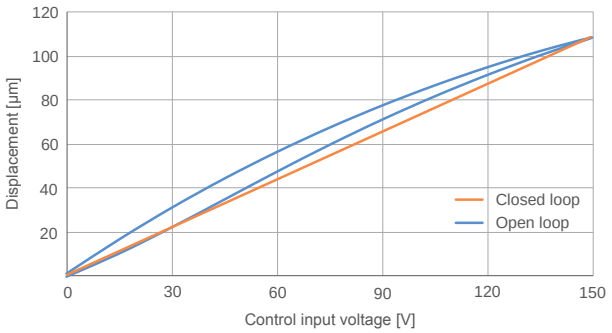
Step time of 7ms at loading 400g to 100% travel.



▸ Recommended Controllers

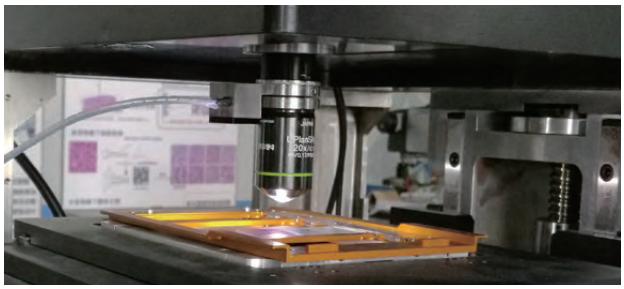
E00/E01	E52	E53
		
1 channel Digital,analog, knob adjustment Open/closed loop Ave. current: 291mA	1 channel Analog Open/closed loop Ave. current: 300mA	1 channel Digital, analog Open/closed loop Ave. current: 60mA
Note: Please see "Piezo Controller" for detailed information.		

Open/Closed Loop Curve



Application Example

P72 piezoelectric objective scanner can be used for automatic cell microscopy, cold atom microscopy and so on.



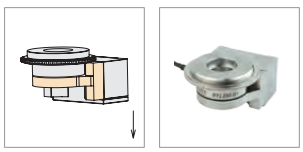
Technical Data

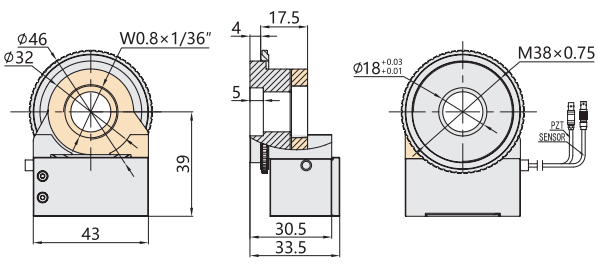
Type	S-Closed loop K-Open loop	P72.Z80S	P72.Z80K	P72.Z100S	P72.Z100K	Units
Active axes		Z	Z	Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel	1 driving channel 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		64	64	80	80	µm±10%
Max.travel range(0~150V)		80	80	100	100	µm±10%
Integrated sensor		SGS	-	SGS	-	
Resolution		3	1	3	1	nm
Closed-loop linearity		0.1	-	0.1	-	%F.S.
Repeatability		0.05	-	0.05	-	%F.S.
Push/pull force		160/20	160/20	110/15	110/15	N
Stiffness		2	2	1.4	1.4	N/µm±20%
Unloaded resonant frequency		700	700	350	350	Hz±20%
Loaded resonant frequency		300@400g	300@400g	150@200g	150@200g	Hz±20%
Unloaded step time		7	2.5	10	3	ms±20%
Closed-loop operating frequency (-3dB)		-	-	70@100g	-	Hz±20%
Load capacity		0.4	0.4	0.2	0.2	kg
El. capacitance		14	14	3.6	3.6	µF±20%
Material		Steel	Steel	Steel	Steel	
Mass		360（no cable）	360（no cable）	150	150	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

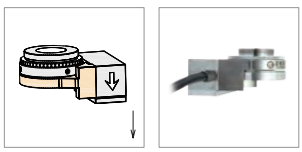
Drawing

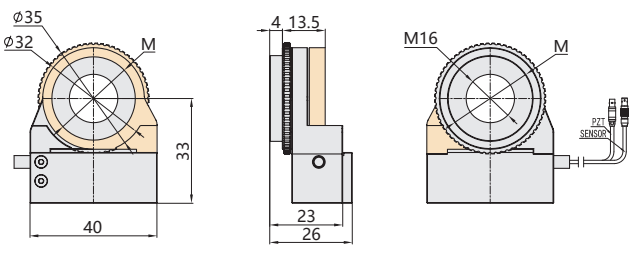
P72.Z80S/K





P72.Z100S/K





M(Type)
W0.8×1/36"
M25×0.75
M26×1/36"
M26×0.75
M27×0.75

P73 Piezo Objective Scanner

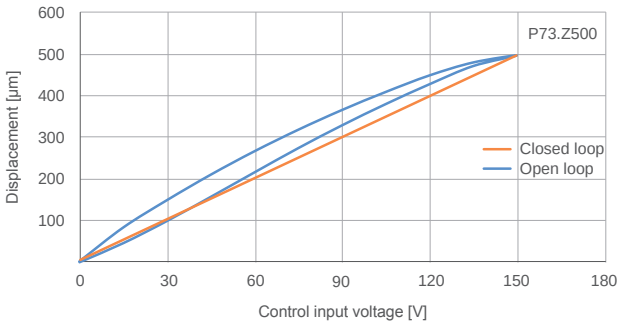


P73 piezo objective scanner features a long travel of 200μm, 500μm or 1000μm in Z direction. It also adopts flexible hinge mechanism, with no friction, good linearity and high positioning accuracy. P73 is widely used in long-travel scanning of microscopic imaging, two-photon microscopy and other fields.

▸ Characteristics

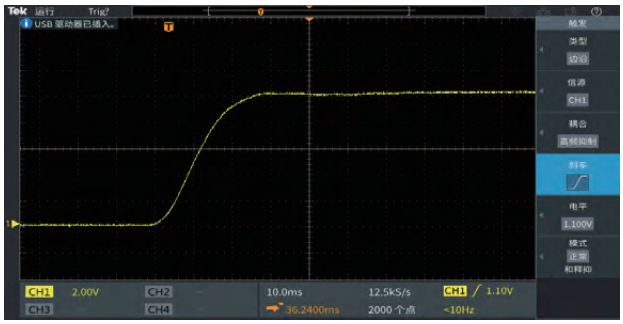
- Optional 200μm, 500μm or 1000μm travel
- Millisecond response time
- Closed loop for high repeatability

▸ Open/Closed-Loop Curves



▸ Closed-Loop Step Time

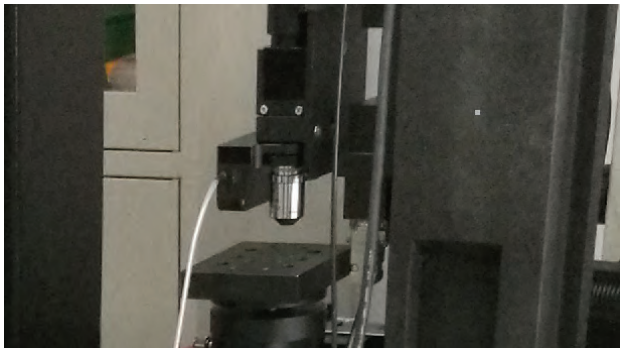
The step time loading 200g is about 30ms to reach 100% travel.



▸ Adapters Compatible

P73 objective positioner is connected to the objective lens through an adapter to quickly make the objective lens in the desired position. Various adapters are available, such as M27×0.75, M26×0.75, M26×1/36", M25×0.75, W0.8×1/36", etc.

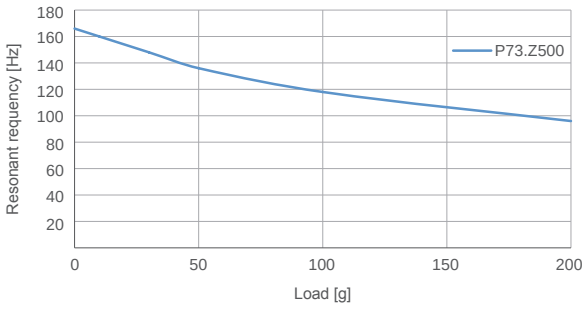
▸ Surface Analysis



▸ Typical Applications

- 3D imaging
- Semiconductor test
- Surface structure analysis
- Interference/metering
- Biotechnology
- Confocal microscope

▸ Frequency vs Load Curve



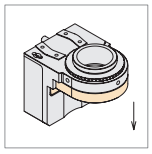
▸ Recommended Controllers

E00/E01	E53	XE-650
		
1 channel Digital, analog Open/closed loop Ave. current: 291mA	1 channel Digital, analog Open/closed loop Ave. current: 60mA	1 channel I/O, analog Open/closed loop Ave. current: 50mA

Note: Please see "Piezo Controller" for detailed information.

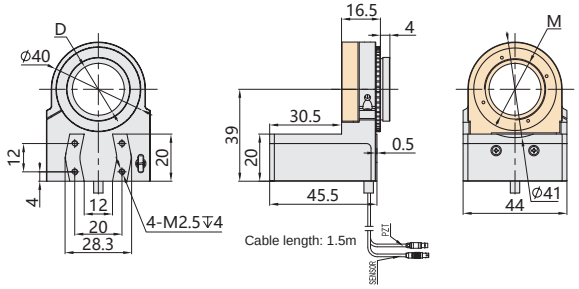
Drawings

P73.Z200

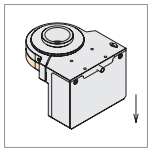




M(Model)	D(mm)
M26×0.75	Φ21
M26×1/36"	Φ21
M27×0.75	Φ22
M25×0.75	Φ20
W0.8×1/36"	Φ15

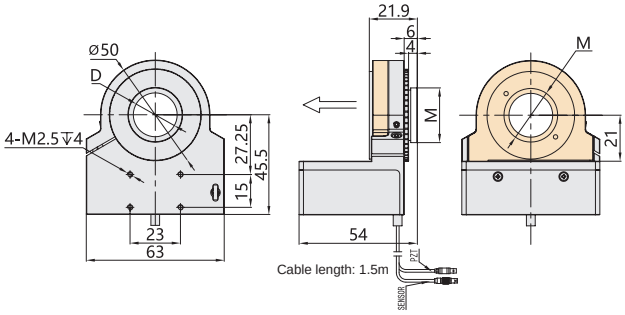


P76.Z500-C

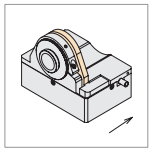




M(Model)	D(mm)
*W0.8×1/36"	Φ15
M25×0.75	Φ20
M26×1/36"	Φ21
M26×0.75	Φ21
M27×0.75	Φ22
M38×0.75	Φ21

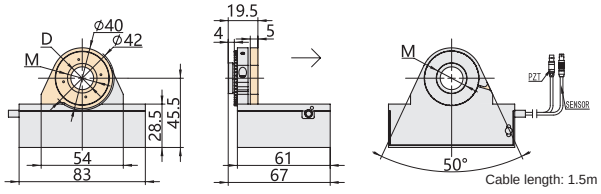


P73.Z1000

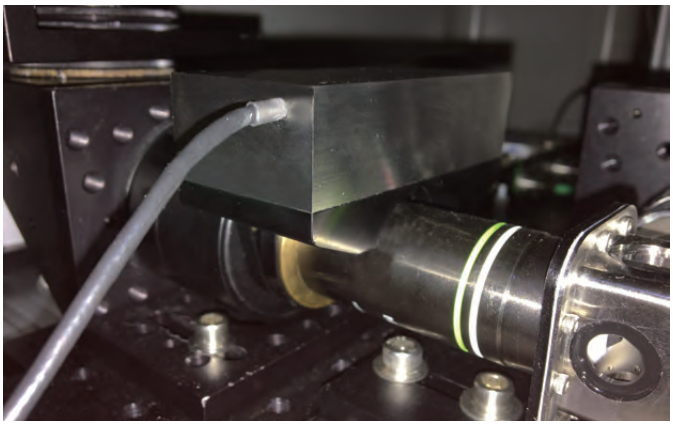




M(Model)	D(mm)
M26×0.75	Φ21
M26×1/36"	Φ21
M27×0.75	Φ22
M25×0.75	Φ20
W0.8×1/36"	Φ15



Application Example



Fluorescence Imaging

Technical Data

Type	S-Closed loop K-Open loop	P73.Z200S P73.Z200K	P76.Z500S-C P76.Z500K-C	P73.Z1000S P73.Z1000K	Units
Active axes		Z	Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	
Travel range(0~120V)		160	400	800	μm±10%
Max.travel range(0~150V)		200	500	1000	μm±10%
Integrated sensor		SGS/-	SGS/-	SGS/-	
Resolution		5.5/2	14/4	36/8	nm
Linearity		0.1/-	0.1/-	0.5/-	%F.S.
Repeatability		0.05/-	0.05/-	0.3/-	%F.S.
Push/pull force		80/10	80/10	20/5	N
Stiffness		0.25	0.2	0.02	N/μm±20%
Unloaded resonant frequency		210	170	110	Hz±20%
Unloaded step time		20/10	120@200g/10	150/25	ms±20%
Load capacity		0.2	0.4	0.2	kg
El. capacitance		7.2	14	43.2	μF±20%
Material		Steel, Al	Steel, Al	Steel, Al	
Mass		210	300	786	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation use, the recommended driving voltage is 0~120V.

P75 Piezo Objective Scanner



The P75 piezo objective scanner can achieve a displacement of 250μm in the Z-axis direction and has a load capacity up to 0.2kg. It adopts a frictionless flexible hinge parallel guiding mechanism, with no friction, good linearity and high positioning accuracy, low compensation amount of objective lens , with ultra-high focusing stability. It has a design of separated thread adapterr ,which make it able to adapt to various models of microscopes.

▸ Characteristics

• Max. travel range to 250μm • Load capacity to 0.2kg • Unloaded resonant frequency to 389Hz • Design of separated thread adapter

▸ Applications

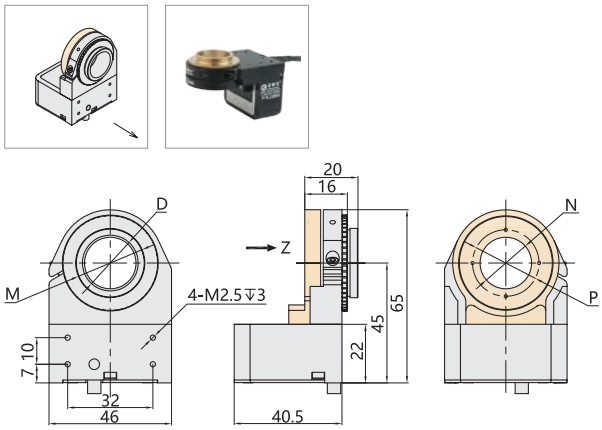
• 3D imaging • Interference/metering • Semiconductor test • Biotechnology • Surface structure analysis • Confocal microscope

▸ Technical Data

Type	S-Closed loop K-Open loop	P75.Z200S	P75.Z200K	Units
Active axes		Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		200	200	μm±10%
Max. travel range(0~150V)		250	250	μm±10%
Sensor type		SGS	-	
Resolution		6	2.5	nm
Linearity		0.125	-	%F.S.
Repeatability		0.05	-	%F.S.
Push/pull force		25/10	25/10	N
Stiffness		0.1	0.1	N/μm±20%
Unloaded resonant frequency		389	389	Hz±20%
Closed-loop operating frequency (-3dB)		20	-	Hz±20%
Step time		25@200g	10	ms±20%
Load capacity		0.2	0.2	kg
El. capacitance		6.5	6.5	μF±20%
Material		Al, Steel	Al, Steel	
Mass		225	225	g±5%

▸ Drawing

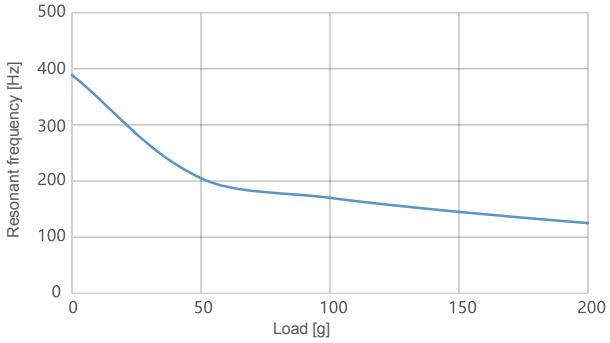
P75.Z200S/K



Type M	D
M26X0.75	Ø21
M26X1/36"	Ø21
M27X0.75	Ø22
M25X0.75	Ø20
W0.8X1/36"	Ø15

Type N	P
W0.8X1/36"	Ø25
M25X0.75	Ø28
M26X1/36"	Ø28
M26X0.75	Ø28
M27X0.75	Ø29

▸ Frequency vs Load Curve



▸ Recommended Controllers

E00/E01	E52	E53
		
1 channel Digital, analog Open/closed loop Ave. current: 291mA	1 channel Analog Open/closed loop Ave. current: 300mA	1 channel Digital, analog Open/closed loop Ave. current: 60mA

Note: Please see "Piezo Controller" for detailed information.

P76 Piezo Objective Scanner



P76 series piezoelectric objective scanner features a large load capacity up to 900g, Z-axis linear motion range up to 200μm, adopting flexible hinge mechanism, no friction, good linearity, high closed-loop positioning accuracy.

▸ Characteristics

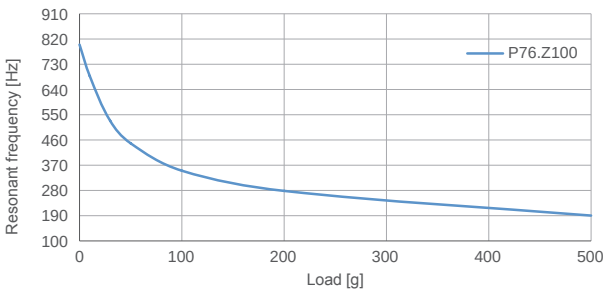
• Millisecond response • Closed loop for high repeatability • Excellent focusing stability • Designed for objective positioning

▸ Large Load Capacity, High Frequency and Resolution

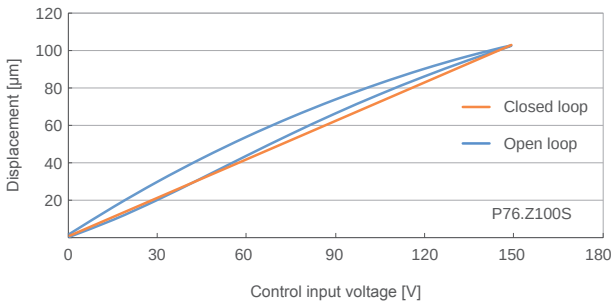
P76 Piezo objective scanner is designed for high-load, large-aperture objectives to achieve the fastest step times in high-resolution microscopy applications. Its extremely rugged design provides very fast settling times and scanning frequency, even when carrying a few hundred grams of objective. The rotationally symmetric alignment of multiple piezoelectric actuators and the optimized design of the flexure and lever elements give it a high stiffness while ensuring excellent guiding accuracy and dynamics.

P76 Piezo Objective Scanner has a maximum load of 900g. It is suited for multiphoton microscopy and confocal microscopy applications. P76 Piezo Objective Positioner can be used to match a variety of standard lenses from such as Zeiss, Nikon, Olympus, and Leica. It can also be used in conjunction with a manual adjustment stage via an adapter.

▸ Frequency vs Load Curve



▸ Open/Closed-Loop Curve(@500g load)



▸ Typical Applications

- 3D imaging
- Auto focusing system
- Wafer cutting
- Interference/metering
- Confocal microscope
- Semiconductor test

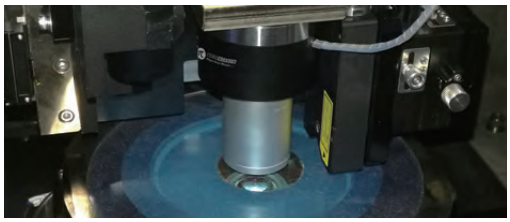
▸ Thread Adapter for Easy Integration

P76 objective positioner is connected to the objective through an adapter. A variety of thread adapters are available, such as M27×0.75, M26×0.75, M26×1/36", M25×0.75, W0.8×1/36", etc., and custom is available

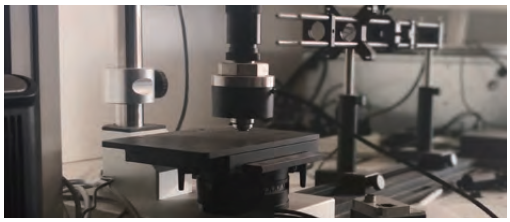
▸ Recommended Controllers

E00/E01	E52	E53
		
1 channel Digital, analog Open/closed loop Ave. current: 291mA	1 channel Analog Open/closed loop Ave. current: 300mA	1 channel Digital, analog Open/closed loop Ave. current: 60mA
Note: Please see "Piezo Controller" for detailed information.		

▸ Application Examples



Wafer Cutting



Material Analysis

▸ Technical Data

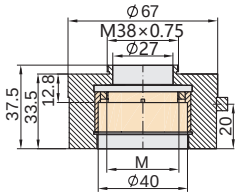
Type	S-Closed loop K-Open loop	P76.Z50S P76.Z50K	P76.Z70S P76.Z70K	P76.Z80S P76.Z80K	P76.Z100S P76.Z100K	P76.Z150S44 P76.Z150K44	P76.Z200S P76.Z200K	Units
Active axes		Z	Z	Z	Z	Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	1 driving channel 1 sensing channel	
Travel range(0~120V)		40	60	64	80	108	160	μm±10%
Max.travel range(0~150V)		50	75	80	100	135	200	μm±10%
Integrated sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Resolution		1.5/0.5	2/1	3/1	3/1	5/1.5	5.5/2	nm
Linearity		0.03/-	0.03/-	0.03/-	0.03/-	0.03/-	0.03/-	%F.S.
Repeatability		0.02/-	0.02/-	0.02/-	0.02/-	0.06/-	0.02/-	%F.S.
Push/pull force		35/10	180/16	-	70/10	-	-	N
Stiffness		0.8	3	-	0.8	-	-	N/μm±20%
Unloaded resonant frequency		800	1800	1700	800	890 (330@500g)	900	Hz±20%
Closed-loop operating frequency (-3dB)		-	-	-	160 (unloaded)	-	-	Hz±20%
Unloaded step time		5/2	1.6/1	15@24μm,900g/-	5/2	25@500g/10	10/4	ms±20%
Load capacity		0.5	0.5	0.9	0.5	0.5	0.5	kg
El. capacitance		3.2	7.2	14.4	7.2	19.2	28.8	μF±20%
Material		Al, Steel	Al, Steel	Al, Steel	Al, Steel	Al, Ti	Al, Steel	
Mass		430	520	765	500	525*	740	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V ;
For high-reliability and long-term operation, the recommended driving voltage is 0~120V. *: including wires and connectors.

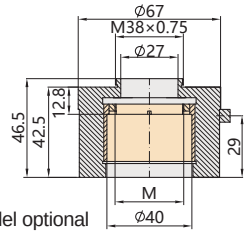
▸ Drawings

Standard Drawing of P76 Piezo Objective Scanner

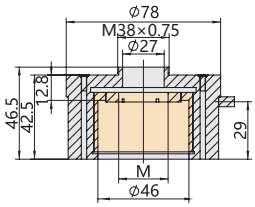
P76.Z50



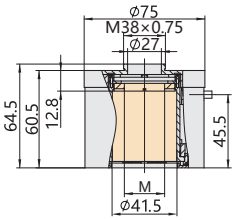
P76.Z70/P76.Z100



P76.Z80S/K



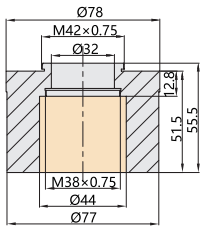
P76.Z200S/K



Lens connector adapter model optional

Lens connectorr M (Model)	M38×0.75	M32×0.75	M28×0.75	M27×0.75	M26×0.75	M26×1/36"	M25×0.75	W0.8×1/36"	M19×0.75

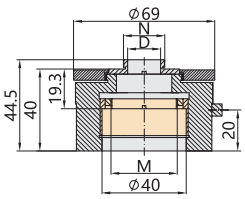
P76.Z150S/K44



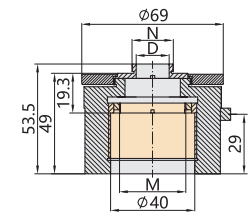
Note:The P76.Z150SK44 cable outlet is in the bottom.

Drawing of P76 Piezo Objective Scanner with adapter

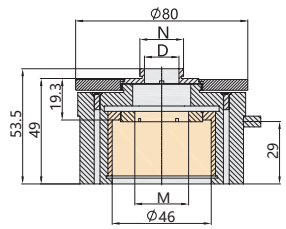
P76.Z50 with Adapter



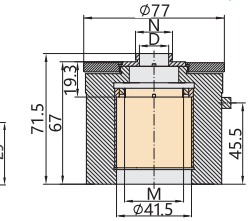
P76.Z70/Z100 with Adapter



P76.Z80 with Adapter



P76.Z200 with Adapter

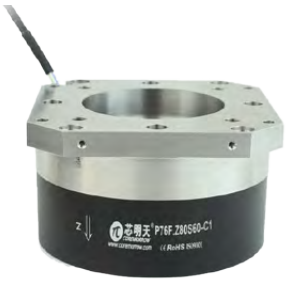


After installing the adapter, the optional corresponding relationship between the adapter model and the microscope equipment is as follows

Lens connector M (Model)	M38×0.75	M32×0.75	M28×0.75	M27×0.75	M26×0.75	M26×1/36"	M25×0.75	W0.8×1/36"	M19×0.75
Fixed connector N(Model)	/	M32×0.75	M28×0.75	M27×0.75	M26×0.75	M26×1/36"	M25×0.75	W0.8×1/36"	M19×0.75
D	Φ27	Φ27	Φ23	Φ22	Φ21	Φ21	Φ20	Φ15	Φ14

Note: When the model of fixed connector is selected as M38 × 0.75, it defaults to the standard product and can be used without an adapter;

P76F Piezo Objective Scanner



The P76F is a Z-direction piezo objective scanner with a maximum displacement of 90μm and a load capacity up to 900g, making it suitable for high load applications such as laser invisible cutting of wafer. The objective lens connector has various adapters thread to choose, and is customizable according to customer needs. It can be fixed through two different aperture through holes. It adopts flexible hinge mechanism, with no friction, good linearity and high positioning accuracy.

▸ Characteristics

- Max stroke to 90μm
- Load capacity to 900g
- Millisecond response time
- Adapters compatible

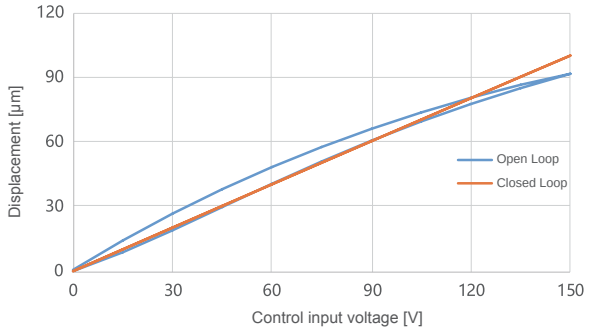
▸ Applications

- 3D imaging
- Interference/metering
- Auto focusing system
- Confocal microscope
- Wafer cutting
- Semiconductor test

▸ Techniacal Data

Type	S-Closed loop K-Open loop	P76F.Z80S60-C	P76F.Z80K60-C	Units
Active axes		Z	Z	
Drive control		1 driving channel 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)		72	72	μm±10%
Max. travel range(0~150V)		90	90	μm±10%
Sensor type		SGS	-	
Resolution		3	1	nm
Linearity		0.2	-	%F.S.
Repeatability		0.03	-	%F.S.
Pitch/yaw/roll		<20	<20	μrad
Unloaded resonant frequency		750	750	Hz±20%
Loaded resonant frequency@900g		280	280	Hz±20%
Step time		10@900g	3	ms±20%
Load capacity		0.9	0.9	kg
El. capacitance		14.4	14.4	μF±20%
Material		Al, Steel	Al, Steel	
Mass		1740	1740	g±5%

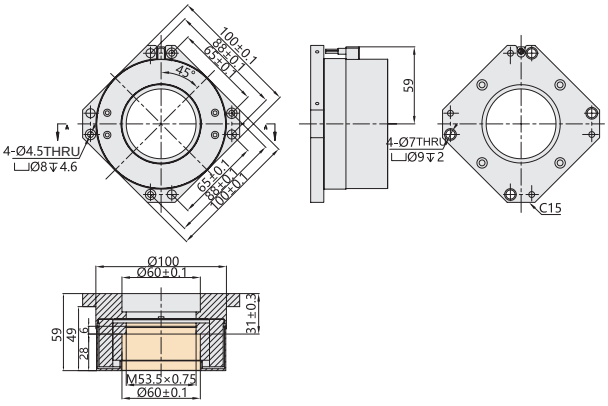
▸ Open/Closed Loop Curve



▸ Drawing

P76F.Z80S/K60-C





▸ Recommended Controllers

E00/E01	E52	E53
		
1 channel Digital, analog Open/closed loop Ave. current: 291mA	1 channel Analog Open/closed loop Ave. current: 300mA	1 channel Digital, analog Open/closed loop Ave. current: 60mA

Note: Please see "Piezo Controller" for detailed information.

XD730.100 Piezo Objective Scanner



XD730.100 Piezo Objective Scanner is a Z-motion platform designed for large loads and 100-micron travel. Its travel range is up to 100μm and its carrying capacity is up to 0.5kg. It is very suitable for nano-scale objective motion control.

▸ Characteristics

• Motion in Z • Travel up to 100μm • Load capacity up to 0.5kg • Optional closed-loop sensor • Customizable

▸ Application

• Focus microscopy
• Laser processing
• Z-direction positioning and scanning
• Surface structure analysis
• Interference/metrology
• Semiconductor testing

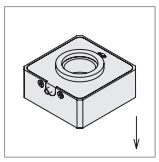
▸ Technical Data

Type	XD730.100S	XD730.100K	Units
Active axes	Z	Z	
Drive control	1 driving channel , 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)	80	80	μm±10%
Max.travel range(0~150V)	100	100	μm±10%
Sensor	SGS	-	
Resolution	<10	1	nm
Linearity	0.06	-	%F.S.
Repeatability	0.01	-	%F.S.
Unloaded resonant frequency	450	450	Hz±20%
Unloaded step time	30	2	ms±20%
Load capacity	500	500	g
El.capacitance	6.8	6.8	μF±20%
Material	Steel, Aluminum	Steel, Aluminum	
Mass	190	190	g±5%

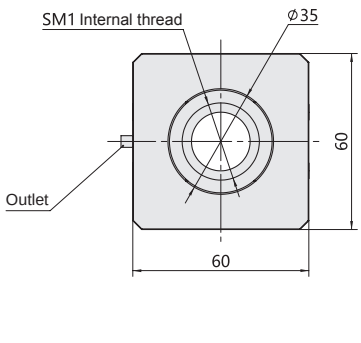
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing

XD730.100S/K







XD730.400S/K Piezo Objective Scanner



The XD730.400S/K Piezo Objective Scanner is a Z axis objective lens drive platform. The load capacity can reach 0.5kg, which is very suitable for static positioning applications.

Characteristics

- Z axis motion
- Large range of travel
- Load up to 0.5kg
- Optional closed loop sensor

Application

- Focus microscopy
- Laser processing
- Z-direction positioning and scanning
- Surface structure analysis

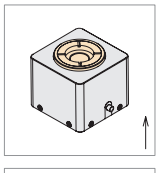
Technical Data

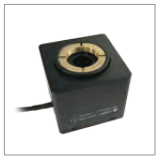
Type	XD730.400S	XD730.400K	Units
Active axes	Z	Z	
Drive control	1 driving channel , 1 sensing channel	1 driving channel	
Travel range(0~120V)	400	400	μm±10%
Max.travel range(0~150V)	500	500	μm±10%
Sensor	SGS	-	
Resolution	14	4	nm
Linearity	0.2	-	%F.S.
Repeatability	0.05	-	%F.S.
Unloaded resonant frequency	150	150	Hz±20%
El. capacitance	28.8	28.8	μF±10%
Load capacity	0.5	0.5	kg
Material	Aluminium, steel	Aluminium, steel	
Mass	520	520	g±5%

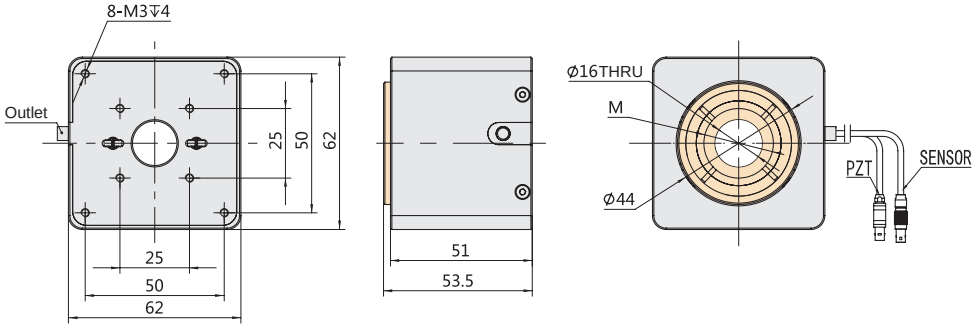
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

Drawing

XD730.400S/K







M(Model)
M26×0.75
M26×1/36"
M27×0.75
M25×0.75
W0.8×1/36"

XD730.500S/K Piezo Objective Scanner



XD730.500 piezo objective scanner features high load capacity, long travel and high accuracy, and is ideal for various optical microscopy applications.

▸ Characteristics

• Motion in Z • High load capacity • Long travel • High accuracy • Optional sensor

▸ Applications

• Focus Microscopy • Laser Machining • Z Positioning and Scanning • Surface Structure Analysis

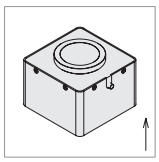
▸ Technical Data

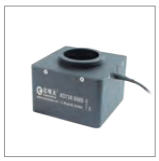
Type	XD730.500S	XD730.500K	Units
Active axes	Z	Z	
Drive control	1 driving channel , 1 sensing channel	1 driving channel	
Nominal travel range(0~120V)	400	400	μm±10%
Max.travel range(0~150V)	500	500	μm±10%
Sensor	SGS	-	
Resolution	17	5	nm
Linearity	0.12	-	%F.S.
Repeatability	0.03	-	%F.S.
Unloaded resonant frequency	310	310	Hz±20%
Resonant frequency @500g	155	155	Hz±20%
El.capacitance	30	30	μF±10%
Load capacity	0.5	0.5	kg
Material	Al, Steel	Al, Steel	
Mass	590	590	g±5%

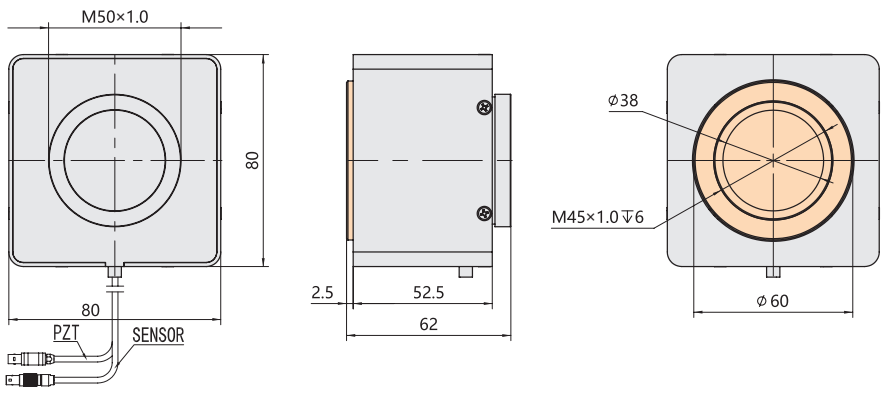
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing

XD730.500S/K







XP-721 Piezo Objective Scanner

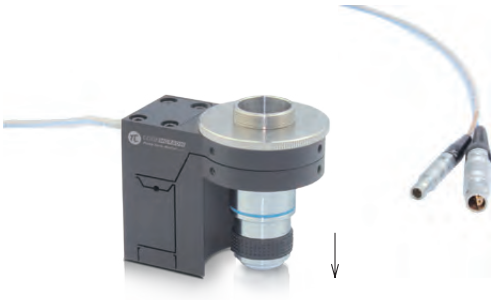


XP-721 is a small-volume piezo objective positioner with a separate thread adapter design that can be used with a variety of microscopes.

Characteristics

- Z travel to 100μm
- Load capacity to 200g
- Millisecond response
- Closed loop for high repeatability

Motion in Z



Typical Applications

- 3D imaging
- Surface structure analysis
- Biotechnology
- Interference/metering
- Confocal microscopy
- Semiconductor testing

Thread Adapter for Easy Integration

XP-721 objective positioner is connected to the objective lens through an adapter to quickly make the objective lens in the desired position. A variety of thread adapters are available, such as M27×0.75, M26×0.75, M26×1/36”, M25×0.75, W0.8×1/36”, etc., custom is available.

Quick Installation, High Stability

XP-721 piezo objective scanner is compact and cost-effective, and can be matched with many types of microscope objectives on the market.

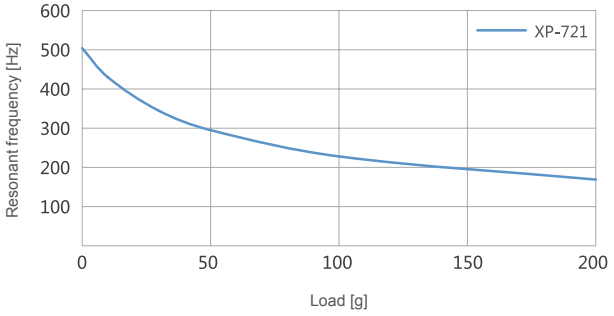
The product is mounted between the lens mount and the objective lens via a threaded adapter. The objective scanner body is threaded onto the lens turret and the objective lens is attached to the scanner. This design eliminates the need to remove the other components when removing the objective lens.

Application Example

XP-721 piezo objective scanner is mounted in an inverted optical microscope.



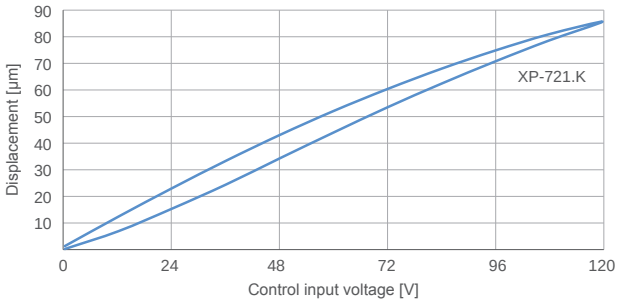
Frequency vs Load Curve



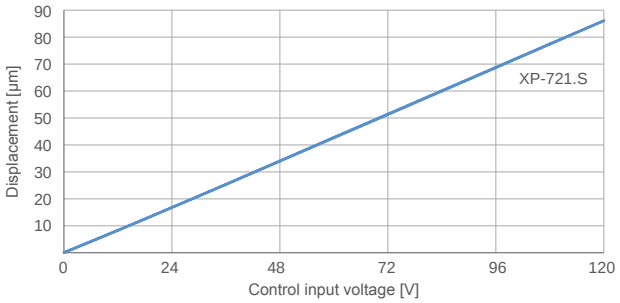
Recommended Controllers

E00/E01	E53	XE-650
		
1 channel Digital, analog Open/closed loop Ave. current: 291mA	1 channel Digital, analog Open/closed loop Ave. current: 60mA	1 channel I/O, analog Open/closed loop Ave. current: 50mA
Note: Please see "Piezo Controller" for detailed information.		

Open-Loop Curve

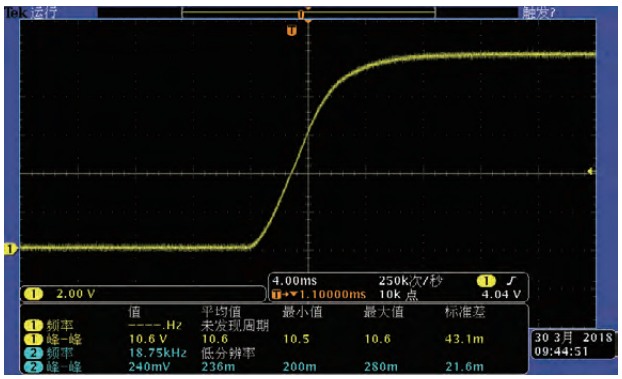


Closed-Loop Curve



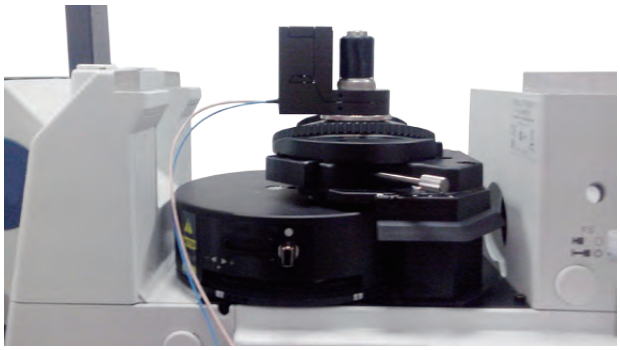
Step Time

XP-721.S has a load step time of about 10ms.



Application Example

XP-721 piezo objective scanner is integrated into sample microscopy.



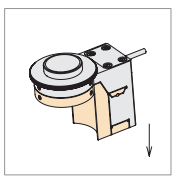
Technical Data

Type	S-Closed loop K-Open loop	XP-721.S XP-721.K	Units
Active axes		Z	
Drive control		1 driving channel 1 sensing channel	
Travel range(0~120V)		80	µm±10%
Max.travel range(0~150V)		100	µm±10%
Sensor		SGS/-	
Resolution		3/1	nm
Linearity		0.2/-	%F.S.
Repeatability		0.1/-	%F.S.
Push/pull force		30/10	N
Stiffness		0.3	N/µm±20%
Unloaded resonant frequency		500	Hz±20%
Unloaded step time		10/2	ms±20%
Load capacity		0.2	kg
El. capacitance		3.6	µF±20%
Material		Aluminum	
Mass		250	g±5%

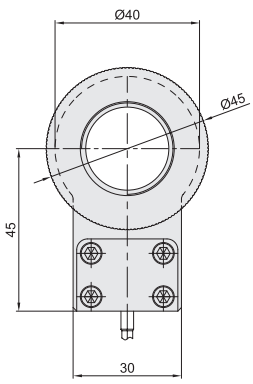
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

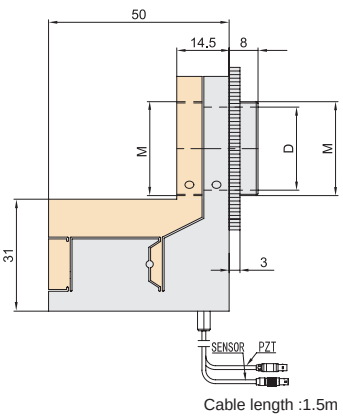
Drawing

XP-721









Cable length :1.5m

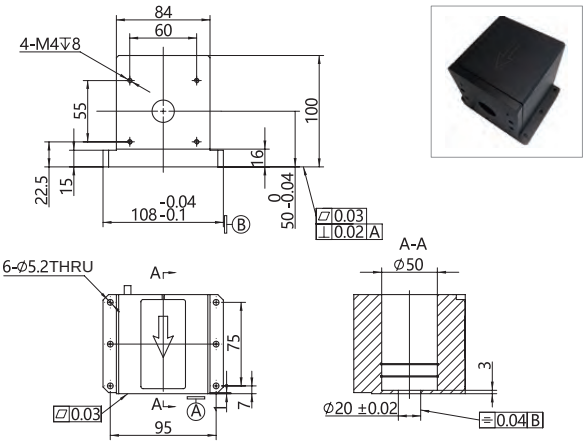
M(Model)	D
M26×0.75	Ø23
M26×1/36"	Ø23
M27×0.75	Ø24
M25×0.75	Ø22
W0.8×1/36"	Ø17

H11.X150 Piezo Objective Scanner

▸ Technical Data

Type	H11.X150S/K	Units
Active axes	Z	
Drive control	1 driving channel 1 sensing channel	
Sensor	SGS/CAP	
Travel range(0~150V)	150	μm±20%
Load capacity	2	kg±5%
Size	Ø25~Ø50	mm
Resolution(5mV)	2/5	nm±20%
Unloaded resonant frequency	400	Hz±20%
Loaded resonant frequency@2kg	36	Hz±20%
El. capacitance	29	μF±20%
Material	Steel, Al	
Mass(with no cable)	1.8	kg±5%

▸ Drawing

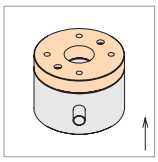


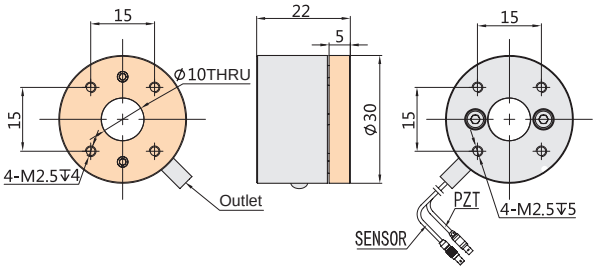
21062 Piezo Objective Scanner

▸ Technical Data

Type	21062	Units
Active axes	Z	
Travel range(0~150V)	7	μm±20%
Sensor	SGS	
Aperture	Φ10	mm
Size	Φ30×22	mm
Resolution	0.5/0.2	nm±20%
Closed-loop linearity	0.5	%F.S.±20%
Repeatability	0.2	%F.S.±20%
Stiffness	50	N/μm±20%
Push/pull force	350/20	N
Unloaded resonant frequency	6	kHz±20%
Load capacity	500	g
El. capacitance	0.8	μF±20%
Material	Steel	

▸ Drawing



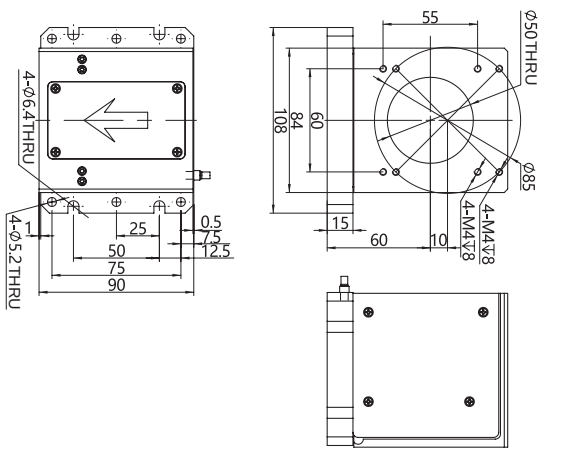


22129-1 Piezo Objective Scanner

▸ Technical Data

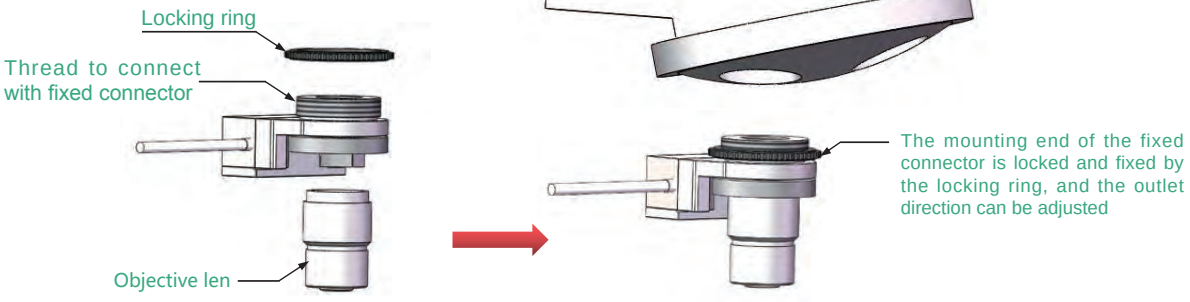
Type	22129-1	Units
Active axes	Z	
Sensor	SGS	
Travel range(0~150V)	200	μm±20%
Load capacity	2	kg±5%
Resolution	3	nm±20%
Size	Ø25~Ø50	mm
Unloaded resonant frequency	100	Hz±20%
Loaded resonant frequency@2kg	40	Hz±20%
Closed-loop resolution(@5mV ripple)	10	nm±20%
Linearity	0.2	%F.S.
Repeatability	0.15	%F.S.
El.capacitance	36	μF±20%
Material	Steel, Al	
Mass(not include cable)	<1.8	kg±5%

▸ Drawing



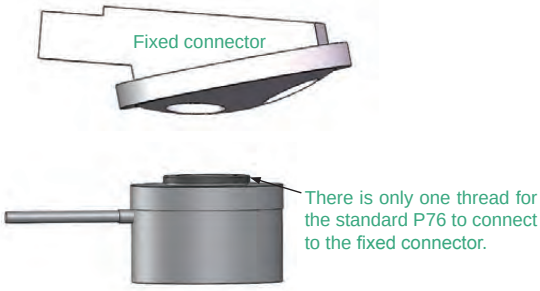
Installation

P72

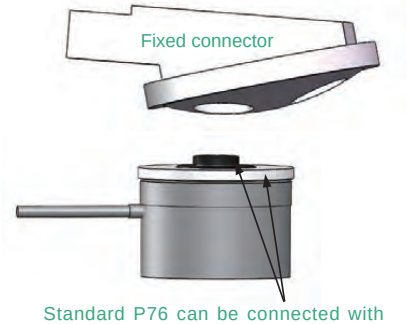


P76

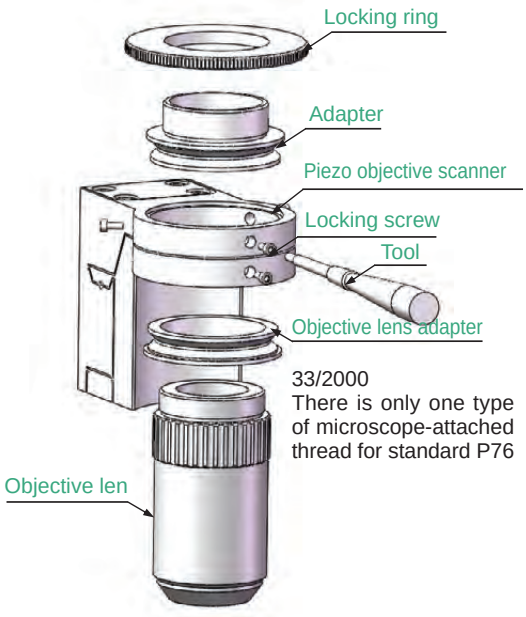
The outlet direction of the standard P76 is random



After adding the adapter to the standard P76, its outlet direction can be adjusted.

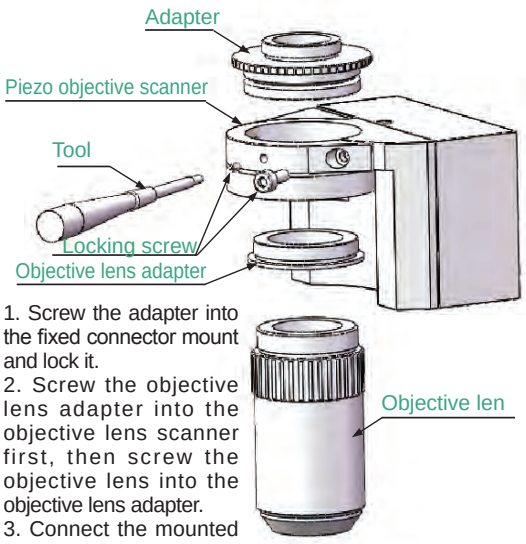


XP-721



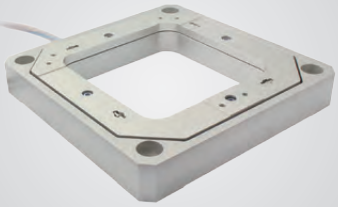
33/2000
There is only one type of microscope-attached thread for standard P76

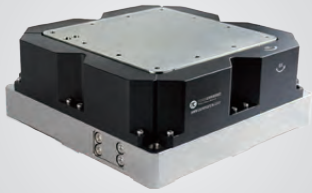
P73



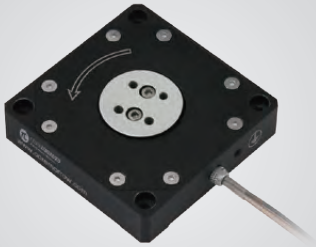
1. Screw the adapter into the fixed connector mount and lock it.
2. Screw the objective lens adapter into the objective lens scanner first, then screw the objective lens into the objective lens adapter.
3. Connect the mounted objective scanner with the adapter, and lock the locking screw with the tool.

Piezo Z/Tip/Tilt/Rotation Stage









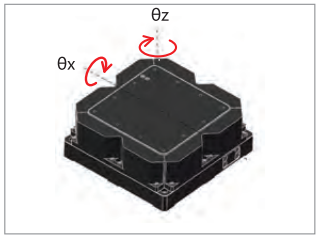
Based on piezoelectric ceramics as the driving source, Piezo Z and Tip/Tilt/Rotation Stages can generate θx, θy, θz or/and XYZ motion.



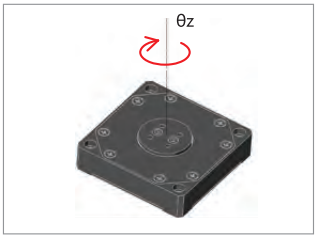
Piezo Z/Tip/Tilt/Rotation Stages

Piezo Z and Tip/Tilt/Rotation Stages are precisely angular and linear motion stages, drived by piezoelectric ceramic actuator. The internal flexible hinge parallel structure design ensures excellent deflection accuracy, high stability and fast response. It is very suitable for laser beam scanning and optical path adjustment such as laser beam combining.

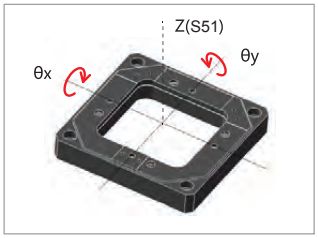
▸ Motion Directions: θx, θy, θz, X, Y, Z



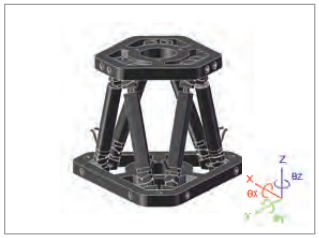
S50



S21/S20

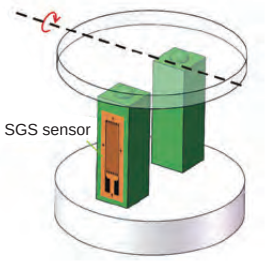


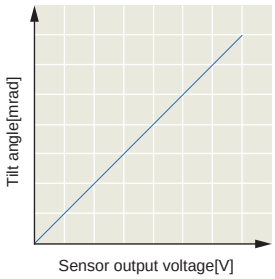
S54/S51



H61/H60

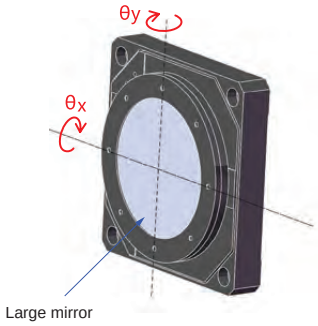
▸ Optional Sensor for High Accuracy



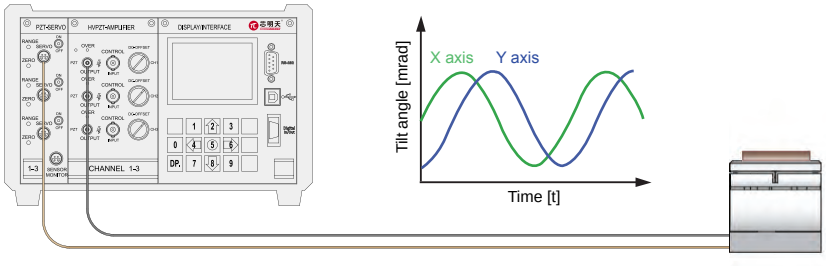


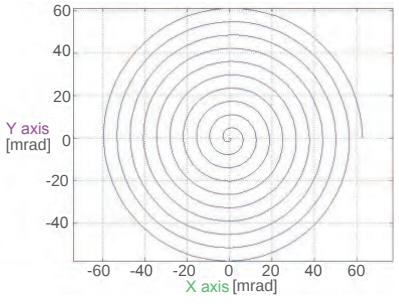
▸ Large Aperture, Large Load Capacity

Piezoelectric ceramic drive and high-stiffness structure make it can carry up to 125mm outer diameter lens.

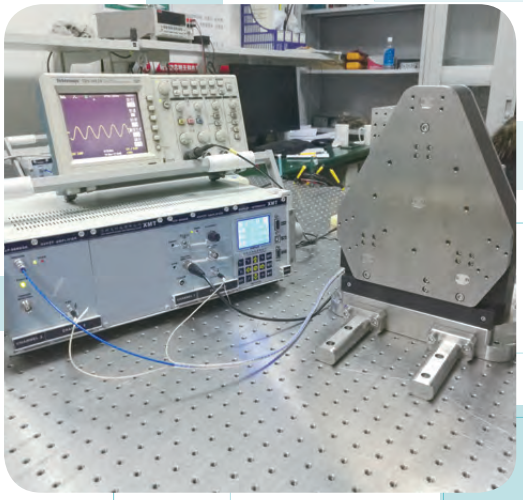


▸ Driving and Control

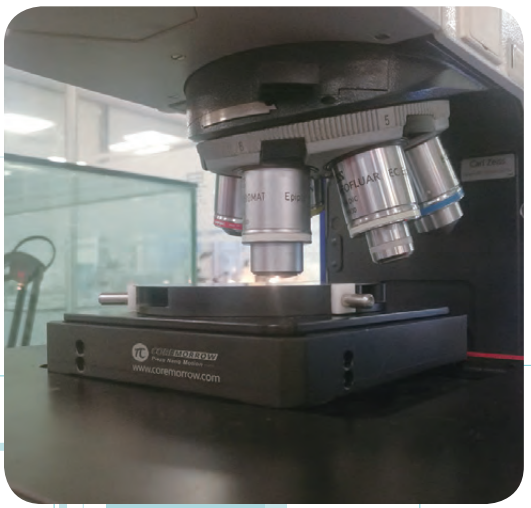




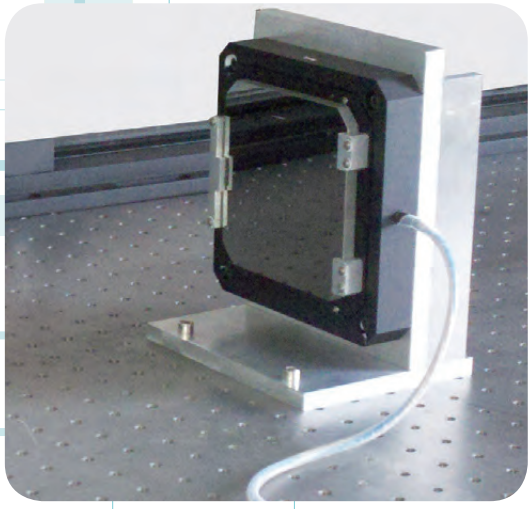
▸ Applications



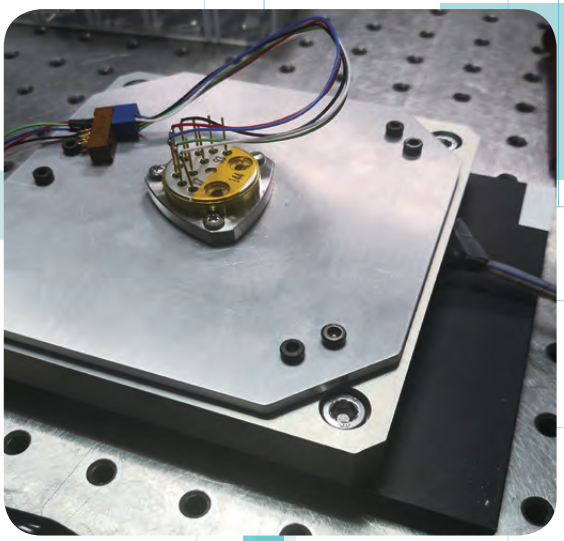
Vibration Simulation



Sample Leveling and Focusing



Laser Beam Adjustment



Sensor Calibration

▶ Product List

Type	Active axes	Max.travel range	Resolution	Page
S20.R0	θz	0.5mrad(≈100″)	0.05μrad(≈0.01″)	285
S21.R3	θz	3mrad(≈618″)	0.03μrad(<0.01″)	287
S21.R7	θz	7.5mrad(≈1500″)	0.1μrad(≈0.02″)	288
S50.U0C/K	θx	0.19mrad(≈39″)	-	290
S50.U0C/K-D	θx	0.5mrad(≈100″)	0.01μrad(<0.01″)	291
S50.UR0C/K	θx, θz	0.5mrad(≈100″)/axis	0.01μrad(<0.01″)	292
S50.UR0C/K-A	θx, θz	0.3mrad(≈62″)/axis	0.01μrad(<0.01″)	294
S50.UR1S/K	θx, θz	1.3mrad(≈268″)/axis	0.03μrad(<0.01″)	295
S51.ZT0S/K	θx, θy Z	±0.4mrad(≈±82″)/axis 110μm	0.1μrad(≈0.02″) 3nm	296
S51.ZT1S/K	θx, θy Z	±1.1mrad(≈±220″)/axis 100μm	0.05μrad(≈0.01″) 4nm	297
S51.ZT1S/K-C	θx, θy Z	±1.1mrad (≈±220″)/axis 110μm	0.05μrad(≈0.01)″ 4nm	299
S51.ZT2S/K-C	θx, θy Z	±2mrad(≈±412″)/axis 240μm	0.06μrad(≈0.01″) 2nm	300
S52	θx, θy Z	±1.37mrad(≈±282.5″)/axis 217μm	0.04μrad(<0.01″) 2nm	301
S54.T0S/K	θx θy	±0.5mrad(≈±103″) ±0.62mrad(≈±128″)	0.015μrad(<0.01″) 0.02μrad(<0.01″)	302
S54.T0S/K-C	θx, θy	±0.35mrad(≈±72″)/axis	0.1μrad（≈0.02″)	303
S54.T1S/K-C	θx θy	±1mrad(≈±206″) ±0.75mrad(≈±155″)	0.03μrad(<0.01″)	304
S54.T2	θx, θy	±1mrad(≈±200″)/axis	0.05μrad(≈0.01″)	305
S54A.T3S/K112	θx, θy	±1.5mrad(≈±309″)/axis	0.2μrad(≈0.04″)	307
S55	θx, θy	±0.16mrad(≈±33″)/axis	0.1μrad(≈0.02″)	308
H30.XY100R2	X, Y θz	±70μm/axis 2mrad(≈413″)	2nm 0.1μrad(≈0.02″)	309
H32.TR4	θx, θy θz	±2.3mrad(≈±475″)/axis 3.2mrad(≈660″)	0.07μrad(≈0.01″) 0.05μrad(≈0.01″)	310
H60.XYZTR1	θx, θy θz X, Y Z	±0.16mrad(≈±30″)/axis ±0.24mrad(≈±50″) ±6.5μm/axis ±3.2μm	0.01μrad(<0.01″) 0.02μrad(<0.01″) 0.4nm 0.2nm	311
H60.XYZTR3	θx, θy θz X, Y Z	±0.32mrad(≈±66″)/axis ±0.48mrad(≈±99″) ±12.5μm/axis ±6.4μm	0.02μrad(<0.01″) 0.03μrad(<0.01″) 0.8nm 0.4nm	311
H60.XYZTR5	θx, θy θz X, Y Z	±0.6mrad(≈±123″)/axis ±0.8mrad(≈±165″) ±40μm/axis ±27.5μm	better than the 0.5μrad(0.1″) better than the 0.5μrad(0.1″) better than the 0.5nm better than the 0.5nm	311
H61.XYZTR0S/K-A	θx, θy θz X, Y Z	±0.35mrad(≈±72″)/axis ±0.15mrad(≈±31″) ±40μm/axis 35μm	0.01μrad(<0.01″) 0.01μrad(<0.01″) 1nm 0.5nm	313
H61.XYZTR0S/K	θx, θy θz X, Y Z	±0.25mrad(≈±51″)/axis 0.15mrad(≈31″) 125μm/axis 31μm	0.5μrad(≈0.1″) 0.5μrad(≈0.1″) <10nm 2.5nm	313
H63	θx, θy, θz X, Y, Z	0.8mrad(≈165″)/axis 4.8μm/axis	0.01μrad(<0.01″) 0.1nm	314

▶ Product List

Type	Active axes	Max.travel range	Resolution	Page
H63A	θx, θy θz X, Y Z	±12.5mrad(≈±2578″)/axis 1.6mrad(≈330″) ±100μm/axis 200μm	0.25μrad(≈0.05″) 0.01μrad(<0.01″) 2nm 2nm	315
H64	θx, θy, θz X, Y, Z	0.4mrad(≈83″)/axis 1.6mrad(≈330″) 18μm/axis 37.5μm	4nrad(<0.01″) 16nrad(<0.01″) 0.2nm 0.4nm	315
XD500.T0	θx, θy	±0.29mrad(≈±60″)/axis	0.1μrad(≈0.02″)	316
XD500.T4	θx, θy	±2mrad(≈±413″)/axis	0.1μrad(≈0.02″)	317
XD503	θx, θy	±5mrad(≈±1000″)/axis	0.1μrad(≈0.02″)	318
XD504	θx, θy	±1mrad(≈±200″)/axis	0.5μrad(≈0.1″)	318
XD505	θx, θy	±0.18mrad(≈±37″)/axis	0.003μrad(<0.01″)	319
20060	θx, θy	±1.25mrad(≈±257″)/axis	0.05μrad(≈0.01″)	320
21031	θz	2mrad(≈413″)	0.02μrad(≈0.01″)	320
21075	θx, θy Z	±2mrad(≈±413″)/axis 250μm	0.05μrad(≈0.01″) 10nm	320
21087	θx, θy	0.5mrad(≈103″)/axis	0.01μrad(<0.01″)	321
21101	θz	1.5mrad(≈309″)	0.03μrad(<0.01″)	322
21180	θx, θy Z	±1mrad(≈±200″)/axis 500μm	0.3μrad(≈0.06″) 67nm	322
21205	θx, θy	±3.5mrad(≈722″)/axis	-	322
22033	θz	1mrad(≈200″)	0.03μrad(<0.01″)	323
22038	X, Y θz	50μm/axis 9mrad(≈1856″)	0.5nm 0.1μrad(≈0.02″)	323
22044	θx, θy	20"/axis	0.1μrad(≈0.02″)	323
22064	θx	0.3mrad(≈62″)	-	324
22104	θx, θy	1.5mrad(≈309″)/axis	0.5μrad(≈0.1″)	324

S20 Piezo Rotation Stage



The S20 piezo rotation stage with a diameter of 20mm central aperture, features compact size, a rotation angle of 0.5mrad and closed-loop repeatability of 0.2%F.S.

▸ Characteristics

• Rotation angle range to 0.5mrad • Aperture diameter: Ø20mm • Closed loop for high accuracy • Fast response • Small size

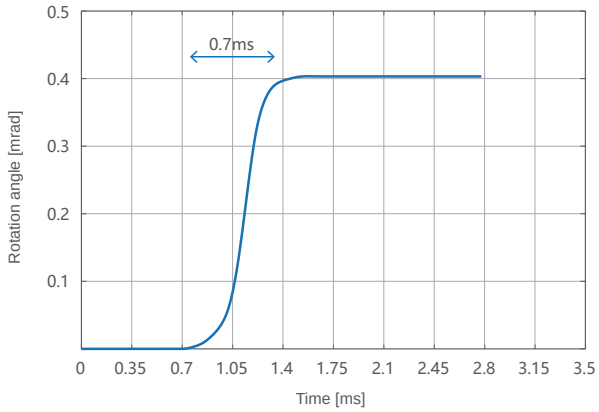
▸ θz Rotation



▸ Large Load Capacity

S20 has a maximum rotation angle of 0.5mrad. The excellent hinge guiding mechanism design features a load capacity of up to 4kg and high stability. It is very suitable for applications like scientific research and industrial precision operation, optical path adjustment, etc.

▸ Short Step Time

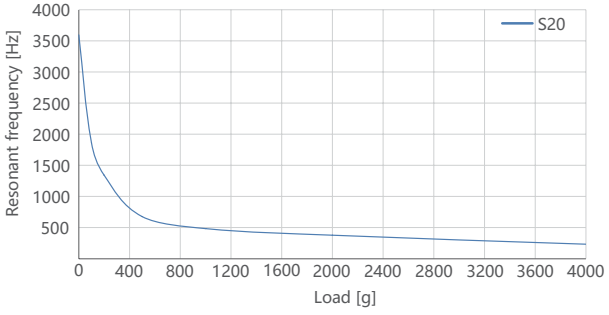


▸ Mini, Aperture,High Resolution & Reliability

S20 is a θz high-precision rotating platform, and its rotating axis is located in the center. The center aperture is suited for transmitted-light applications. The finite element analysis is used to optimize the microstructure to meet the dynamic and guiding accuracy.

The high-reliability piezoelectric ceramic is used as the driving component, and the flexible hinge mechanism features frictionless, high resolution and reliability. OEM custom is available.

▸ Frequency and Load Curve



▸ Recommended Controllers

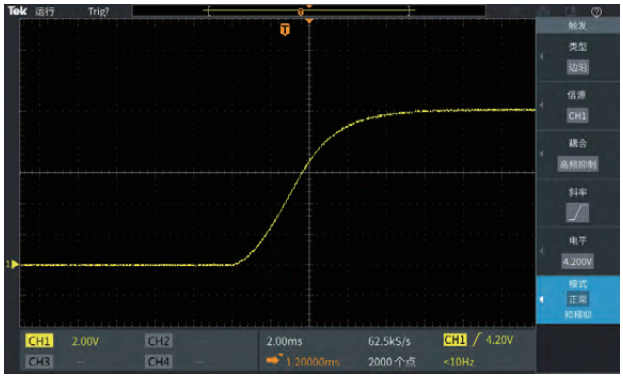
E01	E53	E52
		
1 channel Digital, analog Open/closed loop Ave. current 291mA	1 channel Digital, analog Open/closed loop Ave. current 60mA	1 channel Analog Open/closed loop Ave. current 300mA
Note: Please see "Piezo Controller" for detailed information.		

Typical Applications

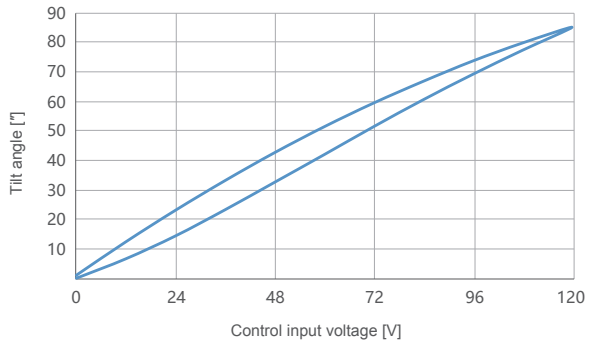
- Fiber alignment
- Micro-operation
- Sensor calibration
- Materials Science
- Image stabilization
- Optical path

Step Time

The unloaded step time of S20.R0S to 100% rotation angle is about 8ms.



Open-Loop Curve



Positioning Accuracy



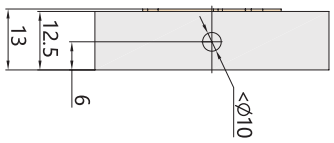
Technical Data

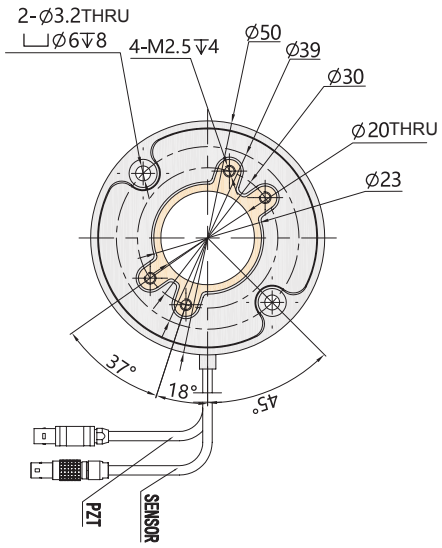
Type	S - closed loop K - open loop	S20.R0S S20.R0K	Units
Active axes		θz	
Drive control		1 driving channel 1 sensing channel	
Rotation angle(0~120V)		0.4(≈80″)	mrad±20%
Max.rotation angle(0~150V)		0.5(≈100″)	mrad±20%
Integrated sensor		SGS/-	
Resolution		0.25(≈0.5″) /0.05(≈0.01″)	μrad
Closed-loop linearity		0.5/-	%F.S.
Closed-loop repeatability		0.2/-	%F.S.
Push/pull force		50/10	N
Stiffness		5	N/μm±20%
Unloaded resonant frequency		3.5	kHz±20%
Unloaded step time		8/0.7	ms±20%
Load capacity		4	kg
El. capacitance		1.6	μF±20%
Material		Steel	
Mass		140	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

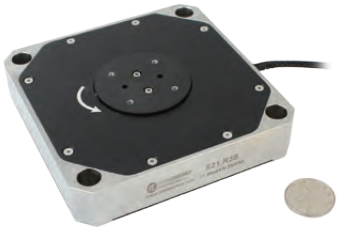
Drawing

S20.R0S/K





S21.R3S/K Piezo Rotation Stage



S21.R3 piezo rotation platform moves in θz, it's very compact and easy to integrate.

▸ Characteristics

• θz rotation • Rotation range to 3mrad • Closed loop for high accuracy • Fast response • Small size

▸ Typical Applications

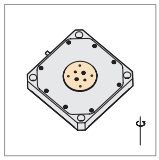
• Optical path adjustment • Interference/Metrology • Beam scanning • Sensor calibration

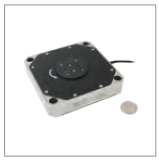
▸ Technical Data

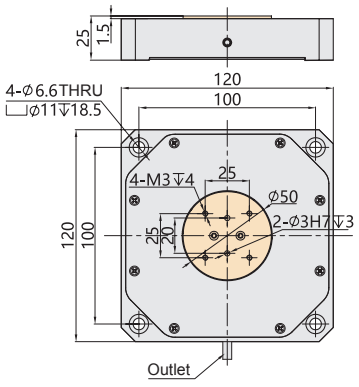
Type	S21.R3S	S21.R3K	Units
Active axes	θz	θz	
Drive control	1 driving channel , 1 sensing channel	1 driving channel	
Integrated sensor	SGS	-	
Rotation angle(0~120V)	2.4	2.4	mrad±20%
Max.rotation angle(0~150V)	3	3	mrad±20%
Resolution	0.3	0.03	μrad±20%
Closed-loop linearity	0.3	-	%F.S.
Closed-loop repeatability	0.1	-	%F.S.
Unloaded resonant frequency	700	700	Hz±20%
Resonant frequency@0.5kg load	120	120	Hz±20%
Load capacity	0.5	0.5	kg
El. capacitance	5.4	5.4	μF±20%
Material	Aluminum, Steel	Aluminum, Steel	
Mass(not include cable)	1635	1635	g±5%

▸ Drawing

S21.R3S/K





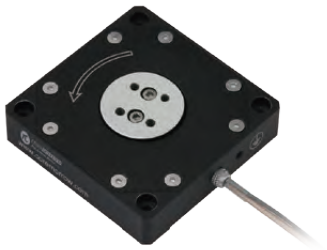


▸ Recommended Controllers

E01	E53	E52
		
1 channel Digital, analog Open/closed loop Ave. current 291mA	1 channel Digital, analog Open/closed loop Ave. current 60mA	1 channel Analog Open/closed loop Ave. current 300mA

Note: Please see "Piezo Controller" for detailed information.

S21.R7S/K Piezo Rotation Stage



S21 piezoelectric rotation stage is a θz rotation stage with small size, a rotation angle of 7.5mrad and a load capacity of 0.1kg, which can drive the lens to make precise rotation motion.

▸ Characteristics

• θz rotation • Rotation range to 7.5mrad • Closed loop for high accuracy • Fast response • Small size

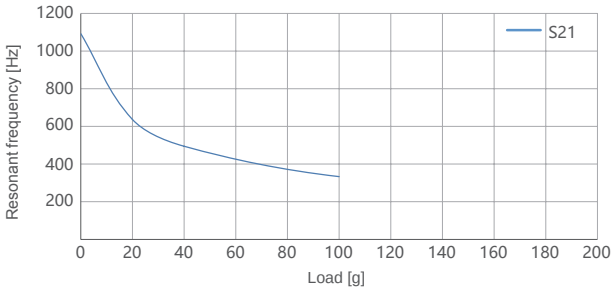
▸ Typical Applications

• Optical path adjustment • Interference/Metrology
• Beam scanning • Sensor calibration

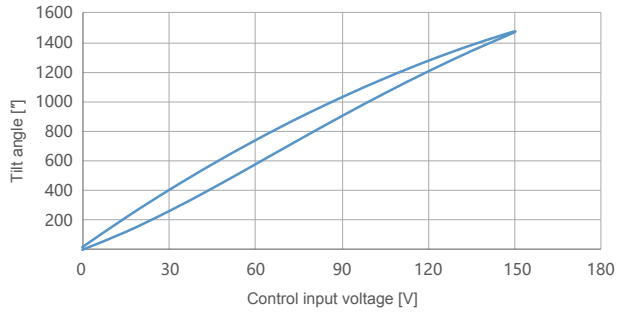
▸ High Resolution and Accuracy

S21 rotation stage adopts the principle of mechanism amplification design. Piezoelectric ceramic is used as the driving component, and the stage body adopts a flexible hinge mechanism, which has no friction, and can achieve a resolution of 0.2 μrad. The closed-loop version with built-in SGS sensor can realize the positioning accuracy of micro-radians and plays a very important role in the precise adjustment of the optical path.

▸ Frequency and Load Curve



▸ Open-Loop Curve



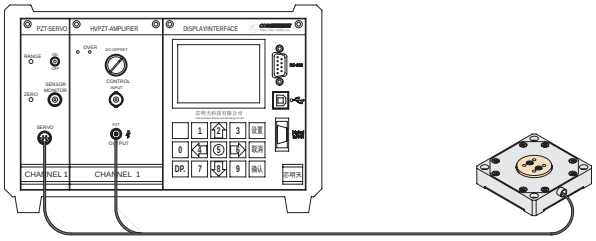
▸ Application Example

S21 piezo rotation stage can be used with CoreMorrow any linear or tilting stage to form a multi-axis precision positioning operations.



▸ Driving and Control

S21 rotation stage needs a piezo controller with 1-channel voltage output. The P21 closed-loop version equipped with E01 series closed-loop controller realizes θz high-precision rotary positioning control.

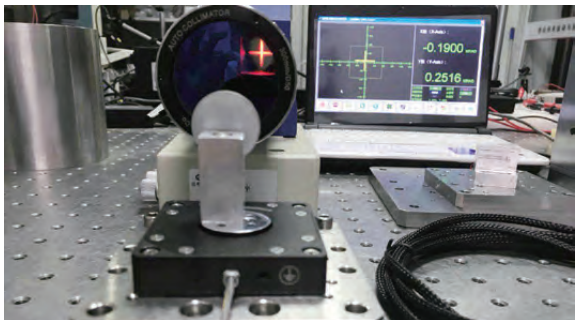


▸ Recommended Controllers

E01	E53	E52
		
1 channel Digital, analog Open/closed loop Ave. current 291mA	1 channel Digital, analog Open/closed loop Ave. current 60mA	1 channel Analog Open/closed loop Ave. current 300mA
Note: Please see "Piezo Controller" for detailed information.		

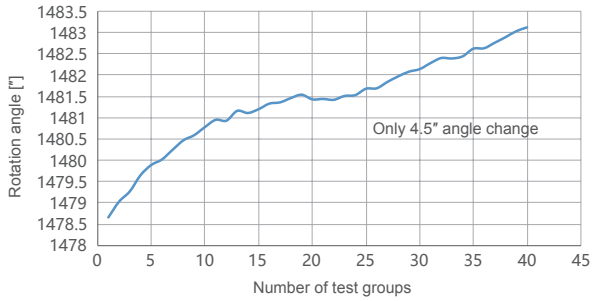
Tilt Angle Measuring

The tilt angle range of the S21.R7S is measured by a laser collimator.



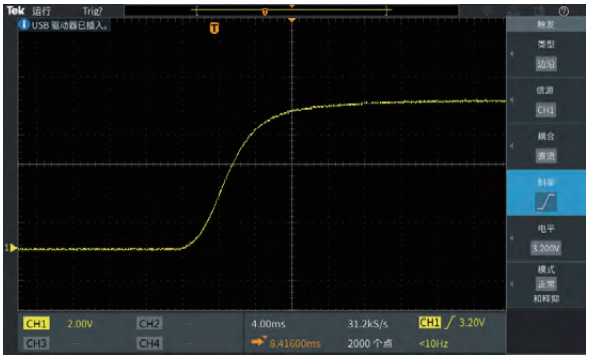
Angle Stability

40 groups are tested for the rotation angle range of S21.R7S, and the max rotation angle difference was about 4.5″.



Step Time

Drived by E53.D1 piezo controller, the loaded step time of S21. R7S is about 30ms.



Positioning Accuracy



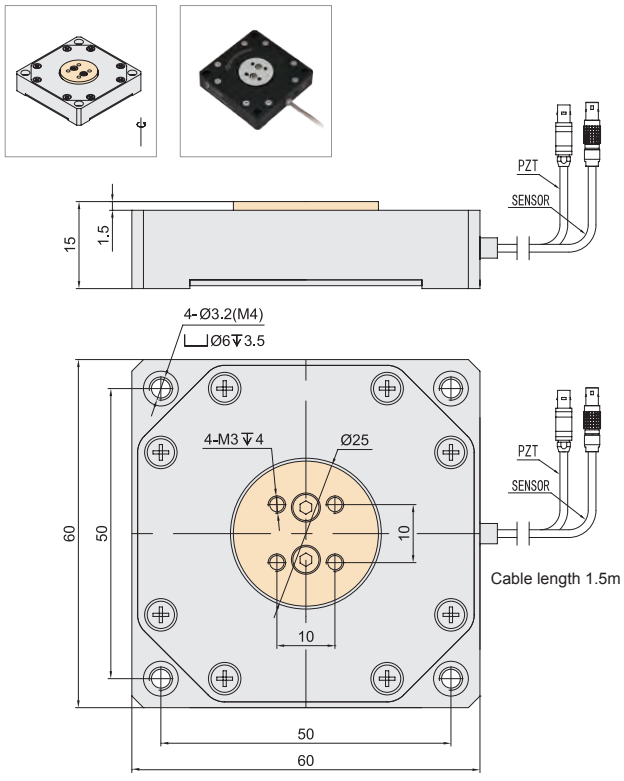
Technical Data

Type	S - closed loop K - open loop	S21.R7S S21.R7K	Units
Active axes		θz	
Drive control		1 driving channel 1 sensing channel	
Rotation angle(0~120V)		6(≈1240″)	mrad±10%
Max.rotation angle(0~150V)		7.5(≈1500″)	mrad±10%
Integrated sensor		SGS/-	
Resolution		0.2(≈0.04″) /0.1(≈0.02″)	μrad
Closed-loop linearity		0.5/-	%F.S.
Closed-loop repeatability		0.2/-	%F.S.
Push/pull force		10/5	N
Stiffness		1	N/μm±20%
Unloaded resonant frequency		1.1	kHz±20%
Unloaded step time		30/1.5	ms±20%
Load capacity		0.1	kg
El. capacitance		1.8	μF±20%
Material		Aluminum	
Mass		105	g±5%

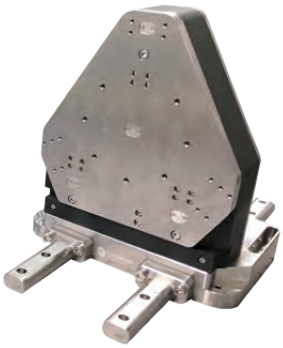
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

Drawing

S21.R7S/K



S50.U0C/K Large-Load Piezo Tilt Stage



The S50.U0C/K piezo stage is an X deflection stage, which is specially designed for heavy load applications. It features 7kg load capacity, the deflection angle under 100V driving voltage of 0.19mrad, and the corresponding closed-loop step time of 17ms.

▸ Characteristics

- θx deflection
- 7kg load capacity
- Capacitive closed-loop sensor
- Unloaded resonant frequency up to 1kHz

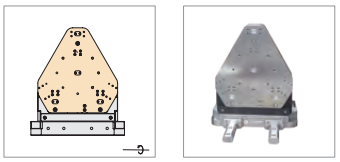
▸ Technical Data

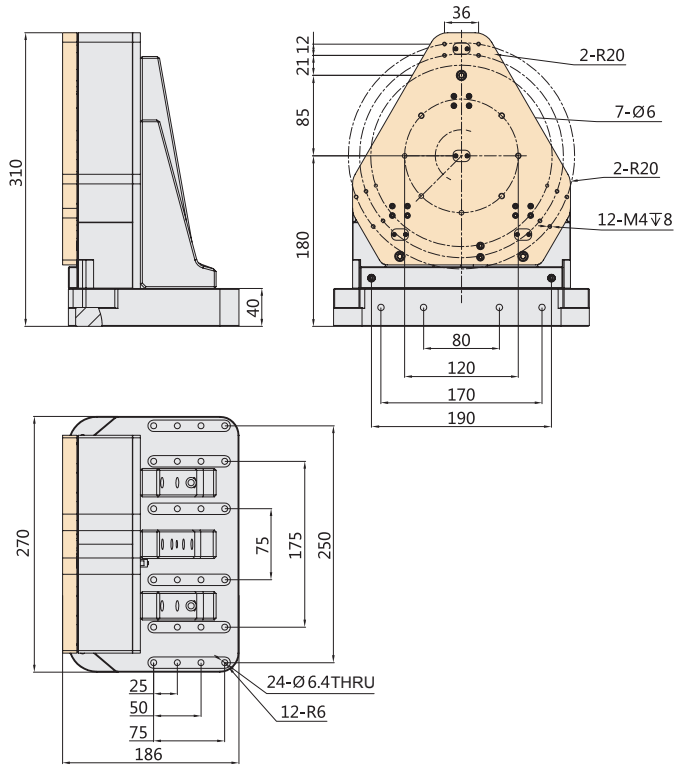
Type	S50.U0C/K	Units
Active axes	θx	
Drive control	2 driving channels 1 sensing channel	
Tilt angle@100V	0.19	mrad±10%
Integrated sensor	CAP/-	
Closed-loop linearity	1.25/-	%F.S.
Closed-loop repeatability	1/-	%F.S.
Unloaded resonant frequency	1000	Hz±20%
Resonant frequency @7kg load	210	Hz±20%
Closed/open-loop step time	17/16	ms±20%
Load capacity	7	kg
El. capacitance	40	μF±20%

Note: The above parameters are measured using E00/E01 piezo controllers. The max driving voltage can be -20~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~100V.

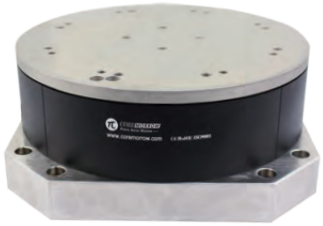
▸ Drawing

S50.U0C/K





S50.U0C/K-D Piezo Tilt Stage



S50.U0C/K-D is a 1-axis θx piezo stage, featuring load capacity of 60kg, and tilt angle of ±0.25mrad. It uses capacitive closed-loop sensor with resolution of up to 10nrad and can work at high frequencies at load of 20kg. It is very suitable for large-load motion experiments.

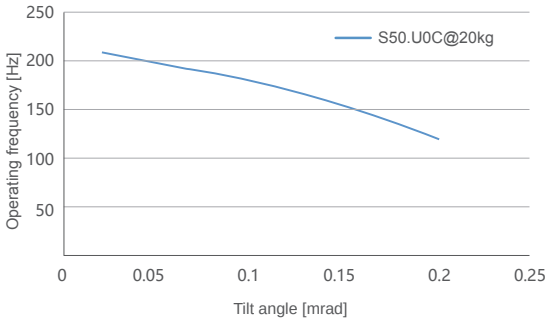
Characteristics

- Tilt in θx
- Load to 60kg
- Tilt angle to 0.5mrad@150V
- Operating frequency to 210Hz@±0.01mrad

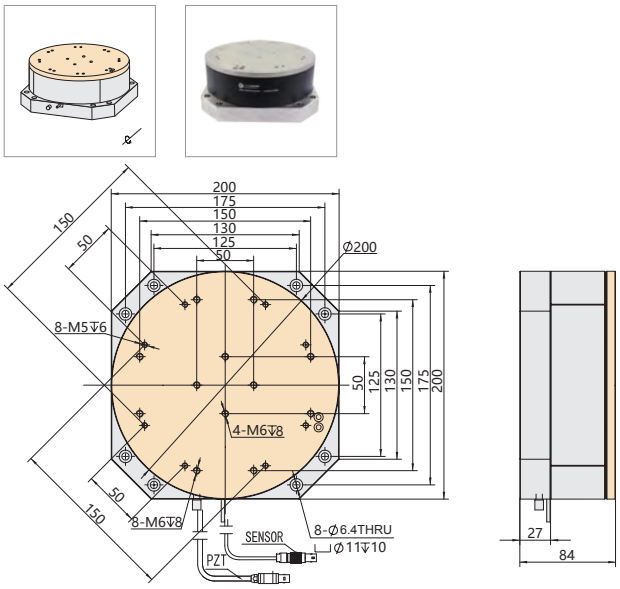
Applications

- Beam scanning
- Heavy load motion experiment
- Interference/metering
- Vibration simulation system

Tilt Angle vs Operating Frequency



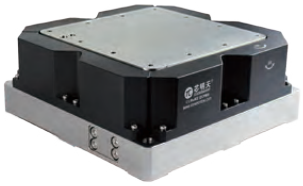
Drawing



Technical Data

Type		S50.U0C/K-D				Units
Active axes		θx				
Drive control		2 driving channels , 1 sensing channel				
Tilt angle(0~120V)		0.4(≈80″)				mrad±10%
Max.tilt angle(0~150V)		0.5(≈100″)				mrad±10%
Integrated sensor		CAP/-				
Resolution		0.02/0.01(<0.01″)				μrad
Closed-loop linearity		0.3/-				%F.S.
Closed-loop repeatability		0.3/-				%F.S.
Unloaded resonant frequency		750				Hz±20%
Unloaded step time		30/15				ms±20%
Tilt angle vs operating frequency @20kg load	Angle	±0.1	±0.05	±0.02	±0.01	mrad±20%
	Frequency	0~120	0~180	0~200	0~210	Hz±20%
Load capacity		60				kg
El. capacitance		30				μF±20%
Material		Aluminum, Steel				
Cable length		1.5				m±10mm

S50.UR0C/K Piezo Tilt/Rotation Stage





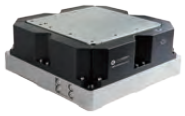
Vacuum version(SGS)

S50.UR0C/K is a θx and θz axes tilt/rotation stage, with super large load capacity of up to 40kg and deflection angle of ±0.25mrad. It can work in dynamics with a 20kg load. The products are mainly used in large load tilt/rotation motion experiments, such as vibration simulation experiments.

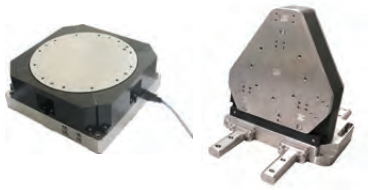
▸ Characteristics

- θx, θz motion
- Tilt angular range to ±0.25mrad
- Load capacity to 40kg
- CAP sensor
- High response

▸ θx, θz Motion



Standard



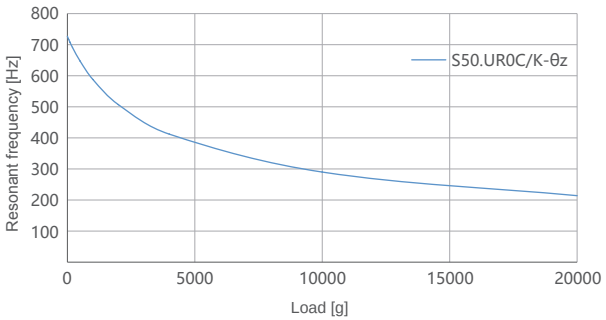
Custom is available

▸ Large Load, High Accuracy & Frequency

S50 stage features a large load capacity specially designed for large load applications. It has capacitive closedloop amplitude correction function and can move precisely with a 40kg load. The maximum travel is ±0.25mrad/axis.

Using finite element analysis to optimize the structure, S50 has very high stiffness, high dynamics even under load, up to 500 Hz. A variety of sensor types are available, such as CAP, SGS, LVDT, and etc.

▸ Frequency and Load Curve

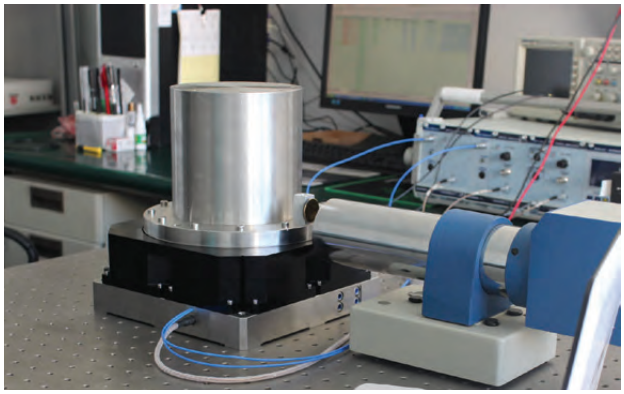


▸ Typical Applications

- Beam scanning
- Heavy load motion experiment
- Interference/metering
- Vibration simulation system

▸ Performance Test

S50 stage requires three-channel controller for drive control, and different power piezo controllers are used according to the required frequency. For example, for the operating frequency of 100~200Hz, we recommend E00/E01 controller with E05 amplifier module.



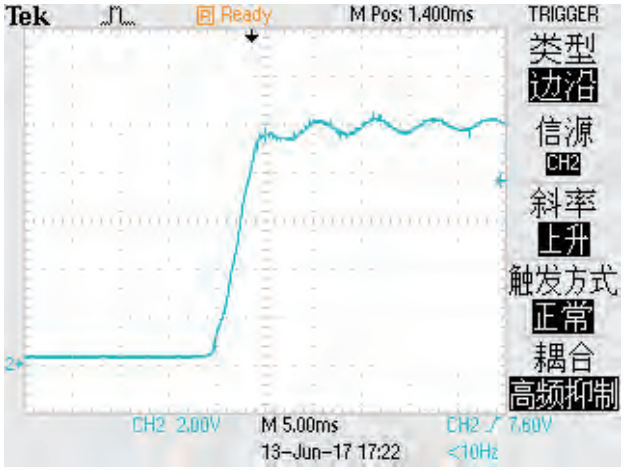
▸ Recommended Controllers

E01	E00	E70
		
3 channels Digital, analog Open/closed loop Ave. current 58mA	3 channels Digital, analog Open/closed loop Ave. current 291mA	3 channels Digital, analog Open/closed loop Ave. current 70mA

Note: Please see "Piezo Controller" for detailed information.

Loaded Step Time

When S50.UR0C/K piezo tilt/rotation stage is loaded with a 20kg load, works in 100% travel, and step time is set to 5ms, the step curve is as shown in the following figure.



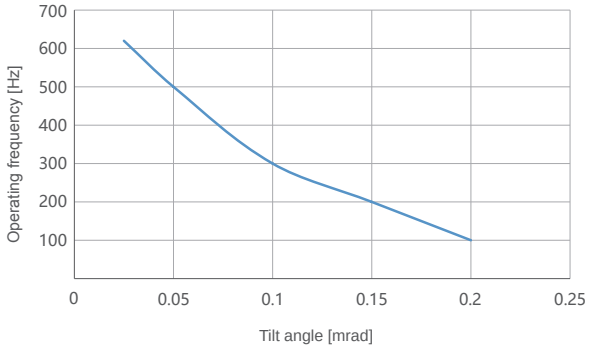
Technical Data

Type	C - closed loop K - open loop	S50.UR0C S50.UR0K	Units
Active axes		θx, θz	
Drive control		3 driving channels 2 sensing channels	
Tilt angle(0~120V)		0.4/axis(≈80″)	mrad±10%
Max.tilt angle(0~150V)		0.5/axis(≈100″)	mrad±10%
Integrated sensor		CAP/-	
Resolution		0.02/0.01(<0.01″)	μrad
Closed-loop linearity		0.3/-	%F.S.
Closed-loop repeatability		0.2/-	%F.S.
Unloaded resonant frequency		θx500/θz750	Hz±20%
Unloaded step time		30/15	ms±20%
Tilt angle vs operating frequency @20kg load	Angle	±0.1 ±0.05 ±0.02 ±0.01	mard±20%
	Frequency θz	0-130 0-300 0-400 0-500	Hz±20%
	Frequency θx	0-100 0-170 0-180 0-180	Hz±20%
Load capacity		40	kg
El. capacitance		30/axis	μF±20%
Material		Aluminum, Steel	
Mass		16	kg±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

Dynamic Performance

Loaded with 20kg, the relationship between tilt angles and operating frequency of S50.UR0C is showed in below figure.

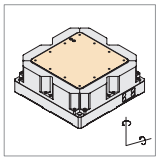


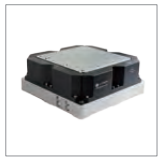
With 20kg Load, Tilt Angle vs Frequency

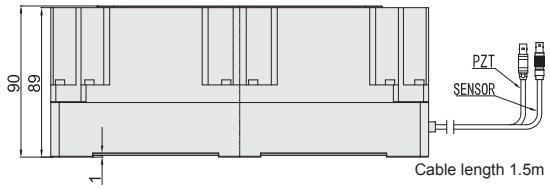
Angle	±0.1	±0.05	±0.02	±0.01	mrad±20%
Frequency θz	0-130	0-300	0-400	0-500	Hz±20%
Frequency θx	0-100	0-170	0-180	0-180	Hz±20%

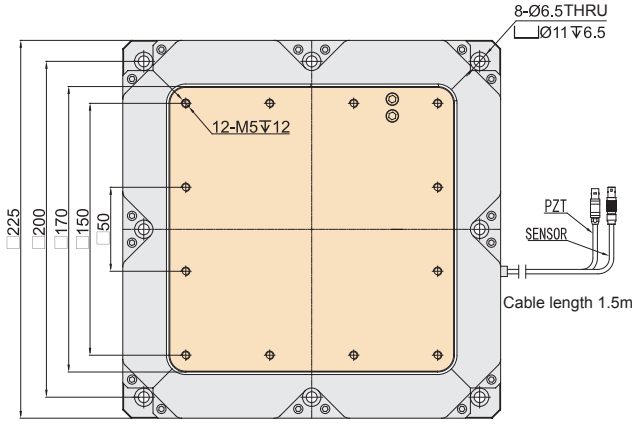
Drawing

S50.UR0C/K









S50.UR0C/K-A Piezo Tilt/Rotation Platform



S50.UR0C/K-A piezo tilt/rotation platform is designed for large load applications, and load capacity is up to 10kg. Its closed-loop version utilizes capacitive feedback sensor, and its unloaded resonant frequency is up to 1kHz.

▸ Characteristics

• θx tilt and θz rotation • Large load capacity • High frequency • Optional capacitive feedback sensor

▸ Typical Applications

• Beam scanning • Heavy load motion experiment • Interference/metering • Vibration simulation system • For research

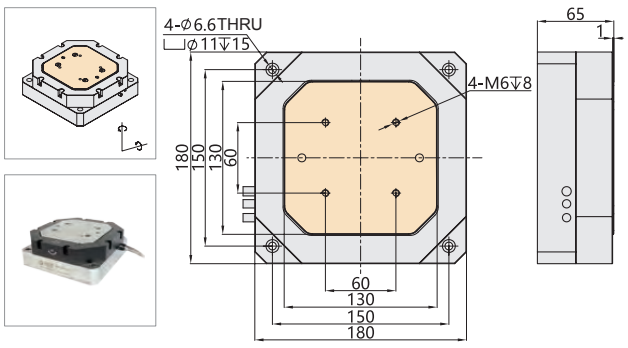
▸ Technical Data

Type	S50.UR0C-A	S50.UR0K-A	Units
Active axes	θx θz	θx θz	
Drive control	3 driving channels 2 sensing channels	3 driving channels	
Nominal travel range(0~120V)	0.24/axis	0.24/axis	mrad±10%
Max.travel range(0~150V)	0.3/axis	0.3/axis	mrad±10%
Sensor	CAP	-	
Resolution	0.02	0.01	μrad
Linearity	0.3	-	%F.S.
Repeatability	0.2	-	%F.S.
Unloaded resonant frequency	1000	1000	Hz
Operating frequency （@5kg,0.1mrad）	≤400	≤400	Hz±20%
Load capacity	10	10	kg
El.capacitance	14.4/axis	14.4/axis	μF±10%
Material	Al, Steel	Al, Steel	
Mass	9.5	9.5	kg±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing

S50.UR0C/K-A



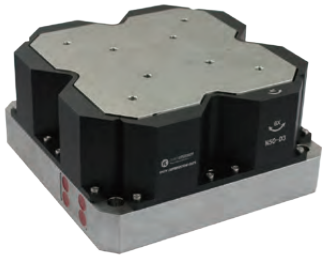
▸ Recommended Controller

E00.D3



3 channels output, with constant voltage output, capacitive sensor, digital or analog control, with button operation

S50.UR1S/K Piezo Tilt/Rotation Stage



▸ Characteristics

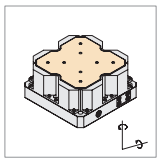
- θx deflection, θz rotation
- Optional closed-loop sensor
- Load up to 20kg
- Resolution up to 0.03μrad

▸ Technical Data

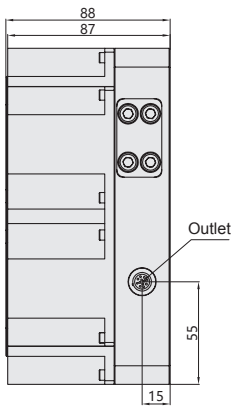
Type	S50.UR1S	S50.UR1K	Units
Active axes	θx, θz	θx, θz	
Drive control	3 driving channels 2 sensing channels	3 driving channels	
Tilt angle(0~120V)	1/axis	1/axis	mrad±10%
Max.tilt angle(0~150V)	1.3/axis	1.3/axis	mrad±10%
Sensor	SGS	-	
Resolution	0.03	<0.03	μrad
Linearity	0.2	-	%F.S.
Closed loop repeatability	0.07	-	%F.S.
Unloaded resonant frequency, θx/θz	604/726	604/726	Hz±20%
Resonant frequency@20kg load, θx/θz	68/155	68/155	Hz±20%
Unloaded step time	50	20	ms±20%
Load capacity	20	20	kg
El. capacitance, θx/θz	36/44.3	36/44.3	μF±20%
Material	Steel, Aluminum	Steel, Aluminum	
Mass	9.5	9.5	kg±5%

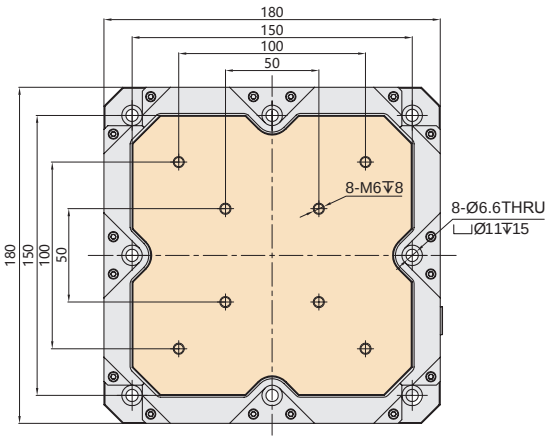
▸ Drawing

S50.UR1S/K

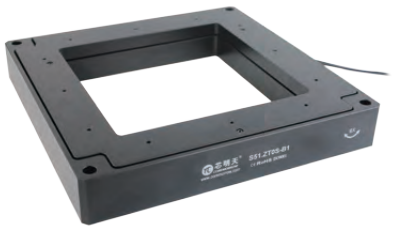








S51.ZT0S/K Piezo Z/Tip/Tilt Platform



S51.ZT0S/K Piezo Z/Tip/Tilt Platform is one customized piezo stage that tilts in θx, θy and moves in Z. There is a large aperture in its center that is suitable for light-transmitted applications.

Characteristics

• θx θy tilt and Z motion • Closed-loop version for high accuracy • Fast response • Aperture size of 200×200mm • Available UHV version

Typical Applications

• Scanning microscopy
• Laser beam combination
• Space disturbance simulation system
• Interference/metering
• Biotechnology
• Mask and wafer position

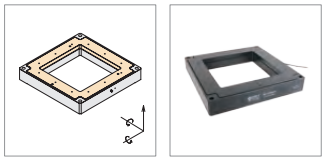
Technical Data

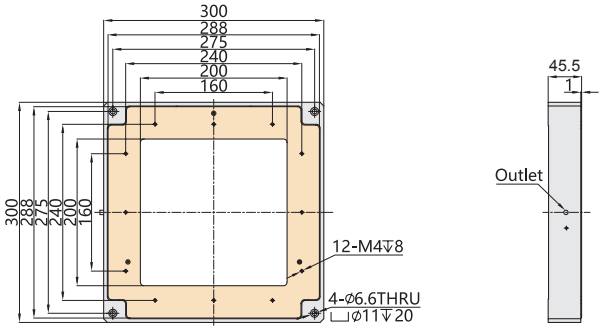
Types	S51.ZT0S	S51.ZT0K	Units
Active axes	θx θy Z	θx θy Z	
Drive control	3 driving channels 3 sensing channels	3 driving channels	
Nominal travel in Z(0 ~120V)	90	90	μm±10%
Max.travel in Z(0 ~150V)	110	110	μm±10%
Nominal travel in θx θy(0~120V)	±0.32/axis	±0.32/axis	mrad±10%
Max.travel in θx θy(0~150V)	±0.4/axis	±0.4/axis	mrad±10%
Sensor type	SGS	-	
Resolution in Z	10	3	nm
Resolution in θx θy	0.25	0.1	μrad
Closed-loop linearity	0.05	-	%F.S.
Closed-loop repeatability	0.03	-	%F.S.
Blocking force in Z	500	500	N
Stiffness in Z	8	8	N/μm±20%
El.capacitance	7.2 /axis	7.2 /axis	μF±20%
Load capacity	5	5	kg
Unloaded resonant frequency	230	230	Hz±20%
Resonant frequency@3kg	150	150	Hz±20%
Step Time	40@3kg	10	ms±20%
Mass	5 (Cable not included)	5 (Cable not included)	kg±5%
Material	Al, Steel	Al, Steel	

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

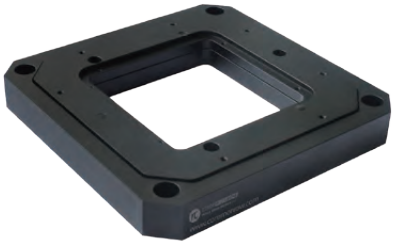
Drawing

S51.ZT0S/K





S51 Piezo Tip/Tilt and Z Stage



S51 is a piezoelectric deflection stage with 3 axes motion in θx, θy and Z, and with a 80×80mm central large aperture. It adopts frictionless flexible hinge structure design, featuring fast response speed and high precision of closed-loop positioning. The central large aperture makes it easy to integrate into microscopic and scanning optical system.

▸ Characteristics

- θx, θy and Z motion
- High closed-loop positioning accuracy
- Fast response
- Light aperture: 80×80mm

▸ High Accuracy

S51 piezo deflection stage adopts a frictionless flexible hinge guiding structure and is optimized by finite element analysis, with high stiffness and guiding precision.

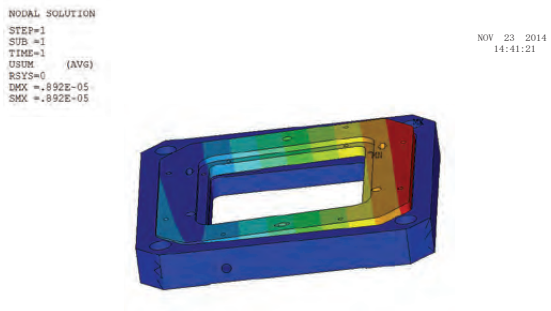
The built-in precision sensor can be used for position feedback to ensure excellent motion control accuracy. The linear motion resolution can reach sub-nanometer, the deflection resolution of sub-microradian, and the positioning stabilization time is in the order of milliseconds.

▸ Low-Profile Design

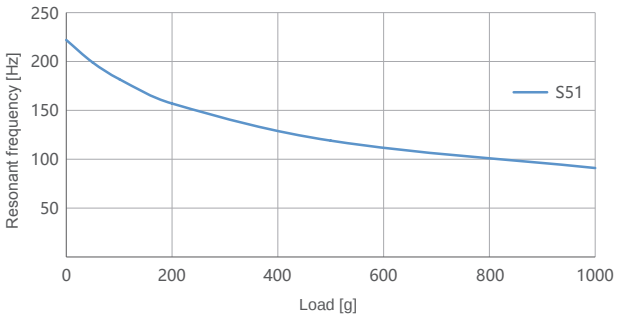
S51 piezo stage is specially designed for alignment, nanofocusing, metrology, etc, and features low-profile of only 20mm, easy to integrate.

▸ Simulation Analysis

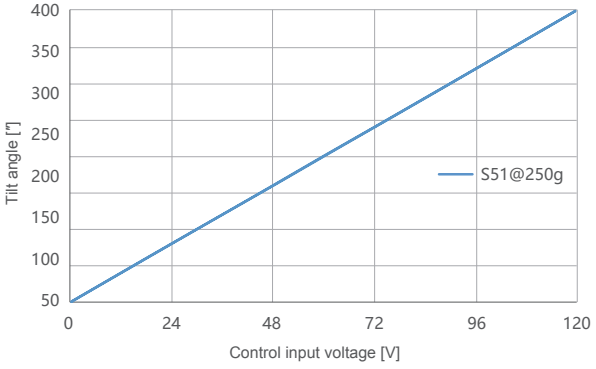
S51 Finite element analysis techniques are used to design the highest stiffness in the direction of motion and to reduce angular misalignment. The hinge mechanism has no gaps and no friction offering high accuracy.



▸ Frequency and Load Curve



▸ Closed-loop Curve



▸ Recommended Controllers

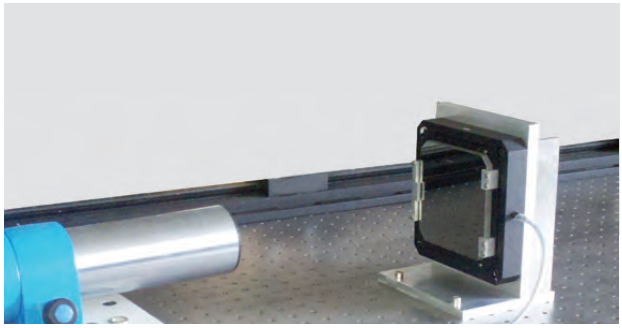
E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

Typical Applications

- Scanning microscopy
- Vibration simulation system
- Mask and wafer position adjustment
- Interference/Measuring
- Laser beam alignment
- Biotechnology

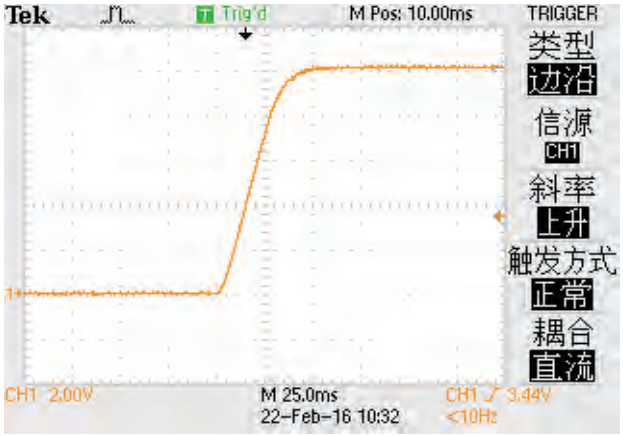
Large Aperture

S51 piezoelectric stage has a large aperture of 80×80mm, which is very suitable for transmitted-light applications.

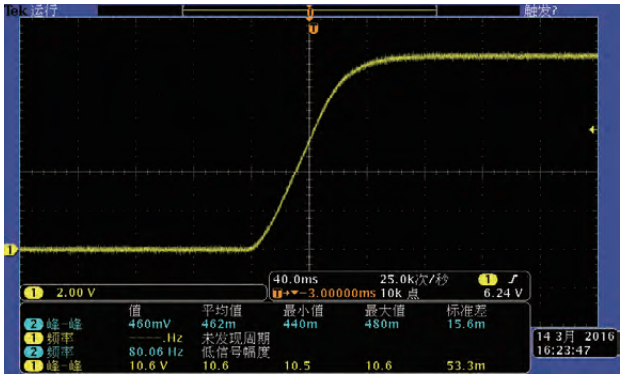


Load Step Time

S51.ZT1S piezo stage controlled with E01.D3 piezo controller, its step time of loading 240g to 100% travel is about 50ms, and the step time of loading 500g load to 100% travel is about 100ms.



Loading 240g



Loading 500g

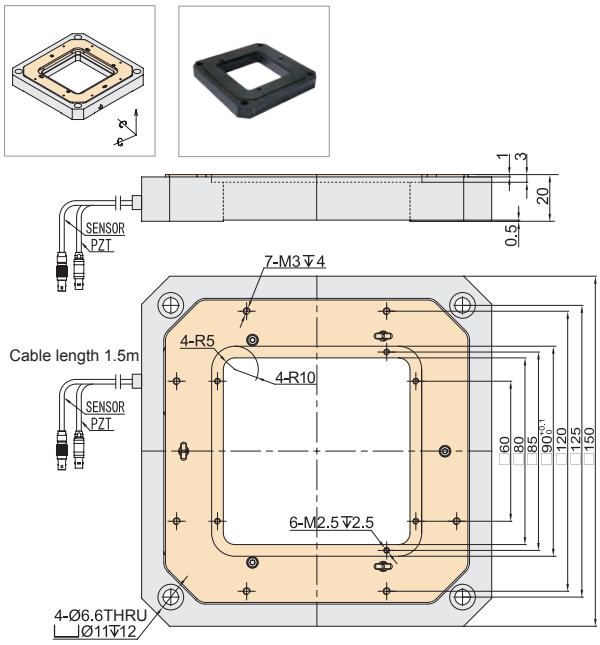
Technical Data

Type	S - closed loop K - open loop	S51.ZT1S S51.ZT1K	Units
Active axes		θx, θy, Z	
Drive control		3 driving channels 3 sensing channels	
Linear travel axes(0~120V)		80	μm±10%
Linear travel axes(0~150V)		100	μm±10%
Tilt angle(0~120V)		±0.9/axis(≈±190″)	mrad±10%
Max.tilt angle(0~150V)		±1.1/axis(≈±220″)	mrad±10%
Integrated sensor		SGS/-	
Resolution in Z		7/4	nm
Resolution(θx, θy)		0.25(≈0.05″) /0.05(≈0.01″)	μrad
Closed-loop linearity		0.1/-	%F.S.
Closed-loop repeatability		0.05/-	%F.S.
Push/pull force		120/15	N
Stiffness in Z		1.5	N/μm±20%
Unloaded resonant frequency		340	Hz±20%
Unloaded step time		30/4.5	ms±20%
Load capacity		1	kg
El. capacitance		5.4	μF±20%
Material		Aluminum, Steel	
Mass		820	g±5%

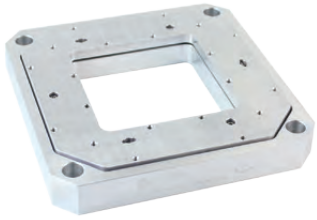
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

Drawing

S51.ZT1S/K



S51.ZT1S/K-C Piezo Z/Tip/Tilt Platform



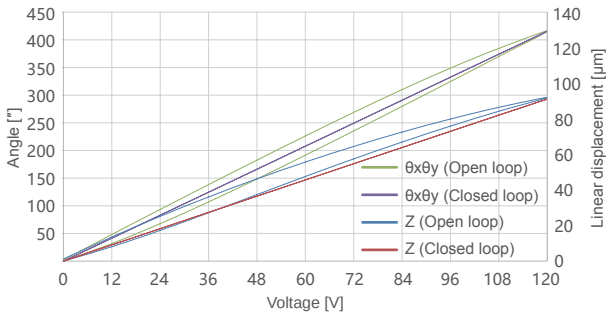
Characteristics

• Motion in θx, θy and Z • Closed-loop version for high accuracy • Fast response • Aperture of 80×80mm • Optional vacuum version

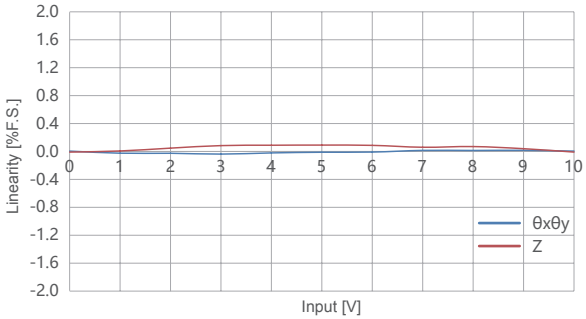
Applications

• Scanning microscopy • Laser beam alignment • Interference/metrology • Space perturbation simulation • Biotechnology

Travel vs Voltage Curves



Linearity vs Control Voltage Curve

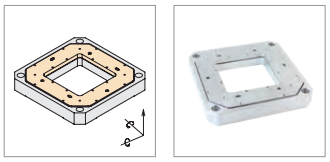


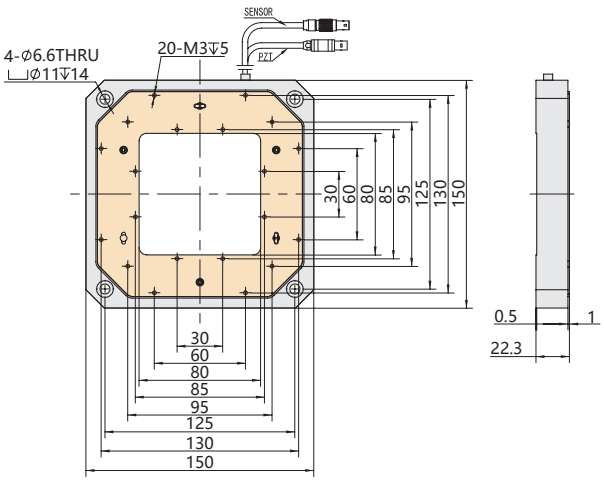
Technical Data

Types	S51.ZT1S-C	S51.ZT1K-C	Units
Active axes	θx, θy, Z	θx, θy, Z	
Drive control	3 driving channels 3 sensing channels	3 driving channels	
Nominal travel in Z (0~120V)	90	90	µm±10%
Max.travel in Z(0~150V)	110	110	µm±10%
Nominal travel in θx θy(0~120V)	±0.9/axis (≈±190″)	±0.9/axis (≈±190″)	mrad±10%
Max.travel in θxθy (0~150V)	±1.1/axis (≈±220″)	±1.1/axis (≈±220″)	mrad±10%
Sensor type	SGS	-	
Resolution in Z	7	4	nm
Resolution in θx θy	0.25	0.05	µrad
Linearity	0.1	-	%F.S.
Repeatability	0.05	-	%F.S.
Push/pull force	120/15	120/15	N
Stiffness in motion direction	1.5	1.5	N/µm±20%
Unloaded resonant frequency	300	300	Hz±20%
Unloaded step time	35	5	ms±20%
Load capacity	2.5	2.5	kg
El.capacitance	10.8	10.8	µF±10%
Material	Al, Steel	Al, Steel	
Mass	815	815	g±5%
Cable length	1.5	1.5	m±10mm

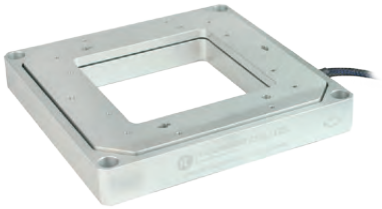
Note: Above are measured using E00/E01 piezo controllers. The max driving voltage can be -20V~150V; Recommended voltage 0~120V for high-reliability and long-term use.

Drawing





S51.ZT2S/K-C Piezo Z/Tip/Tilt Platform



S51.ZT2S/K-C Piezo Z/Tip/Tilt Platform is one customized piezo stage that tilts in θx, θy and moves in Z. There is a large aperture in its center that is suitable for light-transmitted applications.

▸ Characteristics

• θx θy tilt and Z motion • Closed-loop version for high accuracy • Fast response • Aperture size of 96×96mm • Available UHV version

▸ Applications

- Scanning microscopy
- Laser beam combination
- Space disturbance simulation system
- Biotechnology
- Mask and wafer position
- Interference/metering

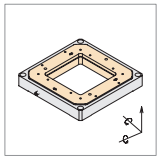
▸ Technical Data

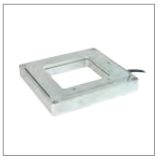
Types	S51.ZT2S-C	S51.ZT2K-C	Units
Active axes	θx, θy, Z	θx, θy, Z	
Drive control	3 driving channels , 3 sensing channels	3 driving channels	
Nominal travel in Z(0 ~120V)	192	192	μm±20%
Max.travel in Z(0 ~150V)	240	240	μm±20%
Nominal travel in θx θy(0~120V)	±1.6/axis	±1.6/axis	mrad±20%
Max.travel in θx θy(0~150V)	±2/axis	±2/axis	mrad±20%
Sensor type	SGS	-	
Resolution in Z	7	2	nm
Resolution in θx θy	0.15	0.06	μrad
Linearity in Z	0.3	-	%F.S.
Linearity in θx θy	0.3	-	%F.S.
Repeatability in Z	0.3	-	%F.S.
Repeatability in θx θy	0.1	-	%F.S.
Unloaded resonant frequency	160	160	Hz±20%
Load capacity	1.5	1.5	kg
El.capacitance	21.6/axis	21.6/axis	μF±20%
Material	Al, Steel	Al, Steel	
Mass	1070	1070	g±5%

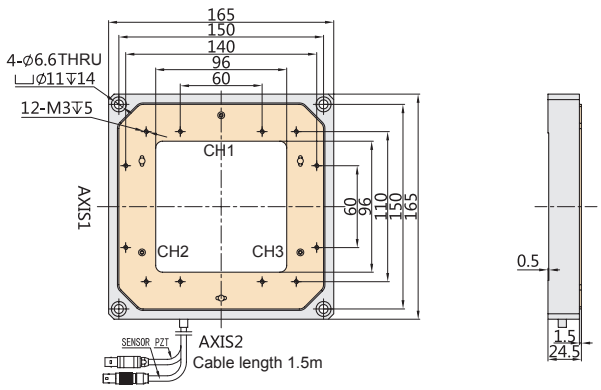
Note: Above are measured using E00/E01 piezo controllers. The max driving voltage can be -20V~150V; Recommended voltage 0~120V for high-reliability and long-term use.

▸ Drawing

S51.ZT2S/K-C







S52 Piezo Tip/Tilt and Z Platform



S52.ZT2K Piezo Tip/Tilt and Z Stage is one customized piezo stage that tilts in θx, θy and moves in Z. Its max load capacity is up to 5kg, the closed-loop repeatability is up to 0.006%F.S., it is very suitable to use in high precision application field. It features a center aperture of 55×55mm^2 that is suitable for light-transmitted applications.

▸ Characteristics

- Aperture size of 55×55mm^2
- Optional vacuum version
- Closed-loop version for high linearity and repeatability
- Small coupling in series structure

▸ Applications

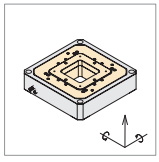
- Transmitted light application
- Prism position adjustment
- Image processing and stabilization
- Laser beam deflection/stabilization

▸ Technical Data

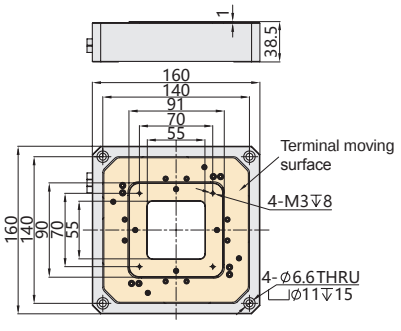
Type	S52.ZT2S	S52.ZT2K	Units
Active axes	θx, θy, Z	θx, θy, Z	
Drive control	8 driving channels , 8 sensing channels	8 driving channels	
Nominal travel in Z(0 ~120V)	174	174	μm±10%
Max.travel in Z(0 ~150V)	217	217	μm±10%
Nominal travel in θx θy(0~120V)	±1.10/axis(≈±227″)	±1.10/axis(≈±227″)	mrad±10%
Max.travel in θx θy(0~150V)	±1.37/axis(≈±282.5″)	±1.37/axis(≈±282.5″)	mrad±10%
Sensor type	SGS	-	
Resolution in Z	3.5	2	nm
Resolution in θx θy	0.14(≈0.03″)	0.04(＜ 0.01″)	μrad
Closed-loop linearity in Z	0.013	-	%F.S.
Closed-loop linearity in θx θy	0.009	-	%F.S.
Closed-loop repeatability in Z	0.009	-	%F.S.
Closed-loop repeatability in θx θy	θx: 0.0067, θy: 0.006	-	%F.S.
Blocking force in Z	220	220	N
Stiffness in Z	1.1	1.1	N/μm±20%
El.capacitance	θxθy: 7, Z: 28	θxθy: 7, Z: 28	μF±20%
Load capacity	5	5	kg
Unloaded resonant frequency	233	233	Hz±10%
Resonant frequency@2.5kg	θxθy: 63, Z: 68	θxθy: 63, Z: 68	Hz±10%
Step Time@2.5kg	θxθy: 200, Z: 300	θxθy: 200, Z: 300	ms±10%
Pitch angle in Z	20	20	μrad±10%
Yaw angle in Z	8.7	8.7	μrad±10%
Roll angle in Z	14.5	14.5	μrad±10%
Coupling in X/Y	θx: 9.5, θy: 8.7	θx: 9.5, θy: 8.7	μrad±10%
Coupling in horizontal direction	θx: 17.3, θy: 16.3	θx: 17.3, θy: 16.3	μrad±10%
Mass(Cable included)	2.5	2.5	kg±5%
Material	Al, Steel	Al, Steel	

▸ Drawing

S52.ZT2S/K







▸ Recommended Controllers

E00.D12AL-V4



8 channels, analog, digital, servo control

S54.T0S/K Piezo Tip/Tilt Stage



S54.T0S/K is a customized piezo tip/tilt stage that tilts in θx, θy. It adopts a frictionless flexible hinge structure design with fast response speed and high closed-loop positioning accuracy. It is compact and features a large center through-hole, makes it easy to integrate into the systems of microscopy and scanning optical system.

Characteristics

• θx, θy tilt • Open/closed loop version and vacuum version optional • Large aperture of 68×48 mm^2 • Load capacity to 0.1kg

Applications

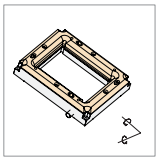
• Microscopy imaging • Sensor calibration • Vibration simulation • Laser beam combining

Technical Data

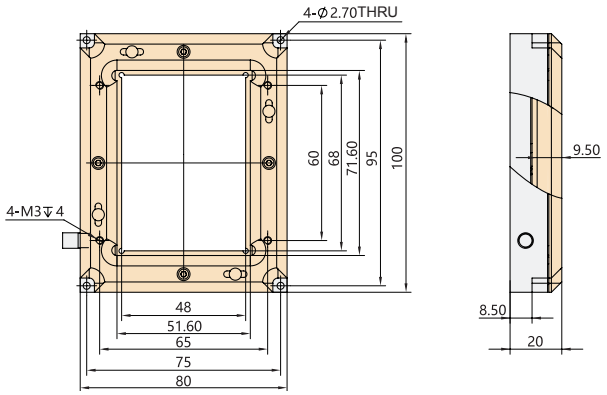
Types	S-closed loop K-open loop	S54.T0S	S54.T0K	Units
Active axes		θx,θy	θx,θy	
Drive control		3 driving channels , 2 sensing channels	3 driving channels	
Nominal tilt angle(0~120V)		±0.4(≈±83″) /±0.5(≈±103″)	±0.4(≈±83″) /±0.5(≈±103″)	mrad±10%
Max.tilt angle(0~150V)		±0.5(≈±103″) /±0.62(≈±128″)	±0.5(≈±103″) /±0.62(≈±128″)	mrad±10%
Integrated sensor		SGS	-	
Tilt resolution		0.04(< 0.01″) /0.05(≈ 0.01″)	0.015(<0.01″) /0.02(<0.01″)	μrad
Linearity		θx0.06/θy0.05	-	%F.S.
Repeatability		θx0.04/θy0.03	-	%F.S.
Unloaded resonant frequency		θx0.7/θy0.6	θx0.7/θy0.6	kHz±20%
Loaded resonant frequency@100g		θx0.3/θy0.4	θx0.3/θy0.4	kHz±20%
Unloaded step time		12	1	ms±20%
Load capacity		0.1	0.1	kg
El. capacitance		1.6/axis	1.6/axis	μF±20%
Material		Al, Steel	Al, Steel	
Mass		330(with cable)	330(with cable)	g±5%

Drawing

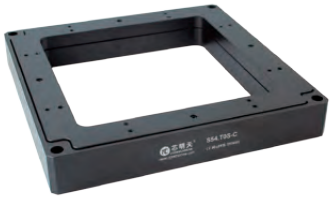
S54.T0S/K







S54.T0S/K-C Piezo Tip/Tilt Stage



S54.T0S/K-C piezo tip/tilt stage tilts in θx, θy. It adopts a frictionless flexible hinge structure design with fast response speed and high closed-loop positioning accuracy. Its load capacity is to 8kg, which is designed for suitable for large load tilt application. With a 200mm×200mm through hole in the center, it can be used for transmitted light applications.

▸ Characteristics

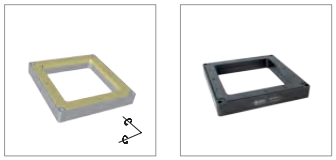
- θx, θy tilt
- Load capacity to 8kg
- Large aperture of 200mm×200mm
- UHV version available

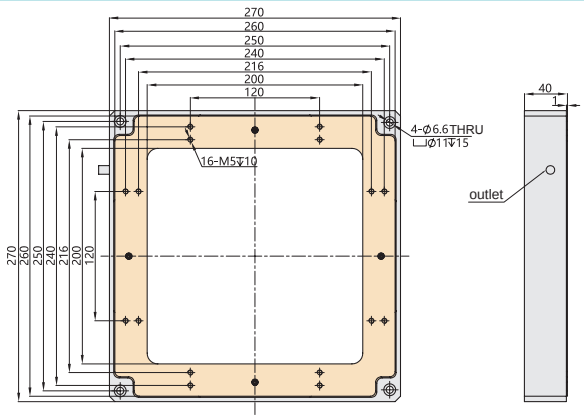
▸ Technical Data

Type	S-Closed loop K-Open loop	S54.T0S-C	S54.T0K-C	Units
Active axes		θx,θy	θx,θy	
Drive control		3 driving channels, 2 sensing channels	3 driving channels	
Nominal tilt angle(0~120V)		±0.28(≈±58″)/axis	±0.28(≈±58″)/axis	mrad±10%
Max.tilt angle(0~150V)		±0.35(≈±72″)/axis	±0.35(≈±72″)/axis	mrad±10%
Integrated sensor		SGS	-	
Resolution		0.7(≈0.14″)	0.1(≈0.02″)	μrad
Linearity		0.05	-	%F.S.
Repeatability		0.03	-	%F.S.
Unloaded resonant frequency		400	400	Hz±20%
Resonant frequency@8kg		180	180	Hz±20%
Step time		50@8kg	4	ms±20%
Load capacity		8	8	kg
El.capacitance		14.5/axis	14.5/axis	μF±20%
Material		Steel, Al	Steel, Al	
Mass(Cable included)		3.75	3.75	kg±5%

▸ Drawing

S54.T0S/K-C





S54.T1S/K-C Piezo Tip/Tilt Stage



The S54.T1S/K-C is a high-precision piezo tip/tilt stage moving in θx and θy, and travel up to 2mrad. Its design adopts a frictionless flexible hinge structure, ensuring rapid response times and superior positioning accuracy. The closed-loop version with sensors achieves the accuracy of ±0.011%F.S., making it suitable for high-precision applications. It also features a 110mm×80mm aperture, suitable for transmissive light applications.

Characteristics

- θx, θy tilt
- Ultra-high precision
- Large aperture design: 110×80mm^2
- The load capacity up to 300g

Applications

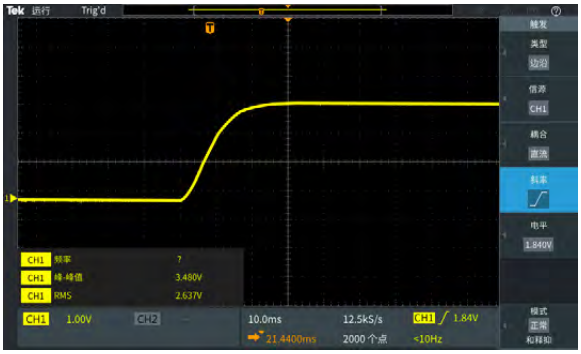
- Mask and wafer position adjustment
- Calibration of acceleration/angular velocity sensors
- Sample leveling and focusing
- Laser beam combining
- Light-transmitted applications

Technical Data

Type	S-Closed loop K-Open loop	S54.T1S-C	S54.T1K-C	Units
Active axes		θx, θy	θx, θy	
Drive control		3 driving channels 2 sensing channels	3 driving channels	
Nominal tilt angle(0~120V)		±0.8(≈±165″)/ ±0.6(≈±124″)	±0.8(≈±165″)/ ±0.6(≈±124″)	mrad ±10%
Max. tilt angle(0~150V)		±1(≈±206″)/ ±0.75(≈±155″)	±1(≈±206″)/ ±0.75(≈±155″)	mrad ±10%
Integrated sensor		SGS	-	
Aperture		110×80	110×80	mm
Resolution		0.1(≈0.02″)	0.03(<0.01″)	μrad
Linearity		θx0.01/ θy0.009	-	%F.S.
Repeatability		θx0.011/ θy0.023	-	%F.S.
Unloaded resonant frequency		445/490	445/490	Hz±20%
Resonant frequency@300g		250/300	250/300	Hz±20%
Step time		25@0.4mrad, 300g	5	ms±20%
Load capacity	Horizontal	300	300	g
El.capacitance		3.6/axis	3.6/axis	μF±20%
Material		Stainless steel, aluminum alloy		
Mass(Cable included)		560	560	g±5%

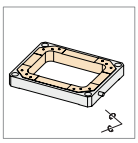
Loaded Step Time

S54.T1S-C step time of about 25ms @ loading 300g&0.4mrad tilt angle

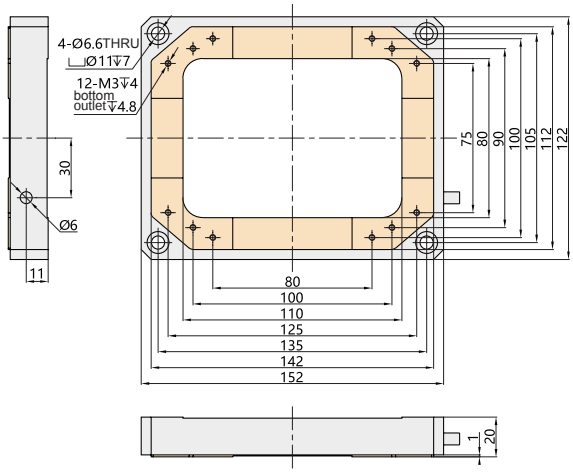


Drawing

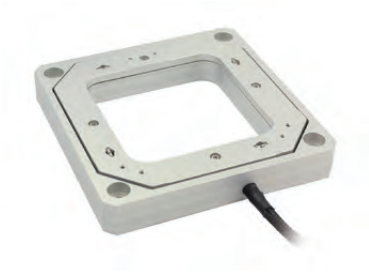
S54.T1S/K-C







S54.T2 Piezo Tip/Tilt Stages

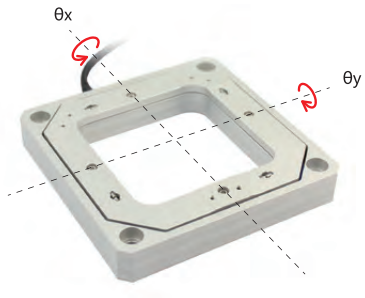


S54.T2 is a two-axis piezoelectric deflection stage in θx, θy with a large aperture. It adopts a frictionless flexible hinge structure design with fast response speed and high closed-loop positioning accuracy. The 80×80mm aperture makes it easy to integrate into the systems of microscopy and scanning optical system.

▸ Characteristics

• θx, θy tilt • Open/closed loop • 80×80mm large aperture • High resolution • Low profile

▸ θx, θy Tilt



▸ Custom Design

Custom is available according to your application.

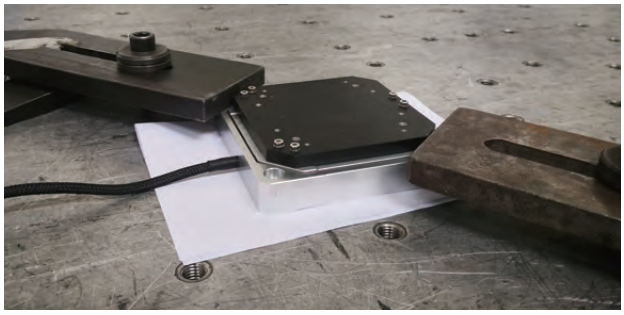


▸ Closed loop with High Accuracy

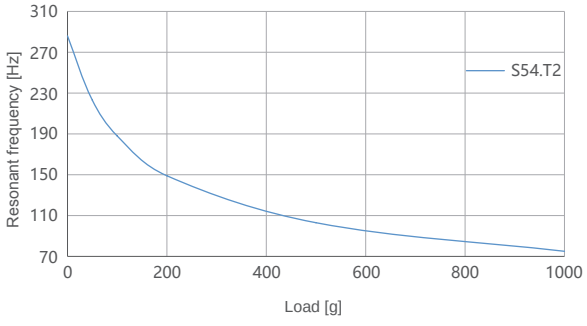
The internal flexible hinge guiding mechanism is optimized by finite element analysis to minimize the angular offset with no friction.

S54.T2 tip/tilt stage can achieve a maximum deflection range of ±1mrad with a resolution of up to 0.05μrad. The closed-loop sensor can be optionally configured to achieve a repeatability of 0.1% F.S.

▸ Tilt Range Measuring



▸ Frequency and Load Curve



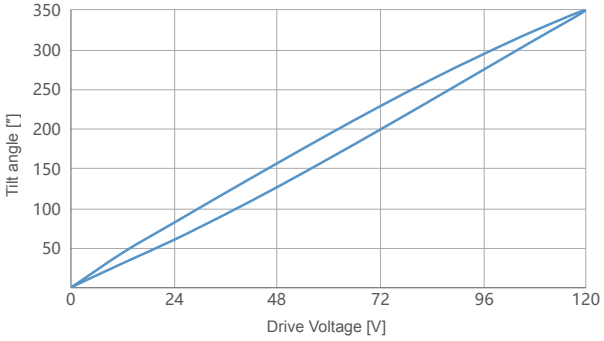
▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

Typical Applications

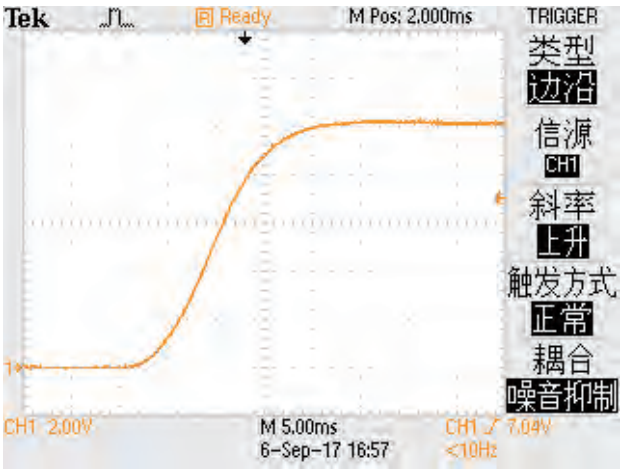
- Beam scanning
- Laser beam alignment
- Interference/Measuring
- Vibration simulation system
- Micro-operation
- Mask and wafer position adjustment

Open-Loop Curve

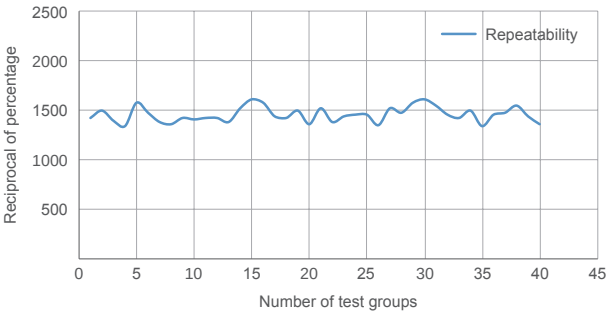


Step Time

S54.T2S unloaded step time to reach 100% travel is about 20ms.



Repeatability



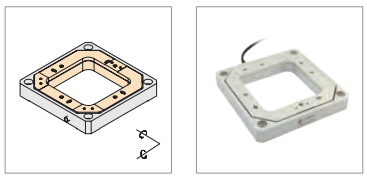
Technical Data

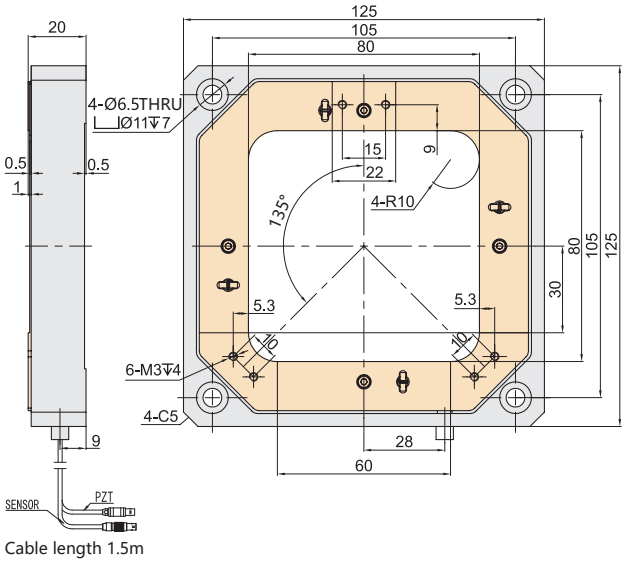
Type	S - closed loop K - open loop	S54.T2S S54.T2K	Units
Active axes		θx, θy	
Drive control		3 driving channels 2 sensing channels	
Tilt angle(0~120V)		±0.8/axis(≈±165″)	mrad±10%
Max.tilt angle(0~150V)		±1/axis(≈±200″)	mrad±10%
Integrated sensor		SGS/-	
Tilt resolution		0.25(≈0.05″) /0.05(≈0.01″)	μrad
Closed-loop linearity		0.2/-	%F.S.
Closed-loop repeatability		0.1/-	%F.S.
Push/pull force		40/8	N
Stiffness		0.5	N/μm±20%
Unloaded resonant frequency		X450/Y400	Hz±20%
Unloaded step time		20/3.5	ms±20%
Closed-loop operating frequency (-3dB)		110 (unloaded)	Hz±20%
Load capacity		1	kg
El. capacitance		3.6/axis	μF±20%
Material		Aluminum, Steel	
Mass		510	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

Drawing

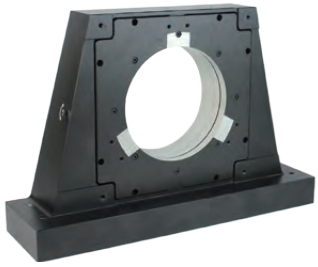
S54.T2





Cable length 1.5m

S54A.T3S/K112 Piezo Tip/Tilt Stage



S54A piezo tip/tilt stage that tilts in θx, θy, the deflection angle can reach ±1.5mrad/axis. It has an aperture of Ø112mm and its vertical load capacity is up to 1kg, which make it possible to carry a lens with a diameter of Ø140mm×23mm for two-dimensional movement. The stage has been specially designed and made of materials to adapt to special environments, and can realize operating normally in low-temperature environments. It has passed very strict mechanical testing, such as anti mechanical vibration tests, impact vibration tests, and random vibration tests, etc.

▸ Characteristics

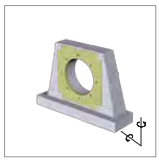
• θx, θy tilt • Load capacity up to 1kg • Aperture of Ø112mm • High reliability • UHV version available

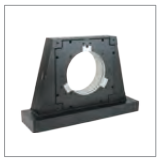
▸ Technical Data

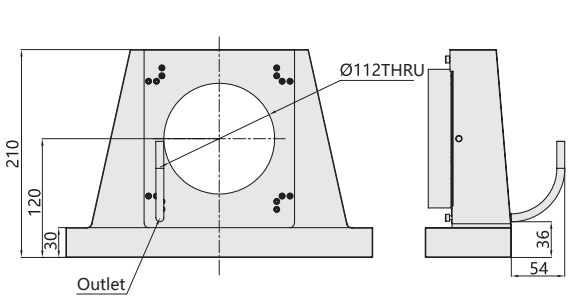
Type	S-Closed loop K-Open loop	S54A.T3S112	S54A.T3K112	Units
Active axes		θx, θy	θx, θy	
Drive control		3 driving channels,2 sensing channels	3 driving channels	
Nominal tilt angle(0~120V)		±1.2/axis(≈±248″)	±1.2/axis(≈±248″)	mrad±10%
Max. tilt angle(0~150V)		±1.5/axis(≈±309″)	±1.5/axis(≈±309″)	mrad±10%
Integrated sensor		SGS	-	
Aperture		Ø112	Ø112	mm
Resolution		0.6(≈0.12″)	0.2(≈0.04″)	μrad
Linearity		θx0.3/θy1.2	-	μrad
Repeatability		θx0.2/θy0.6	-	μrad
Unloaded resonant frequency		460	460	Hz±20%
Resonant frequency@1kg		310	310	Hz±20%
Step time		5ms@50μrad,1kg	2	ms±20%
Load capacity	Vertical	1	1	kg
El.capacitance		28.8/axis	28.8/axis	μF±20%
Material		Stainless steel, aluminum alloy	Stainless steel, aluminum alloy	
Mass(Cable included)		6.2	6.2	kg±5%

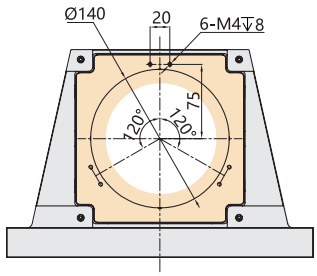
▸ Drawing

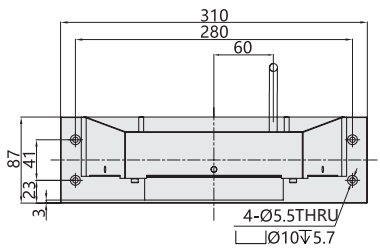
S54A.T3S/K112



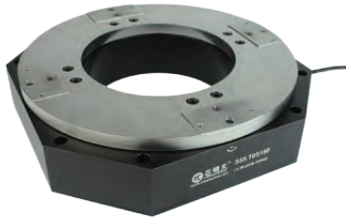








S55.T0S/K150 Piezo Tip/Tilt Stage



S55.T0S/K150 is a piezo tip/tilt stage that tilts in θx and θy, with a stroke of ±0.16mrad/axis. Its load capacity of horizontal mounting/vertical mounting/inverted mounting can reach 10kg/8kg/8kg, suitable for large load applications and can be used in fields such as simulating spatial disturbance experiments.

▸ Characteristics

- θx, θy tilt
- Tilt stroke up to ±0.16mrad/axis
- Optional horizontal, vertical, and inverted mounting
- Load capacity to 10kg
- Large aperture of Ø150mm
- UHV version available

▸ Appliciations

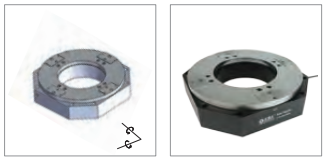
- Beam scanning
- Heavy load motion experiment
- Interference/metering
- Simulating spatial disturbance experiments

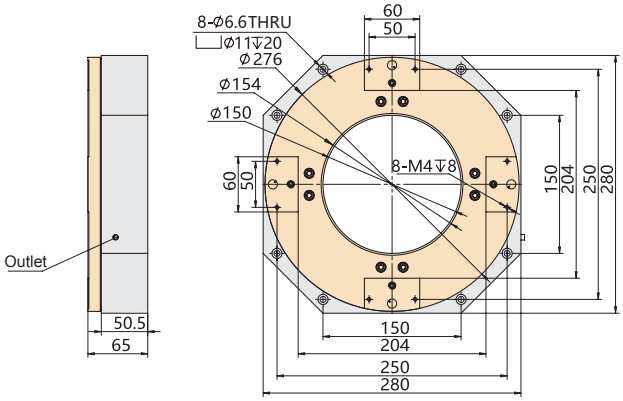
▸ Technical Data

Type	S-Closed loop K-Open loop	S55.T0S150	S55.T0K150	Units
Active axes		θx, θy	θx, θy	
Drive control		3 driving channels,2 sensing channels	3 driving channels	
Nominal tilt angle(0~120V)		±0.13/axis(≈±27″)	±0.13/axis(≈±27″)	mrad±10%
Max. tilt angle(0~150V)		±0.16/axis(≈±33″)	±0.16/axis(≈±33″)	mrad±10%
Integrated sensor		SGS	-	
Aperture		φ150	φ150	mm
Resolution		0.25(≈0.05″)/0.27(≈0.06″)	0.1(≈0.02″)	μrad
Linearity		1.8(≈0.37″)/4.7(≈0.97″)	-	μrad
Repeatability		2.1(≈0.43″)/1.8(≈0.37″)	-	μrad
Unloaded resonant frequency		θx1.0/θy1.1	θx1.0/θy1.1	kHz±20%
Resonant frequency@10kg		θx0.24/θy0.47	θx0.24/θy0.47	kHz±20%
Step time		100@10kg	66	ms±20%
Load capacity	Horizontal	10	10	kg
	Vertical	8	8	
	Inverted	8	8	
El.capacitance		32/axis	32/axis	μF±20%
Material		Steel, Al	Steel, Al	
Mass(Cable included)		9.8	9.8	kg±5%

▸ Drawing

S55.T0S/K150





H30 Piezo Scanning and Rotation Stage



H30 is a piezo scanning and rotation stage with 3 axes motion in X, Y and θz, and with a Ø60mm central large aperture. It adopts frictionless flexible hinge structure design, featuring fast response speed and high precision of closed-loop positioning. The central large aperture makes it easy to integrate into microscopic and scanning optical system.

▸ Characteristics

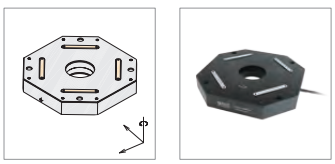
- X, Y and θz motion
- Aperture of Ø60mm
- Load capacity to 6kg
- High closed-loop positioning accuracy
- Resolutio in XY to 2nm
- Resolutio in θz to 0.1μrad
- Tilt angle range to 2mrad
- Linear travel range to 140μm/axis

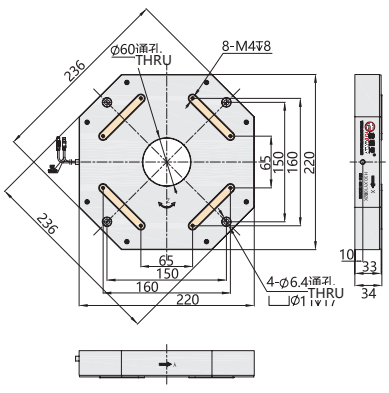
▸ Technical Data

Type	H30.XY100R2S	H30.XY100R2K	Units
Active axes	X, Y, θz	X, Y, θz	
Drive control	4 driving channels ,3 sensing channels	4 driving channels	
Linear travel range(0~120V)	±56/axis	±56/axis	μm±10%
Max.linear travel range(0~150V)	±70/axis	±70/axis	μm±10%
Tilt angle range(0~120V)	1.6(≈330″)	1.6(≈330″)	mrad±10%
Max.tilt angle range(0~150V)	2(≈413″)	2(≈413″)	mrad±10%
Sensor	SGS	-	
Resolution in XY	6	2	nm
Resolution in θz	0.3	0.1	μrad
Linearity in XY	X0.14/Y0.125	-	%F.S.
Linearity in θz	0.07	-	%F.S.
Repeatability in XY	X0.057/Y0.018	-	%F.S.
Repeatability in θz	0.03	-	%F.S.
Unloaded resonant frequency	XY450/θz330	XY450/θz330	Hz±20%
Loaded resonant frequency@6kg	XY110/θz85	XY110/θz85	Hz±20%
El. capacitance	XY15/θz28.8	XY15/θz28.8	μF±20%
Step time	150@6kg	5	ms±20%
Load capacity	6	6	kg
Material	Aluminum alloy		
Mass(Cable not included)	2.3		kg±5%

▸ Drawing

H30.XY100R2S/K





H32.TR4S/K Piezo Tilt/Rotation Stage



H32.TR4S/K is a three-dimensional motion piezo tilt/rotation stage that can achieve θx, θy deflection and θz rotation. It adopts a frictionless flexible hinge structure design internally, with fast response speed and high closed-loop positioning accuracy. Its size is 155×155×50.5mm^3, and the load capacity can reach 1kg. It can be used as a vibration platform to simulate vibration environments and complete control accuracy testing and analysis of precision equipment.

Characteristics

- θx, θy deflection, θz rotation
- High closed-loop positioning accuracy
- Tilt angular range to 4.6mrad/axis, resolution to 0.07μrad
- Rotation angle range to 3.2mrad, resolution to 0.05μrad
- Load capacity to 1kg
- Millisecond response time

Application

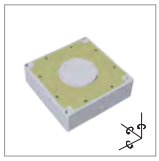
- Simulating vibration environment
- Large load tilt motion
- Analysis of control accuracy testing for precision equipment
- Interference/Measurement
- Beam scanning

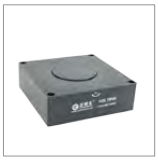
Technical Data

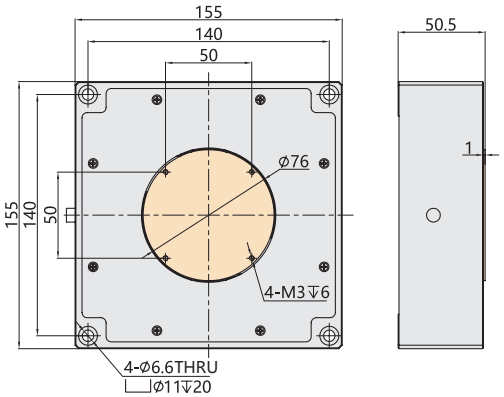
Type	S-Closed loop K-Open loop	H32.TR4S	H32.TR4K	Units
Active axes		θx, θy, θz	θx, θy, θz	
Drive control		4 driving channels ,3 sensing channels	4 driving channels	
Nominal tilt angle range(0~120V)		θxθy±1.85(≈±382″)/θz2.6(≈536″)	θxθy±1.85(≈±382″)/θz2.6(≈536″)	mrad±10%
Max. tilt angle range(0~150V)		θxθy±2.3(≈±475″)/θz3.2(≈660″)	θxθy±2.3(≈±475″)/θz3.2(≈660″)	mrad±10%
Sensor		SGS	-	
Resolution		θxθy0.15(≈0.03″)/θz0.1(≈0.02″)	θxθy0.07(≈0.01″)/θz0.05(≈0.01″)	μrad
Linearity		θx0.07/θy0.03/θz0.09	-	%F.S.
Repeatability		θx0.02/θy0.03/θz0.1	-	%F.S.
Unloaded resonant frequency		θxθy250/θz560	θxθy250/θz560	Hz±20%
Loaded resonant frequency@1kg		θxθy140/θz200	θxθy140/θz200	Hz±20%
El. capacitance		θxθy14.4/θz10.8	θxθy14.4/θz10.8	μF±20%
Step time		30@1kg	10	ms±20%
Load capacity	Horizontal	1	1	kg
	Vertical	0.5	0.5	
	Inverted	0.5	0.5	
Material		Stainless steel, aluminum alloy		
Mass(Cable not included)		2240		g±5%

Drawing

H32.TR4S/K







H60 Piezo Hexapod





Vacuum version

H60 Piezo Hexapod is a piezo stage with 6-axis motion of θx, θy, θz, X, Y, and Z. 6-axis movement in space is realized by the coordinated expansion and contraction of six piezoelectric actuators. The closed-loop model has high positioning accuracy. It is suited for applications such as microelectronics precision machining, test, etc.

▸ Typical Applications

• 6 axes precise positioning • Semiconductor equipment • Lithography • Wafer inspection/micromachining • Medical • Aerospace

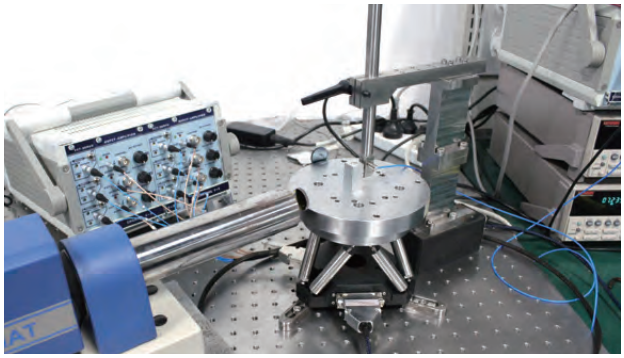
▸ Characteristics

• Motion in X, Y, Z, θx, θy, θz • Small coupling • Closed-loop version for high accuracy • No accumulation of error

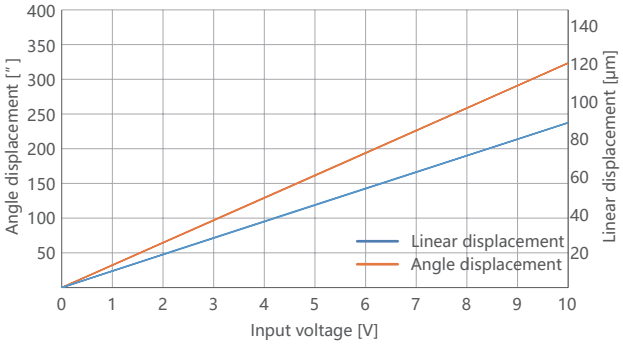
▸ Piezo Drive



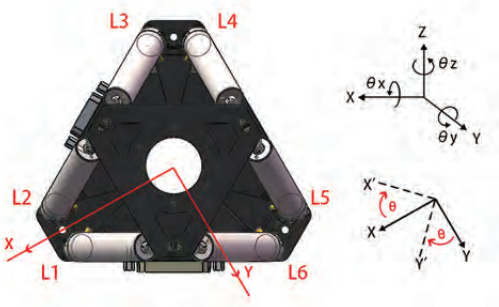
▸ Performance Test



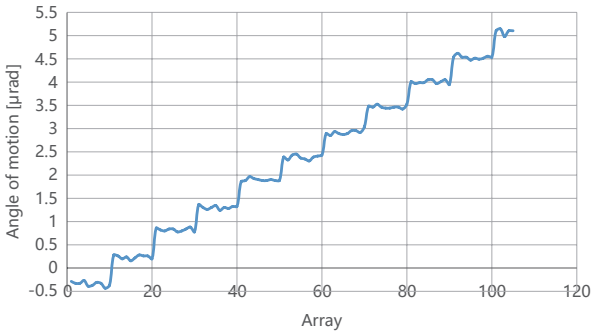
▸ Travel vs Voltage Curves



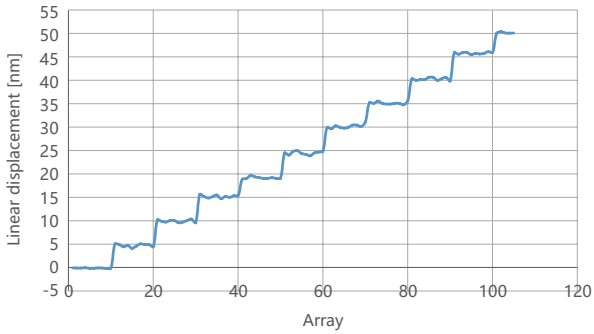
▸ Motion Directions



▸ Angular Motion Resolution Curve



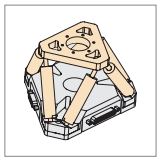
▸ Linear Motion Resolution Curve



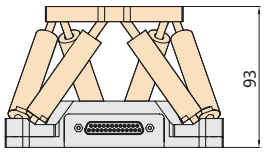
Technical Data

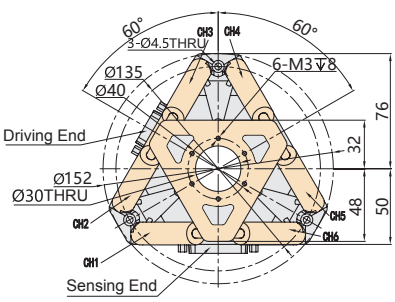
Type	S - closed loop K - open loop	H60.XYZTR1S H60.XYZTR1K	H60.XYZTR3S H60.XYZTR3K	H60.XYZTR5S H60.XYZTR5K	Units
Active axes			X, Y, Z, θx, θy, θz		
Drive control		6 driving channels 6 sensing channels	6 driving channels 6 sensing channels	6 driving channels 6 sensing channels	
Linear travel in X, Y (0~120V)		±6.5	±12.5	±40	μm±20%
Linear travel in Z (0~120V)		±3.2	±6.4	±27.5	μm±20%
Tilt angle in θx, θy(0~120V)		±0.16(≈±30″)	±0.32(≈±66″)	±0.6(≈±123″)	mrad±20%
Tilt angle in θz(0~120V)		±0.24(≈±50″)	±0.48(≈±99″)	±0.8(≈±165″)	mrad±20%
Tilt resolution(θx, θy)		0.02(<0.01″) /0.01(<0.01″)	0.04(<0.01″) /0.02(<0.01″)	Better than the 0.5(0.1″)	μrad
Tilt resolution, θz		0.04(<0.01″) /0.02(<0.01″)	0.06(≈0.01″) /0.03(<0.01″)	Better than the 0.5(0.1″)	μrad
Resolution in X, Y		0.8/0.4	1.6/0.8	Better than the 0.5	nm
Resolution in Z		0.4/0.2	0.8/0.4	Better than the 0.5	nm
Closed-loop linearity		0.25/-	0.25/-	Better than the 0.1/-	%F.S.
Closed-loop repeatability		0.1/-	0.1/-	Better than the 0.1/-	%F.S.
Structure			Hexapods		
Driving source			Piezo actuators		
Load capacity			5		kg
Mass		1000	1150	1300	g±5%

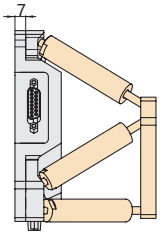
Drawing









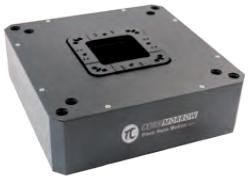


Recommended Controllers



E01 Piezo Controller

H61.XYZTR0 6-Axis Piezo Tilt Stage



H61.XYZTR0 6-Axis Piezo Tilt Stage can produce six-axis ultra-precision motion, suitable for static six-axis linear nano-positioning and angular nano-radian deflection. With a 50mm×50mm through hole in the center, it can be used for transmitted light applications.

▸ Characteristics

- Motion in X, Y, Z, θx, θy, θz
- High load capacity
- Optional closed loop sensor
- Positive static use

▸ Application

- Six-axis ultra-precision position adjustment
- Optical applications
- Prism position adjustment
- Transmitted light applications, etc.

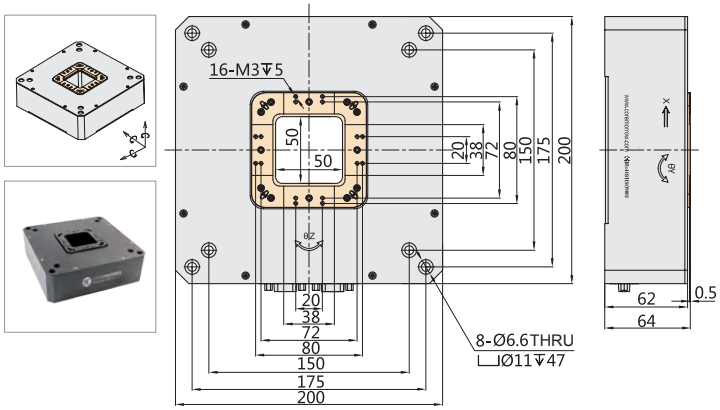
▸ Technical Data

Type	H61.XYZTR0S/K-A	H61.XYZTR0S/K	Units
Active axes	X, Y, Z, θx, θy, θz	X, Y, Z, θx, θy, θz	
Drive control	8 driving channels , 6 sensing channels	7 driving channels , 6 sensing channels	
XYZ Travel(0~120V)	XY: ±32/axis, Z: 28	XY100/axis, Z25	μm±20%
XYZ Max.travel(0~150V)	XY: ±40/axis, Z: 35	XY125/axis, Z31	μm±20%
Travel in θxθy(0~120V)	±0.28/axis	±0.2/axis	mrad±20%
Max.travel in θxθy(0~150V)	±0.35/axis	±0.25/axis	mrad±20%
Travel in θz(0~120V)	±0.12	0.12	mrad±20%
Max.travel in θz(0~150V)	±0.15	0.15	mrad±20%
Closed/open-loop resolution in θx, θy	0.02/0.01(<0.01″)	0.5	μrad
Closed/open-loop resolution in θz	0.02/0.01(<0.01″)	0.5	μrad
Closed/open-loop resolution in XY	2.5/1	<10	nm
Closed/open-loop resolution in Z	1/0.5	2.5	nm
Linearity	0.2	0.2	%F.S.
Repeatability	0.1	0.1	%F.S.
Unloaded resonant frequency	350	150	Hz±20%
Resonant frequency at loading	50(@10.5kg)	70(@2kg)	Hz±20%
Sensor	SGS/-	SGS/-	
Load capacity	10.5	Horizontal 2, Vertical 0.1, inverted 0.2	kg
Central aperture	50×50	50×50	mm
Using way	Positive use, static	Static	
El. capacitance	XYZ: 29/axis, θxθy: 15/axis, θz: 7	XY: 10.8/axis, Z: 14.4, θxθyθz: 3.6/axis	μF±20%
Mass	4.2	3	kg±5%
Material	Steel, Al	Steel, Al	
Connector	One DB15 male and one DB15 female		

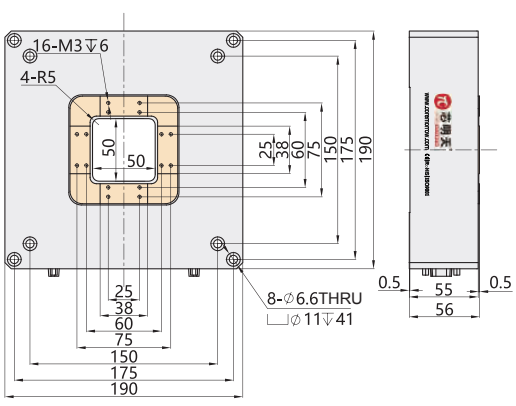
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V. An external adapter cable is required to be selected.

▸ Drawing

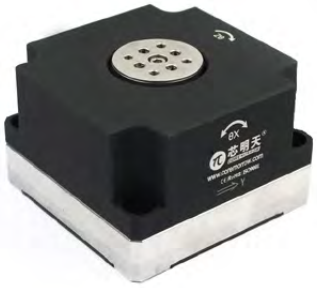
H61.XYZTR0S/K-A



H61.XYZTR0S/K



H63 6-Axis Motion Piezo Stage



▸ Characteristics

- Motion in X, Y, Z, θx, θy, θz
- Linear travel to 4.8μm@120V
- Deflection travel to 0.8mrad@120V
- Load capacity to 500g

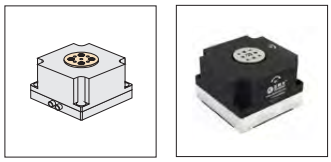
▸ Technical Data

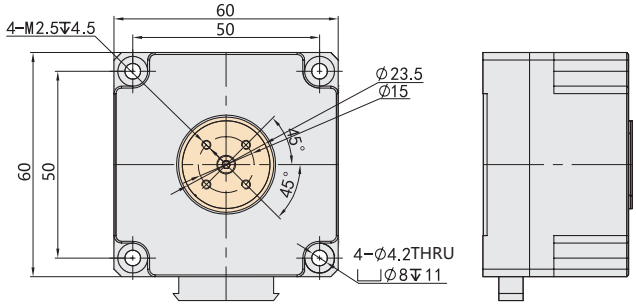
Type	S - closed loop K - open loop	H63.XYZTR1S H63.XYZTR1K	Units
Active axes		X, Y, Z, θx, θy, θz	
Drive control		7 driving channels 6 sensing channels	
Motion & Position			
XYZ travel range(0~100V)		4/axis	μm±10%
XYZ Max.travel range(0~120V)		4.8/axis	μm±10%
θxθyθz deflection angle (0~100V)		0.6/axis	mrad±10%
θxθyθz Max.deflection angle (0~120V)		0.8/axis	mrad±10%
Integrated sensor		SGS/-	
Closed/open-loop angular resolution		0.15/0.01	μrad
Closed/open-loop linear resolution		1.5/0.1	nm
Closed-loop linearity		0.25/-	%F.S.
Closed-loop repeatability		0.2/-	%F.S.
Mechanical Property			
Unloaded resonant frequency		X2330/Y895/Z1425/ θx3485/θy5620/θz2300	Hz±20%
Unloaded closed-loop step time		25	ms±20%
Load capacity		500	g
Drive Performance			
El. capacitance, XYZ		1.8	μF/axis±20%
El. capacitance, θx, θy, θz		3.6	μF/axis±20%
Others			
Material		Steel, Aluminum	
Mass		440(Not include cable)	g±5%
Sensing/voltage Connector		J30J-31ZKS	

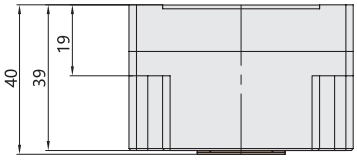
Note: An external adapter cable is required to be selected.

▸ Drawing

H63







▸ E51.D7S Piezo Controller

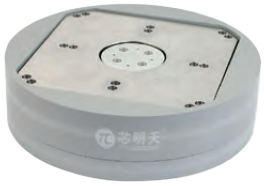


Front panel



Rear panel

H63A 6-Axis Motion Piezo Nanopositioning Stage



▸ Characteristics

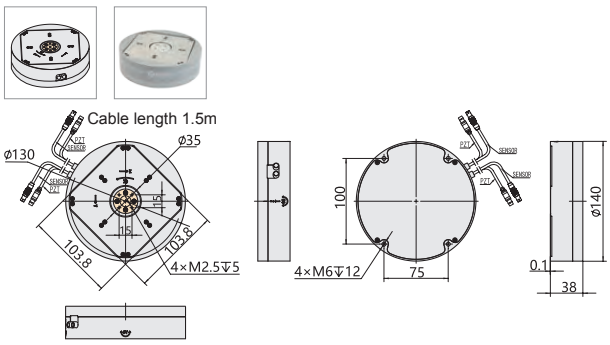
- Motion in X, Y, Z, θx, θy, θz
- Load capacity up to 200g
- Optional closed-loop feedback sensor
- Low profile

▸ Technical Data

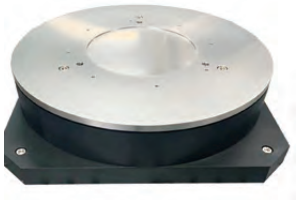
Type	H63A.XYZTR25S H63A.XYZTR25K	Units
Active axes	X, Y, Z, θx, θy, θz	
Drive control	7 driving channels 6 sensing channels	
XYZ nominal travel range(0~120V)	XY±80/Z160	μm±20%
XYZ Max.travel range(0~150V)	XY±100/Z200	μm±20%
θxθyθz nominal travel range(0~120V)	θxθy±10(≈ ±2063″)/ θz1.28(≈ 264″)	mrad±20%
θxθyθz Max.travel range(0~150V)	θxθy±12.5(≈ ±2578″)/ θz1.6(≈ 330″)	mrad±20%
Integrated sensor	SGS/-	
XYZ resolution	7/2	nm
θxθyθz resolution	θxθy0.9(≈0.2″)/0.25(≈0.05″) θz0.06(<0.01″)/0.01(<0.01″)	μrad
Linearity	0.5/-	%F.S.
Repeatability	0.2/-	%F.S.
Unloaded resonant frequency	X140/Y150/Z200 θx270/θy280/θz110	Hz±20%
Load capacity	0.2	kg
El. Capacitance	XYθxθy14.4/ Z28.8/θz3.6	μF±20%
Material	Steel, Al	
Mass	960(Not include cable)	g±5%

▸ Drawing

H63A



H64 6-Axis Motion Piezo Stage

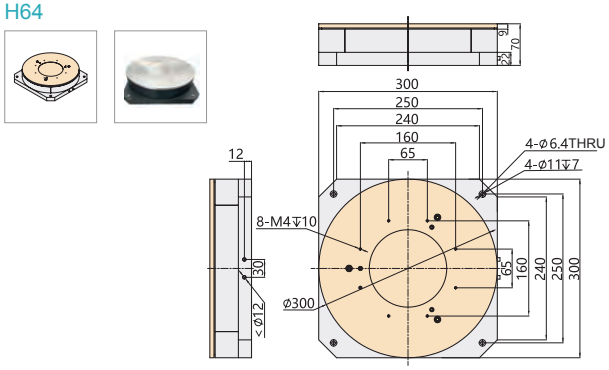


▸ Technical Data

Type	H64.XYZTR0S H64.XYZTR0K	Units
Active axes	X, Y, Z, θx, θy, θz	
Drive control	6 driving channels 6 sensing channels	
XYZ nominal travel range(0~120V)	XY14.4/Z30	μm±10%
XYZ Max.travel range(0~150V)	XY18/Z37.5	μm±10%
θxθyθz nominal travel range(0~120V)	θxθy0.32(≈66″)/θz1.3(≈268″)	mrad±10%
θxθyθz Max.travel range(0~150V)	θxθy0.4(≈83″)/θz1.6(≈330″)	mrad±10%
Integrated sensor	SGS/-	
XYZ resolution	XY0.6/0.2, Z1.25/0.4	nm
θxθyθz resolution	θxθy13/4(<0.01″), θz50/16(<0.01″)	nrad
Linearity	X0.053/Y0.02/Z0.084/θx0.167/ θy0.1/θz0.125	%F.S.
Repeatability	X0.091/Y0.2/Z0.063/θxθy0.134/ θz0.108	%F.S.
Unloaded resonant frequency	XY180/Z260/θz150	Hz±20%
Loaded resonant frequency@10kg	XY100/Z150/θz100	Hz±20%
Load capacity	10	kg
El. Capacitance	XY6.8/θxθyZ14.2/θz62.5	μF±20%
Closed-Loop Step Time	XYZθxθy60/θz500	ms±20%
Material	Steel, Al	
Mass	9.5(Not include cable)	kg±5%

▸ Drawing

H64



XD500.T0S/K Piezo Tilt Stage



XD500.T0S/K piezo tilt/tip platform does the motion in θx and θy direction, its load capacity is to 10kg, which is designed for large load tilt application.

▸ Characteristics

- Motion in θx, θy
- Load capacity to 10kg
- Optional closed-loop sensor
- Suitable for large load application

▸ Application

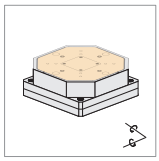
- Laser beam deflection
- Heavy mirror holder deflection
- Laser beam combining
- Beam scanning

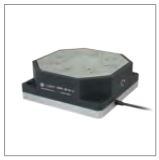
▸ Technical Data

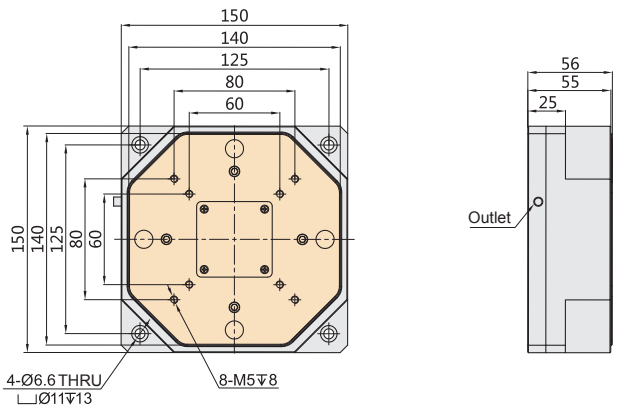
Type	XD500.T0S	XD500.T0K	Units
Active axes	θx, θy	θx, θy	
Drive control	3 driving channels , 2 sensing channels	3 driving channels	
Travel range(0~120V)	0.23/axis(≈ ±48″)	0.23/axis(≈ ±48″)	mrad±10%
Max.travel range(0~150V)	0.29/axis(≈ ±60″)	0.29/axis(≈ ±60″)	mrad±10%
Sensor	SGS	-	
Closed/open loop resolution	0.2	0.1	μrad
Repeatability	0.1	-	%F.S.
Push/pull force	200/20	200/20	N
Unloaded resonant frequency	1000	1000	Hz±20%
Resonant frequency@10kg	230	230	Hz±20%
Load capacity	10	10	kg
El. capacitance	21.5/axis	21.5/axis	μF±20%
Material	Steel, aluminum	Steel, aluminum	
Mass	5	5	kg±5%

▸ Drawing

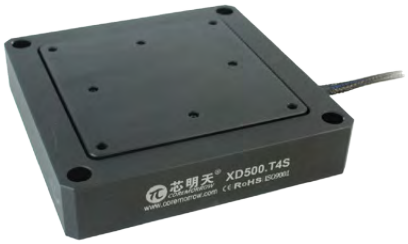
XD500.T0S/K







XD500.T4 Piezo Tip/Tilt Stage



The XD500.T4 piezo tip/tilt platform is a two-dimensional motion platform. Its carrying capacity can reach 1kg, and its large moving platform is suitable for the installation and deflection of large mirrors.

▸ Characteristics

- θx, θy tilt
- Tilt angle to ±2mrad
- Load capacity to 1kg
- Open-loop or closed-loop version

▸ Applications

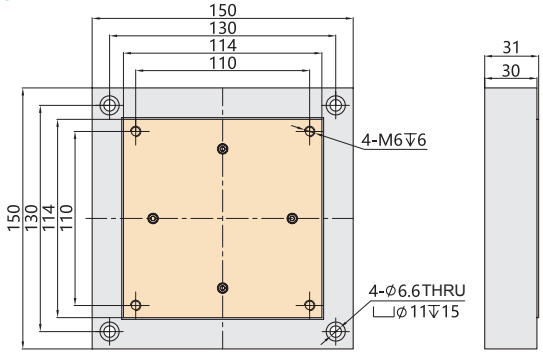
- Laser beam deflection
- Heavy mirror holder deflection
- Laser beam combining
- Beam scanning

▸ Technical Data

Type	XD500.T4S	XD500.T4K	Units
Active axes	θx, θy	θx, θy	
Drive control	3 driving channels , 2 sensing channels	3 driving channels	
Nominal travel range(0~120V)	±1.6/axis	±1.6/axis	mrad±10%
Max.travel range(0~150V)	±2/axis	±2/axis	mrad±10%
Sensor	SGS	-	
Closed/open-loop resolution	0.5(≈0.03″)	0.1(<0.01″)	μrad
Linearity	0.3	-	%F.S.
Repeatability	0.2	-	%F.S.
Unloaded resonant frequency	280	280	Hz±20%
Resonant frequency@1kg	100	100	Hz±20%
Load capacity	1	1	kg
El. capacitance	10.8/axis	10.8/axis	μF±20%
Material	Steel, aluminum	Steel, aluminum	
Mass	1575	1575	g±5%

▸ Drawing

XD500.T4



▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

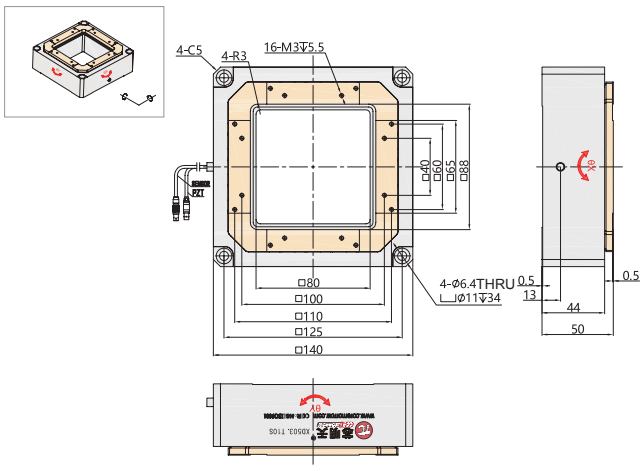
XD503 Piezo Tip/Tilt Stage



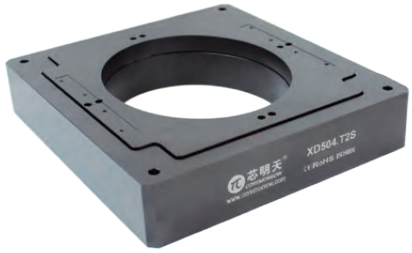
Technical Data

Type	XD503.T10S/K	Units
Active axes	θx, θy	
Drive control	3 driving channels 2 sensing channels	
Sensor	SGS	
Max.travel range(0~150V)	±5	mrad±20%
Load capacity	Horizontal 2/Vertical 0.02/Inverted 0.1	kg
Resolution	0.4 (≈ 0.08″) / 0.1 (≈ 0.02″)	μrad±20%
Unloaded resonant frequency	200	Hz±20%
Resonant frequency@2kg load	60	Hz±20%
Linearity	0.2	%F.S.
Repeatability	0.15	%F.S.
Mass(Not include cable)	1300	g±5%
El. capacitance	57.6	μF/ axis±20%
Material	Aluminium	

Drawing



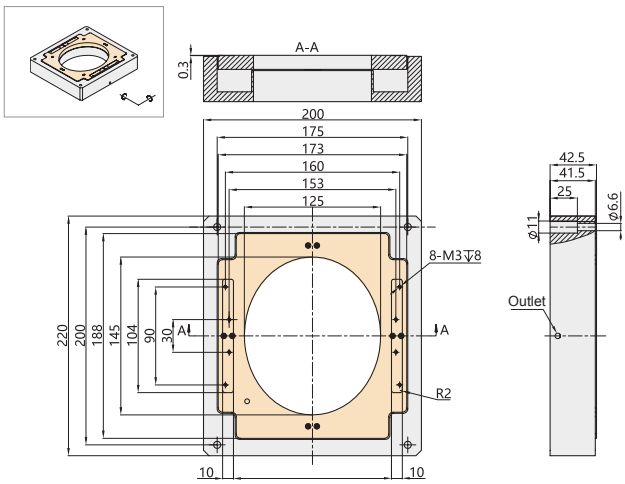
XD504 Piezo Tip/Tilt Stage



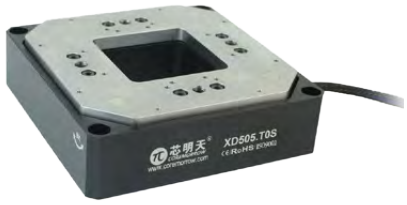
Technical Data

Type	XD504.T2S/K	Units
Active axes	θx, θy	
Drive control	3 driving channels 2 sensing channels	
Sensor	SGS	
Max.travel range(0~150V)	±1/axis	mrad±20%
Load capacity	2	kg
Unloaded resonant frequency	400	Hz±20%
Resonant frequency@1.8kg load	200	Hz±20%
Closed loop resolution	0.5	μrad
Linearity	0.2/-	%F.S.
Repeatability	0.2/-	%F.S.
Unloaded step time	40	ms
El. capacitance	28.8/axis	μF±20%
Mass(Not include cable)	3.2	kg±5%
Material	Steel, Aluminum	

Drawing



XD505.T0 Piezo Tip/Tilt Stage



XD505.T0 piezo tilt/tip stage tilts in θx and θy direction,its load capacity is up to 20kg,which is ideal for large load deflection adjustment. It features a center aperture of 60×60mm^2 that is suitable for light-transmitted applications.

▸ Characteristics

- Motion in θx, θy, Load capacity to 20kg
- Aperture size of 60×60mm^2
- Open-loop or closed-loop version

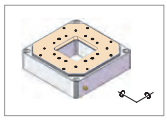
▸ Applications

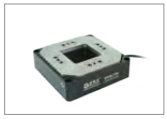
- Light-transmitted applications
- Large load applications
- Laser beam deflection/stabilization
- Laser beam combining,etc

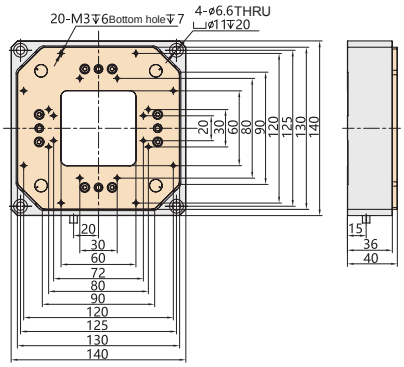
▸ Technical Data

Type	XD505.T0S	XD505.T0K	Units
Active axes	θx, θy	θx, θy	
Drive control	3 driving channels , 2 sensing channels	3 driving channels	
Sensor	SGS	-	
Nominal travel in θx θy(0~120V)	±0.14/axis(≈ ±29″)	±0.14/axis(≈ ±29″)	mrad±10%
Max.travel in θx θy(0~150V)	±0.18/axis(≈ ±37″)	±0.18/axis(≈ ±37″)	mrad±10%
Closed/open-loop resolution	0.01	0.003	μrad
Linearity	0.3	-	%F.S.
Repeatability	θx0.13/θy0.24	-	%F.S.
Unloaded resonant frequency	4.6	4.6	kHz±20%
Resonant frequency@5kg	θx0.4/θy0.32	θx0.4/θy0.32	kHz±20%
Step Time	50	10	ms±20%
Load capacity	20	20	kg
El.capacitance	14.4/axis	14.4/axis	μF±20%
Material	Steel,Al	Steel,Al	
Mass(Cable included)	2100	2100	g±5%

▸ Drawing







▸ Recommended Controllers

E00/E01	E70	E80
		
3 channels, Digital, analog,knob adjustment,Open/closed loop ,Ave. current: 291mA/58mA	3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA

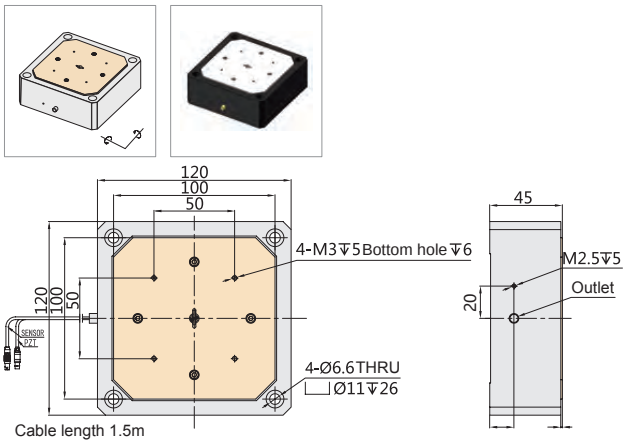
Note: Please see "Piezo Controller" for detailed information

20060 Piezo Tip/Tilt Stage (Custom Version)

Technical Data

Type	20060	Units
Active axes	θx, θy	
Travel range(0~120V)	±1	mrad±20%
Travel range(0~150V)	±1.25	mrad±20%
Integrated sensor	SGS	
Closed/open-loop resolution	0.25/0.05	μrad
Linearity	0.2/-	%F.S.
Repeatability	0.1/-	%F.S.
Unloaded resonant frequency	200	Hz±20%
Push/pull capacity	100/20	N±20%
El. capacitance	14.4/axis	μF±20%
Material	Steel, Aluminum	
Load capacity	5	kg±5%

Drawing

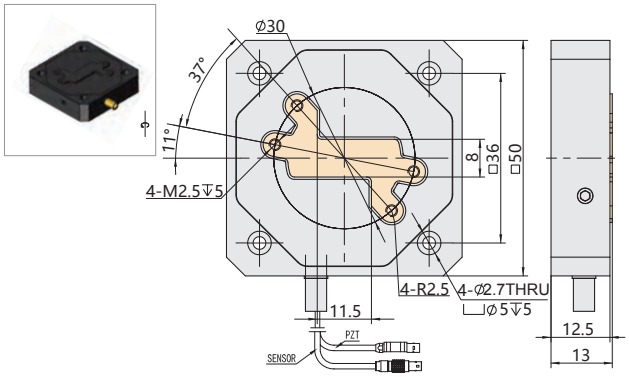


21031 Piezo Rotary Stage

Technical Data

Type	21031	Units
Active axes	θz	
Travel range(0~150V)	2	mrad±20%
Sensor	SGS	
Open-loop resolution	0.02	μrad±20%
Closed loop resolution @ 20mV ripple	0.3(Expected)	μrad±20%
Repeatability	0.1	%F.S. ±20%
Unloaded resonant frequency	3000	Hz±20%
Load capacity	1	kg±5%
El. capacitance	3.6	μF±20%
Mass(Not include cable)	<0.1	kg±20%
Material	Aluminium	

Drawing

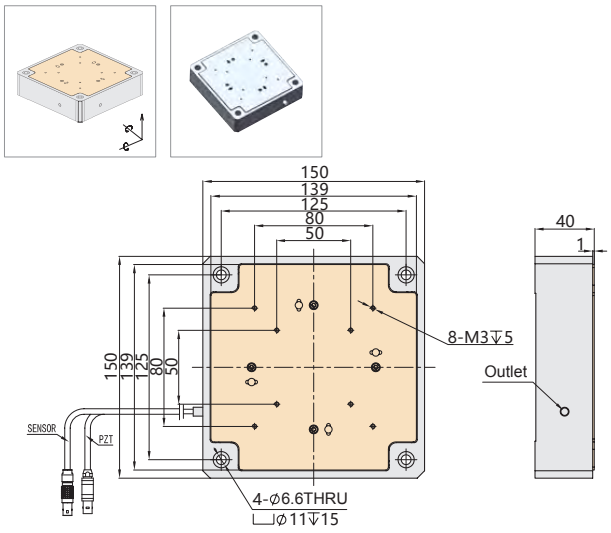


21075 Piezo Tip/Tilt and Z Stage

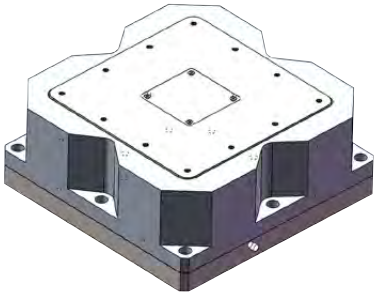
Technical Data

Type	21075	Units
Active axes	θx, θy, Z	
Linear travel(0~120V)	200	μm±5%
Linear travel(0~150V)	250	μm±5%
Tilt range(0~120V)	±1.6	mrad±20%
Tilt range(0~150V)	±2	mrad±20%
Size	150×150×40	mm^3
Sensor	SGS	
Closed/open loop linear resolution	20/10	nm
Closed/open loop tilt resolution	0.25/0.05	μrad
Linearity	0.2	%F.S.
Repeatability	0.1	%F.S.
Push/pull force	100/20	N
Unloaded resonant frequency	180/180/150	Hz±20%
Load capacity	3	kg
El. capacitance	X14.4/Y14.4/Z36	μF±20%
Material	Steel, aluminum	
Mass	2.5	kg±10%

Drawing



21087 Piezo Tilt Stage



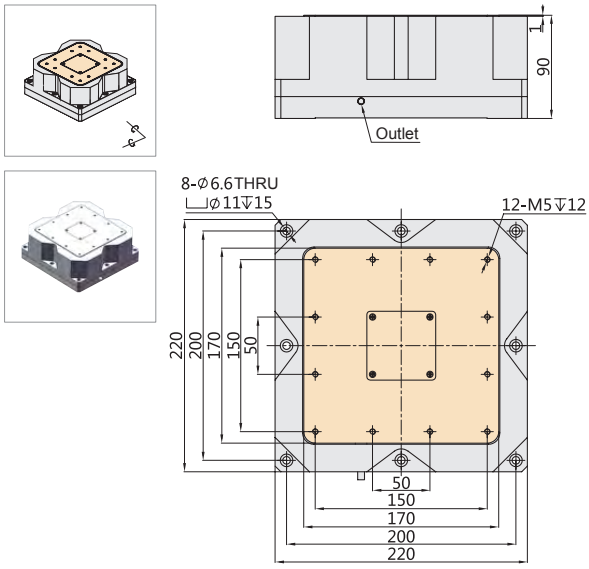
▸ Technical Data

Type	21087-1	21087-2	Units
Active axes	θx, θy	θx, θy	
Driving channels	3 driving channels	3 driving channels	
Travel range(0~120V)	0.4	0.4	mrad±20%
Travel range(0~150V)	0.5	0.5	mrad±20%
Sensor	SGS	SGS	
Size	220×220×90	170×170×76	mm
Closed/open loop resolution	0.03/0.01	0.03/0.01	μrad
Linearity	0.2	0.2	%F.S.±20%
Repeatability	0.1	0.1	%F.S.±20%
Unloaded resonant frequency	650	800	Hz±20%
Load capacity	50	20	kg
El. capacitance	28.8/axis	21.6/axis	μF±20%
Material	Steel, aluminum	Steel, aluminum	
Mass	15	8	kg±5%

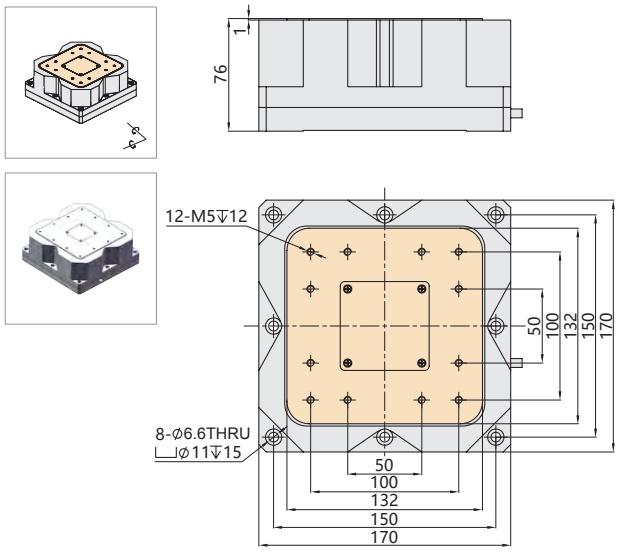
Note: The above parameters are measured using E00/E01 piezo controllers. The max driving voltage can be -20~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing

21087-1



21087-2

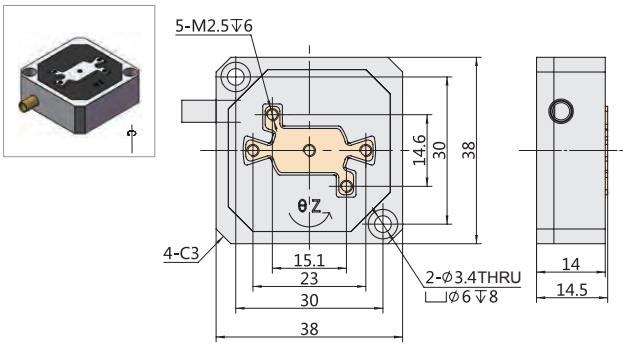


21101 Piezo Rotation Stage

▸ Technical Data

Type	21101	Units
Active axes	θz	
Travel range(0~150V)	1.5	mrad±20%
Open-loop resolution	0.03	μrad±20%
Repeatability	0.2	%F.S.±20%
Unloaded resonant frequency	9000	Hz±20%
Operating frequency@30g, 10μrad	0.9	kHz±20%
El.capacitance	3.6	μF±20%
Mass(not include cable)	<0.1	kg±20%
Material	Steel	

▸ Drawing

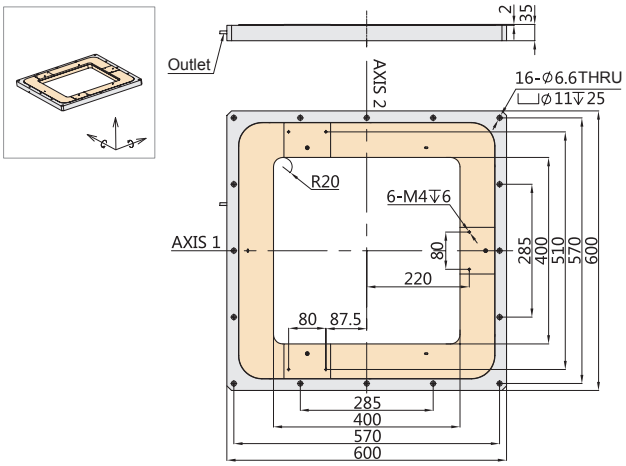


21180 Piezo Tip/Tilt and Z Stage

▸ Technical Data

Type	21180	Units
Active axes	θx, θy, Z	
Linear travel(0~150V)	500	μm±20%
Tilt angle(0~150V)	±1/axis	mrad±20%
Sensor	SGS, high accuracy	
Resolution in Z	67@20mV	nm
Resolution(θx, θy)	0.3	μrad
Linearity	0.4	%F.S.
Repeatability	0.25	%F.S.
Unloaded resonant frequency	30	Hz±20%
Resonant frequency@1.5kg	20	Hz±20%
Load capacity	1.5	kg
El. capacitance(Z)	86.4	μF±20%

▸ Drawing

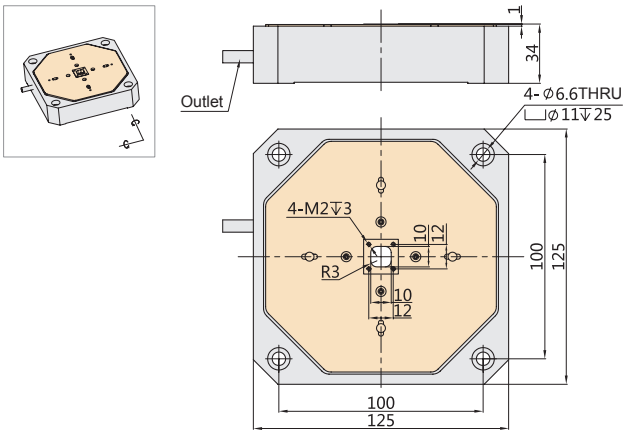


21205 Piezo Tip/Tilt Stage

▸ Technical Data

Type	21205	Units
Active axes	θx, θy	
Travel range(0~120V)	±3.5	mrad±20%
Sensor	SGS, high accuracy	
Unloaded resonant frequency	170	Hz±20%
Resonant frequency (@10×10×2mmmirror)	160	Hz±20%
El.capacitance	10.8/axis	μF±20%
Material	Steel, Aluminum	

▸ Drawing

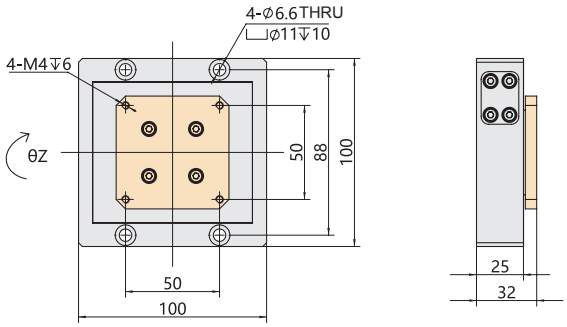


22033 Piezo Rotation Platform

▸ Technical Data

Type	22033	Units
Active axes	θz	
Sensor	SGS	
Travel(0~150V)	1	mrad±20%
Closed-loop resolution	0.03	μrad±20%
Linearity	0.2	%F.S.
Repeatability	0.1	%F.S.
Load capacity	6	kg±5%
El.capacitance	14.4	μF±20%
Material	Steel, Al	
Mass	2	kg±10%

▸ Drawing

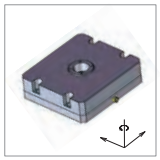


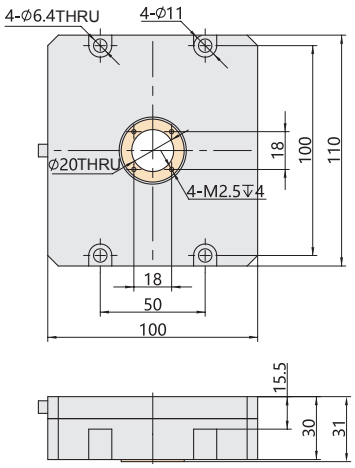
22038 Piezo Scanning and Rotation Stage

▸ Technical Data

Type	22038	Units
Active axes	X, Y, θz	
Sensor	SGS	
XY travel(0~150V)	50/axis	μm±20%
θz rotation travel(0~150V)	9	mrad±20%
Open/closed-loop resolution in XY	0.5/2	nm±20%
Open/closed-loop resolution in θz	0.1/0.3	μrad±20%
Linearity	0.2	%F.S.
Repeatability	0.15	%F.S.
El.capacitance in XY	5.4	μF/axis±20%
El.capacitance in θz	21.6	
Load capacity	0.2	kg±5%
Material	Steel, Al	
Mass(no cable)	<0.5	kg±5%

▸ Drawing



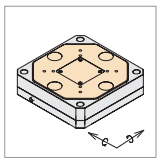


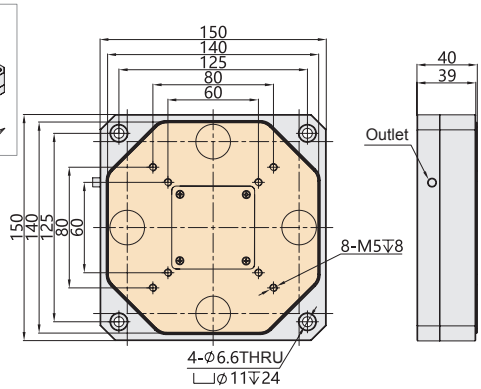
22044 Piezo Tip/Tilt Platform

▸ Technical Data

Type	22044	Units
Active axes	θx, θy	
Travel(0~150V)	20/axis	arcsecond
Sensor	SGS	
Closed/open-loop resolution	0.2/0.1	μrad±20%
Linearity	0.2	%F.S.±20%
Repeatability	0.1	%F.S.±20%
Unloaded resonant frequency	1000	Hz±20%
Load capacity	5	kg
Closed-loop step at 4kg load	6.5	ms±20%
El.capacitance	7.2/axis	μF±10%
Material	Steel, Al	
Mass	5	kg±10%

▸ Drawing



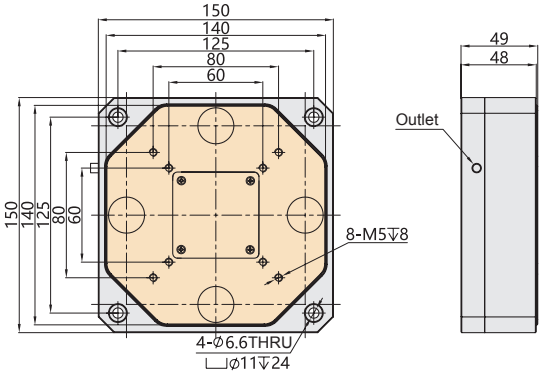


22064 Piezo Tilt Platform

▸ Technical Data

Type	22064	Units
Active axes	θx	
Travel(0~150V)	0.3	mrad±20%
Unloaded resonant frequency	1000	Hz±20%
Load capacity	10	kg
Operating frequency @10kg load and 0.1mrad tilt	100	Hz±20%
El.capacitance	14.4/axis	μF±10%
Material	Steel, Al	
Mass	5.5	kg±10%

▸ Drawing

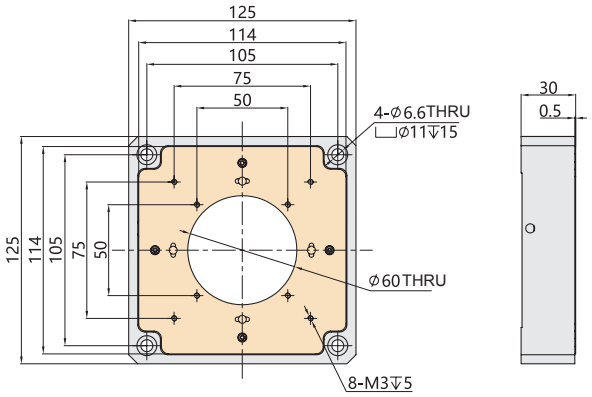


22104 Piezo Tip/Tilt Platform

▸ Technical Data

Type	22104	Units
Active axes	θx, θy	
Sensor	SGS	
Travel(0~150V)	1.5	mrad±20%
Load capacity	2	kg±5%
Unloaded resonant frequency	400	Hz±20%
Closed-loop resolution	0.5	μrad
Linearity	0.2	%F.S.
Repeatability	0.1	%F.S.
El.capacitance	7.2/axis	μF±20%
Material	Steel, Al	

▸ Drawing



Piezo Tip/Tilt/Z Platform



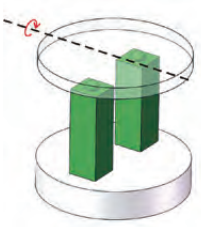
Using piezo actuators as the driving source, Piezo Tip/ Tilt Platform can generate θx, θy tilt, or also Z motion, which is used to drive the deflection of the reflective/ transmissive lens to change the direction of the optical path.

Piezo Tip/Tilt/Z Platform

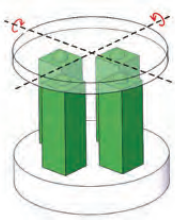
Piezoelectric Tip/tilt/Z Platform uses piezoelectric actuators as driving components, adopts a flexible hinge parallel guiding structure and realizes single-axis or multi-axis angular deflection motion through the expansion and contraction of internal piezoelectric actuators. To ensure the deflection with excellent motion accuracy and high stability, it can also use closed-loop control with built-in high-precision sensor to achieve nano-radian resolution and microradian positioning accuracy.

▸ Different Motion Directions

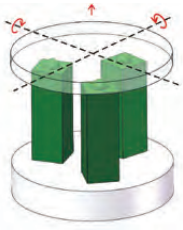
1 axis motion
θx



2 axes motion
θx, θy

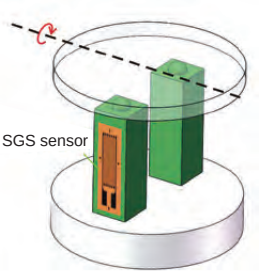


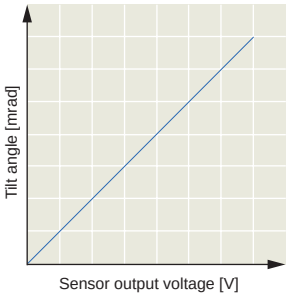
3 axes motion
θx, θy, Z



▸ Closed Loop for High Accuracy

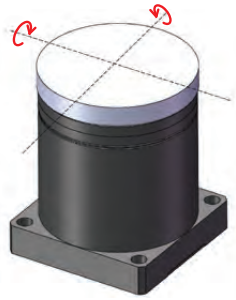
For closed-loop control, the sensor output monitoring voltage is linear with the deflection angle of piezo platform.



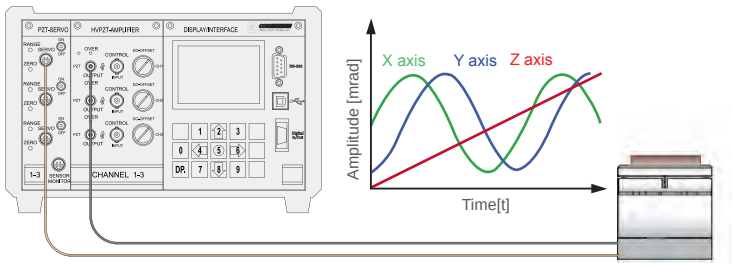


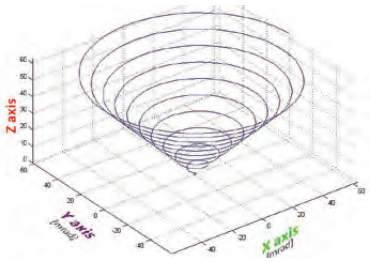
▸ Large Load Capacity

Designed with high rigidity structure, it can carry mirrors with an outer diameter of 110mm. Larger load platforms are customizable.

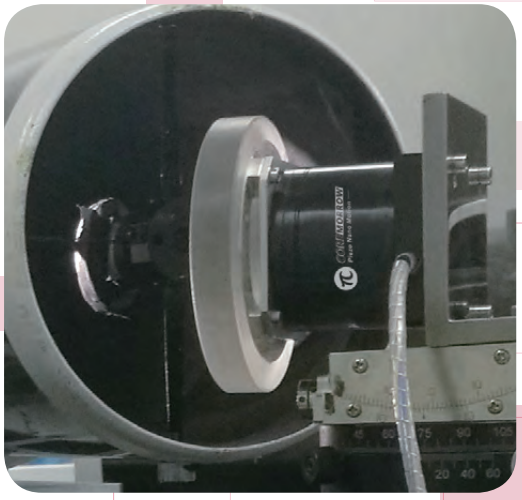


▸ Driving

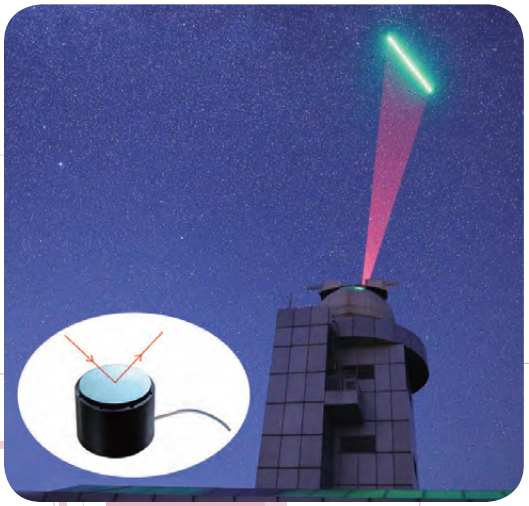




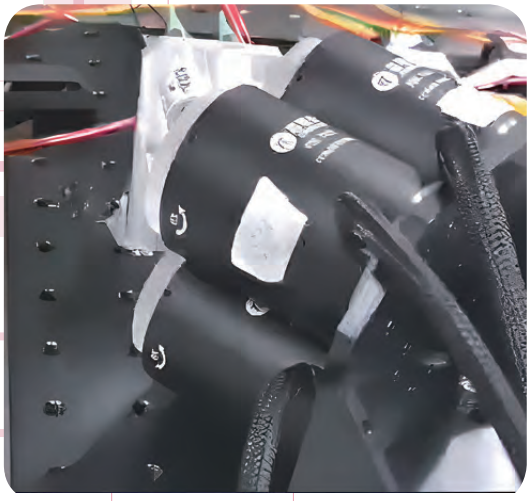
▸ Applications



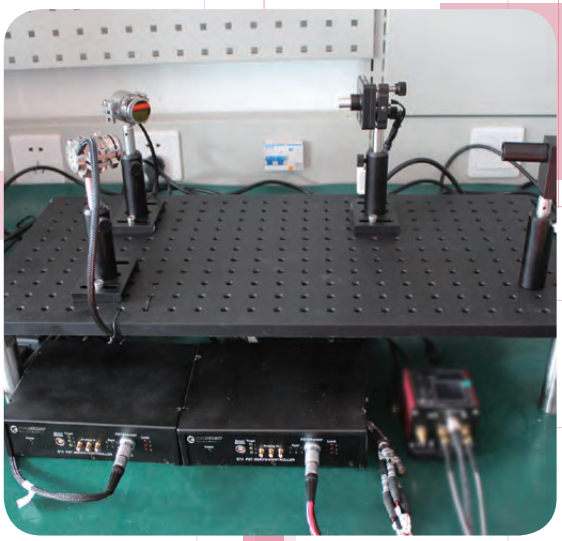
Optical Path Adjustment



Laser Communication



Deformable Mirror



Laser Stabilization

▶ Product List

Type	Axes	Max.tilt angle	Resolution	Resonant frequency	Page
P32.ZT4	θx, θy Z	6mrad(≈1230″) /axis 37.5μm	0.05μrad(≈0.01″) 0.5nm	2kHz	329
P32.ZT6	θx, θy Z	11mrad(≈2268″) /axis 55μm	0.1μrad(≈0.02″) 0.5nm	4kHz	329
P32.ZT8	θx, θy Z	15mrad(≈ 3093″) /axis 75μm	0.2μrad(≈ 0.04″) 1nm	2.5kHz	329
P33.T2	θx, θy	2.5mrad(≈516″) /axis	0.02μrad(<0.01″)	3.7kHz	331
P33.T4	θx, θy	5mrad(≈1031″) /axis	0.04μrad(<0.01″)	3.4kHz	331
P33.T5	θx, θy	6.8mrad(≈1402″) /axis	0.05μrad(≈0.01″)	3.3kHz	331
P33.T6	θx, θy	7.5mrad(≈1546″) /axis	0.1μrad(≈0.02″)	3.2kHz	331
P33.T8	θx, θy	10mrad(≈2062″) /axis	0.1μrad(≈0.02″)	3.1kHz	331
P34.T1S/K	θx, θy	1.4mrad(≈289″) /axis	0.1μrad(≈0.02″)	3.6kHz	333
P34.T2S/K	θx, θy	2.8mrad(≈577″) /axis	0.1μrad(≈0.02″)	2.8kHz	333
P34.T4S/K	θx, θy	5.6mrad(≈1155″) /axis	0.1μrad(≈0.02″)	1.6kHz	333
P35.T20	θx, θy	27mrad(≈5569″) /axis	0.3μrad(≈0.06″)	1.75kHz	335
P35.T40	θx, θy	43mrad(≈8869″) /axis	0.4μrad(≈0.08″)	1.5kHz	335
P35A.T40	θx, θy	43mrad(≈8869″) /axis	0.4μrad(≈0.08″)	1.3kHz	336
P35A.T35	θx, θy	±18.5mrad(≈±3816″) /axis	0.4μrad(≈0.08″)	2kHz	336
P35A.U1	θx	±0.75mrad(≈±155″)	0.1μrad(≈0.02″)	5.4kHz	336
S22.U3	θx	3mrad(≈610″)	0.03μrad(<0.01″)	3kHz	337
S23	θx, θy Z	1.5mrad(≈300″) /axis 10μm	0.02μrad(<0.01″) 0.08nm	3.2/3.5kHz 7.5kHz	338
S30.T1KY	θx, θy	1.5mrad(≈300″) /axis	0.02μrad(<0.01″)	15kHz	340
S30.T2S/KY	θx, θy	3mrad(≈619″) /axis	0.03μrad(<0.01″)	15kHz	340
S30.T2S/KF	θx, θy	3mrad(≈619″) /axis	0.03μrad(<0.01″)	17kHz	340
S31.T2S/K	θx, θy	3.8mrad(≈784″)/axis	0.05μrad(≈0.01″)	12kHz	341
S31.T4S/K	θx, θy	8.5mrad(≈1754″)/axis	0.1μrad(≈0.02″)	11.5kHz	341
S33.T1SYH	θx, θy	1.3mrad(≈268″)/axis	0.03μrad(<0.01″)	7kHz	342
S34.U0KF	θx	0.108mrad(≈22″)	0.02μrad(<0.01″)	9kHz	343
S34.T2S/KF	θx, θy	2.5mrad(≈516″) /axis	0.02μrad(<0.01″)	1.7kHz	344
S34.T2S/KY	θx, θy	1mrad(≈200″) /axis	0.02μrad(<0.01″)	2.8kHz	345
S34.T4S/KY	θx, θy	±1.1mrad(≈±206″)/axis	0.02μrad(<0.01″)	2.35kHz	346
S37.T2	θx, θy	3.5mrad(≈722″) /axis	0.03μrad(<0.01″)	6.5kHz	347
S37.T3	θx, θy	5.5mrad(≈1134″) /axis	0.04μrad(<0.01″)	6.4kHz	347
S37.T4	θx, θy	6.8mrad(≈1402″) /axis	0.05μrad(≈0.01″)	6.3kHz	347
S37.T5	θx, θy	9.5mrad(≈1960 ″) /axis	0.07μrad(≈0.01″)	6.2kHz	347
S37.T6	θx, θy	10mrad(≈2062″) /axis	0.08μrad(≈0.02″)	6.1kHz	347
S37.T8	θx, θy	13.5mrad(≈2785″) /axis	0.1μrad(≈0.02″)	6kHz	347
S38.T1-C	θx, θy	1.2mrad(≈248″) /axis	0.01μrad(<0.01″)	7kHz	348
S38.T2-C	θx, θy	2.4mrad(≈495″) /axis	0.02μrad(<0.01″)	2kHz	348
XD304.T1	θx, θy	1.2mrad(≈±248″) /axis	0.01μrad(<0.01″)	15kHz	349
XD304.T2	θx, θy	2.4mrad(≈±495″) /axis	0.02μrad(<0.01″)	10kHz	349
20072	θx, θy	±4mrad(≈±800″) /axis	-	-	350
21019	θx, θy Z	17mrad(≈3506″) /axis 150μm	-	1kHz	350
21068	θx, θy	±0.85mrad(≈±175″)/axis	-	-	350
22022	θx, θy	±5mrad(≈±1000″)/axis	-	3.2kHz	351
22143	θx, θy	±5mrad(≈±1000″)/axis	0.5μrad(≈ 0.1″)	>0.5kHz	351
19078 Custom platform	θx, θy	±0.25mrad(≈±50″) /axis	-	8kHz	351
Laser stabilization system					352

P32 Piezo Tip/Tilt and Z Platform



P32 Piezo Tip/Tilt and Z Platform provides high-speed precision θx,θy tilt and Z linear motion. The resolution of linear motion can reach sub-nanometer level, deflection resolution reaches submicroradians, and response time can reach milliseconds. P32 piezoelectric deflection mirrors are compact, enabling up to 6, 11 or 15mrad deflection and 37.5, 55 or 75μm Z-axis linear motion.

▸ Characteristics

- θx, θy and Z motion
- Tilt angle to 6, 11 or 15 mrad
- Sub-ms response time
- High closed loop positioning accuracy

▸ θx, θy and Z axis Motions



▸ High Resolution, Stability and Dynamics

P32 piezo tip/tilt and Z platform is compact and internally assembled with a pre-load, high-reliability piezo actuator integrated into a complex, flexible hinge guidance system that is modeled and analyzed by FEA.

P32 uses a parallel-kinetic direct-drive tripod structure that provides optimum angular stability over a wide temperature range. This design has the advantages of small size, high dynamic performance, fast response and high linearity, making it ideal for industrial applications.

▸ Applications

- Image processing and stabilization
- Optical capture
- Laser scanning and beam deflection
- Laser tuning
- Light filter/optical switch
- Optics/beam stabilization

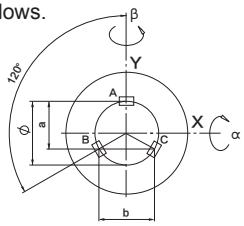
▸ Driving Principle

P32 piezo tip/tilt and Z platform is designed based on the mechanism drived by three piezo actuators that are placed at an angle intervals of 120°. In addition to tilting motion, this structural design also enables linear movement of the Z-direction, which can be used to correct the optical path length. In below drawing, A, B, C represent the measured displacement at the points, and the simple calculation formulas of the two-axis tilt angle and Z-direction displacement are as follows.

$$\alpha = [A-(B+C)/2]/a$$

$$\beta = (B-C)/b$$

$$Z = (A+B+C)/3$$



$$a = \frac{b}{2}\sqrt{3}\ ,\quad \varnothing = \frac{2b}{3}\sqrt{3}$$

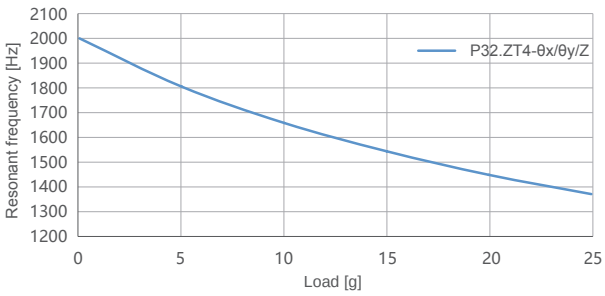
▸ Custom Integrated Deflection System



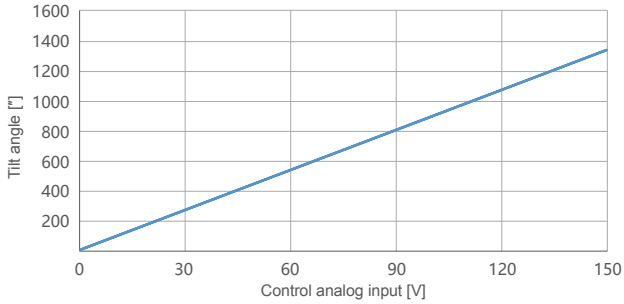
▸ Recommended Controllers

E01	E00	E70
		
3 channels Digital, analog Open/closed loop Ave. current to 58mA	3 channels Digital, analog Open/closed loop Ave. current to 291mA	3 channels Digital, analog Open/closed loop Ave. current to 70mA
Note: Please see "Piezo Controller" for detailed information.		

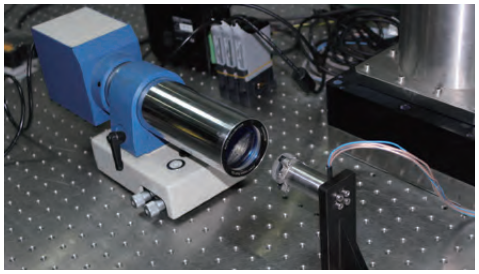
Frequency and Load Curve



Closed-Loop Curve

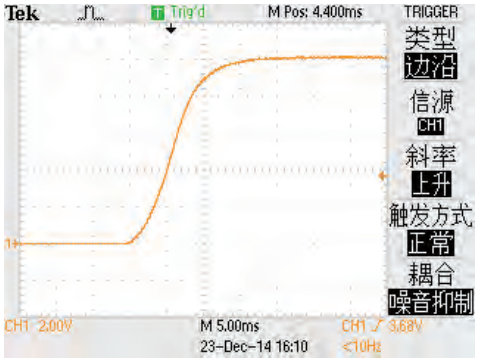


Measuring Tilt Angle



Step Time

The step time of the P32.ZT4S piezo platform reaching the full stroke after loading is about 15ms.



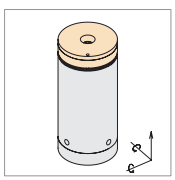
Technical Data

Type	S - closed loop K - open loop	P32.ZT4SY P32.ZT4KY	P32.ZT6SY P32.ZT6KY	P32.ZT8SY P32.ZT8KY	Units
Active axes		θx, θy, Z	θx, θy, Z	θx,θy,Z	
Drive control		3 driving channels 3 sensing channels	3 driving channels 3 sensing channels	3 driving channels 3 sensing channels	
θx, θy Tilt angle(0~120V)		5(≈1030″)	9(≈1854″)	12(≈2475″)	mrad±10%
Travel in Z(0~120V)		30	45	60	μm±10%
θx, θy tilt angle(0~150V)		6(≈1230″)	11(≈2268″)	15(≈3093″)	mrad±10%
Max.travel in Z(0~150V)		37.5	55	75	μm±10%
Integrated sensor		SGS/-	SGS/-	SGS/-	
Resolution in θx, θy		0.2(≈0.04″) /0.05(≈0.01″)	0.3(≈0.06″) /0.1(≈0.02″)	0.4(≈0.08″) /0.2(≈0.04″)	μrad
Resolution in Z		1/0.5	1.5/0.5	2/1	nm
Closed-loop linearity		0.05/-	θx θy: 0.2/- Z: 0.5/-	0.5/-	%F.S.
Closed-loop repeatability		0.02/-	θx θy: 0.2/- Z: 0.5/-	0.3/-	%F.S.
Unloaded resonant frequency		2	4(2@ Φ25×3mm mirror)	2.5	kHz±20%
Unloaded step time		5/2	10/5	15/8	ms±20%
El. capacitance		3.6/axis	5.4/axis	7.2/axis	μF±20%
Material		Steel	Steel	Steel	
Mass		300	350	400	g±5%

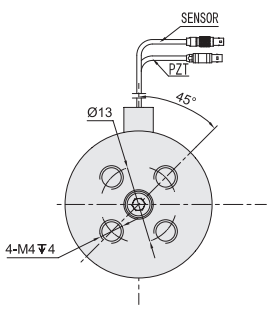
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

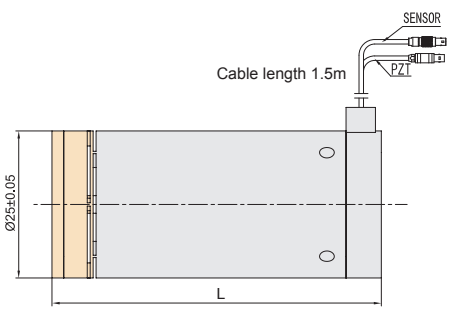
Drawing

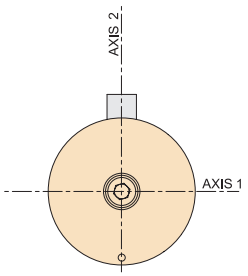
P32











Type	L[mm]
P32.ZT4	55
P32.ZT6	73
P32.ZT8	91

P33 Piezo Tip/Tilt Platform



P33 Piezo Tip/Tilt Platform is a deflection platform with fast response and compact size. It provides high-precision angular motion of the top platform. Compared with other actuators, the flexible hinge-guided piezoelectric deflection platform provides higher acceleration.

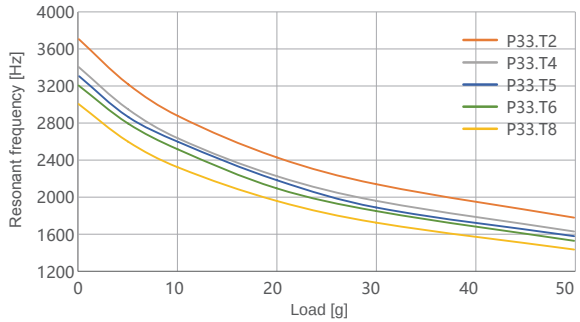
▸ Characteristics

- θx or θx, θy tilt
- Tilt range to 10mrad
- Fast-ms response time
- High closed-loop positioning accuracy
- High temperature stability
- Custom UHV, etc. is available

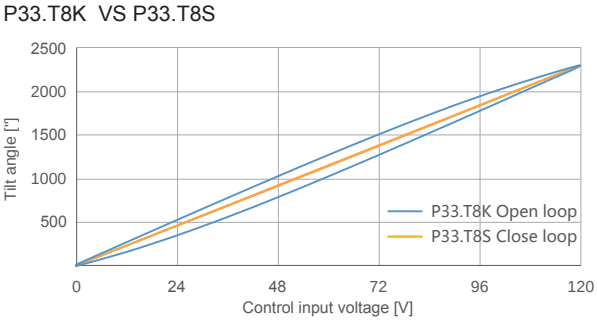
▸ Applications

- Image processing and stabilization
- Laser scanning
- Interlaced scanning, jitter
- Optical filter/switch
- Adaptive optics, image stabilization
- Interference
- Laser micromachining
- Beam deflection

▸ Frequency and Load Curve

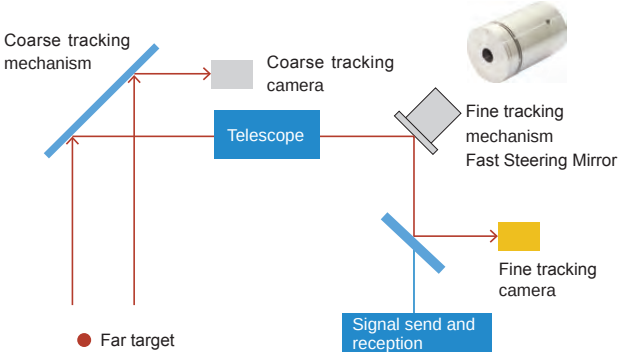


▸ Open/Closed-Loop Curve



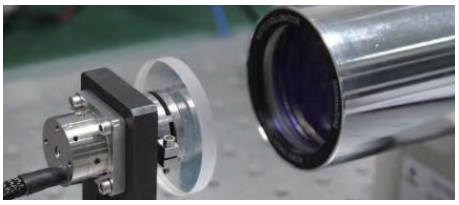
▸ Closed-Loop for High Accuracy

Closed-Loop sensors provide high accuray and feedback position signals to the controller. The sensors are connected in a bridge configuration to eliminate thermal drift and ensure high, stability. This platform can take Ø25.4mm standard diameter lens, and custom is available for Ø50mm mirror.



▸ Measuring Tilt Angle

Laser collimator is measuring the deflection angle of P33.T2S piezo platform.

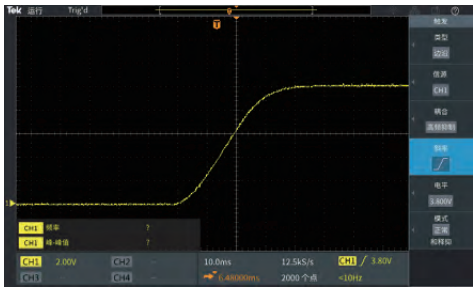


▸ Recommended Controllers

E00/E01	E70	E81-D
		
3 channels with 1 constant voltage Digital, analog Ave. current to 291mA	3 channels with 1 constant voltage Digital, analog Ave. current to 70mA	3 channels with 1 constant voltage Analog control Ave. current to 50mA
Note: Please see "Piezo Controller" for detailed information.		

Loaded Step Time

P33.T8S step time is ~40ms with a loading 50g up to 100% stroke.



※Selection Guide

P33. [T] [2] [S] [Y]

Active axes
- T θxθy
- U θx

Tilt Angle
- 2 2.5mrad
- 4 5mrad
- 5 6.8mrad
- 6 7.5mrad
- 8 10mrad

Sensor
- S with sensor
- K no sensor

Fix way (Refer to "Drawing")
- F Waist fix for square
- Y Bottom fix for round

E.g.: P33.T2S F, θxθy tilt motion, tilt angle to 2.5mrad, with sensor, mounting location in waist.

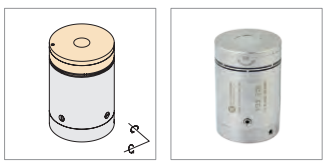
Technical Data

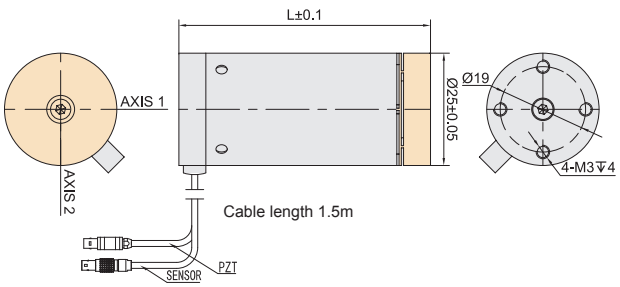
Type	P33.T2SF/Y P33.T2KF/Y		P33.T4SF/Y P33.T4KF/Y	P33.T5SF/Y P33.T5KF/Y	P33.T6SF/Y P33.T6KF/Y	P33.T8SF/Y P33.T8KF/Y	Units
Active axes	θx, θy		θx, θy	θx, θy	θx, θy	θx, θy	
Drive control	3 driving channels 2 sensing channels		3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Tilt angle(0~100V)	2/±1(≈±206″)		4/±2(≈±412″)	5.6/±2.8(≈±577″)	6.2/±3.1(≈±639″)	8.2/±4.1(≈±845″)	mrad±10%
Max.tilt angle (0~120V)	2.5/±1.25(≈±257″)		5/±2.5(≈±515″)	6.8/±3.4(≈±701″)	7.5/±3.75(≈±773″)	10/±5(≈±1031″)	mrad±10%
Integrated sensor	SGS/-		SGS/-	SGS/-	SGS/-	SGS/-	
Resolution	0.05(≈0.01″) /0.02(<0.01″)		0.15(≈0.03″) /0.04(<0.01″)	0.2(≈0.04″) /0.05(≈0.01″)	0.25(≈0.05″) /0.1(≈0.02″)	0.3(≈0.06″) /0.1(≈0.02″)	μrad
Closed-loop linearity	0.1/-		0.2/-	0.25/-	0.25/-	0.25/-	%F.S.
Closed-loop repeatability	0.02/-		0.02/-	0.02/-	0.02/-	0.02/-	%F.S.
Unloaded resonant frequency	3.7		3.4	3.3	3.2	3.1	kHz±20%
Unloaded step time	1.5/1		3/2	5/2.5	6/3.5	8/4	ms±20%
El. capacitance	3.6/axis		7.2/axis	9/axis	11/axis	14.5/axis	μF±20%
Material	Steel	Ti	Steel	Steel	Steel	Steel	
Mass	190	125	240	265	290	340	g±5%
Platform Length L	37		55	64	73	91	mm

Note: The standard material is steel, if you need titanium alloy material, please contact the sales engineer. Technical data is measured by CoreMorrow E00/E01 series piezo controller. Max driving voltage could be -20V~150V, 0~120V is recommended for long-term and high-reliable operation.

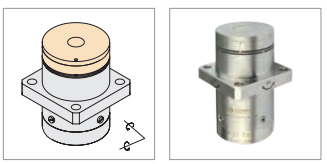
Drawings

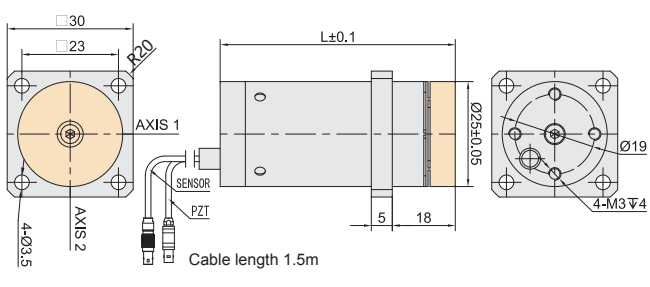
P33.xxxY





P33.xxxF





P34 Piezo Tip/Tilt Platform



P34 piezoelectric deflection platform is designed for large up to 80 mm in diameter. Their differential drive exhibits excellent angular positioning stability over a wide temperature range. P34's structure allows the top platform to perform high dynamic precision deflection motion on two orthogonal axes with common pivot points.

Characteristics

• θx, θy tilt • Tilt range to 5.6mrad • Sub-ms response • High closed-loop positioning accuracy • High temperature stability

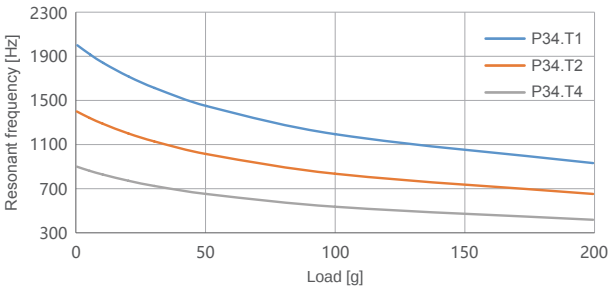
Applications

• Image processing and stabilization
• Optical filter
• Laser scanning/beam deflection
• Active and adaptive optic
• Beam stabilization
• Error correction for polygon mirror

High Stability, Long Lifetime

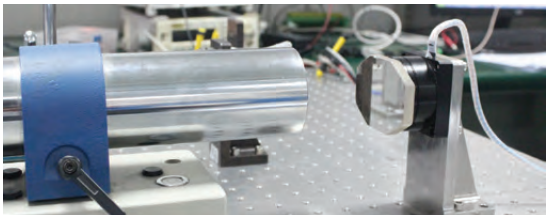
CoreMororow's piezo tip/tilt system is based on a parallel kinematic design. The internal four piezo actuators are paired differential controls that determine the platform deflection motion, which makes P34 piezo platform have excellent angular positioning stability in a wide temperature range. Internal piezo actuator ensures maximum reliability. Special resin insulation makes it resistant to environmental humidity and leakage current faults.

Frequency and Load Curve



Large Load Capacity

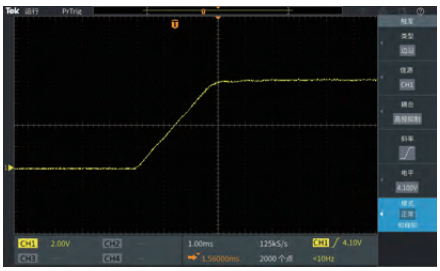
P34 piezo tip/tilt platform can support lens up to 80mm in diameter for beam deflection of 10mrad.

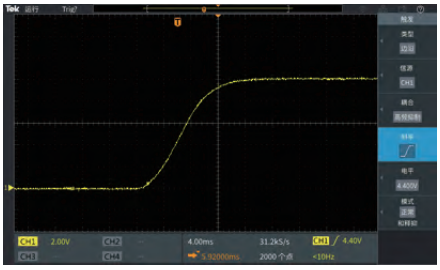


* Custom size, load capacity, etc. are available.

Step Time

Controlled by E51.B piezo controller, P34.T2S piezo tip/tilt platform's step time to 80% deflection range is about 3ms; The step time of loading 200g to 100% tilt range is about 15ms.





Recommended Controllers

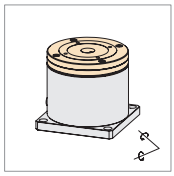
E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

▸ Technical Data(Higher Accuracy Version)

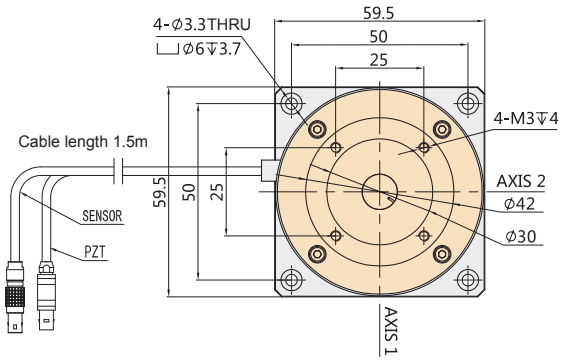
Type	S - closed loop K - open loop	P34.T1S P34.T1K	P34.T2S P34.T2K	P34.T4S P34.T4K	Units
Active axes		θx θy	θx θy	θx θy	
Drive control		3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Nominal travel(0~120V)		1.1/axis(≈227″)	2.2/axis(≈454″)	4.5//axis(≈928″)	mrad±20%
Travel(0~150V)		1.4/axis(≈289″)	2.8/axis(≈577″)	5.6//axis(≈1155″)	mrad±20%
Sensor type		SGS/-	SGS/-	SGS/-	
Resolution		0.2(≈0.04″) / 0.1(≈0.02″)	0.2(≈0.04″) / 0.1(≈0.02″)	0.2(≈0.04″) / 0.1(≈0.02″)	μrad
Linearity		0.1/-	0.1/-	0.1/-	%F.S.
Repeatability		0.02/-	0.02/-	0.02/-	%F.S.
Unloaded resonant frequency		3.6	2.8	1.6	kHz±20%
El.capacitance		3.6/axis	7.2/axis	14.5/axis	μF±20%
Material		Aluminum	Aluminum	Aluminum	
Mass		380	500	800	g±5%
Platform length L		38	56	92	mm±0.1

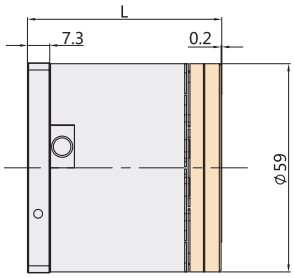
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing









Type	L[mm]
P34.T1	38
P34.T2	56
P34.T4	92

P35 Piezo Tip/Tilt Platform



Designed for high large-angle deflection applications, P35 Piezo Tip/Tilt Platforms provide beam deflections up to 86mrad (approximately 4.9 degrees, 17700"), making them ideal for fast deflection applications with high precision and large angle.

▸ Characteristics

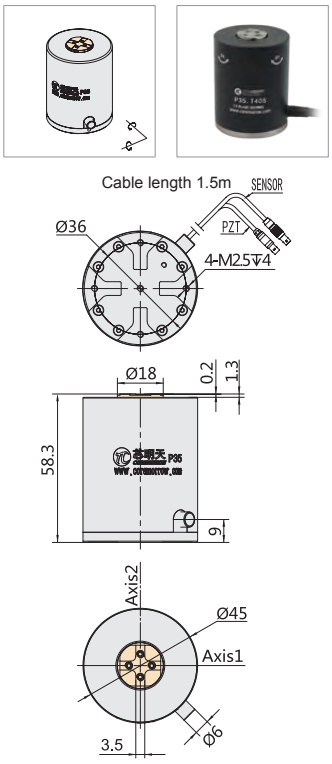
- θx, θy tilt
- Tilt angle to 43mrad/axis
- Resolution to 0.3μrad
- Unloaded resonant frequency to 1.75kHz

▸ Technical Data

Type	S - closed loop K - open loop	P35.T20S P35.T20K	P35.T40S P35.T40K	Units
Active axes		θx, θy	θx, θy	
Drive control		3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Tilt angle(0~120V)		22/±11(≈±2268″)	35/±17.5(≈±3600″)	mrad±10%
Max.tilt angle(0~150V)		27/±13.5(≈±2784″)	43/±21.5(≈±4400″)	mrad±10%
Integrated sensor		SGS/-	SGS/-	
Resolution		0.8(≈0.17")/0.3(≈0.06")	1.2(≈0.25")/0.4(≈0.08")	μrad
Closed-loop linearity		0.08/-	0.02/-	%F.S.
Closed-loop repeatability		0.04/-	0.014/-	%F.S.
Unloaded resonant frequency		1750	1500	Hz±20%
Resonant frequency		800(@25.4×4mm)	480(@10.6g) 215(@30g)	Hz±20%
Closed-loop operating frequency (-3dB)		-	25(@30g load)	Hz±20%
Closed/open-loop step time@10.6g		-	10/1.2	ms±20%
Closed-loop step time@30g		-	25	ms±20%
El. capacitance		7.2/axis	7.2/axis	μF±20%
Material		Titanium, aluminum	Titanium, aluminum	
Mass		260	335	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing



▸ ※Selection Guide

P35. T 40 S

- Active axes
  - T θxθy
  - U θx
- Tilt Angle
  - 40 35mrad
  - 20 22mrad
- Sensor
  - S with sensor
  - K no sensor

E.g.: P35.T40S, θxθy tilt motion, tilt angle to 35mrad,with sensor.

▸ Recommended Controllers

E00/E01	E70	E80
		
1~3 channels, Digital, analog, knob adjustment, Open/closed loop ,Ave. current: 291mA/58mA	1~3 channels Digital, analog Open/closed loop Ave. current:70mA	3 channels Digital control Servo control Ave. current:70mA Compact form factor
Note: Please see "Piezo Controller" for detailed information		

P35A Piezo Tip/Tilt Platform



P35A.T40



P35A.U1S

▸ Characteristics

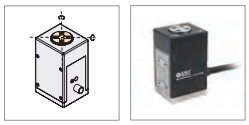
- θx or θx, θy tilt
- Max tilt angle to 43mrad
- Closed-loop resolution to 1.2μrad
- Optional closed loop sensor

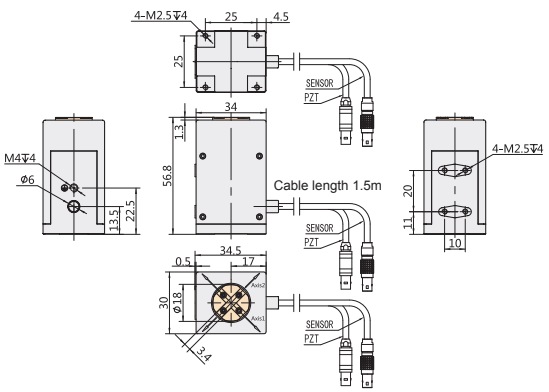
▸ Technical Data

Type	S - closed loop K - open loop	P35A.T40S P35A.T40K	P35A.T35S P35A.T35K	P35A.U1S P35A.U1K	Units
Active axes		θx, θy	θx, θy	θx	
Drive control		3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	2 driving channels 1 sensing channel	
Nominal tilt angle(0~120V)		±17.5/axis(≈±3610″)	±14.8/axis(≈±3053″)	±0.60(≈±124″)	mrad±20%
Max.tilt angle(0~150V)		±21.5/axis(≈±4435″)	±18.5/axis(≈±3816″)	±0.75(≈±155″)	mrad±20%
Integrated sensor		SGS/-	SGS/-	SGS/-	
Resolution		1.2(≈0.24″)/0.4(≈0.08″)	1.2(≈0.24″)/0.4(≈0.08″)	0.2(≈0.04″)/0.1(≈0.02″)	μrad
Linearity		0.05/-	0.13/-	0.15/-	%F.S.
Repeatability		0.02/-	θx0.05/θy0.025/-	0.1/-	%F.S.
Unloaded resonant frequency		1300	2000	5400	Hz±20%
loaded resonant frequency		1050(@Φ12.7×3mm mirror)	1800@Φ12.7×3mm mirror 1100@Φ24.5×3mm mirror	550@350g	Hz±20%
Closed-loop operating frequency (-3dB)		50(@Φ12.7×3mm mirror)	-	200@200μrad/-	Hz±20%
Step time		1.4/1	7@Φ12.7×3mm mirror 8@Φ24.5×3mm mirror	2.5@200μrad, 300g/1.5	ms±20%
El.capacitance		7.2/axis	7.2/axis	28.8	μF±20%
Material		Ti	Ti, Al	Invar, Al	
Mass		223	155	1050	g±5%

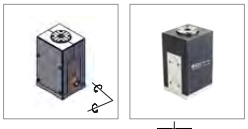
▸ Drawing

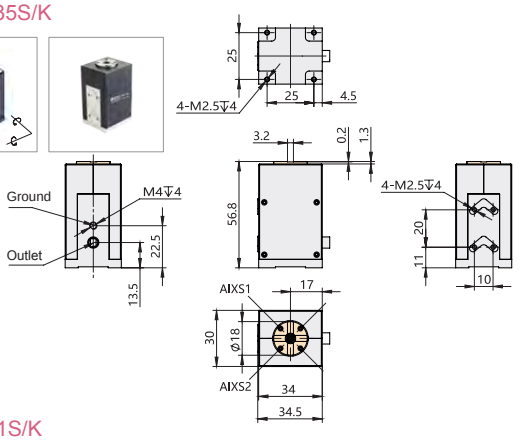
P35A.T40S/K



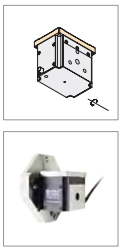


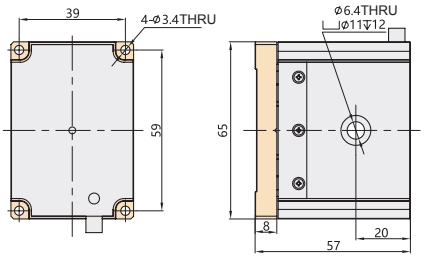
P35A.T35S/K





P35A.U1S/K





S22 Piezo Tilt Platform



S22 Piezo Tilt Platform is a θx deflection platform. The flexible hinge guiding design has zero friction and static resistance, high guiding precision, nano-radian resolution and excellent positioning stability. With a beam deflection range of up to 6mrad, it has an extremely fast response speed (milliseconds to microseconds) and is ideal for dynamic operation (eg. tracking, scanning, drift and vibration cancellation) and positioning of optics and samples.

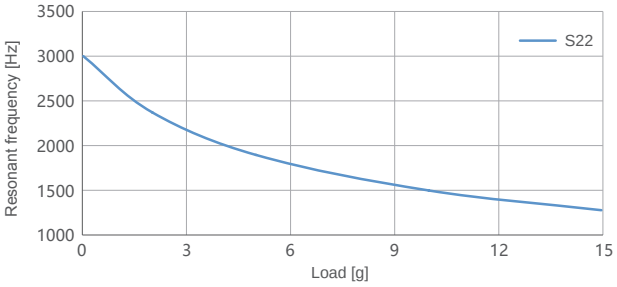
▸ Characteristics

- θx tilt
- Tilt angle up to 3mrad
- Sub-ms response time
- High closed-loop positioning accuracy

▸ Typical Application

- Image processing and stabilization
- Laser scanning
- Beam deflection
- Sample detection
- Interlaced scanning, jitter
- Optical filter/switch

▸ Frequency and Load Curve



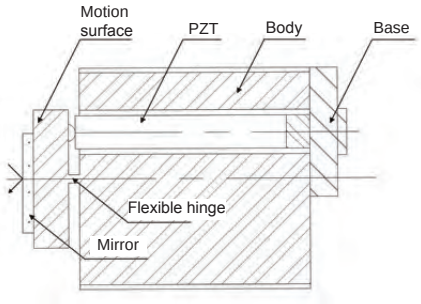
▸ Technical Data

Type	S - closed loop K - open loop	S22.U3S S22.U3K	Units
Active axes		θx	
Drive control		1 driving channel 1 sensing channel	
Tilt angle(0~120V)		2.5(≈520″)	mrad±10%
Max.tilt angle(0~150V)		3(≈610″)	mrad±10%
Integrated sensor		SGS/-	
Resolution		0.08(≈0.02″)/0.03(<0.01″)	μrad
Closed-loop linearity		0.2/-	%F.S.
Closed-loop repeatability		0.15/-	%F.S.
Unloaded resonant frequency		3	kHz±20%
Unloaded step time		3/0.8	ms±20%
El. capacitance		1.8	μF±20%
Material		Steel	
Mass		80	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

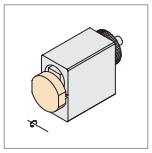
▸ Driving Principle

The platform is supported by one hinge and is pushed by a linear piezo actuator. The hinge defines the pivot point and serves to apply a preload to the piezoelectric actuator. The single hinge and single actuator design has the advantages of simple structure, small size, and high cost performance. If the operating environment temperature varies widely during angular deflection, it is recommended to use a differential drive piezoelectric deflection platform.

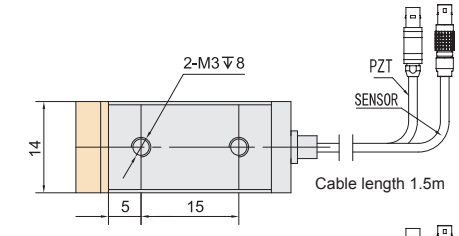


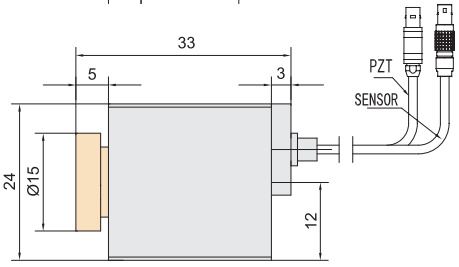
▸ Drawing

S22.U3S/K









S23 Piezo Tip/Tilt Platform



S23 piezoelectric Tilt/Tip and Z Platform(phase shifter) is a θx, θy deflection/tilt and Z-axis linear motion platform, with a center aperture. The product is compact, and features the deflection range of 1.5mrad, Z-axis linear motion travel of 10μm. S23 is an open-loop version with high resolution and response speed, it is the first choice for interference scanning phase shift.

▸ Characteristics

- θx, θy tilt and Z linear motion
- Center aperture: Ø10mm
- High temperature stability
- Piezo phase shifter

▸ Typical Application

- Image processing and stabilization
- Laser scanning / beam deflection
- Active and adaptive optics
- Optical filter
- Phase shifter
- Beam stabilization

▸ Motion Control

S23 Platform/Phase Shifter has build-in three piezo actuators connected in parallel to provide the top ring motion. For vertical positioning (piston movement), it requires a controller with only one drive channel and three drive channels when it is in Z-direction and tip/tilt motion.

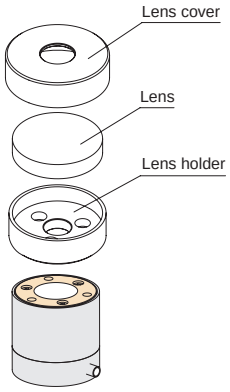
▸ Open Loop, High Dynamic, With Aperture

S23 piezo tip/tilt and Z platform/phase shifter is a multi-axis motion platform with the volume of only Ø20×19.5mm, can achieve 1.5mrad deflection in θx, θy and 10μm linear travel in Z. The open-loop version features ultra-high resolution and ultrafast response speed. The tripod structure design has an very wide operating temperature range.

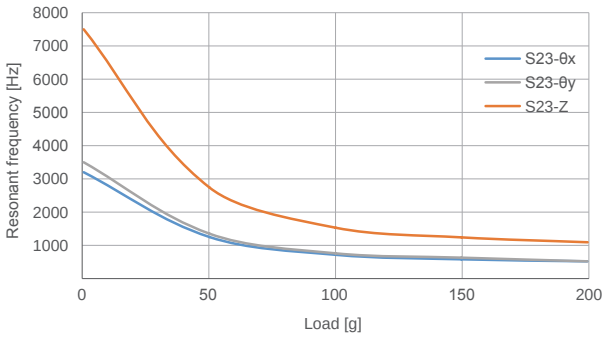
The center of the platform has a aperture of Ø10mm diameter, which is suitable for applications requiring light transmission, such as light filtration.

▸ Optional Mirror Adapter

S23 Piezo tilt/tip platform can be equipped with a mirror adapter to facilitate the installation of the lens.



▸ Frequency and Load Curve



▸ Recommended Controllers

E01	E53.A	E70
		
3 channels Digital, analog Open/closed loop Ave. current to 291/58mA	1 channel Analog input Open loop Ave. currrent to 60mA	3 channels Digital, analog Open/closed loop Ave. current to 70mA
Note: Please see "Piezo Controller" for detailed information.		

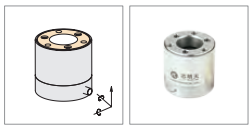
▸ Technical Data

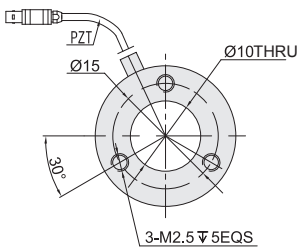
Type	K - open loop	S23.Z10K	S23.ZT1K	Units
Active axes		Z	θx, θy, Z	
Drive control		1 driving channel	3 driving channels	
θx, θy tilt angle(0~120V)		-	1.2(≈248″)	mrad±10%
Travel in Z(0~120V)		8	8	μm±10%
θx, θy Max.tilt angle(0~150V)		-	1.5(≈300″)	mrad±10%
Max.travel in Z(0~150V)		10	10	μm±10%
Tilt resolution in θx, θy		-	0.02(<0.01″)	μrad
Resolution in Z		0.08	0.08	nm
Unloaded resonant frequency		7.5	θx3.2/θy3.5/Z7.5	kHz±20%
Unloaded step time		1.5	0.5	ms±20%
El. capacitance		0.5	0.5/axis	μF±20%
Material		Steel	Steel	
Mass		50	70	g±5%

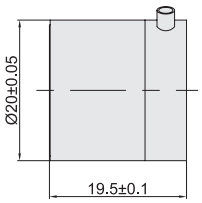
Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

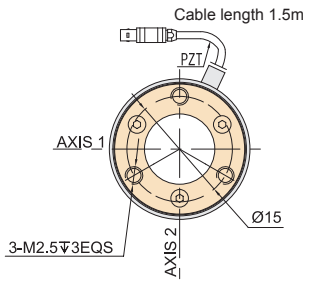
▸ Drawing

S23 (Standard Edition)



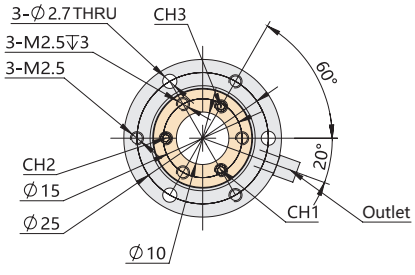


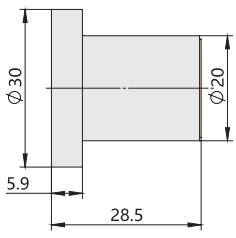




S23(Base flange fixing Edition)

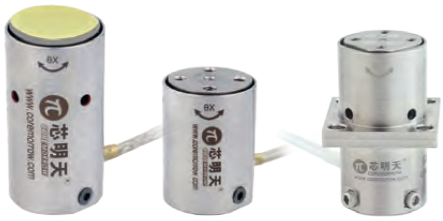






S30 Piezo Tip/Tilt Platform

※Selection Guide



S30. T 2 S F

- Active axes
  - T θxθy
  - U θx
- Tilt angle
  - 1 1.5mrad
  - 2 3mrad
- Sensor
  - S with sensor
  - K no sensor
- T Waist fix for square
- Y Bottom fix for round

E.g.: S30.T2SF, θxθy tilt motion, tilt angle to 3mrad,with sensor

S30 is θx, θy piezo tip/tilt platform, which is designed for highly-dynamic applications, with unloaded resonance frequency up to 17kHz.

▸ Characteristics

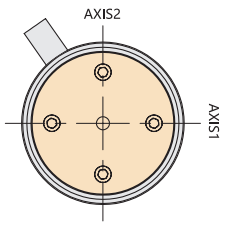
- Small size
- Nanoradian resolution
- Unloaded resonant frequency: 17kHz
- High-dynamic

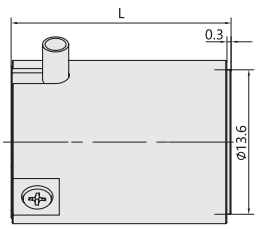
▸ Technical Data

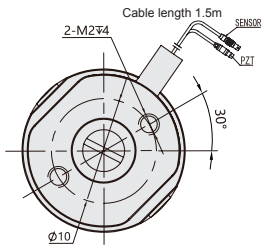
Type	S30.T2SF S30.T2KF	S30.T2SY S30.T2KY	S30.T1KY	Units
Active axes	θx, θy	θx, θy	θx, θy	
Drive control	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels	
Integrated sensor	SGS/-	SGS/-	-	
Tilt angle(0~120V)	3/±1.5(≈±309")	3/±1.5(≈±309")	1.5/±0.75(≈±154")	mrad±10%
Resolution	0.1(≈0.02")/0.03(<0.01")	0.1(≈0.02")/0.03(<0.01")	0.02(<0.01″)	μrad
Unloaded resonant frequency	17	15	15	kHz±20%
Resonant frequency @ Ø12.5×3mm mirror	14	10	10	kHz±20%
Linearity	0.2/-	0.2/-	-	%F.S.
Repeatability	0.1/-	0.1/-	-	%F.S.
Distance from pivot point to platform surface	4.2	4.2	4.2	mm±0.2mm
El. capacitance	1.6/axis	1.6/axis	0.7/axis	μF±20%
Material	Titanium, steel	Titanium, steel	Titanium, steel	
Mass (not include cable)	35	30	20	g±5%

▸ Drawing

S30.T1KY/T2SY/T2KY

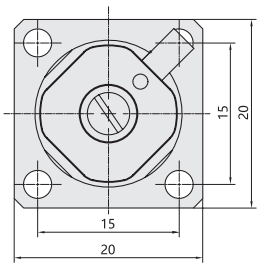


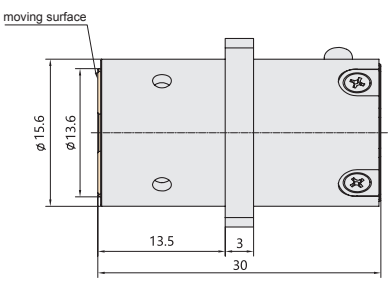


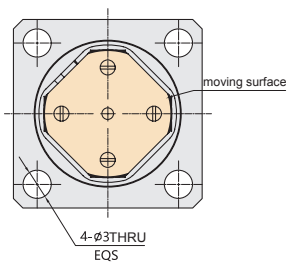


Type	L[mm]
S30.T2SY	30
S30.T2KY	30
S30.T1KY	21

S30.T2S/KF







S31 Piezo Tip/Tilt Platform



S31.T2S



S31.T4S

S31 is θx, θy piezo tip/tilt platform, with two ranges available: 3.8mrad and 8.5mrad. The closed-loop version has a full bridge design which avoids temperature drift and ensures the high accuracy.

▸ Characteristics

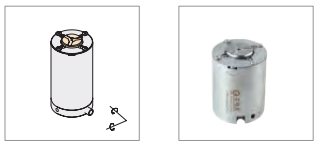
- θx, θy tilt
- Tilt angle up to 8.5mrad
- Unloaded resonant frequency: 12kHz
- Resolution to 0.05μrad

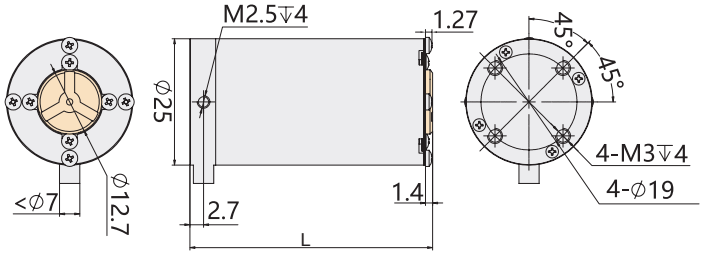
▸ Technical Data

Type	S31.T2S S31.T2K	S31.T4S S31.T4K	Units
Active axes	θx, θy	θx, θy	
Drive control	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Nominal tilt angle(0~120V)	3/±1.5(≈±309″)	6.8/±3.4(≈±700″)	mrad±10%
Tilt angle(0~150V)	3.8/±1.9(≈±392″)	8.5/±4.25(≈±877″)	mrad±10%
Integrated sensor	SGS/-	SGS/-	
Resolution	0.5(≈0.1″)/0.05(≈0.01″)	0.5(≈0.1″)/0.1(≈0.02″)	μrad
Linearity	0.5/-	0.5/-	%F.S.
Repeatability	0.5/-	0.3/-	%F.S.
Unloaded resonant frequency	12	11.5	kHz±20%
Resonant frequency@Φ12.7×3mm mirror	9	9	kHz±20%
El.capacitance	0.96/axis	3.54/axis	μF±20%
Material	Steel, Ti	Steel, Ti	
Mass(including wires and connectors)	115	148	g±5%

▸ Drawing

S31





Type	L[mm]
S31.T2S/K	30
S31.T4S/K	48

S33.T1SYH Piezo Tip/Tilt Platform



Characteristics

- θx, θy tilt
- Tilt angle up to 1.3mrad
- Resolution to 0.03μrad
- Unloaded resonant frequency: 7kHz

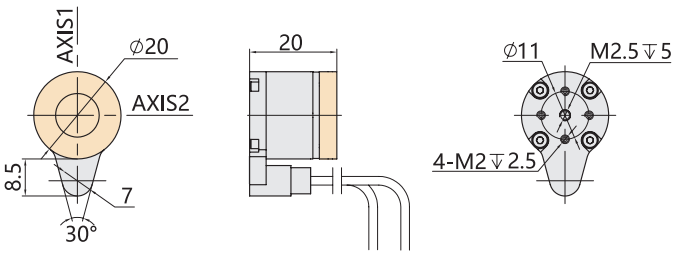
Technical Data

Type	S33.T1SYH	Units
Active axes	θx, θy	
Drive control	3 driving channels 2 sensing channels	
Nominal tilt angle(0~100V)	1/±0.5(≈±103″)	mrad±10%
Max.tilt angle(0~120V)	1.3/±0.65(≈±134″)	mrad±10%
Integrated sensor	SGS	
Resolution	0.03(<0.01″)	μrad
Linearity	0.3	%F.S.
Repeatability	0.1	%F.S.
Unloaded resonant frequency	7	kHz±20%
El.capacitance	1.6/axis	μF±20%
Material	Steel, Copper alloy	
Mass(including wires)	52	g±5%

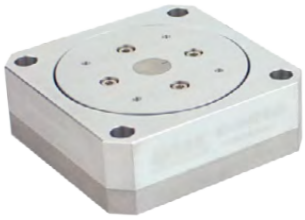
Drawing

S33.T1SYH





S34.U0KF Piezo Tip/Tilt Platform



S34.U0KF is a square one-dimensional θx deflection piezo tilt platform launched by CoreMorrow, with a deflection stroke of up to 0.108mrad. Its unload resonant frequency is up to 9kHz, and the loaded resonant frequency @200g load can reach 2.7kHz. Its load capacity is up to 1kg, it is suitable for high-frequency vibration applications. It has a customized connectors which makes it to be used in a vacuum environment.

▸ Characteristics

• θx tilt • High resonant frequency • Load capacity to 1kg • Customized connector • Vacuum version, optional closed-loop version

▸ Applications

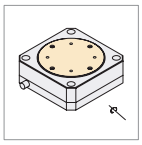
•Interference microscopy • Scanning • Optical measurement • Micro machining • Precision control measurement

▸ Technical Data

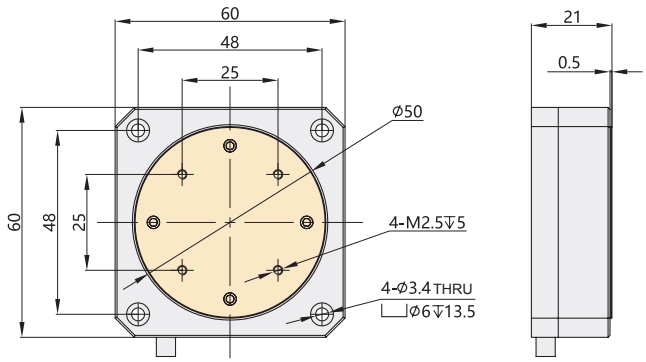
Type		S34.U0KF	Units
Active axes		θx	
Drive control		2 driving channels	
Nominal tilt angle(0~120V)		0.09(≈ 19″)	mrad±10%
Max. tilt angle(0~150V)		0.108(≈22″)	mrad±10%
Resolution		0.02(<0.01″)	μrad
Unloaded resonant frequency		9	kHz±20%
Resonant frequency		6.4@20g 2.7@200g	kHz±20%
El.capacitance		0.7	μF±10%
Load capacity	Horizontal	1	kg
	Vertical	0.5	
	Inverted	0.5	
Material		Stainless steel, Aluminum alloy	
Mass		290	g±5%

▸ Drawing

S34.U0KF







S34.T2S/KF Piezo Tip/Tilt Platform

※Selection Guide



S34. T 2 S F

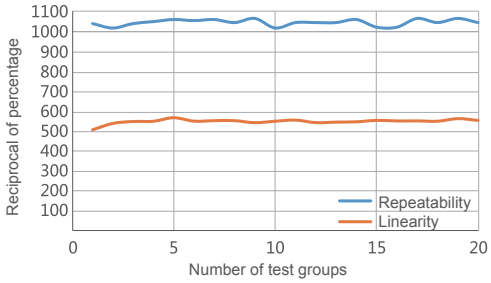
- Active axes: T θxθy; U θx
- Sensor: S with sensor; K no sensor
- Square edge fixed
- Tilt angle: 2 2.5mrad

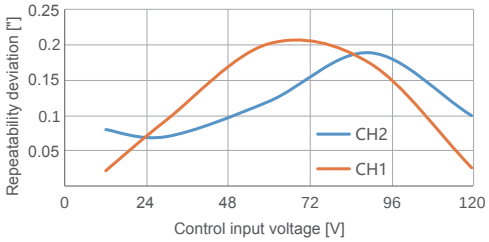
E.g.: S34.T2SF, θxθy tilt motion, tilt angle to 2mrad,with sensor

S34.T2S/KF features a deflection angle of up to 2.5mrad and can load Φ110×10mm len (approx. 245g). The response time to 0.2mrad deflection angle is about 2ms, and the operating frequency at a deflection angle of ±0.1mrad can reach 250Hz.

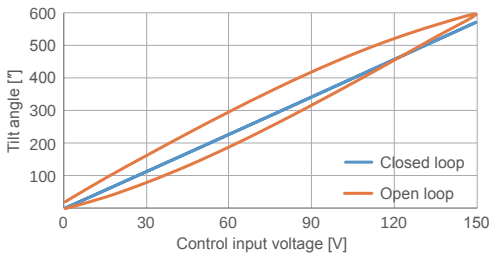
▸ Closed Loop Accuracy

Linearity ~0.2%F.S., and repeatability ~0.1%F.S.

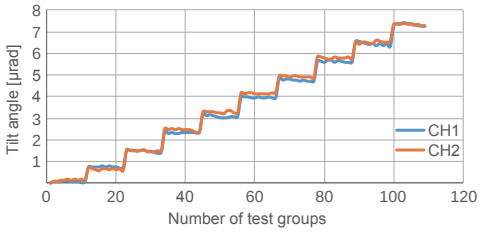




▸ Open/Closed-loop Curve



▸ Closed-loop Resolution<1μrad

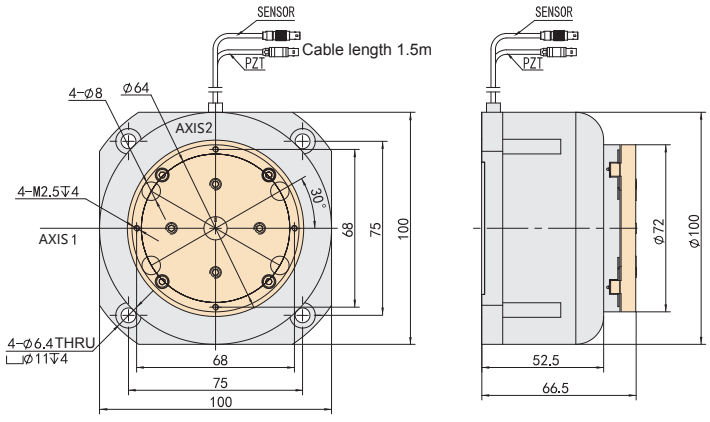


▸ Technical Data

Type	S - closed loop K - open loop	S34.T2SF S34.T2KF	Units
Active axes		θx, θy	
Drive control		3 driving channels 2 sensing channels	
Driving source		Piezo Stack	
Tilt angle(0~120V)		±1/axis(≈±206″)	mrad±10%, typ.
Max.tilt angle(0~150V)		±1.25/axis(≈±258″)	mrad±10%, max
Integrated sensor		SGS/-	
Resolution		0.07(≈0.01″)/0.02(<0.01″)	μrad
Closed-loop linearity		0.2/-	%F.S.
Closed-loop repeatability		0.1/-	%F.S.
Unloaded resonant frequency		1700	Hz±20%
Loaded resonant frequency		740	Hz±20%@245g
Closed-loop operating frequency (-3dB)		300 (@245g load)	Hz±20%
Close-loop response		2 (0.2mrad anglar travel)	ms±20%
Operating frequency		250 (±0.1mrad anglar travel)	Hz±20%
El. capacitance		7.2	μF/axis±20%
Load capacity		245 (Φ110×10mm lens)	g
Material		Aluminum	
Mass		2.2	kg±5%
Cable length		1.5	m±10mm

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing



S34.T2S/KY Piezo Tip/Tilt Platform



▸ Characteristics

- θx, θy tilt
- Load capaciy to 500g
- High resonant frequency
- Fast response

▸ Technical Data

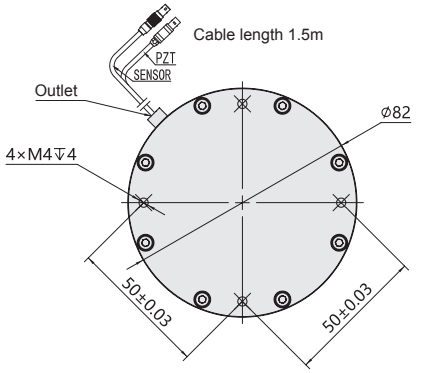
Type	S - closed loop K - open loop	S34.T2SY	S34.T2KY	Units
Active axes		θx, θy	θx, θy	
Drive control		3 driving channels 2 sensing channels	3 driving channels	
Tilt angle(0~120V)		0.8 or ±0.4 (≈±82″)	0.8 or ±0.4 (≈±82″)	mrad/axis±10%
Max.tilt angle(0~150V)		1 or ±0.5 (≈±103″)	1 or ±0.5 (≈±103″)	mrad/axis±10%
Integrated sensor		SGS	-	
Resolution		0.05(≈0.01″)	0.02(<0.01″)	μrad
Linearity		0.5	-	%F.S.
Repeatability		0.2	-	%F.S.
Unloaded resonant frequency		2800	2800	Hz±20%
Resonant frequency@500g		600	600	Hz±20%
Step Time		5	3	ms±20%
El. capacitance		14.5	14.5	μF/axis±20%
Material		Steel, Aluminum	Steel, Aluminum	
Mass		2000	2000	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

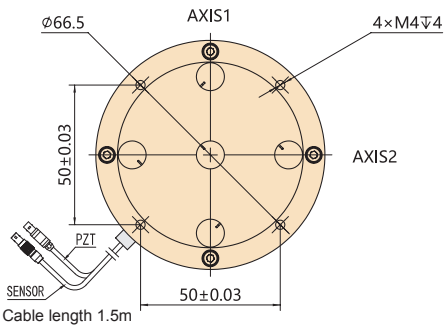
▸ Drawing

S34.T2S/KY









S34.T4S/KY Piezo Tip/Tilt Platform



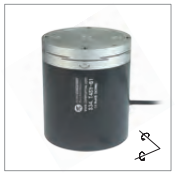
▸ Technical Data

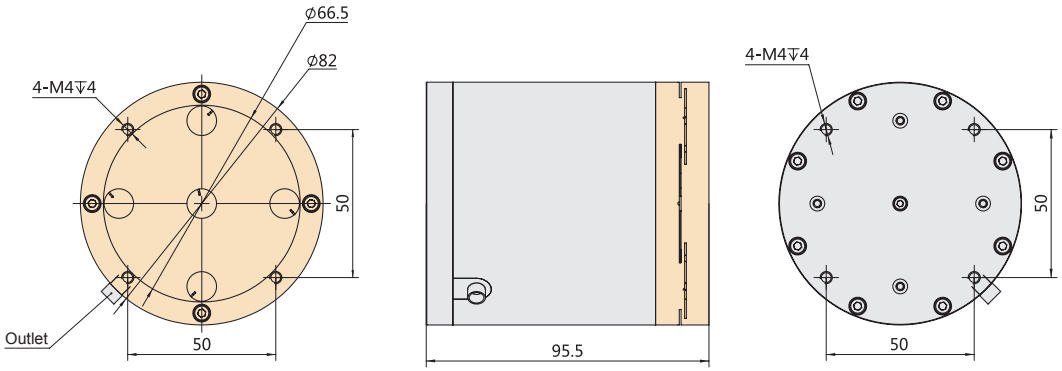
Type	S34.T4SY	S34.T4KY	Units
Active axes	θx, θy	θx, θy	
Drive control	3 driving channels 2 sensing channels	3 driving channels	
Tilt angle(0~150V)	±1.1/axis(≈±206″)	±1.1/axis(≈±206″)	mrad±20%
Integrated sensor	SGS	-	
Resolution	0.06(≈0.01″)	0.02(<0.01″)	μrad
Unloaded resonant frequency	2350	2350	Hz±20%
Resonant frequency@800g	600	600	Hz±20%
El. capacitance	52.8/axis	52.8/axis	μF±10%
Load capacity	1	1	kg
Material	Steel, Aluminum	Steel, Aluminum	
Mass	1360	1360	g±5%

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended drivi ng voltage is 0~120V.

▸ Drawing

S34.T4S/KY





S37 Anti-Vibration Piezo Tip/Tilt Platform



▸ Characteristics

- High reliability
- Anti-vibration design
- Optional open/closed loop
- Large deflection angle

▸ Technical Data

Type	S - closed loop K - open loop	S37.T2SF S37.T2KF	S37.T3SF S37.T3KF	S37.T4SF S37.T4KF	S37.T5SF S37.T5KF	S37.T6SF S37.T6KF	S37.T8SF S37.T8KF	Units
Active axes		θx, θy	θx, θy	θx, θy	θx, θy	θx, θy	θx, θy	
Drive control		3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Tilt angle(0~120V)		2.5/±1.25 (≈±258″)	4/±2 (≈±413″)	5/±2.5 (≈±516″)	6.8/±3.4 (≈±701″)	7.5/±3.75 (≈±773″)	10/±5 (≈±1031″)	mrad±20%
Max.tilt angle(0~150V)		3.5/±1.75 (≈±361″)	5.5/±2.75 (≈±567″)	6.8/±3.4 (≈±701″)	9.5/±4.75 (≈±980″)	10/±5 (≈±1031″)	13.5/±6.75 (≈±1392″)	mrad±20%
Integrated sensor		SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	SGS/-	
Resolution		0.08(≈0.02″) /0.03(<0.01″)	0.15(≈0.03″) /0.04(<0.01″)	0.2(≈0.04″) /0.05(≈0.01″)	0.25(≈0.05″) /0.07(≈0.01″)	0.25(≈0.05″) /0.08(≈0.02″)	0.35(≈0.07″) /0.1(≈0.02″)	μrad
Closed-loop linearity		0.1/-	0.1/-	0.1/-	0.1/-	0.1/-	0.1/-	%F.S.
Closed-loop repeatability		0.02/-	0.02/-	0.02/-	0.02/-	0.02/-	0.02/-	%F.S.
Unloaded resonant frequency		6.5	6.4	6.3	6.2	6.1	6	kHz±20%
El. capacitance		3.6	5.2	7.2	9	11	14.5	μF±20%
Material		Steel, titanium	Steel, titanium	Steel, titanium	Steel, titanium	Steel, titanium	Steel, titanium	
Mass		200	230	250	275	300	350	g±5%
Platform Length		37	46	55	64	73	91	mm±0.1

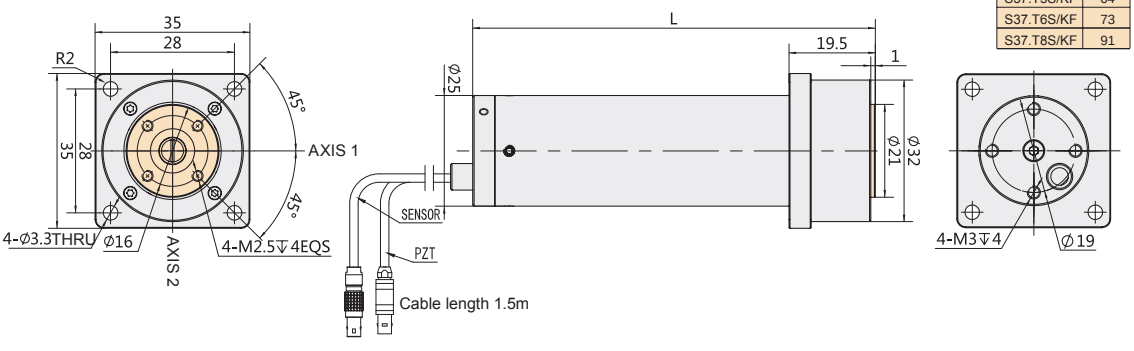
Note: The above parameters are measured using E00/E01 piezo controllers. The max driving voltage can be -20~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing

S37.xxS/KF







Type	L[mm]
S37.T2S/KF	37
S37.T3S/KF	46
S37.T4S/KF	55
S37.T5S/KF	64
S37.T6S/KF	73
S37.T8S/KF	91

S38-C Piezo Tip Tilt Platform





Optional cage structure installation

The S38-C piezo tip tilt platform is a θx, θy two-dimensional deflection piezo fast steering mirror. It is equipped with a lens mounting cap and is small in size and easy to integrate. It can be integrated into a cage structure with a right-angle adapter.

▸ Characteristics

- θx, θy tilt
- Tilt stroke up to 2.4mrad
- Optional closed loop sensor
- Optional right-angle adapter structure

▸ Application

- Light path adjustment
- Laser communication
- Light path stabilization
- Laser fast scanning

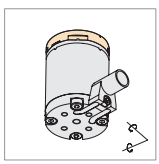
▸ Technical Data

Type	S38.T1S-C S38.T1K-C	S38.T2S-C S38.T2K-C	Units
Active axes	θx, θy	θx, θy	
Drive control	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Tilt angle(0~100V)	1 or ±0.5(≈±103")	2 or ±1(≈±206")	mrad±10%
Max.tilt angle(0~120V)	1.2 or ±0.6(≈±123")	2.4 or ±1.2(≈±247")	mrad±10%
Integrated sensor	SGS/-	SGS/-	
Resolution	0.03(<0.01″)/0.01(<0.01″)	0.07(≈0.01″)/0.02(<0.01	μrad
Closed-loop linearity	0.3/-	0.4/-	%F.S.
Closed-loop repeatability	0.1/-	0.2/-	%F.S.
Unloaded resonant frequency	7000	2000	Hz±20%
El. capacitance	1.6	3.6	μF/axis±20%
Material	Steel, Copper alloy	Steel, Copper alloy	
Mass	50 (Not include cable)	60 (Not include cable)	g±5%

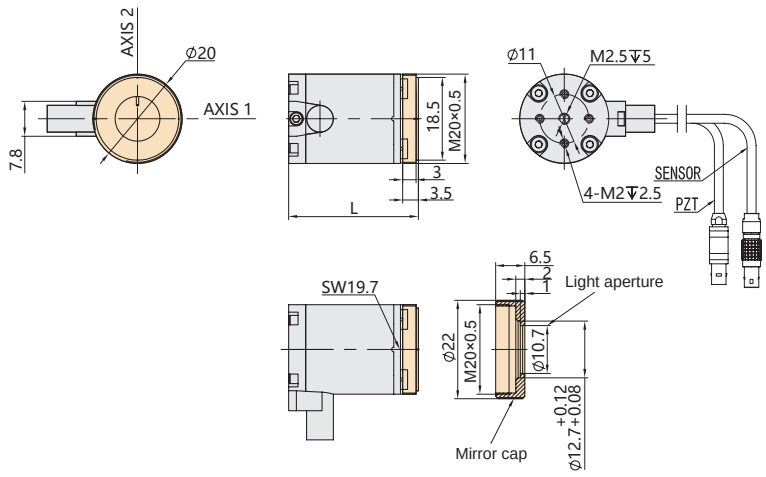
Note: The above parameters are measured using E00/E01 piezo controllers. The max driving voltage can be -20~150V; For high reliability and long-term operation, the recommended driving voltage is 0~120V.

▸ Drawing

S38-C1







Type	L[mm]
S38.T1S/K-C1	20
S38.T2S/K-C1	29

XD304 Piezo Fast Steering Mirror (FSM)



XD304 Piezo Fast Steering Mirror is specially designed for small size, micro stroke and high frequency applications. It can perform θx θy two-dimensional precision angular deflection motion. It is an ideal compact fast-reflection mirror, which is very suitable for deflection adjustment of small reflective mirrors.

▸ Characteristics

- θx, θy deflection
- Optional closed loop sensor
- Small size
- High resonant frequency

▸ Application

- Light path adjustment
- Laser communication
- Beam stabilization
- Fast beam scanning

▸ Technical Data

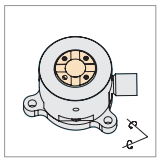
Type	XD304.T1S XD304.T1K	XD304.T2S XD304.T2K	Units
Active axes	θx, θy	θx, θy	
Drive control	3 driving channels 2 sensing channels	3 driving channels 2 sensing channels	
Tilt angle(0~100V)	1 or ±0.5(≈±103")	2 or ±1(≈±206")	mrad±10%
Max.tilt angle(0~120V)	1.2 or ±0.6(≈±123")	2.4 or ±1.2(≈±247")	mrad±10%
Sensor	SGS/-	SGS/-	
Resolution	0.03(<0.01″)/0.01(<0.01″)	0.07(≈0.01″)/0.02(<0.01″)	μrad
Linearity	0.2/-	0.2/-	%F.S.
Repeatability	0.1/-	0.1/-	%F.S.
Size	Φ25×22	Φ25×31	mm
Unloaded resonant frequency	15	10	kHz±20%
Resonant frequency with load	11.6(Φ12.7mm×3mm mirror)	4.2(Φ22mm×4mm mirror)	kHz±20%
El. capacitance	0.8/axis	1.6/axis	μF±20%
Material	Titanium, steel	Titanium, steel	
Mass (not include cable)	40	70	g±5%
Line position	Side	Side	

Note: Above parameters are measured with the E00/E01 piezo controller. The maximum driving voltage can be -20V~150V; For high-reliability and long-term operation, the recommended driving voltage is 0~120V.

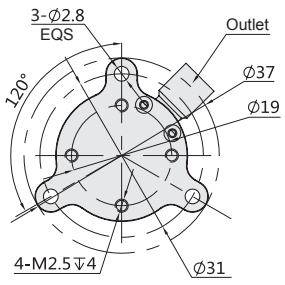
▸ Drawing

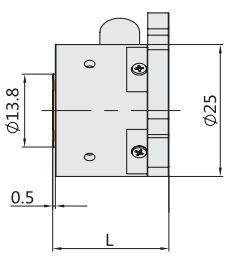
XD304.T1/T2

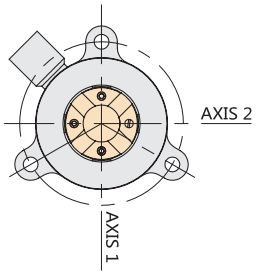
Type	L[mm]
XD304.T1	22
XD304.T2	31











20072 Large-Load Tilt Platform

Characteristics

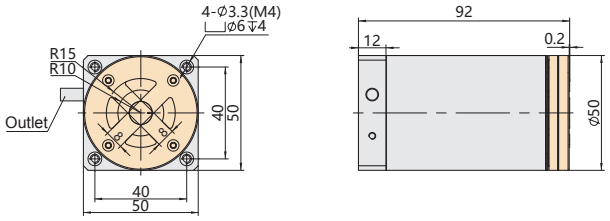
- θx, θy motion
- Tilt angle to ±4mrad/axis
- Optional sensor
- For large load applications

Technical Data

Type	20072	Units
Active axes	θx, θy	
Nominal travel range	±4/axis(≈±800")	mrad±20%
El. capacitance	28.8/axis	μF±20%
Resonant frequency@ Ø100×5mm mirror	≥300	Hz±20%

Drawing



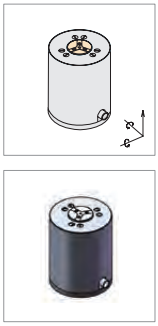


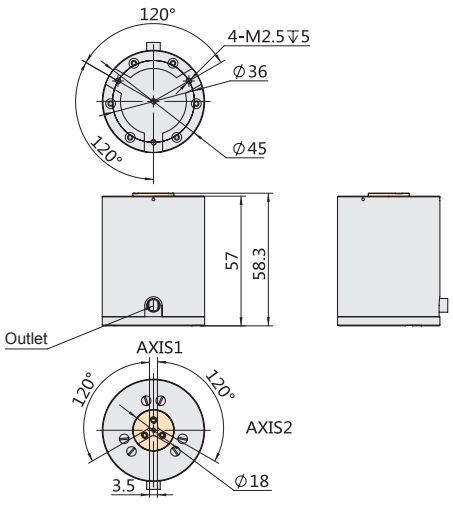
21019 Piezo Tip/Tilt and Z Platform

Technical Data

Type	21019	Units
Active axes	θx, θy, Z	
Tilt range(0~150V)	±17/axis(≈±3506")	mrad±20%
Z travel(0~150V)	150	μm±20%
Integrated sensor	SGS	
Unloaded resonant frequency	1	kHz±20%
El. capacitance	3.6/axis	μF±20%
Material	Aluminum, Steel	

Drawing



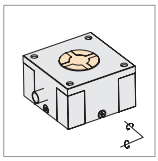


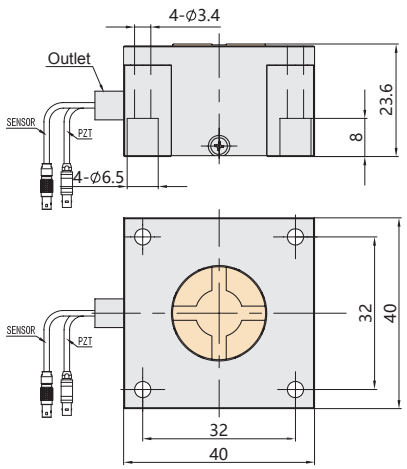
21068 Piezo Tip/Tilt Platform

Technical Data

Type	21068	Units
Active axes	θx, θy	
Tilt angle (0~150V)	1.7/±0.85	mrad±20%
Sensor	SGS	
Size	40×40×23.6	mm
Frequency with load (Mirror 34×34×4.9mm)	1.6	kHz±20%
Linearity	0.3	%F.S.
Repeatability	0.15	%F.S.
El. capacitance	1.8/axis	μF±20%
Material	Titanium alloy, steel, aluminum	
Line Position	Side line	

Drawing



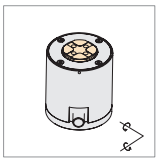


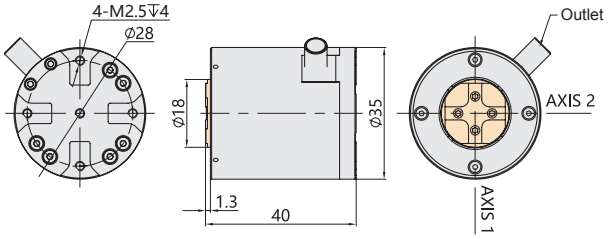
22022 High Frequency Piezo Steering Mirror

▸ Technical Data

Type	22022	Units
Active axes	θx, θy	
Nominal travel(0~120V)	±4/axis(≈±900")	mrad±20%
Travel(0~150V)	±5/axis(≈±1000")	mrad±20%
Sensor	SGS	
Unloaded resonant frequency	3.2	kHz±20%
Loaded(Ø25.4×4mm mirror) resonant frequency	1.9	kHz±20%
El.capacitance	3.6/axis	μF±20%
Material	Ti, Al	
Driving channels	3(with constant voltage)	

▸ Drawing



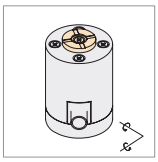


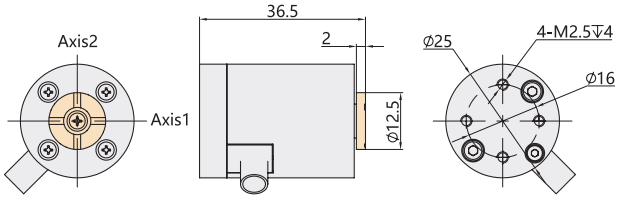
22143 Tip/Tilt Platform

▸ Technical Data

Type	22143	Units
Active axes	θx, θy	
Sensor	SGS	
Travel(0~150V)	±5/axis(≈±1000")	mrad±20%
Loaded(Ø20×3mm mirror) resonant frequency	500	Hz±20%
Closed loop resolution	0.5	μrad
Linearity	0.2	%F.S.
Repeatability	0.2	%F.S.
El.capacitance	1.6/axis	μF±20%
Material	Ti, steel	

▸ Drawing





19078Custom Tip/Tilt Platform

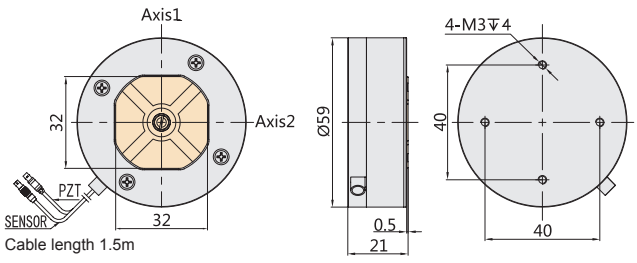
▸ Technical Data

Type	Custom platfrom	Units
Active axes	θx, θy	
Tilt angle(0~150V)	±0.25/axis(≈±50")	mrad±20%
Working mode	Open/closed loop	
Unloaded resonant frequency	8000	Hz±20%
Load resonant frequency (Ø35×8mm mirror)	4500	Hz±20%
El. capacitance	1.6/axis	μF±20%
Operating frequency	2000(@±0.1mrad)	Hz±20%
	600(@±0.25mrad)	
Material	Ti	

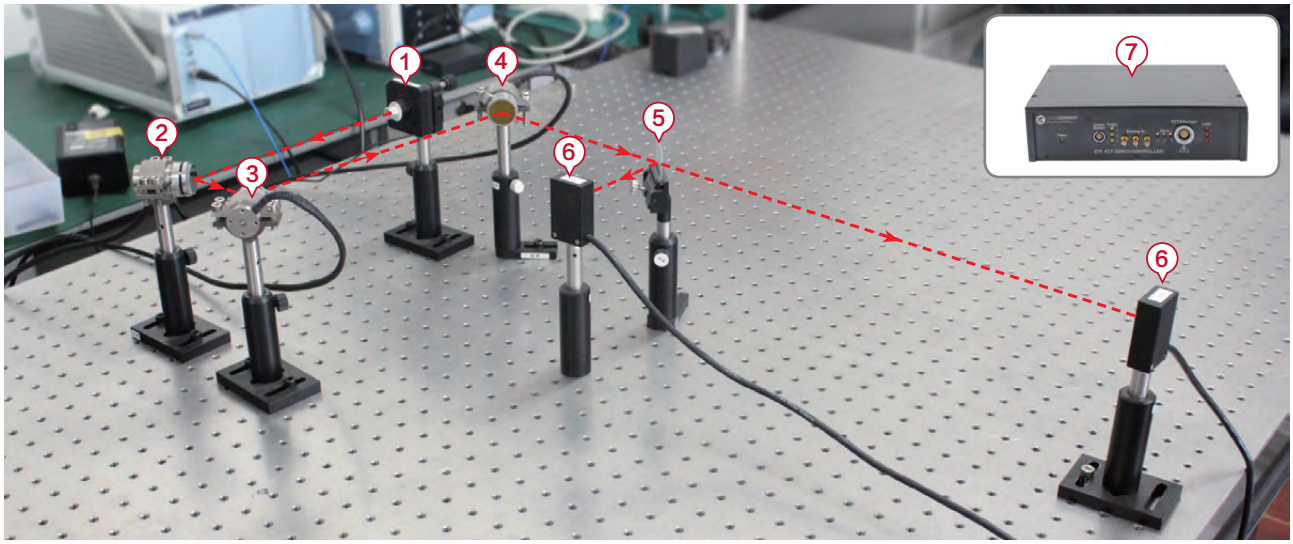
▸ Characteristics

- θx, θy motion
- Deflection angle to ±0.25mrad/axis
- Optional closed-loop sensor
- Suitable for nutation motion

▸ Drawing



PSD Laser Stabilization System



This is a laser stabilization system built by CoreMorrow. We could provide the entire set of components of the system, and the structural principle, optical path, component model parameters, etc. according to the specific requirements of the user experiment.

▸ Introduction

① Laser, point light source

② P33.T2K FSM, θxθy 2-axis tilt jitter compensation, tilt angle to 2.4mrad/axis, drove by E70 piezo controller

③ P33.T2K FSM, θxθy 2-axis tilt jitter compensation, tilt angle to 2.4mrad/axis, drove by E70 piezo controller

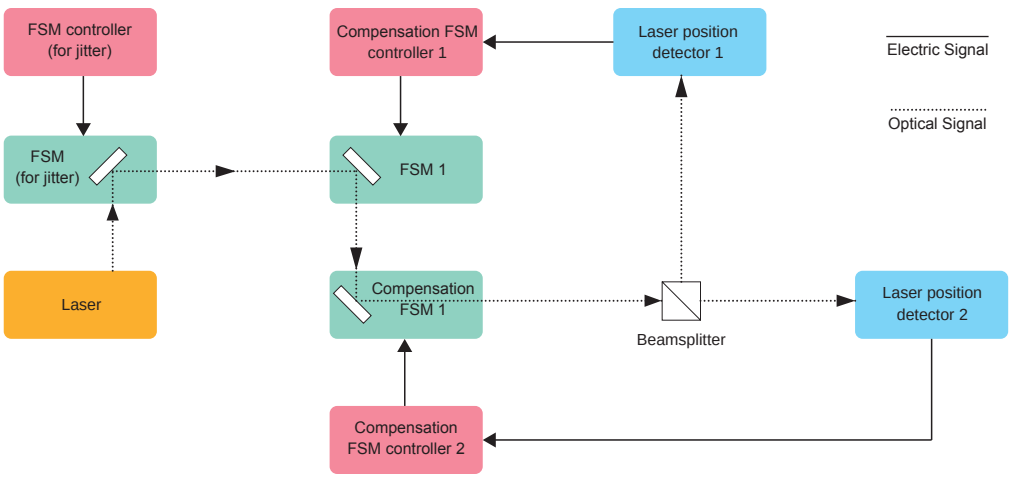
④ P33.T2K FSM, θxθy 2-axis tilt jitter compensation, tilt angle to 2.4mrad/axis, drove by E70 piezo controller

⑤ Beamsplitter

⑥ Laser position detector, detection of laser position

⑦ E70 piezo controller, driving P33.T2K FSM and processing the position signal feedbacked by laser position detector to form closed-loop control

▸ Principle



Piezo Controllers









Piezo controller has power amplification function, controlled by analog or digital signal, used for driving capacitive load, such as PZT, piezo products, etc.



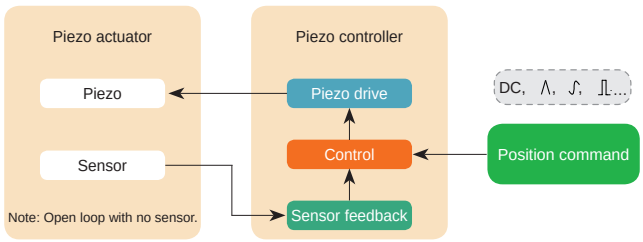
Piezo Controllers

Piezo controllers are used to drive and control piezoelectric ceramics, nano-positioning platforms and other capacitive load, mainly divided into modular, integrated, industrial, and board types.

Characteristics

Analog, digital, keyboard, I/O and other control methods. Available in servo-control, single-channel or multi-channel types. It can drive all kinds of piezoelectric products.

Driving Principle

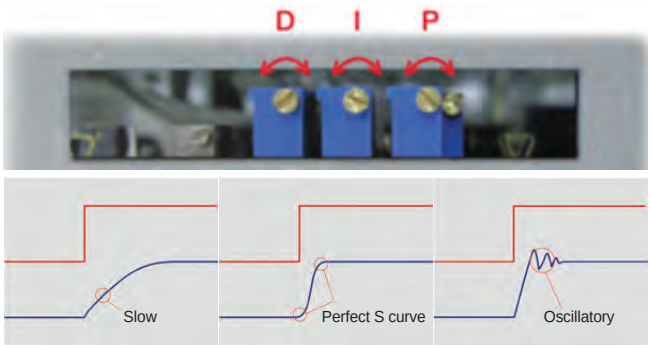


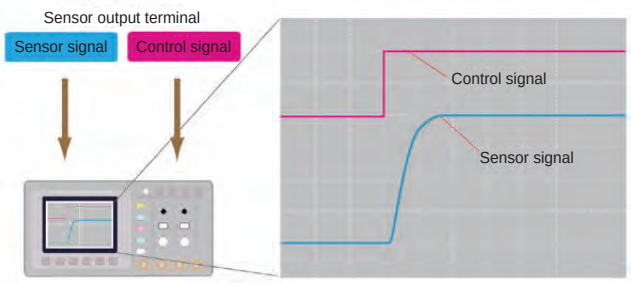
Connection



By Connector　　By Wires

Response Speed Adjustment





Appearance

According to your channels, power, size and other requirements, you can choose different piezo controllers.



Modular type　　Board type　　Industrial type　　Integrated type

▸ Applications



Driving Piezo Stack Actuator



Driving Piezo Stage



Driving Piezo Scanner



Driving Piezo Steering Mirror

▶ Product List

Type	Channels	Output voltage	Ave. current	Servo Control	Power supply	Software	Page
E00/E01	Channels to >100	Optional	5~625mA	Optional	220V AC	Yes	358
E00A02V050F10M	2	0~50Vp-p	-	No	220V AC	Yes	366
E00.A3AL	6	-20~150V/200V	175/233mA	No	220V AC	No	367
E00.A12/E01.A2 /E01.A6	12/2/6	-320~+320V	5mA	No	220V AC	No	368
E00.D6K04	6	0~150V	230mA	Yes	220V AC	Yes	369
E00.D10AL	7	0~120V	291mA	Yes	220V AC	Yes	370
E00.D12AL-V4	8	0~150V	69mA	Yes	220V AC	Yes	371
E01.D4K01	4	0~150V	69mA	Yes	220V AC	Yes	371
High voltage E00/E01.A	1~6	-500~1500V	17mA	No	220V AC	No	46
E01.A36	36	-20~150V	30mA/channel	No	220V AC	No	373
E51	3~18	-20~120V/150V	25mA/channel	Optional	24V DC	Optional	374
E52	1	-20~120V/150V	60~400mA	Optional	220V AC	No	378
E53	1	-20~120V/150V	60mA	Optional	24V DC	Optional	380
E53.A1K-J	1	-20~120V/150V	60mA	No	24V DC	No	382
E53.A1K-K	1	-20~120V/150V	60mA	No	24V DC	No	383
E53.A2K-J	2	-20~120V/150V	17mA	No	24V DC	No	384
E53.A3K-H	3	-20~120V/150V	60mA	No	24V DC	No	385
E53.B1S-I	1	-20~120V/150V	27mA	Yes	24VDC/500mA	No	386
E53.B1S-K	1	-20~120V/150V	60mA	Yes	24V DC	No	387
E53.B1S-M	1	-20~120V/150V	21mA	Yes	24V DC	No	388
E53.D1C-H	1	-20~120V/150V	60mA	Yes	24VDC/1.5A	Yes	389
E53.D1S-L	1	-20~120V/150V	60mA	Yes	24VDC/1.5A	Yes	390
E61.K1DL/ E62.K1DL	1	0~+120V/100V	5mA/3mA	No	-5~+130V/5VDC	No	391
E62.A1K-I	1	±25~±100VOptional	6~25mA	No	+5V DC	No	392
E63.A1K-H	1	0~120V/150V	12mA (loading 100nF)	No	+15V DC/0.5A	No	393
E63.C1K-H	1	-20~150V	2.5mA	No	USB Power Supply	Yes	394
E70.B2S-H	2	0~120V/150V	70mA/channel	Yes	24V DC/3A	No	395
E70.D2S/C2K-L	2	-20~120V/150V	70mA/channel	Optional	24V DC/3A	Yes	396
E70.D3S/C3K-L	3	-20~120V/150V	70mA/channel	Optional	24V DC/3A	Yes	397
E70.D3S/C3K-H	3	-20~120V/150V	70mA/channel	Optional	24V DC/3A	Yes	398
E70.D4S/C4K-L	4	-20~120V/150V	70mA/channel	Optional	24V DC/4A	Yes	400
Modular E70	6~96	-20~120V/150V	70mA/channel	Optional	24V DC	Yes	401

► Product List

Type	Channels	Output voltage	Ave. current	Servo Control	Power supply	Software	Page
E80.A2K-H	2	-300~+300	15mA/channel	No	28V/5A	No	402
E80.A3K-H	3	0~120V	60mA/channel	No	24V DC	No	403
E80.A4K-J	4	0~150V	230mA/channel	No	24V DC 15A	No	404
E80.B1S-H	1	-20~150V	230mA	Yes	24V/5A	No	405
E80.B3K-I	3	-20~120V/150V	100mA/channel	No	28V DC	No	406
E80.B3K-J	3	0~120V	25mA/channel	Optional	24V DC	No	407
Board-Type E80.B5S-I	5	-20~120V/150V	-	Optional	DC28V	No	408
E80.B6S-K	6	0~100V	48mA/channel	Optional	12V/3A	No	409
E80.C1K-H	1	0~120V	60mA/channel	No	24V DC 1A	Yes	410
E80.C2K-H	2	0~200V	60mA/channel	No	24V DC	Yes	411
E80.D1S-H	1	-20~150V	230mA/channel	Yes	24V DC 5A	Yes	412
E80.D1S-I	1	-20~120V	60mA	Yes	24V DC 1.5A	Yes	413
E80.D3S-K	3	-20~120V/150V	70mA/channel	Yes	20~30V DC3A	Yes	414
E80.D3S-O	3	-20~120/150V	70mA/channel	Yes	20~30V DC3A	Yes	416
E80.D3S-P	3	-20~120/150V	70mA/channel	Yes	20~30V DC3A	Yes	417
E80.D3S-Q	3	0~150V	67mA/channel	Yes	24V DC 3A	Yes	418
High voltage E80.D4S-H	4	0~800V	20mA/channel	Optional	28V/10A	Yes	419
E80.D6S-K	6	0~120V	70mA/channel	Yes	24V 5A	Yes	420
E80.D9S-K	9	0~120V	70mA/channe	Yes	24V DC	Yes	421
E80.D12S-I	12	-20~120V/150V	7mA/74mA	Optional	24~30V DC	Yes	422
E80.D	26~156	-20~120V/150V	30mA	Optional	220V AC	Yes	424
C47	1/2	0~±300V	1000mA	No	220V AC	Yes	426
E81	1	-20~150V	2A	No	220V AC	No	426
E81.A1K-I	1	0~200V	5.4A	No	220V AC	No	427
E81.C6K-H	6	-20~120V/150V	70mA/channel	No	220V AC	No	428
E81-D	3/6/9	-20~+150V	50mA	No	170V, ±15V, -24V, 0.2A	No	429
E82.A8K-H	8	-20~150V	30mA	No	DC 28V 2A	No	430
E82.A64K-H	64	-20~150V	30mA	No	DC 28V 15A	No	430
E82.C32K-H	32	-20~100V	13mA/channel	No	220V AC	Yes	431
E82	70~256	-20V~+120V (Optional±350V)	5~90mA	No	AC 220V	Yes	432
E82.C256K-J	256	-20~120V	50mA/channel	No	135V, 40A, 35V, 20A, 24V, 10A	Yes	434
Piezo Mirror Controller E24/E40/E48/E112	Channels to >100	Optional	5~10mA/channel	No	220V AC	No	435
XE-650	1	-20~120V/150V	50mA	Optional	220V AC	No	436
Motion Control Software	Easy installation; standard control software; support for optical control and secondary development						437

E00/E01 Chassis-type Piezo Controller





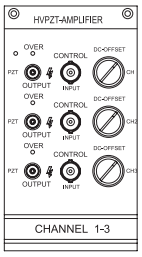
E00/E01 chassis-type piezo controllers are used to drive and control piezoelectric ceramics and nanopositioning platforms and mainly grouped into modular, integrated, industrial and board controllers with analog, digital, keyboard, I/O and other control methods. Available in open loop, closed loop, single or multiple channels. They can drive all kinds of piezoelectric products.

▸ Modules

Piezo Amplifier Module

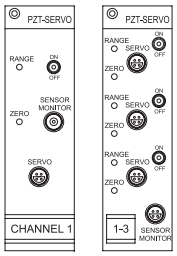


1 channel



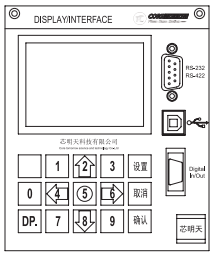
3 channels

Sensor Control Module

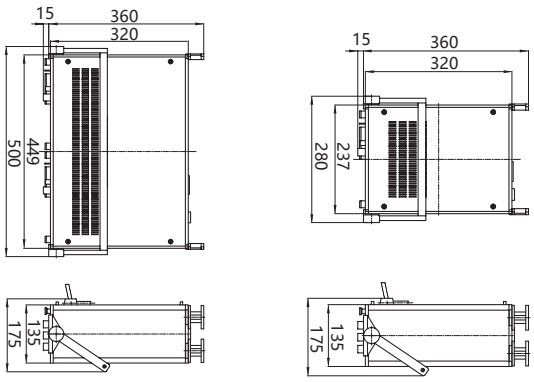


1 channel 3 channels

Display & Interface Module



Chassis & Power Supply Module Drawings

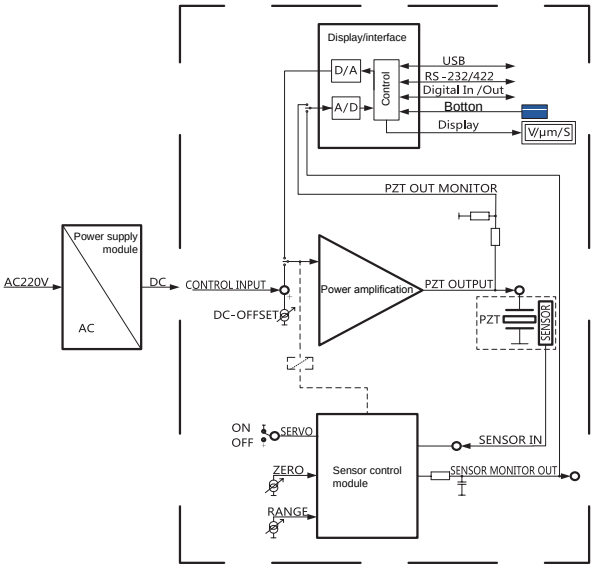


E00 E01

▸ Characteristics

Modules	Output Voltage
• Power amplifier module	-20~120V, -20 ~150V,
• Sensor Control Module	0~300V, 0~600V, 0~900V,
• Display & Interface Module	0~1800V, ±120V, ±150V,
• Chassis & Power Supply Module	±300V, ±450V, ±900V…

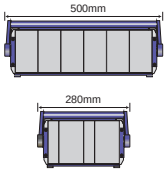
▸ Principle



▸ For Driving Various Piezo Products



▸ Modular Combination Controller

Power Amplifier Module		Modules are freely combined into four types of A, B, C, D	Type A Power amplifier module Chassis & power supply module		
Sensor Control Module			Type B Power amplifier module Sensor control module Chassis & power supply module		
Display & Interface Module			Type C Power amplifier module Display & interface module Chassis & power supply module		
Chassis & Power Supply Module			Type D Power amplifier module Sensor control module Display & interface module Chassis & power supply module		

▸ Selection Guide

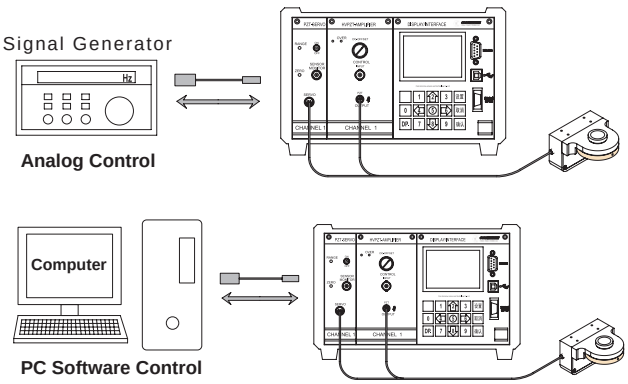
E0 [0] . [A] [3]

Chassis size
- [0] 19 inch
- [1] 9 inch

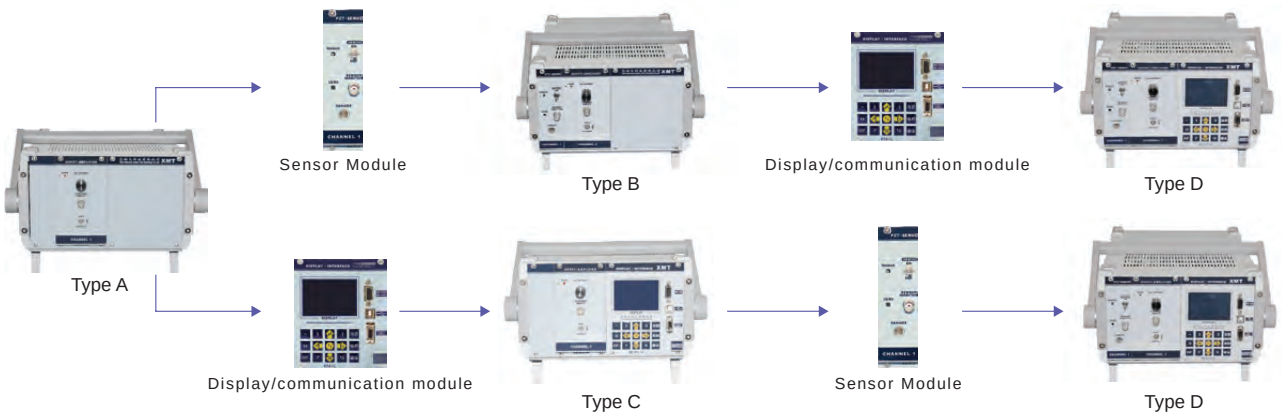
Channels
- [1] 1 channel
- [2] 2 channels
- [3] 3 channels
- ... ...

Type(module combination)
- [A] Power Supply Amplifier
- [B] Power Supply AmplifierSensor
- [C] Power Supply Amplifier+Communication
- [D] Power Supply Amplifier Sensor+Communication

▸ Control Mode



▸ Module Upgrade Available



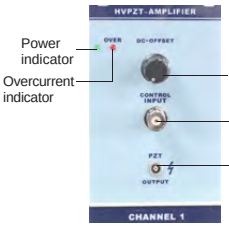
▶ Technical Data Range

Parameters List			
Type	E00		E01
Amplifier Module			
Extended amplifier only	1~18 channels		1~9 channels
Control analog input	Unipolar 0~+10V or 0~+5V, Bipolar -10~+10V or -5~+5V		
Optional output voltage	100V/150V/200V/300V/±150V	±200V/±300V/600V	900V/1800V/±900V
Ripple	5mV	≤10mV	≤20mV
Voltage stability	< 0.1%F.S. (full scale) /8 hours		
Input impedance	100KΩ±20%		
Unloaded bandwidth	Optional 1K, 10K, 30K, 50KHz		
Channels/module	1~3 channels		
Ave. Power 1 channel	7W~35W		
Peak Power 1 channel	20W~110W		
Ave. Current	40mA~350mA		
Peak current	100mA~11A		
Bandwidth, small signal	5kHz~200kHz		
Bandwidth, large signal	1kHz~50kHz		
Voltage gain	10~180 times		
Knob adjustment	10 turns		
Sensor Module			
Sensor type	SGS, LVDT, CAP		
Sensor channels	1~3 channels		
Sensor	LEMO connector (sensor input)		
Sensor output	BNC connector for 1 channel, LEMO connector for 3 channels		
Sensor output voltage	Unipolar: 0~+10V, Bipolar: -10~+10V		
Display/Interface Module			
Channels	1~3 channels		
D/A converter	16/24 bit ±10V output		
A/D converter	16 bit ±10V input		
Output voltage resolution	16 bit(1/30000), 24 bit(1/1000000)		
Communication	RS-232/RS-422/USB 2.0		
Baud rate	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000		
Chassis/Power Supply Module			
Power supply	AC 220V±10% 50Hz±10%		
Current limit	Short circuit protection		
L×H×D	500×175×375mm		280×175×375mm
Functions			
Type	E00		E01
Combination	Available amplifier, sensor and interface modules, see the instructions		
Feature	Modules combined freely, upgradeable		
Basic control way	Manual adjustment, analog input, computer serial/USB interface, spontaneous waveform control, open-loop/servo control		
Basic Functions	Overcurrent protection, dynamic power protection		
Software configuration	Powerful standard computer control software		
Spontaneous waveform	Sine, square, triangular, sawtooth wave, 1kHz-10kHz frequency with no attenuation.		
LCD keyboard	Standard(LCD, membrane button, RS-232, RS-422, USB)		

▸ Module Introduction

Power Amplifier Module

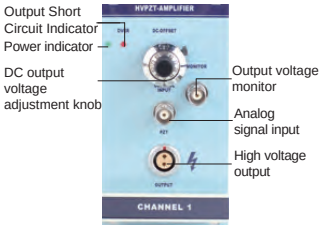
Its main function is to amplify small signal from external analog input or given by the computer through DA or other control signals through a voltage and power amplifier circuit inside the Power Amplifier Module.



E05/E07

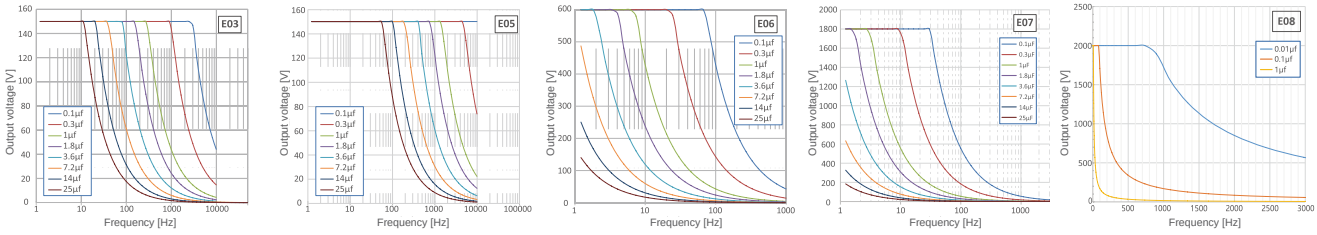

E03

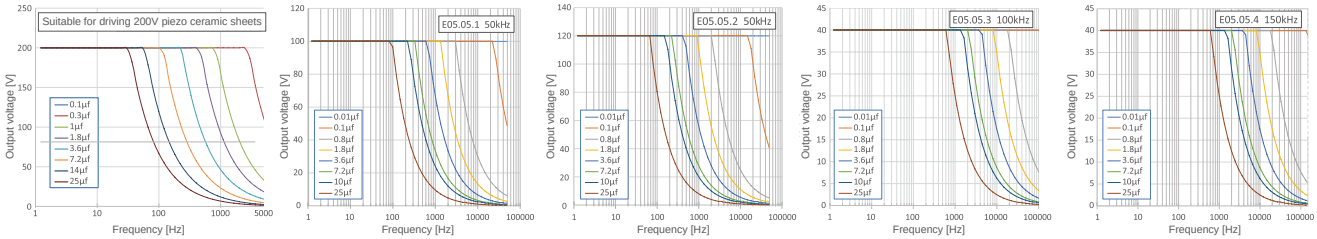

E06



E08

Module Type	Channels	Ave. Power	Output voltage	Frequency
E03	3	7W/channel	0~100V/120V/150V/300V, ±100V/±150V	1kHz, 10kHz, 30kHz,50kHz
E05	1	35W	0~40V/100V/120V/150V/200V/300V/400V/600V, ±100V/±150V/±200V/±300V	1kHz, 5kHz, 10kHz, 30kHz, 50kHz, 100kHz, 150kHz
E06	2/4	3W/channel	-300V~+300V	1kHz
E07	1	5W	0~600V/900V/±450V	2kHz
E08	1	34W	-500~1500V	2kHz
Combination/Bipolar	1	10W	0~1800V, ±900V	3kHz





▸ E03 Power Amplifier Module

Channels	Type	Analog input	Output voltage	Frequency	Ave. current	Peak current	Ripple
1~3	E03.00.1	-1~10V	-20~200V	>5kHz	35mA	105mA	5mV
	E03.00.2	-1~10V	-20~200V	>5kHz	35mA	1000mA	
	E03.00.3	-0.67~10V	-20~300V	>5kHz	23mA	69mA	
	E03.00.4	-0.67~10V	-20~300V	>5kHz	23mA	1000mA	
	E03.00.5	-10~10V	±100V	>5kHz	35mA	1000mA	
	E03.00.6	-10~10V	±150V	>5kHz	23mA	1000mA	
	E03.00.7	-3.33~10V	-20~60V	10kHz	100mA	330mA	
	E03.00.9	-2~+10V	-20~+100V	10kHz	70mA	1000mA	
	E03.00.10	-1.67~+10V	-20~+120V	10kHz	58mA	1000mA	
	E03.00.11	-1.33~+10V	-20~+150V	10kHz	46mA	1000mA	
	E03.00.12	-2~+10V	-20~+100V	30kHz	70mA	210mA	
	E03.00.13	-1.67~+10V	-20~+120V	30kHz	58mA	174mA	
	E03.00.14	-1.33~+10V	-20~+150V	30kHz	46mA	138mA	
	E03.00.15	-1~+10V	-20~+200V	30kHz	35mA	105mA	
	E03.00.16	-0.67~+10V	-20~+300V	30kHz	23mA	69mA	
	E03.00.17	-10~+10V	-100~+100V	30kHz	35mA	105mA	
	E03.00.18	-10~+10V	-150~+150V	30kHz	23mA	69mA	
	E03.05.1	0~+10V	-20~+100V	50kHz	70mA	210mA	
	E03.05.2	0~+10V	-20~+120V	50kHz	58mA	174mA	

▸ E05 Power Amplifier Module

Channels	Type	Analog input	Output voltage	Frequency	Ave. current	Peak current	Ripple
1	E05.00.1	-2~10V	-20~+100V	1kHz	350mA	1050mA	5mV
	E05.00.2	-1.67~10V	-20~+120V	1kHz	291mA	873mA	5mV
	E05.00.3	-1.33~10V	-20~+150V	1kHz	233mA	700mA	5mV
	E05.00.4	-2~10V	-20~+200V	1kHz	175mA	525mA	5mV
	E05.00.5	-0.67~10V	-20~+300V	1kHz	116mA	348mA	5mV
	E05.00.6	-0.5~10V	-20~+400V	1kHz	87mA	260mA	10mV
	E05.00.7	-10~+10V	-100~+100V	5kHz	175mA	525mA	10mV
	E05.00.8	-10~+10V	-150~+150V	5kHz	116mA	348mA	10mV
	E05.00.9	-10~+10V	-200~+200V	5kHz	87mA	260mA	10mV
	E05.00.10*	-10~+10V	-300~+300V	5kHz	116mA	348mA	10mV
	E05.00.11	-1~+10V	-20~+200V	5kHz	175mA	525mA	10mV
	E05.00.12	-0.67~+10V	-20~+300V	5kHz	116mA	348mA	10mV
	E05.00.13	-2~+10V	-20~+100V	10kHz	330mA	1000mA	5mV
	E05.00.14	-1.67~+10V	-20~+120V	10kHz	290mA	1000mA	5mV
	E05.00.15	-1.33~+10V	-20~+150V	10kHz	230mA	1000mA	5mV
	E05.00.16	-1~+10V	-20~+200V	>5kHz	175mA	1000mA	5mV
	E05.00.17*	0~+10V	0~+600V	5kHz	120mA	350mA	10mV
	E05.00.18	-0.67~+10V	-20~+300V	>5kHz	115mA	1000mA	5mV
	E05.00.19	-10~+10V	-100~+100V	>5kHz	175mA	1000mA	5mV
	E05.00.20	-10~+10V	-150~+150V	>5kHz	115mA	1000mA	5mV
	E05.00.21	-10~+10V	-200~+200V	>5kHz	87.5mA	1000mA	5mV
	E05.00.22	0~-10V	0~-300V	>5kHz	115mA	1000mA	5mV
	E05.00.23	0~10V	-20~400V	3kHz	87.5mA	1000mA	5mV
	E05.00.24	0~-10V	0~-400V	2kHz	87.5mA	1000mA	5mV
	E05.03.1	-2~+10V	-20~+100V	30kHz	330mA	1000mA	5mV
	E05.03.2	-1.67~+10V	-20~+120V	30kHz	290mA	1000mA	5mV
	E05.03.3	-1.33~+10V	-20~+150V	30kHz	230mA	1000mA	5mV
	E05.03.4	-1~+10V	-20~+200V	30kHz	175mA	1000mA	5mV
	E05.03.5	-0.67~+10V	-20~+300V	30kHz	115mA	1000mA	5mV
	E05.03.6	-10~+10V	-100~+100V	30kHz	175mA	1000mA	5mV
	E05.03.7	-10~+10V	-150~+150V	30kHz	115mA	1000mA	5mV
	E05.05.1	0~+10V	0~+100V	50kHz	330mA	1000mA	5mV
	E05.05.2	0~+10V	0~+120V	50kHz	290mA	1000mA	5mV
	E05.05.3	0~+10V	0~+40V	100kHz	625mA	1875mA	20mV
	E05.05.4	0~+10V	0~+40V	120kHz	625mA	1875mA	20mV

▸ E06 Power Amplifier Module

Channels	Type	Analog input	Output voltage	Frequency	Ave. current	Peak current	Ripple
2	E06.00.A2	-10~+10V	-300~+300V	1kHz	5mA	15mA	20mV

▸ E07 Power Amplifier Module

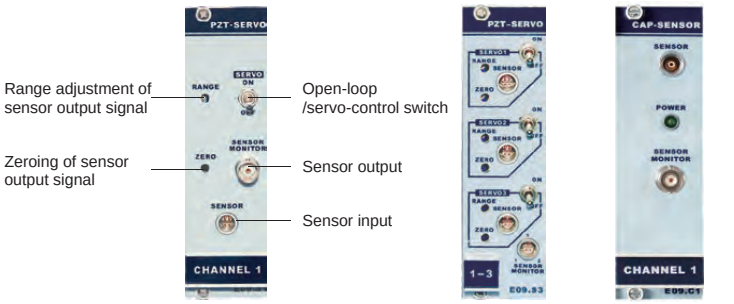
Channels	Type	Analog input	Output voltage	Frequency	Ave. current	Peak current	Ripple
1	E07.00.1	-10~+10V	±300V	2kHz	35mA	438mA	50mV
1	E07.00.2	0~+10V	0~1000V	2kHz	30mA	438mA	50mV

▸ E08 Power Amplifier Module

Channels	Type	Analog input	Output voltage	Frequency	Ave. current	Peak current	Ripple
1	E08.00	-2.5~7.5V	-500~1500V	2kHz	17mA	55mA	50mV
1	E08.06	0-10V	0~2000V	2kHz	17mA	55mA	50mV
1	E08.07	-10~10V	-500~500V	2kHz	30mA	90mA	50mV

▶ E09 PZT Position Sensor Module

E09 PZT sensor module provides high precision, high stability and high reliability excitation signals for sensors in nanopositioning mechanisms such as PZT or micro-motion stages, and detects and processes feedback signals from PZT or micromotion stages. The servo control is done by the internal algorithm circuit. The E09 PZT sensor module is not a stand-alone device and needs to be integrated into the E00/E01 chassis.

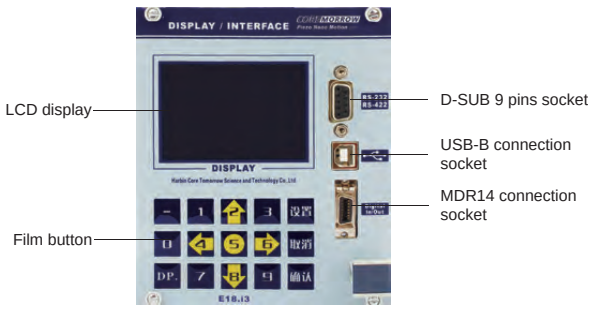


E09.S1/L1　　E09.S3/L3　　E09.C1

Type	E09.S1	E09.S3	E09.L1	E09.L3	E09.C1
Functions	PZT Position Sensor Module				
Channels	1	3	1	3	1
Sensor type	SGS	SGS	LVDT	LVDT	CAP
Servo Characteristics	Analog P-I+notch filter	Analog P-I+notch filter	Analog P-I+notch filter	Analog P-I+notch filter	Analog P-I+notch filter
Sensor input port	ERA.0S.304.CLL	ERA.0S.304.CLL	ERA.0S.304.CLL	ERA.0S.304.CLL	G10S0C-FT1LJG0-000L
Sensor output port	BNC	ERA.0S.303.CLL	BNC	ERA.0S.303.CLL	BNC
Voltage output(V)	0~10(±10V for constant voltage version)				
Operating temperature(°C)	0~50	0~50	+10~+40	+10~+40	+10~+50

▶ E18 Display/Interface Module

With LCD and PC interface, E18 measures and displays the output voltage of Power Amplifier Module and the current displacement of sensor module, receives and processes control commands from computer, and with keyboard, LCD and is equipped software for human-computer interaction, and with servo control and other functions. It is not a stand-alone device and needs to be integrated into the E00/E01 chassis.



Type	E18.i1		E18.i3	
Functions	Display/Interface Module			
Channels	1		3	
Processor	32 Bit single core microprocessor, 168MHz			
Linearity	0.01%			
D/A converter	16 Bit ±10V	24 Bit ±10V	16 Bit ±10V	24 Bit ±10V
Output resolution	1/30000	1/1000000	1/30000	1/1000000
A/D converter	16 bit ±10V			
Film button	15 buttons			
Computer interface	RS-232/422, USB			
Baud rate	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000			
Output wave frequency(Hz)	10k			
I/O interface	1~3pcs, user can set the input or output, MDR14 connector			
LCD keyboard control function	Output and measure voltage and displacement, spontaneous waveform, selection function, set parameters			
Spontaneous waveform	Sine wave, square wave, triangle wave, sawtooth wave			
Software control function	Output and measure voltage and displacement, waveform control, selection function, set parameters			
Software waveform control	Programmable waveform output, standard waveform output			
Secondary development	VC++, Matlab, Python, LabView routine and DLL dynamic link library function, easy for development			
Operating temperature(°C)	0~50			

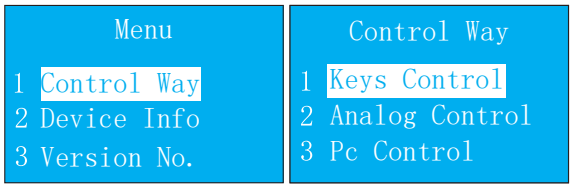
▸ Examples

Type	 E01.A1	 E01.B1	 E01.C1	 E01.D1	 E01.D3	 E00.D3
Amplifier Module						
Channels	1	1	1	1	3	3
Analog input	-1.67~10V	-1.67~10V	-1.67~10V	-1.67~10V	-1.67~10V	-1.67~10V
Output voltage	-20~120V	-20~120V	-20~120V	-20~120V	-20~120V	-20~120V
Ripple	5mV	5mV	5mV	5mV	5mV	5mV
Input impedance	100KΩ±20%	100KΩ±20%	100KΩ±20%	100KΩ±20%	100KΩ±20%	100KΩ±20%
Unloaded bandwidth	10kHz	10kHz	10kHz	10kHz	10kHz	10kHz
Ave. current	291mA	291mA	291mA	291mA	58mA	291mA
Peak current	1A	1A	1A	1A	1A	1A
Bandwidth, small signal(1/10)	>20kHz	>20kHz	>20kHz	>20kHz	>20kHz	>20kHz
Voltage gain	12 times	12 times	12 times	12 times	12times	12 times
Knob adjustment	10 circles	10 circles	10 circles	10 circles	10 circles	10 circles
Sensor Module						
Sensor type	-	SGS	-	SGS	SGS	SGS
Channels	-	1	-	1	3	3
Sensor input	-	ERA.0S.304.CLL	-	ERA.0S.304.CLL	ERA.0S.304.CLL	ERA.0S.304.CLL
Sensor output	-	BNC	-	BNC	ERA.05.303.CLL	BNC
Sensor output voltage	-	0~10V	-	0~10V	0~10V	0~10V
Operating temperature	-	0~50°C	-	0~50°C	0~50°C	0~50°C
Display/Interface Module						
Channels	-	-	1	1	3	3
D/A converter	-	-	16 bit ±10V	16 bit ±10V	24 bit ±10V	16 bit ±10V
A/D converter	-	-	16 bit ±10V	16 bit ±10V	16 bit ±10V	16 bit ±10V
Output voltage resolution	-	-	1/30000	1/30000	1/1000000	1/30000
Communication	-	-	RS-232/422, USB	RS-232/422, USB	RS-232/422, USB	RS-232/422, USB
Chassis/Power Supply Module						
Power supply	AC 220V±10% 50Hz±10%	AC 220V±10% 50Hz±10%	AC 220V±10% 50Hz±10%	AC 220V±10% 50Hz±10%	AC 220V±10% 50Hz±10%	AC 220V±10% 50Hz±10%
Current limit	Short-circuit protection	Short-circuit protection	Short-circuit protection	Short-circuit protection	Short-circuit protection	Short-circuit protection
L×H×D	280×175×375mm	280×175×375mm	280×175×375mm	280×175×375mm	280×175×375mm	500×175×375mm
Functions						
Basic control	Manual adjustment, Analog input		Manual adjustment, analog input, computer serial/USB interface, spontaneous waveform control			
Basic functions	Overcurrent protection,dynamic power protection					
Software	-	-	Powerful standard computer control software			
Spontaneous waveform	-	-	Sine, square, triangular, sawtooth wave, 1kHz-10kHz frequency with no attenuation			
LCD keyboard	-	-	Standard(LCD, membrane button, RS-232, RS-422, USB)			

▶ E00/01 Operation Instructions

Turn on the power switch, the "main menu" is displayed, as shown in the figure, with three options of "Control Way", "Device Info", "Version No.". We mainly introduce the control methods.

On the "Control way" page, press the up and down keys (No. "2" and "8") to move the cursor to "Keys Control" and press "Enter" to enter this interface. Press the "Cancel" to return to the main menu.

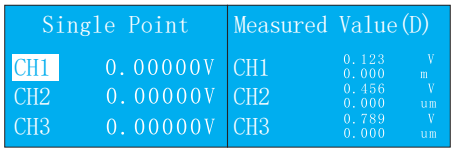


Keys Control



1. Single Point Control

After entering "Single Point", press the "left" and "right" (No. "4", "6") to switch and set the output voltage or displacement, press the "up" and "down" to select the channel to be set, press the "set" to input the value, and press the "confirm" to output after the input is completed. Press the "Cancel" button to return to the previous menu.



2. Wave Control

In the "Wave Control" interface, press the "Left", "Right" to switch channels, press the "Up", "Down" to select parameter. After the cursor stays, press the "Set" to set or switch.

The cursor stays at "M1/M2/M3", press the "Set" to switch modes of single-channel control, multi-channel control and phase control. In multi-channel control, the three channels can send different frequencies and peak-to-peak waveforms simultaneously. The waveform frequency of each channel can reach 10kHz. Under phase control, three channels can send waveforms simultaneously. The frequency, wave, and I/O port direction must be the same. The waveform frequency can reach 1kHz. The phase angle setting range is 0~360 degrees. The three channels need to set their respective phase angles. And same waveform phase for three channels, they will output same.

The cursor stays at the waveform icon ∿ ⅄ ⅄ ⅄, and press the "Set" to switch. There are four types of waveforms to choose from: sine, square, triangle and sawtooth wave. The cursor stays at "I/O", press the "Set" to switch. The cursor is at the On/Off icon, press the "Enter" to start or stop the waveform.

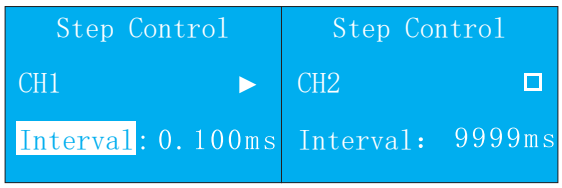


Note:
M1: Single mode
M2: Multiple mode
M3: Phase mode
▶ : Off
■ : On
⏸ : Pause

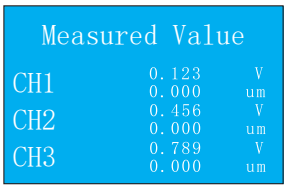
3.Single Point Step Control

Before this function, the upper computer software needs to store stepping output voltage or displacement values in the E18 module. Each channel can store 192 voltages or displacements values. Press the "up" and "down" to select the parameter. Press "set", then number keys to enter the data. In the non-input data state, you can press the "left" or "right" to switch channels.

Note: The interval time range is 0.1~9999ms.



Analog Control



Connect the supplied BNC cable to the CONTROL INPUT (external analog signal input) end of the power amplifier module, and the other end to the analog signal. The red fish clip is the positive input while the black is the negative input. The analog signal is amplified through the amplifier. The amplified analog signal is output from the output terminal of the power. If you use the analog control function, you must enter the "analog control" interface or switch the system state to the analog input state through the host computer communication command, then use the analog control function.

(3) Software control

Connect one end of the supplied communication cable to the serial port of the computer, and the other end to the RS-232/422 serial port or connect the device and the computer through a USB connection cable.

When entering the "software control mode", the screen displays "Connecting...", after successful communication, it will jump to the software measurement value interface. Press the "Cancel" to return to the "Control Way" interface.

Note: Direct communication is possible in any interface without entering the "PC Control".

E00A02V050F10M Power Amplifier



CoreMorrow E00A02V050F10M power amplifier integrates with internal voltage and power amplifier circuit, which can amplify the weak external analog input signals or analog signals from DA or other control signals, and then output. Its output bandwidth can be up to 10MHz, and the gain can be adjusted; Keyboard operation and touch operation are available. It has host computer communication function and optional signal generator function. Parameters can be customized.

Characteristics

- Output bandwidth up to 10MHz
- Output voltage up to 50V
- Gain adjustable, 0.05 min.step
- Parameters can be customized
- Optional signal generator function

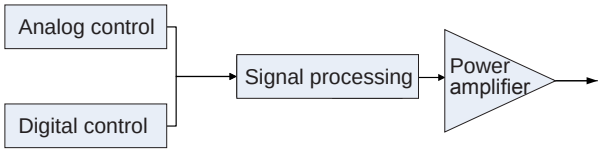
Applications

- Scientific research experiment
- Driving piezo ceramics
- Driving piezo transducer
- Driving crystal
- High power application

Technical Data

Type	E00A02V050F10M
External input channel	2
Signal generator channel	2
Output type	Single output
Bandwidth(-3dB, MHz)	DC~10
Max. output voltage(Vp-p)	50(25Vp)
DC offset(V)	-25~+25 adjustable
Max. output current(Ap)	1
Max. output power/channel(Wp)	25
Fuse	4A/250V
Voltage gain	x0~5(0.05step)
Output resistance(Ω)	1/5
Input resistance(Ω)	1k/2k
Max. Input voltage(Vp-p)	5
Max. capacitance(μF)	1
Output voltage error	≤±3%F.S.@1kHz
Voltage monitor	100:1(±5%)
Slew rate(V/μs)	1000
Total harmonic distortion(THD)	≤0.1%@1kHz, 50Vp-p
Output voltage zero drift(V)	≤0.2
Signal to noise ratio(SNR)(dB)	≥80
Output interface	4mm Banana jack
Communication interface	USB(slave computer to RS-232)
Upper computer control software	VB routine
Secondary development	Available, provide communication protocol
Protection	Over current protection
Signal Ground	Connected with the chassis and power cord
Power supply	AC220V±10%, 50Hz
Operating temperature(°C)	0~45
Storage temperature(°C)	-20~50
Operating humidity	≤80%RH, non-condensing
Dimensions(mm)	270×134×510
Mass(kg)	12.9

Principle



Panel Introduction

Front panel

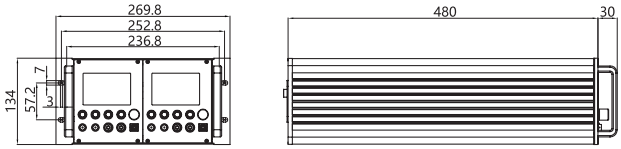


No.	Function discription
1	Menu, Analog/digital control interface switch button
2	Rin, Input resistance switch button, 1KΩ/2KΩ
3	Rout, Output resistance switch button, 1Ω/5Ω
4	Output, Output button, press to start output
5	Scale, Magnification adjustment knob, press to select single step increment, 1.0/0.1/0.05
6	Input, Analog input interface
7	Monitor, Monitor interface
8	OUT, Output interface
9	Reserved : Reserved function button
10	USB, Upper computer communication interface
11	Touch screen display panel

Rear panel



Drawing



E00.A3AL Chassis-type Piezo Controller



E00.A3AL chassis-type piezo controller is a customized one with 6 outputs, and each channel features different output voltage and current that is to satisfy different applications.

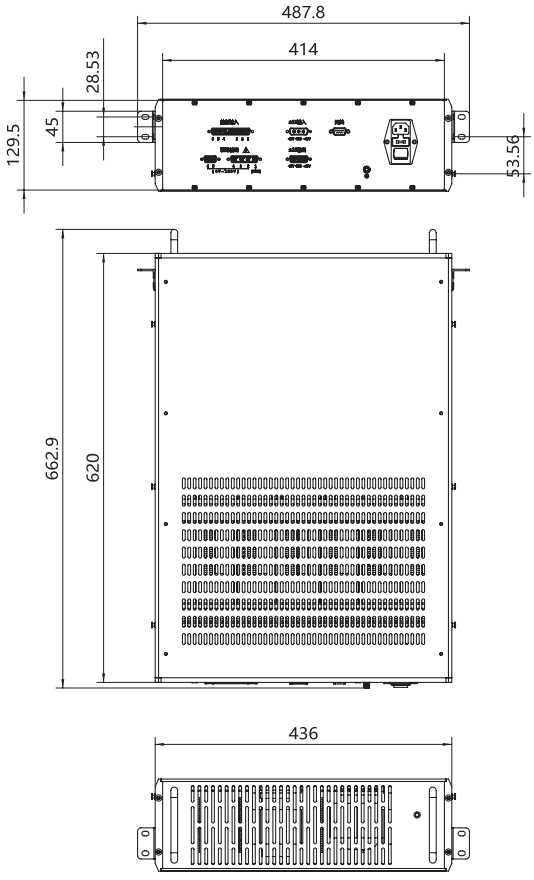
▸ Characteristics

- 6 outputs
- Output voltage -20 to 150V/200V
- Short-circuited proof
- Peak current up to 1A

▸ Technical Data

Model	E00.A3AL
Channels	6
Input voltage range(V)	Channel 1: -1~10 Channel 2 to 6: -1.33~10
Output voltage range(V)	Channel 1: -20~200 Channel 2 to 6: -20~150
Ripple(mV)	5
Unloaded bandwidth(kHz)	Channel 1: ≥20 Channel 2 to 6: ≥10
Ave.current(mA)	Channel 1: 175 Channel 2 to 6: 233
Peak current(A)	1
PZT connector	Channel 1 to 4: 4W4 D-SUB Channel 5 to 6: 2W2 D-SUB
Analog input connector	13W6A D-SUB
Operating temperature(°C)	0~50
Current limit	Short-circuited proof
Output short-circuited current(mA)	50
Static dissipation(W)	30
L×H×D(mm)	436×129.5×620
Power supply	AC 220V±10, 50Hz±10%
Mass(kg)	21

▸ Drawing



E00.A12/E01.A2/E01.A6 Series Bipolar Piezo Controller



E01.A2



E01.A6



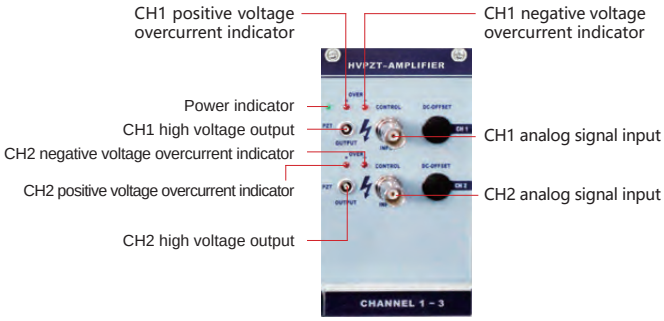
E00.A12

The output voltage range of this series of bipolar piezo controllers can reach -320V to +320V, which can be used to drive piezo products such as piezo scanning tubes, and the number of channels can be freely selected.

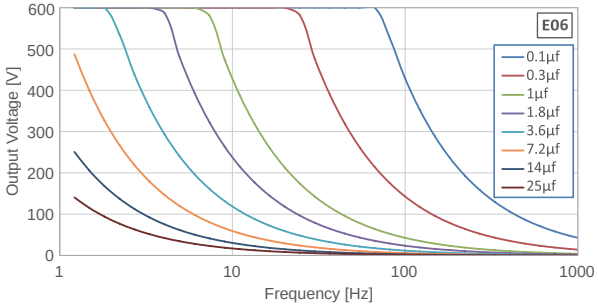
Characteristics

• Bipolar output • Output voltage up to ±320V • Small signal bandwidth up to 5kHz • Suitable for driving piezo scanning tubes, etc.

Panel Introduction



Voltage vs Frequency Curves

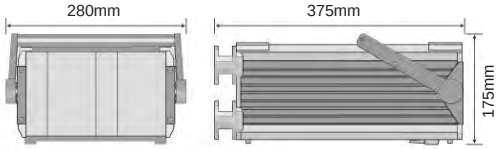


Technical Data

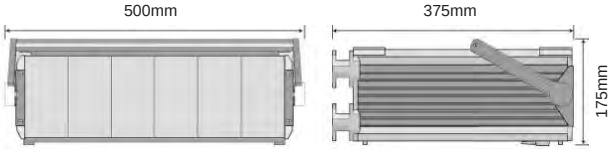
Type	E01.A2	E01.A6	E00.A12
Channels	2	6	12
Analog input(V)	-10~+10	-10~+10	-10~+10
Output voltage(V)	-320~+320	-320~+320	-320~+320
Ripple(mV)	20	20	20
Voltage stability	<0.1%F.S./8 hours	<0.1%F.S./8 hours	<0.1%F.S./8 hours
Input impedance(kΩ)	100±20%	100±20%	100±20%
Unloaded bandwidth(kHz)	1	1	1
Ave. Current(mA)	5	5	5
Peak current(A)	15	15	15
Bandwidth (1/10 signal)(kHz)	5	5	5
Voltage gain	32	32	32
Power supply	AC 220V±10% 50Hz±10%	AC 220V±10% 50Hz±10%	AC 220V±10% 50Hz±10%
Current limit	Short-circuited proof, 8~9mA	Short-circuited proof, 8~9mA	Short-circuited proof, 8~9mA
L×H×D(mm)	280×175×375	280×175×375	500×375×175
Basic control way	Analog control	Analog control	Analog control

Drawing

E01



E00



E00.D6K04 Chassis-type Piezo Controller



E00.D6K04 chassis-type piezo controller has 6 channels output. It can be controlled by analog or digital signals and it can communicate with the software control through the RS-422 serial port.

Characteristics

- 6 channels output
- 0~150V output
- Bandwidth to 10kHz
- Closed-loop servo control

Applications

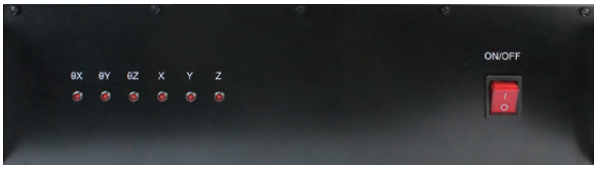
- Driving 6-Axis Piezo Tilt Stage
- Driving Piezo Nanopositioning Stages,etc.

Technical Data

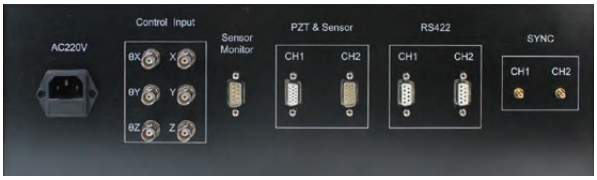
Type	E00.D6K04
Drive	
Channels	6
Analog input(V)	0~10
Output voltage(V)	0~150
Ripple(mV)	5
Unloaded bandwidth(kHz)	10
Ave. Current(mA)	230
Peak current(A)	1
Control input interface	BNC
Servo control	
Sensor type	SGS(or LVDT,CAP)
Servo	Analog P-I +Notch filter
Sensor interface	DB15HD
Sensor output voltage(V)	0~10
Communication	
Computer interface	RS-422
Baud rate	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000, 5250000
Output wave frequency(Hz)	10k
I/O interface	SMB
Others	
Operating temperature(°C)	0~50
Power supply	AC 220V±10%, 50Hz±10%
Current limit	Short-circuited proof
L×H×D(mm)	449×134×315

Front & Rear Panel

Front panel



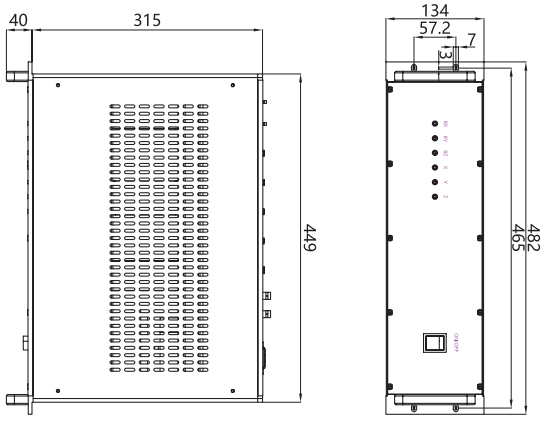
Rear panel



Driving 6-Axis Piezo Tilt Stage



Drawing



E00.D10AL Chassis-type Piezo Controller



E00.D10AL chassis-type piezo controller is designed for driving 6-axis piezo tilt stage with 7 channels output that contains one constant voltage output. It can be controlled by analog or digital signals and it can communicate with the software control through the RS-422 serial port.

Characteristics

- 7 channels output, containing one constant voltage output
- Bandwidth to 10kHz
- Closed-loop servo control
- 0~120V output

Applications

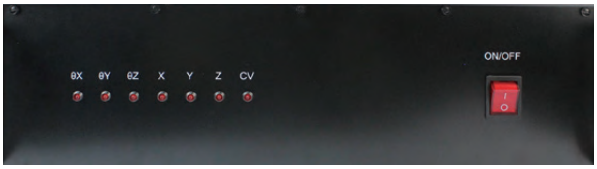
- Driving 6-Axis Piezo Tilt Stage
- Driving Piezo Nanopositioning Stages,etc.

Technical Data

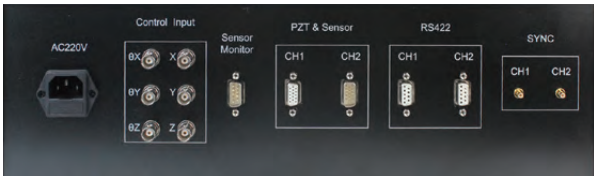
Type	E00.D10AL
Drive	
Channels	7, containing 1 constant voltage output
Analog input(V)	0~10
Output voltage(V)	0~120
Ripple(mV)	5
Unloaded bandwidth(kHz)	10
Ave. Current(mA)	291
Peak current(A)	1
Control input interface	BNC
Servo control	
Sensor type	SGS(or LVDT,CAP)
Servo	Analog P-I +Notch filter
Sensor interface	DB15HD
Sensor output voltage(V)	0~10
Communication	
Computer interface	RS-422
Baud rate	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000, 5250000
Output wave frequency(Hz)	10k
I/O interface	SMB
Others	
Operating temperature(°C)	0~50
Power supply	AC 220V±10%, 50Hz±10%
Current limit	Short-circuited proof
L×H×D(mm)	449×134×315

Front & Rear Panel

Front panel



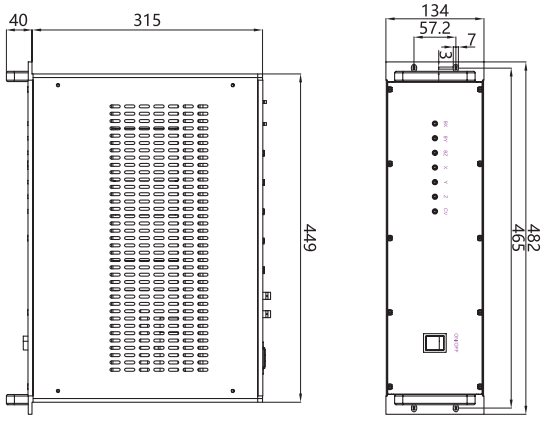
Rear panel



Driving 6-Axis Piezo Tilt Stage



Drawing



E00.D12AL-V4/E01.D4K01 Chassis-type Piezo Controller



E00.D12AL-V4



E01.D4K01

This chassis-type piezo controller has both 4-channel and 8-channel versions, which can be controlled through analog or digital signals. It can communicate with the upper computer through RS-232/422 serial port or USB interface, and its output voltage resolution can reach 1/1000000 of the full stroke. It is suitable for driving high-precision piezo actuators such as piezo nanopositioning stage/piezo z/tip/tilt/rotation stage.

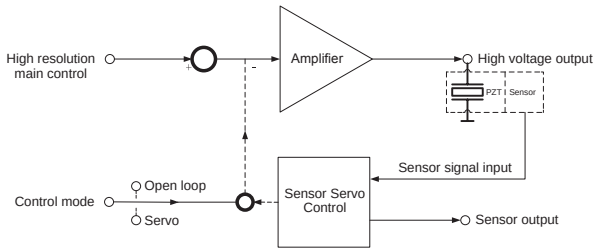
▸ Characteristics

- 4 or 8 channels output
- 0~150V output
- Servo control
- Bandwidth to 10kHz
- Analog or digital control
- Output voltage resolution: 1/1000000 of the full stroke

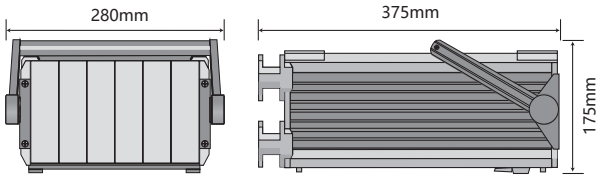
▸ Applications

- Driving Piezo Nanopositioning Stage
- Driving Piezo Z/Tip/Tilt/Rotation Stage
- Driving bipolar piezo products,etc.

▸ Principle

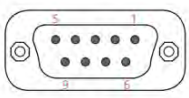


▸ Drawing



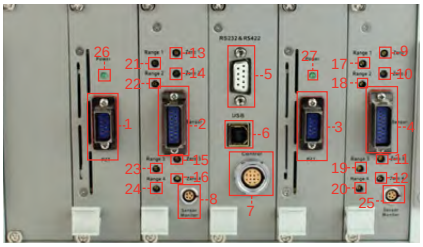
▸ RS-232/422

NO.	Description
1	-
2	RS-232 TxD
3	RS-232 RxD
4	-
5	GND
6	RS-422 RxD+
7	RS-422 RxD-
8	RS-422 TxD-
9	RS-422 TxD+

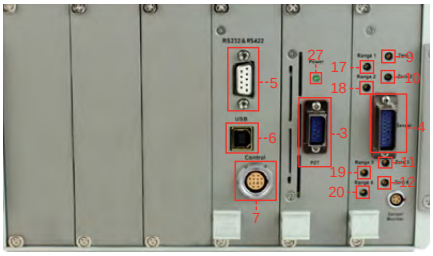


▸ Panel Introduction

Front panel



E00.D12AL-V4(8-channel)



E01.D4K01(4-channel)

No.	Function	Description
1	Drive Output	Channel 5 to 8
2	Sensor Input	Channel 5 to 8
3	Drive Output	Channel 1 to 4
4	Sensor Input	Channel 1 to 4
5	Communication interface	RS-232/RS-422
6	Communication interface	USB-B
7	Analog input&External interface	Analog signal input interface and other reserved external interfaces
8	Sensor Monitor	Channel 5 to 8
9-12	Sensor Zero adjustment	Channel 1 to 4
13-16	Sensor Zero adjustment	Channel 5 to 8
17-20	Sensor regulation amplification	Channel 1 to 4
21-24	Sensor regulation amplification	Channel 5 to 8
25	Sensor Monitor	Channel 1 to 4
26-27	Power Indicator	LED-Green

Rear panel



Technical Data

Type	E00.D12AL-V4	E01.D4K01
Drive		
Channels	8	4
Analog input(V)	0~10	0~10
Output voltage(V)	0~150	0~150
Ripple(mV)	5	5
Amplifier (-3dB) bandwidth(kHz)	10	10
Ave. Current(mA)	69	69
Peak Current(mA)	550	550
Analog in&external input interface	ZCG.2B.312.CLV	ZCG.2B.312.CLV
PZT interface	J14A-9ZK1B	J14A-9ZK1B
Servo control		
Sensor type	SGS(or LVDT, CAP)	SGS(or LVDT, CAP)
Servo	Analog P-I +Notch filter	Analog P-I +Notch filter
Sensor input interface	J14A-15ZK1B	J14A-15ZK1B
Channels of Sensor input	8	4
Sensor monitor interface	LEMO-EPG-0B-305	LEMO-EPG-0B-305
Sensor output voltage(V)	0~10	0~10
Communication		
Computer interface	RS-232/422, USB-B	RS-232/422, USB-B
Baud rate	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000, 5250000	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000, 5250000
Output wave frequency (kHz)	10	10
D/A converter	24 Bit±10V	24 Bit±10V
Output voltage resolution	1/1000000	1/1000000
Others		
Operating temperature(°C)	0~50	0~50
Power supply(V)	AC220V(200V~240V)	AC220V(200V~240V)
Current limit	Short-circuited proof	Short-circuited proof
Input power(W)	43	40
Static power(W)	25	20
Size(mm)	280×175×375	280×175×375
Mass(kg)	7.6	7

E01.A36 Chassis-type Piezo Controller

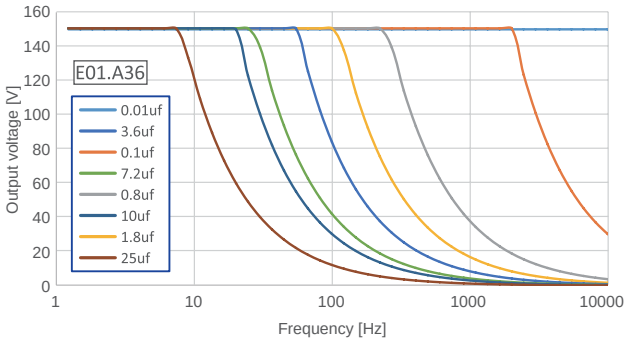


E01.A36 chassis-type piezo controller is a 36-channel power amplifier, its peak current is up to 1A, and bandwidth up to 10kHz.

Characteristics

- Modular, 36 channels output
- Ave.current to 30mA/channel
- Peak current to 1A/channel
- Bandwidth to 10kHz

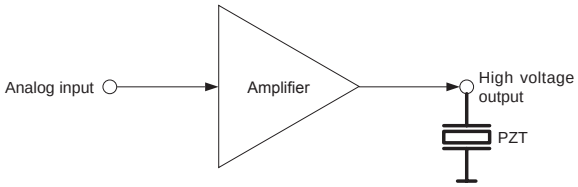
Frequency vs Load Curve



Application

For driving various capacitive loads such as PZT.

Principle

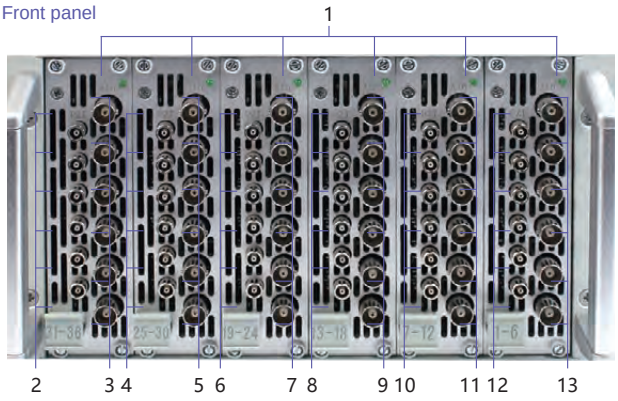


Technical Data

Type	E01.A36
Channels	36
Analog input(V)	-1.33~10
Output voltage(V)	-20~150
Peak current(A)	1/channel
Ave.current(mA)	30/channel
Bandwidth(Hz)	10K/channel
Output ripple(mVpp)	20/channel, effective value
Operating temperature(°C)	0~50
Power supply	220VAC
Voltage output connector	single-core
Size(mm)	370×177×320(4U)
Mass(kg)	10

Interface

Front panel



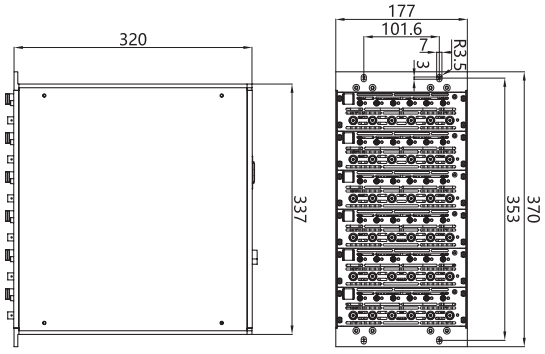
No.	Functions	Types
1	Power indicator	LED
2, 4, 6, 8, 10, 12	PZT, voltage output	EPL.00S.250.HLN
3, 5, 7, 9, 11, 13	A_{In}, analog input	BNC

Rear panel



No.	Functions	Types
14	Power switch	KCD2
15	AC220V, fuse socket	IPZ-4

Drawing



E51.B3/D3 Multi-channel Piezo Controller



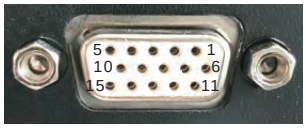
E51.B3



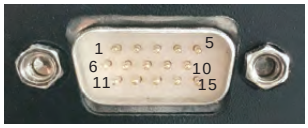
E51.D3

E51.B3/D3 multi-channel piezo controller, an ultra-small 3-channel controller designed for driving fast steering mirror, differential drive and other systems. The controller uses a dedicated operational amplifier circuit to ensure highvoltage and high-current output, and the power supply part adopts switching power supply technology. Reliable circuit optimization and antiinterference design ensure high bandwidth.

E51.B3 Pin Definition



Drive output and sensor input



Power supply and control

No.	Pin definition
1	CH 2 drive output
2	CH 3 drive output
3	CH 3 sensor input -
4	CH 3 sensor input +
5	Sensor power supply: DC 10V
6	CH 1 drive output
7	Drive output ground
8	Sensor power supply: DC 10V
9	Sensing power supply ground
10	Sensing power supply ground
11	Drive output ground
12	CH 2 sensor input -
13	CH 2 sensor input +
14	CH 1 sensor input +
15	CH 1 sensor input -

No.	Pin definition
1	+24V power supply ground
2	CH 2 sensor control switch
3	AGND
4	AGND
5	AGND
6	+24V DC power supply
7	CH 3 servo control switch
8	CH 1 sensor control switch
9	CH 1 analog input
10	CH 2 analog input
11	CH 3 sensor output
12	CH 2 sensor output
13	CH 1 sensor output
14	AGND
15	CH 3 analog input

Note: E51.B3S adopts high and low level signals for open loop and servo control adjustment. The low level for open loop, high for servo control.

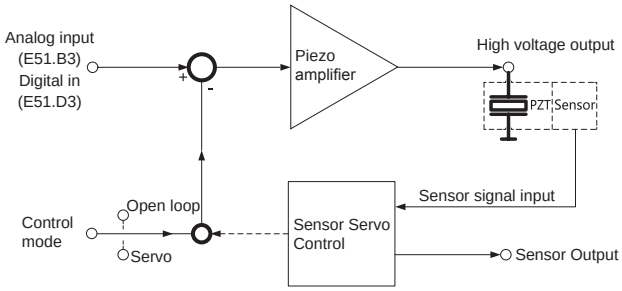
E51.D3S Pin Definition

Pin Definition, drive output and sensor input connector of E51. D3S and E51.B3S are same. Pow supply and control connector's pin definition are as below.

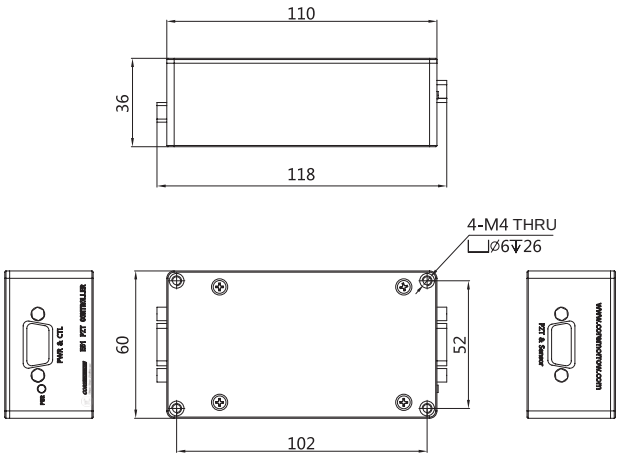


1~5: +24V power supply
6~9: +24V power supply ground

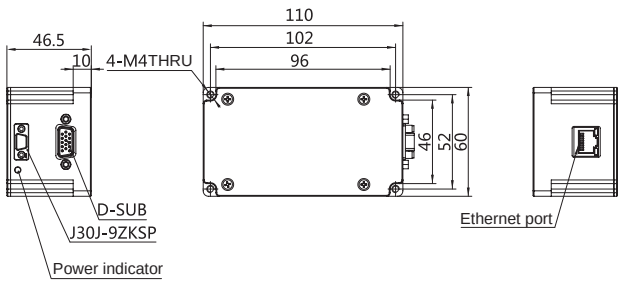
Driving Principle



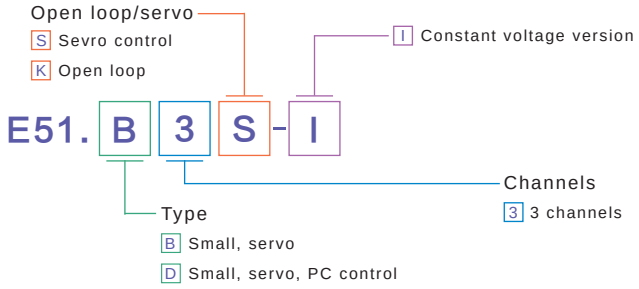
E51.B3 Drawing



E51.D3 Drawing

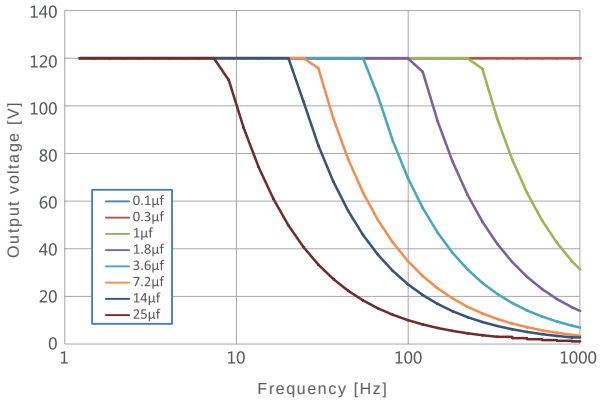


Selection Guide



Type	Characteristics
E51.B3S-H	Small, 3 channels, standard version
E51.B3S-I	Small, 3 channels, constant voltage
E51.D3S-I	3 channels, constant voltage, digital

Voltage, Frequency& Load Curves



Technical Data

Type	E51.B3S-H	E51.B3S-I	E51.D3S-I
Functions	Analog servo controller	Analog servo controller	Analog servo controller
Control mode	Analog signal	Analog signal	Digital signal
Drive			
Channels	3	3(with 1 constant voltage output)	3(Optional constant voltage)
Analog input(V)	-1.67~10	±10	-
Output voltage(V)	-20~120	-20~120, the 3rd channel outputs constant voltage	-20~120, Optional constant voltage
Peak current(mA)	185/channel	185/channel	185/channel
Ave. current(mA)	25/channel	25/channel	25/channel
Input power(W)	15	15	15
Bandwidth(kHz)	1	1	1
Output voltage ripple(mV)	5(1.8μF)	5(1.8μF)	5(1.8μF)
Sensor			
Sensor type	SGS	SGS	SGS
Sensor output voltage(V)	0~10	±10	-
Servo characteristics	Analog P-I	Analog P-I	Analog P-I
Servo ripple(mV)	10	10	-
Others			
Size(mm)	110×36×60	110×36×60	110×46.5×60
Operating temperature(°C)	0~50	0~50	0~50
Input connector(PWR&CTL)	HDB15(needle)	HDB15(needle)	-
Output connector(PZT&Sensor)	HDB15(hole)	HDB15(hole)	HDB15(hole)
Protection	Over-current protection	Over-current protection	Over-current protection
Power interface	HDB15(needle)	HDB15(needle)	J30J-9ZKSP
Mass(g)	270	270	315
Static power(W)	3.6	3.6	3.6
Heat dissipation	Natural heat dissipation	Natural heat dissipation	Natural heat dissipation
Power supply(V DC)	24	24	24
Communication interface	-	-	Ethernet Port RJ45

E51.D7S-I Multi-channel Piezo Controller



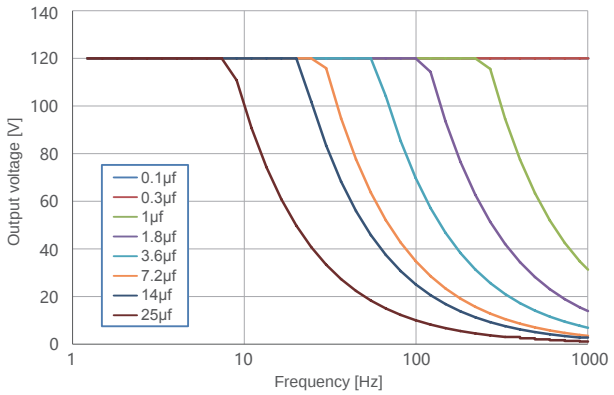
Characteristics

- 7-channel output
- Output voltage -20~120V
- Software control
- Can drive a 6-axis piezo stage

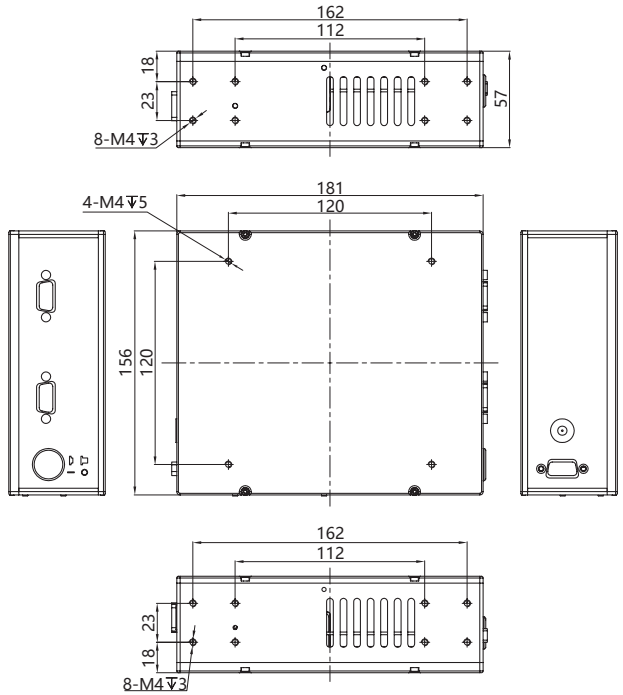
Technical Data

Type	E51.D7S-I
Functions	Servo controller
Control method	Digital signal
Drive	
Channels	7
Analog input(V)	-
Output voltage(V)	-20~120, one constant voltage
Peak current(mA)	185/channel
Ave. current(mA)	25/channel
Input power(W)	90
Bandwidth(kHz)	1
Output voltage ripple(mV)	5(1.8μF)
Servo control	
Sensor type	SGS
Servo	Analog P-I
Others	
Size(mm)	156×57×181
Operating temperature(°C)	0~50
Input connector(PWR&CTL)	-
Output connector(PZT&Sensor)	HDB15(hole)
Communication interface	D-SUB 9-hole socket
Over-current protection	Yes
Mass(g)	1450
Static power(W)	7.2
Heat dissipation	Natural
Power supply(V DC)	24
Power interface	DC-044B-J(Φ2.5)
Communication	RS-422

Frequency vs Load Curve



Drawing



E51.D12S-I Multi-channel Piezo Controller



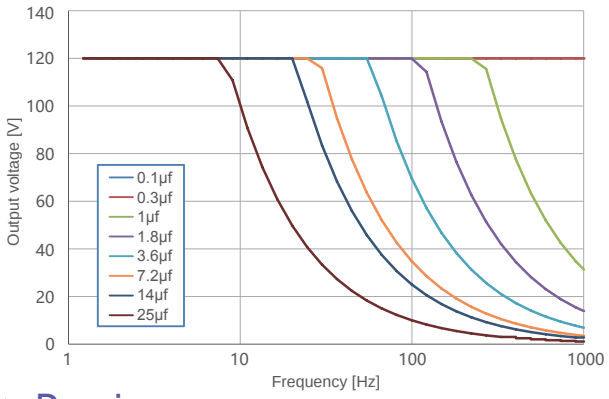
Characteristics

• 18 channels with 6 channels of constant voltage • Output voltage -20~120V • Software control • Can drive 6 piezo tip/tilt platforms

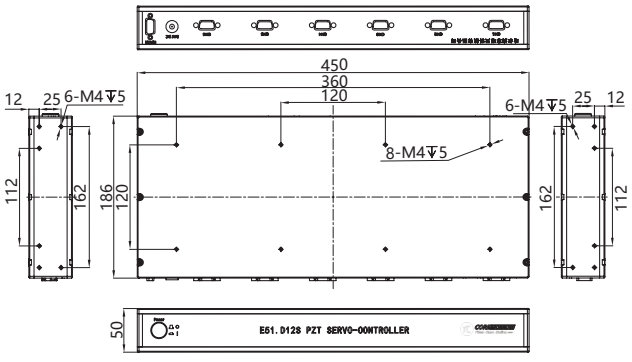
Technical Data

Type	E51.D12S-I
Function	Analog servo controller
Control	Digital signal
Drive	
Channels	18
Analog input(V)	-
Output voltage(V)	-20~120
Peak current(mA)	185/channel
Ave. current(mA)	25/channel
Input power(W)	90
Bandwidth(kHz)	1
Ripple(mV)	5(1.8μF)
Servo control	
Sensor type	SGS
Servo	Analog P-I
Others	
Size(mm)	450×50×186
Operating temperature (°C)	0~50
Input connector(PWR&CTL)	-
Output connector(PZT&Sensor)	HDB15(hole)
Communication interface	D-SUB 9-hole socket
Overcurrent protection	Yes
Mass(g)	3600
Static power(W)	21.6
Heat dissipation	Natural heat dissipation
Power supply(V DC)	24
Power interface	DC-044B-J(Φ2.5)
Communication	RS-422

Frequency, Voltage and Load Curves



Drawing



Piezo Deflection System

E51.D12S-I1 piezo controller drives six fast steering mirrors.



E52 Piezo Controller



E52.B1S-H (standard version)



E52.B1S-I (simplified version)

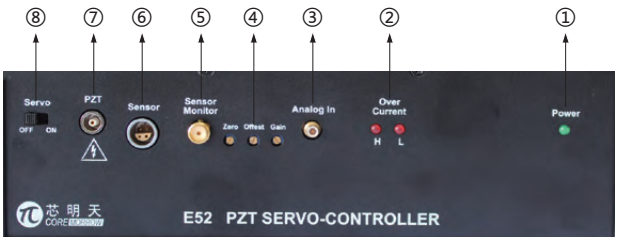
The E52 piezo controller is specially developed and designed for high-power applications. It has a compact size and structure, suitable for driving various piezo products.
The E52 can also be used to drive dispensing valves and control the dispensing of individual dispensing valves through analog signals. The dispensing parameters can be changed at any time, and it is easy to operate. Simply change the amplitude and frequency of the input signal to control the dispensing amount. For example, by adjusting the input voltage to control the single dispensing volume of the dispensing valve; Control the dispensing speed by adjusting the frequency of the voltage signal.

▸ Characteristics

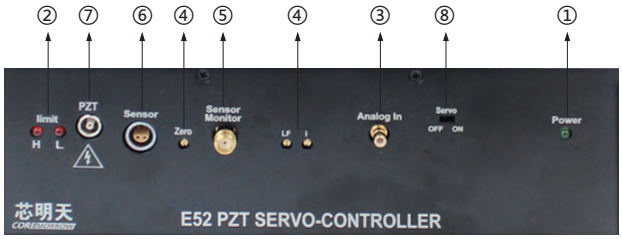
• Self-developed piezo controller • Only 50μs step time when driving 10μF load • Analog control • High current, high power

▸ Appearance and Functions

E52.B1S-H(standard version)



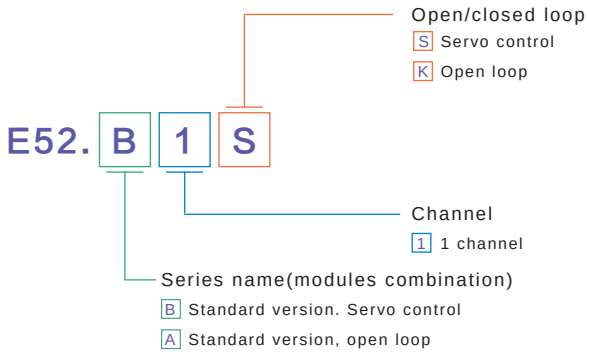
E52.B1S-I (simplified version)



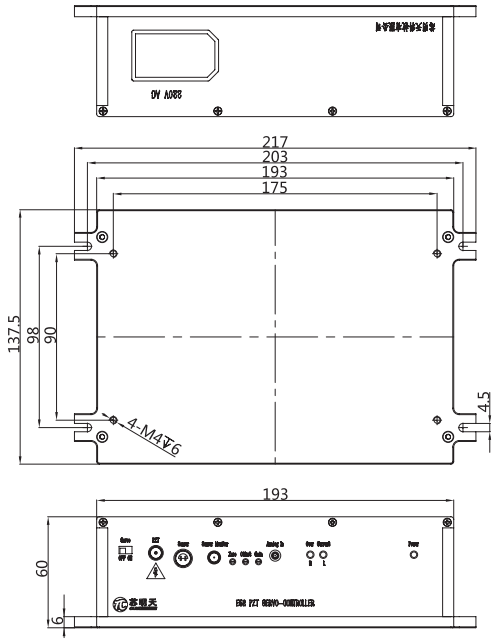
No.	Functions	Description
①	Power indicator	Green, lights when power's on
②	Overcurrent indicator	Red, lights when the output current exceeds the rated value
③	Analog input	Analog voltage input interface
④	Potentiometer	Parameters adjustment(sensing zero, offset, gain)
⑤	Sensor monitor	Detect sensor output, voltage range 0~10V
⑥	Sensor	Sensor input
⑦	PZT	Voltage output interface
⑧	Servo	Open/closed loop switch

Note: The E52. A1K-H open-loop piezo controller lacks the Servo open-loop switch, Sensor, Sensor Monitor, and zero adjustment potentiometer compared to the E52. B1S-H closed-loop piezoe controller (standard version).

▸ Selection Guide

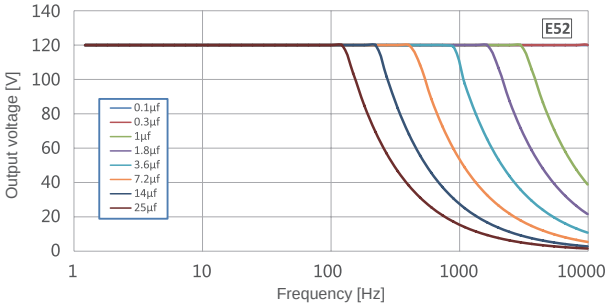


▸ Drawing

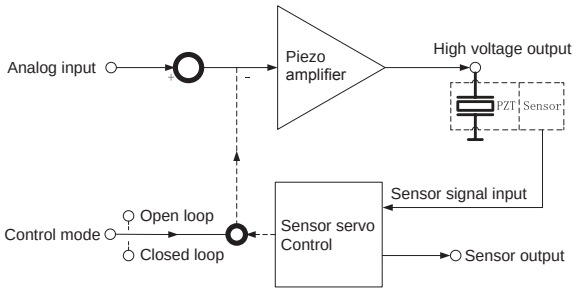


Note: The E52.B1S-H, E52.B1S-I, and E52.A1K-H models share identical overall dimensions; however, they differ in their front panel configurations and connector arrangements.

Frequency, Voltage and Load Curves



Driving Principle



Technical Data

Type	E52.B1S-H	E52.B1S-I	E52.A1K-H	
Functions	Servo piezo controller (standard version)	Servo piezo controller (simplified version)	Open loop piezo controller	
Drive				
Channels	1	1	1	
Control input voltage(V)	-1.67~10	-1.67~10	-1.67~10	
Output voltage(V)	-20~120(Optional -20~150)	-20~120	-20~120(Optional -20~150)	
Peak current(A)	1.1 or 14.3	0.35	8.3	14.3
Ave. current(A)	0.23	0.06	0.4(Additional heat dissipation)	0.23
Bandwidth(kHz)	10	10	10	
Ripple(mVpp)	3(0.1μF)	5(2.2μF)	3(0.1μF)	
PZT connector	ZPL.00.250.NTN	ZPL.00.250.NTN	ZPL.00.250.NTN	
Control input connector	SMB	SMB	SMB	
Sensor				
Sensor type	SGS	SGS	-	
Servo	Analog P-I+notch filter	Analog P-I +low pass+notch filter	-	
Sensor connector	EPL.0S.304.HLN	EPL.0S.304.HLN	-	
Sensor output connector	SMA	SMA	-	
Others				
Operating temperature(°C)	0~50	0~50	0~50	
Overcurrent protection	When output ave. current > 0.23A	When output ave. current > 0.06A	When output ave. current > 0.4A	When output ave. current > 0.23A
Static power(W)	<8	4.2	<8	
Dimensions(mm)	L193×H60×D137.5	L193×H60×D137.5	L193×H60×D137.5	
Mass(kg)	1.76	1.42	1.76	
Power supply	220V AC(198V~242V)	220V AC(198V~242V)	220V AC(198V~242V)	

E53 Compact Piezo Controller



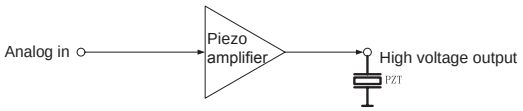
To meet the small-volume application requirements, CoreMorrow develops E53 series compact piezo controller. It is a single-channel controller controlled by analog and digital signals. It has three specification versions with different functions. The power supply is 24VDC/1A. The body has a heat-dissipating area that quickly conducts the heat generated.

▸ Characteristics

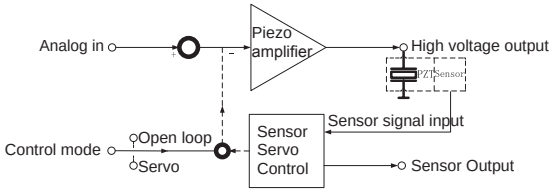
• Small Size • Four versions with different functions • Single channel • 24VDC1.5A (36W) power supply • Easy to integrate

▸ Principle

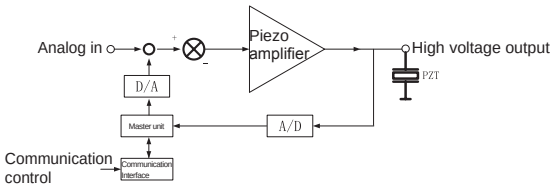
E53.A(amplifier))



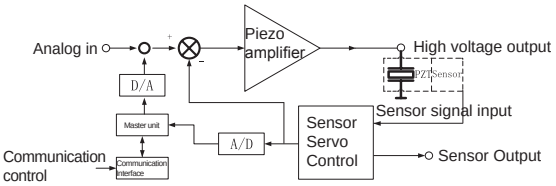
E53.B (amplifier+servo)



E53.C(amplifier+software)



E53.D(amplifier+servo+software)



▸ Selection Guide

Control
- S Servo control
- K Open loop

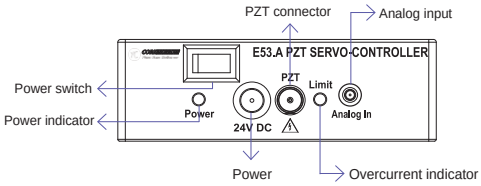
E53. B 1 S

Type
- A 1 channel, open loop, analog
- B 1 channel, servo, analog
- C 1 channel, open loop, analog & digital
- D 1 channel, servo, analog & digital

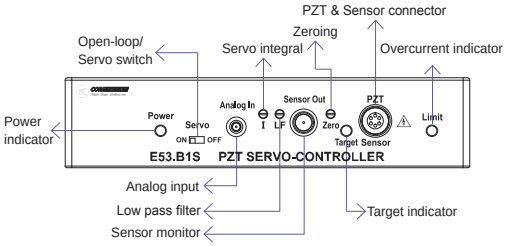
Channels
- 1 1 channel
- 2 2 channels
- 3 3 channels

▸ Panel Introduction

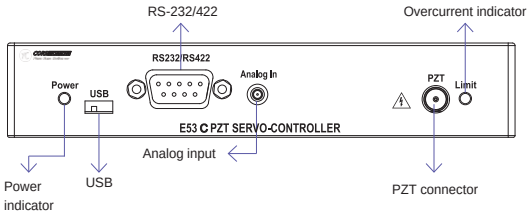
E53.A



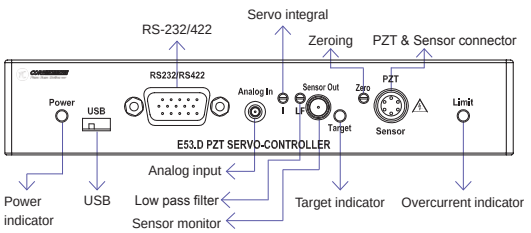
E53.B

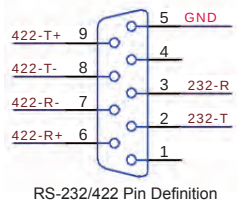


E53.C



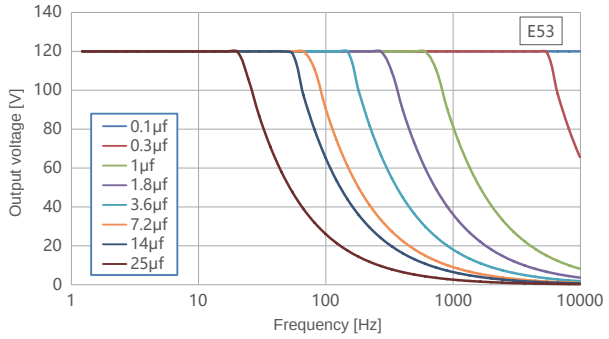
E53.D





RS-232/422 Pin Definition

▸ Frequency, Voltage and Load Curves

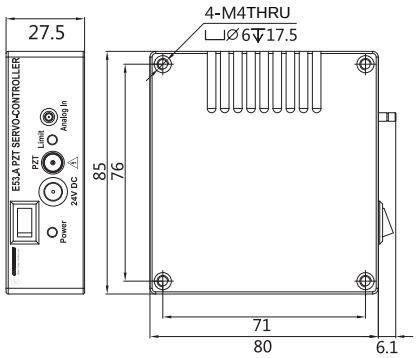


▸ Technical Data

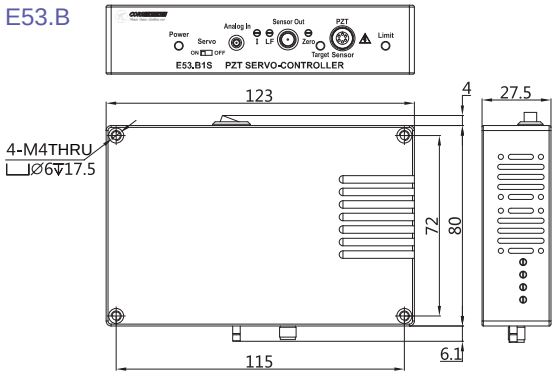
Type	E53.A1K-H	E53.B1S-H	E53.C1K-H	E53.D1S-H
Appearance				
Channels	1			
Input voltage(V)	-1.67~10			
Output voltage(V)	-20~120(Optional -20~150)			
Peak current(A)	1			
Ave. current(mA)	60			
Bandwidth(kHz)	10			
Ripple(mVpp)	10(@2.2μF)			
PZT connector	ZPL.00.250.NTN	ECG.0B.306.CLLV	ZPL.00.250.NTN	ECG.0B.306.CLLV
Input connector	SMB			
Sensor				
Sensor type	-	SGS	-	SGS
Servo characteristics	-	Analog P-I+Notch filter +Low pass filter	-	Analog P-I+Notch filter +Low pass filter
Sensor connector	-	ECG.0B.306.CLLV	-	ECG.0B.306.CLLV
Sensor output connector	-	SMA	-	SMA
Interfaces/Commanication				
Interface	-	-	USB(TYPE-C), RS-422(D-SUB9), RS-232(D-SUB9)	
Baud rate	-	-	9600, 19200, 38400, 115200	
Secondary development baud rate	-	-	9600, 19200, 38400, 57600, 76800, 115200 , 128000, 230400, 256000	
Processor	-	-	32 bit 168MHz	
D/A converter	-	-	16 bit	
A/D converter	-	-	16 bit	
Others				
Operating temperature(°C)	0~50			
Output current, short-circuit(mA)	60			
Overcurrent indicator	Lights when output ave. current > 60mA			
Static power(W)	<3	<4	<5	<5
Size(mm)	85×27.5×80	123×27.5×80	148×27.5×80	148×27.5×80
Mass(kg)	0.24	0.32	0.35	0.37
Power supply	24V(20~30V)DC1.5A(36W)			

▸ Drawing

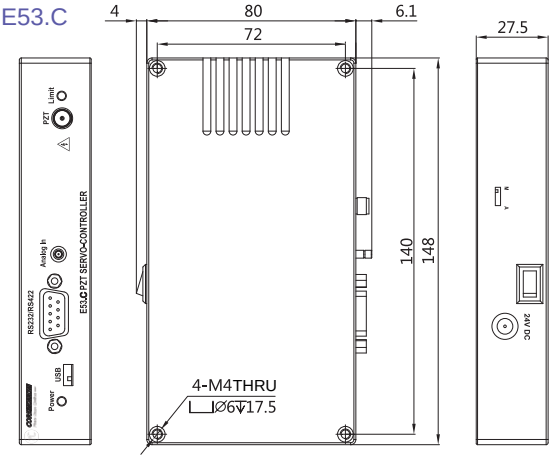
E53.A



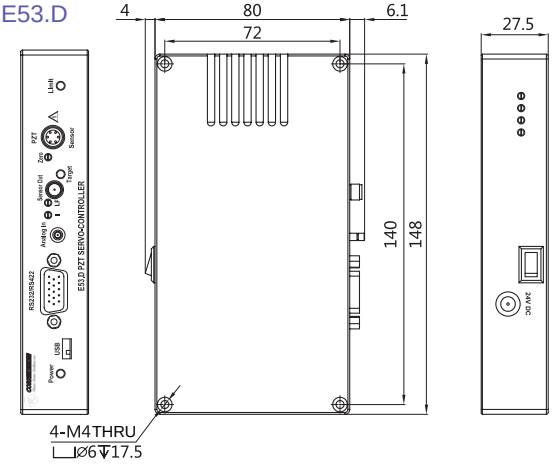
E53.B



E53.C



E53.D



E53.A1K-J Compact Piezo Controller



E53.A1K-J compact piezo controller has a size of 123×27.5×80mm^3, with one output, controlled by analog signal. The body has a heat-dissipating area that quickly conducts the heat generated.

Characteristics

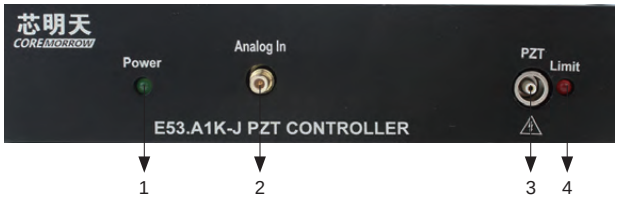
- Single channel
- Small size
- Easy to integrate
- Bandwidth to 30kHz

Technical Data

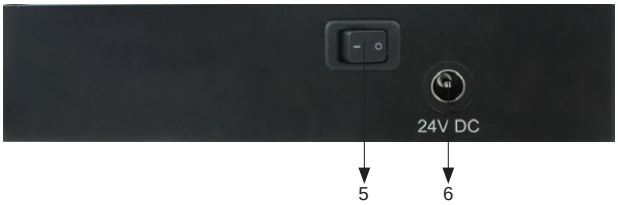
Type	E53.A1K-J
Channels	1
Nominal analog input(V)	-1.67~10
Nominal output voltage(V)	-20~120(Optional -20~150)
Peak current(A)	1
Ave. current(mA)	60
Bandwidth(kHz)	30@120V 20@150V
Ripple(mVpp)	10(loading 2.2μF)
PZT connector	ZPL.00.250.NTN
Control input connector	SMB
Operating temperature(°C)	0~50
Output short-circuited current(mA)	60
Overcurrent indication	Lights on, when ave. current>60mA
Static power(W)	5
Size(mm)	123×27.5×80
Mass(kg)	0.32
Power supply	24V(20~30V)DC1.5A(36W)

Panel Introduction

Front Panel

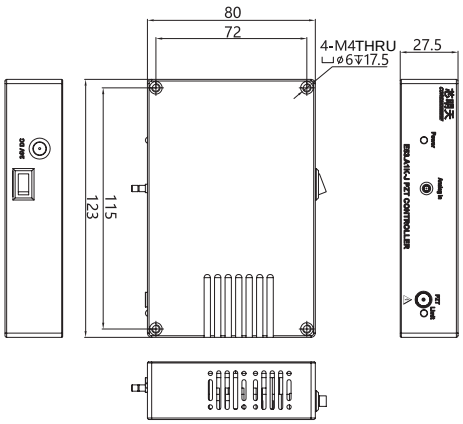


Rear Panel



No.	Functions	Description
1	Power indicator	LED green, always on when it works
2	Analog In	Analog control signal input port
3	PZT	Voltage output port, to drive PZT
4	Overcurrent indicator	LED red, always on when ave. current>60mA
5	Power switch	Power on and off
6	Power supply	24V DC interface

Drawing



E53.A1K-K Piezo Motor Control Module



E53.A1K-K piezo motor control module is specially customized according to customer requirements, and it's mainly used for driving piezo actuator. It is small in size and ideal for space-limited applications. Meanwhile, it's equipped with heat sink below the equipment, to achieve effective heat dissipation and avoid heat accumulation.

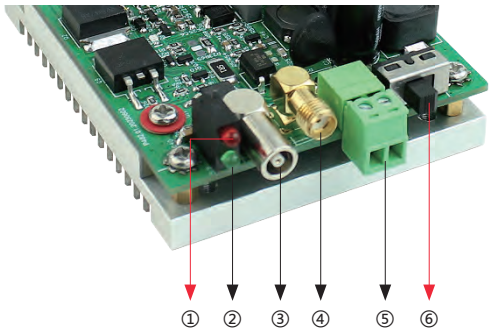
▸ Characteristics

- Analog input
- Single channel output
- Board-type
- 24VDC/1.5A power supply

▸ Technical Data

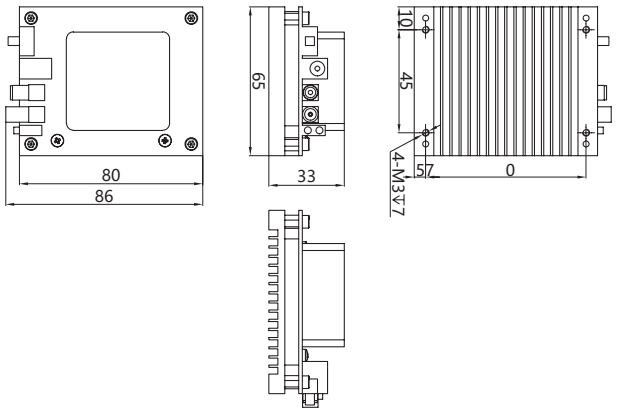
Type	E53.A1K-K
Channels	1
Nominal analog input(V)	-1.67~10
Nominal output voltage(V)	-20~120(Optional -20~150)
Peak current(A)	1
Ave. current(mA)	60
Bandwidth(kHz)	10
Ripple(mVpp)	10(loading 2.2μF)
PZT connector	ZPL.00.250.NTN
Control input connector	SMA
Operating temperature(°C)	0~50
Output short-circuited current (mA)	2
Overcurrent indication	Lights on, when ave. current >60mA
Static power(W)	2
Size(mm)	L80×W65×H33
Mass(kg)	0.17
Power supply	24V(20~30V)DC1.5A(36W)

▸ Panel Introduction



No.	Functions	Description
①	Overcurrent indicator	LED red, always on when ave. current>2mA
②	Power indicator	LED green, always on when it works
③	PZT	Voltage output port, to drive PZT
④	Analog input	Analog control signal input port
⑤	Power supply	24V power supply interface
⑥	Power switch	Power on and off

▸ Drawing



E53.A2K-J Compact Piezo Controller



Industrial, small size, dual-channel piezo amplifier E53.A2K-J is specially designed for industrial applications. It features small size, light mass, dual-channel and low dynamics. It adopts analog input control mode and industrial wiring terminals, provides a highly reliable electrical connection, and can meet the high requirements for volume in applications with limited space. Besides, E53.A2K-J can drive two capacitive loads at the same time.

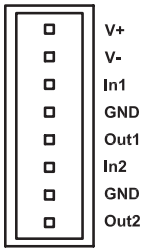
Characteristics

- Output voltage: -20~120V/150V
- Industrial application
- Dual channel, open-loop control
- Analog input -1.67~10V

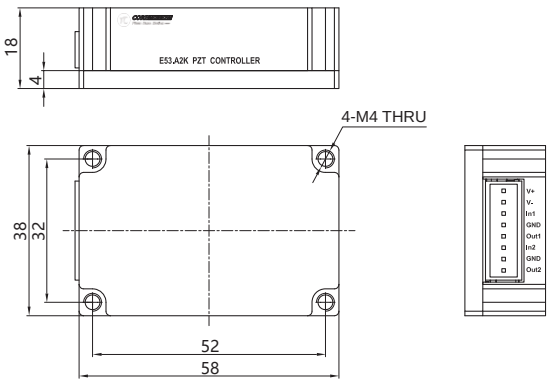
Technical Data

Type	E53.A2K-J
Channels	2
Analog input(V)	-1.67~10
Output voltage(V)	-20~120(Optional -20~150)
Peak current(mA)	120
Ave. current(mA)	17
Static power(W)	1
Bandwidth -3dB(kHz)	1
Ripple@2.2μF(mVpp)	<10
Interface	Industrial terminal KF2EDGR-2.54-8P
Operating temperature(°C)	0~50
Size(L×W×H, mm)	58×38×18
Power supply	24V DC
Heat dissipation	Shell needs heat dissipation
Mass(g)	55

Pin Definition

Module	No.	Function
	V+	DC24V power supply +
	V-	DC24V power supply -
	In1	PZT1 analog input
	GND	GND
	Out1	PZT1 output +
	In2	PZT2 analog input
	GND	GND
	Out2	PZT2 output +

Drawing

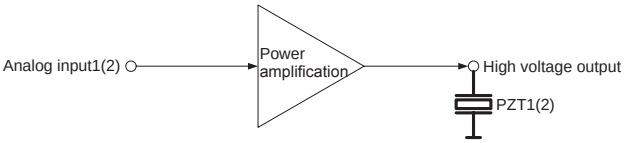


Customizable



Driving Principle

The E53.A2K-J piezo amplifier is controlled by external analog signals. The analog input range is -1.67~10V. After the power amplification of the amplifier, the output voltage is 0~120V, and optional 0~150V output.



E53.A3K-H Compact Piezo Controller



E53. A3K-H is a 3-channel piezo controller. It is open loop and analog control, and the power supply is 24VDC/1.5A. The body has a heat-dissipating area that quickly conducts the heat generated.

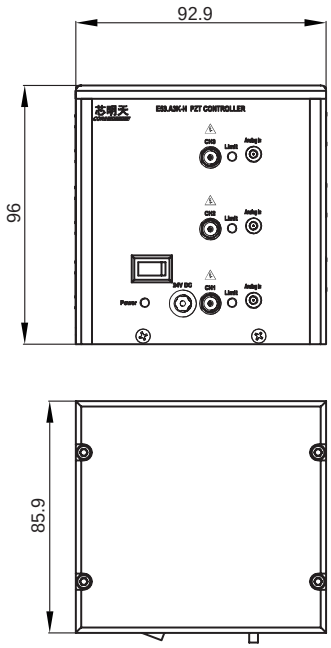
▸ Characteristics

- 3 channels
- Analog signal control
- Open-loop
- 24VDC/1.5A(36W) power supply

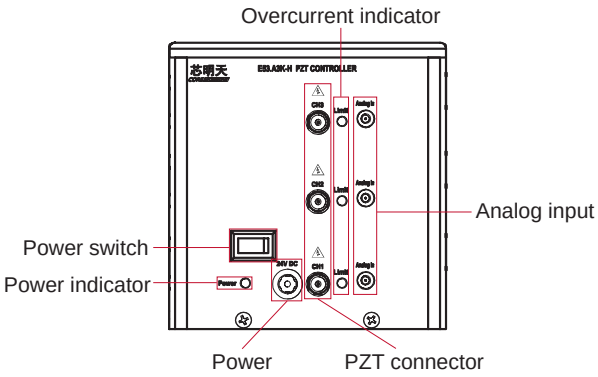
▸ Technical Data

Type	E53.A3K-H
Channels	3
Nominal analog input(V)	-1.67~10
Nominal output voltage(V)	-20~120(Optional-20~150)
Peak current(A)	1
Ave. current(mA)	60
Bandwidth(kHz)	10
Ripple(mVpp)	10(loading2.2μF)
PZT connector	ZPL.00.250.NTN
Control input connector	SMB
Operating temperature(°C)	0~50
Output short-circuited current(mA)	60
Overcurrent indication	Lights on, when ave. current >60mA
Static power(W)	6
Size(mm)	92.9×96×85.9
Mass(kg)	0.7
Power supply	24V(20~30V)DC1.5A(36W)

▸ Drawing



▸ Panel Introduction



E53.B1S-I Compact Piezo Controller

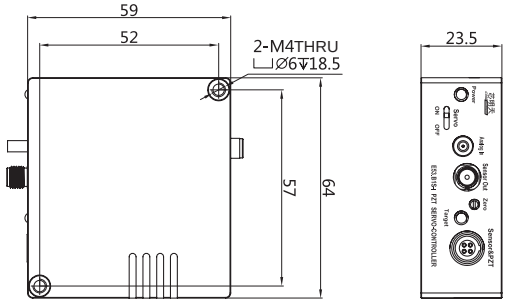


E53.B1S-I compact piezo controller's size is only 64×59×23.5mm^3, with one output, controlled by analog signal, and suits for industrial applications.

Technical Data

Type	E53.B1S-I
Channels	1
Nominal input voltage(V)	-1.67~10
Output voltage(V)	-20~120
Peak current(mA)	82
Ave.current(mA)	27
Bandwidth(kHz)	1
Ripple(mVpp)	10(@1.8μF load)
Control input connector	SMB connector
PZT&SENSOR connector	ZPG.0B.306.HLN
Sensor type	SGS
Servo	Analog P-I
Sensor output connector	SMA connector
Operating temperature(°C)	0~50
Short-circuited current(mA)	27
Static dissipation(W)	<2.4
Size(mm^3)	64×59×23.5
Mass(g)	97
Power supply	24VDC/500mA

Drawing

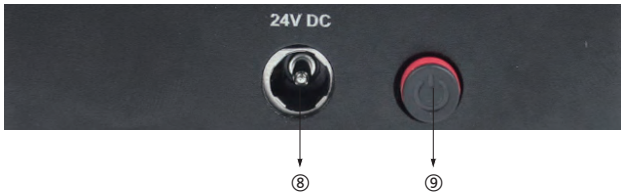


Characteristics

- Small size
- One output channel
- Analog signal control
- For industrial applications

Panel Introduction





No.	Function	Description
①	Power indicator	Lights when power on
②	Servo	Servo switch
③	Analog input	Control analog input port
④	Sensor monitor	Output the position voltage signal returned by the sensor
⑤	Zeroing	Adjustment of sensor Zero point
⑥	Target indicator	Lights when deviate the target travel
⑦	Sensor&Driving connector	Sensor input&voltage output
⑧	Power supply interface	24V DC interface
⑨	Power switch	Press down, power on; Lift, power off

E53.B1S-K Compact Piezo Controller



This controller is designed for industrial applications and can be used to drive capacitive loads such as piezo ceramic actuators. The customized interface is more suitable for industrial applications.

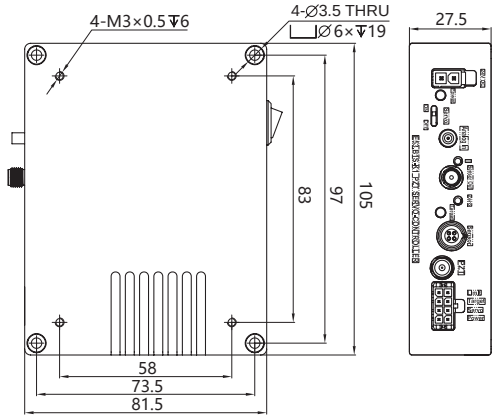
▸ Characteristics

• OEM • Custom industrial interface • 1 channel output, servo control • Suitable for driving various capacitive loads, such as PZT

▸ Technical Data

Type	E53.B1S-K
Channels	1
Nominal analog input(V)	-1.67~10
Nominal output voltage(V)	-20~120(Optional -20~150)
Peak current(A)	1
Ave. current(mA)	60
Bandwidth(kHz)	10
Ripple(mVpp)	10(loading 2.2μF)
PZT connector	ZPL.00.250.NTN
Control input connector	SMB
Servo control	
Sensor type	SGS
Servo	Analog P-I+ band stop + low pass
Sensor connector	EPL.0S.304.HLN
Sensor output connector	SMA
Others	
Operating temperature(℃)	0~50
Output short-circuited current (mA)	60
Overcurrent indication	Lights, when ave. current>60mA
Static power(W)	<4
Dimensions(mm)	L105×W27.5×D 81.5
Mass(kg)	0.28
Power supply	24V(20~30V) DC1.5A(36W)
Power interface	Molex4.2_1x2
Target indicator	Molex3.0 _4x2

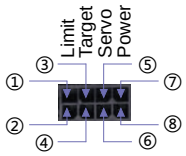
▸ Drawing

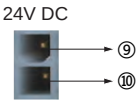


▸ Panel Introduction



No.	Functions	Description
①	Power supply	24V DC
②	Power light	Always on after power on
③	Servo	Servo switch
④	Analog input	Analog voltage input
⑤	Integral	Servo deviation integral adjustment
⑥	Sensor monitor	Monitor output signal returned by sensor
⑦	Zero adjustment	Adjust the zero point of the sensor
⑧	Target indication	Lights when the displacement deviates
⑨	Sensor connector	Sensor signal input
⑩	Drive connector	Voltage output interface
⑪	Status indicator interface	Over-current, target, servo-control, power



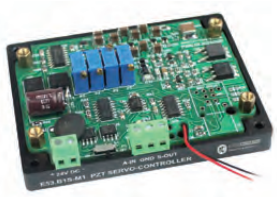


Marking	Function	No.	Description
Limit	Overcurrent indicator, ON: 5V/OFF: 0V	①	Output +
		②	Output -
Target	Target indicator, ON: 5V/OFF: 0V	③	Output +
		④	Output -
Servo	Non-servo/servo indicator, non-: 5V/OFF Servo: 0V	⑤	Output +
		⑥	Output -
Power	Power indicator ON: 24V/OFF: 0V	⑦	Output +
		⑧	Output -

No.	Function	Description
⑨	Power supply -	24V DC, -
⑩	Power supply +	24V DC, +

E53.B1S-M Compact Piezo Controller





This controller is designed for industrial applications. It uses a custom-designed industrial interface and is suitable for driving various capacitive loads, such as PZT piezoelectric actuator. It can be used in various industrial applications, such as optical detection and interference shifting.

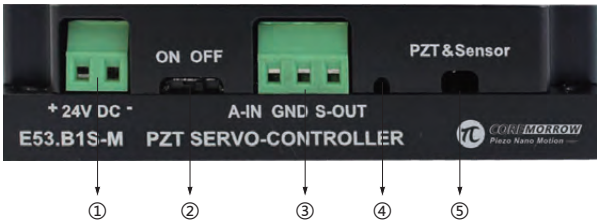
▸ Characteristics

- Customized industrial interface
- Analog input, single channel output
- Servo control
- 24VDC/1A power supply

▸ Technical Data

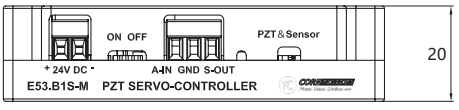
Type	E53.B1S-M
Channels	1
Power supply(V)	24VDC/1A
Static power(W)	<4
Servo control	
Sensor	SGS
Servo	Analog P-I
Drive	
Nominal analog input(V)	-1.67~10
Output voltage(V)	-20~120
Peak current(mA)	125
Ave. current(mA)	21
Bandwidth(kHz)	1
Ripple(mVpp)	10(load 2.2μF)
Rated output power(W)	2.5
Protection	
Operating temperature(°C)	0~50
Output short-circuited current (mA)	21
Overcurrent indication	No
Connector	
Control input connector	Bare wire
Sensor output connector	KF128-3P
PZT connector	Bare wire
Sensor connector	Bare wire
Power connector	KF128-2P
Appearance	
Size(mm^3)	80×62×20
Mass(g)	105

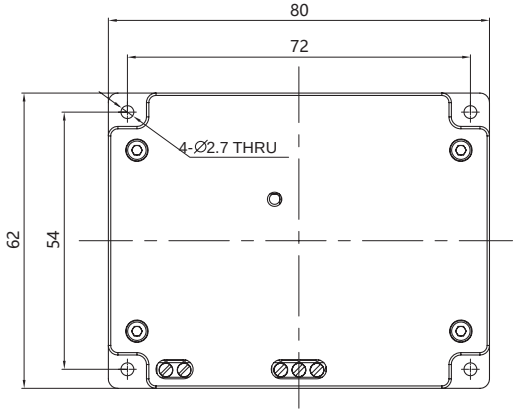
▸ Panel Introduction



No.	Functions	Description
①	Power port	24V power supply interface.
②	Servo	Servo Switch. ON: servo; OFF: non-servo
③	Signal monitor port	A-IN: analog input signal; GND: ground; S-OUT: sensor monitor signal
④	Analog input	Analog control signal input port
⑤	PZT&Sensor	Voltage output port and sensor signal input port

▸ Drawing





E53.D1C-H Compact Piezo Controller



E53.D1C-H compact piezo controller are servo controllers controlled by analog and digital signals, designed and developed specially for driving piezo products equipped with capacitive sensors. This model has a size of 165×27.5×147mm^3, and the power supply is 24VDC/1.5A. The body has a heat-dissipating area that quickly conducts the heat generated.

▸ Characteristics

- Single channel
- Driving piezo products equipped with capacitive sensors
- Small size and easy to integration
- Analog & digital control, with software

▸ Technical Data

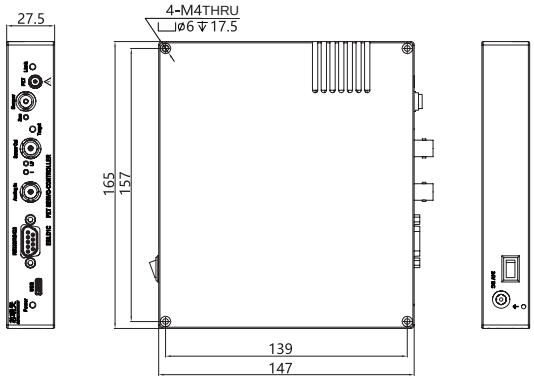
Type	E53.D1C-H
Channels	1
Nominal input voltage (V)	-1.67~10
Nominal output voltage (V)	-20~120V (optional -20~150V)
Peak current (A)	1
Ave. current (mA)	60
Bandwidth (kHz)	10
Ripple (mV)	10(@2.2μF)
PZT connector	ZPL.00.250.NTN
Input connector	SMB
Sensor type	CAP
Servo characteristics	Analog P-I+Notch filter+Low pass filter
Sensor connector	G10S0C-FT1LJG0-000L
Sensor output connector	SMA
Interface	TYPE-C,D-SUB9
Baud rate	9600,19200,38400, 115200
Secondary development baud rate	9600,19200,38400, 57600,76800,15200, 128000,230400, 256000
Processor	32Bit 168MHz
D/A converter	16Bit
A/D converter	16Bit
Operating temperature (°C)	0~50
Output current,short-circuit(mA)	60
Over-current indicator	Lights when output ave. current > 60mA
Static power (W)	<5
Size (mm)	165×27.5×147
Power supply	24V (20~30V) DC1.5A (36W)

▸ Panel Introduction



No.	Function	Description
①	Power indicator	LED green,lights when it works
②	USB C-type interface	PC communication port
③	RS-232/422 connector	PC communication port
④	Analog in	Analog control signal input port
⑤	Servo integral	Servo deviation integral adjustment,to adjust step response
⑥	Low pass filter	Adjust the closed-loop response time
⑦	Sensor monitor	Monitor output signal returned by sensor, the range is 0~10V
⑧	Target indicator	LED yellow,lights when the displacement deviates
⑨	Zeroing	Adjust sensor zero point
⑩	Sensor connector	Sensor signal feedback input
⑪	PZT connector	Voltage output interface
⑫	Over-current indicator	LED red,lights when ave. current>60mA

▸ Drawing



E53.D1S-L Compact Piezo Controller



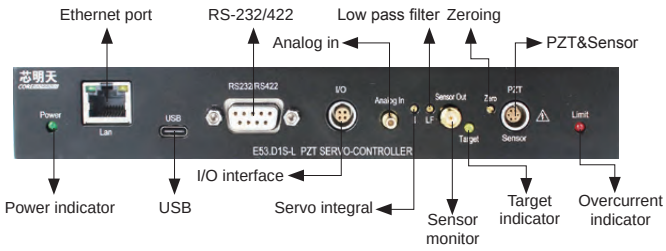
The E53.D1S-L compact piezo controller is a 1-channel piezo controller designed based on the standard E53.D1S-H piezo controller. It can be operated through software via serial port, USB or network port.

Technical Data

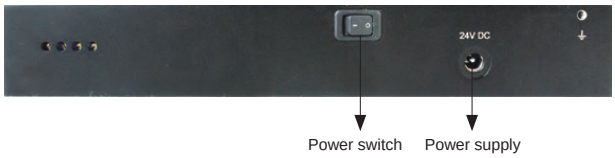
Type	E53.D1S-L
Channels	1
Input voltage(V)	-1.67~10
Output voltage(V)	-20~120(Optional -20~150)
Peak current(A)	1
Ave. current(mA)	60
Bandwidth(kHz)	10
Ripple(mVpp)	10(@2.2μF)
PZT connector	ECG.0B.306.CLLV
Input connector	SMB
Sensor type	SGS
Servo characteristics	Analog P-I+Notch filter +Low pass filter
Sensor connector	ECG.0B.306.CLLV
Sensor output connector	SMA
I/O interface	Setting the input or output
I/O connector	EPG.0B.304.HLN
Communication Interfaces	RS-232/422(DB9), USB(Type-C), Ethernet
Baud rate	9600,19200,38400,115200
Secondary development baud rate	9600,19200,38400, 57600,76800,115200 ,128000,230400,256000
Processor	32Bit 168MHz
D/A converter	16Bit
A/D converter	16Bit
Operating temperature(°C)	0~50
Output current, short-circuit(mA)	60
Overcurrent indicator	Lights when output ave.current > 60mA
Static power(W)	5
Size(mm^3)	200×30×80
Mass(kg)	0.46
Power supply	24V(20~30V)DC1.5A(36W)

Panel Introduction

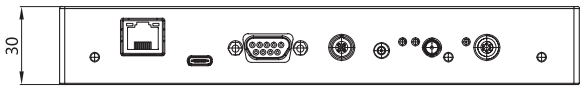
Front Panel

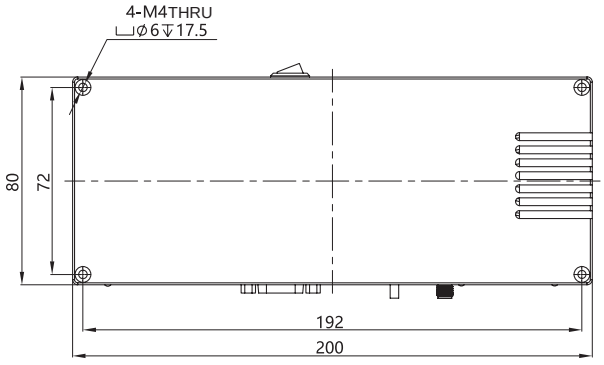


Rear Panel



Drawing





E61/E62 Miniature Piezo Control Module





Board-type piezo controller is specially designed for industrial application.

▸ Characteristics

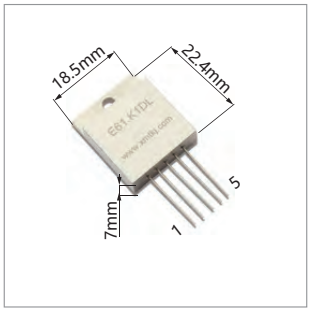
• 1 channel • Analog input • Open loop • 120V output • Can connect directly to PCB

▸ Technical Data

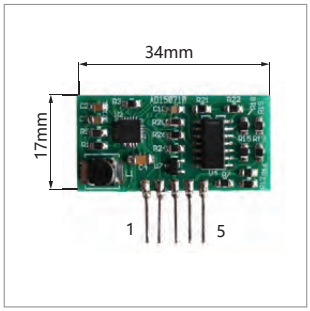
Type	E61.K1DL	E62.K1DL
Functions	Board Type Miniature Piezo Amplifier	
Channels	1	1
Control	Analog input	Analog input
Input range(V)	0~+10	0~+10
Input impedance(KΩ)	100	100
Output voltage(V)	0~+120	0~+100
Ripple(mV)	10	10mV(Cload=1μF)
Peak current(mA)	35	20
Unloaded Bandwidth(kHz)	5(-3dB)	3(-3dB)
Operating temperature(°C)	0~+50	0~+50
Heat dissipation	Shell	-
Power supply(V)	+VS=+130V, -VS=-5V (+VS to -VS), <140V	5VDC
Ave. current(mA)	5	3
Interface	5-PIN SIP, Ø0.5mm, 15mm	5-PIN SIP, Ø0.5mm, 10mm
Voltage stability	<0.1%F.S/8hours	<0.1%F.S/8hours
Size(mm)	22.4×18.5×7	34×17×4

▸ Small size

E61.K1DL



E62.K1DL



No.	E61.K1DL	Description	E62.K1DL	Description
1	VS+	Power supply +	VOUT+	+ output
2	VS-	Power supply -	VOUT-	- output
3	+VOUT	Output	+VS	Power supply
4	GND	GND	GND	GND
5	Vin	Analog input	Vin	Analog input

E62.A1K-I Miniature Piezo Control Module



E62.A1K-I miniature piezo control module is a small and linear amplifier, it can be used to drive piezo benders, piezo stack actuators, and other piezo products. It can provide variable gain and bias voltage, switchable voltage range and the selection between unipolar and bipolar inputs and outputs. Its applications include piezo valves, motors, pumps, MEMS, and ultra-low power positioning and operating systems.

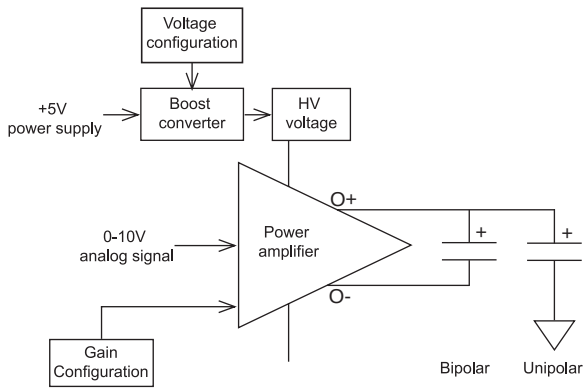
▸ Characteristics

- Single channel
- Board-Type
- Small size and easy-integrated
- 120V output
- Singleboard with 4 unipolar/bipolar voltage output ranges simultaneously

▸ Technical Data

Type	E62.A1K-I			
Channels	1			
Power supply(V)	+5V DC			
Unipolar voltage output ranges(V)	0~25	0~50	0~75	0~100
Bipolar voltage output ranges(V)	-25~+25	-50~+50	-75~+75	-100~+100
Static power(W)	0.03	0.04	0.06	0.105
Input power(W)	2.56	2.75	2.55	2.95
Ave. current(mA)	25	16	9	6
Bandwidth(kHz)	10	6	4	3
Peak current(mA)	100			
Input voltage range(V)	0~10			
Input impedance(KΩ)	133			
Ripple(mVpp)	12010(load2.2μF)			
Connector	KF128-2.54-4P			
Protection	Overheat protection,Overcurrent and overload protection			
Operating temperature(°C)	-40~+70			
Size (mm)	45×25			
Mass (g)	7.8			

▸ Functional Block Diagram



▸ Pin&Function Introduction



Input connector	
Identifier	Function
EN	Suspended or high level enabled, grounded: off
S	Analog input signal, voltage range 0~10V
+5	Power supply +, +5V power supply
G	Ground, signal reference terminal of +5V power supply and analog input

Output connector	
Identifier	Function
O-	Negative output
O+	Positive output
G	O-,O+,HV public reference terminal
HV	Positive high voltage

Identifier	Function
S1	Dial switch, configuring voltage output range
S2	Dial switch, configure amplifier gain
Rx (x corresponds to different numbers)	Potentiometer that can adjust the output voltage

E63.A1K-H Miniature Piezo Controller

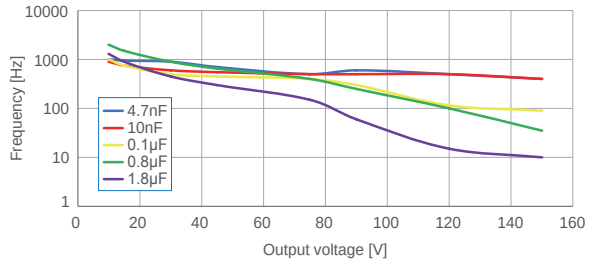


E63.A1K-H is a small-volume, single-channel, open-loop low-dynamic piezoceramic controller with analog input control and pin-type connection. The product is small in size, and suitable for industrial application.

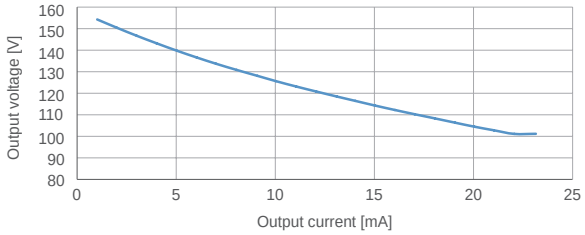
▸ Characteristics

• Output voltage: -20~120V/150V • Single-channel open-loop control • Analog input -1.67~10V • Suitable for industrial applications

▸ Voltage, Frequency and Load Curves



▸ Voltage Drop Curve



Note: The maximum output voltage will decrease as the output current increases.

▸ Technical Data

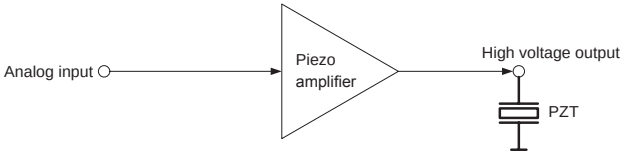
Type	E63.A1K-H
Functions	Power Amplifier
Drive	
Channels	1
Control input voltage(V)	0~10
Output voltage range(V)	0~120(Optional 0~150)
Peak current(mA)	80
Ave. current(mA)	12(loading 100nF)
Static power(W)	0.2
Bandwidth(kHz)	1
Out ripple(mVpp)	5(2.2μF)
Connection	5 Pins(2.54 pitch)
Others	
Operating temperature(°C)	0 ~ 50
Dimensions(mm)	60×30×12.5
Mass(g)	35
Power supply	+15VDC/0.5A
Heat dissipation function	Shell needs heat dissipation

▸ Pin Definition

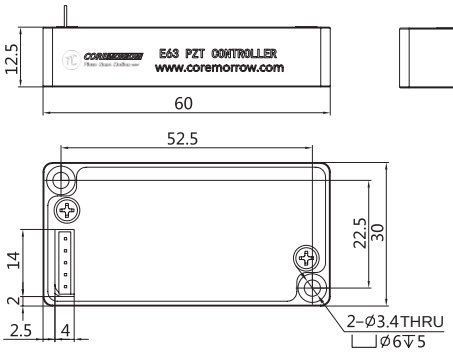


Pin No.	Functions
1	Analog voltage output
2	Voltage output ground: SGND
3	Analog voltage input
4	Supply voltage ground and control input ground, AGND
5	Power supply: +15VDC/0.5A
Housing	Shielding ground GND

▸ Principle



▸ Drawing



E63.C1K-H Miniature Piezo Controller

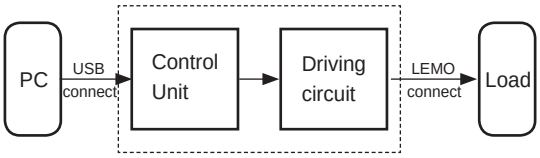


E63.C1K is also a small-volume, single-channel, open-loop low-dynamic piezoelectric ceramic controller with USB power supply and computer software control, and suitable for industrial applications. The product is only the size of the U disk, which is convenient for the integration and is the first choice for the open-loop small-volume piezoelectric controller.

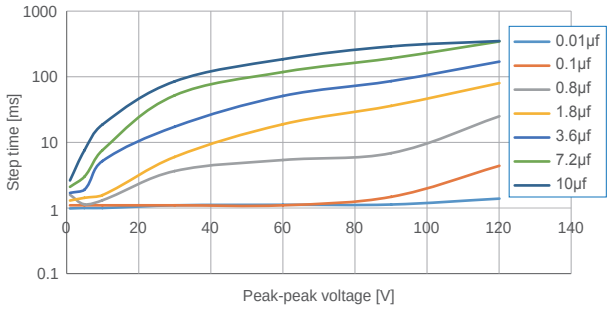
Characteristics

• Output voltage: -20~150V • Single-channel and open-loop control • Software control • Suitable for Industrial application

Driving Principle



Voltage, Step Time and Load Curve



Technical Data

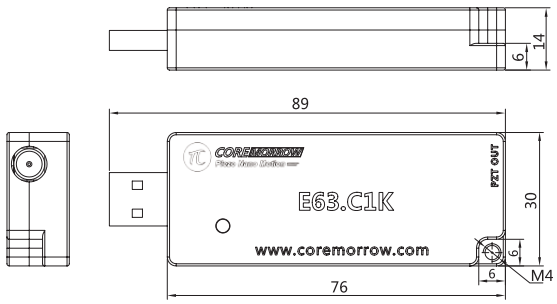
Type	E63.C1K
Functions	Power Amplifier
Channels	1
Power supply	USB
Output voltage(V)	-20~150
Processor(MHz)	32
D/A converter	12bit
A/D converter	No
Peak current(mA)	35
Ave. current(mA)	2.5
Output current, shortcircuit(mA)	6
Short circuit protection	Yes
Input power(W)	1.2
Static power(W)	0.4
Amplifier bandwidth(kHz)	1
Output ripple(mVpp)	8(2.2 μF)
Operating temperature(°C)	0~50
Size(mm)	89×30×14
Mass(g)	52
Heat dissipation function	Shell needs heat dissipation
PZT connector	ERA.00.250.CTL
Connector	USB-A

Application Example

Below image shows that E63.C1K driving a preloaded piezo actuator, which is very compact and easy to integrate, making it ideal for applications such as interferometers.



Drawing



E70.B2S-H Multi-channel Piezo Controller



The E70.B2S-H multi-channel piezo controller is a two-channel analog piezo controller.

Characteristics

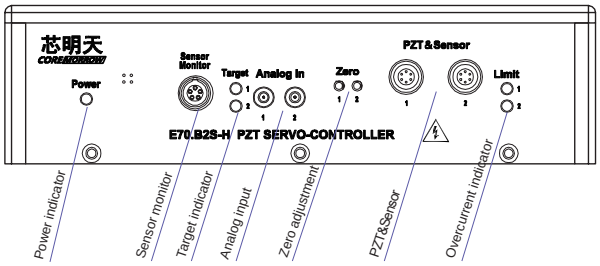
- 2 output channels
- Analog control
- Output voltage: 0~120V/150V
- DC24V 3A DC power supply

Technical Data

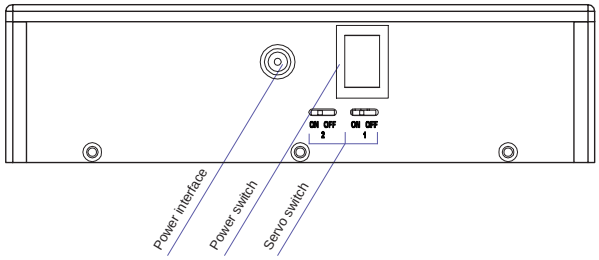
Type	E70.B2S-H
Functions	Analog piezo controller
Channels	2
Nominal analog input(V)	0~10
Nominal output voltage(V)	0~120(Optional 0~150)
Input power(W)	56
Peak current(A)	1.1/channel
Ave. current(mA)	70/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	5/channel(2.2μF)
PZT and sensor connector	ZCG.0B.306.CLLV
Control input connector	SMB
Sensor type	SGS
Servo	P.I+Low pass+Notch filter
Sensor output voltage(V)	0~10
Sensor output connector	ZPG.0S.303.HLN
Sensor output ripple(mV)	10
Operating temperature(°C)	0~50
Over-current protection	Yes
Static power(W)	11
Cooling method	Fan
Size(mm)	170×45.5×124
Mass(kg)	1.05
Power supply	24V DC3A, DC-022B (ø2.5)
Control way	Analog signal

Panel Introduction

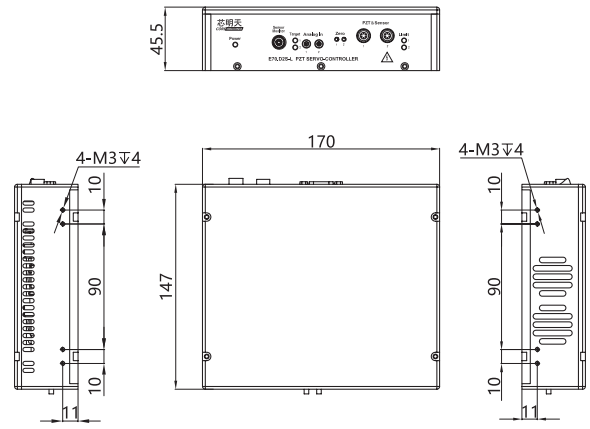
Front panel



Rear panel



Drawing



E70.D2S/C2K-L Multi-channel Piezo Controller



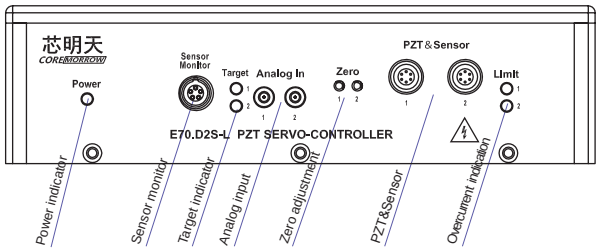
The E70.D2S/C2K-L multi-channel piezo controller is a two-channel piezoelectric controller designed based on the standard E70 piezoelectric controller. It can carry out digital communication through serial port, USB or network port.

Technical Data

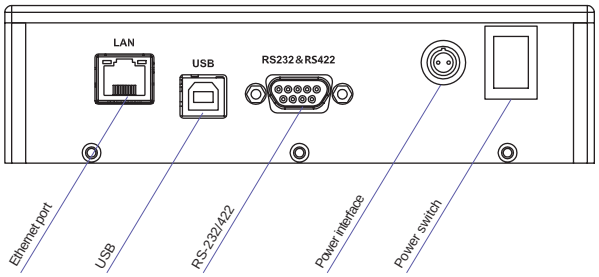
Type	E70.C2K-L	E70.D2S-L
Functions	Digital and analog piezo controller	
Drive		
Channels	2	
Nominal analog input(V)	-1.67~10 (±10V for constant voltage version)	
Nominal output voltage(V)	-20~120(Optional -20~100/150 and one constant voltage)	
Input power(W)	56	
Peak current(A)	1.1/channel	
Ave. current(mA)	70/channel	
Bandwidth(Hz)	10k/channel	
Ripple(mV)	5/channel(2.2μF)	
PZT and sensor connector	ZCG.0B.306.CLLV	
Control input connector	SMB	
Servo control		
Sensor type	-	SGS
Servo	-	P.I+Low pass+Notch filter
Sensor output voltage(V)		0~10(±10V for constant voltage version)
Sensor output connector	-	ZPG.0S.303.HLN
Sensor output ripple(mV)	-	10
Master control		
Communication	RS-232/422(DB9), USB-B,Ethernet	
Baud rate	9600, 38400, 57600, 115200	
Settable baud rate for Software secondary development	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000	
PC software control function	Output voltage & displacement, waveform control, setting parameters	
PC software waveform control	Programmable/standard waveform output	
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc	
Others		
Operating temperature(°C)	0~50	
Over-current protection	Yes	
Static power(W)	11	
Cooling method	Fan	
Size(mm)	147×170×45.5	
Mass(kg)	1.255	
Power supply	24V DC3A, DC-022B (ø2.5)	
Control way	Analog/digital signal	

Panel Introduction

Front panel

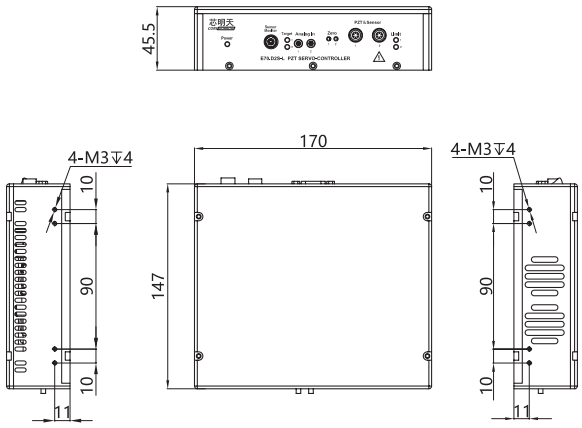


Rear panel



Note: E70.C2K-L has no servo control function.

Drawing



E70.D3S/C3K-L Multi-channel Piezo Controller



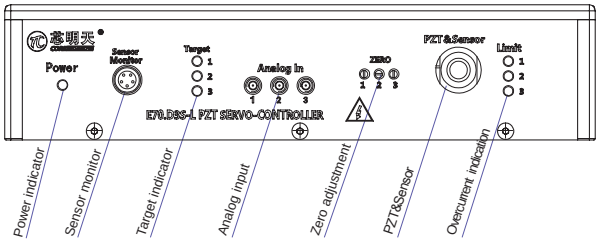
The E70.D3S/C3K-L multi-channel piezo controller is a three-channel piezoelectric controller designed based on the standard E70 piezoelectric controller. It can carry out digital communication through serial port, USB or network port.

Technical Data

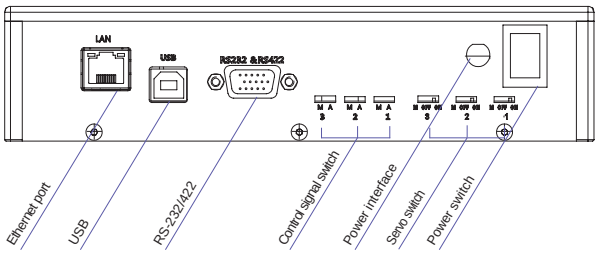
Type	E70.C3K-L	E70.D3S-L
Functions	Digital and analog piezo controller	
Drive		
Channels	3	
Nominal analog input(V)	-1.67~10 (±10V for constant voltage version)	
Nominal output voltage(V)	-20~120(Optional -20~100/150 and one constant voltage)	
Input power(W)	56	
Peak current(A)	1.1/channel	
Ave. current(mA)	70/channel	
Bandwidth(Hz)	10k/channel	
Ripple(mV)	5/channel(2.2μF)	
PZT and sensor connector	ECG.2B.312.CLV	
Control input connector	SMB	
Servo control		
Sensor type	-	SGS
Servo	-	P.I+Low pass+Notch filter
Sensor output voltage(V)		0~10(±10V for constant voltage version)
Sensor output connector	-	EPG.0B.304.HLN
Sensor output ripple(mV)	-	10
Master control		
Communication	RS-232/422(DB9), USB-B,Ethernet	
Baud rate	9600, 38400, 57600, 115200	
Settable baud rate for Software secondary development	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000	
PC software control function	Output voltage & displacement, waveform control, setting parameters	
PC software waveform control	Programmable/standard waveform output	
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc	
Others		
Operating temperature(°C)	0~50	
Over-current protection	Yes	
Static power(W)	11	
Cooling method	Fan	
Size(mm)	201×170×45.5	
Mass(kg)	1.6	
Power supply	24V DC3A, DC-022B (ø2.5)	
Control way	Analog/digital signal	

Panel Introduction

Front panel

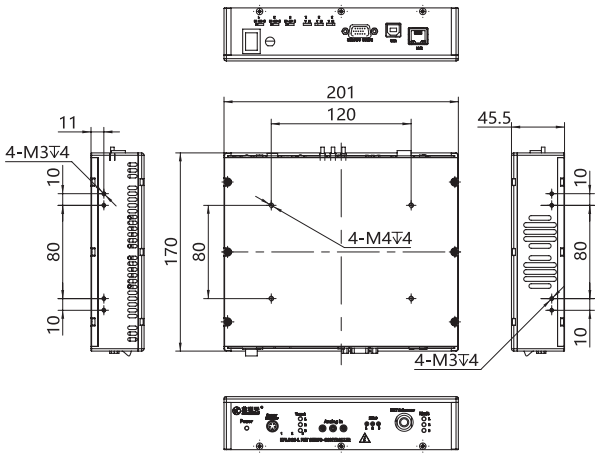


Rear panel



Note: E70.C3K-L has no servo control function.

Drawing



E70.D3S/C3K-H Multi-channel Piezo Controller



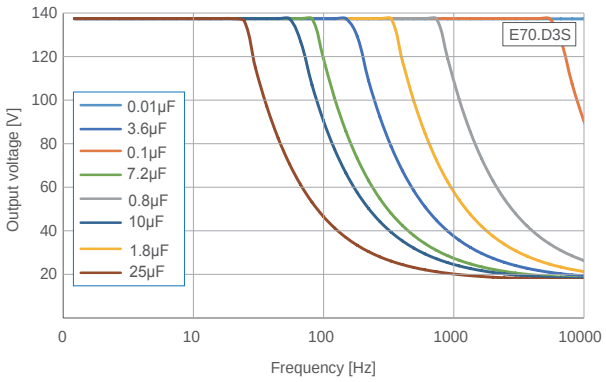
This controller is a 3-channel E70.D3S/C3K-H multi-channel piezo controller with small size, high power, low power consumption, high bandwidth, and low ripple noise. The controller adopts a dedicated operational amplifier circuit to ensure the output capability of high voltage and high current. By optimizing the sensing servo module, the accuracy and stability of PI adjustment and control are improved, and the reliable anti-interference design ensures the high frequency response of the controller.

The controller adopts DC24V power supply with integrated digital and analog control functions, optional servo control, RS-232/RS-422/USB communication, integrated PZT&Sensor mini interface for easy connection, external control functions can be set with simple and convenient operation.

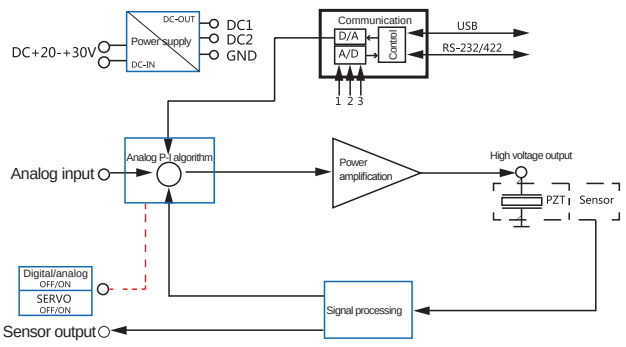
Characteristics

- Analog & digital control
- 3-channel output
- Small size, large output power
- High amplifier bandwidth
- Low ripple noise
- Low static power
- Excellent frequency response performance
- Stable PI adjustment, control & fast response
- DC24V3A DC power supply
- USB/RS-232/RS-422 communication interface

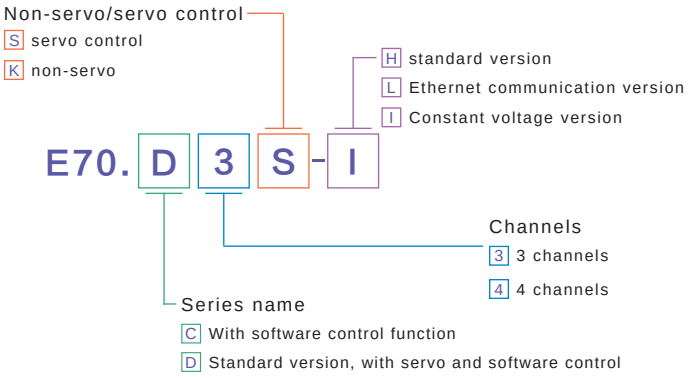
Frequency, Voltage and Load Curves



Driving Principle



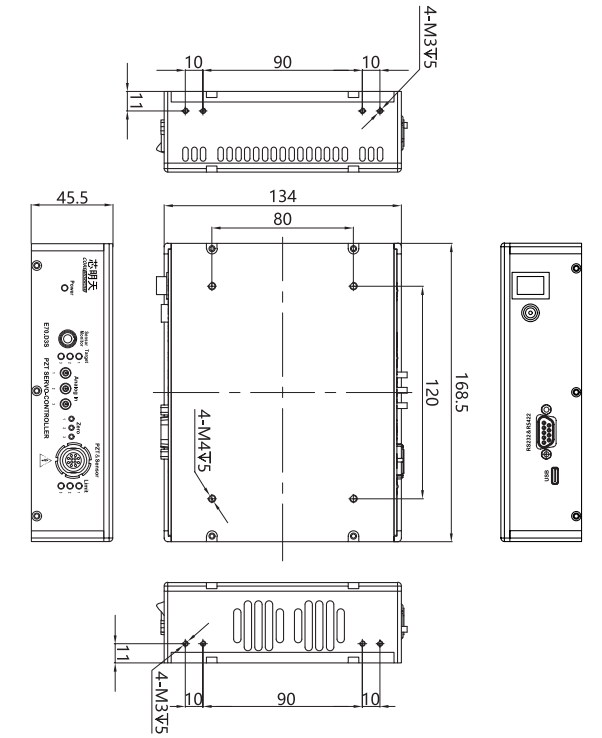
Type Guide



Technical Data

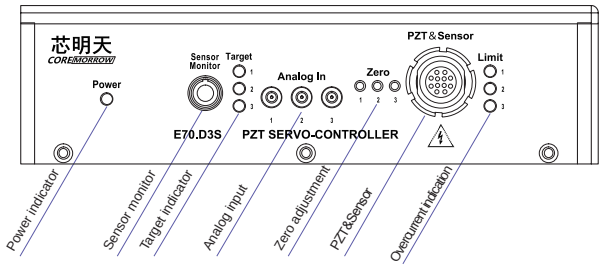
Type	E70.C3K–H	E70.D3S–H
Functions	Digital and analog piezo controller	
Drive		
Channels	3	
Nominal analog input(V)	-1.67~10 (±10V for constant voltage version)	
Nominal output voltage(V)	-20~120(Optional -20~100/150 and one constant voltage)	
Input power(W)	56	
Peak current(A)	1.1/channel	
Ave. current(mA)	70/channel	
Bandwidth(Hz)	10k/channel	
Bandwidth, 1/10(Hz)	10k/channel	
Bandwidth(-3DB)(Hz)	37k/channel	
Bandwidth, 1/10(-3DB)(Hz)	54k/channel	
Ripple(mV)	5/channel(2.2μF)	
PZT and sensor connector	ECG.2B.312.CLV	
Control input connector	SMB	
Servo control		
Sensor type	-	SGS
Servo	-	P.I+Low pass+Notch filter
Sensor output connector	-	EPG.0B.304.HLN
Sensor output voltage(V)	-	0~10(±10V for constant voltage version)
Sensor output ripple(mV)	-	10
Master control		
Communication	RS-232/422(D-SUB 9), USB(TYPE-C-female seat)	
Baud rate	9600, 38400, 57600, 115200	
Settable baud rate for Software secondary development	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000	
Processor	ARM 32 bit	
D/A converter	16 bit ±10V	
A/D converter	16 bit ±10V	
PC software control function	Output voltage & displacement, waveform control, setting parameters	
PC software waveform control	Programmable/standard waveform output	
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc	
Others		
Operating temperature(°C)	0~50	
Over-current protection	Yes	
Static power(W)	11	
Cooling method	Fan	
Size(mm)	168.5×134×45.5	
Mass(kg)	1.13	
Power supply	24V DC3A	
Power interface	DC-022B (Ø2.5)	
Control way	Analog/digital signal	

Drawing

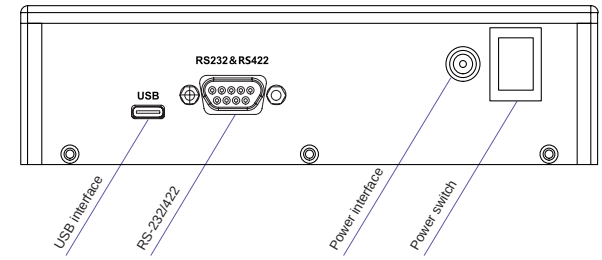


Panel Introduction

E70.D3S–H front panel



E70.D3S–H rear panel



Note: E70.C3K–H has no servo control function.

E70.D4S/C4K-L Multi-channel Piezo Controller



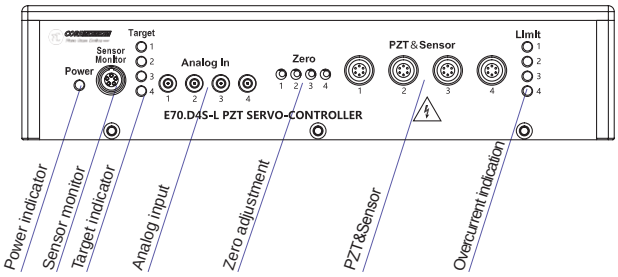
The E70.D4S/C4K-L multi-channel piezo controller is a four-channel piezoelectric controller designed based on the standard E70 piezoelectric controller. It can carry out digital communication through serial port, USB or network port.

Technical Data

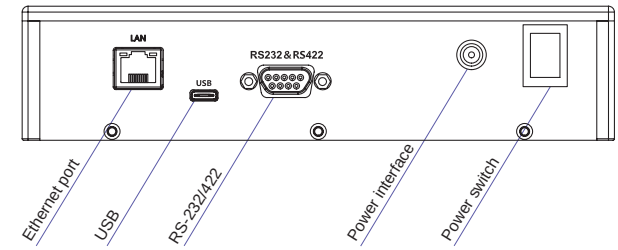
Type	E70.C4K-L	E70.D4S-L
Characteristics	Digital & analog integrated controller	
Drive		
Channels	4	
Nominal analog input (V)	-1.67~10 (±10V for constant voltage version)	
Nominal output voltage(V)	-20~120(Optional -20~100/150)	
Input power(W)	76	
Peak current(A)	1/channel	
Ave. current(mA)	70/channel	
Bandwidth(Hz)	10k/channel	
Bandwidth, 1/10 (Hz)	10k/channel	
Bandwidth, -3DB(Hz)	37k/channel	
Bandwidth, -3DB, 1/10(Hz)	54k/channel	
Ripple(mV)	5/channel(2.2μF)	
PZT and sensor connector	ZCG.0B.306.CLLV	
Control input connector	SMB	
Servo control		
Sensor type	-	SGS
Servo	-	P.I+low pass+notch filters
Sensing output connector	-	EPG.0B.305.HLN
Sensor output voltage(V)	-	0~10(±10V for constant voltage version)
Ripple(mV)	-	10
Master control		
Communication	RS-232/422(D-SUB 9), USB-C,Ethernet(RJ45)	
Baud rate	9600, 38400, 57600, 115200	
Settable baud rate for Software secondary development	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000	
Processor	ARM 32 bit	
D/A converter	16 bit ±10V	
A/D converter	16 bit ±10V	
PC software control function	Output voltage & displacement, waveform control, parameters set	
PC software waveform control	Programmable/standard	
Secondary development	VC++, Matlab, LabView & Program & DLL dynamic link library functions, etc.	
Others		
Temperature(°C)	0~50	
Overcurrent protection	Yes	
Static power(W)	15	
Cooling	Fan	
Size(mm)	201×170×45.5	
Mass(kg)	1.66	
Power supply	24V DC4A	
Power interface	DC-022B (Ø2.5)	
Control mode	Analog/digital signal	

Panel Introduction

E70.D4S-L front panel

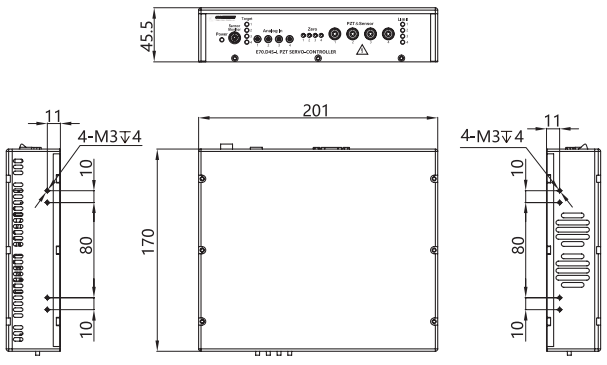


E70.D4S-L rear panel



Note: E70.C4K-L has no servo control function.

Drawing



Modular E70 Multi-channel Piezo Controller





This controller can freely choose the number of cascaded modules according to the user's needs. The number of channels for a single module is 3 channels/module, and up to 32 modules can be cascaded. It can be controlled by external analog signals or digital signals via RS-422 interface and optional servo control function.

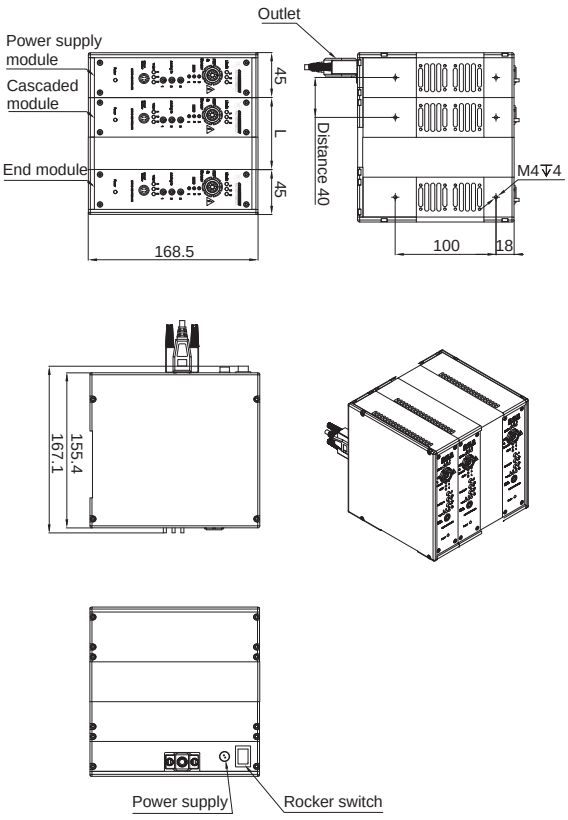
Technical Data

Type	Modular E70
Functions	Digital & analog integrated controller
Drive	
Channels/module	3
Assemble modules	2~32 pcs
Optional channel number	6/9/12/.../96
Nominal analog input(V)	-1.67~10(±10V for constant voltage version)
Nominal output voltage(V)	-20~120(Optional -20~100/150)
Input power(W)	60/module
Peak current(A)	1/channel
Ave.current(mA)	70/channel
Bandwidth(Hz)	10k/channel
Bandwidth, 1/10(Hz)	10k/channel
Bandwidth, -3DB(Hz)	37k/channel
Bandwidth, -3DB, 1/10(Hz)	54k/channel
Ripple(mV)	5/channel(2.2μF)
PZT and sensor connector	ECG.2B.312.CLV
Control input connector	SMB
Servo control	
Sensor type	SGS
Servo	PI+ low pass + notch
Sensor output voltage(V)	0~10(±10V for constant voltage version)
Sensing output connector	EPG.0B.304.HLN
Ripple(mV)	10
Master control	
Communication	RS-422(D-SUB 9-hole socket)
Baud rate	9600, 38400, 57600, 115200
Settable baud rate for Software secondary development	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000
Processor	ARM 32 bit
D/A converter	16 bit ±10V
A/D converter	16 bit ±10V
PC software control function	Output voltage & displacement, waveform control, setting parameter
PC software waveform control	Programmable/standard
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc.
Others	
Operating temperature(°C)	0~50
Over-current protection	Yes
Static power(W)	11/Module
Cooling	Fan
Width(mm)	No. of modules ×40+10
Height × depth(mm)	168.5×155.4
Mass(kg)	0.925/Module
Power supply	24V DC3A/module
Power interface	SF812-S2
Control mode	Analog/digital signal

Characteristics

- Modular, free to choose the number of modules
- Digital & analog control
- 6~96 channels freely selectable
- Servo control

Drawing



Type	E70.D6S	E70.D9S	E70.D12S	...	E70.D96S
L(mm)	0	40	80	...	1280

Note: When two modules are cascaded, the total width is 90mm, and each increase for a module, the total width increases by 40mm, and so on.

E80.A2K-H Multi-channel Piezo Controller

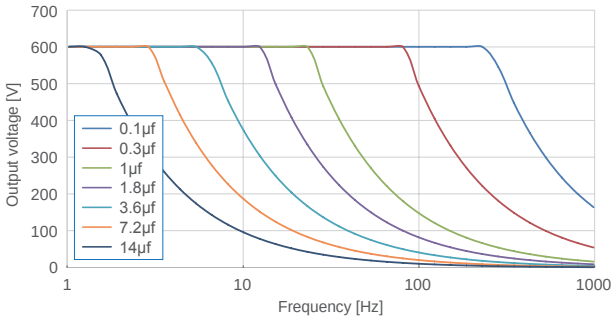


E80.A2K-H multi-channel piezo controller is an open-loop, dual-channel output piezo amplifier, its output voltage can reach -300V~+300V, and the bandwidth can reach 1kHz.

Characteristics

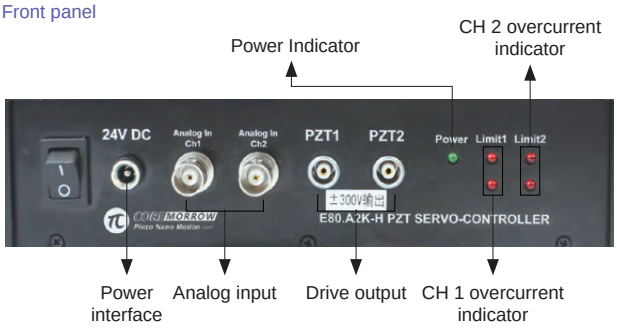
- Open loop, dual channel output
- Output voltage -300V~+300V
- Bandwidth up to 1kHz
- Peak current up to 500mA

Frequency vs Load Curve



Panel Introduction

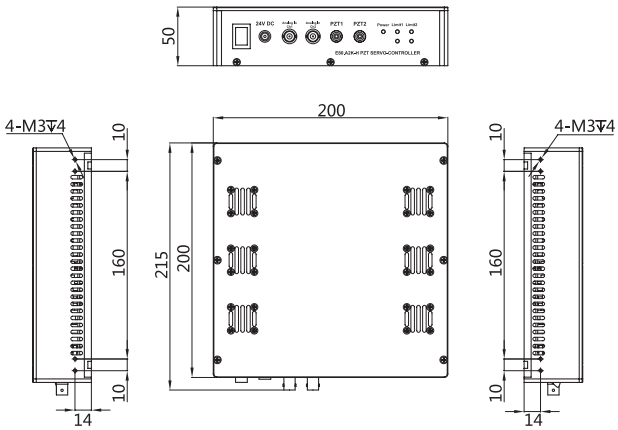
Front panel



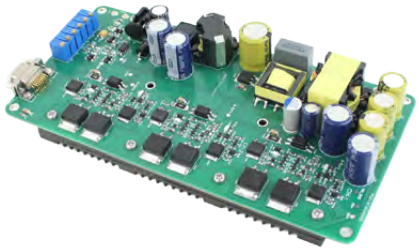
Technical Data

Type	E80.A2K-H
Channels	2
Nominal input voltage (V)	-5~+5
Nominal output voltage (V)	-300~+300
Peak current (mA)	500/channel
Average current (mA)	15/channel
Average power (W)	9/channel
Amplifier bandwidth (Hz)	1000/channel
Output ripple voltage (mVpp)	200/channel
Operating temperature (°C)	-25 to 65
Power supply	28V/5A
Power interface	DC-022B(Ø2.5)
Analog input connector	BNC-50KY
PZT output connector	ERA.0S.116.CTL
Size (mm)	200×200×50

Drawing



E80.A3K-H Piezo Control Module



E80.A3K-H is a 3-channel, open-loop version analog control piezo controller with an output voltage range of 0 to 120V, suitable for driving piezo tip/tilt/Z platform.

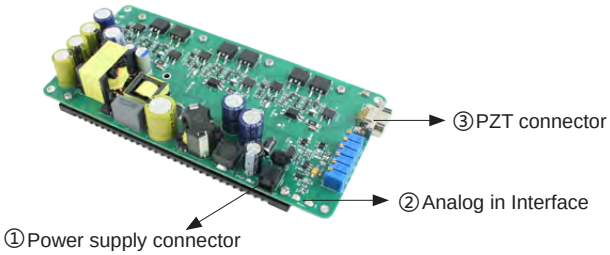
▸ Characteristics

• 3 output channels • Board-type • Output voltage: 0~120V • Analog control • Suitable for driving piezo steering mirror

▸ Technical Data

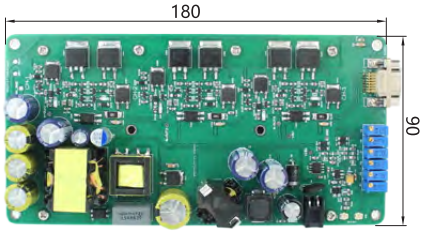
Type	E80.A3K-H
Channels	3
Nominal analog input(V)	0~10
Nominal output voltage(V)	0~120
Peak current(A)	1/channel
Ave. current(mA)	60/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	10/channel
Over-current protection	Yes
Operating temperature(°C)	-40~65
Power supply	24V DC 3A
Size(mm)	90×180×30
Mass(g)	330
Control way	Analog signal

▸ Interface Introduction



No.	Function	Type	Description
①	Power supply connector	DF63M-2P-3.96DS	24V DC 3A
②	Analog in Interface	U.FL-R-SMT-1(10)	Analog control signal input port
③	PZT connector	J30J-15ZKWP7-J	The voltage output interface for driving PZT

▸ Drawing



E80.A4K-J Multi-channel Piezo Controller



E80.A4K-J is a 4-channel, open-loop analog control piezo controller with an output voltage range of 0 to 150V.

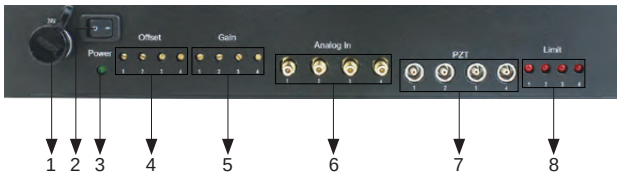
Characteristics

• 4 output channels • Output voltage 0~150V • Analog control •Open loop

Technical Data

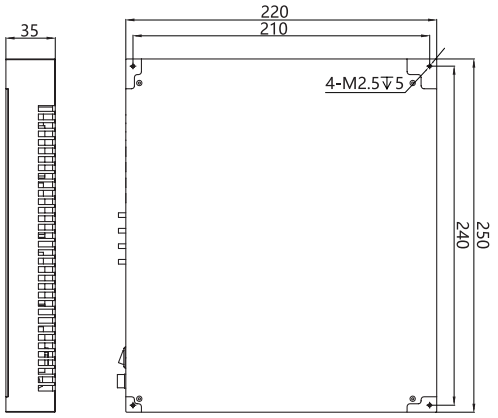
Type	E80.A4K-J
Channels	4
Nominal analog input(V)	0~10
Nominal output voltage(V)	0~150
Peak current(A)	1/channel
Ave. current(mA)	230/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	10/channel
Over-current protection	Yes
Operating temperature(°C)	-40~65
Power supply	24V DC 15A
Size(mm)	250×220×35
Mass(kg)	1.76
Control mode	Analog signal control

Panel Introduction



No.	Function	Description
1	Power interface	24V DC interface
2	Power switch	Power on and off
3	Power indicator	LED green, it lights when power on
4	Offset	Potentiometer, for adjusting voltage offset
5	Gain	Potentiometer, for adjusting voltage gain
6	Analog in	Analog control signal input port
7	PZT connector	Voltage output port, to drive PZT
8	Over-current	LED red, it lights When the output current of a certain channel exceeds the set limit value

Drawing



E80.B1S-H Piezo Controller



E80.B1S-H is a one-channel and servo piezo controller, its output voltage is up to -20V to 150V, and the output voltage is controlled by analog input voltage.

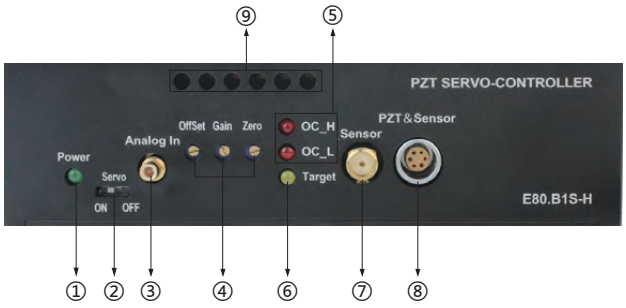
Characteristics

- Single channel
- Open-loop/servo control
- Analog signal control
- -20 to 150V output

Technical Data

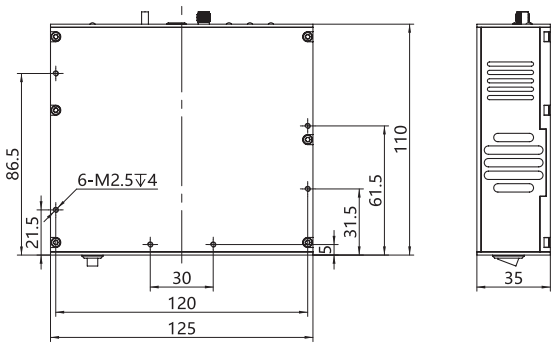
Type	E80.B1S-H
Function	Piezo controller
Channels	1
Sensor type	SGS
Servo	Analog P-I
Analog input voltage(V)	-1.33 to 10
Output voltage range(V)	-20 to 150
Peak current(mA)	1000
Ave. current(mA)	230
Bandwidth(Hz)	10k
Ripple(mVpp)	10
Proof	Over current
Operating temperature(℃)	-40 to 65
Power supply	24V/5A
Size(mm)	125×110×35
Mass(g)	600

Panel Introduction

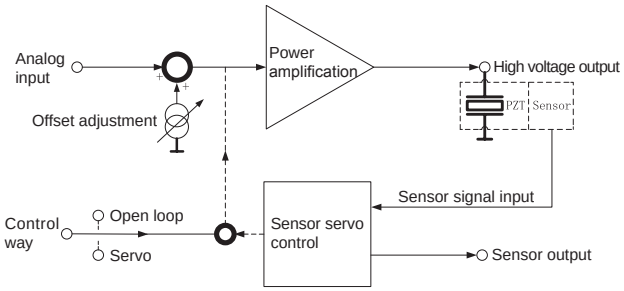


Item No.	Function
①	Power indicator, it lights when power on
②	Open-loop/servo control switch, on:servo, off:open loop
③	Analog signal input
④	Potentiometer,parameters adjustment (sensing offset, gain,zero)
⑤	Over-current indicator, H lights when positive voltage over flow, L lights when negative voltage over flow
⑥	Servo indicator, it lights when fail to switch to servo condition
⑦	Sensor output, outputting voltage signal
⑧	Voltage output and sensor input
⑨	Potentiometer,to adjust closed-loop parameters

Drawing



Principle



E80.B3K-I Multi-channel Piezo Controller



E80.B3K-I multi-channel piezo controller is designed for driving piezo steering mirror with 3 channels output that contains one constant voltage output, which is very suitable for differential drive. E80.B3K-I Multi-channel Piezo Controller has the function of sensor monitor that can output sensor voltage signal that feedbacks the travel of PZT.

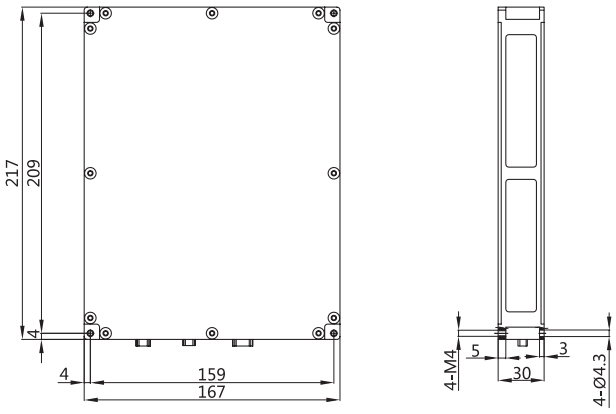
▸ Characteristics

- 3 channels output, containing one constant voltage output
- Low profile, easy to integrate
- -20~120V output
- Suitable for driving piezo steering mirror
- Peak current up to 1A
- Open loop, but can monitor sensor signals, and can form a closed loop servo control with external sensor signal processing

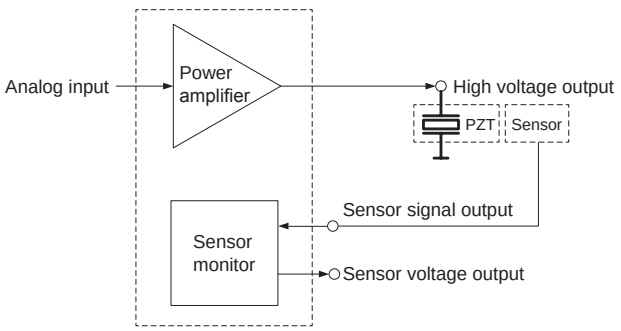
▸ Technical Data

Type	E80.B3K-I
Control way	Analog input
Channels	3, with 1 voltage constant output
Nominal analog input(V)	-0.83~5
Nominal output voltage(V)	-20~120, the 3rd channel outputs 120V
Peak current(A)	1/channel
Ave. Current(mA)	100/channel
Bandwidth(kHz)	10
Output ripple(mV)	10/channel(2.2μF)
Power supply port	J30J-9ZKSP
Analog input port	J30J-9ZJSP
PZT output port	J30J-15ZKSP
Static power dissipation(W)	7
Operating temperature(℃)	0~70
Power supply	28VDC
Size L×H×D(mm)	167×30×217
Mass(g)	1050

▸ Drawing



▸ Principle



E80.B3K-I Multi-channel Piezo Controller
(Only includes power amplification, sensor monitoring in the dashed box)

E80.B3K-J Piezo Control Module



E80.B3K-J piezo control module is a 3 channels output that contains one constant voltage output piezo controller controlled by analog signal. It is equipped with sensor monitoring module.

▸ Characteristics

• 3 channels output, containing one constant voltage output

• 0~120V output • Bandwidth to 1kHz • Sensor monitoring output

▸ Applications

• Differential drive piezo scanner • Driving piezo steering mirror

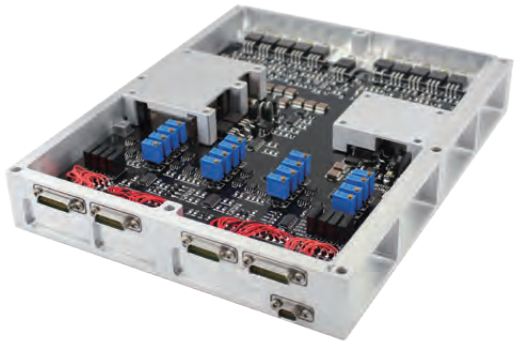
▸ Driving Differential Drive Piezo Scanner



▸ Technical Data

Type	E80.B3K-J
Function	Analog piezo controller
Control way	Analog input
Drive	
Channels	3
Nominal analog input(V)	0~10
Nominal output voltage(V)	0~120,containing 1 constant voltage output
Peak current(mA)	185/channel
Ave. Current(mA)	25/channel
Input power(W)	15
Bandwidth(kHz)	1
Output ripple(mV)	5(1.8μF)
Servo Monitor	
Sensor type	SGS
Sensor output voltage(V)	0~10
Ripple(mV)	10
Others	
Size(mm)	81×125×30
Operating temperature(°C)	0~50
Input and power connector(PWR&CTL)	MDC1-21SN
Output connector(PZT&Sensor)	MDC1-15SN
Over-current protection	Yes
Mass(g)	130
Static power(W)	3.6
Heat dissipation	Natural heat dissipation
Power supply(V DC)	24

E80.B5S-I Piezo Control Module



E80.B5S-I piezo control module is specially designed for driving two FSMs at the same time and suited for application with limited space.

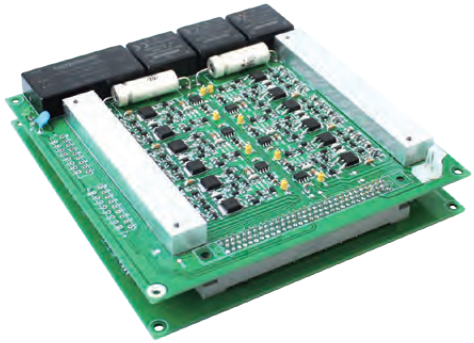
▸ Characteristics

- Servo control
- 5 channels(4 channels variable voltage output, 1 channel constant voltage output)
- Small size
- Output voltage -20~120V
- For driving two FSMs

▸ Technical Data

Type	E80.B5S-I
Channels	5
Sensor type	SGS
Sensor feedback output(V)	-10~10
Analog input voltage(V)	-10~10(Optional 0~10)
Output voltage(V)	-20~120(Optional -20~100/150)
Ripple(mV)	≤10
Bandwidth(kHz)	1
Peak power dissipation	≤30
Ave. power dissipation(W)	≤15
Mass(kg)	0.8
Bandwidth(Driving P33.T2 FSM)	700Hz/400μrad
Power supply interface	J30J-9ZKS
Input and monitor interface	J30J-21ZKS
Voltage output interface	J30J-25ZKS
Power supply(V)	DC28
Size(mm)	222×180×40
Can drive double FSMs	Two piezo deflecting mirrors can be driven simultaneously

E80.B6S-K Piezo Control Module



E80.B6S-K piezo control module has 6-channel outputs that contain 2 constant voltage output. It is designed for driving piezo steering mirrors, and can drive CoreMorrow P33.T2S piezo steering platform to operate at ±0.1mrad@100Hz very stably.

▸ Characteristics

- 6 outputs, including 2 constant voltage outputs
- Output voltage 0~100V
- Bandwidth to 10kHz
- For driving piezo steering platforms, etc.
- Closed-loop servo control

▸ Technical Data

Type	E80.B6S-K
Function	Board-type controller
Channels	6, including 2 voltage constant output
Nominal analog input(V)	0~10
Nominal output voltage(V)	0~100
Input power(W)	36
Peak current(A)	0.9/channel
Ave. current(mA)	48/channel
Input impedance(kΩ)	100
Bandwidth(Hz)	10k/channel
Ripple, RMS(mV)	10/channel(2.2μF)
PZT connector	J30J-15(female)
Control input connector	J30J-15(female)
Servo control	
Sensor type	SGS
Sensor output voltage(V)	0~10(±10 for constant voltage version)
Servo	P.I
Ripple(mV)	20
Others	
Operating temperature(°C)	-40~55
Overcurrent protection	yes
Static power dissipation(W)	11
Cooling	Cooling fin
Size L×W×H(mm)	150×150×40, two layers
Mass(g)	460
Power supply	12V/3A
Power supply port	Inter-board connector
Control way	Analog signal control

E80.C1K-H Piezo Control Module



E80.C1K-H piezo control module is a 1-channel, open-loop digital control piezo controller with an output voltage range of 0 to 120V, suitable for driving piezo phase shifter.

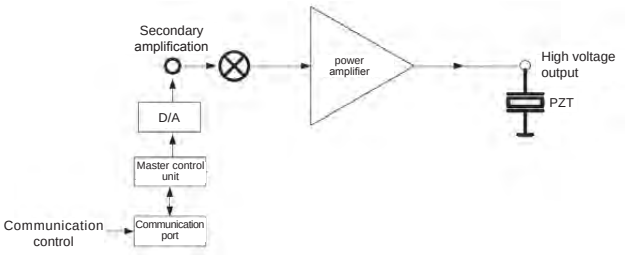
Characteristics

- 1 output channel
- Output voltage: 0~120V
- Board-type
- Software control

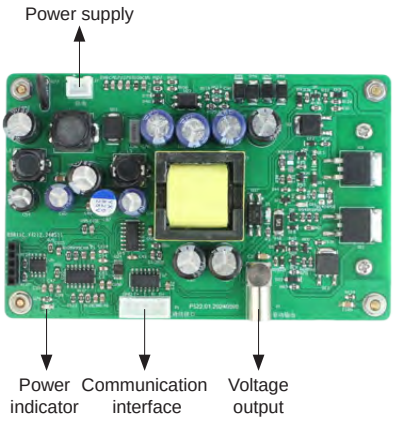
Technical Data

Type	E80.C1K-H
Function	Digital Controller
Channels	1
Nominal Output voltage(V)	0~120
Peak current(A)	1
Ave. current(mA)	60
Bandwidth(kHz)	10
Ripple(mVpp)	10(load 2.2μF)
PZT connector	LEMO ERA.00.250.CTL
Communication connector	XH2.54-5P
Communication interface	RS-422
Processor	32bit 168MHz
D/A converter	16bit
Operating temperature(°C)	0~50
Output short-circuited current (mA)	60
Static power(W)	5
Mass(g)	116
Power supply(V)	24V DC/1A(20V~30V)

Driving Principle



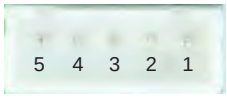
Interface Introduction



Function	Description
Communication interface	Connect the computer with the controller through RS-422 port to realize computer control.
Power supply	Power port, 24V DC/1A
Power indicator	When power indicator is always on, the E80.C1K-H is in working condition.
Voltage output	Output votlage to drive PZT

Communication Interface Pin Definition

Pin No.	Function
1	RS-422 RxD+
2	RS-422 RxD-
3	RS-422 TxD-
4	RS-422 TxD+
5	GND



E80.C2K-H Multi-channel Piezo Controller



The E80.C2K-H multi-channel piezo controller is specially customized according to customer requirements, and it's mainly used for driving piezo actuator. The power amplifier module has two output channels which can output 0~200V voltage, and controlled by analog or digital signal.

The customized modules have extra two DAC outputs and eight ADC gatherings, their voltage ranges all are 0~10V, and resolution is better than 0.1mV. There is a extra ±8V power supply output on the front panel.

Characteristics

- 2-channel output
- Output voltage: 0~200V
- Customizable
- Analog or Software control

Technical Data

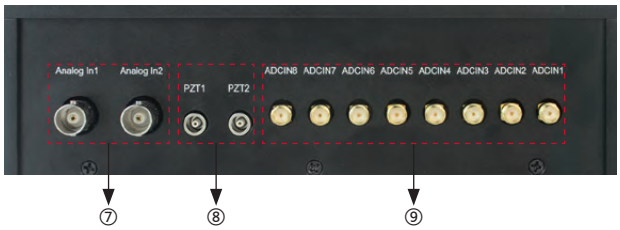
Type	E80.C2K-H
Channels	2
Power supply	24VDC/1A(20V~30V)
Static power(W)	12
Processor	32bit 480MHz
D/A converter	18bit
A/D converter	18bit
Communication Interface	RS-232, RS-422
Nominal analog input(V)	0~10
Nominal output voltage(V)	0~200
Peak current(mA)	200
Ave. current(mA)	60
Ampliffer bandwidth(kHz)	10
Ripple(mVpp)	10(@2.2μF)
Rated output power(W)	12W
Operating temperature range(°C)	0~50
Output short-circuit current(mA)	60
PZT output connector	ERA.00.250.CTL
±8V output Interface	EPL.0S.303.HLN
Communication connector	DB9
Analog Input	BNC
A/D gathering Interface	SMA
D/A output Interface	SMB
Size(mm)	195×170×56
Mass(kg)	1.85

Panel introduction

Front Panel

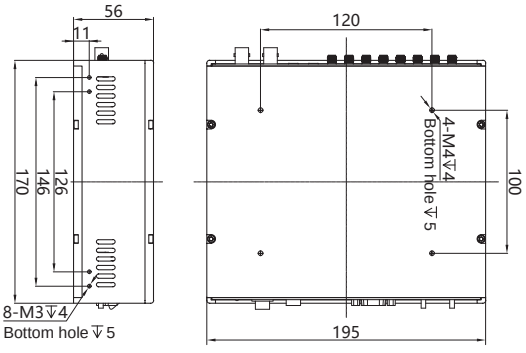


Rear Panel



No.	Function	Description
①	D/A Output	0~10V voltage output (2 channels)
②	RS-232/422 connector	PC communication port
③	Power supply output	±8V power supply output
④	Power supply input	24V power supply input
⑤	Power switch	Power on and off
⑥	Power indicator	LED green, always on when it works
⑦	Analog input	Analog input (2 channels, BNC)
⑧	PZT	Voltage output port (2 channels)
⑨	A/D gathering Interface	External A/D gathering (8 channels)

Drawing



E80.D1S-H Piezo Controller



E80.D1S-H is a 1-channel analog and digital control piezo controller. It can perform motion control through analog signal input or using upper computer software, supporting secondary development of upper computer software.

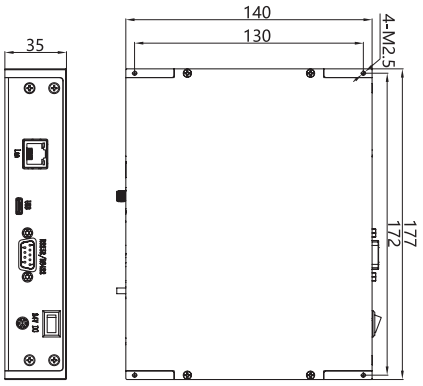
Characteristics

- 1 output channel
- Peak current to 1A
- Output voltage: -20~150V
- Analog and digital control

Technical Data

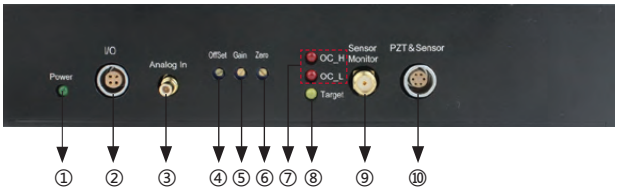
Type	E80.D1S-H
Function	Digital&analog piezo controller
Channels	1
Nominal analog input(V)	-1.33~10
Nominal output voltage(V)	-20~150
Peak current(A)	1/channel
Ave. current(mA)	230/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	10/channel
Sensor type	SGS
Servo	Analog P-I
Over-current protection	Yes
Operating temperature(°C)	-40~65
Size(mm)	177×35×140
Mass(kg)	0.83
Power supply	24V DC 5A
Control mode	Digital/analog signal control

Drawing



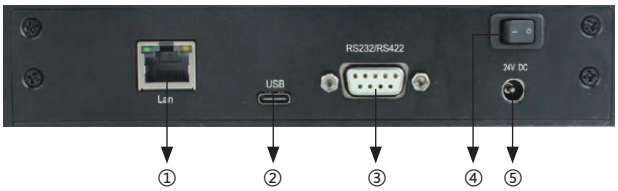
Panel Introduction

Front Panel



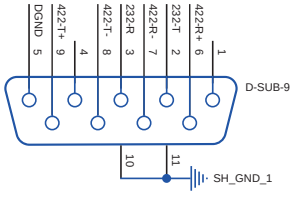
No.	Function	Description
①	Power indicator	Green LED light, always on when it works
②	I/O interface	I/O output interface
③	Analog in	Analog control signal input port
④	Offset	Potentiometer,used to adjust analog input offset
⑤	Gain	Potentiometer,used to adjust the analog input gain
⑥	Zero	Potentiometer,used for zero point adjustment of sensing signals
⑦	Overcurrent indicator	Red LED light,H lights when positive voltage overcurrent occurs;L lights when negative voltage overcurrent occurs
⑧	Target indicator	Under closed-loop conditions, when the target value is not reached, the yellow LED light will turn on. Under open loop, it's always on
⑨	Sensor Monitor	Monitoring output of position signals returned by sensors
⑩	PZT&Sensor	Voltage output interface & input interface for sensing signals

Rear Panel



No.	Function	Description
①	Ethernet port	Ethernet communication interface
②	USB	USB communication interface
③	RS-232/422	Serial communication interface
④	Power switch	Power on and off
⑤	Power supply interface	24V DC 5A power interface

RS-232/422 Communication Interface

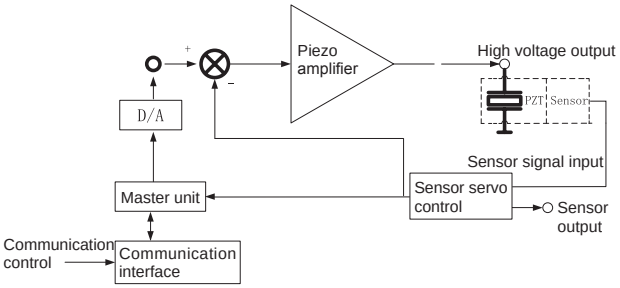


E80.D1S-I Piezo Control Module



The E80.D1S-I piezo control module serves as a specialized power supply for driving piezo actuators, etc.. It features both open-loop and closed-loop servo control capabilities. This module is controlled by digital signal via RS-422 port.

▸ Driving Principle



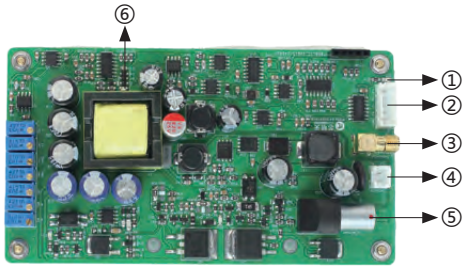
▸ Technical Data

Type	E80.D1S-I
Function	Piezo Control Module
Control mode	Digital Control
Drive	
Channels	1
Nominal output voltage(V)	-20~120V
Peak current(mA)	1000
Ave. current(mA)	60
Bandwidth(kHz)	10k
Output ripple(mV)	10(2.2μF)
PZT&Sensor connector	ZPG.0B.306.HLN
Input power(W)	7
Servo control	
Sensor type	SGS
Sensor output connector	SMA
Master control	
Communication	RS-422
Communication connector	XH2.54-5P
Processor	32bit 168MHz
D/A converter	16bit
Others	
Operating temperature(°C)	0~50
Over-current protection	Yes
Output short-circuited current (mA)	60
Static power(W)	5
Length × depth (mm)	135×75
Power supply(V)	24VDC/1.5A (20~30V)
Mass(g)	123

▸ Characteristics

- 1 output channel
- Board-type
- Software control
- Output voltage: -20~120V

▸ Interface Introduction



No.	Function	Description
①	Power indicator	Green LED, When power indicator is always on, it is in working condition.
②	Communication interface	Connect the computer with the controller through RS-422 port to realize computer control.
③	Sensor output	SMA, Sensor output, outputting voltage signal.
④	Power interface	24V DC interface, XH2.54-2P.
⑤	PZT&Sensor	Voltage output and sensor input.
⑥	Sensor indicator	Yellow LED, the light on indicates that the piezo control module is not connected to PZT or connected to PZT but in an open-loop state; Otherwise, connecting PZT is in a closed-loop state.

Power interface Pin Definition

Pin No.	Function
①	GND
②	Power supply+24V



Communication Interface Pin Definition

Pin No.	Function
①	RS-422 RxD+
②	RS-422 RxD-
③	RS-422 TxD-
④	RS-422 TxD+
⑤	GND



E80.D3S-K Multi-channel Piezo Controller



Characteristics

- 3-channel piezo controller
- Analog servo control, digital control
- Power supply 20~30V DC
- Suitable for driving PDM

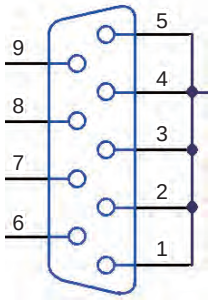
Panel Introduction



Identifier	Type	Function
Power	J30J-9ZKSP	Power supply connector
PZT	J30J-15ZKSP	The output voltage for driving PZT Sensor input signal
Communication	J30J-9ZJSP	Software control Sensor output signal monitor. Output range 0~10V

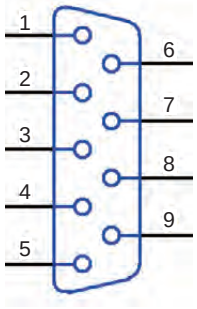
Power Supply

Pin No.	Definition
1	Power supply +
2	Power supply +
3	Power supply +
4	Power supply +
5	Null
6	Power supply -
7	Power supply -
8	Power supply -
9	Power supply -



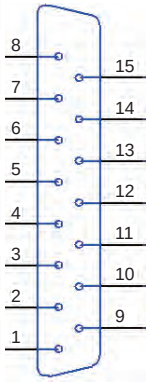
RS-422 Communication Interface

Pin No.	Definition
1	Sensor monitor signal 2 + (S2+)
2	Sensor monitor signal 1 + (S1+)
3	Receive data + (422-R+)
4	Send data - (422-T-)
5	Signal ground (GND)
6	Sensor monitor signal 2 - (S2-)
7	Sensor monitor signal 1 - (S1-)
8	Receive data - (422-R-)
9	Send data + (422-T+)

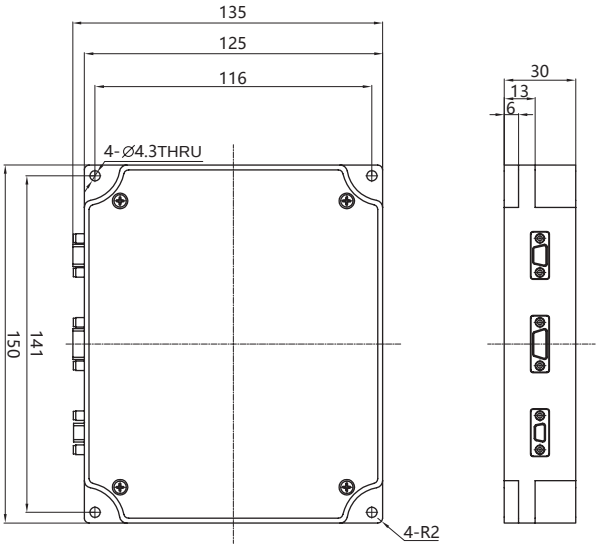


PZT Interface

Pin No.	Definition
1	Sensor 2 reference voltage signal(VREF2)
2	Sensor 2 signal + (S2+)
3	Sensor 1 reference voltage signal(VREF1)
4	Sensor 1 signal + (S1+)
5	Null
6	PZT drive signal ground(PZT1_GND)
7	PZT drive signal ground(PZT2_GND)
8	PZT drive signal ground(PZT3_GND)
9	Sensor 2 signal analog ground(AGND2)
10	Sensor 2 signal - (S2-)
11	Sensor 1 signal analog ground(AGND1)
12	Sensor 1 signal - (S1-)
13	PZT drive signal channel 3
14	PZT drive signal channel 2
15	PZT drive signal channel 1



Drawing



▶ Technical Data

Type	E80.D3S-K
Function	Digital controller
Drive	
Channels	3
Nominal analog input(V)	-
Nominal output voltage (V)	-20~120V(optional -20~100/150V), one constant voltage output
Input power(W)	56
Peak current(A)	1/channel
Ave. current(mA)	70/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	5/channel(2.2μF)
PZT connector	J30J-15ZKSP
Input connector	J30J-9ZJSP
Servo control	
Sensor type	SGS
Servo	P.I + low pass
Output connector	J30J-9ZJSP
Master control	
Communication	RS-422(J30J-9ZJSP)
Baud rate	9600, 38400, 57600, 115200
Settable baud rate for software secondary development	9600, 19200, 38400, 57600, 76800, 115200 , 128000, 230400, 256000
Processor	ARM 32 bit
D/A converter	16 bit ±10V
A/D converter	16 bit ±10V
PC software control function	Output voltage and displacement, waveform control, setting parameters
PC software waveform control	Programmable/standard
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc.
Others	
Operating temperature(°C)	-40~65
Overcurrent protection	Yes
Static power(W)	11
Cooling	At the bottom of the shell
Size(mm)	150×125×30
Mass(kg)	0.649
Power supply	20~30V DC3A
Control mode	Digital signal control

E80.D3S-O Multi-channel Piezo Controller





E80.D3S-O multi-channel piezo controller is for driving piezo tip/tilt platform, features 3 outputs, and the third channel is constant voltage output that is suitable for differential drive. It has two types, packaged type and board type for choice.

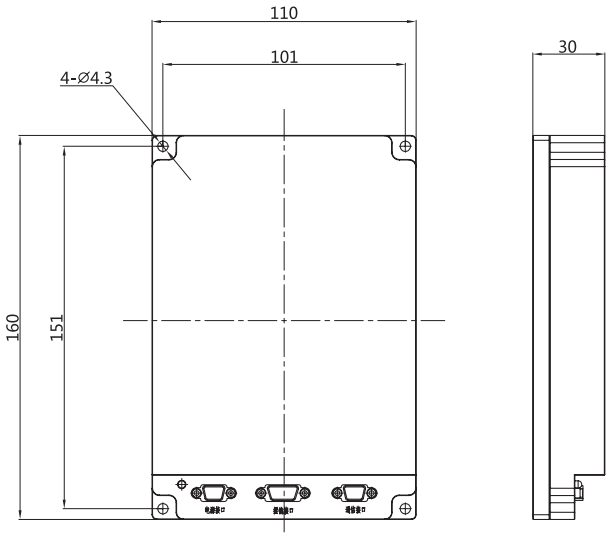
Technical Data

Type	E80.D3S-O
Function	Digital controller
Channels	3
Ananog input(V)	-
Output voltage(V)	-20~120(optional -20~100/150), the 3rd channel outputs constant voltage
Input power(W)	56
Peak current(A)	1/channel
Ave.current(mA)	70/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	5/channel(2.2μF)
PZT connector	J30J-15ZKNP5-J
Communication connector	J30JR-9TJNP5-J
Sensor type	SGS
Servo	P.I+low pass
Sensor output connector	J30JR-9TJNP5-J
Communication port	RS-422(J30JR-9TJNP5-J)
Baud rate	9600, 38400, 57600, 115200
Settable baud rate for software secondary development	9600, 19200, 38400, 57600, 76800, 115200 , 128000, 230400, 256000
Processor	ARM 32bit
D/A converter	16bit ±10V
A/D converter	16bit ±10V
PC software control function	Output voltage and displacement, waveform control, setting parameters
PC software waveform control	Programmable/standard
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc.
Operating temperature(°C)	-40~65
Overcurrent protection	Yes
Static power(W)	11
Cooling	At the bottom of the shell
Size(mm)	160×110×30
Mass(g)	495
Power supply	20~30V DC3A
Control mode	Digital signal control

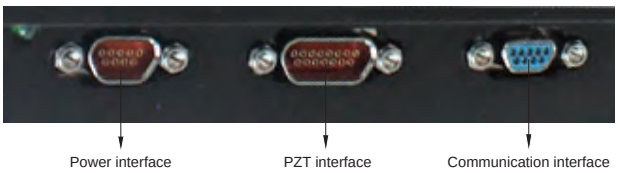
Characteristics

- 3 channels
- 20~30V DC power supply
- Digital control
- Suitable for driving piezo steering mirror

Drawing



Panel Introduction



Identifier	Type	Function
Power	J30J-9ZKNP5-J	Power supply connector
PZT	J30J-15ZKNP5-J	The output voltage for driving PZT Sensor input signal
Communication	J30JR-9TJNP5-J	Software control Sensor output signal monitor. Output range 0~10V

E80.D3S-P Multi-channel Piezo Controller



E80.D3S-P multi-channel piezo controller is designed for driving Piezo Tip/Tilt Platform with 3 channels output that contains one constant voltage output, which is very suitable for differential drive. Controlled by analog and digital signals. The controller has the function of sensor monitor that can output sensor voltage signal that feedbacks the travel of PZT, which can achieve high-precision control of the platform. The controller can meet many strict environmental tests, such as electromagnetic compatibility tests (CS101, CS114, CS115, CS116, RE102, RS103), mechanical impact tests (gravity acceleration of 20g), and 22.6kPa low pressure tests (absolute value).

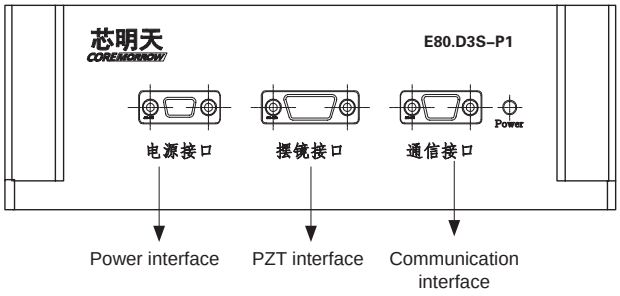
▸ Characteristics

- 3 channels output, containing one constant voltage output
- Analog/digital signal control
- Driving Piezo Tip/Tilt Platform
- Digital control, software operable

▸ Technical Data

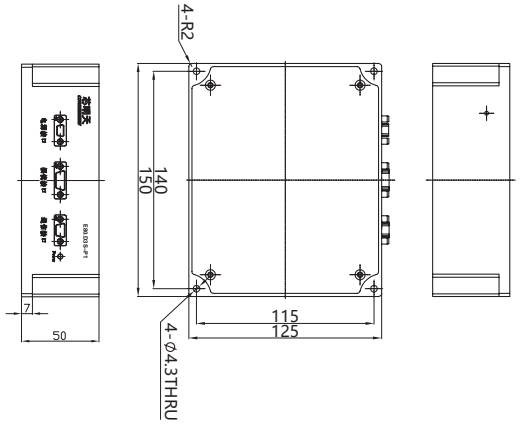
Type	E80.D3S-P
Function	Digital and analog piezo controller
Channels	3
Nominal analog input(V)	0-10
Nominal output voltage (V)	-20~120V(optional -20~100/150V), one constant voltage output
Input power(W)	56
Peak current(A)	1/channel
Ave. current(mA)	70/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	5/channel(2.2μF)
PZT connector	J30J-15ZKSP
Input connector	J30J-9ZJSP
Sensor type	SGS
Servo	P.I + low pass
Output connector	J30J-9ZJSP
Communication interface	RS-422(J30J-9ZJSP)
Baud rate	9600, 38400, 57600, 115200
Settable baud rate for software secondary development	9600, 19200, 38400, 57600, 76800, 115200, 128000, 230400, 256000
Processor	ARM 32
D/A converter	16 ±10V
A/D converter	16 ±10V
PC software control function	Output voltage and displacement, waveform control, setting parameters
PC software waveform control	Programmable/standard
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc.
Operating temperature(°C)	-40~65
Overcurrent protection	Yes
Static power(W)	11
Cooling method	Shell
Size(mm)	150×125×50
Mass(kg)	0.98
Power supply	20~30V DC3A
Control mode	Analog/digital signal

▸ Panel Introduction



Identifier	Type	Function
Power interface	J30J-9ZKSP	Power supply connector
PZT interface	J30J-15ZKSP	The output voltage for driving PZT. Sensor input signal.
Communication interface	J30J-9ZJSP	Software control. Analog signal input. Input range 0~10V. Sensor output signal monitor. Output range 0~10V.
Power	LED Green	Always on after power on

▸ Drawing



E80.D3S-Q Multi-channel Piezo Controller



E80.D3S-Q is a digital and analog multi-channel piezo controller designed for driving Piezo Tip/Tilt Platform with 3 channels output that contains one constant voltage output channel, which is very suitable for differential drive. The controller has the function of sensor monitor that can output sensor voltage signal that feedbacks the travel of PZT, which can achieve high precision control of the platform.

Characteristics

- 3 channels output, containing one constant voltage output channel
- High reliability
- Analog/digital signal control
- Suitable for driving piezo tip/tilt platform, etc

Technical Data

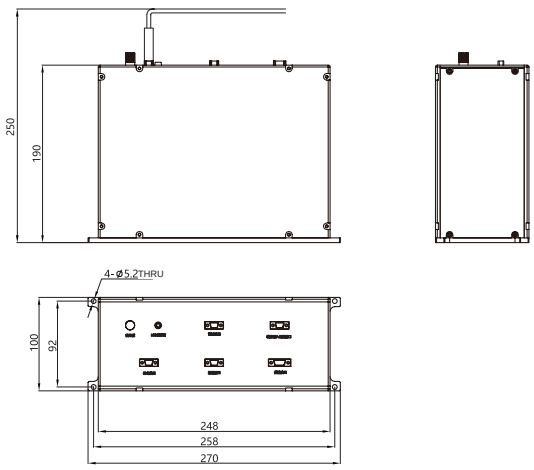
Type	E80.D3S-Q
Function	Digital & analog integrated controller
Channels	3
Ananog input(V)	0~10
Output voltage(V)	0~150, the 3rd channel outputs constant voltage
Peak current(A)	1/channel
Ave.current(mA)	67/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	10/channel(2.2μF)
PZT connector	J30JM-15ZKP36
Communication connector	J30JM-9ZKP36
Sensor type	SGS
Servo	P.I+low pass
Communication port	RS-422(J30JM-9ZKP36)
Debugging interface	J30JM-9ZKP36
Analog in/monitoring interface	J30JM-9ZKP36
Baud rate	9600 , 57600, 115200, 256000, 460800, 576000, 691200, 1382400
Processor	ARM 32bit
D/A converter	16bit ±10V
A/D converter	16bit ±10V
PC software control function	Output voltage and displacement, waveform control, setting parameters
PC software waveform control	Programmable/standard
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc.
Operating temperature(°C)	-40~65
Overcurrent protection	Yes
Static power(W)	12
Cooling	At the bottom of the shell
Size(mm)	248×100×190
Mass(g)	3050
Power supply	24V DC3A
Control mode	Analog/digital signal control

Panel Introduction



Identifier	Type	Description
Power	LED green	Power indicator is always on, the E80 is in working condition.
Debugging interface	J30JM-9ZKP36	Used for debugging and upgrading controller programs
PZT	J30JM-15ZKP36	·Output votlage to drive PZT ·Sensor input signal
GND	JDZ_M6*23	GND
Power supply	J30JM-9ZKP36	Power supply: +24V DC/3A
Communication connector	J30JM-9ZKP36	Connect the computer with the controller interface module through RS-422 port access terminal to realize computer control.
Analog in/ monitoring interface	J30JM-9ZKP36	·Analog input signal. Voltage range 0~10V ·Sensor output signal monitoring. Output range 0~10V

Drawing



E80.D4S-H Multi-channel Piezo Controller



Characteristics

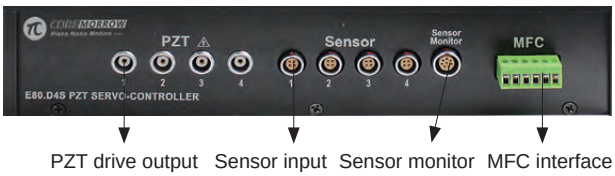
• 4 channels • Output voltage 0~800V • Peak current up to 100 mA • Bandwidth up to 1kHz • Integrated charge amplifier

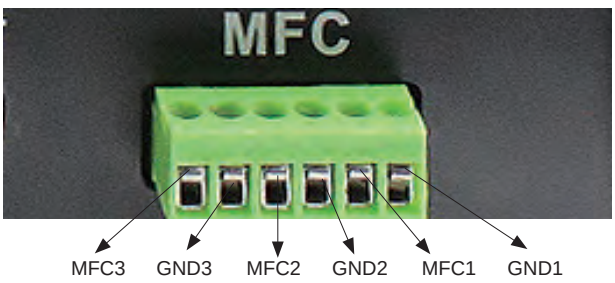
Technical Data

Type	E80.D4S-H
Characteristics	Piezo controller
Drive	
Channels	4
Nominal analog input(V)	0~10V
Nominal output voltage(V)	0~800V
Peak current(mA)	100/channel
Ave. current(mA)	20/channel
Bandwidth(Hz)	1k/channel
Ripple(mV)	200
PZT connector	ERA.0S.116.CTL
Input connector	USB-B
Servo control	
Sensor type	SGS
Servo	AnalogP-I
Sensor connector	EPG.0B.304.HLN
Output connector	EPG.0B.308.HLN
Master control	
Communication	USB-B
D/A converter	16 bits
A/D converter	16 bits
Others	
Operating temperature(°C)	-30~+65
Storage temperature(°C)	–50~+70
Humidity	Max: 80%, 30°C Minimum: 50%, 40°C
Output short-circuited current(mA)	20
Overcurrent indication	No
Static power(W)	74
Dimensions(mm)	270×245×50
Mass(kg)	1.66
Power supply	28V/10A
Power interface	HT396-2P

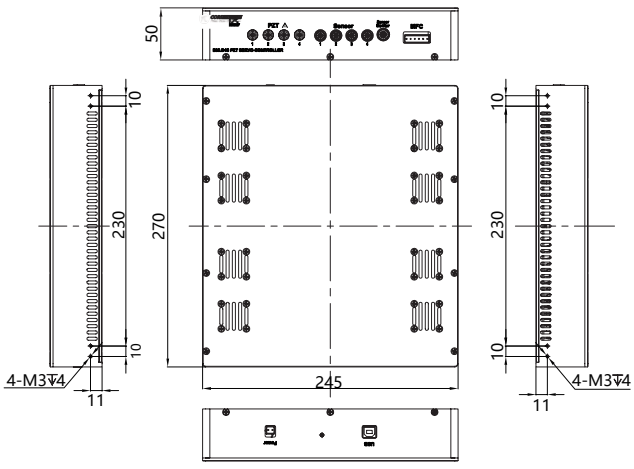
Interface Definition







Drawing



E80.D6S-K Multi-Channel Piezo Controller



The E80.D6S-K multi-channel piezo controller, featuring six voltage outputs, is able to achieve real-time communication with computer via the RS-422 interface. It supports secondary development of software, allowing for parameter settings such as voltage and displacement through dedicated communication software. This controller is suitable for driving piezo tilt, multi-axis motion products and differential drive applications.

Characteristic

• 6 voltage output channels • Analog servo, digital control • Power supply: 24V 5A • Support secondary development of software

Technical Data

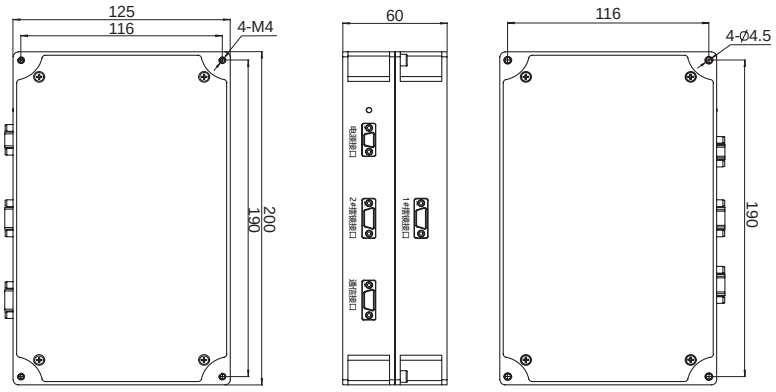
Type	E80.D6S-K
Function	Piezo controller
Channels	6
Nominal output voltage(V)	0~120V
Peak current(mA)	1000/channel
Ave. current(mA)	70/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	10/channel
PZT interface	J30J-15ZKSP
Sensor type	SGS
Servo	Analog P-I
Communication	RS-422
Communication&Sensor interface	J30J-15ZJSP
Baud rate	9600, 38400, 57600, 115200, 460800, 691200
Operating temperature(°C)	-40~65
Power supply	24V 5A
Cooling	At the bottom of the shell
Size(mm)	200×125×60
Mass(g)	1270
Control mode	Digital signal control

Panel Introduction



Name	Type	Function Description
Power indicator	Green LED	When power indicator is always on, the E80.D6S-K is in working condition.
Power interface	J30J-9ZKSP	Power supply connector.
PZT interface	J30J-15ZKSP	Output voltage for driving PZT. Sensor input signal.
Communication interface	J30J-15ZJSP	Used for communication with the upper computer, realizing computer control, using RS-422 interface standard. Sensor output signal monitoring end, output range 0~10V.

Drawing



E80.D9S-K Multi-channel Piezo Controller



E80.D9S-K is a 9-channel output driving controller suitable for driving piezo tip/tilt platform.

▸ Characteristic

- 9-channel piezo controller
- Analog servo control, digital control
- Power supply 24V 7.5A
- Suitable for driving PDM

▸ Technical Data

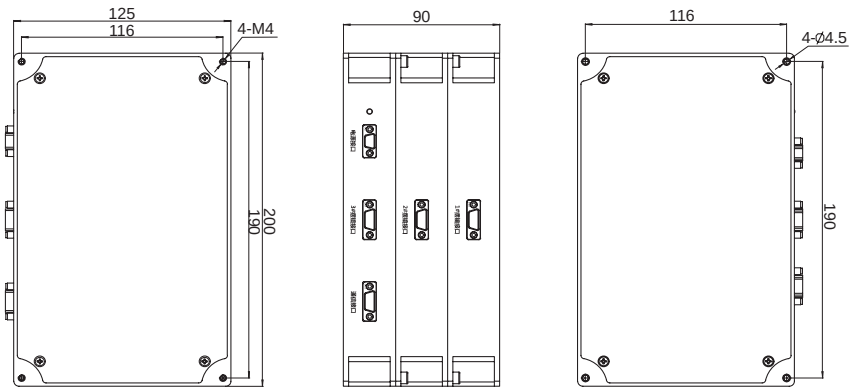
Type	E80.D9S-K
Function	Digital controller
Channels	9
Communication	RS-422
Baud rate	9600,38400,57600, 115200,460800,691200
Nominal output voltage (V))	0~120V
Peak current(A)	1/channel
Ave. current(mA)	70/channel
Average power(W)	8/channel
Bandwidth(Hz)	10k/channel
Ripple(mV)	10/channel
PZT interface	J30J-15ZKSP
Communication&Sensor interface	J30J-15ZJSP
Sensor type	SGS
Servo	Analog P-I
Operating temperature(°C)	-40~65
Power supply	24V 7.5A
Cooling	At the bottom of the shell
Size(mm)	200×125×90
Mass(g)	1800

▸ Panel Introduction

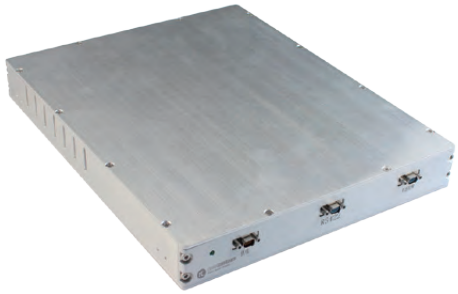


Identifier	Type	Function
Power	LED Green	Always on after power on
Power interface	J30J-9ZKSP	Power supply connector
PZT interface	J30J-15ZKSP	1.The output voltage for driving PZT 2.Sensor input signal
Communication interface	J30J-15ZJSP	1.Software control 2.Sensor output signal monitor. Output range 0~10V

▸ Drawing



E80.D12S-I Multi-channel Piezo Controller

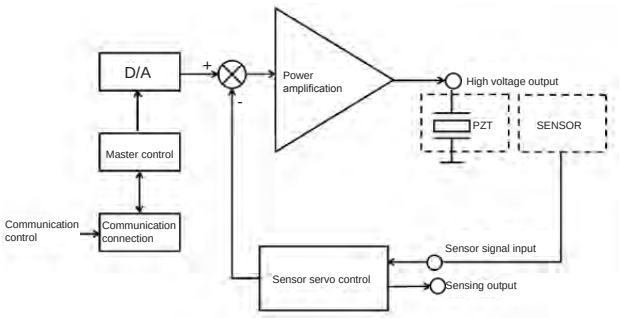


The E80.D12S-I multi-channel piezo controller is designed for driving piezo deflection mirrors. It can drive 4 piezoelectric deflection mirrors at the same time, with a bandwidth of up to 5kHz. E80.D12S is digitally controlled by the upper computer with servo control function.

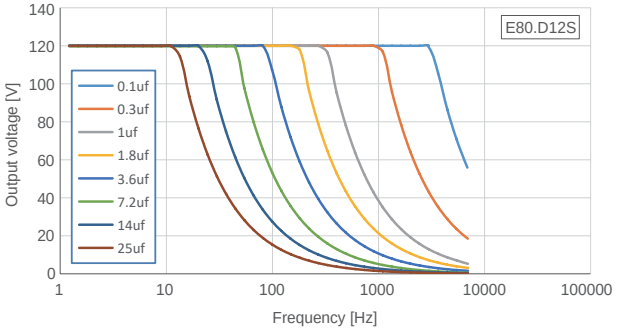
▸ Characteristics

• Integrated • 12-channel output • Output voltage -20~120V • Servo control • Can drive 4 piezo deflection mirrors

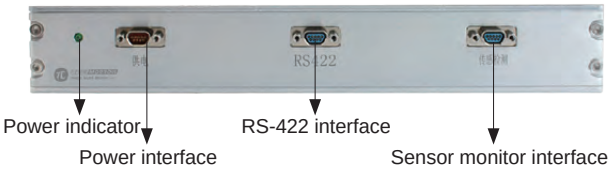
▸ Driving Principle

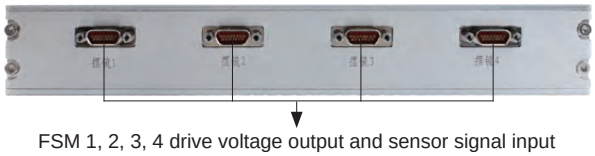


▸ Frequency vs Load Curve

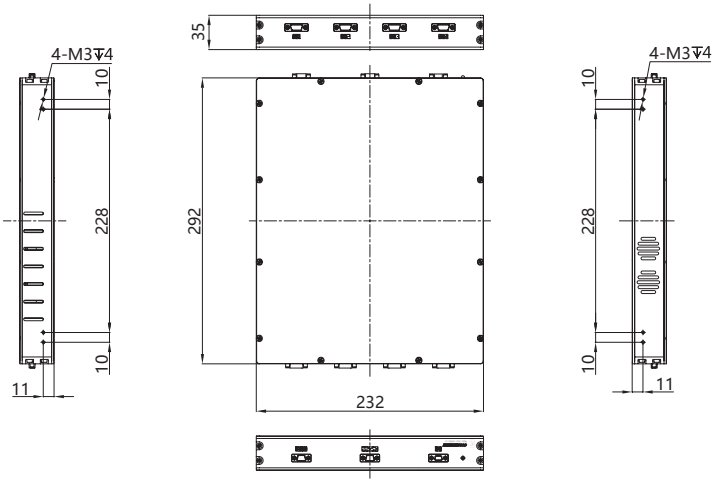


▸ Panel Interface





▸ Drawing



▶ Technical Data

Type	E80.D12S-I
Functions	Digital integrated controller
Drive	
Channels	12
Nominal output voltage(V)	-20~120 (Optional -20~100/150) (1~4# 3rd channel constant voltage output 120V)
Peak current(mA)	1~3# interface: 85; 4# interface: 1100
Ave.current(mA)	1~3# interface: 7; 4# interface: 74
Static power(W)	12
Bandwidth(Hz)	1~3# interface: 1k/channel; 4# interface: 5k/channel
Ripple(mV)	<5/channel(2.2μF)
PZT output & sensor input connector	J30J-15ZKSP
Servo control	
Sensor type	SGS/LVDT
Servo	Analog P-I
Sensor output voltage(V)	0~10(±10V for constant voltage version)
Output connector	J30J-9ZKSP
Ripple(mV)	10
Master control	
Communication	RS-422(J30J-9ZKSP)
Processor	ARM 32 bit
D/A converter	16 bits
PC software control function	Output voltage & displacement, waveform control, setting parameters
PC software waveform control	Programmable/standard
Secondary development	VC++, Matlab, LabView, DLL dynamic link library functions, etc.
Others	
Overcurrent protection	Yes
Cooling	Shell(can install a cooling fan inside)
Size(mm)	292×232×35
Mass(kg)	1.9
Supply voltage	24~30V DC
Power interface	J30J-9ZJSP
Control mode	Digital signal control
Humidity	Max: 80%, 30°C Minimum: 50%, 40°C
Operating temperature(°C)	0~+50
Storage temperature(°C)	–25~+85

E80 Chassis-type Piezo Controller



E80 chassis-type piezo controller is developed and designed for driving large quantities of PZT piezo actuators and piezo deformable mirror products. It has up to 156 output channels and can be controlled by CoreMorrow software via the Ethernet port with servo control function.

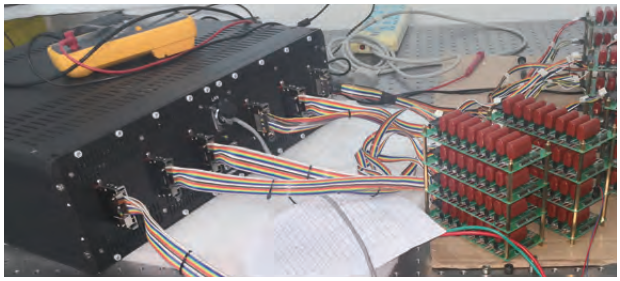
▸ Characteristics

- 26~156 channels output
- Output voltage -20~120V
- Computer software control
- Customizable

▸ Applications

- Phased array antenna
- PZT fiber phase modulation
- Deformable mirror
- Adaptive optics

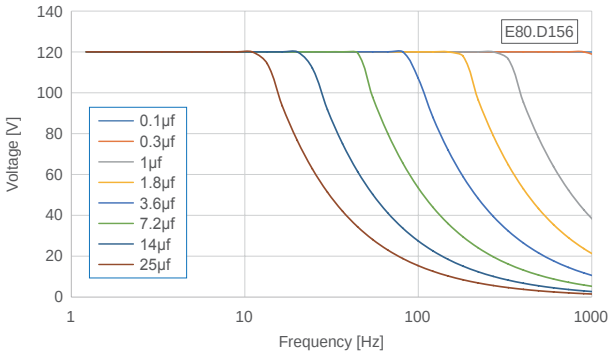
▸ Performance Test



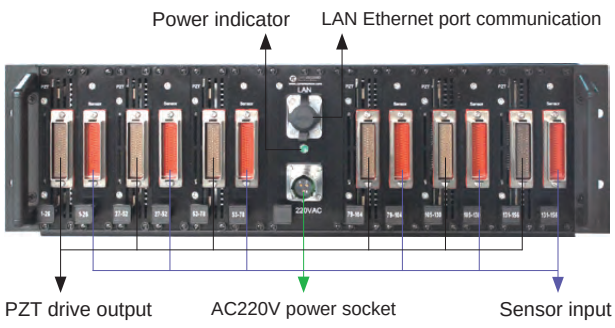
▸ Adapter connector



▸ Frequency vs Load Curve



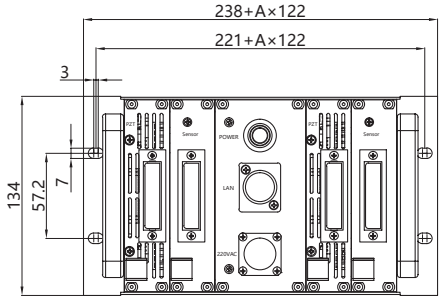
▸ Panel Interface

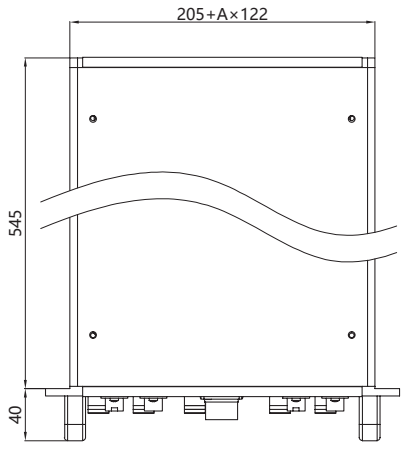


▸ Technical Data

Type	E80.D26-H	E80.D52-H	E80.D78-H	E80.D104-H	E80.D130-H	E80.D156-H
Channels	26	52	78	104	130	156
Output voltage (V)	-20~120(Optional -20~150)					
Resolution (mV)	5	5	5	5	5	5
Voltage ripple (mV)	10(RMS)	10(RMS)	10(RMS)	10(RMS)	10(RMS)	10(RMS)
Single-channel average current (mA)	30	30	30	30	30	30
Single-channel peak current (mA)	180	180	180	180	180	180
Bandwidth (kHz)	1	1	1	1	1	1
Protection	Overcurrent protection					
Output interface	J14A-74ZK1B(Optional)					
Sensor type	SGS	SGS	SGS	SGS	SGS	SGS
Servo	Analog P-I	Analog P-I	Analog P-I	Analog P-I	Analog P-I	Analog P-I
Sensor connector	J14A-74ZJ1B(Optional)					
Communication Interface	Ethernet					
AD acquisition	Software interface display					
Supply voltage	220V AC	220V AC	220V AC	220V AC	220V AC	220V AC
Power interface	JY27466T13E03SN-H					
Input power (W)	220 (Static use 85)	435 (Static use 170)	650 (Static use 250)	870 (Static use 335)	1085 (Static use 420)	1300 (Static use 500)
Weight (kg)(Adapter not included)	4	7.5	11	15	18.5	22
Size (mm)	standard 3U W238×H134×D545		standard 3U W360×H134×D545		standard 3U W482×H134×D545	
Temperature (°C)	0~+40	0~+40	0~+40	0~+40	0~+40	0~+40

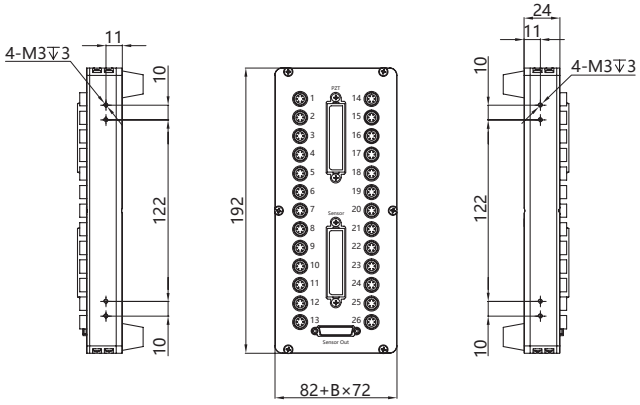
▸ Drawing





Channels	26	52	78	104	130	156	...
A	0		1		2		
B	0	1	2	3	4	5	

Junction Box



C47/E81 Chassis-type Piezo Controller



C47



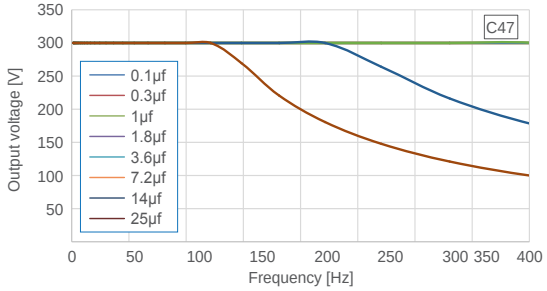
E81

Both C47 and E81 are high-power chassis-type piezo controllers that are ideally suited for driving and testing of large quantities of piezoceramics with adjustable frequency and output voltage.

The Difference between C47 and E81

Type	C47	E81
Output waveform	Square wave	Arbitrary waveform, depending on the analog input
Work mode	Pulse	Power amplification
Power	300W	300W
Output voltage	0~±300V	-20~150V

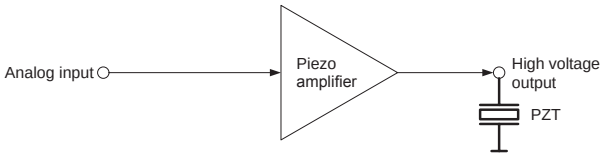
Output, Load and Frequency Curve



C47 Technical Data

Type	C47.K1AL	
Functions	Large power pulse	
Drive		
Channels	2	1
Output voltage(V)	Unipolar 0~300/0~-300	Bipolar -300~300
Peak current(mA)	3000	
Ave. current(mA)	1000	
Amplifier bandwidth(Hz)	300	
Output ripple(mVpp)	50	
Control input voltage(V)	AC 0~250	
Output voltage range(V)	Control input votlage × 1.4	
Input connector	JXZ-2 type terminal	
Output connector	JXZ-2 type terminal	
Interface and operation		
Communication	RS-232	
D/A converter	16 bit	
A/D converter	16 bit	
External feature	Film keyboard LCD display	
Software configuration	Standard computer software	
Output waveform type	Square wave	
Others		
Operating temperature(°C)	0~50	
Size(mm)	L343×H133×D343	
Power supply	220VAC 50Hz±10%	

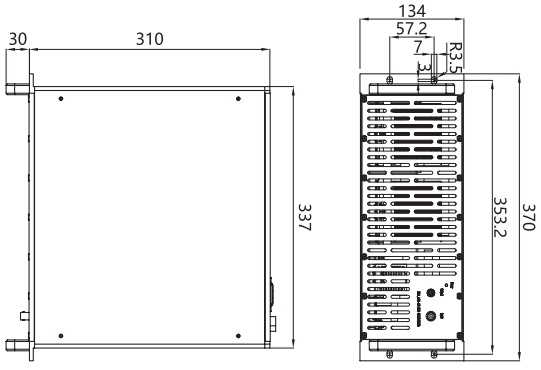
E81 Driving Principle



E81 Technical Data

Type	E81.A1K-H
Channels	1
Input voltage range(V)	-1.33~10
Output voltage range(V)	-20~150
Peak current(A)	>6
Ave. current(A)	2(±10%)
Gain	15
Amplifier bandwidth(kHz)	10
Ripple	20 mVpp(2.2μF)
Protection	
Operating temperature(°C)	0~50
Output current, short-circuit(mA)	80
Analog input connector	BNC-50KY female
PZT connector	ERA.0S.116.CTL
Power	
Power supply	220VAC
Power interface	IPZ-4
Static power(W)	<35
Shape	
Size(mm)	L370×H134×D310
Mass(g)	9180

E81 drawing



E81.A1K-I Chassis-type Piezo Controller



E81.A1K-I chassis-type piezo controller is designed for high power application, and has one output channel, its output voltage can be up to 200V and ave.current up to 5.4A.

▸ Characteristics

- High power output
- Output voltage to 200V
- Analog signal control
- Bandwidth to 5kHz

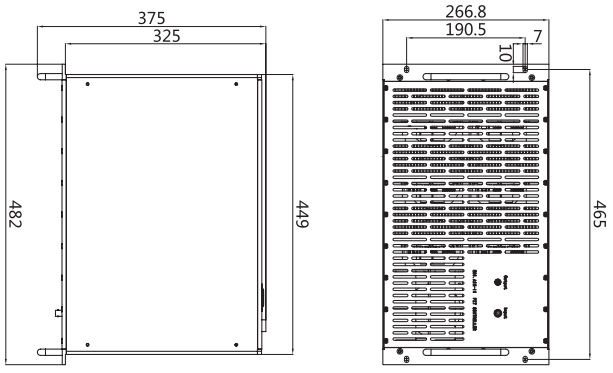
▸ Application

- Suitable for high power, high frequency application
- Driving piezo stack, piezo actuator, piezo transducer, etc.

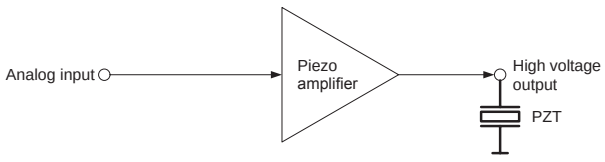
▸ Technical Data

Type	E81.A1K-I
Channels	1
Intput voltage range(V)	-1.33~10
Output voltage range(V)	0~200
Peak current(A)	>20
Ave. current(A)	5.4(±10%)
Gain	20
Bandwidth(kHz)	5
Ripple(mVpp)	20(@2.2μF)
Operating temperature(°C)	0~50
Output short-circuited current(mA)	60
PZT connector	EGG.2B.302.CLL
Analog input connector	BNC-50KY female
Power interface	IPZ-4
Power supply	220VAC
Static power(W)	≤55
Input power (W)	1480

▸ Drawing



▸ Driving Principle



E81.C6K-H Multi-channel Piezo Controller

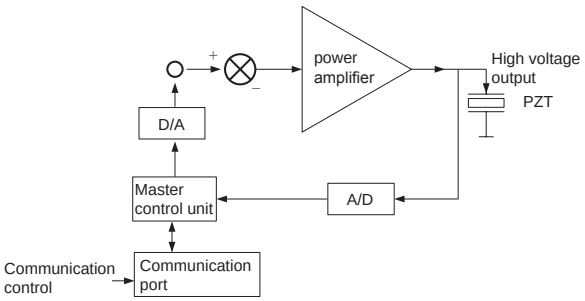


E81.C6K-H multi-channel piezo controller is a digital controller with 6 outputs that can drive 6 piezo actuators at the same time, and its baud rate is up to 5250000Baud.

Technical Data

Type	E81.C6K-H
Function	Piezo controller
Channels	6
Nominal output voltage(V)	-20~120
Peak current(mA)	1000/channel
Ave. Current(mA)	70/channel
Bandwidth(Hz)	10k/channel
Ripple(mVpp)	10/channel
PZT connector	EGG.0B.305.CLL
Communication port	RS-422(D-SUB9)
Band rate	9600, 115200, 256000, 1382400, 5250000
Operating temperature(°C)	-20 to 65
Storage temperature(°C)	-40 to 70
Humidity	Max: 80%, 30°C Minimum: 50%, 40°C
Size(mm)	335×205×44
Mass(kg)	2.35
Power supply	220V AC
Power interface	IEC socket

Principle

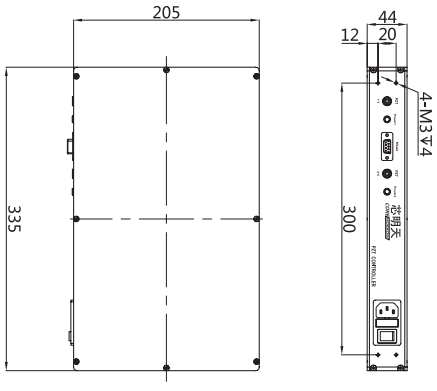


Panel Introduction

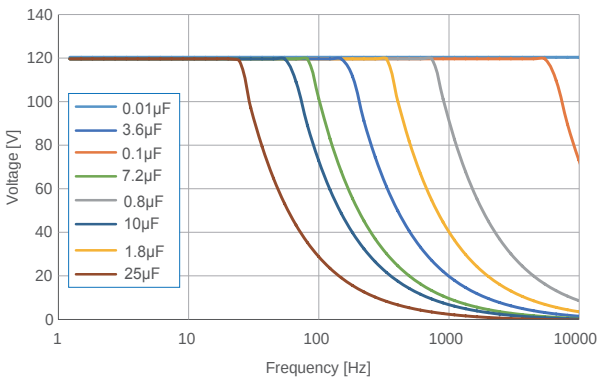


No.	Description
1	CH 1 to CH 3 voltage output interface
2	CH 1 to CH 3 power indicator
3	RS-422 communication interface
4	CH 4 to CH 6 voltage output interface
5	CH 4 to CH 6 power indicator
6	Power supply port
7	Power switch

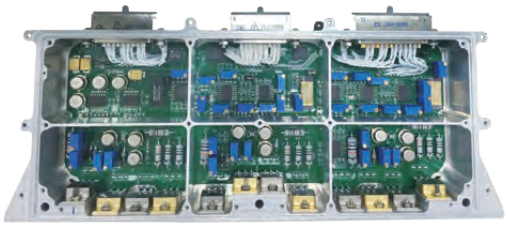
Drawing



Frequency, Voltage and Load Curve



E81-D Piezo Control Module



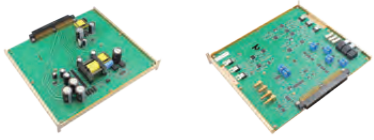
▸ Characteristics

Analog control, optional 3, 6 or 9 channels, could drive 1, 2 or 3 FSMs respectively.

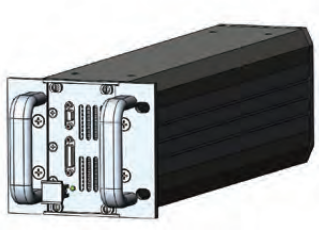
▸ Technical Data

Type	E81-D
Input	Analog input
Channels	3/6/9
Analog input voltage(V)	-0.67~5
Input impedance(KΩ)	100
Bandwidth(Hz)	1k
Output voltage(V)	-20~+150
Ripple(mVpp)	≤20
Peak current(mA/channel)	150
Ave. current(mA/channel)	50
Interface	DB scoket
Length×width(mm)	280×170
Height(mm)	30
Operating temperature(°C)	-45~80
Operating voltage	+170V, ±15V, -24V 0.2A
Protection	Over current, short circuit

▸ Customized Board-Type Piezo Controller

E80.A4K-I	E80.D3S-J	E80.D3S-I	E80.B6S-J	E80.B3S-I
				
4 channels, Open loop, Analog input	3 channels, Servo control, Driving FSM	3/6 channels, Driving FSM	6 channels, Servo control, Driving FSM	3 channels, Servo control Driving FSM

E82.A Chassis-type Piezo Controller





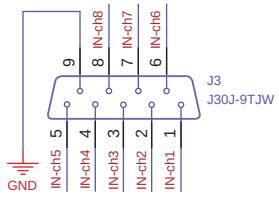
Characteristics

• 8/64 channel output • Analog input control • Output -20~150V • With handle, easy to install • Can drive PZT in optical fiber sensor

Technical Data

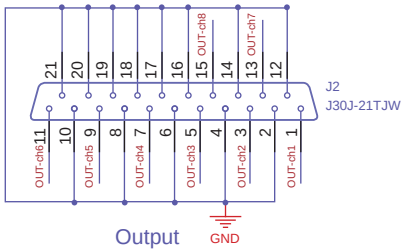
Type	E82.A8K-H	E82.A64K-H
Channels	8	64
Output voltage range(V)	-20~150	-20~150
Output voltage resolution(mV)	<5/channel	<5/channel
Control mode	Analog input	Analog input
Analog input voltage(V)	-0.67~5	-0.67~5
Ave. output power(W)	3/channel	3/channel
Ave. current	30mA	30mA
Peak current	300mA	300mA
Output bandwidth(kHz)	75(unloaded, 10V), 30(3nF load, 150V)	
Output ripple(mV)	<20	<20
Power supply	DC 28V 2A	DC 28V 15A
Power interface	WS20J2	WS20J2
Operating temperature(°C)	-20~+40	-20~+40
Analog input connector	J30J-9TJW	J30J-9TJW
Voltage output connector	J30J-21TJW	J30J-21TJW
Output protection	Current limit/over-current /over-temperature proof	
Size(mm)	330×89×103.2	Standard 19 inch 2U chassis, 449×330×89
Mass(kg)	2	13

Input & Output Interface Definition



1~8: Input CH1-CH8
9: Common GND

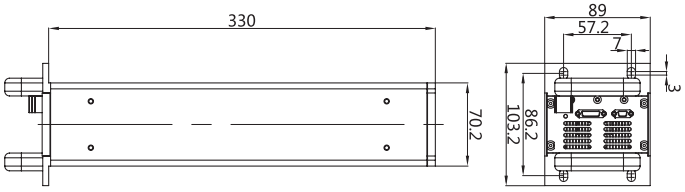
Input



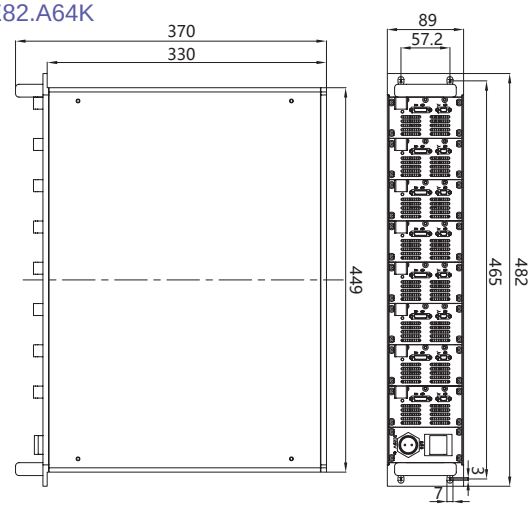
1, 3, 5, 7, 9, 11, 13, 15: CH1-CH8 Output
2, 4, 6, 8, 10, 12, 14, 16, 17-21: Common GND

Drawing

E82.A8K



E82.A64K



E82.C32K-H Chassis-type Piezo Controller



The 32-channel E82.C32K-H chassis-type piezo controller has USB communication interface to realize real-time communication with the host computer. The 32-channel voltage output can be controlled by the upper computer, and the real-time voltage can be read through the AD. It supports the secondary development of the upper computer software which can set voltage parameters.

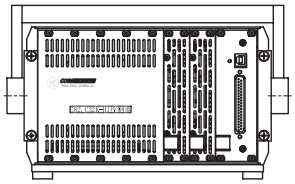
▸ Characteristics

• 32 channels • Ave. current up to 13mA/channel • USB communication • Bandwidth up to 1kHz • Support secondary development

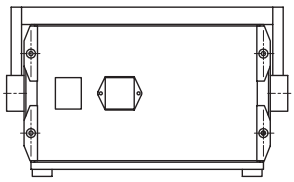
▸ Technical Data

Type	E82.C32K-H
Channels	32
Function	Piezo Controller
Output voltage(V)	-20~100
Communication	USB-B
Peak current(mA)	170/channel
Ave. current(mA)	13/channel
Bandwidth(Hz)	1k/channel
Ripple(mVpp)	10/channel
Operating temperature(°C)	0~50
Power supply	220VAC
PZT output connector	DB37
Size(mm)	280×370×175
Mass(kg)	12

▸ Panel Introduction



Front panel

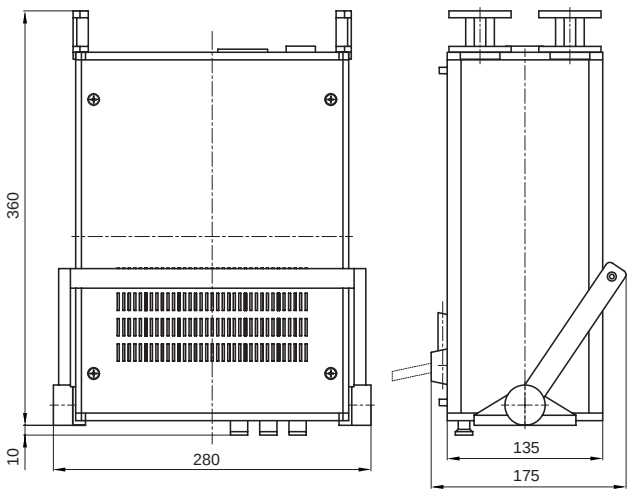


Rear panel

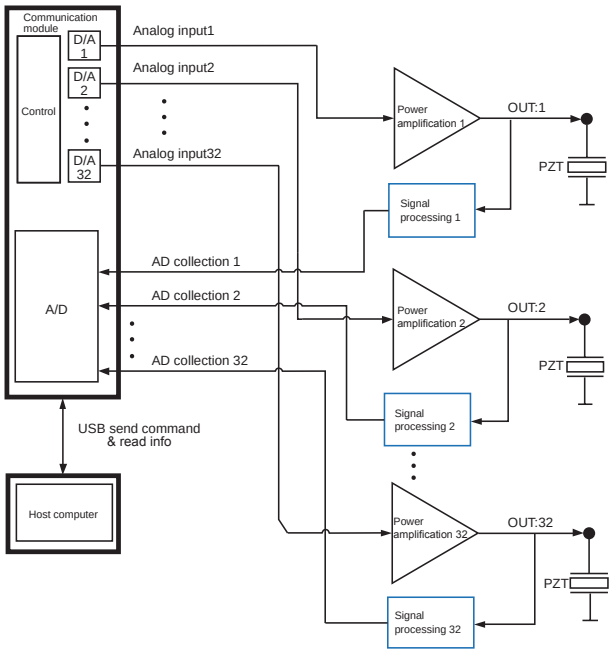
Identifier	Type	Front panel function
Power Indicator	LED	The light is always on, E82 works
Communication	USB	PC communication interface
Output ⚠	D-SUB 37 contacts output terminal	Output voltage signal

Identifier	Type	Rear panel function
Power outlet	AC-220A	Power connector socket
Rocker switch	KCD3-3104A	Power on and off

▸ Drawing



▸ Principle Diagram



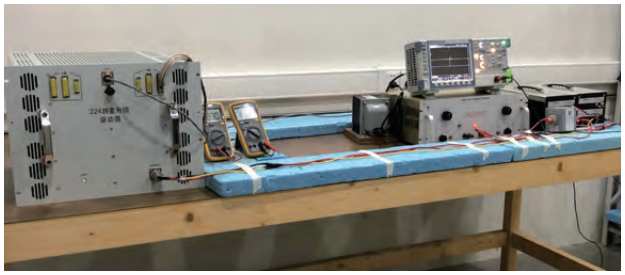
E82 Chassis-type Piezo Controller



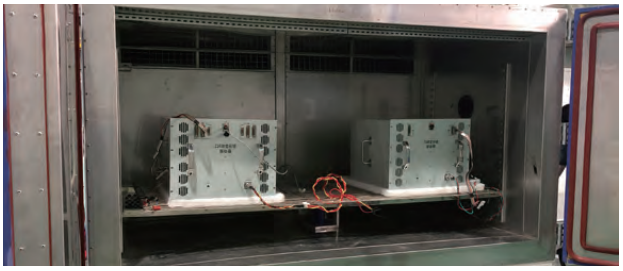


E82 is specially designed for driving PDMs. It is grouped into 4 types: 70-channel, 130-channel, 224-channel and 256-channel type. Due to the extreme working environment, the controller has passed very strict environmental experiments, such as salt spray test, mold test, damp heat test, electromagnetic compatibility test, vibration test, etc.

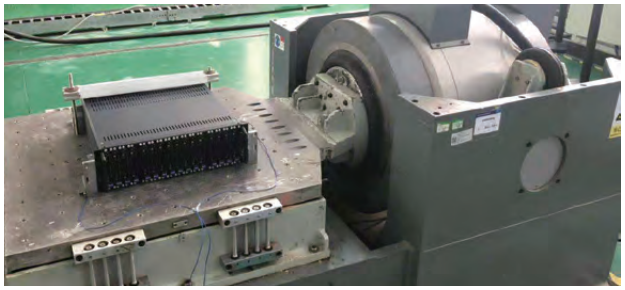
▸ Test



Electromagnetic Compatibility Test



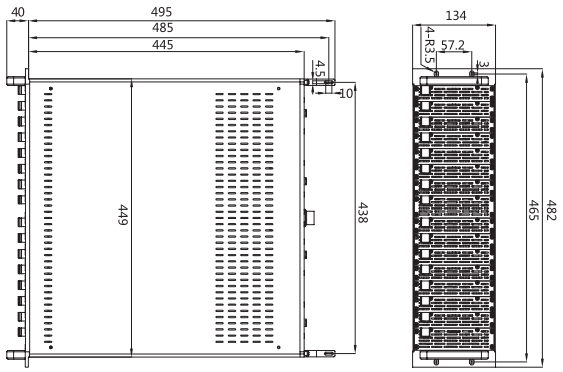
High and Low Temperature Test



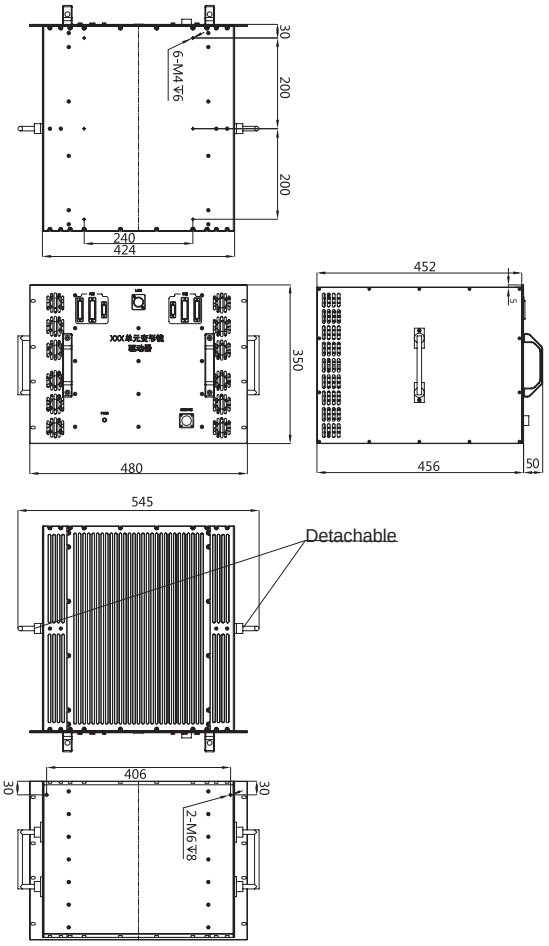
Vibration Test

▸ Drawing

E82.C256



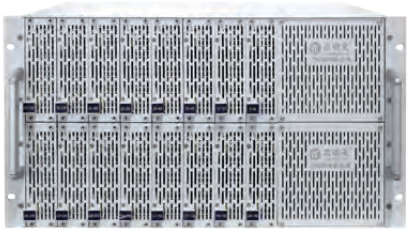
E82.C70/130/224



▶ Technical Data

Type	E82.C70K-I	E82.C130K-I	E82.C224K-I	E82.C256K-I
Channels	70	130	224	256
Output voltage(V)	-20~+120	±350	-20~+120	-20~+120
Output voltage resolution(mV)	5	25	5	5
Output voltage ripple(mV)	10(RMS)	20(RMS)	10(RMS)	10(RMS)
Ave. current/ channel(mA)	90	5	25	30
Peak current/ channel(mA)	300	15	80	90
Output bandwidth(kHz)	1	0.3	1	1
Protection	Over current	Over current	Over current	Over current
PZT output interface	J24H-52ZKH J24H-38ZKH (optional)	J24H-74ZKH (optional)	J24H-52ZKH J24H-74ZKH J24H-15ZKH (optional)	J24H-74ZKH (optional)
Communication	Ethernet port, HY9511180A	Ethernet port, HY9511180A	Ethernet port HY9511180A	Ethernet port, HY9511180A
AD gathering function	Software showed in	Software showed in	Software showed in	Software showed in
Power supply	AC 220V	AC 220V	AC 220V	AC 220V
Power interface	JY27467T13E03PN-H	JY27467T13E03PN-H	JY27467T13E03PN-H	JY27467T13E03PN-H
Input power(W)	1300	600	1000	1300
Mass(kg)	55	40	58	26
Size(mm)	19 inch, standard 8U, W480×H351×D506			19 inch, standard 3U W482×H134×D495
Operating temperture(°C)	-10~+40			
Store temperture(°C)	-25~+50			
Customization	Available			

E82.C256K-J Chassis-type Piezo Controller



E82.C256K-J chassis-type piezo controller is designed to drive PDMs and other products. It has 256 output channels, and use Ethernet communication design.

Characteristics

• 256 channels • -20~120V Continuously adjustable • Bandwidth up to 1.5kHz • Ethernet communication • Computer software control

Applications

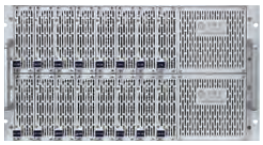
- Optical phase modulation
- Adaptive optics
- Phased-array antenna
- PMDs

Technical Data

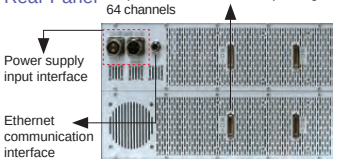
Model	E82.C256K-J
Output channels	256
Output voltage(V)	-20V~+120, continuously adjustable
Output voltage resolution(mV)	10
Output voltage ripple(mV)	<40
Voltage shock(V)	<2
Bandwidth(kHz)	1.5
Step time(ms)	110@(1.5kHz, 5V@6.8μF)
Full output power(kW)	2.7
Output protection	Overcurrent protection
Output interface	JONHON J24H-74ZKH
Communication interface	100M Ethernet
AD acquisition	Software display
Supply voltage	135V, 40A; 35V, 20A; 24V, 10A
Operating temperature(°C)	-10~40
Storage temperature(°C)	-20~50
Size(mm)	486×320×267
Mass(kg)	30
Cooling method	air-cooled heat dissipation
power supply module	E82.C256K-J-PW power supply
Customization	Available

Panel Introduction

Front Panel

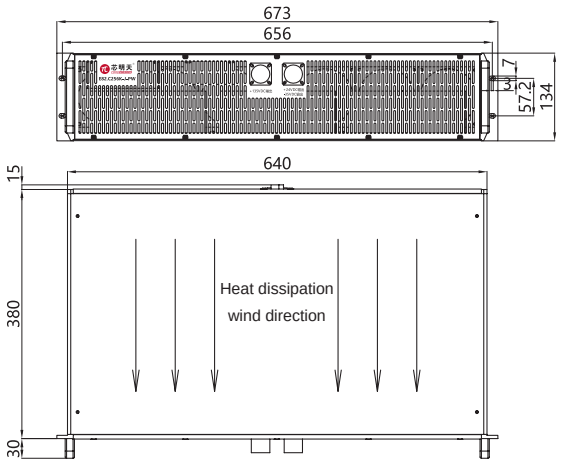


Rear Panel

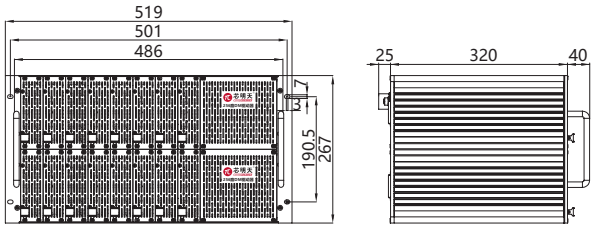


E82.C256K-J-PW Power Supply Module

To power E82.C256K-J Piezo Controller : Input voltage: 220V AC; Output voltage: 135V, 40A; 35V, 20A; 24V, 10A; Size as follows.



Drawing



E24/E40/E48/E112 Chassis-type Piezo Controller



CoreMorrow has a lot of experience in customizing piezoceramic controllers, and the professional R&D team can quickly provide the best solution for users. The controllers are specially designed for driving PDM and could be customized according to the customer's deformable mirror that requires the number of control channels, voltage, and control methods.

▸ Characteristics

Industrial/board/rack, control mode, input/output voltage, interface, size, channel number, operating environment, etc., can be customized.

▸ Technical Data

Type	E24	E40	E48	E112
Functions	Piezo Deformable Mirror Controller			
Control	Analog input			
Channels	24	40	48	112
Input range(V)	-10~+10	±5(difference)	-5~+10	±5(difference)
Knob(turns)	-	10	-	10
Input impedance(KΩ)	100			
Bandwidth(Hz)	1k			
Output voltage(V)	-300~+300	0~+300	-200~+400	0~+400
Ripple(mVpp)	≤30	≤5	≤30	≤10
Peak current(mA channel)	30	30	30	30
Ave. current(mA/channel)	10	5	5	5
Interface	BNC/LEMO	DB	51 core aviation plug	DB
Length×Width(mm)	433×308	365×308	433×308	510×380
Height	Standard 3U	Standard 6U	Standard 3U	Standard 6U
Operating temperature(°C)	-10~50			
Power supply	220VAC 50Hz±10%			
Protection	Overcurrent and short circuit protection			



E24



E40



E48



E112

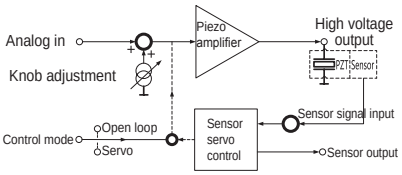
XE-650 Piezo Controller



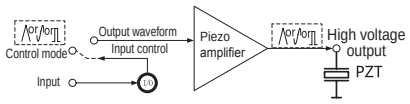
XE-650 piezoelectric ceramic controller is a small-volume single-channel piezo driver with -20~120V output voltage, which can be selected as analog input, spontaneous waveform or I/O port control, and open-loop/servo control model.

Principle

E50.S1AL

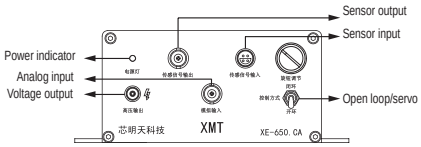


XE-650.OW

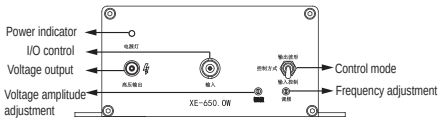


Panel Introduction

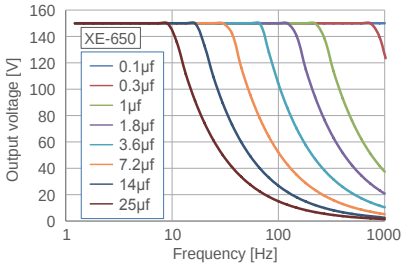
E50.S1AL



XE-650.OW



Frequency vs Load Curves



Technical Data

Type	XE-650.OW	E50.S1AL
Functions	Spontaneous waveform open -loop controller	Analog servo controller
Drive		
Output channels	1	1
Control analog input(V)	I/O control, 0 or 5	-1.67~10
Output voltage range(V)	-20~120(or -20~150) (sine wave / square wave or triangle wave)	-20~120
Peak current(mA)	150	165
Ave. current(mA)	50	50
Bandwidth(kHz)	1	8
Output ripple(mVpp)	20	<5
PZT output connector	ERA.00.250.CLL	ERA.00.250.CLL
Analog input connector	BNC-50KY female	BNC-50KY female
Control mode	I/O control	Analog input, knob adjustment
Sensor		
Sensor type	-	SGS
Servo characteristics	-	Analog P-I+notch filter
Sensor input connector	ERA.0S.304.CLL	ERA.0S.304.CLL
Sensor monitoring connector	BNC-50KY female	BNC-50KY female
Others		
Operating temperature(°C)	0~50	0~50
Size(mm)	L147×H61×D141	L147×H61×D141
Mass(kg)	1.2	1.3
Power supply	220VAC 50Hz±10%	220VAC 50Hz±10%

Custom Anti-Vibration Piezo Controller - E70.D3S-I2



Custom Piezo Controller



Motion Control Software

▸ Characteristics

- Easy to install
- Standard control software for each product
- Support for optical control
- Support for system integration with third-party devices
- Easy parameter adjustment
- Support secondary development

▸ Language and Software Environments

- C
- C++
- Visual C++
- VisualBasic
- LabVIEW
- MATLAB
- python
- JAVA

▸ Software functions

- Single point control
- Linear motion control
- Waveform control function
- Read controller support commands
- Computer display function
- Movement arrival prompt
- Controller cascade synchronization
- Offering to develop multi-dimensional motion control

The picture below shows a 100μm × 100μm Olympic icon by laser lithography controlled by CoreMomorrow motion control software.



▸ Main Interface



▸ Read System Information



High Precision Micrometer/Strain Sensor



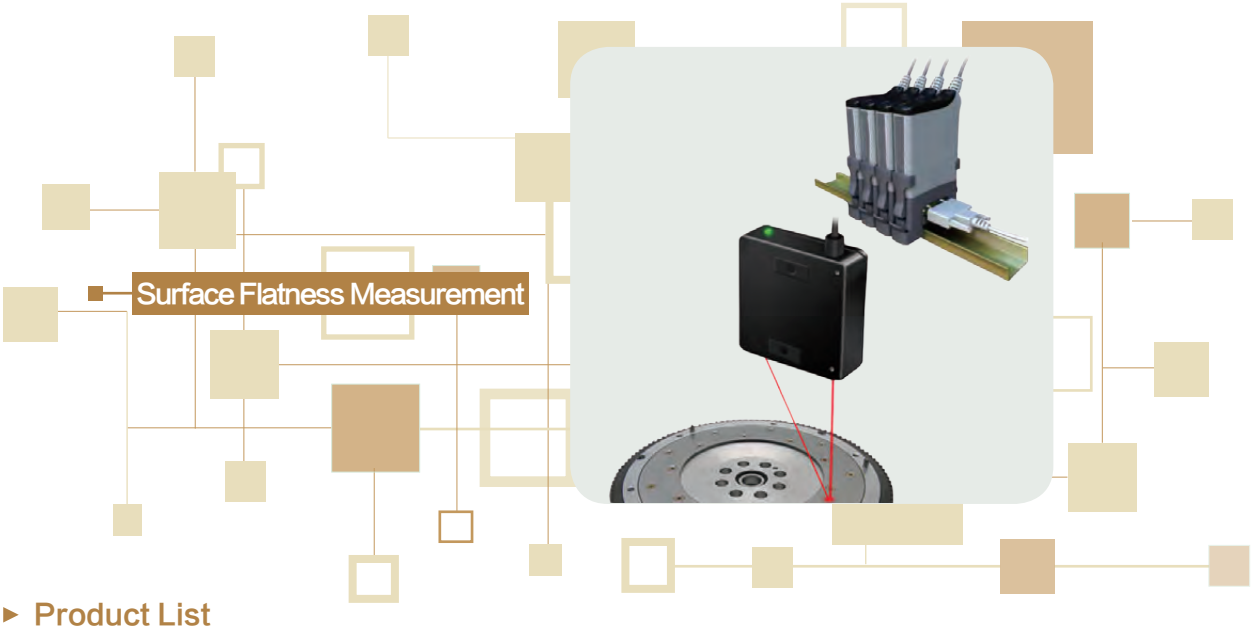






The micrometers are instruments with micrometer or millimeter measurement ranges with nano-level accuracy. They are grouped into inductive, capacitive and laser types and mainly used for high-precision measurement of length, thickness, depth, taper and other applications. Piezo strain sensor is used for force process monitoring. When subjected to deformation force, it outputs voltage signal.

▸ Applications



▸ Product List

Type	Appearance	Measure mode	Measuring range	Characteristics	Page
E75 LVDT		Inductive, Contact measurement	0~1mm	Digital rebound RS-485 serial port Touch screen display Voltage or 4~20mA optional	440
E01.CapX-X		Capacitive, Non-contact measurement	0~1mm	Modular design Output channel 1 to 6 optional Nanometer level measurement accuracy 0~10V voltage (analog) output monitoring	441
E00.CapX-X		Capacitive, Non-contact measurement	0~1mm	Modular design Output channel 7 to 12 optional Nanometer level measurement accuracy 0~10V voltage (analog) output monitoring	441
E75.Cap1-X		Capacitive, Non-contact measurement	0~1mm	Compact size 1 output channel Easy to integrate Nanometer level measurement accuracy	441
E09.Cap1-X		Capacitive, Non-contact measurement	0~1mm	Board-type 1 output channel With no power supply module Nanometer level measurement accuracy	441
Strain Sensor		Piezoelectric	100με	Sensitivity 40mV/με Low frequency lower limit 0.01Hz Temperature -40~85°C	463

▸ Application

- Length (depth, height, thickness, diameter, taper) measurement
- Vibration measurement
- Precision positioning system
- Optical fiber alignment position detection
- Micro-displacement detection
- Micro-manipulation robot position detection

E75 LVDT Displacement Measurement System



E75 LVDT displacement measurement system is a contact micrometer, through the inductive probe to detect the external displacement deformation, the measurement range of 0~1mm, accuracy is better than 100nm.

Characteristics

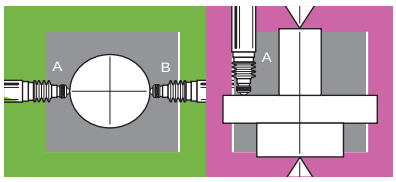
• Measuring range 0~1mm • Touch screen display • Resolution of 0.05 microns • Contact measurement • Touch screen control or PC software control

Touch screen

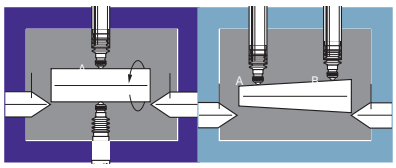


Typical Application

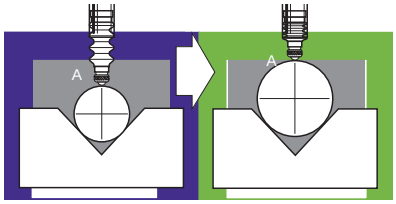
Length(depth, height, thickness, diameter, taper, etc.) measurement, vibration measurement, precision positioning system, micro-displacement detection, position detection, optical fiber alignment and etc that require micro-displacement detection.



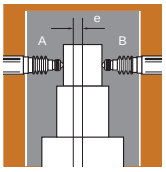
Diameter and flatness measure



Coaxiality and dimensionality measure

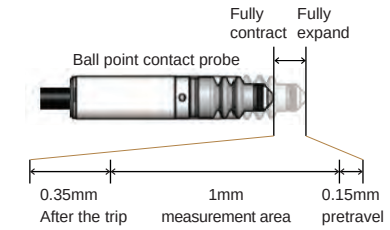


Scale factor

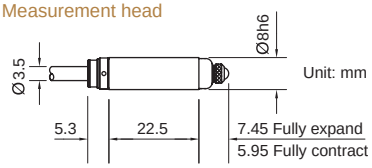


Eccentricity measure

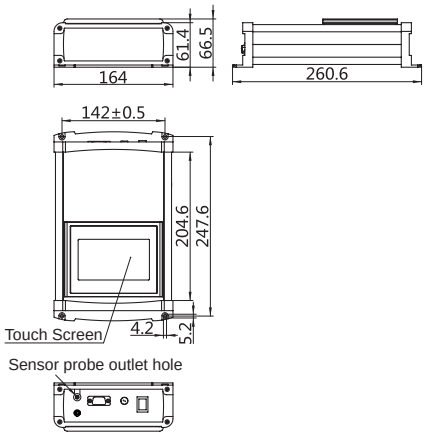
Contact Digital Probe



Measurement head



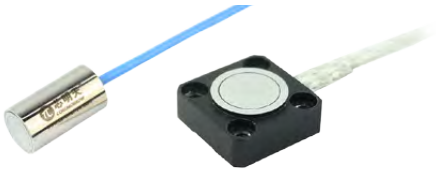
Drawing



Technical Data

Type	E75.LVDT-H
Measuring range(mm)	0~1
Channels	Single Channel
Resolution(μm)	0.05
Display update frequency	10times/s
Screen type	Touch
Display type	Digital rebound
Sensor reading rate	200 readings per second
Analog output(mA)	Voltage or 4~20 optional
Operating temperature(°C)	5~50
Storage temperature(°C)	-20~50°C
Accuracy (percentage of readings)	0.05% or 0.1μm, whichever is larger
Repeatability (worst case)	0.15μm, the difference between the maximum and minimum values of the carbide surface was measured several times when the lateral force was used for the bearing
Repeatability (typical)	0.05μm, one standard deviation of multiple measurements of cemented carbide surface results (68%)
pretravel(mm)	0.15
After the trip(mm)	0.35
Spring driven (force measurement in middle position)	0.70N±20%
Temperature drift coefficient of	0.01%FS/ºC
Probe life (number of runs)	100 million (without side load), more than 10 million in most applications
Probe shell material	Steel
Probe material	Tungsten carbide
Computer interface mode	RS-485
Power supply	24VDC 4A
Function	Data acquisition, storage, triggering, etc
Mass(g)	1285

Capacitive Displacement Measurement System



The capacitive sensing probe



The sensing and power supply modules

The capacitive displacement measurement system is a non-contact displacement measuring instrument, which consists of a capacitive sensing probe and a sensing and power supply module. It can measure small displacements within the range of 0-1mm with a measurement accuracy of up to nanometer level.

▸ Composition

CoreMorrow can provide capacitive sensing probe with multiple ranges, with a measurement range of 100μm~1mm available. It can be used in combination with any of sensing and power supply modules from the E09 chassis type, the E09 board type, or compact E75.



The capacitive sensing probe



E09 Chassis Type Sensing and Power Supply Module

Or



E75 Compact Sensing and Power Supply Module

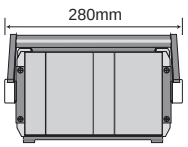
Or



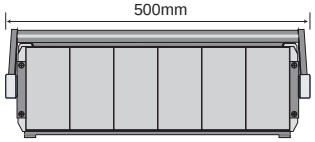
E09 Board-type Sensing and Power Supply Module(with no power supply module)

▸ The Drawing of the sensing and power supply modules

E09 Chassis Type Sensing and Power Supply Module

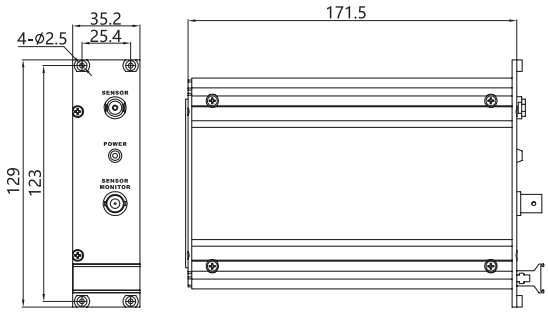


Suitable for channels 1~6

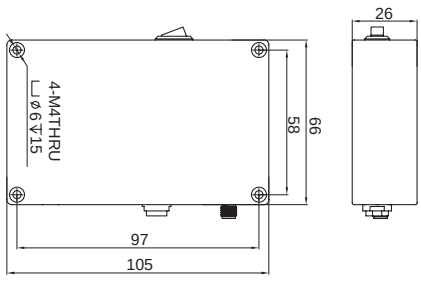


Suitable for channels 7~12

E09 Board-type Sensing and Power Supply Module (with no power supply module)

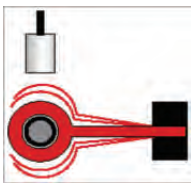


E75 Compact Sensing and Power Supply Module

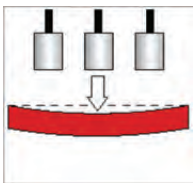


▸ Typical applications

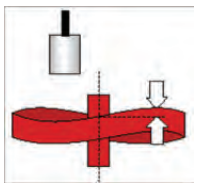
The capacitive displacement measurement system of CoreMorrow is suitable for high-precision positioning, angle/linear vibration measurement, thickness detection (film thickness measurement, wafer thickness measurement, brake disc thickness measurement, oil film thickness measurement, etc.), rotating machinery clearance measurement, jumping measurement (shaft jumping measurement, etc.), automatic focusing or zeroing, dielectric constant measurement, astronomical telescope lens positioning, outer diameter measurement, deformation measurement, etc.



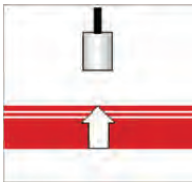
Vibration, amplitude, gap, beating



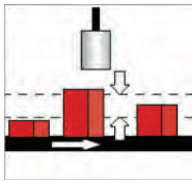
Deflection, deformation, waviness, inclination



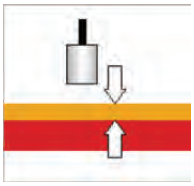
Distortion, deformation, axial vibration



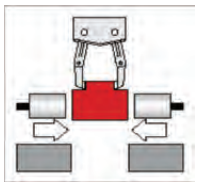
Displacement, distance, position, elongation



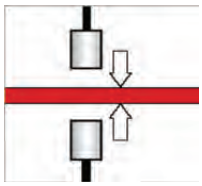
Size, tolerance,identification



Insulator thickness measur-ement



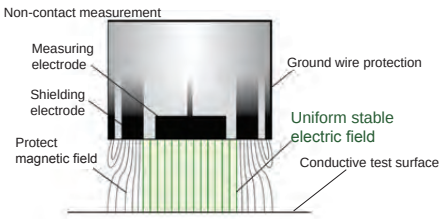
Online inspection, size inspection



Double-sided thickness detection

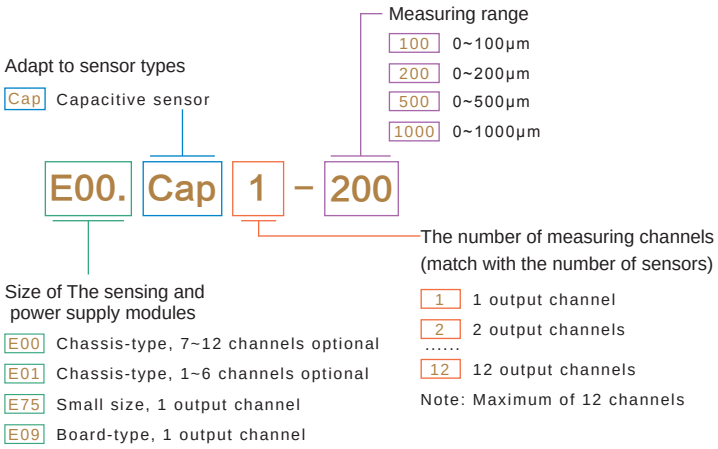
▶ Principle

It is based on the principle of an ideal parallel plate capacitor. The sensor and the measured target on the opposite side form two electrodes. The principle of guard ring capacitor is used to ensure that the sensor is still linear when measuring any metal.

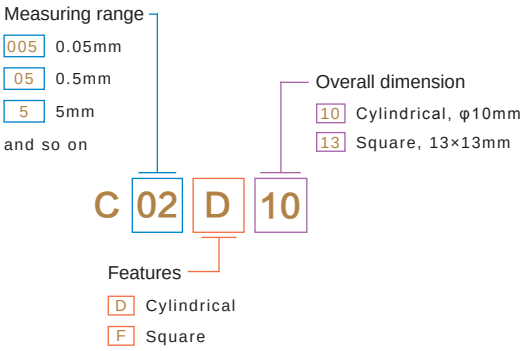


▶ Model Naming Rules

Capacitive Displacement Measurement System



The capacitive sensing probe



▶ 产品目录

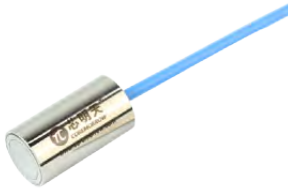
No.	Type	Measuring range [μm]	Channels	Capacitive probe				Sensing and power supply modules	Page
				Type	Resolution [nm]	Linearity [nm]	Repeatability [nm]		
1	E01.CapX[1]-100	0~100	1~6	C01D10	1.25	50	2.5	Chassis-type	443
2	E01.CapX[1]-200	0~200	1~6	C02D10	2.5	100	5		444
3		0~200	1~6	C02F13	2.5	100	5		445
4	E01.CapX[1]-500	0~500	1~6	C05D10	5	200	10		446
5	E01.CapX[1]-1000	0~1000	1~6	C1D10	10	400	20		447
6	E00.CapX[2]-100	0~100	7~12	C01D10	1.25	50	2.5		448
7	E00.CapX[2]-200	0~200	7~12	C02D10	2.5	100	5		449
8		0~200	7~12	C02F13	2.5	100	5		450
9	E00.CapX[2]-500	0~500	7~12	C05D10	5	200	10		451
10	E00.CapX[2]-1000	0~1000	7~12	C1D10	10	400	20		452
11	E75.Cap1-100	0~100	1	C01D10	1.25	50	2.5	Compact-type	453
12	E75.Cap1-200	0~200	1	C02D10	2.5	100	5		454
13		0~200	1	C02F13	2.5	100	5		455
14	E75.Cap1-500	0~500	1	C05D10	5	200	10		456
15	E75.Cap1-1000	0~1000	1	C1D10	10	400	20		457
16	E09.Cap1-100	0~100	1	C01D10	1.25	50	2.5	Board-type, without power supply modules	458
17	E09.Cap1-200	0~200	1	C02D10	2.5	100	5		459
18		0~200	1	C02F13	2.5	100	5		460
19	E09.Cap1-500	0~500	1	C05D10	5	200	10		461
20	E09.Cap1-1000	0~1000	1	C1D10	10	400	20		462

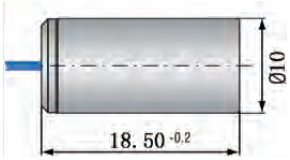
Note: [1]:The X represents the number of channels, ranging from 1 to 6;

[2]:The X represents the number of channels, ranging from 7 to 12.

Chassis Type Capacitive Displacement Measurement System

-100μm range (E01 chassis, 1~6 channels)





Probe size



▸ Characteristics

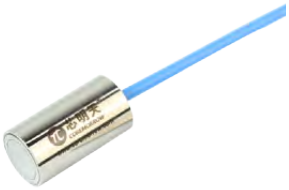
- Measuring range: 0~100μm
- Static resolution: 1.25nm
- Repeatability: 2.5nm
- 1~6 channels optional

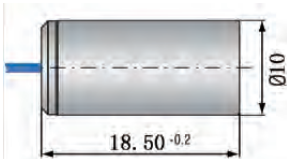
▸ Technical Data

Type		E01.CapX-100	Units
	Channels	1~6 optional	
Capacitive probe	Type	C01D10	
	Measuring range	0~100	μm
	Static resolution	1.25	nm
	Dynamic resolution(1kHz)	50	nm
	Linearity	50	nm
	Repeatability	2.5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	1~6 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	280×175 ×375	mm
Mass		≈7	kg±5%

Note: In the model E01.CapX-100, the X represents the number of channels, ranging from 1 to 6. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System
-200μm range (E01 chassis, 1~6 channels)





Probe size



▸ Characteristics

- Measuring range: 0~200μm
- Static resolution: 2.5nm
- Repeatability: 5nm
- 1~6 channels optional

▸ Technical Data

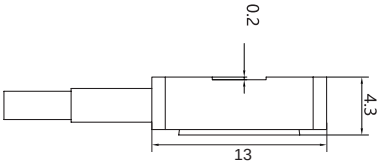
Type		E01.CapX-200	Units
	Channels	1~6 optional	
Capacitive probe	Type	C02D10	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	1~6 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	280×175 ×375	mm
	Mass	≈7	kg±5%

Note: In the model E01.CapX-200, the X represents the number of channels, ranging from 1 to 6. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System

-200μm range (E01 chassis, 1~6 channels)





Probe size



▸ Characteristics

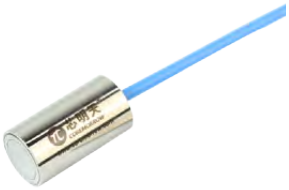
• Measuring range: 0~200μm • Static resolution: 2.5nm • Repeatability: 5nm • Square capacitive sensing probe • 1~6 channels optional

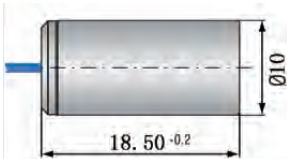
▸ Technical Data

Type		E01.CapX-200	Units
	Channels	1~6 optional	
Capacitive probe	Type	C02F13	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	9	mm
	Minimum target diameter	9	mm
	Sensor wire length	2	m
	Installation	Radial clamping	
	Probe size	13×13×4.3	mm
	Mass(wires and connectors included)	33	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	1~6 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	280×175 ×375	mm
Mass		≈7	kg±5%

Note: In the model E01.CapX-200, the X represents the number of channels, ranging from 1 to 6. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System
-500μm range (E01 chassis, 1~6 channels)





Probe size



▸ Characteristics

- Measuring range: 0~500μm
- Static resolution: 5nm
- Repeatability: 10nm
- 1~6 channels optional

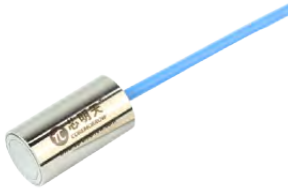
▸ Technical Data

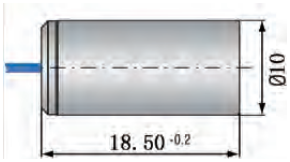
Type		E01.CapX-500	Units
	Channels	1~6 optional	
Capacitive probe	Type	C05D10	
	Measuring range	0~500	μm
	Static resolution	5	nm
	Dynamic resolution(1kHz)	200	nm
	Linearity	200	nm
	Repeatability	10	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	1~6 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	280×175 ×375	mm
Mass		≈7	kg±5%

Note: In the model E01.CapX-500, the X represents the number of channels, ranging from 1 to 6. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System

-1000μm range (E01 chassis, 1~6 channels)





Probe size



▸ Characteristics

- Measuring range: 0~1000μm
- Static resolution: 10nm
- Repeatability: 20nm
- 1~6 channels optional

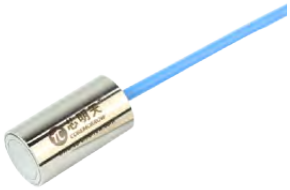
▸ Technical Data

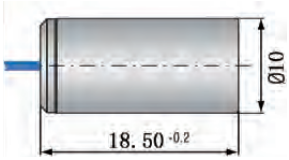
Type		E01.CapX-1000	Units
	Channels	1~6 optional	
The capacitive probe	Type	C1D10	
	Measuring range	0~1000	μm
	Static resolution	10	nm
	Dynamic resolution(1kHz)	400	nm
	Linearity	400	nm
	Repeatability	20	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	1~6 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	280×175 ×375	mm
Mass		≈7	kg±5%

Note: In the model E01.CapX-1000, the X represents the number of channels, ranging from 1 to 6. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System

-100μm range (E00 chassis, 7~12 channels)





Probe size



▸ Characteristics

- Measuring range: 0~100μm
- Static resolution: 1.25nm
- Repeatability: 2.5nm
- 7~12 channels optional

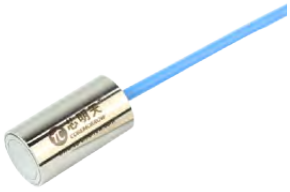
▸ Technical Data

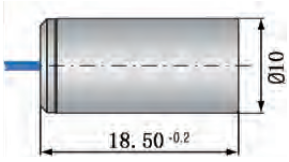
Type		E00.CapX-100	Units
	Channels	7~12 optional	
Capacitive probe	Type	C01D10	
	Measuring range	0~100	μm
	Static resolution	1.25	nm
	Dynamic resolution(1kHz)	50	nm
	Linearity	50	nm
	Repeatability	2.5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	7~12 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	500×175 ×375	mm
	Mass	≈12	kg±5%

Note: In the model E00.CapX-100, the X represents the number of channels, ranging from 7 to 12. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System

-200μm range (E00 chassis, 7~12 channels)





Probe size



▸ Characteristics

- Measuring range: 0~200μm
- Static resolution: 2.5nm
- Repeatability: 5nm
- 7~12 channels optional

▸ Technical Data

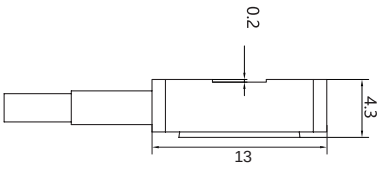
Type		E00.CapX-200	Units
	Channels	7~12 optional	
Capacitive probe	Type	C02D10	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	7~12 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	500×175 ×375	mm
	Mass	≈12	kg±5%

Note: In the model E00.CapX-200, the X represents the number of channels, ranging from 7 to 12. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System

-200μm range (E00 chassis, 7~12 channels)





Probe size



▸ Characteristics

• Measuring range: 0~200μm • Static resolution: 2.5nm • Repeatability: 5nm • Square capacitive sensing probe • 7~12 channels optional

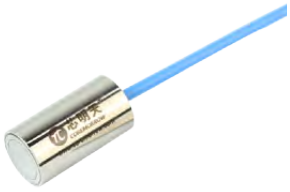
▸ Technical Data

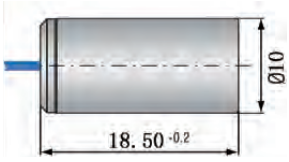
Type		E00.CapX-200	Units
	Channels	7~12 optional	
Capacitive probe	Type	C02F13	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	9	mm
	Minimum target diameter	9	mm
	Sensor wire length	2	m
	Installation	Radial clamping	
	Probe size	13×13×4.3	mm
	Mass(wires and connectors included)	33	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	7~12 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	500×175 ×375	mm
	Mass	≈12	kg±5%

Note: In the model E00.CapX-200, the X represents the number of channels, ranging from 7 to 12. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System

−500μm range (E00 chassis, 7~12 channels)





Probe size



▸ Characteristics

- Measuring range: 0~500μm
- Static resolution: 5nm
- Repeatability: 10nm
- 7~12 channels optional

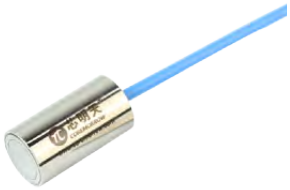
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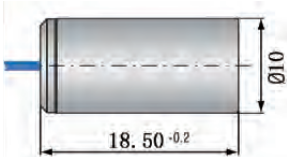
Type		E00.CapX-500	Units
	Channels	7~12 optional	
Capacitive probe	Type	C05D10	
	Measuring range	0~500	μm
	Static resolution	5	nm
	Dynamic resolution(1kHz)	200	nm
	Linearity	200	nm
	Repeatability	10	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	7~12 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	500×175 ×375	mm
Mass		≈12	kg±5%

Note: In the model E00.CapX-500, the X represents the number of channels, ranging from 7 to 12. Preheating time is about 30 minutes.

Chassis Type Capacitive Displacement Measurement System

-1000μm range (E00 chassis, 7~12 channels)





Probe size



▸ Characteristics

- Measuring range: 0~1000μm
- Static resolution: 10nm
- Repeatability: 20nm
- 7~12 channels optional

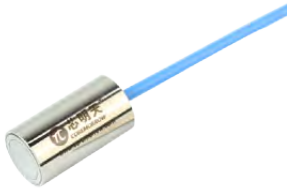
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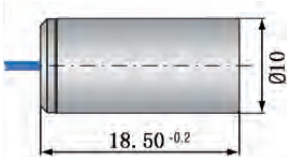
Type		E00.CapX-1000	Units
	Channels	7~12 optional	
Capacitive probe	Type	C1D10	
	Measuring range	0~1000	μm
	Static resolution	10	nm
	Dynamic resolution(1kHz)	400	nm
	Linearity	400	nm
	Repeatability	20	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensing and Signal Processing	Type	E09.Cap1-100	
	Sensor type	CAP	
	Sensor channels	1	
	The numbers of module	7~12 (depending on the number of channels)	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Sensor output interface	BNC	
	Voltage output range(analog)	0~10	V
Chassis&power supply module	Power supply	AC 220V±10,50Hz±10%	
	Size(L×H×D)	500×175 ×375	mm
Mass		≈12	kg±5%

Note: In the model E00.CapX-1000, the X represents the number of channels, ranging from 7 to 12. Preheating time is about 30 minutes.

Compact Capacitive Displacement Measurement System

–100μm range, 1 output channel





Probe size



▸ Characteristics

• Measuring range: 0~100μm • Static resolution: 1.25nm • Repeatability: 2.5nm • Compact size, 1 output channel

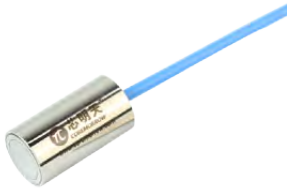
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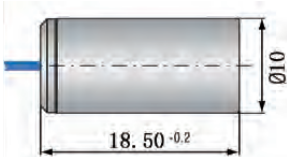
Type		E75.Cap1-100	Units
	Channels	1	
Capacitive probe	Type	C01D10	
	Measuring range	0~100	μm
	Static resolution	1.25	nm
	Dynamic resolution(1kHz)	50	nm
	Linearity	50	nm
	Repeatability	2.5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Type	E75.CapA1-H	
	Sensor type	CAP	
	Sensor channels	1	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	24V DC/±50mA	V
	Voltage output range(analog)	0~10	V
	Sensor output interface	SMA	
	Size(L×W×D)	105×26×66	mm
	Mass	180	g±5%

Note: Preheating time is about 30 minutes.

Compact Capacitive Displacement Measurement System

−200μm range, 1 output channel





Probe size



▸ Characteristics

- Measuring range: 0~200μm
- Static resolution: 2.5nm
- Repeatability: 5nm
- Compact size, 1 output channel

▸ Technical Data

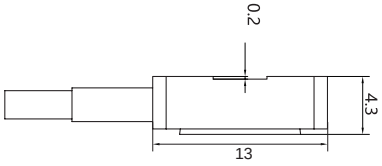
Type		E75.Cap1-200	Units
	Channels	1	
Capacitive probe	Type	C02D10	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Type	E75.CapA1-H	
	Sensor type	CAP	
	Sensor channels	1	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	24V DC/±50mA	V
	Voltage output range(analog)	0~10	V
	Sensor output interface	SMA	
	Size(L×W×D)	105×26×66	mm
	Mass	180	g±5%

Note: Preheating time is about 30 minutes.

Compact Capacitive Displacement Measurement System

−200μm range, 1 output channel





Probe size



▸ Characteristics

• Measuring range: 0~200μm • Static resolution: 2.5nm • Repeatability: 5nm • Square capacitive sensing probe • Compact size, 1 output channel

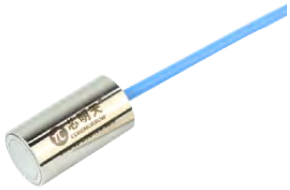
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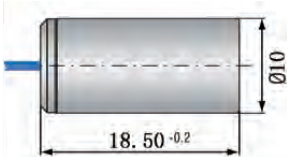
Type		E75.Cap1-200	Units
	Channels	1	
Capacitive probe	Type	C02F13	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	9	mm
	Minimum target diameter	9	mm
	Sensor wire length	2	m
	Installation	Radial clamping	
	Probe size	13×13×4.3	mm
	Mass(wires and connectors included)	33	g
Sensor signal processing and power supply	Type	E75.CapA1-H	
	Sensor type	CAP	
	Sensor channels	1	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	24V DC/±50mA	V
	Voltage output range(analog)	0~10	V
	Sensor output interface	SMA	
	Size(L×W×D)	105×26×66	mm
	Mass	180	g±5%

Note: Preheating time is about 30 minutes.

Compact Capacitive Displacement Measurement System

–500μm range, 1 output channel





Probe size



▸ Characteristics

- Measuring range: 0~500μm
- Static resolution: 5nm
- Repeatability: 10nm
- Compact size, 1 output channel

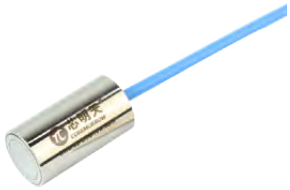
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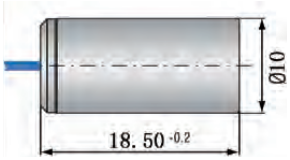
Type		E75.Cap1-500	Units
	Channels	1	
Capacitive probe	Type	C05D10	
	Measuring range	0~500	μm
	Static resolution	5	nm
	Dynamic resolution(1kHz)	200	nm
	Linearity	200	nm
	Repeatability	10	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Type	E75.CapA1-H	
	Sensor type	CAP	
	Sensor channels	1	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	24V DC/±50mA	V
	Voltage output range(analog)	0~10	V
	Sensor output interface	SMA	
	Size(L×W×D)	105×26×66	mm
	Mass	180	g±5%

Note: Preheating time is about 30 minutes.

Compact Capacitive Displacement Measurement System

–1000μm range, 1 output channel





Probe size



▸ Characteristics

- Measuring range: 0~1000μm
- Static resolution: 10nm
- Repeatability: 20nm
- Compact size, 1 output channel

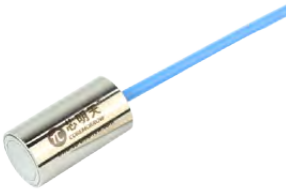
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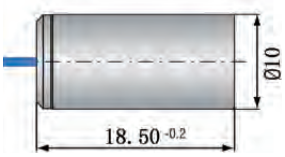
Type		E75.Cap1-1000	Units
	Channels	1	
Capacitive probe	Type	C1D10	
	Measuring range	0~1000	μm
	Static resolution	10	nm
	Dynamic resolution(1kHz)	400	nm
	Linearity	400	nm
	Repeatability	20	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Type	E75.CapA1-H	
	Sensor type	CAP	
	Sensor channels	1	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	24V DC/±50mA	V
	Voltage output range(analog)	0~10	V
	Sensor output interface	SMA	
	Size(L×W×D)	105×26×66	mm
	Mass	180	g±5%

Note: Preheating time is about 30 minutes.

Board-type Capacitive Displacement Measurement System

-100μm range, 1 output channel, with no power supply module





Probe size



▸ Characteristics

• Measuring range: 0~100μm • Static resolution: 1.25nm • Repeatability: 2.5nm • 1 output channel • Require external power supply

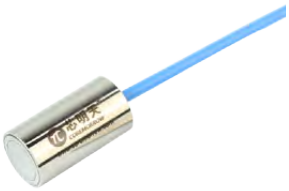
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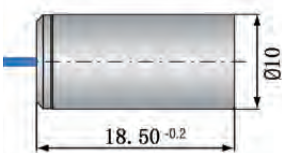
Type		E09.Cap1-100 (without power supply)	Units
	Channels	1	
Capacitive probe	Type	C01D10	
	Measuring range	0~100	μm
	Static resolution	1.25	nm
	Dynamic resolution(1kHz)	50	nm
	Linearity	50	nm
	Repeatability	2.5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Sensor channels	1	
	Sensor type	CAP	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	Prepare on your own, AC 220V±10%50Hz±10%	
	Voltage output range(analog)	0~10	V
	Sensor output interface	BNC	
	Size(L×W×D)	35.2×129×171.5	mm

Note: This board-type CAP Micrometer does not have a power supply module and requires external power supply. Preheating time is about 30 minutes.

Board-type Capacitive Displacement Measurement System

-200μm range, 1 output channel, with no power supply module





Probe size



▸ Characteristics

• Measuring range: 0~200μm • Static resolution: 2.5nm • Repeatability: 5nm • 1 output channel • Require external power supply

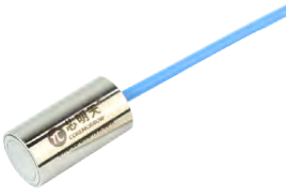
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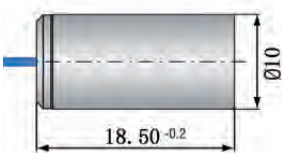
Type		E09.Cap1-200 (without power supply)	Units
	Channels	1	
Capacitive probe	Type	C02D10	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Sensor channels	1	
	Sensor type	CAP	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	Prepare on your own, AC 220V±10%50Hz±10%	
	Voltage output range(analog)	0~10	V
	Sensor output interface	BNC	
	Size(L×W×D)	35.2×129×171.5	mm

Note: This board-type CAP Micrometer does not have a power supply module and requires external power supply. Preheating time is about 30 minutes.

Board-type Capacitive Displacement Measurement System

-200μm range, 1 output channel, with no power supply module





Probe size



▸ Characteristics

- Measuring range: 0~200μm
- Static resolution: 2.5nm
- Repeatability: 5nm
- 1 output channel
- Require external power supply
- Square capacitive sensing probe

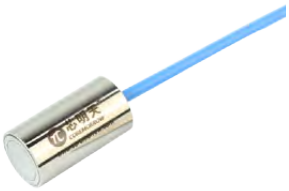
▸ Technical Data

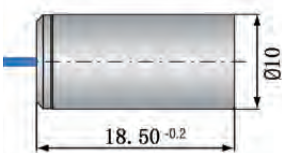
Type		E09.Cap1-200 (without power supply)	Units
	Channels	1	
Capacitive probe	Type	C02F13	
	Measuring range	0~200	μm
	Static resolution	2.5	nm
	Dynamic resolution(1kHz)	100	nm
	Linearity	100	nm
	Repeatability	5	nm
	Sensor diameter	9	mm
	Minimum target diameter	9	mm
	Sensor wire length	2	m
	Installation	Radial clamping	
	Probe size	13×13×4.3	mm
	Mass(wires and connectors included)	33	g
Sensor signal processing and power supply	Sensor channels	1	
	Sensor type	CAP	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	Prepare on your own, AC 220V±10%50Hz±10%	
	Voltage output range(analog)	0~10	V
	Sensor output interface	BNC	
	Size(L×W×D)	35.2×129×171.5	mm

Note: This board-type CAP Micrometer does not have a power supply module and requires external power supply. Preheating time is about 30 minutes.

Board-type Capacitive Displacement Measurement System

-500μm range, 1 output channel, with no power supply module





Probe size



▸ Characteristics

• Measuring range: 0~500μm • Static resolution: 5nm • Repeatability: 10nm • 1 output channel • Require external power supply

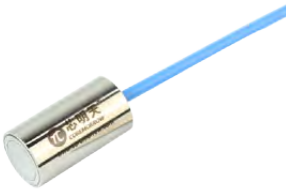
▸ Technical Data

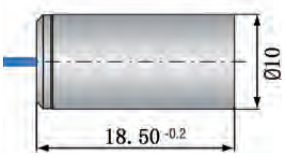
Type		E09.Cap1-500 (without power supply)	Units
	Channels	1	
Capacitive probe	Type	C05D10	
	Measuring range	0~500	μm
	Static resolution	5	nm
	Dynamic resolution(1kHz)	200	nm
	Linearity	200	nm
	Repeatability	10	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Sensor channels	1	
	Sensor type	CAP	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	Prepare on your own, AC 220V±10%50Hz±10%	
	Voltage output range(analog)	0~10	V
	Sensor output interface	BNC	
	Size(L×W×D)	35.2×129×171.5	mm

Note: This board-type CAP Micrometer does not have a power supply module and requires external power supply. Preheating time is about 30 minutes.

Board-type Capacitive Displacement Measurement System

-1000μm range, 1 output channel, with no power supply module





Probe size



▸ Characteristics

• Measuring range: 0~1000μm • Static resolution: 10nm • Repeatability: 20nm • 1 output channel • Require external power supply

▸ Technical Data

Type		E09.Cap1-1000 (without power supply)	Units
	Channels	1	
Capacitive probe	Type	C1D10	
	Measuring range	0~1000	μm
	Static resolution	10	nm
	Dynamic resolution(1kHz)	400	nm
	Linearity	400	nm
	Repeatability	20	nm
	Sensor diameter	10	mm
	Minimum target diameter	10	mm
	Sensor wire length	1.5	m
	Installation	Radial clamping	
	Probe size	Φ10×18.5	mm
	Mass(wires and connectors included)	55	g
Sensor signal processing and power supply	Sensor channels	1	
	Sensor type	CAP	
	Static resolution	0.00125	%F.S.
	Dynamic resolution(2kHz)	0.05	%F.S.
	Analog signal output speed	2	kHz
	Absolute error	±0.2	%F.S.
	Linearity	0.05	%F.S.
	Repeatability	0.0025	%F.S.
	Signal temperature stability	<0.005	%FSO/°C
	Long-term stability	<0.004	%FSO/month
	Bandwidth	2	kHz(-3dB)
	Operating temperature	-10~+50	°C
	Storage temperature	-10~+75	°C
	Ambient humidity	<85	%
	Power supply	Prepare on your own, AC 220V±10%50Hz±10%	
	Voltage output range(analog)	0~10	V
	Sensor output interface	BNC	
	Size(L×W×D)	35.2×129×171.5	mm

Note: This board-type CAP Micrometer does not have a power supply module and requires external power supply. Preheating time is about 30 minutes.

Strain Sensor



Strain sensors are mainly used to measure the deformation of a structural surface. Generally, during the entire process of applying force, the mechanical load-bearing structure will be strained by a tensile or compressive force greater or lesser than the required force. The strain sensor can perform indirect dynamic and quasi-static force measurement on it, and the relationship between the force and strain is linear enough to effectively meet the requirements of accurate measurement and monitoring. When using strain for indirect measurement, the force split can be close to 99%, much higher than direct measurement.

Strain sensors can be used for process monitoring of force, such as welding force monitoring. The sensor is equipped with electronics and IEPE interface. The converter type is 10-32UNF.

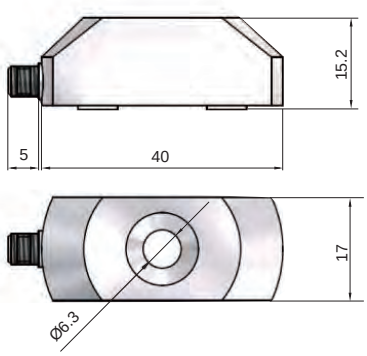
▸ Characteristics

• Sensitivity: 40mV/με • Lower limit of low frequency: 0.01Hz • Acceleration compensation • Application: process monitor of force

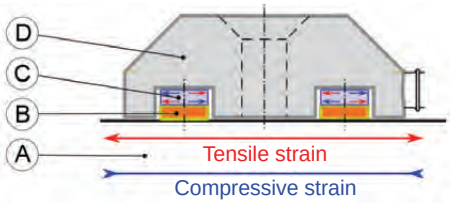
▸ Mounting & Force Monitor



▸ Drawing



▸ Structure



A. The measured mechanical structure is used to be stretched or compressed cyclically.

B. The two contact feet (yellow area) of the strain sensor transmit the structural strain to the sensor and the piezo element through friction to measure the shear force.

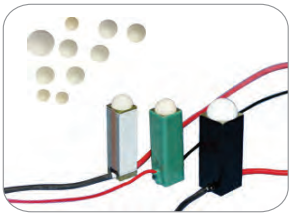
C . Piezo measuring element generates an electric charge proportional to the applied shear force.

D. The sensor housing or body, similar to a spring, converts strain into a corresponding proportional force.

▸ Technical Data

Parameter	Typical value	Units
Measurement parameters	Deformation in the direction of the longer axis	
Sensitivity	40	mV/με at room temperature +20%/-10%
Polarity	Positive voltage when tension is applied	
Low frequency lower limit	0.01	Hz
Resonant frequency	14.7	kHz
Dynamic range	100	με
Connector	Coaxial 10-32 UNF	
Power current	4(min 2, max 20)	mA
DC bias voltage	12(min 8, max 14)	V
DC bias stable	60	s
Mounting thread	M6×20, tapered head	
Mounting torque	5(min 3, max 10)	Nm
Operating temperature	-40~+85	°C
Mass	50	g±5%

Accessories



Piezo adapter



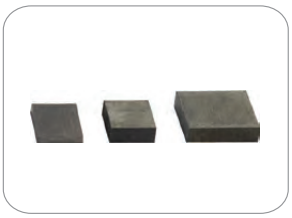
AIO adapter



Metal adapter



Actuator flexible adapter



Tungsten steel gasket



Thermally stable heat sink



Actuator and platform adapter



Actuator test stand



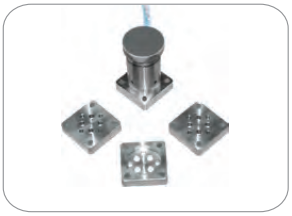
Mirror adhesive



P34 mirror adapter



P32/P34 mirror adapter



P32/P34 mirror adapter



S22 test stand



P32/P33 test stand



S34 test stand



S54 test stand



BNC to LEMO



BNC to fish clip



LEMO seat to fish clip



LEMO cable



BNC connector to fish clip



LEMO connector



Test stand



Magnetic stand

Challenge the Limits of Nano Motion and Control Technology...

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