



N81K13T60 Optical Mount with Piezo Linear Actuator

User Manual

Version: V1.0



This user manual describes the following products:

- N81K13T60 optical mount with piezo linear actuator

Declaration

Thank you very much for choosing CoreMorrow's products!

For your smooth and correct use of this product, please read this manual carefully before use, and follow the relevant instructions in the manual for installation and use. Improper operation may cause damage to the product and/or injury to the operator, so it is required that the entire installation and operation process should be completed by professionals with a certain foundation and a certain understanding of product principles, or under the guidance of a professional.

If you disassemble or transform the product without permission, our company will not be responsible for any consequences arising therefrom.

To change the product model and other false sales of our company's products are illegal, users should be vigilant. Once found, you should actively report or contact our company, jointly crack down on illegal acts, and prevent fraud and economic losses. CoreMorrow will investigate for the legal responsibility of the illegal subject and related parties.

With the continuous development and innovation of technology, CoreMorrow will timely add the latest information to the manual as required. If you need, please contact us, or to our website (<http://www.coremorrow.com/en>) for download, we apologize for any inconvenience caused to you.

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1. Introduction

1.1. Purpose and content

- The manual is mainly for smooth and correct use of N81K13T60 optical mount with piezo linear actuator.
- The manual contains all the necessary information for N81K13T60 optical mount with piezo linear actuator.
- The manual contains the introduction of the precautions during installation and use.

1.2. Symbol and meaning

Symbol	Meaning
	DANGER: Improper handling may could cause injury to the operator.
	Attention: Improper handling can cause damage to the equipment.
	No order between items.
1. 2.	Please operating in order.

1.3. Users of This Manual

The default user of this manual has knowledge of optical mount with piezo linear actuator and supporting controllers, and has a certain basis for their installation and use.

1.4. User manual notes

- When using the optical mount with piezo linear actuator and supporting piezo controller, the user manual should be placed near the system for easy reference in time. If the user manual is lost or damaged, please contact to our customer service department.
- If your user manual is incomplete, it will miss a lot of important information, may cause serious or fatal injuries, and cause property damage.
- You have read and understood the contents of the user manual before installing and operating the optical mount with piezo linear actuator and supporting piezo controller.
- Our company's official website (<http://www.coremorrow.com/en>) provides the latest user manual download.
- Only authorized professionals who meet the technical requirements can install, operate, maintain and clean the supporting controller.

1.5. User Manual Download

User manual download process instructions:

1. Open the website <http://www.coremorrow.com/en/>;
2. Search for product model (e.g. N81K13T60) or series (e.g. optical mount with piezo linear actuator) on the website;
3. Click on the corresponding product to open the product details page;
4. On the product details page, scroll down to "Downloads";
5. Click on the desired file to download.

Be careful! If the manual is lost or there are problems downloading, please contact our customer service department.

2. Safety Guide

This product is designed with the most advanced technology and safety standards. For your own safety and the correct use of the product, please observe the following points when in use.



A change in temperature and pressure will charge the piezo actuator, and the actuator will remain charged for a period of time when it is disconnected from the controller, so the operator should pay attention to when in use:

- Do not disassemble the piezo product.
- Discharge the product before mounting, which can be done by connecting to the controller.
- Do not unplug the wire connecting with controller during operation.
- Before use, check whether the connection wire of the product is in good condition and whether the product and the controller are effectively grounded. During operation, strictly standardize the operation. Do not touch the product (up to 150V voltage) with your hand when power on, in case of danger.



In order to prevent damage to the product caused by improper operation, the following points should be paid attention to when in use.

- The product should be used in a dust-free, oil-free and lubricant-free environment.
- As the product is designed with flexible structure, it is recommended that the load should not exceed load capacity of product.
- When loading, **DO NOT** apply torque force and **DO NOT** pry or twist the load surface, so as not to damage the structure.
- Do not disassemble the product to avoid damage.
- Avoid stretching and bending the cable interface to prevent damage to the cable.
- Use the dedicated cable provided by CoreMorrow to this product to controller.
- Do not connect via an extension cable casually, if you need a longer cable, please contact CoreMorrow.

3. Product Overview

3.1. Product Introduction

The N81K13T60 optical mount with piezo linear actuatorIt has two linear actuation points for two-dimensional $\theta_x\theta_y$ deflection motion adjustment of the mirror, and the adjusting range can reach $\pm 4^\circ$. Each axis is driven by a single piezo linear motor, and there is a common deflection axis between the two axes, and no coupling. It has a mounting diameter of $\Phi 63.5\text{mm}$, which is suitable for loading $\Phi 50.8\text{mm}$ (2 inches) or $\Phi 63.5\text{mm}$ optical device. With E53 piezo motor controller, it can be operated by PC software, which is more convenient. It has following advantages:

➤ High performance piezo stack:

This product is driven by a highly reliable ceramic actuator with a fully insulated structure, so its performance and service life are far better than the traditional actuator. The insulating layer can effectively prevent the piezoelectric ceramic from being damaged when exposed to moisture. Therefore, the stability of piezoelectric ceramics can be guaranteed under extreme circumstances. Compared with traditional driving mechanism, there are no transmission parts and friction. Therefore, ceramic actuator has the characteristics of no rebound, no maintenance, and no wear, etc.

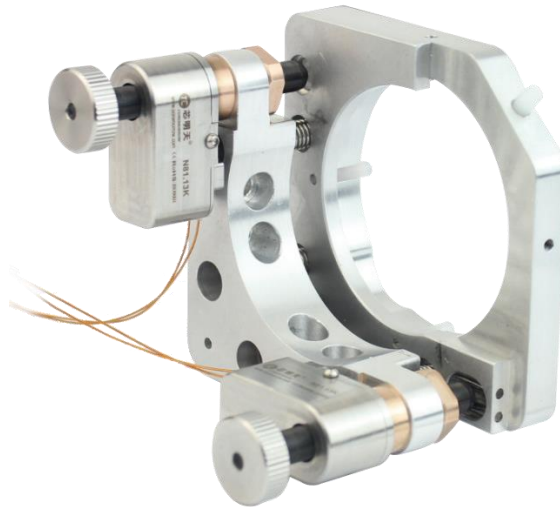
➤ Flexible hinge structure:

This product adopting flexible hinge mechanism has advantages of no friction, high positioning accuracy. Flexible hinge is an element not affected by static and

dynamic friction, based on the elastic deformation of metal material (e.g., steel) , there is no rolling and sliding parts. Flexible unit has very high load capacity and stiffness. Hinge guide needs no maintenance and no wear and tear. Suitable for a wide range of temperatures, no lubricating oil is required.

The N81K13T60 optical mount with piezo linear actuator adopts a flexible hinge mechanism, which has the advantages of no mechanical friction, fast response speed, high repeatability positioning accuracy, high flexibility and easy operation. This product can also be customized according to needs, with high flexibility, easy operation, and meeting different application scenarios.

3.2. Product appearance

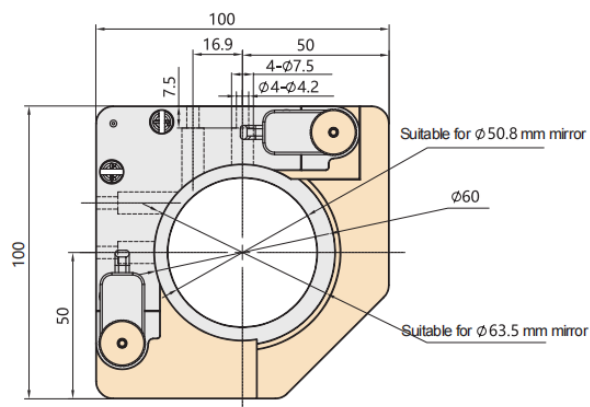
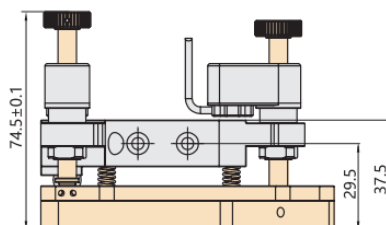
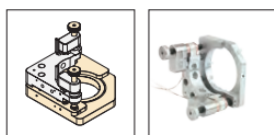


N81K13T60

3.3. Technical data

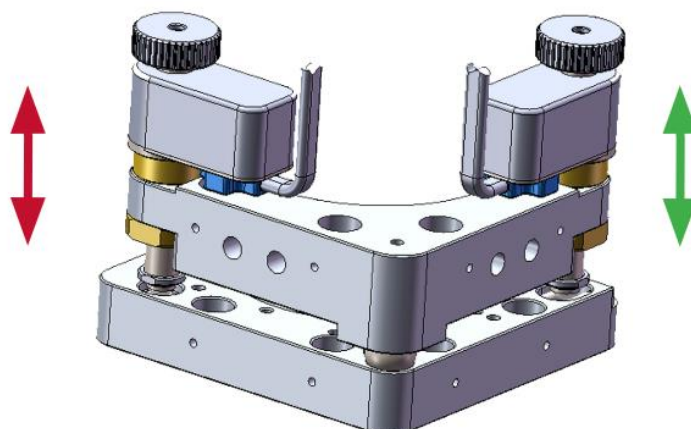
Type	N81K13T60	Units
Mounting diameter	63.5	mm
Active axes	θ_x, θ_y	
Tilt range	± 4	°
Resolution	0.4	μrad
Motorized axes	2	pcs
Actuator	Piezo screw actuator	
Operating temperature	10~40	°C
Mass	300	$\text{g} \pm 5\%$
Recommended controller	E53.C4K-H	
PZT connector	RJ11	

3.4. Drawing

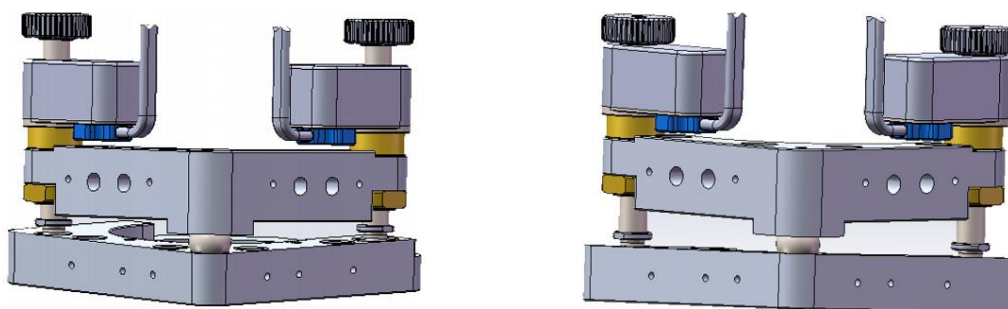


Note: The yellow area marked represents the actual motion surface.

3.5. Diagram of Movement Direction



N81.K13 piezo motor driven linear actuator

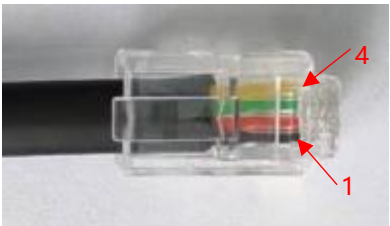


N81K13T60

3.6. Connector Pin Description

The default connector type for N81K13T60 optical mount with piezo linear actuator when they leave the factory is RJ11, with a model number of 4P4C, and the corresponding pin definitions of RJ11 is as follows:

Pin No.	Pin Definition	Corresponding color
1	DriveOut-	Black
2	DriveOut+	Red
3	DriveOut-	Green
4	DriveOut+	Yellow



Note: The wires in the picture are for reference only. Please confirm with the actual product.

4. Operating Environment

The N81K13T60 optical mount with piezo linear actuator must comply with the following usage environment:

Environmental Condition	Condition Description
Area of application	For indoor use only
Operating temperature	0~40°C
Storage temperature	-10~40°C
Transport temperature	-10~40°C
Environmental requirements	dust-free, clean and non-corrosive
Relative humidity	< 60%

Note: If the ambient temperature exceeds the operating temperature range of this product, please contact to our customer service department.

5. Installation and Operation

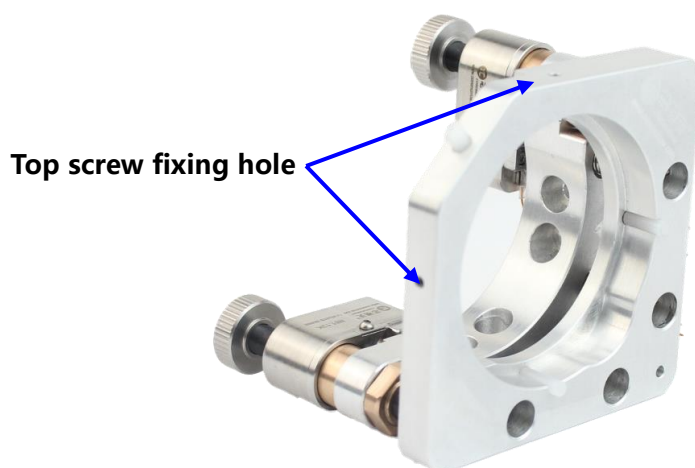
Safety check should be carried out before installation, such as whether the connection wire is damaged or broken, whether the drive power supply is grounded, etc.

5.1. Installation and Precautions

Be careful! During the installation of the optical mount with piezo linear actuator, please tighten the bolts slowly and do not apply excessive torque to avoid damaging the mechanism.

1. First, connect the optical components to the N81K13T60 optical mount with piezo linear actuator, which can be achieved through a top screw, as follows:

No.	Top screw specification	Quantity	Installation torque
01	M4	2	<1.5N·m

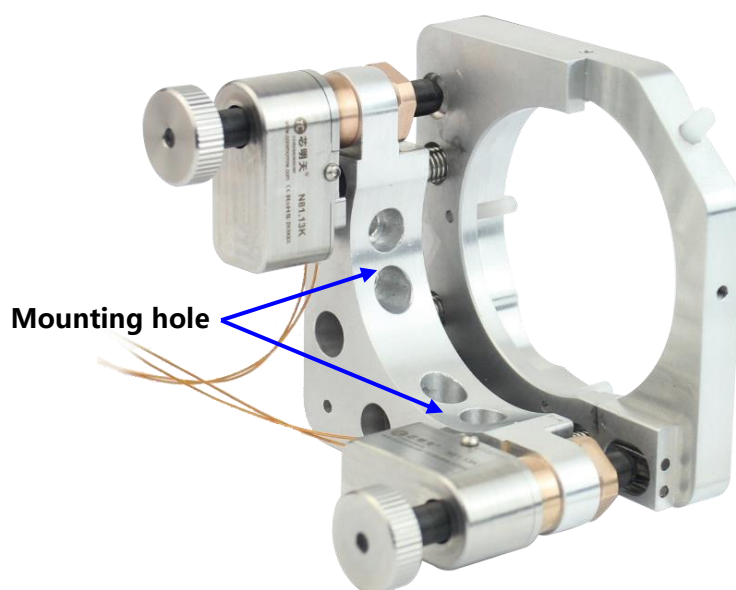


2. When fixing the optical mount with piezo linear actuator connected to the optical components. Please ensure that the mounting surface is flat and pay

attention to the appropriate position of the outlet, which will not cause significant bending of the cable. Avoid pulling and bending cables.

3. Secure the piezo motorized mirror mounts with specified screws and tighten.

No.	Screw specifications	Quantity	Installation torque
01	M4	4	<1.5N·m



Connect the PZT product to the corresponding interface of the controller according to the line identification near the connector head.

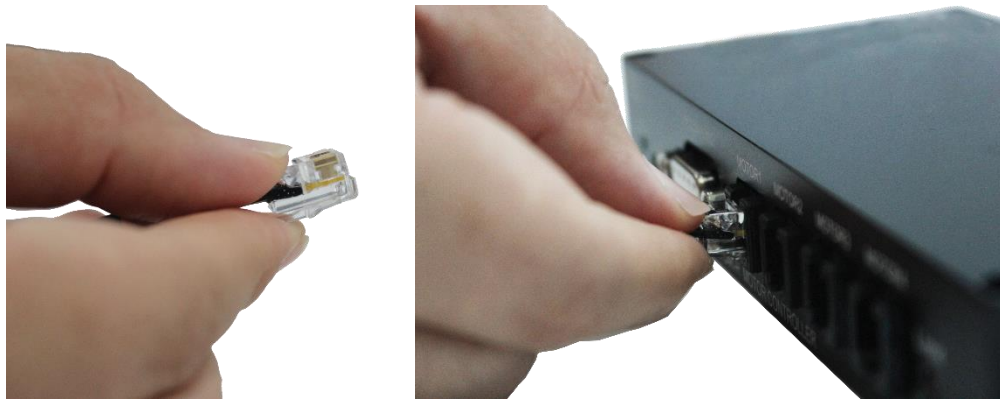
5.2. Operating

5.2.1. Precautions for startup

When plugging or unplugging cables, please hold the middle position of the connector with your fingers to avoid pulling the cable directly. Pulling the cable directly may cause damage to the cable. (Note: Please refer to the schematic diagram below for cable insertion and removal. The controller in the diagram is for reference only.)

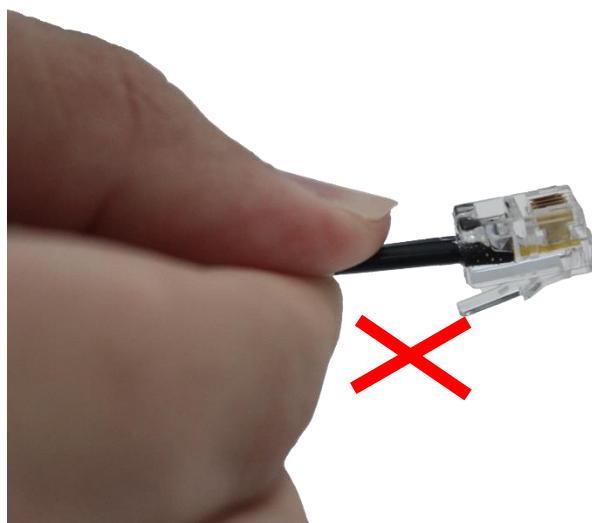


Recommend piezo motor controller: E53.C4K-H



The **correct** way of plugging and unplugging cables

Attention: When inserting the RJ11 crystal head, the plastic spring of the crystal head should be located **below**; When pulling out, press the plastic shrapnel by hand, it is as shown in the above picture.



The **wrong** way of plugging and unplugging cables

- Use the dedicated cable provided by CoreMorrow to connect the product and

the controller.

- Do not connect via an extension cable casually, if you need a longer cable, please contact CoreMorrow.
- If the grounding protection wire is not connected, there may be a risk of electric shock;
- The use of piezo products in environments with increased electrical conductivity may be damaged by electric flashover;
- Continuous high pressure may shorten the life of piezo ceramics;
- Incorrect connection of the operating voltage may cause damage to the piezo product;
- Uncontrolled vibration can cause irreversible damage to piezo products.

5.2.2. Operation precautions

After confirming the startup status, perform the following related operations on the controller:

1. Please read the user manual of the controller carefully before operation, and then start the controller.
2. Set the output voltage of the controller to zero first.
3. Check no abnormal phenomenon, then input the number of motion steps or motion time required for the optical mount with piezo linear actuator to be executed in the upper computer software.
4. Operating normally within the rated voltage range of piezo ceramics.
5. After use, please carry out voltage reset operation.

Please take light steps when the product in operation, do not knock the product, so as not to affect the use of the product or even damage the product. The resolution of the product itself is unlimited, and the resolution depends on the performance of the controller. In order to achieve better motion precision, it is recommended to use our company's supporting controller. Please refer to the user manual of the controller for the specific operation to ensure correct operation before relevant operation.

Notes:

- Do not remove the grounding protection during the operation. If you need to remove it temporarily, please reconnect the grounding protection before starting it again.
- The driving voltage shall not exceed the voltage range of the PZT product.
- If any abnormal noise or oscillation occurs during use, turn off the power immediately and check the parameter setting.

5.2.3. Disassembly precautions**Discharging the PZT product connected to the controller**

Turn off the power switch of the corresponding piezo controller to make it have no output.

Discharging the PZT product not connected to the controller

Connect the the PZT product to the switched-off piezo controller from CoreMorrow.

6. Transportation and Inspection

6.1. Transportation

This product is packed in cartons. Transportation is carried out under the packaging conditions. This product can be transported by various means of transport under normal circumstances. In the process of transportation, direct rain and snow, corrosive substances, strong collision, extrusion, irregular placement and other improper behaviors should be avoided as far as possible.

6.2. Open-Box Inspection

Improper external force applied to the surface of piezoelectric products can cause damage to mechanisms such as flexible hinges and sensors. The tension at the cable outlet and the bending of the connecting cable may cause the piezoelectric product to fail to connect properly with the controller and thus not function properly.

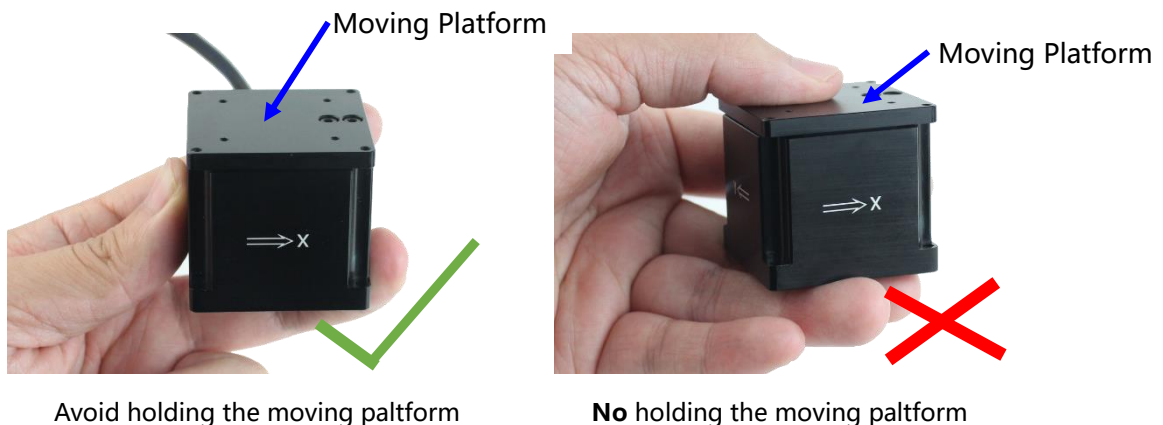
6.2.1. Open-Box

- Before opening the package, please check the outer packing carefully to see if there is any breakage, wetting, dampness, deformation, etc.
- Please do not use heavy tools or rough way to open, and prevent the product from being scratched or damaged by blades or other sharp objects.
- When removing the product from the packaging box, do not pull the cable of the product to prevent improper force from damaging the cable.
- Please handle with care when opening the package, so as not to knock against

the product and cause permanent damage to it.

➤ When holding the product, **do not** hold the product's moving platform to avoid damaging the internal structure of the product due to improper force. (Note: See the schematic diagram of the handheld product below. The piezo product in the diagram is for reference only.)

➤ Keep all packaging materials in case the product needs to be returned.



6.2.2. Item verification

- Please check the completeness of package contents one by one according to the supply contract and packing list.
- Check whether the surface of the product has obvious damage.
- Check whether the product identification is clear and complete.
- Check whether the connector is loose and the connector wire is broken or damaged.

Note! In case of any of the above, please make a detailed record and take a photo of it. Meanwhile, please contact us for processing immediately.

7. Maintenance and Treatment

7.1. Problem Handling

FAQ are shown in the table below.

Problem description	Possible reason	Solution
No displacement or less displacement	The connection wire is not connected properly or poor contact	Check the connection wire
	Sensor zero drift	Check the sensor
Low accuracy	Mounting surface unevenness	Mount the platform on a flat surface
	Loose connection	Fasten connection
Vibration or inaccurate positioning at startup	Incorrect input control parameters	Stop immediately and check the parameter Settings
	Resonance occurs	Lower operating frequency less than resonance frequency

If the user cannot solve the problem by himself in the process of using, please record the problem in detail and contact CoreMorrow, and professional technical personnel will help to solve.

Problems caused by improper operation are not covered by the warranty.

CoreMorrow is not responsible for any problems caused by dismantling products without permission.

7.2. Daily maintenance

If the product is not used for a long time, please store it in a dust-free,

well-ventilated, clean and non-corrosive indoor environment after packaging.

In the daily maintenance, please do not loosen the bolts on the product structure, so as not to affect the movement accuracy of the product.

Daily cleaning:

Please disconnect the product from the controller before cleaning the surface.

When cleaning, gently wipe the surface of the product with a towel dipped in a small amount of detergent, and then clean it with alcohol. Please do not use ultrasonic cleaner.

When cleaning the surface, try not to pick up the product. If you have to pick up the product, it is better to put the sponge under the product for protection. The product should not be too high from the sponge, in case the product falls off.

7.3. Disposal

Waste products should be disposed according to national and local rules and regulations. In order to fulfill our responsibility as a product manufacturer, we will dispose all old equipments on the market in an environmentally friendly manner. If you have equipment that cannot be disposed, you can ship it to CoreMorrow.

However, the shipping costs will be borne by the sender. We do not accept freight collect shipments.

Address: Building I2, No.191 Xuefu Road, Nangang District, Harbin, Heilongjiang, China

Tel: +86-451-86268790



8. Customer Service

8.1. Use question consultation

If you have questions about the products you are currently using, please let us know the following information:

- Product model and relevant number
- The controller model
- Software driver version
- Computer operating system that installs supporting software

8.2. Contact us

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CoreMorrow Official and CTO WeChat are below:

