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MCD100 Manual Center Device Product Manual

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Foreword

Thank you for choosing the MCD100 Manual Center Device.

The MCD100 Manual Center Device integrates image capture, real-time observation, and centering inspection functions. It employs a high-precision image sensor and specialized optical components, along with an intelligent recognition algorithm, to accurately complete laser nozzle recognition and coaxial detection. This device replaces traditional manual calibration methods, effectively improving calibration accuracy and operational efficiency while offering intuitive and reliable operation.

Please note that this manual only serves as the use of the Manual Center Device. Please refer to other manuals or contact technical support for software use and other content.

We make every effort to ensure that the contents of the manual are applicable, but reserve the right of final interpretation. Contents of this manual are subject to change without prior notice.

If you have any questions or suggestions during use, please contact us using the information provided in this manual.

Symbol Definitions

Notice: Provides supplementary explanations or clarifications for the product.

Caution: Indicates that non-compliance with the instructions may result in minor injuries or equipment damage.

Warning: Indicates that non-compliance with the instructions may result in severe injuries or death.

Danger: Indicates that non-compliance with the instructions will result in severe injuries or death.

Declaration

The operation of the machine tool and the laser cutting effect may directly relate to the material being cut, the laser used, the gas used, the gas pressure, and the various parameters you set.Please set various parameters carefully according to your cutting process

requirements. Improper parameter settings and operations may lead to poor cutting effect, damage to the laser head, or other machine tool components, and even personal injury. BOCHU has tried its best to provide various protection measures. Laser equipment manufacturers and end users should try to follow operating procedures to avoid the occurrence of injury accidents.

BOCHU shall not be liable for any direct or indirect losses arising from the following circumstances: damages caused by improper use of this manual or the product, failures to comply with safety operating procedures or force majeure events such as natural disasters.

Additionally, operational equipment carries inherent risks. Users are obligated to implement robust fault-handling mechanisms and safety protections. BOCHU assumes no responsibility for any incidental or consequential losses resulting from such risks.

Revision History

Version No.	Date	Description
V1.0.0	2026/03/18	First English edition.

Safety Precautions

Warning

➢ The installation and use of the product must comply with the electrical safety regulations of the country and region of use.

➢ A power adapter provided by a reputable manufacturer shall be used; refer to the adapter description for details.

➢ To prevent fire or shock hazard, do not expose this product to rain or moisture.

➢ During installation, ensure that the product is securely fixed.

➢ If the product operates abnormally, please contact technical support personnel. Do not disassemble or modify the product yourself.

➢ BOCHU shall not be held liable for failures resulting from unauthorized modifications or repairs.

Caution

➢ Avoid installing the product in a vibrating or impactful environment, and keep away from electromagnetic interference sources.

➢ Do not touch the heat sink directly to avoid burns.

➢ Indoor products must not be installed in locations where they may be exposed to rain or other liquids.

➢ Do not use the product in extremely hot, extremely cold, dusty, corrosive, or high-humidity environments. For specific temperature and humidity requirements, refer to the technical parameters.

➢ Avoid aiming the glass at strong light sources (such as lamps, sunlight, or laser beams, etc.) to prevent damage to the image sensor.

➢ Do not touch the recognition window directly. If cleaning is required, use a soft, clean cloth lightly moistened with alcohol to gently wipe away dust and dirt. When the product is not in use, attach the dust cap to protect the recognition window.

➢ Please properly store all original packaging materials for the equipment. If any issues arise and the product needs to be returned for service, be sure to use the original packaging for transport. BOCHU shall not be held liable for transport damage resulting from the use of non-original packaging materials.

Description

➢ Qualifications for installation and maintenance personnel:

- Installation and maintenance personnel must possess relevant certification for low-current system installation and maintenance, or have proven relevant professional experience.

- They shall possess basic knowledge and operational skills in low-voltage wiring and low-voltage electronic circuit connections.

- They must be able to fully understand the contents of this technical manual.

Contents

Chapter 1 Product Introduction

The MCD100 Manual Center Device integrates image capture, real-time observation, and centering inspection functions. It employs a high-precision image sensor and specialized optical components, along with an intelligent recognition algorithm, to accurately complete laser nozzle recognition and coaxial detection. MCD100 replaces traditional manual calibration methods, effectively improving calibration accuracy and operational efficiency while offering intuitive and reliable operation.

1.1 Technical Parameters

Table 1-1 MCD100 Manual Center Device Technical Parameters

Features	Parameters	Description
Recognition Performance	Resolution	1920 × 1200
	Following Height	1 mm
	Repeatability Accuracy	≤ 0.02 mm
	Absolute Accuracy	≤ 0.05 mm
Electrical Specifications	Power Supply Method	21700 battery
	Charging Method	USB, adapter
	Battery Capacity	4500 mAh @ 0.2 C
	Power Consumption	< 4 W @ 4.2 V DC
Structure	Light Source	Blue light
	Dimension	180 mm × 80 mm × 82.5 mm (L × W × H)
	Screen Size	4.5 inches
	Weight	About 1 kg
	Protection Level	IP64
	Operating Temperature	0°C to 60°C
	Ambient Humidity	0% to 70% RH, non-condensing
Certification	Product Certification	This product is CE certified.

1.2 Product Details

The product includes the MCD100 Manual Center Device and a USB Type-C to USB Type-A cable.

Table 1-2 Manual Center Device Product Details

MCD100 Manual Center Device∗ 1	USB Type-C to USB Type-A Cable∗ 1

1.3 Adapter Description

The Manual Center Device supports two charging modes: computer USB and an adapter (5 V/3 A). BOCHU only supplies the USB Type-C to USB Type-A cable. For adapter charging, user shall prepare their own adapter. When using the charger for power supply, the following requirements must be strictly followed. Improper use may result in equipment damage, abnormal performance, or safety hazards.

➢ Charger type restriction: Only standard mobile phone chargers are supported, specifically those which are consistent with the input voltage, output voltage, and output current specifications recommended for adapters in Table 1-3.

➢ Voltage and device restrictions: Prohibit the use of chargers with an output voltage other than 5 V (e.g., 12 V chargers) or the use of non-mobile phone charging devices such as computer chargers.

Table 1-3 Recommended Adapter Specifications

Parameters	Description
Adapter Type	60 W, 120 W mobile phone chargers
Fast Charging Protocol	SuperCharge Protocol (SCP)
Mainstream Power	22.5 W
Input Voltage	220 V to 240 V

Parameters	Description
Output Port	Type-C
Output Voltage	5 V
Output Current	3 A

Chapter 2 Manual Center Device Structure

This chapter primarily introduces the appearance and structure of the Manual Center Device, as well as its installation dimensional drawing, to enable users to understand the device's composition and installation requirements.

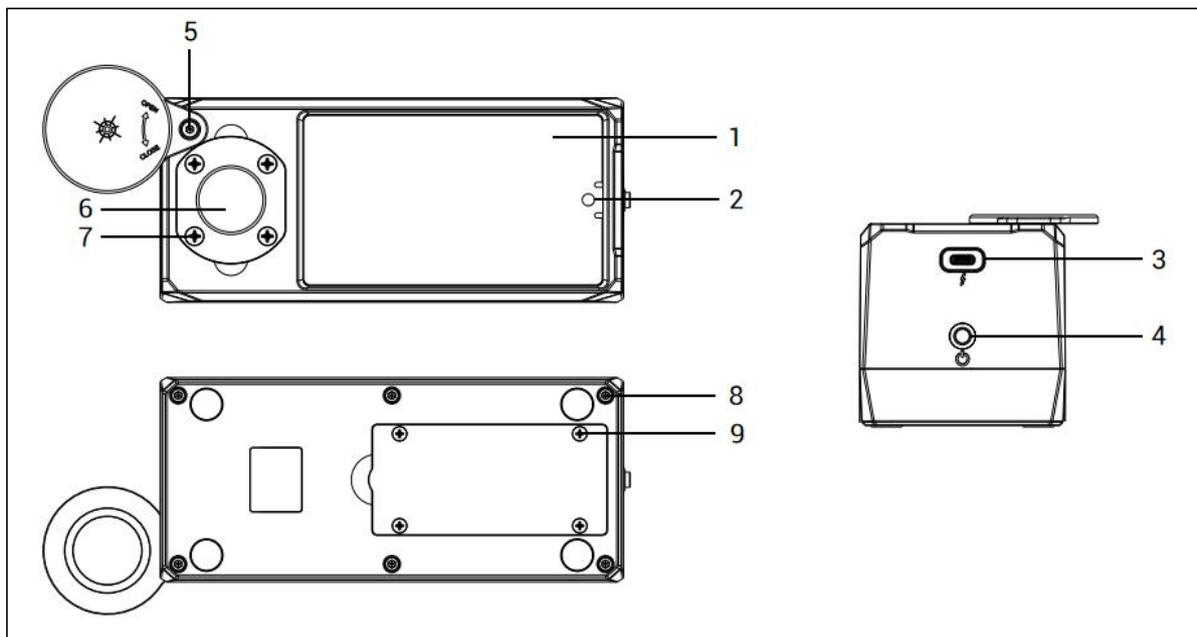## 2.1 Product Appearance Description

Figure 2-1 Manual Center Device structure

1. 4.5-inch screen;

2. Indicator light;

3. USB interface;

4. Power button;

5. Mounting holes for recognition window cover;

6. Recognition window;

7. Mounting holes for recognition window;

8. Rear mounting holes;

9. Mounting holes for the battery compartment.

Table 2-1 Manual Center Device Structure Description

| No.	Name	Description
1	4.5-inch screen	Used to display the image for recognition.
2	Indicator light	• During use: When the battery level is ≥ 20%, the indicator light is steady green; when the battery level is < 20%, the indicator light is steady red. • During charging: When the battery level is ≤ 95%, the indicator light flashes green; when the battery level is > 95%, the indicator light is steady green.
3	USB interface	Type-C interface, capable of connecting to a charger or a computer's USB interface for charging
4	Power button	Press and hold for 2 seconds to turn the device on or off.
5	Mounting holes for recognition window cover	The device is equipped with one mounting hole for the recognition window cover, which is used to secure the cover, allowing it to rotate. A hexagon socket shoulder screw (∅ 4 × 10 × M3) is used for this purpose.
6	Recognition window	The recognition window houses a built-in lens and a blue light source. The lens is used for image recognition, and the blue light source provides illumination for the lens.
7	Mounting holes for recognition window	The device features 4 mounting holes for the recognition window, secure the recognition window glass using cross recessed countersunk head screws (M4 × 6).
8	Rear mounting holes	The device has 6 rear mounting holes for securing the bottom cover plate, using hexagon socket head cap screws (M3 × 8).
9	Mounting holes for the battery compartment	The device features 4 mounting holes for the battery compartment to secure the battery cover plate with cross recessed countersunk head screws (M3 × 8).

2.2 Dimension
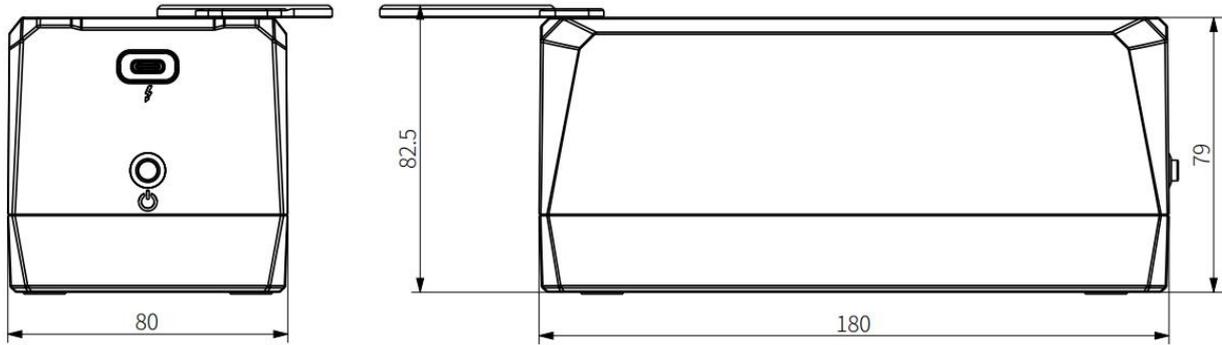
Figure 2-2 Manual Center Device dimension (Unit: mm)

Chapter 3 Manual Center Device Interface

The Manual Center Device interface displays the nozzle diameter, device battery level, red light offset value, and image. The center status of the nozzle and the red light can be observed via the screen interface.

3.1 Interface Description

The Manual Center Device displays the laser nozzle diameter, red light offset value, real-time nozzle center image, and device battery level through its built-in screen.
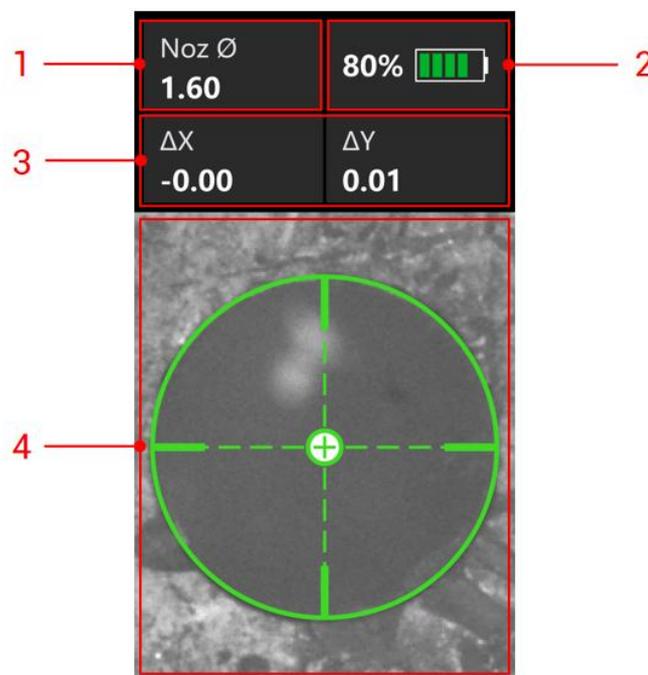
Figure 3-1 Manual Center Device Interface

The composition of the Manual Center Device interface is described in the following table:

Table 3-1 Manual Center Device Interface Description

No.	Module	Description
1	Nozzle diameter	Displays the laser nozzle inner diameter, with a minimum display resolution of two decimal places and a recognition accuracy within ±0.05 mm. When no nozzle is detected, -- is displayed.
2	Device battery level	Displays the current battery level. Charge the battery in time when remaining capacity is below 10%.

No.	Module	Description
3	Red light offset value	ΔX/ΔY: X/Y axis deviation value of the red light center relative to the laser nozzle inner diameter center. The minimum display resolution is two decimal places, with a recognition accuracy of ±0.02 mm. When no red light is detected, -- is displayed.
4	Image	Displays red light center status. For details, refer to Section 3.2 Image Display.

3.2 Image Display

➢ When no nozzle is detected: As shown in the figure below, both the nozzle diameter display and the red light offset value display show - -.
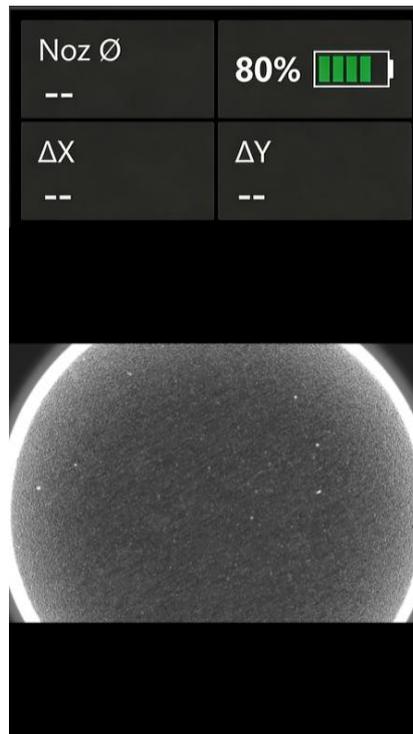
Figure 3-2 No nozzle detected

➢ When the nozzle is detected but the red light is not centered: As shown in the figure below, the nozzle part is displayed in yellow, and the red light positioning is displayed in red.
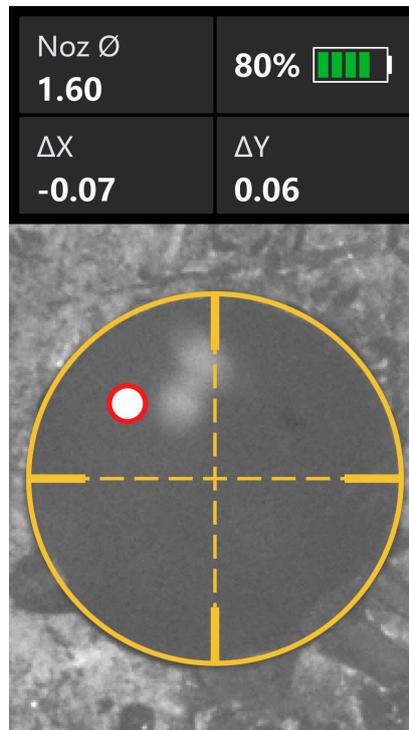
Figure 3-3 Nozzle detected, but red light not centered

➢ When the nozzle is detected and the red light is centered: As shown in the figure below, both the nozzle and the red light positioning are displayed in green.
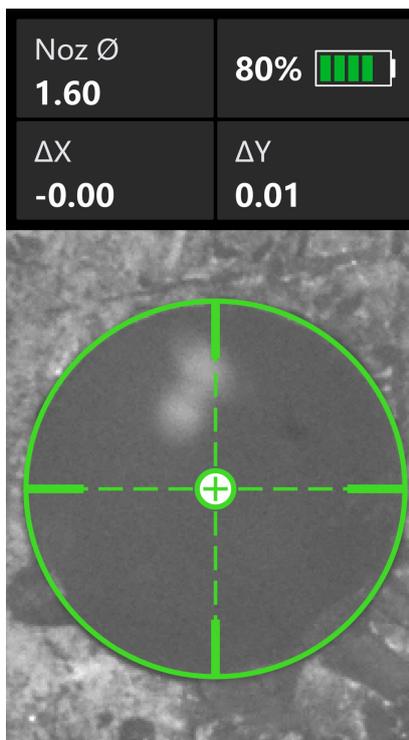
Figure 3-4 Nozzle detected and red light centered

Chapter 4 Focus Correction and Center Detection

Red light focus correction is required when using the Manual Center Device for the first time. After that, the center detection function can be used directly without focus correction.

4.1 Red Light Focus Correction

When using the Manual Center Device for the first time, users must perform the red light focus correction. For detailed instructions, please refer to [the red light focus correction tutorial video](#).

Step 1 Confirm that the nozzle is properly installed and the laser beam is off. Turn on the laser red light and perform capacitance calibration.

Step 2 Turn on the MCD100 Manual Center Device and place it securely, with the red light centered on the arrow mark on the recognition window cover. Then, open the cover.

Step 3 Press *Follow* on the Remote Control, and the cutting head will automatically follow to a position 1 mm from the window.

Step 4 In the cutting software, adjust the focus by zooming, and gently lift the Manual Center Device alternately from side to side while observing the display of the red light on the screen.

1. If the red light disappears in place on the screen (meaning the relative position of the red light and the nozzle remains unchanged), then this is the zero-focus position.
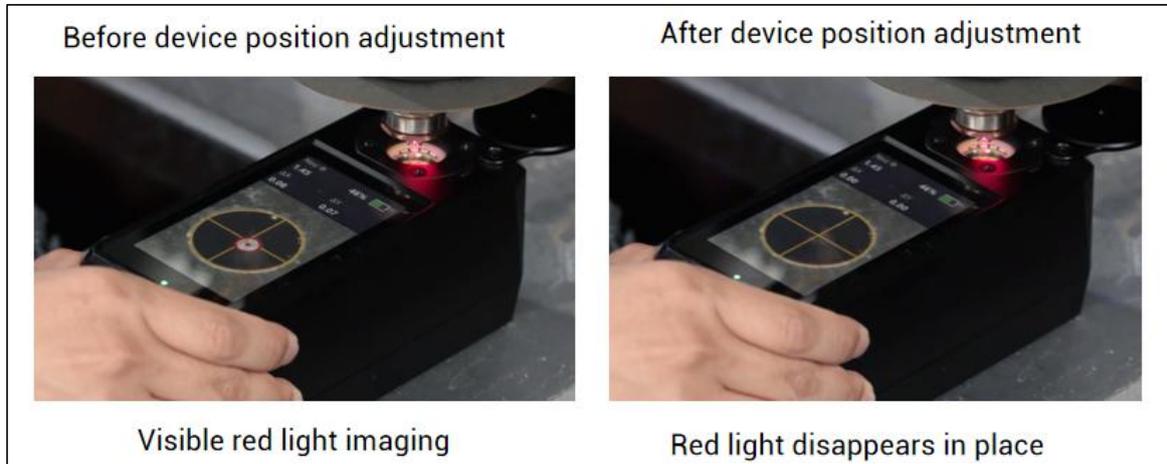
Figure 4-1 Zero-focus position

2. If the red light disappears while shifting on the screen (meaning the relative position of the red light and the nozzle changes), then this is not the zero-focus position.
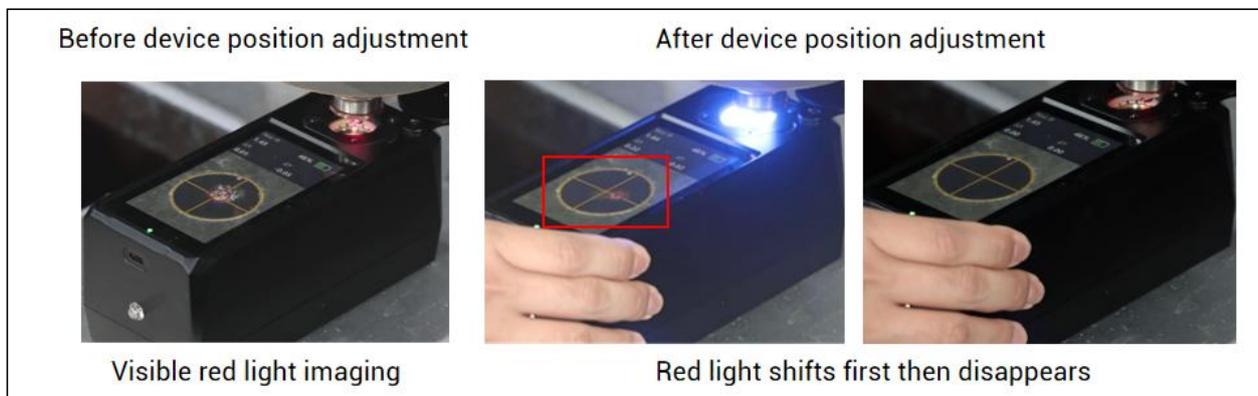

Figure 4-2 Non-zero-focus position

4.2 Red Light Center Detection

Step 1 Replace the nozzle on the cutting head as required, ensure the laser beam is off, turn on the laser red light, and perform capacitance calibration.

Step 2 Place the MCD100 Manual Center Device securely, press and hold the power button for 2 seconds to turn it on.

Figure 4-3 Manual Center Device power on

Step 3 Adjust the position of the Manual Center Device so that the red light is centered on the arrow mark on the recognition window cover. Then, open the cover.

Figure 4-4 Open the recognition window cover

Step 4 Press *Follow* on the Remote Control, and the cutting head will automatically follow to a position 1 mm from the window.

Figure 4-5 Follow

⚠️Caution: The red light focus correction is required upon first use.

Step 5 The Manual Center Device will automatically detect the nozzle and display the center of the red light on the screen. When the red light is not centered, the nozzle center is displayed in yellow, and the red light positioning is displayed in red. According to the screen display, manually adjust the X-Y adjustment screws on the cutting head so that both the nozzle and the red light positioning are displayed in green.

Adjust the X-Y adjustment screws

Figure 4-6 Adjust the X-Y adjustment screws
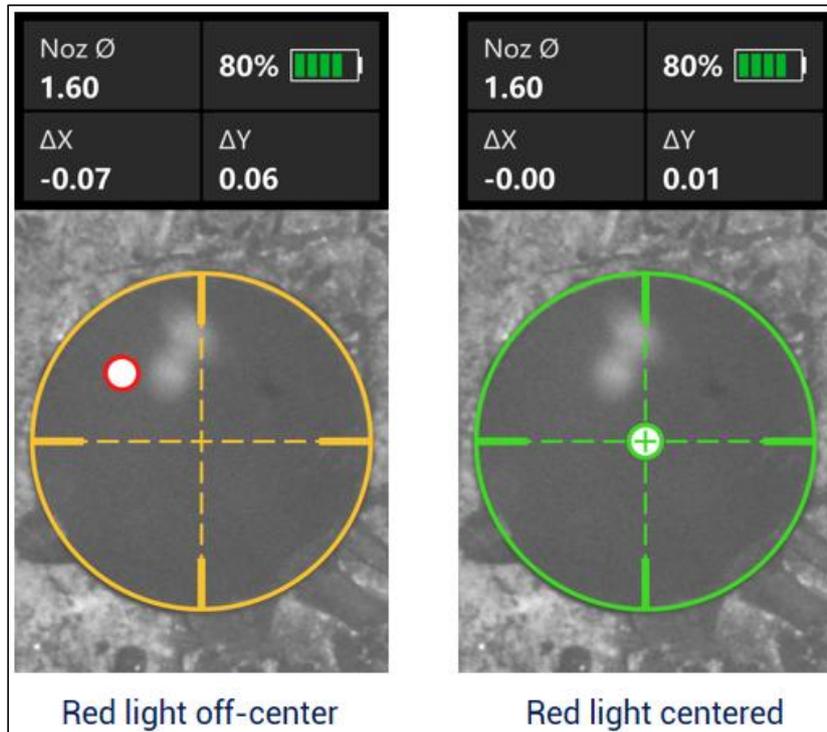
Figure 4-7 Red light center status display

Step 6 The center detection is complete. Lift and move the cutting head away. The interface automatically returns to its initial state. Press and hold the power button to turn the device off.

Chapter 5 Maintenance and Upgrade

This chapter primarily covers the firmware update methods for the device, as well as the steps for identifying the conductive glass and replacing the battery, to assist users in device maintenance and upgrades.

5.1 Replace the Conductive Glass of Recognition Window

When the conductive glass of the recognition window is contaminated, affecting normal recognition, or damaged, it needs to be replaced. The operation steps are as follows:

Step 1 Rotate to open the recognition window cover. Remove the four Phillips countersunk head screws (M4 × 6) from the mounting holes of the recognition window, and set the screws aside for later use.
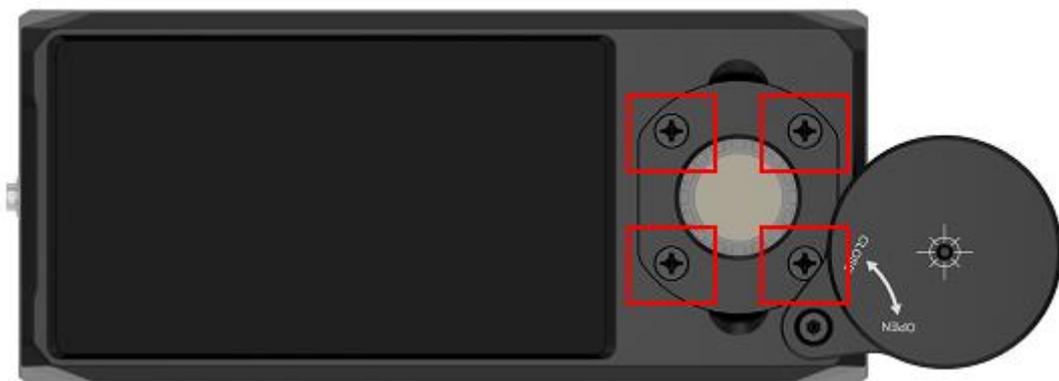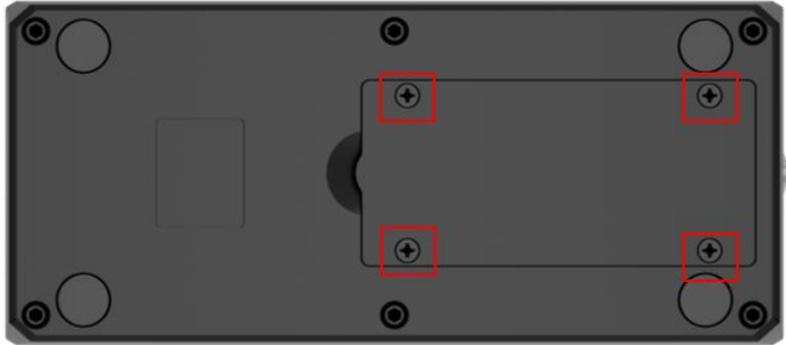

Figure 5-1 Remove the Phillips countersunk head screws

Step 2 After removing the screws from the mounting holes, take off the conductive glass retaining plate.
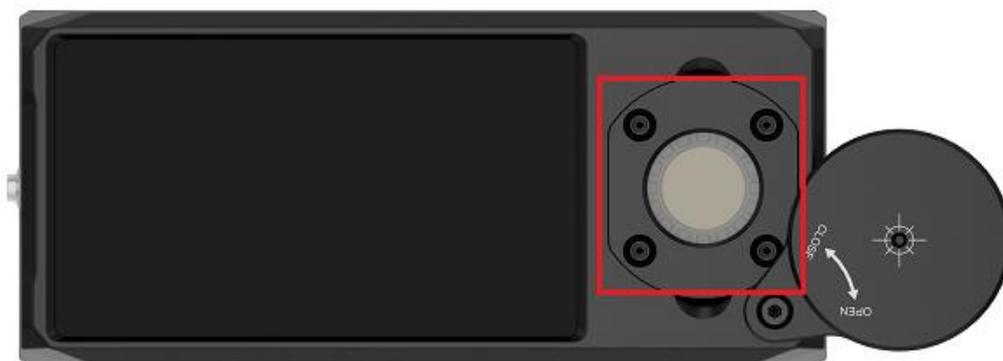
Figure 5-2 Take off the conductive glass retaining plate

Step 3 Remove the contaminated or damaged conductive glass.

Figure 5-3 Remove the contaminated or damaged conductive glass

Step 4 Remove the new conductive glass from its packaging. Check that the conductive glass is free from visible dust, foreign objects, or impurities. Ensure the triangle mark is facing up, and place the conductive glass into the recognition window.
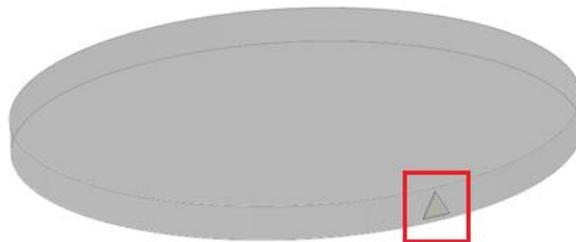
Figure 5-4 Conductive glass

Step 5 Check the conductive glass retaining plate to ensure it is free from dirt and foreign objects. Install the conductive glass retaining plate into the recognition window.

Step 6 Secure the conductive glass retaining plate using the 4 Phillips countersunk head screws (M4 × 6). Pre-tighten the screws first, then perform final tightening. The torque should be 1.2 N·m.

5.2 Replace the Battery

Step 1 Remove the four Phillips countersunk head screws (M3 × 8) from the mounting holes for the battery compartment, and set the screws aside for later use.

Figure 5-5 Remove the Phillips countersunk head screws

Step 2 Remove the battery compartment cover plate and take out the old battery.

Step 3 Place the new battery into the battery compartment with the raised side facing the positive terminal, according to the positive and negative symbols inside the compartment.
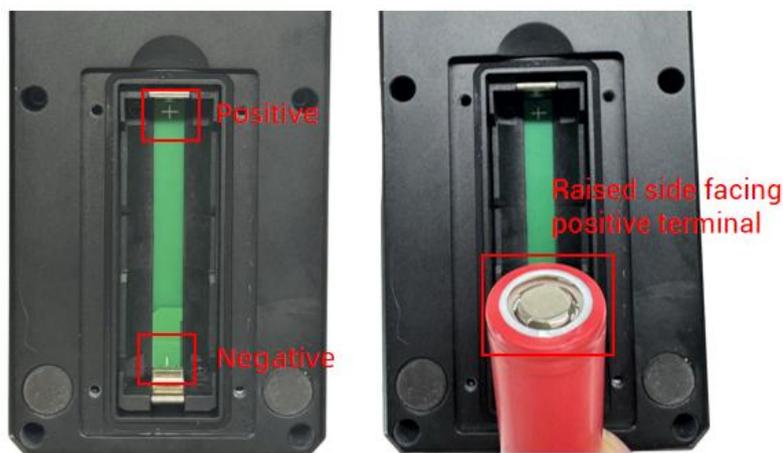
Figure 5-6 Place the new battery

Step 4 Secure the battery compartment cover plate using the 4 Phillips countersunk head screws (M3 × 8). Pre-tighten the screws first, then perform final tightening. The torque should be 0.8 N·m.

5.3 Upgrade the Device Firmware

If you need to upgrade the device firmware, please contact technical support to confirm the relevant information before proceeding with the upgrade steps.

Step 1 Connect the Manual Center Device to the computer using a USB Type-C to USB Type-A cable. Connect the USB Type-C end to the Manual Center Device and the USB Type-A end to the computer.

Step 2 On the computer, open the Control Panel, then click *Network and Internet* → *Network and Sharing Center* → *Change adapter settings*.
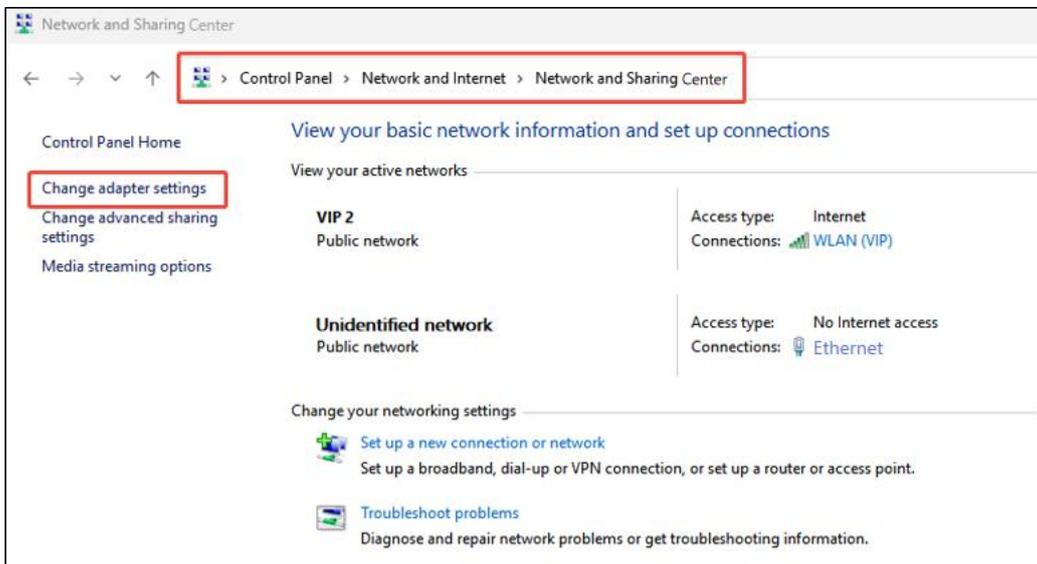
Figure 5-7 Change adapter settings

Step 3 Configure the IP address.

1. In the **Network Connections**, locate the network adapter corresponding to the device (the adapter name may vary depending on the system or hardware).

2. Double-click the network adapter corresponding to the device, then click
   Properties → *Internet Protocol Version 4 (TCP/IPv4)*.
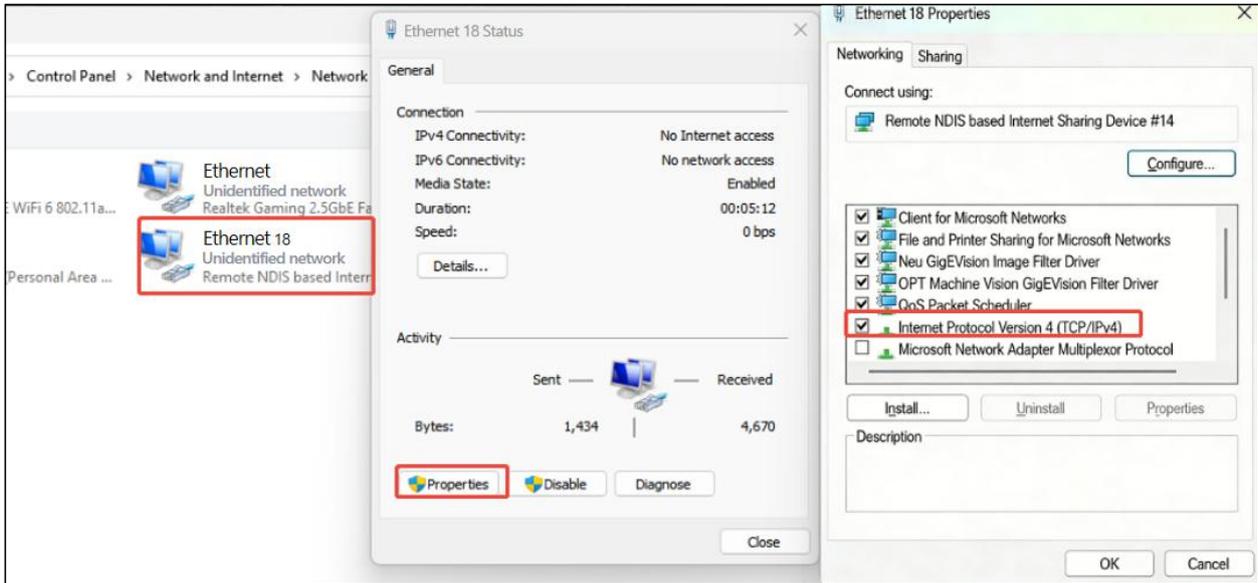
Figure 5-8 Internet Protocol Version 4 (TCP/IPv4)

3. Select *Use the following IP address*, and set the corresponding network adapter
   IP address to *192.168.10.xxx*, where xxx is any integer between 0 and 255.

⚠️Caution: Avoid using 192.168.10.79 to prevent IP address conflicts.
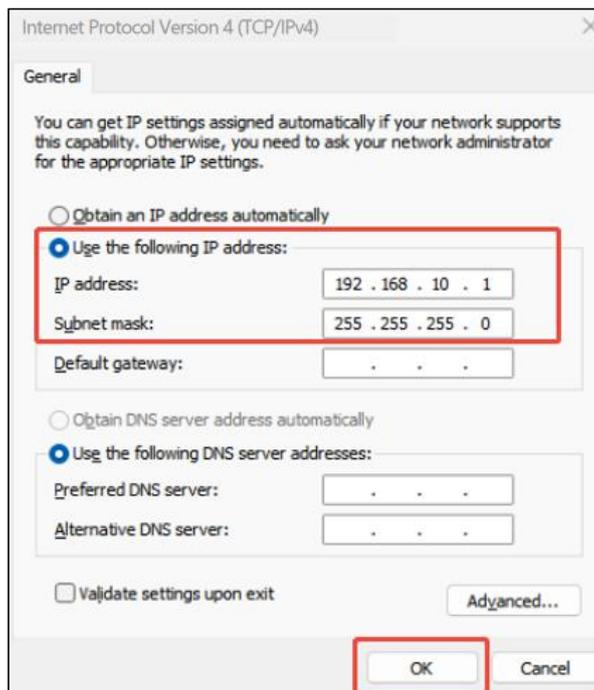
4. Set the *Subnet Mask* to *255.255.255.0*, and then click *OK*.

Figure 5-9 Set the IP Address and Subnet Mask

Step 4 Double-click to open the batch upgrade tool SimAssist.exe.

Figure 5-10 Open SimAssist.exe

Step 5 Click *RefreshData* to refresh the device list.

Figure 5-11 Refresh the device list

Step 6 Select the devices to be upgraded on the left.

Figure 5-12 Select the devices to be upgraded

Step 7 Click *SelectOption*, choose the corresponding firmware file for the upgrade in the pop-up file selection window (file format: *.bin), and then click *Open*.
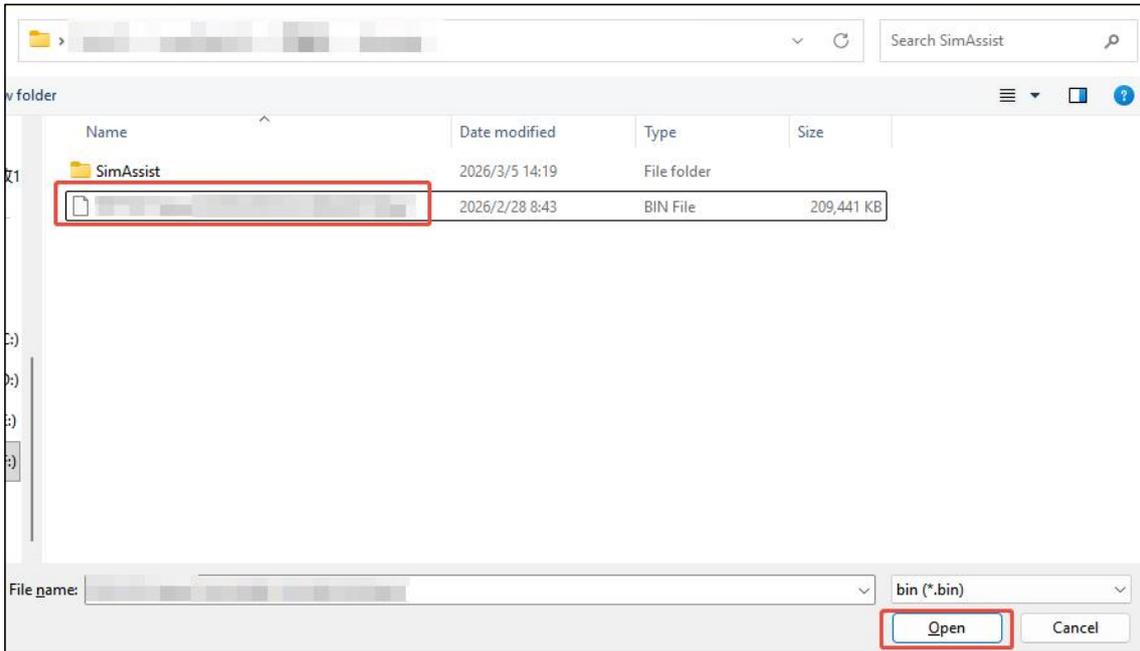

Figure 5-13 Select the upgrade firmware

Step 8 Click *Upgrade* and wait for the upgrade to complete successfully.
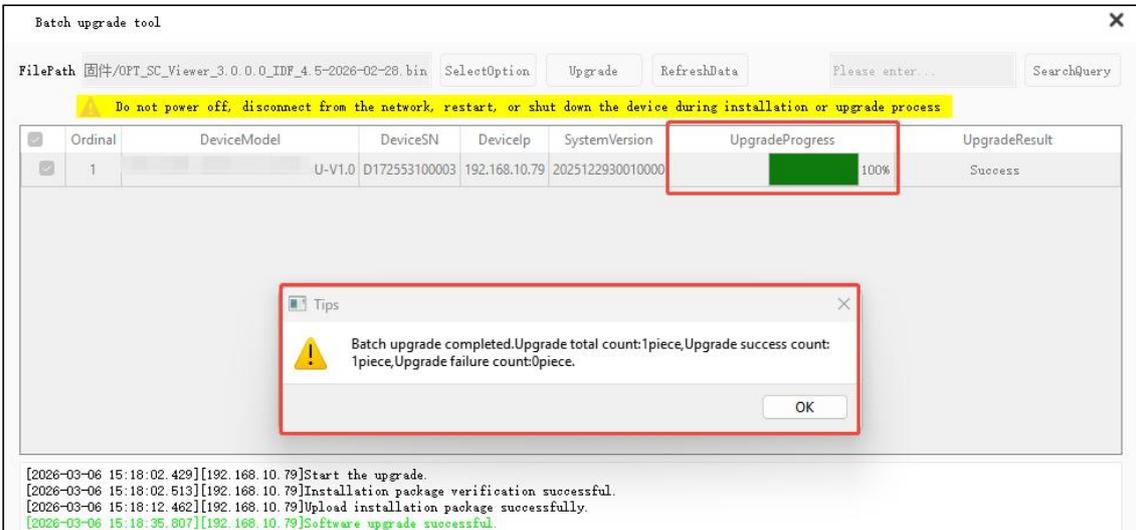

Figure 5-14 Upgrade

⚠️Caution: Do not connect multiple devices for upgrade simultaneously. The tools and firmware files required for the upgrade can be obtained by contacting technical support.

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