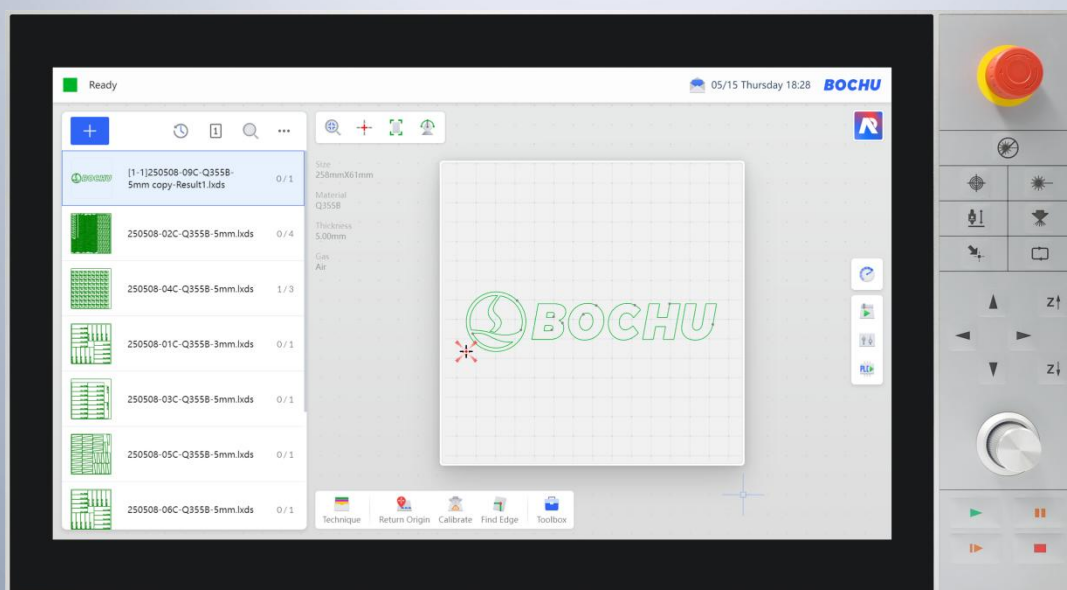




FSCUT8000 Installation Manual

System: 8000

Document Version: V1.6.0



Foreword

Thank you for using BOCHU FSCUT8000 System.

BOCHU FSCUT8000 High-Power Bus System (hereinafter referred to as the FSCUT8000 system) is an advanced intelligent bus system designed for high-power fiber laser cutting applications requiring 8 kW and above. It features stability, reliability, convenient deployment, simplified commissioning, production safety, rich functionality, and outstanding performance. The system supports and provides modular, personalized, automated, and informatized solutions.

This manual is only an instruction for the installation and wiring of the FSCUT8000 system. For software operation or details required advanced permissions, please refer to other manuals or contact our technical support.

Due to the continuous update of system functions, the actual situation may differ in some aspects from the statements in this manual. We've tried our best to ensure that the content of the manual is applicable, but reserves the right of final interpretation. Changes in the content of this manual will not be explicitly notified.

Any questions or suggestions during use, please contact us through the information provided.

Convention Symbol Explanation

Notice: Supplementary or explanatory information for the use of this product.

Caution: If not operated as specified, it may result in minor physical injury or equipment damage.

Warning: If not operated as specified, it may lead to death or serious physical injury.

Danger: If not operated as specified, it will cause death or serious physical injury.

Declaration

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. FSCUT8000 Laser Cutting Control System 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
V1.6.0	2025/10/20	Format and content revision.

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Chapter 1 Overview

1.1 Introduction

FSCUT8000 is a high-power dedicated bus CNC system. Developed based on EtherCAT bus technology, it serves as a comprehensive solution for high-end laser cutting CNC machine tools. This manual provides hardware installation guidance only. For software operation and additional information, please refer to [HypCut/HypCutRevo Laser Cutting Control Software User Manual](#).

1.2 Product Specifications

The FSCUT8000 system encompasses the following configurations: 8000APLUS+, 8000A, 8000B, and 8000C. Refer to the sections below for accessory specifications pertaining to each system. Notably, 8000APLUS+ and 8000A systems share identical accessory components.

! Notice: The hardware components and quantities may vary slightly across different FSCUT8000 configuration packages. For clarification or detailed specifications, please contact BOCHU technical support.

1.2.1 8000APLUS+ (Adapted for BLT Cutting Head)

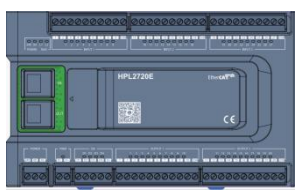
Table 1-1 8000APLUS+ (Adapted for BLT Cutting Head)

HyPanel2 AIO*1	BCL4568E Terminal Board*1	WKB V6H Wireless Remoter*1
		

PWE-20 Towline Cable*1	Network Cables
	

1.2.2 8000APLUS+ (Adapted for Non-BLT Cutting Head)

Table 1-2 8000APLUS+ (Adapted for Non-BLT Cutting Head)

HyPanel2 AIO*1	HPL2720E Terminal Board*1	WKB V6H Wireless Remoter*1
		
BCS100E Height Controller*1	BCL_AMP Amplifier*1	SPC-140 RF Cables*2
		
HC-20 Aviation Plug Cable*1	Network Cables	
		

Beyond the accessory components listed in the table above, variations arise based on the height sensor model deployed. When using the BCS100E, amplifier, SPC-140 RF cables, and HC-20 aviation plug cable must be additionally configured; whereas for the BCS100E_Pro, only a flexible coaxial cable with BNC-20 connectors is required.

Table 1-3 BCS100E/BCS100E_Pro Hardware Components

Model	Product Name	Diagram
BCS100E	BCS100E Height Controller*1	
	BCL_AMP Amplifier*1	
	SPC-140 RF Cables*2	
	HC-20 Aviation Plug Cable*1	
BCS100E_Pro	BCS100E_PRO*1	
	BNC-20 Coaxial Towline Cable*1	

1.2.3 8000B/8000C

The 8000B and 8000C systems share the same components excluding the configuration of EtherCAT CNC Host. The 8000B system is equipped with the HypTronic3. For the 8000C system, customers must supply their own host computer, which must be installed with the BOCHU Master Motion Controller Card.

Table 1-4 8000B/8000C Hardware Component

HypTronic3 EtherCAT CNC Host*1 (Only for 8000B)	Master Motion Controller Card*1 (Only for 8000C)
	

Chapter 2 Host Wiring

2.1 HyPanel2

HyPanel2 is a premium CNC system solution developed based on the basis of EtherCAT bus technology, designed for laser cutting machine tools. And it has excellent performance and anti-interference capability.

2.1.1 Technical Data

Table 2-1 HyPanel2 Technical Data

Module	Qty.	HyPanel2_IAC2822W3	HyPanel2_IAC2822W5
Processor	1	12th Intel i3 4 cores and 8 threads	12th Intel i5 6 cores and 12 threads
Graphics Card	1	Intel UHD Graphics 730	Intel UHD Graphics 730
RAM	1	8 GB DDR4	16 GB DDR4
Hard Drive	1	SSD 512 GB	SSD 512 GB
Real Time Ethernet Protocol	/	ECAT integrates EtherCAT master protocol	ECAT integrates EtherCAT master protocol
Network	4	Gigabit Ethernet interfaces	Gigabit Ethernet interfaces
USB	8	USB3.0	USB3.0
	1	USB2.0 on the side	USB2.0 on the side
Power	/	DC 24 V (Typical 3 A, Max 6 A)	DC 24 V (Typical 3 A, Max 8A)
Operating System	/	Windows 10 IOT LTSC (64-bit)	Windows 10 IOT LTSC (64-bit)
Screen Size	/	21.5 (16:9)	21.5 (16:9)
Resolution	/	1920 × 1080	1920 × 1080
Control Panel Type	/	10-Point Multi-Touch Screen	10-Point Multi-Touch Screen
Power Consumption	/	Up to 144 W	Up to 192 W
Dimension (L × W × H)	/	609 mm × 326.8 mm × 95 mm	609 mm × 326.8 mm × 95 mm
Weight	/	7.95 kg	7.95 kg
Protection	/	IP20	IP20

Module	Qty.	HyPanel2_IAC2822W3	HyPanel2_IAC2822W5
Cooling	/	Air Cooling	Air Cooling
Temperature	/	0°C to 60°C	0°C to 60°C

2.1.2 Installation Dimension

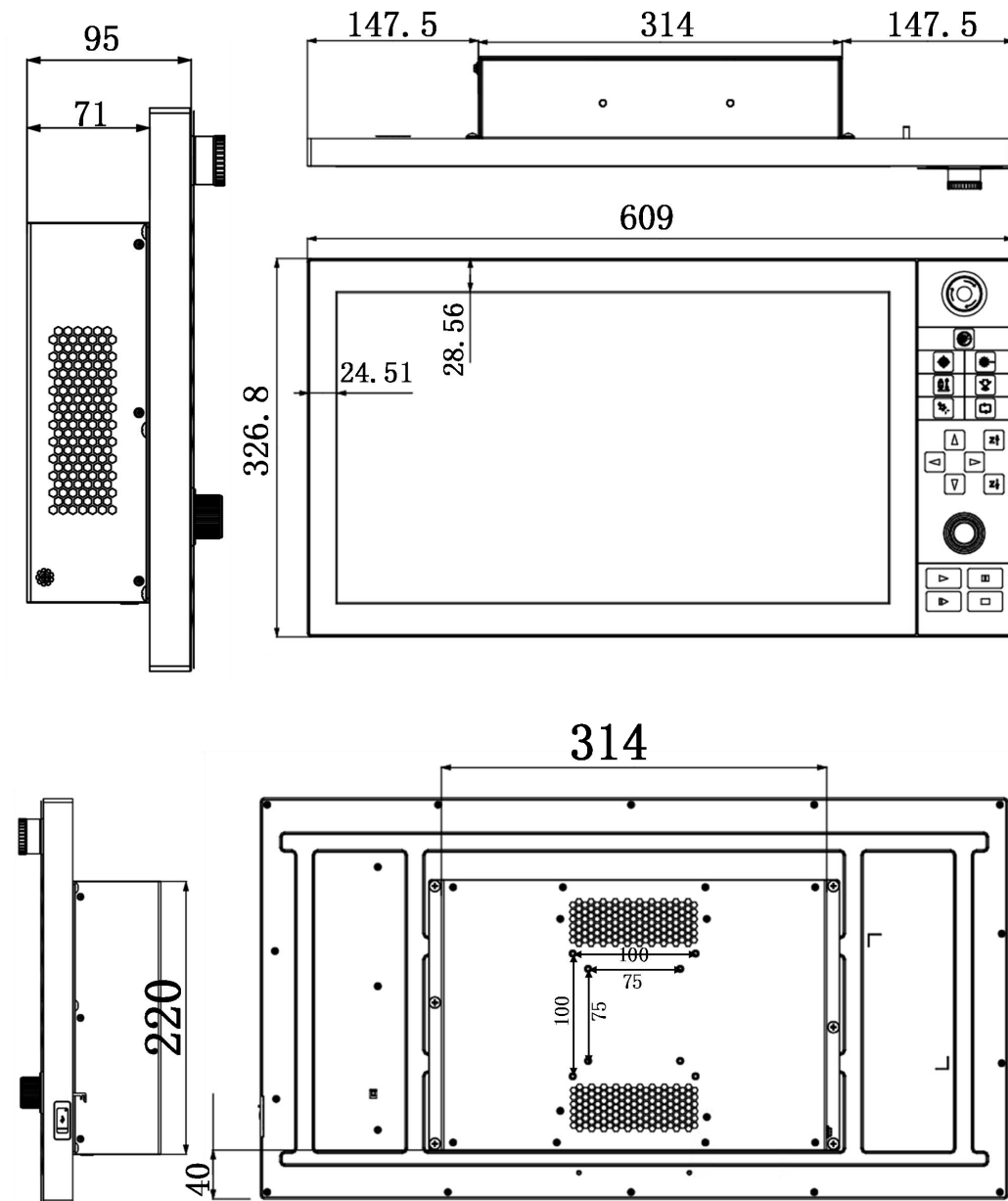


Figure 2-1 HyPanel2 dimension (unit: mm)

! Notice: The rear HyPanel2 features two VESA mounting holes: 100 × 100 mm and 75 × 75 mm. Either pattern may be used for installation.

2.1.3 Interface Layout

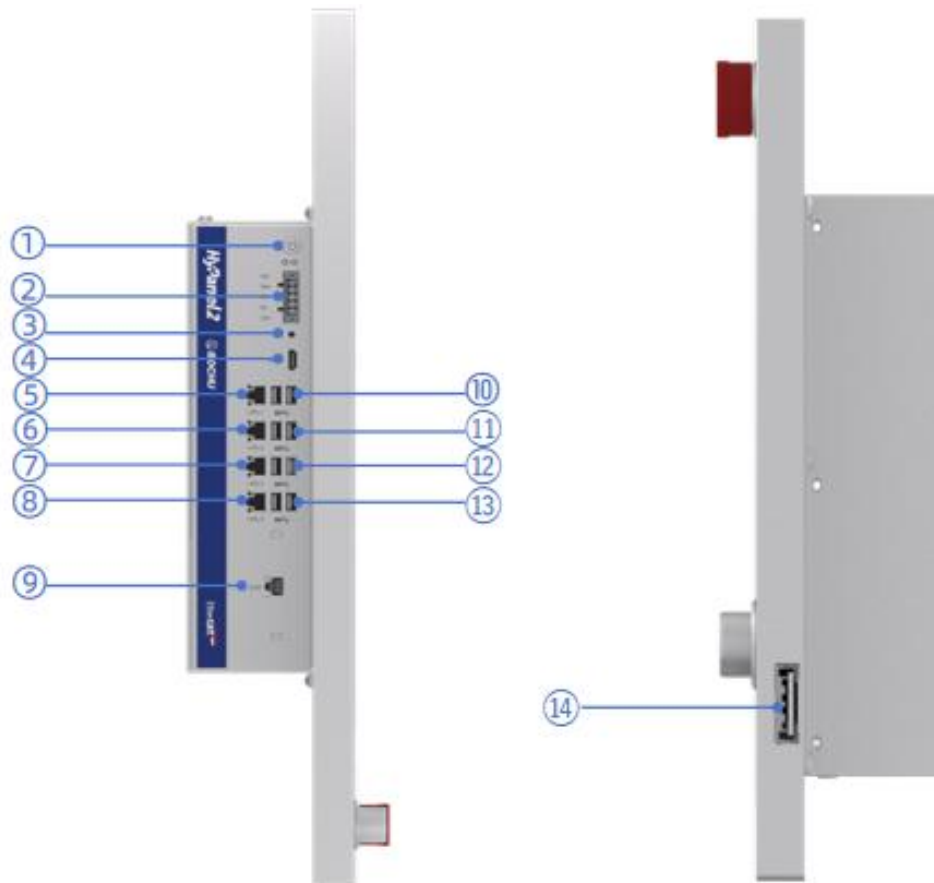


Figure 2-2 Interface layout

- | | |
|-------------------------------|-----------------------------|
| 1. J01 Power Button | 8. J08 Ethernet Interface 4 |
| 2. J02 24 V DC Power Terminal | 9. J09 EtherCAT Interface |
| 3. J03 Restore Button | 10. J10 USB3.0 Interface 1 |
| 4. J04 HDMI Interface | 11. J11 USB3.0 Interface 2 |
| 5. J05 Ethernet Interface 1 | 12. J12 USB3.0 Interface 3 |
| 6. J06 Ethernet Interface 2 | 13. J13 USB3.0 Interface 4 |
| 7. J07 Ethernet Interface 3 | 14. J14 USB2.0 Interface 1 |

2.1.4 J01 Power Button

J01 is the power button of the host. When connected to 24 V power, the host will boot up by default, or can be turned on/off by pressing this button.

2.1.5 J02 24 V DC Power Terminal

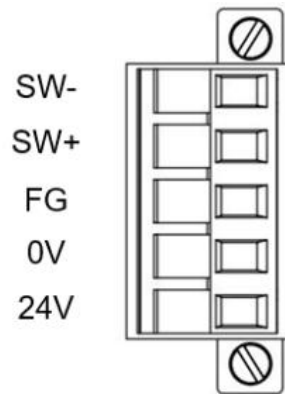


Figure 2-3 Top view of the power terminal

Detailed descriptions of the power supply terminals are shown in the table below.

Table 2-2 J02 24V DC Power Terminal

Pin	Description	Wiring
SW-	Power button, Negative (0 V short-circuited)	Automatic reset switch (normally open type).
SW+	Power button, positive	
FG	Shield ground, case ground	Must be well grounded, ground wire has to be short and thick, grounding resistance no more than 4 Ω .
0 V	24 V power ground	Connect to 24 V switch power supply.
24 V	24 V power positive	

2.1.6 J03 Restore Button

J03 is the restore button of the HyPanel2. You can enter the restore interface by long pressing this button when the device is turned on. This button has an anti-touch design, and can be pressed with a screwdriver, tweezers, or others. You can also enter the restore interface by pressing the key **ALT+F3** in the BIOS interface.

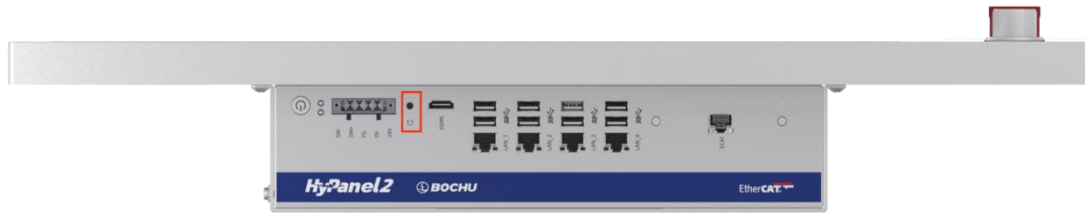


Figure 2-4 Restore button

2.1.7 J04 HDMI Interface

J04 is a standard HDMI interface, compatible with DVI digital signals (using HDMI to DVI adapters to connect to DVI digital interface displays), but incompatible with analog signals such as VGA, and DVI-A.

2.1.8 J05/06/07/08 Ethernet Interface

J05/06/07/08 are standard RJ45 interfaces that can be used to connect network devices (such as webcams, lasers with network communication, etc.), switches, and so on.

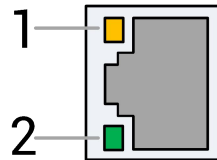


Figure 2-5 Terminal RJ45

The table below demonstrates the different connection statuses suggested by the LED status of the network terminal RJ45.

Table 2-3 RJ45 Connection Description

Label	Description	LED Color	Status	Description
1: Link	Ethernet Link Status	Orange	Off	No Connection
			Blink	Connecting
			On	Connected
2: Speed	Ethernet Connection Speed	Green	Off	10 Mbps Connection
			Off	100 Mbps Connection
			On	1000 Mbps Connection

The standard network port should be connected with a network cable as required by the equipment, and it is recommended to use a shielded network cable of category 5 or above.

2.1.9 J09 EtherCAT Communication Interface

J09 interface, defined as an EtherCAT interface, is a standard RJ45 interface that can be used to connect EtherCAT slaves, such as servo drives, etc.).

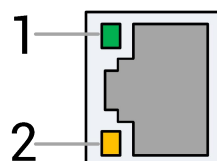


Figure 2-6 Terminal RJ45

The table below demonstrates the different connection statuses suggested by the LED status of the network terminal RJ45.

Table 2-4 RJ45 Connection Description

Label	Description	LED Color	Status	Description
1: Link	EtherCAT Bus Connection and Communication Status	Green	Off	No Connection
			On	Connected, No Communication
			Blink	Connected, with Communication
2: Status	EtherCAT Bus Link Status	Yellow	Off or Blink	Not in the OP State
			On	In the OP State

2.1.10 J10/11/12/13/14 USB Interface

J10/11/12/13 are standard USB 3.0 interfaces, while J14 is a USB 2.0 interface, designated for connecting USB devices.

 **Notice:** When a longer USB extension cable is required, please choose an externally powered USB extension cable with a driver enhancement chip.

2.1.11 Wiring

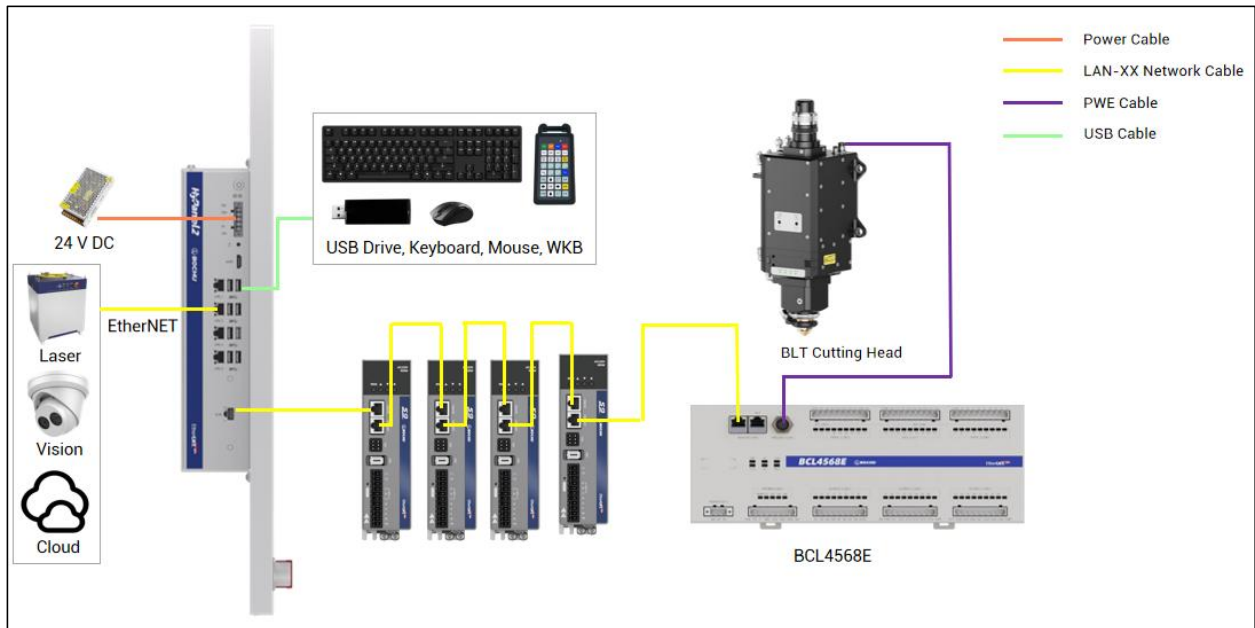


Figure 2-7 Wiring diagram (BLT cutting head)

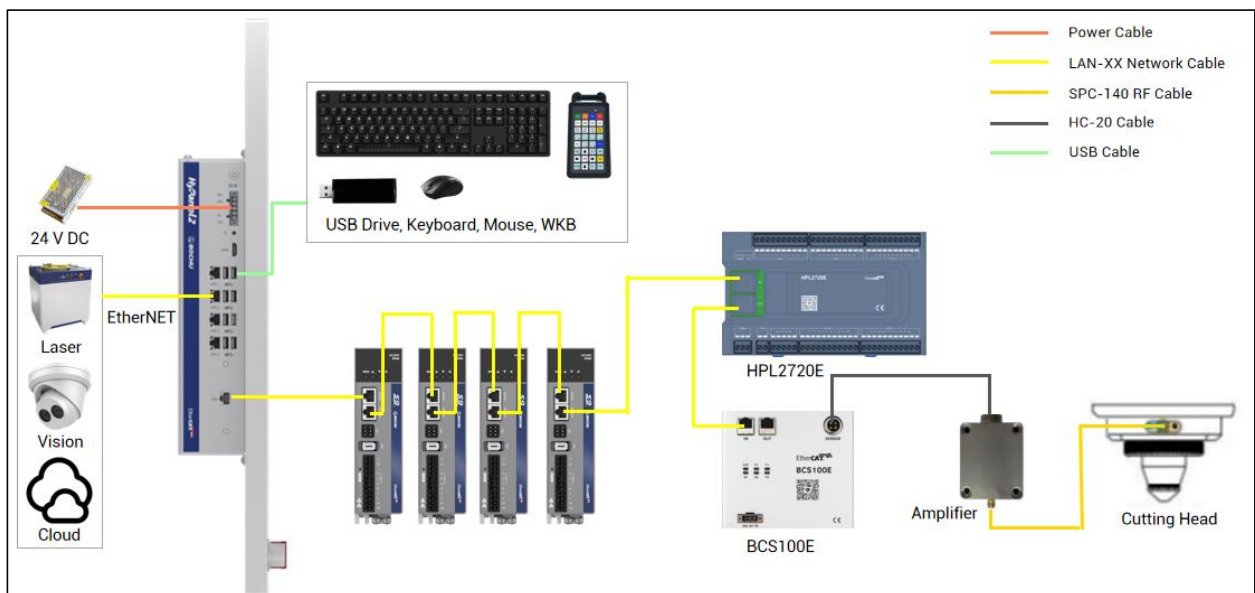


Figure 2-8 Wiring diagram (Non-BLT cutting head)



Figure 2-9 Cooling holes of HyPanel2

Caution:

1. Regions marked with red boxes are cooling holes for ventilation and heat dissipation, do not cover!
2. The white label on the back is marked with compatible models. Do not use incorrect models.

2.2 HypTronic3

HypTronic3 is a bus CNC host computer based on EtherCAT technology, categorized into two models: HPC3830E and HPC3870E.

2.2.1 Technical Data

Table 2-5 HypTronic3 Technical Data

Parameter \ Model	HypTronic3_HPC3830E	HypTronic3_HPC3870E
Processor	12th Intel i3 4 cores and 8 threads Base Frequency: 3.3 GHz	12th Intel i7 12 cores and 20 threads P-core Base Frequency: 2.1 GHz E-core Base Frequency: 1.6 GHz
Graphics Card	Intel UHD Graphics 730	Intel UHD Graphics 770
RAM	8 GB DDR4	16 GB DDR4
Network	4 × Gigabit Ethernet interfaces	4 × Gigabit Ethernet interfaces
Drive	SSD 512 GB	SSD 512 GB
Display	HDMI (DVI digital signal compatible)	HDMI (DVI digital signal compatible)

Parameter \ Model	HypTronic3_HPC3830E	HypTronic3_HPC3870E
USB	8 × USB3.0	8 × USB3.0
Real Time Ethernet Protocol	ECAT integrates EtherCAT master protocol	ECAT integrates EtherCAT master protocol
Operating System	Windows 10 IOT LTSC (64-bit)	Windows 10 IOT LTSC (64-bit)
Power	DC 24 V 3 A (typical), maximum 6 A	DC 24 V 3 A (typical), maximum 8 A
Power Consumption	Up to 144 W	Up to 192 W
Dimension (L × W × H)	337.4 mm × 220.4 mm × 70.5 mm	337.4 mm × 220.4 mm × 70.5 mm
Weight	2 kg	2 kg
Protection	IP20	IP20
Cooling	Air Cooling	Air Cooling
Temperature	0°C to 60°C	0°C to 60°C

2.2.2 Installation Dimension

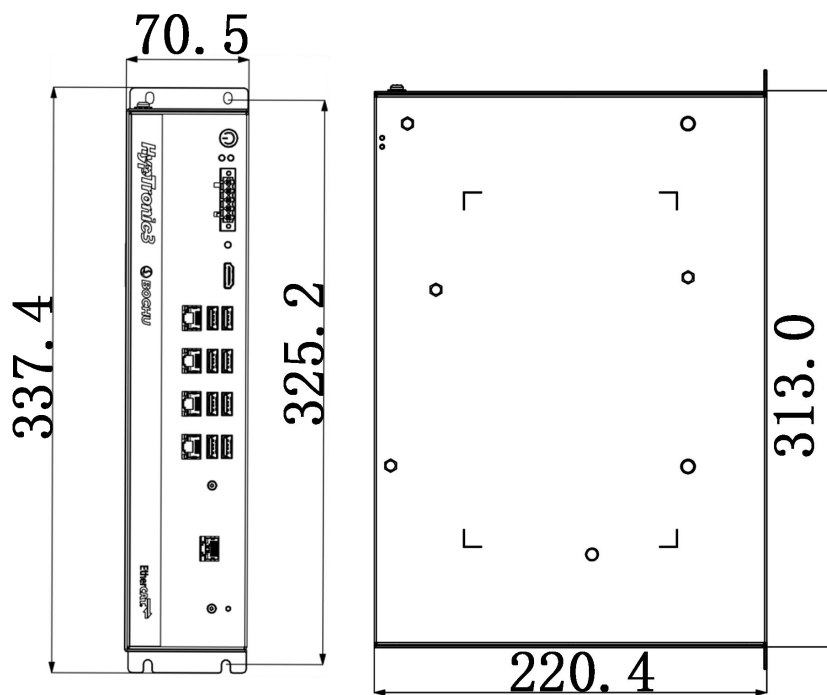


Figure 2-10 HypTronic3 dimension (unit: mm)

2.2.3 Interface Layout

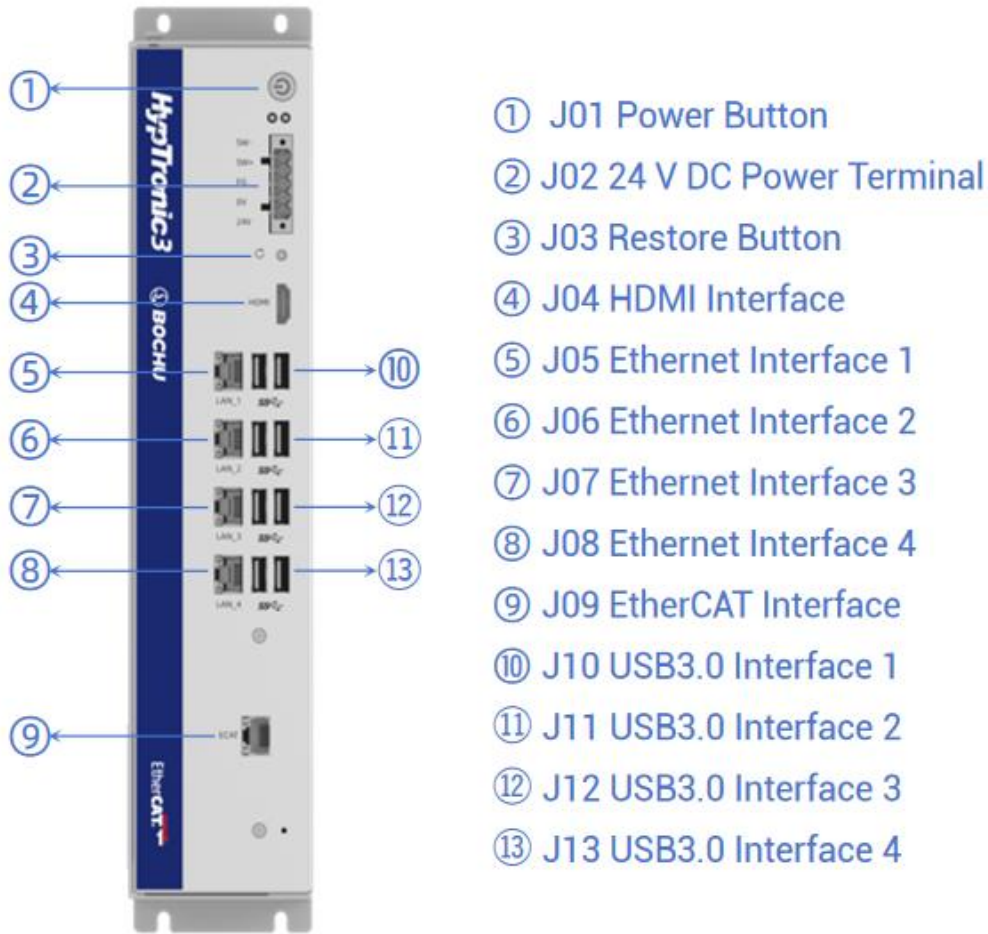


Figure 2-11 HypTronic3 interface layout

⚠ Notice: The HypTronic3 lacks one J14 USB 2.0 interface compared to the HyPanel2. For detailed specifications of each terminal, refer to the relevant [HyPanel2](#) documentation.

2.2.4 Wiring

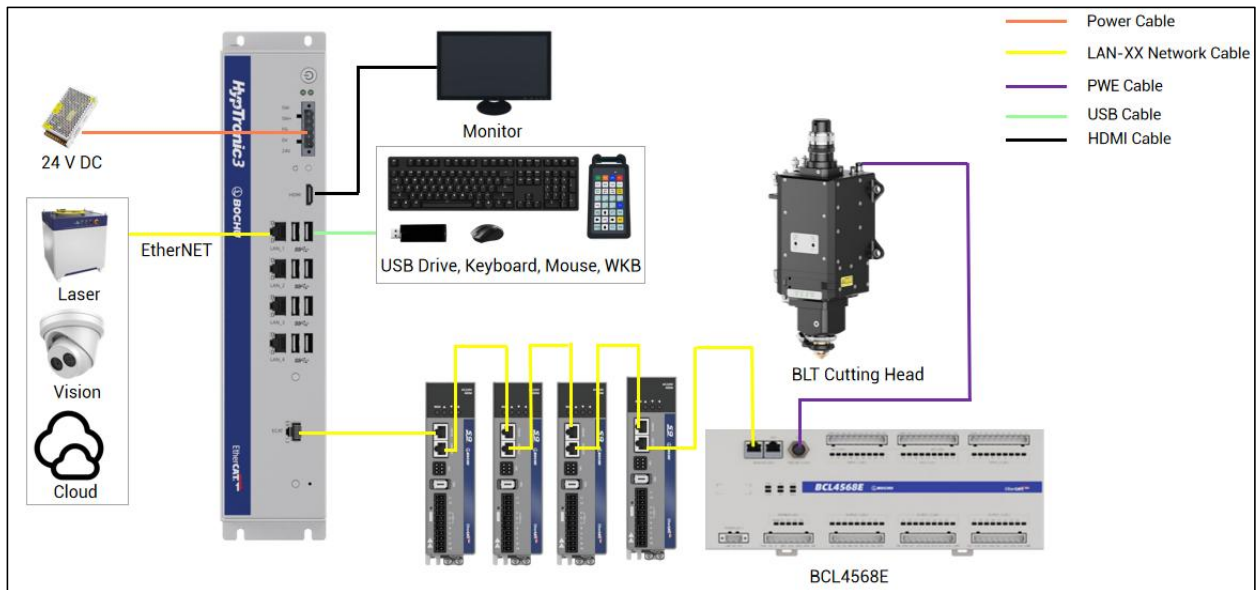


Figure 2-12 Wiring diagram (BLT cutting head)

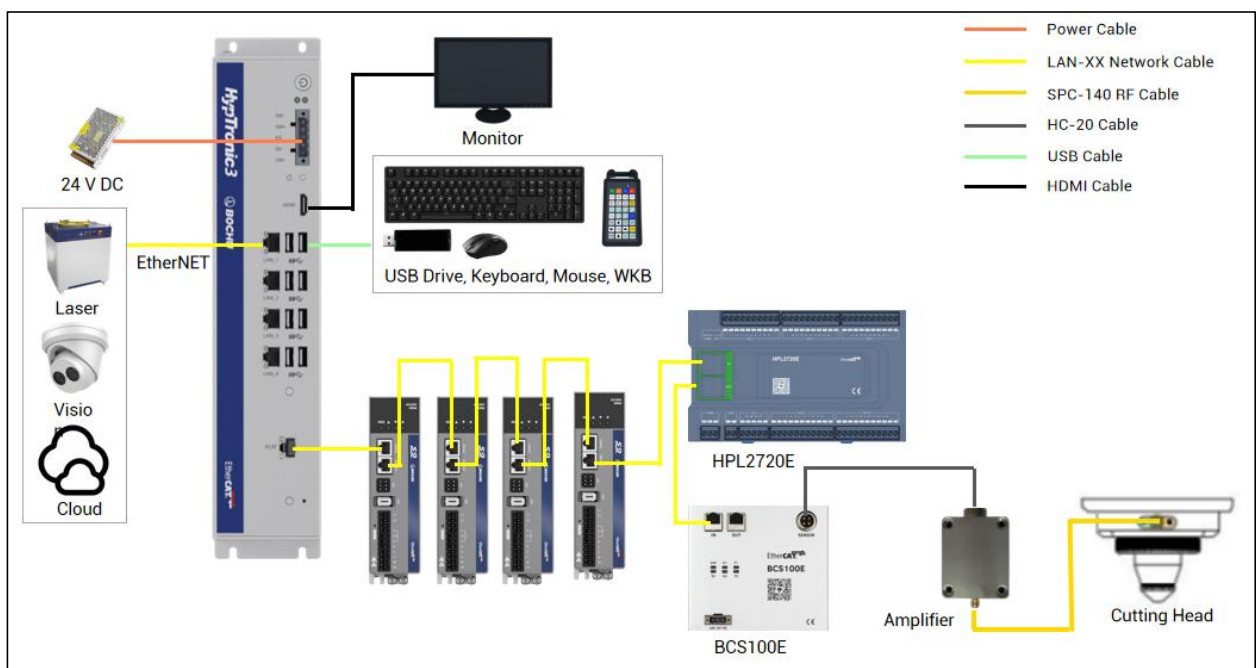


Figure 2-13 Wiring diagram (Non-BLT cutting head)

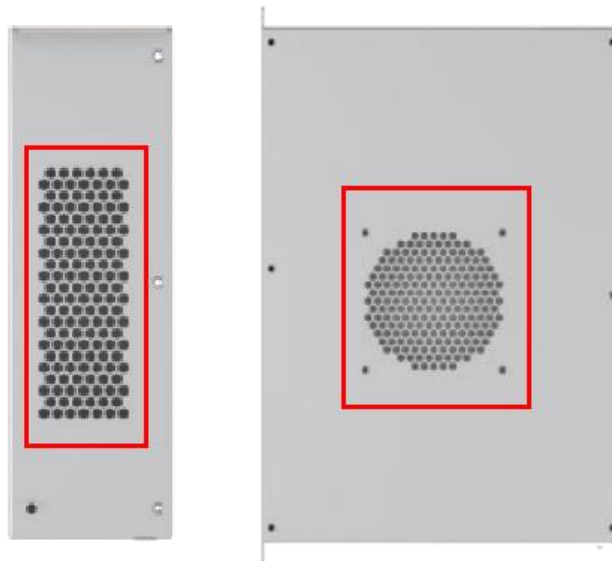


Figure 2-14 Cooling holes

 Caution:

1. Regions marked with red boxes are cooling holes for ventilation and heat dissipation, do not cover!
 2. The white label on the back of the main unit is marked with compatible models. Do not use incorrect models.
-

Chapter 3 Terminal Board Wiring

3.1 BCL4568E

BCL4568E is the latest EtherCAT bus slave product, designed to work seamlessly with BOCHU BLT cutting heads and HypCutRevo/HypCut software. It enables key features including automatic following and focusing, *Smooth Pierce*, *Flash Pierce*, *Vibration Suppression*, and *Smooth Microjoint*.

⚠ Notice: Before connecting the terminal board, verify the orientation configuration of the X, Y, and Z-axis limit settings for the current machine model.

3.1.1 Technical Data

Table 3-1 BCL4568E Technical Data

Module	Qty.	Description
Power	/	Input: 24 V DC/6 A
DA	4	- Range: 0 V to 10 V - Resolution: 12 Bit - Accuracy: 50 mV
PWM	2	- Voltage Levels: 5 V and 24 V - Accuracy: 5 kHz, 0.3% (Top to 50 kHz, 3%)
General Output	24	- Logic Level: 24 V high level - Current Limits: ≤ 0.7 A per channel; ≤ 2.5 A for all channels
Dedicated Input	27	- IN1 to IN24: Active-low (valid range: 0 V to 15 V; invalid range: 19 V to 24 V) - IN25 to IN27: Active-high (valid range: 8 V to 24V; invalid range: 0 V to 4 V)
Working Temperature	/	0°C to 60°C
Humidity	/	10% to 90% RH (non-condensing)
Dimension	/	300 mm × 123 mm × 34 mm (L × W × H)
Weight	/	913 g

3.1.2 Installation Dimension

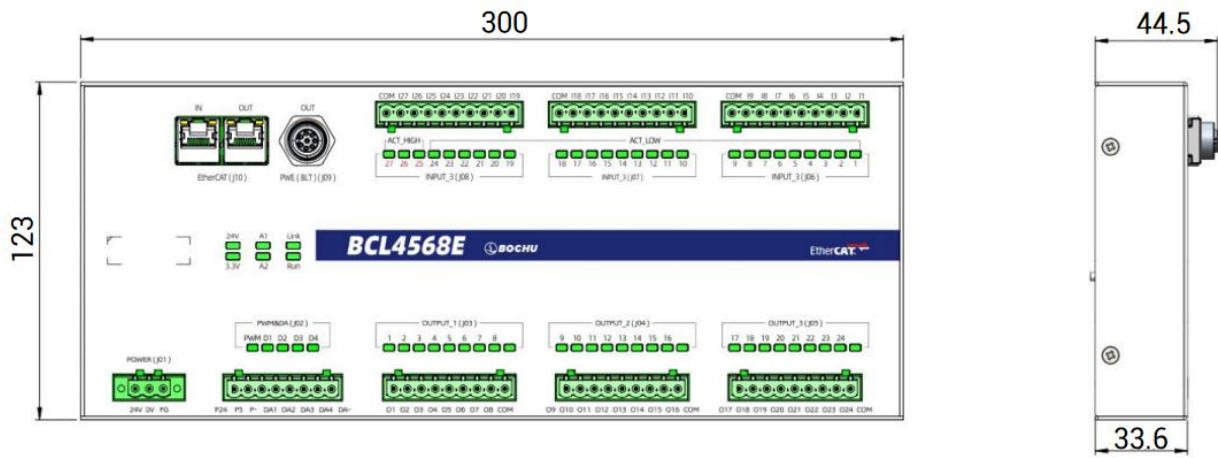


Figure 3-1 BCL4568E dimension (unit: mm)

3.1.3 Interface Layout

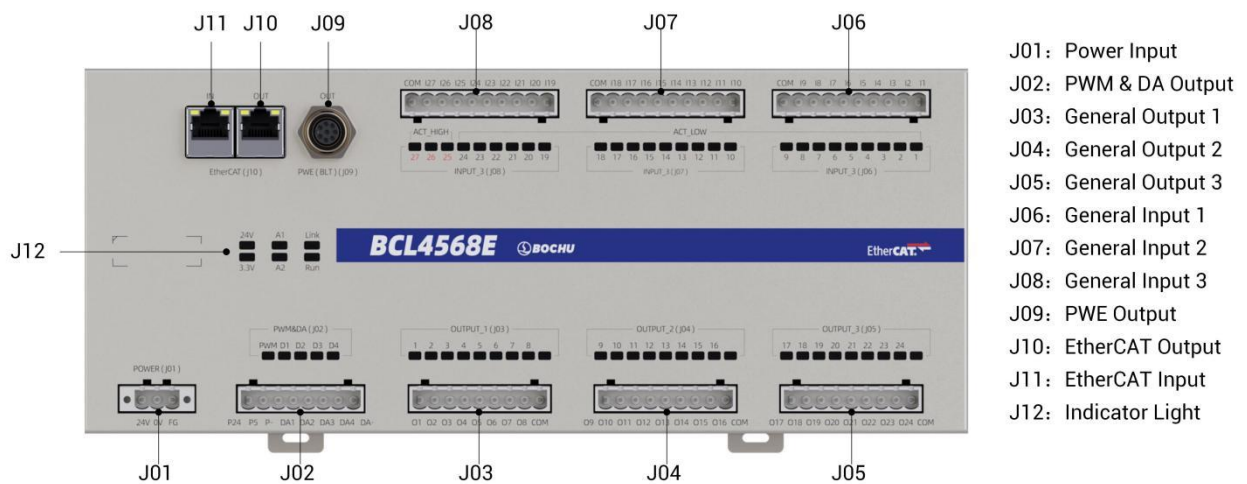


Figure 3-2 Detailed interface layout of BCL4568E

3.1.4 J01 Power Input

The machine's enclosure is the negative terminal of the capacitor measured. To ensure stable operation of the measuring circuit, the following grounding requirements must be met:

- The **FG** pin of the power supply interface must conduct well with the machine enclosure.
- The preamplifier enclosure of the BCL4568E must also conduct well with the machine enclosure.

The specific requirement is that DC resistance must consistently remain below 10 Ω ; otherwise, the EMC (Electromagnetic Compatibility) performance may be compromised.

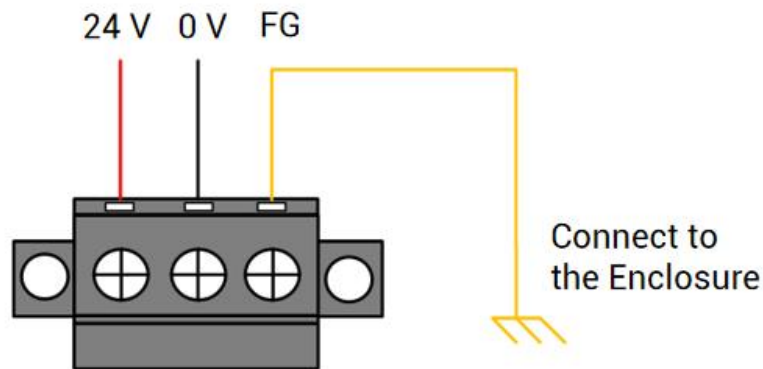


Figure 3-3 Power wiring terminals

3.1.5 J02 PWM/DA Output

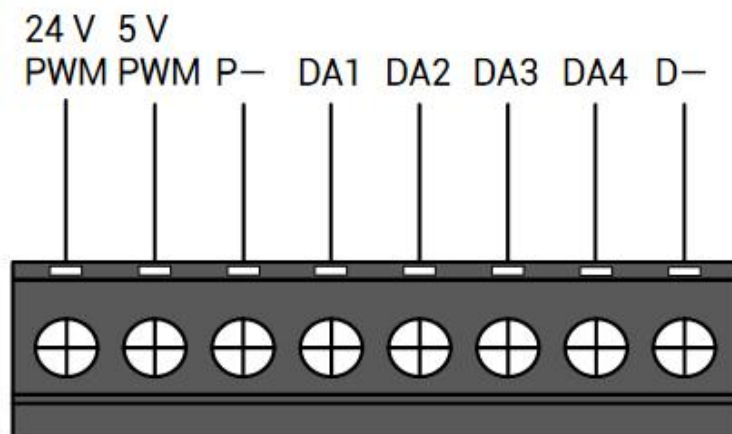


Figure 3-4 PWM/DA wiring terminal

BCL4568E provides two channels of PWM (Pulse Width Modulation) signals. The left channel is 24 V level PWM, the right channel is 5 V level PWM, and P- is the negative terminal

of the PWM signal. The duty cycle is adjustable from 0% to 100% with a maximum carrier frequency of 50 kHz. The signal output is shown in the figure below.

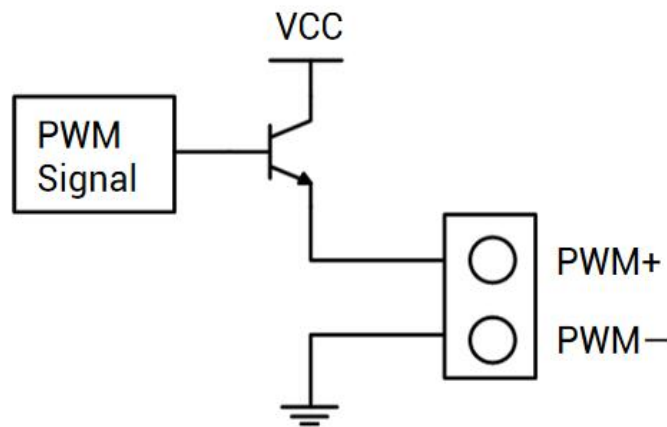


Figure 3-5 PWM output circuit

⚠ Caution:

1. There are dedicated enabling relays for PWM+ and PWM- signals, and there is no need for external relay for isolation.
2. Wrong connection of the 5 V/24 V PWM signals may cause damage to the laser.

BCL4568E has 4 analog outputs from 0 V to 10 V. DA1/DA2/DA3/DA4 are positive terminals of analog, and D- is the negative terminal of analog. It is advised to configure DA1/DA2/DA3/DA4 as control signals for laser peak power and gas proportional valves through the Machine Config tool of HypCut/HypCutRevo.

Table 3-2 BCL4568E Signals

Parameter	Value
Output Signal Range	0 V to +10 V
Maximum Output Load Capacity	50 mA
Maximum Tolerance	+/-10 mV
Resolution	2.7 mV
Conversion Speed	400 us

3.1.6 J03/J04/J05 General Output

Taking J03 as an example, the terminals are shown in the figure below:

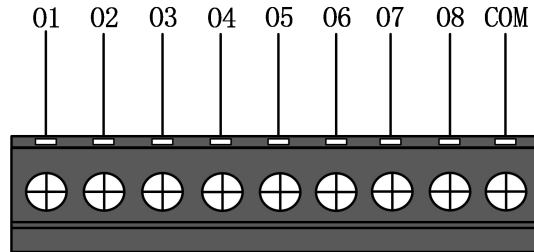


Figure 3-6 Output wiring terminals

There are 24 channels of high-level (24 V) outputs for J03 to J05. The figure above shows the wiring of J03, where O1 to O8 are positive output terminals, and COM is the common negative terminal. Through Machine Config tool, all the 24 outputs can be configured to serve control outputs for components such as the *Height Controller*, *Laser*, *Cutting Head*, *Auxiliary Gas*, *Alarm*, and *Dual-Motor Pallet Changer*.

Caution:

1. The maximum current of one output port is 0.7 A, and the short circuit protection will be triggered once exceeded.
2. The maximum current of total output port is 2.5 A, and the short circuit protection will be triggered once exceeded.

3.1.7 J06/J07/J08 General Input

Taking J06 as an example, the terminals are shown in the figure below:

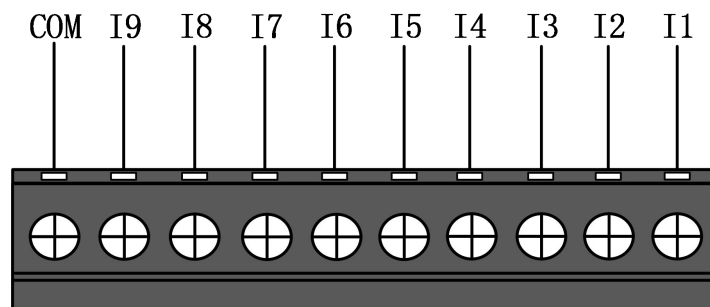


Figure 3-7 Input wiring terminals

There are a total of 27 input channels in J06, J07 and J08.

- IN1 to IN24: active (conducting) at low level (0 V to 15V); inactive (non-conducting) at high level (19 V to 24 V);
- IN25 to IN27: active (conducting) for high level (8 V to 24V); inactive (non-conducting) at low level (0 V to 4 V).

Taking J06 as an example, I1 to I9 are the positive terminals for input signals, and COM is the common negative terminal. The typical wiring of a photoelectric switch is shown below, and a 24 V NPN-type photoelectric switch must be used.

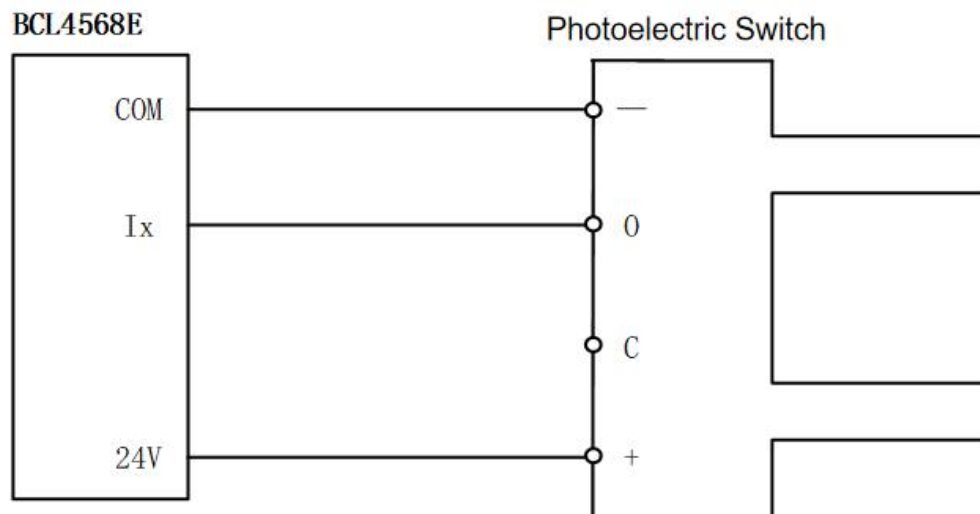


Figure 3-8 Photoelectric switch wiring

The typical wiring of the contact switch is shown below.

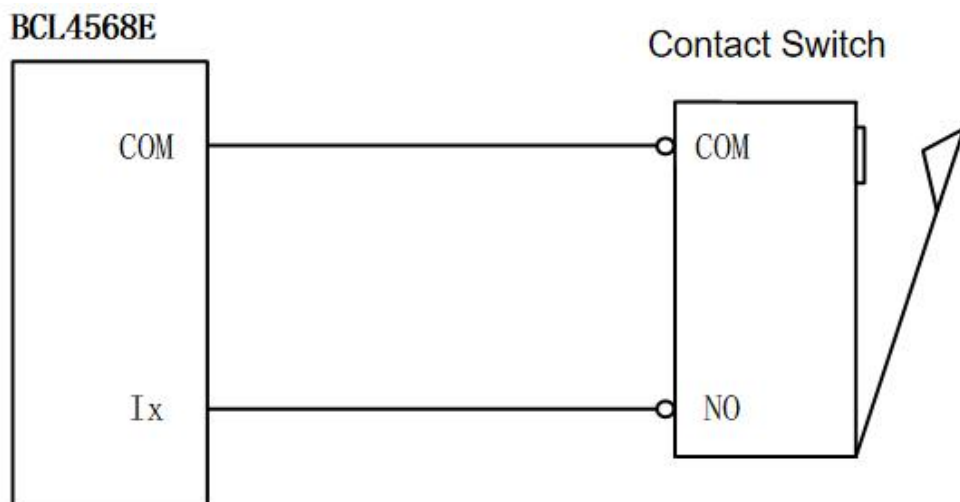


Figure 3-9 Contact switch wiring

The typical wiring of magnetic switch is shown below, and a 24 V NPN-type magnetic switch shall be used.

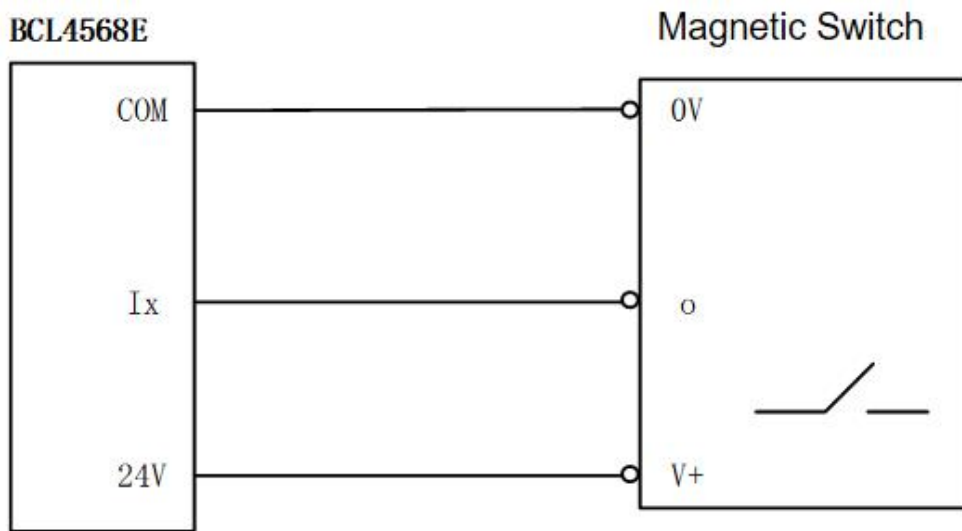


Figure 3-10 Magnetic switch wiring

3.1.8 J09 PWE Output

J09 is an output interface that connects the Ethernet power. It supports 100 Mbps network communication, and provides power and communication to the BLT Intelligent Cutting Heads via PWE cables.

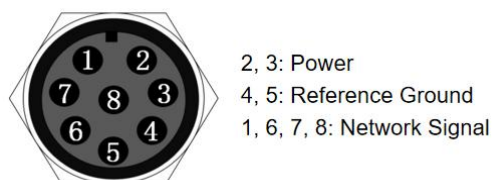


Figure 3-11 PWE interfaces

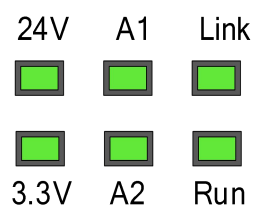


Figure 3-12 PWE indicator

The table below shows the distinct connection status indicated by the PWE LEDs.

Table 3-3 PWE Network and Power Connection Status Description

Label	Description	LED Color	Status	Description
1: Link	Hardware Connection and Communication Status	Green	Off	No PWE Connection
			On	PWE Connected
			Flashing	Connected and Communicating
2: Run	EtherCAT Bus Link Status	Green	Off or Flashing	Not in the OP State
			On	In the OP State

3.1.9 J10/11 EtherCAT Communication Interface

J10 is the EtherCAT output interface, and J11 is the EtherCAT input interface. Recommended to use Cat5e (or above) standard RJ45 network cable.

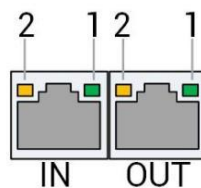


Figure 3-13 EtherCAT communication interface

Description of the connection status of network interface is shown in the table below.

Table 3-4 Communication Interface Status

Label	Description	LED Color	Status	Description
1: Link	EtherCAT Bus Connection and Communication Status	Green	Off	No Connection
			On	Connected, no Communication
			Blink	Connected, with Communication
2: Status	EtherCAT Bus Link Status	Yellow	Off or Blink	Not in the OP State
			On	In the OP State

3.1.10 J12 Indicator Light

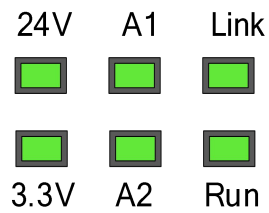


Figure 3-14 Indicator light

Description of the indicator light is shown in the table below.

Table 3-5 Indicator Light Status

Label	Description	LED Color	Status	Description
24 V	24 V power Indicator	Yellow-green	On	Normal
			Off	Not Powered/Fault
3.3 V	3.3 V power Indicator	Yellow-green	On	Normal
			Off	Fault
A1/A2	ARM indicator	Yellow-green	Alternating Flash	Running
Link/Run	Refer to: J09 PWE Output .			

⚠ Notice: Under normal conditions, A1 and A2 blink once each, with a frequency of 1 Hz. Any other blinking pattern indicates an ARM malfunction.

3.1.11 Wiring Diagram

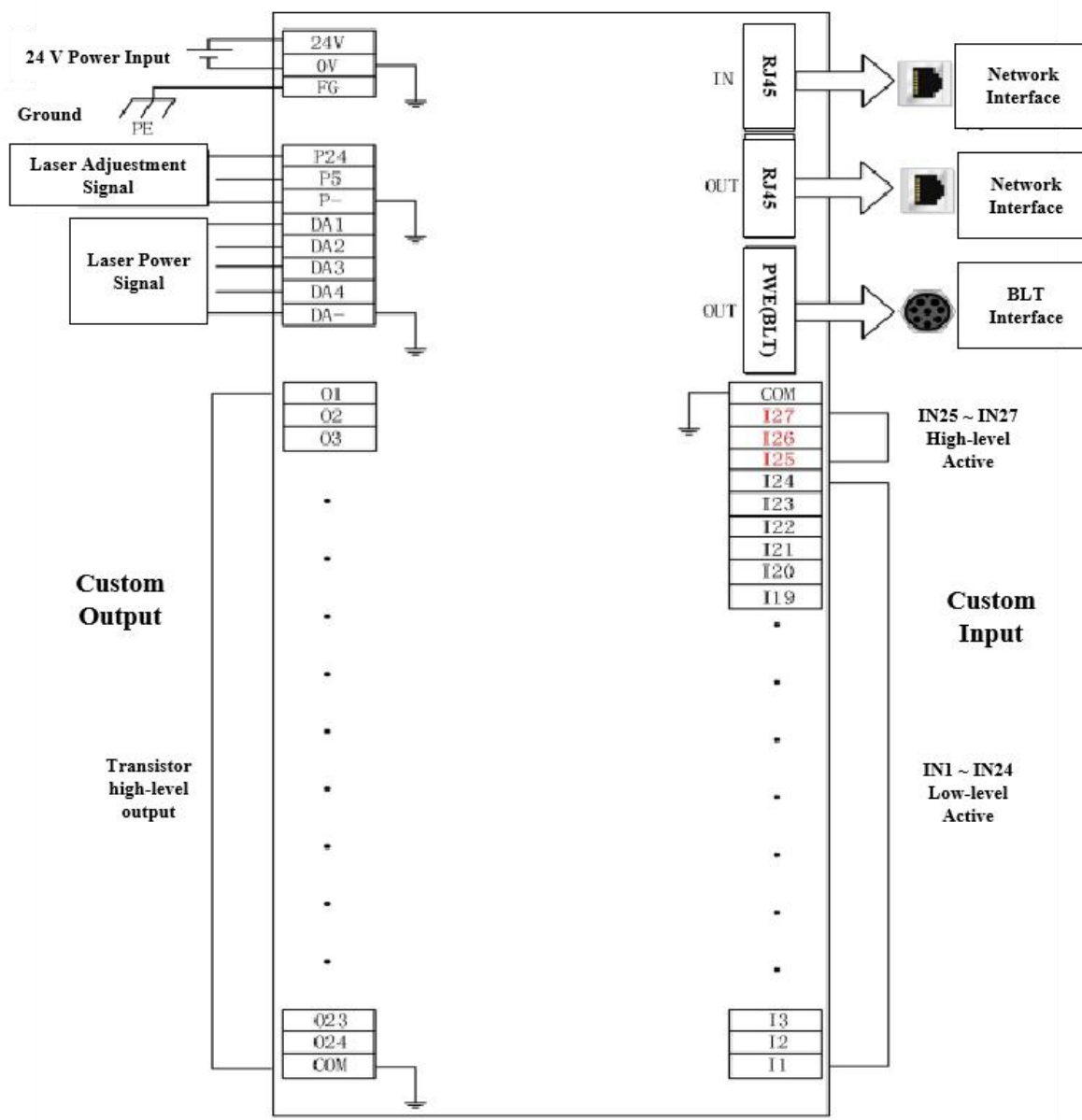


Figure 3-15 BCL4568E wiring

3.2 HPL2720E

HPL2720E is an IO expansion board based on an EtherCAT bus, which can be connected with the peripheral resources required by the FSCUT8000 laser cutting system.

3.2.1 Technical Data

The table below shows the technical data of HPL2720E.

Table 3-6 HPL2720E Technical Data

Module	Qty.	Description
Power	/	Input: 24 V DC/3.5 A
DA	4	• Range: 0 V to 10V • Resolution: 12 Bit • Accuracy: ± 20 mV
PWM	1	• Voltage Levels: 24 V • Accuracy: 5 kHz, 0.3% (top to 50 kHz, 3%)
General Output	20	• Logic Level: 24 V high level • Current Limits: ≤ 0.7 A per channel; ≤ 2.5 A for all channels • Recommended wiring: External 24 V relay connected to output port
General Input	27	• 24 V, active-low (valid range: < 15.6 V) • The IN1, IN2, and IN3 can be switched to high level active (valid range: > 5.8 V)
Working Temperature	/	0°C to 60°C
Humidity	/	10% to 90% RH (non-condensing)
Dimension	/	195 mm $\times$ 118 mm $\times$ 45.2 mm (L $\times$ W $\times$ H)
Weight	/	480 g

3.2.2 Installation Dimension

The product dimension of HPL2720E is shown below:

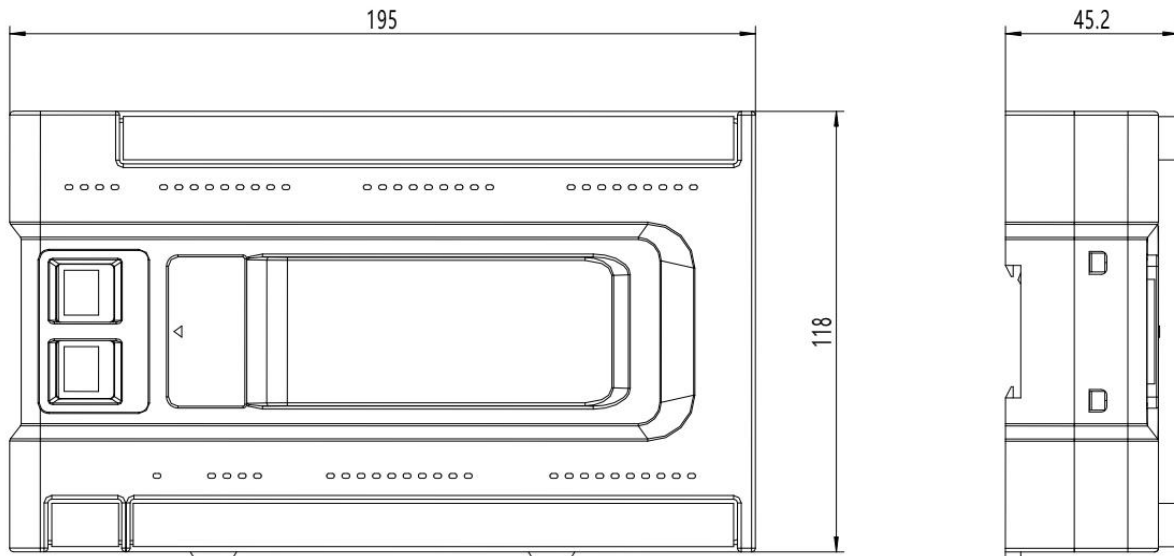


Figure 3-16 HPL2720E dimension (unit: mm)

3.2.3 Interface Layout

The detailed terminal layout of HPL2720E is shown below:

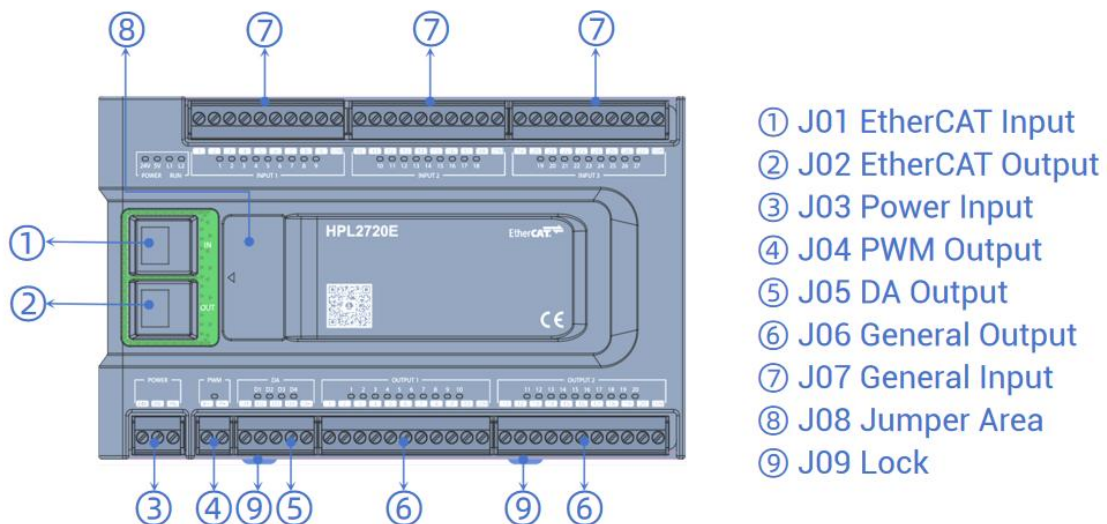


Figure 3-17 Detailed interface layout of HPL2720E terminal board

3.2.4 J01 EtherCAT Input

J01 is the input terminal for EtherCAT, which shall be connected with standard RJ45 network cables.

3.2.5 J02 EtherCAT Output

J02 is the output terminal for EtherCAT, which shall be connected with standard RJ45 network cables.

3.2.6 J03 Power Input

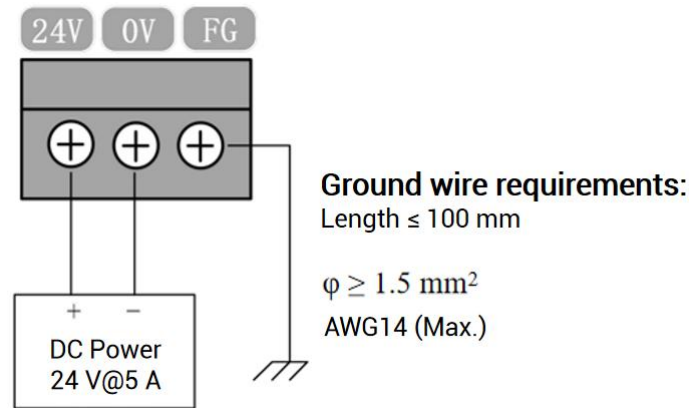


Figure 3-18 J03 power input

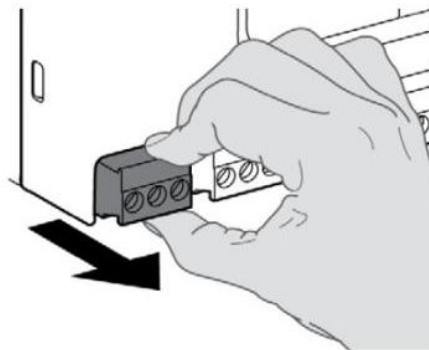


Figure 3-19 Removing the power terminal block

Caution:

1. 24 V and 0 V are connected to the positive end and the negative end of the 24 V DC correspondingly. The FG pin must be securely connected to protective earth (PE).
2. All terminals are pluggable only, and disassembly is shown in the figure above. There is no need to unplug the terminals for wiring.

3.2.7 J04 PWM Output

HPL2720E features 1 channel of PWM signal for laser average power control, which is 24 V. The duty cycle is adjustable from 0% to 100% with a maximum carrier frequency of 50 kHz. The signal output is shown in the figure below.

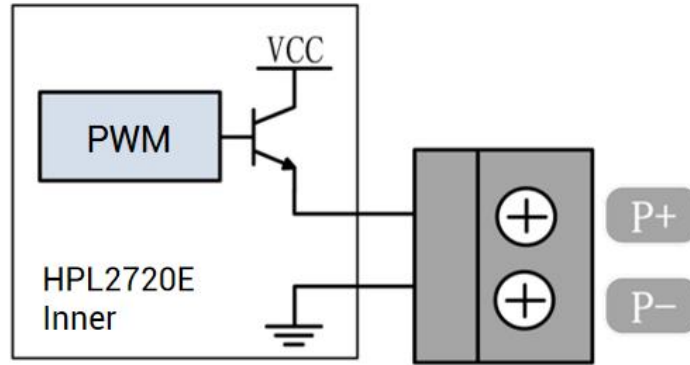


Figure 3-20 PWM output circuit

⚠ Caution: There are dedicated enabling relays for PWM+ and PWM- signals, and there is no need for external relay for isolation. If 5 V PWM signal is required, the BCL4516E terminal board can be selected.

3.2.8 J05 DA Output

HPL2720E has 4 analog outputs from 0 V to 10 V. It is advised to configure DA1/DA2/DA3/DA4 as control signals for laser peak power and gas proportional valves through the Machine Config tool of HypCut/HypCutRevo.

Table 3-7 DA Output Description

Parameter	Value
Output Signal Range	0 V to +10 V
Maximum Output Load Capacity	50 mA
Maximum Tolerance	+/- 20 mV
Resolution	2.7 mV
Conversion Speed	400 us

3.2.9 J06 General Output

There are 20 high-level (24 V) outputs from OUT1 to OUT20. Through Machine Config tool, the 20 outputs can be configured to serve control outputs for components such as the *Height Controller, Laser, Cutting Head, Auxiliary Gas, Alarm, and Dual-Motor Pallet Changer*.

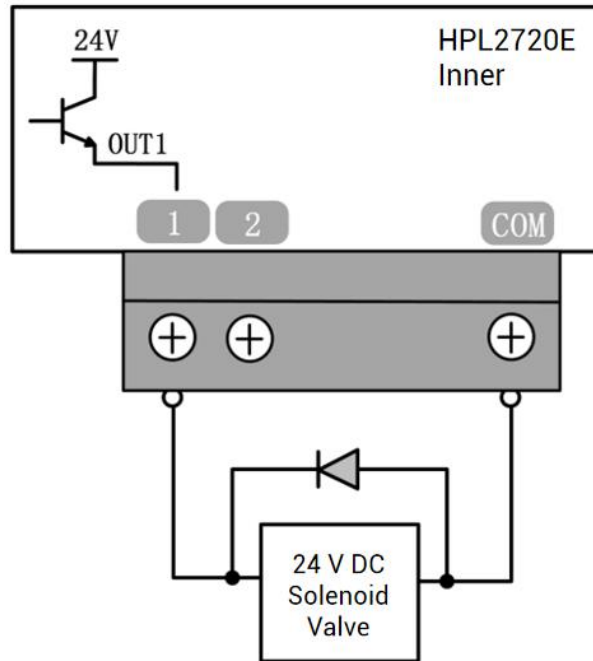


Figure 3-21 J06 general output

⚠ Caution: The maximum current of total output port is 2.5 A, and the short circuit protection will be triggered once exceeded.

3.2.10 J07 General Input

HPL2720E does not require dedicated input ports. All the input ports can be configured as the axis limit signal or origin signal. For instance, the normally open (NO) and normally closed (NC) modes of the limit and origin signals can be changed through the Machine Config tool. When set to the normally open mode, the input is considered valid when the input port is conductive with 0 V. When set to the normally closed mode, the input is valid when it is disconnected from 0 V.

Photoelectric switches must be NPN-type 24 V photoelectric sensors. Magnetic switches must be NPN-type 24 V magnetic sensors. A typical wiring example is shown below:

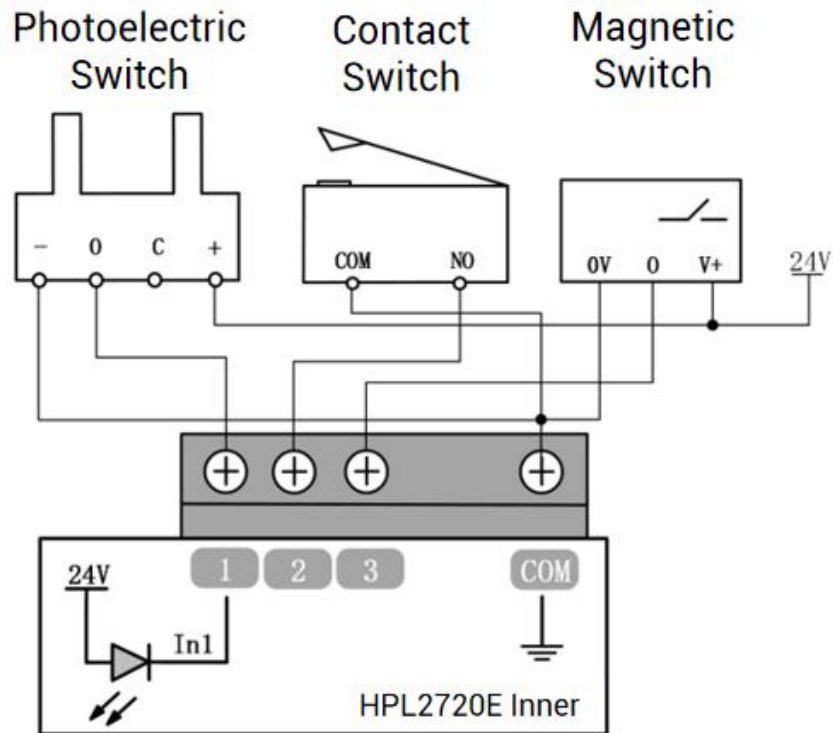


Figure 3-22 General input wiring diagram

IN1 to IN3 can adjust the polarity of effective level by hardware jumper.



Figure 3-23 IN1 to IN3 adjust the polarity of effective level

- When ALM signal is ACT_LOW, low level input (0 V) is active;
- When ALM signal is ACT_HIGH, high level input (24 V) is active;

3.2.11 Wiring Diagram

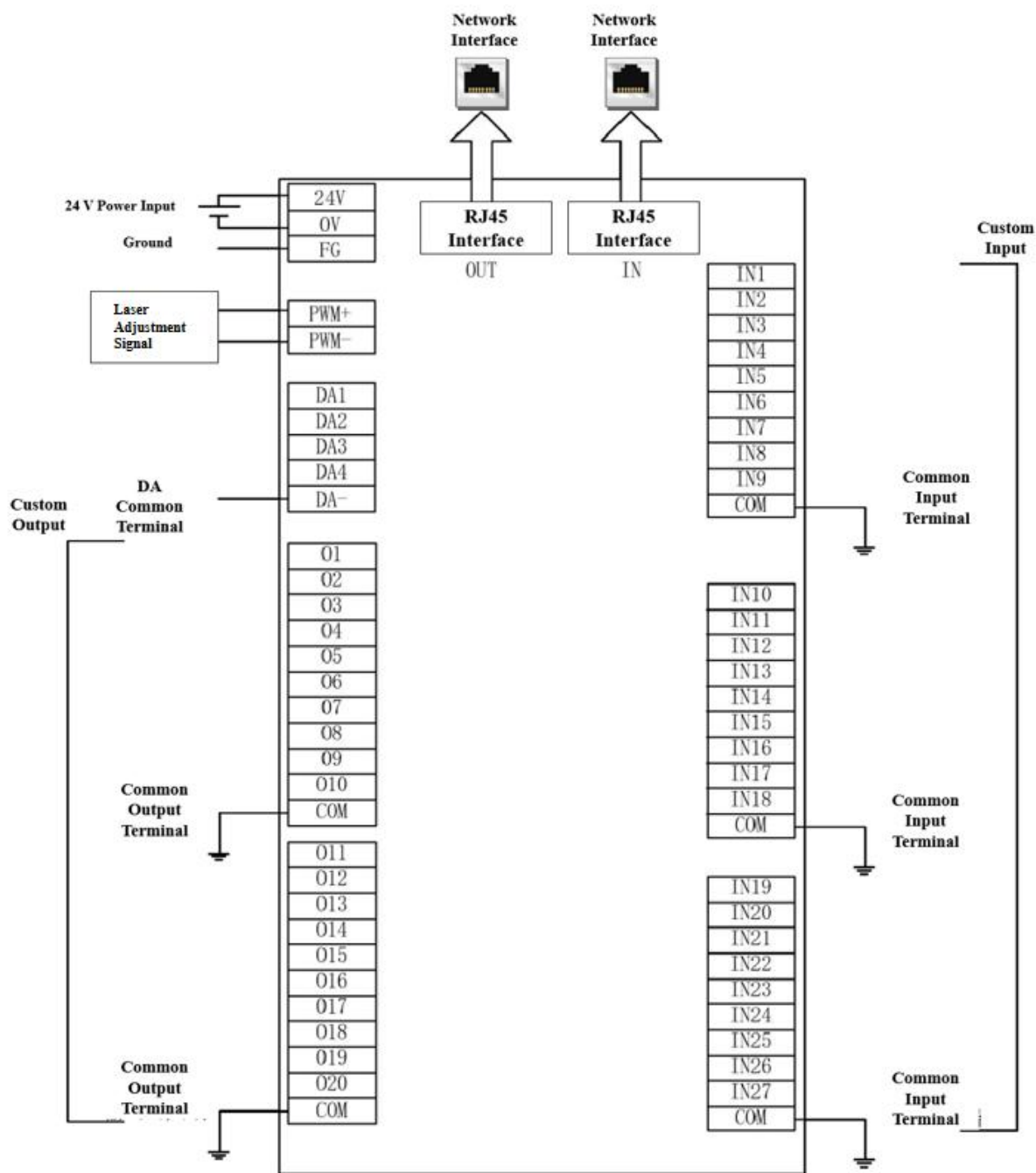


Figure 3-24 HPL2720E wiring

Chapter 4 Height Controller Wiring

4.1 BCS210E

BCS210E is a capacitive height controller specifically designed for BLT cutting heads. It incorporates BOCHU newest-generation Follow-up Control Algorithm, thereby delivering high performance.

4.1.1 Technical Data

Table 4-1 BCS210E Technical Data

Module	Description
Power	100 to 240 V AC, 2.5 A
Working Temperature	0°C to 60°C
Humidity	10% to 90% (non-condensing)
Dimension	136 mm × 126.3 mm × 34 mm (L × W × H)

4.1.2 Installation Dimension

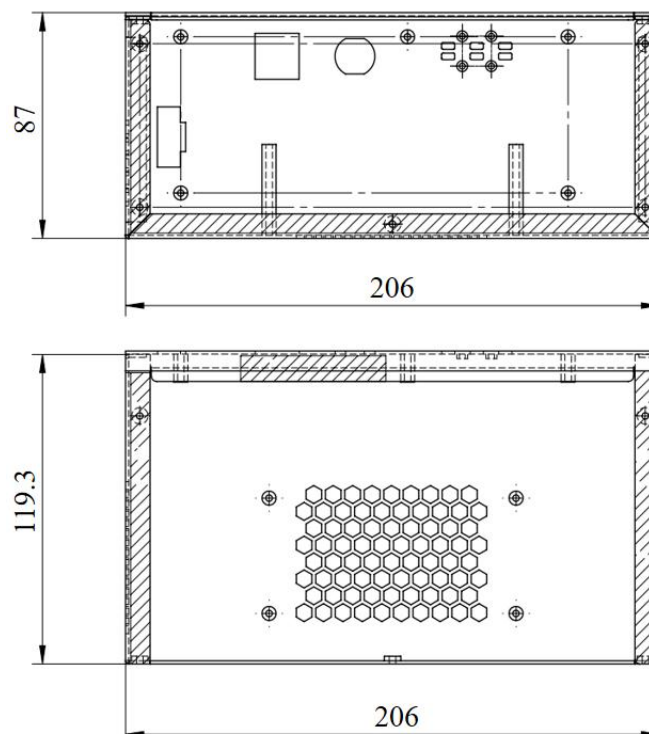


Figure 4-1 BCS210E dimension (unit: mm)

4.1.3 Interface Layout

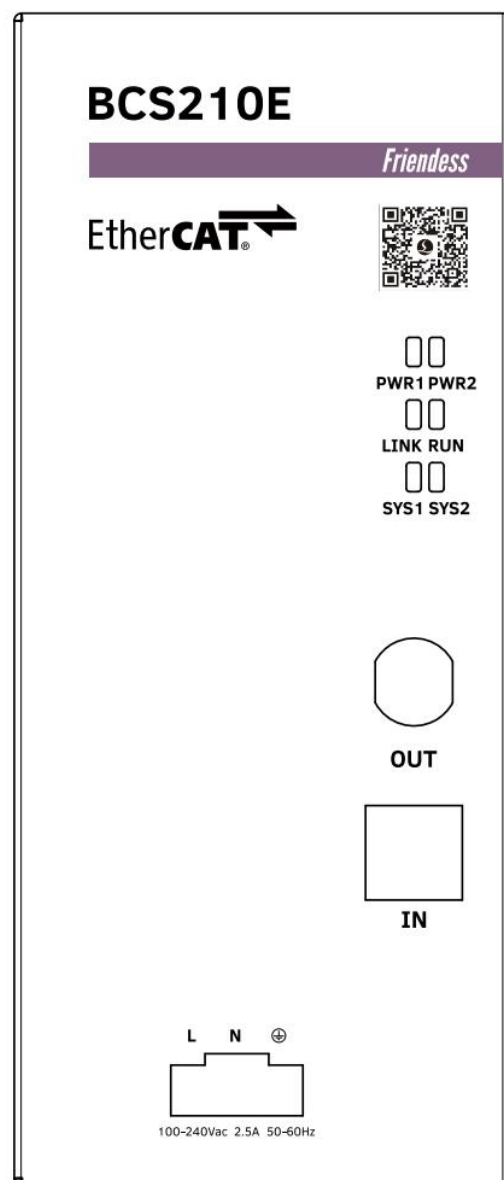


Figure 4-2 Detailed interface layout of BCS210E

4.1.4 Silkscreen Instruction

Table 4-2 BCS210E Silkscreen Instruction

Name	Silkscreen	Description	Power-On State
Power Interface	LN	Power Input: 220 V AC	/
EtherCAT Input	IN	- The input interface for EtherCAT. - Connect standard Ethernet cable (yellow).	/

Name	Silkscreen	Description	Power-On State
EtherCAT Output	OUT	- The output interface for EtherCAT. - Connect PWE cable (purple).	/
Power Indicator 1	PWR1	Internal Power Indicator 1	Stays steady after power-up.
Power Indicator 2	PWR2	Internal Power Indicator 2	Stays steady after power-up.
Communication Indicator 1	LINK	Communication LINK Status Light	Stays steady after stable power-up, and changes to rapid flashing upon EtherCAT connection.
Communication Indicator 2	RUN	Communication RUN Status Light	Remains off at power-on, and changes to steady upon EtherCAT connection.
System Indicator 1	SYS1	System run status indicator 1	Blinks slowly after stable power-up.
System Indicator 2	SYS2	System run status indicator 2	Stays steady after stable power-up.

4.2 BCS100E

BCS100E is a standard EtherCAT-based height controller, while BCS100E_PRO is specifically designed to support Precitec series cutting heads.

4.2.1 Technical Data

Table 4-3 BCS100E/BCS100E_PRO Technical Data

Module	Description
Power	24 V DC/1 A
Capacitive Sampling	BCS100E: 4-core conductor, same as BCS100
	BCS100E_PRO: Single-core BNC Transmission
Working Temperature	0°C to 60°C
Humidity	10% to 90% (non-condensing)
Dimension	110.5 mm × 127.8 mm × 52.45 mm (L × W × H)

4.2.2 Installation Dimension

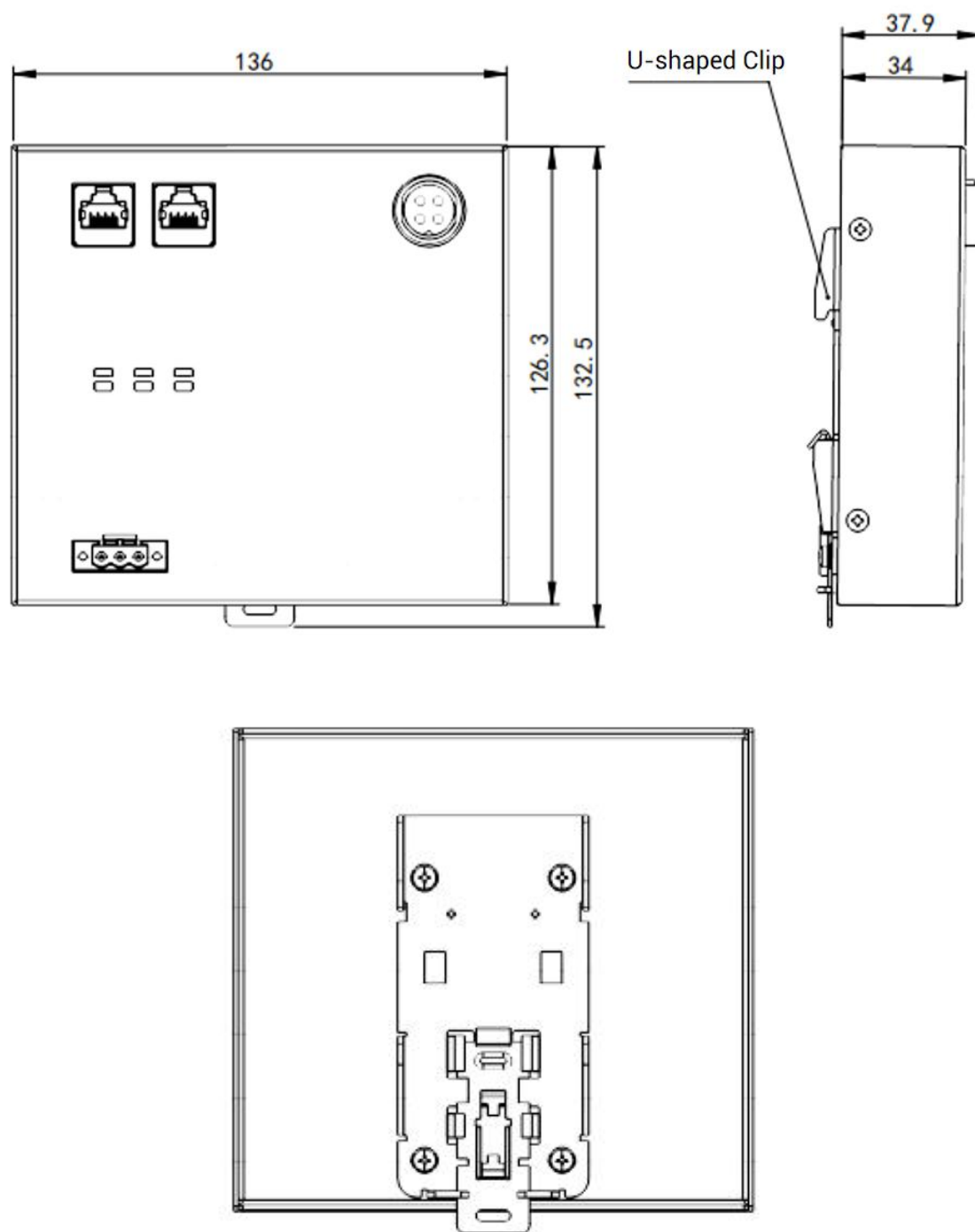


Figure 4-3 BCS100E/BCS100E_PRO dimension (unit: mm)

4.2.3 Interface Layout

The detailed terminal layout of BCS100E/BCS100E_PRO is shown below:

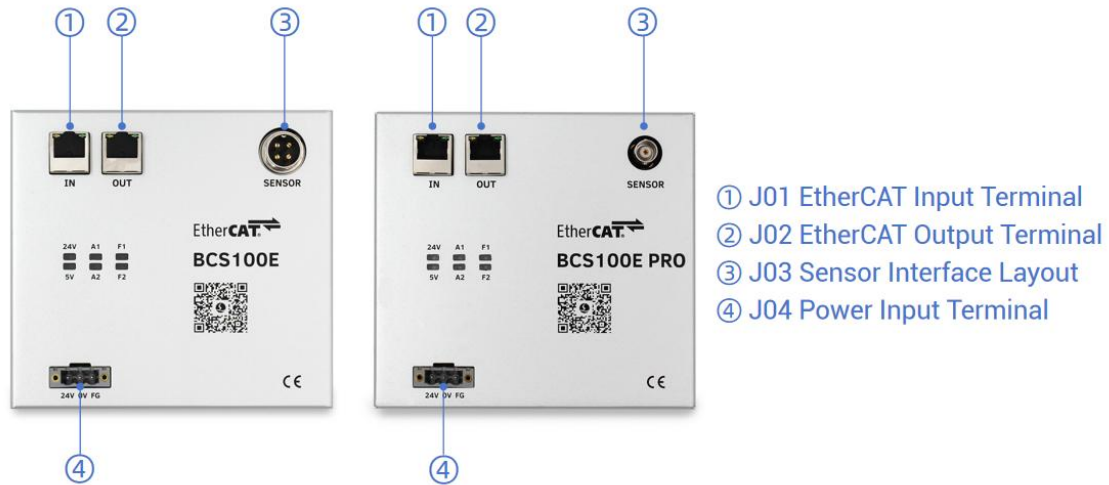


Figure 4-4 Detailed interface layout of BCS100E/BCS100E_PRO

4.2.4 Power Input Terminal

The machine's enclosure is the negative terminal of the capacitor measured. To ensure stable operation of the measuring circuit, the following grounding requirements must be met:

- The **FG** pin of the power supply interface must conduct well with the machine enclosure ,using a short, low-resistance grounding cable.
- The amplifier enclosure must also conduct well with the machine enclosure.

The specific requirement is that DC resistance must consistently remain below 4 Ω ; otherwise, the capacitive following performance may be compromised.

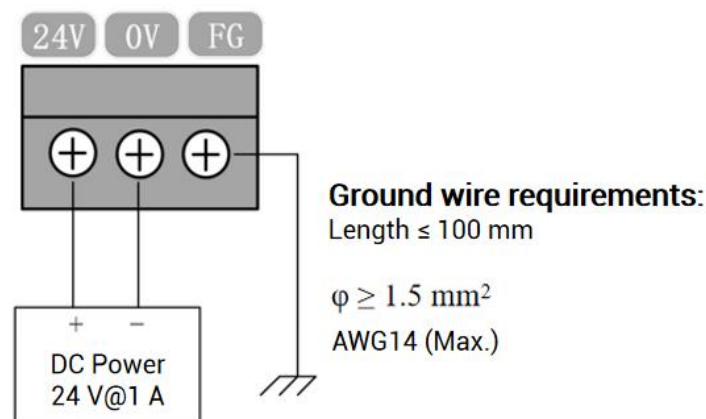


Figure 4-5 Power input terminal

4.2.5 Sensor Interface Layout

Sensor interface layout of BCS100E is as shown in the figure below.

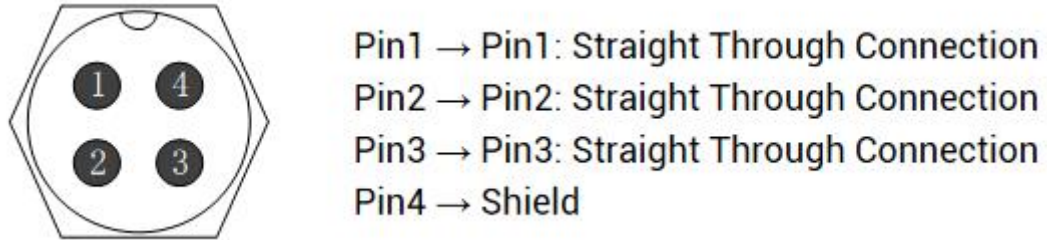


Figure 4-6 Sensor interface layout of BCS100E

Sensor interface layout of BCS100E_PRO is as shown in the figure below.

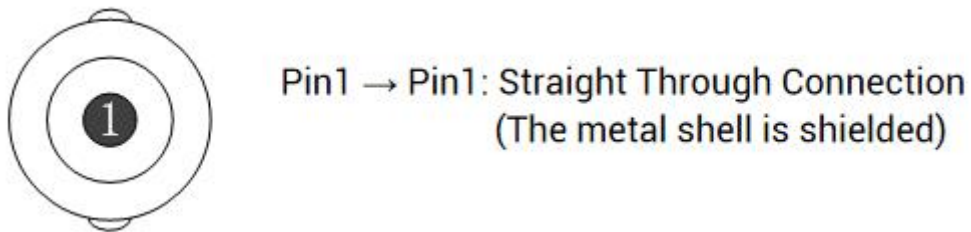


Figure 4-7 Sensor interface layout of BCS100E_PRO

Chapter 5 Cutting Head Wiring

5.1 BLT Cutting Head Wiring

When using BCS210E, the connection configuration for BLT cutting head is illustrated in the figure below:

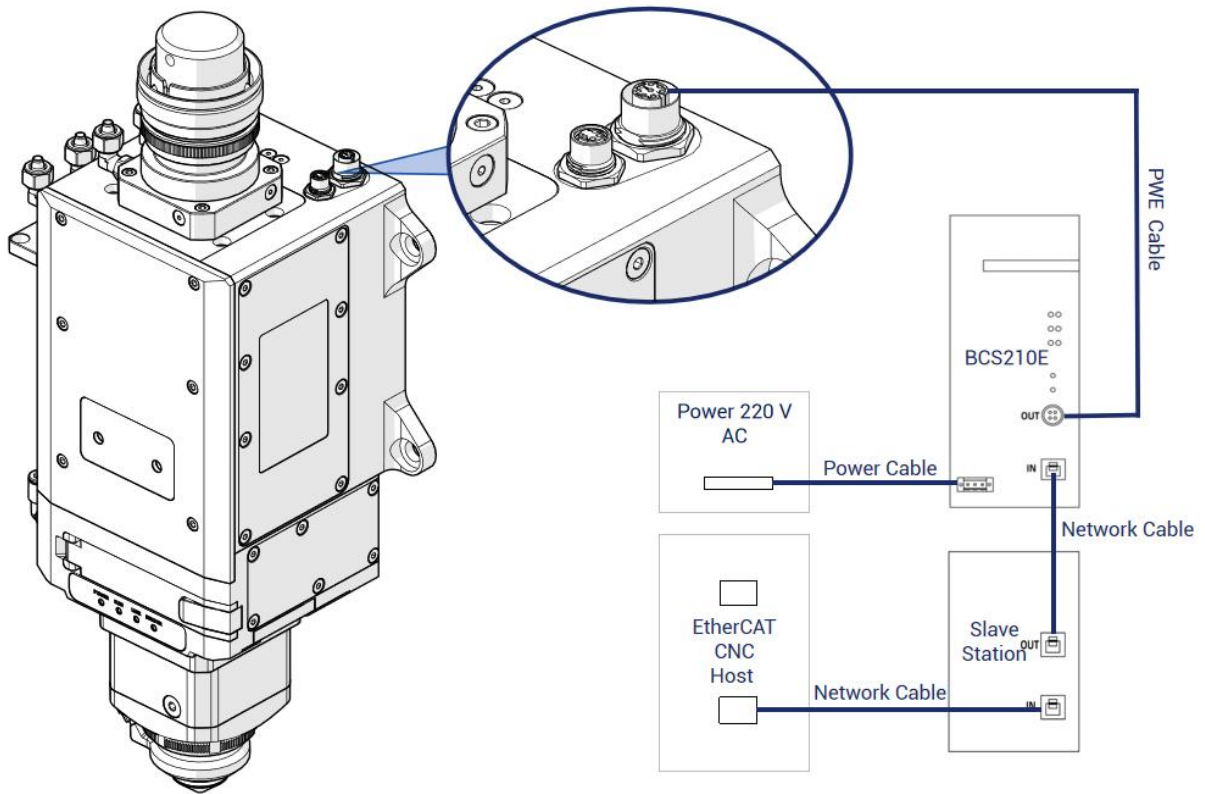


Figure 5-1 BLT cutting head wiring

5.2 ProCutter Cutting Head Wiring

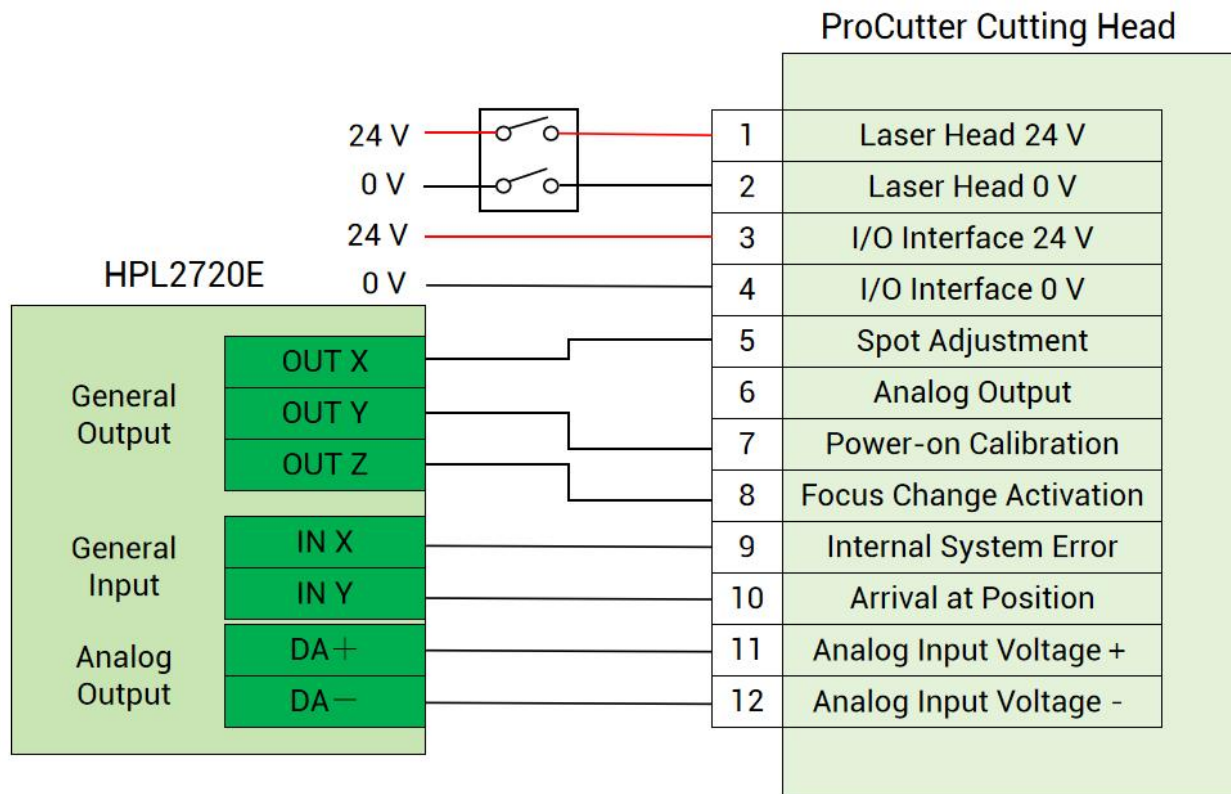


Figure 5-2 ProCutter cutting head wiring

5.3 HighYag Cutting Head Wiring

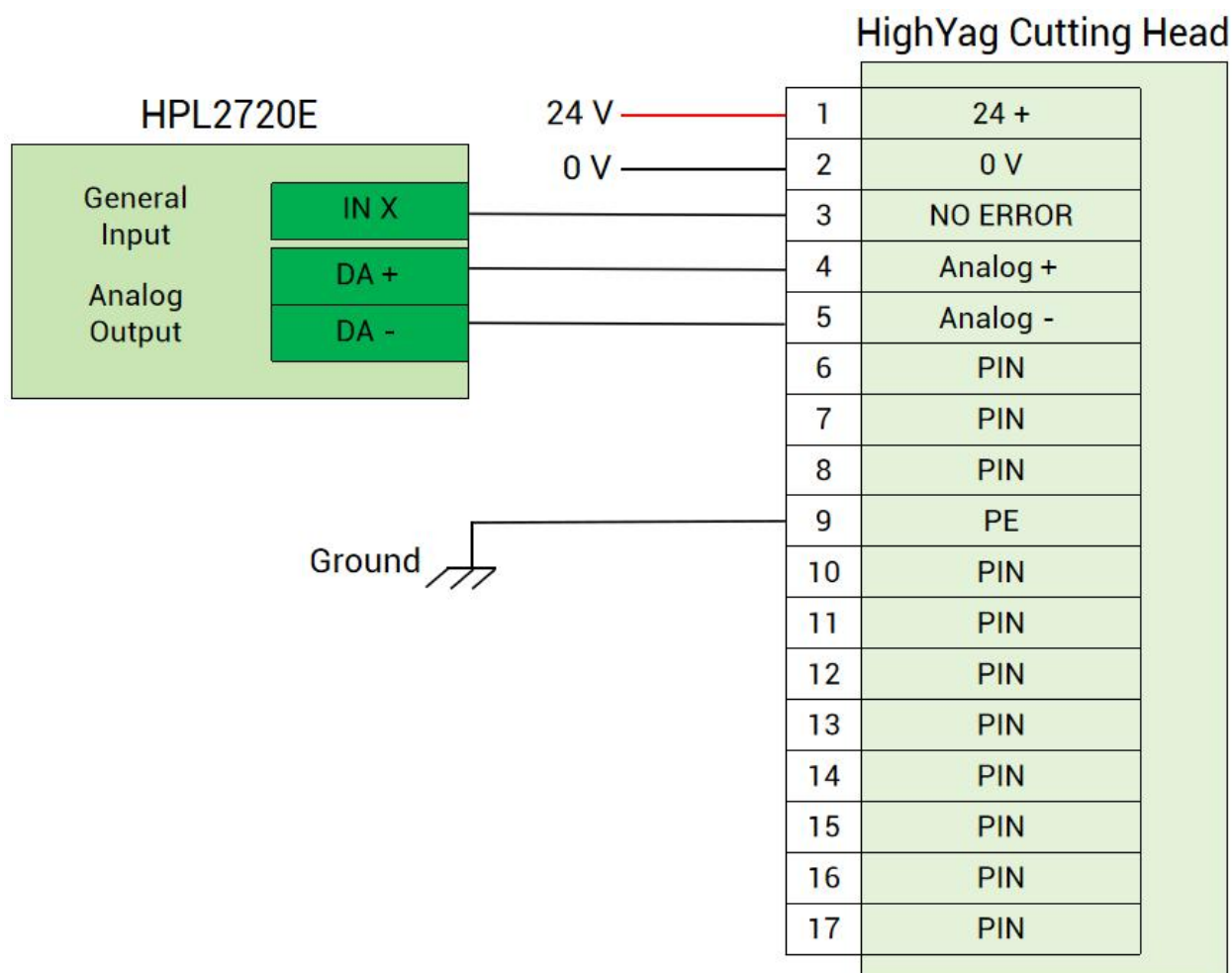


Figure 5-3 HighYag cutting head wiring

5.4 Raytools Cutting Head Wiring

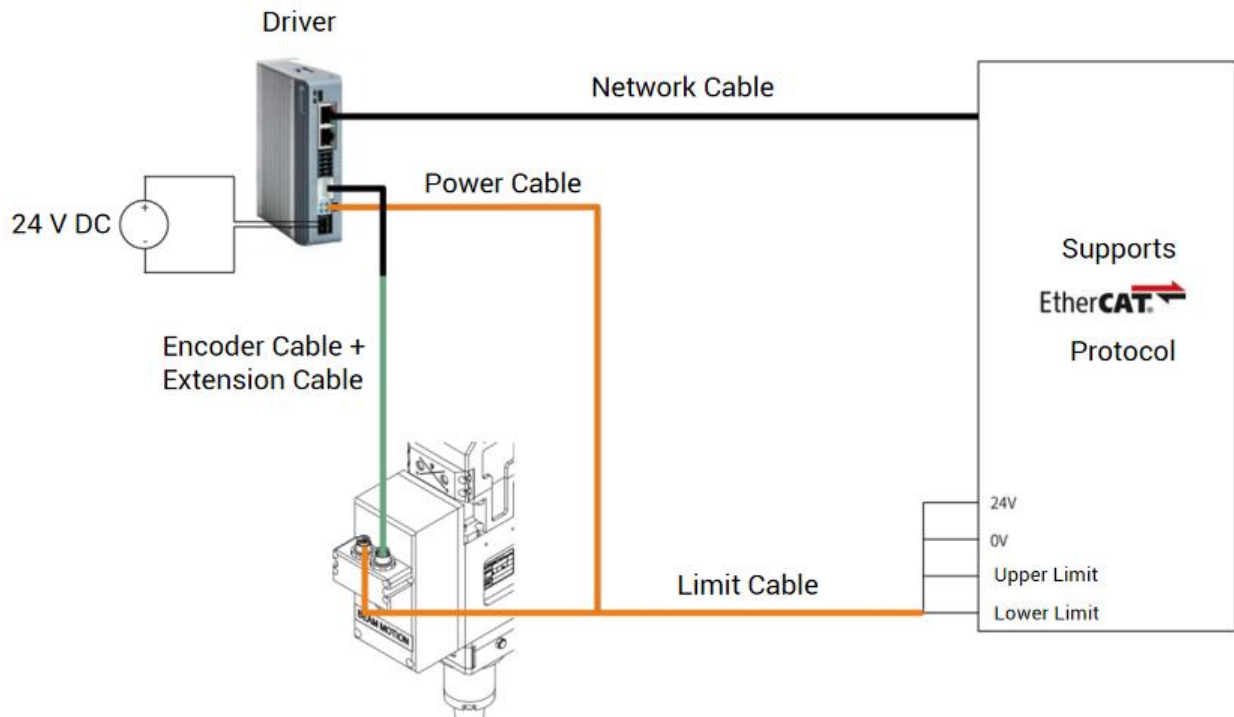


Figure 5-4 Raytools cutting head wiring

Chapter 6 Laser Wiring

6.1 IPG-YLS Network Communication Wiring

All IPG-YLS series lasers can be quickly connected to the laser following this method.

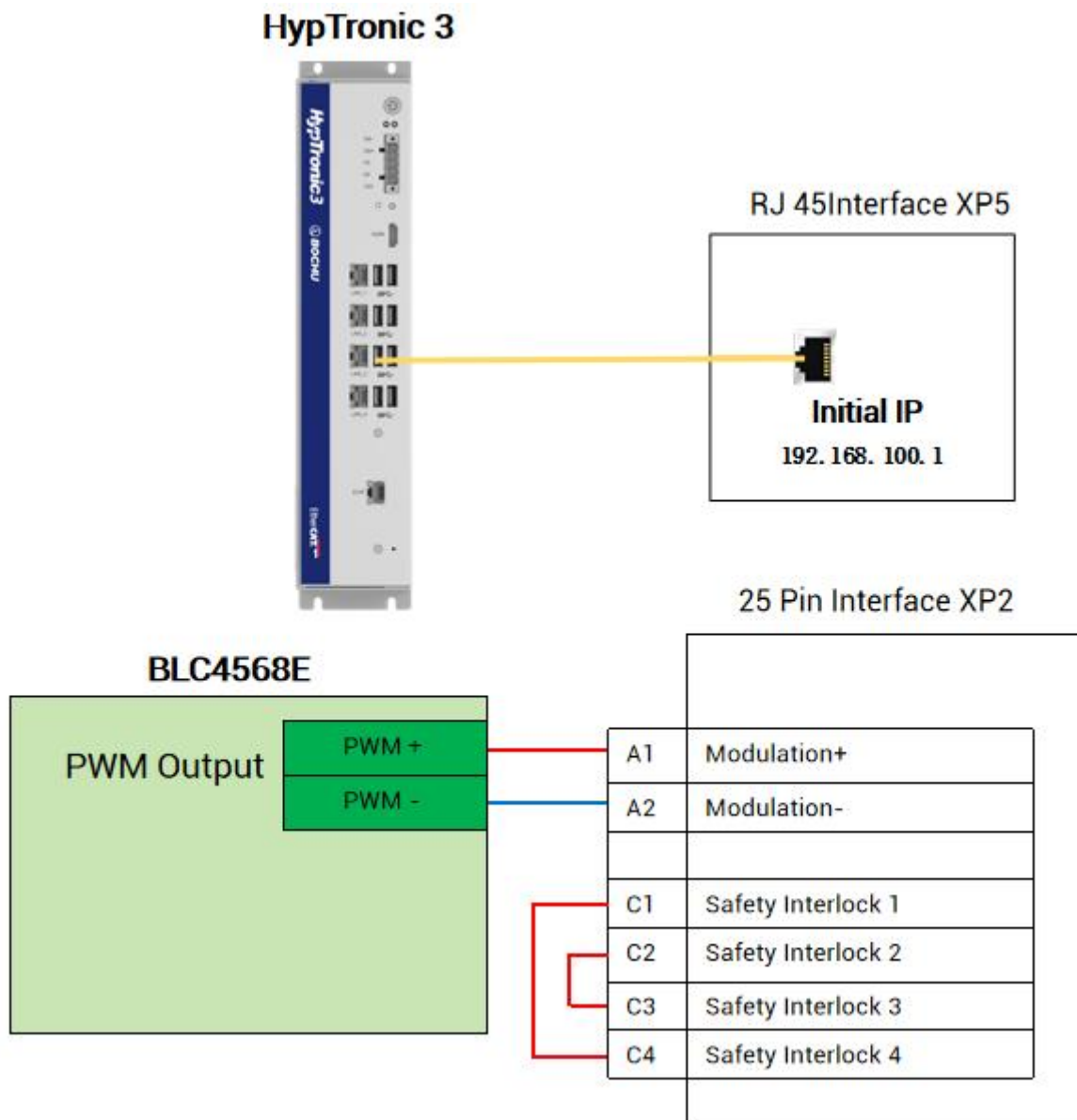


Figure 6-1 IPG-YLS series laser wiring

6.2 IPG-German Non-Network Communication Wiring

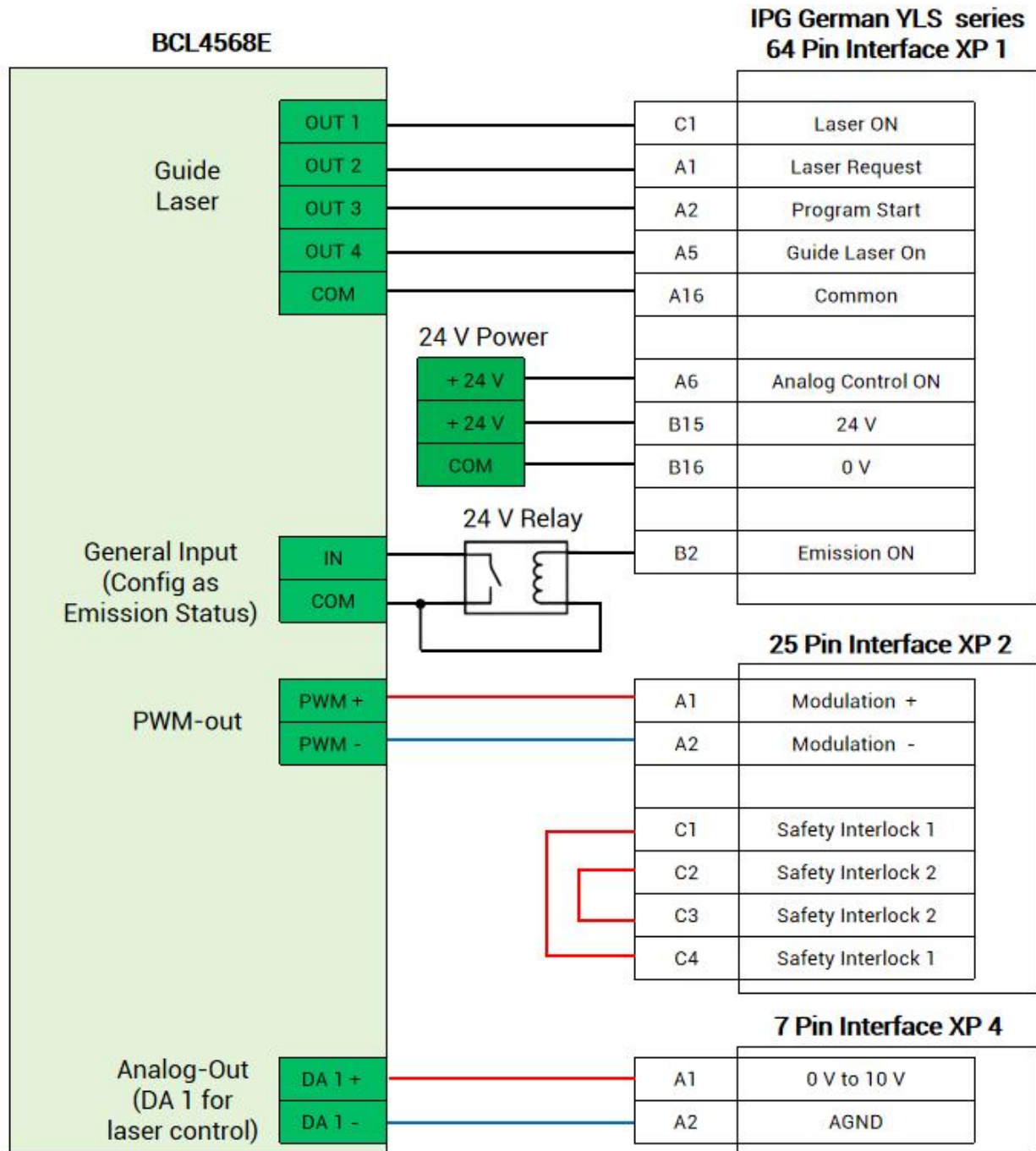


Figure 6-2 IPG-German non-network communication wiring

6.3 IPG-American Non-Network Communication Wiring

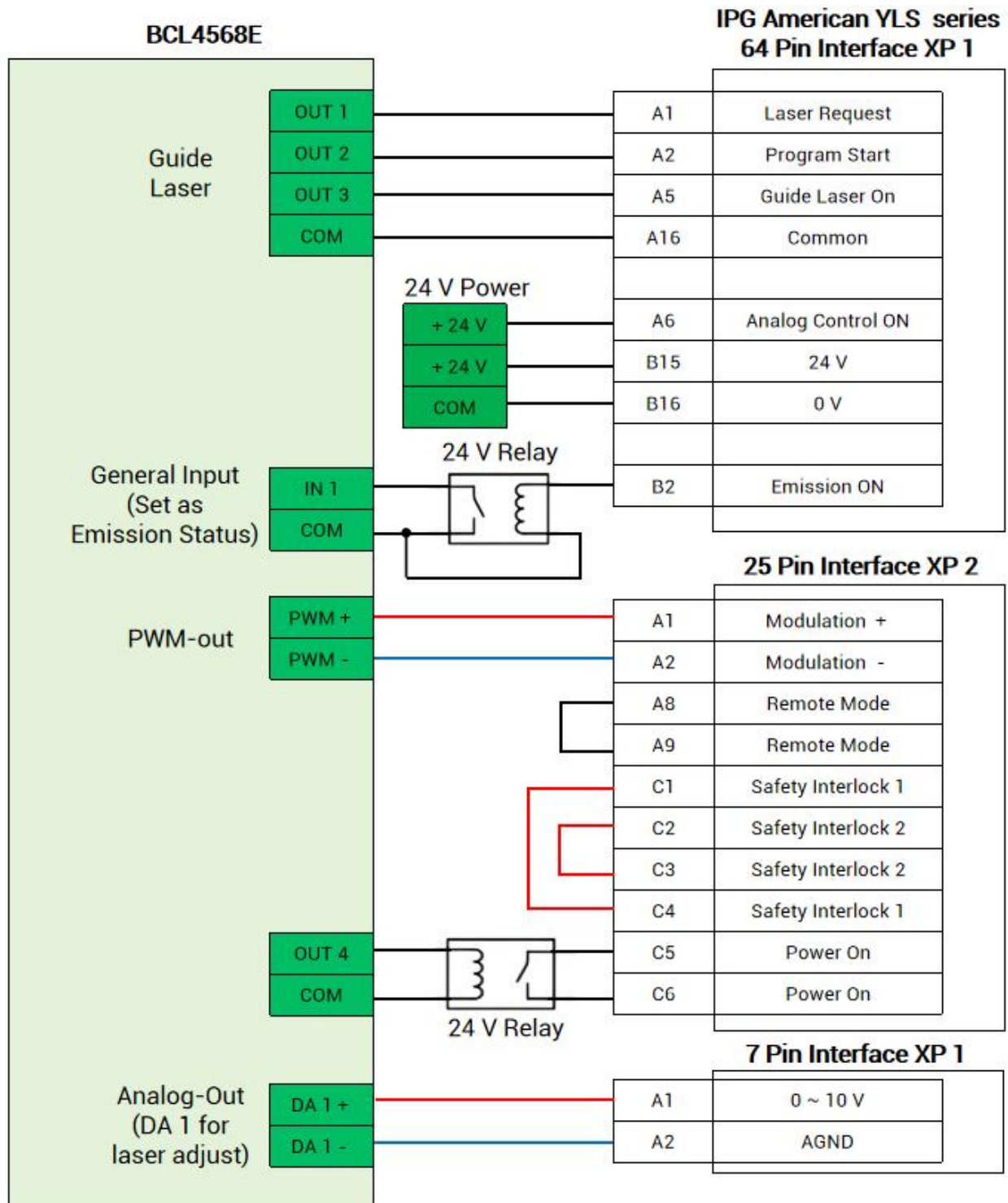


Figure 6-3 IPG-American non-network communication wiring

6.4 RayCus Serial Communication Wiring

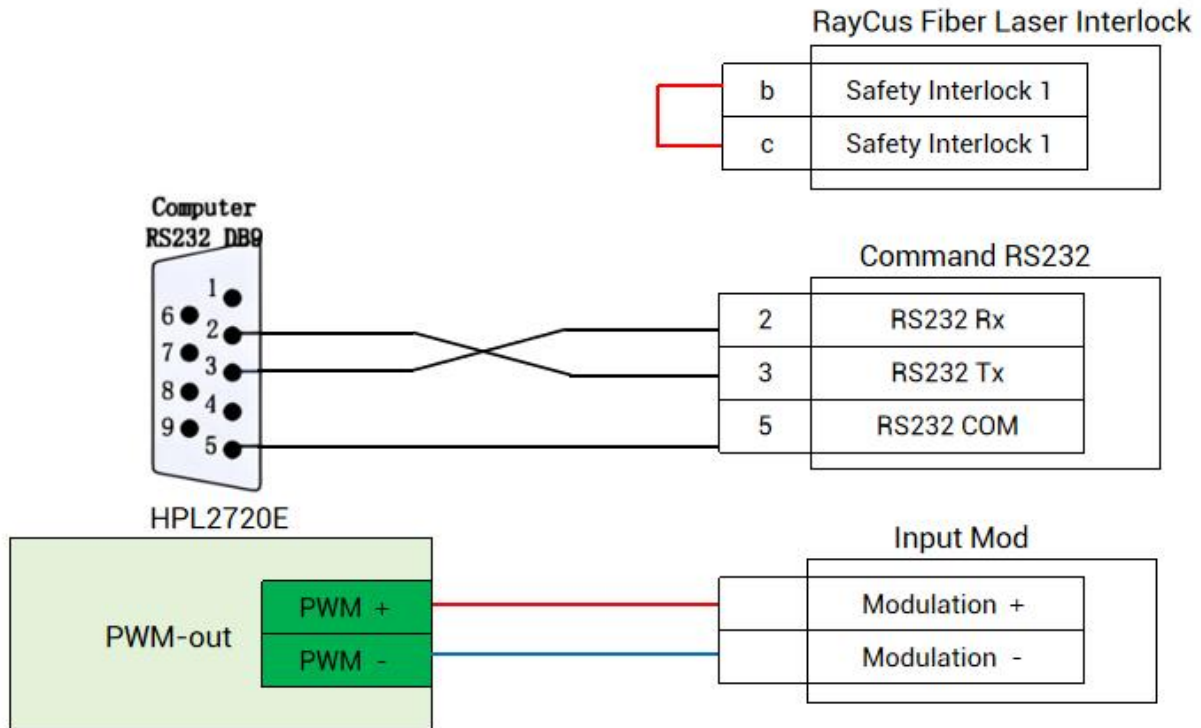


Figure 6-4 RayCus serial communication wiring

! Notice: The HS232 interface has been removed from the HypTronic3 Host. If a serial port is required to control the Raycus laser, it is recommended to purchase a USB to RS232 module additionally.

6.5 Trumpf Serial Communication Wiring

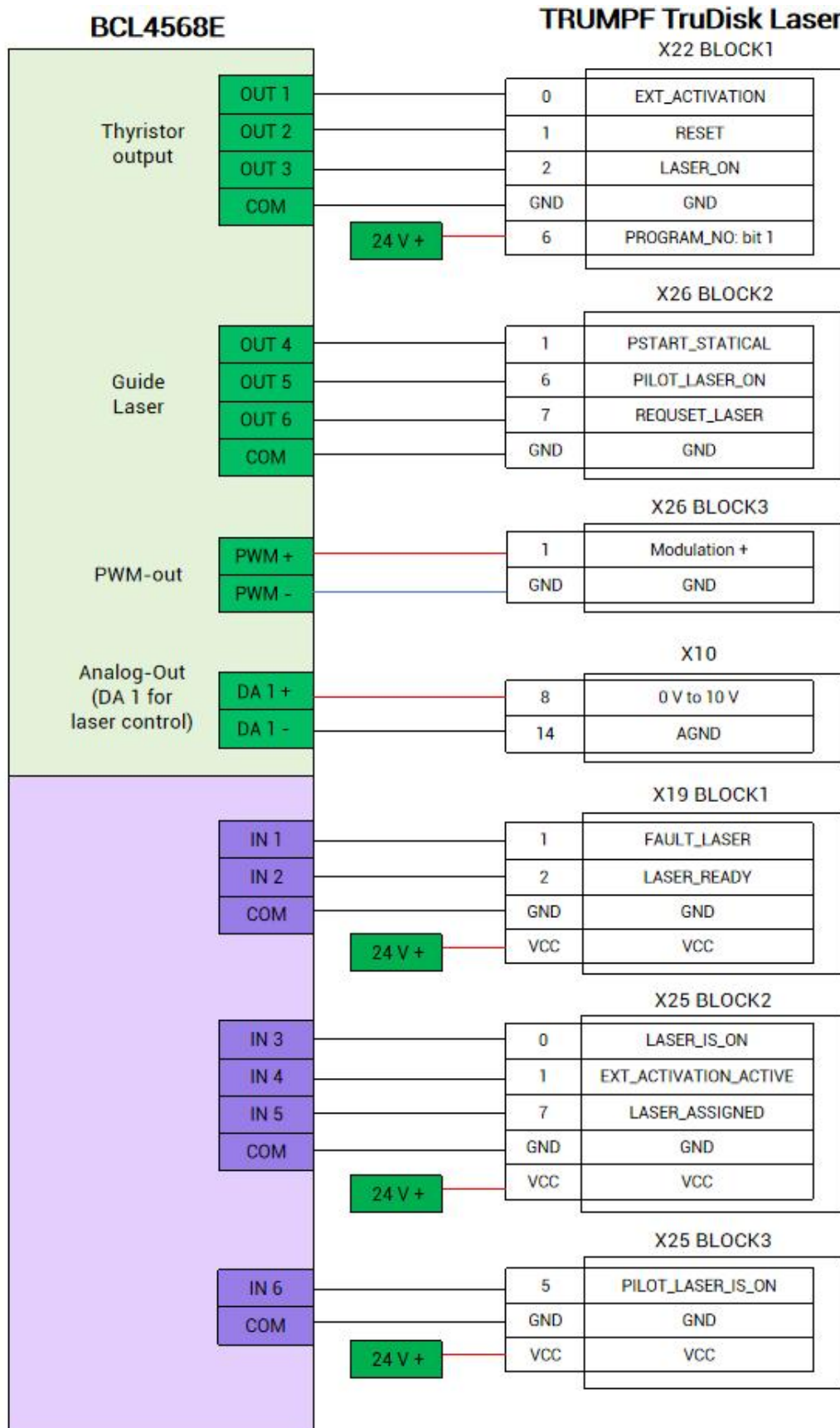


Figure 6-5 Trumpf serial communication wiring

6.6 Rofin Serial Communication Wiring

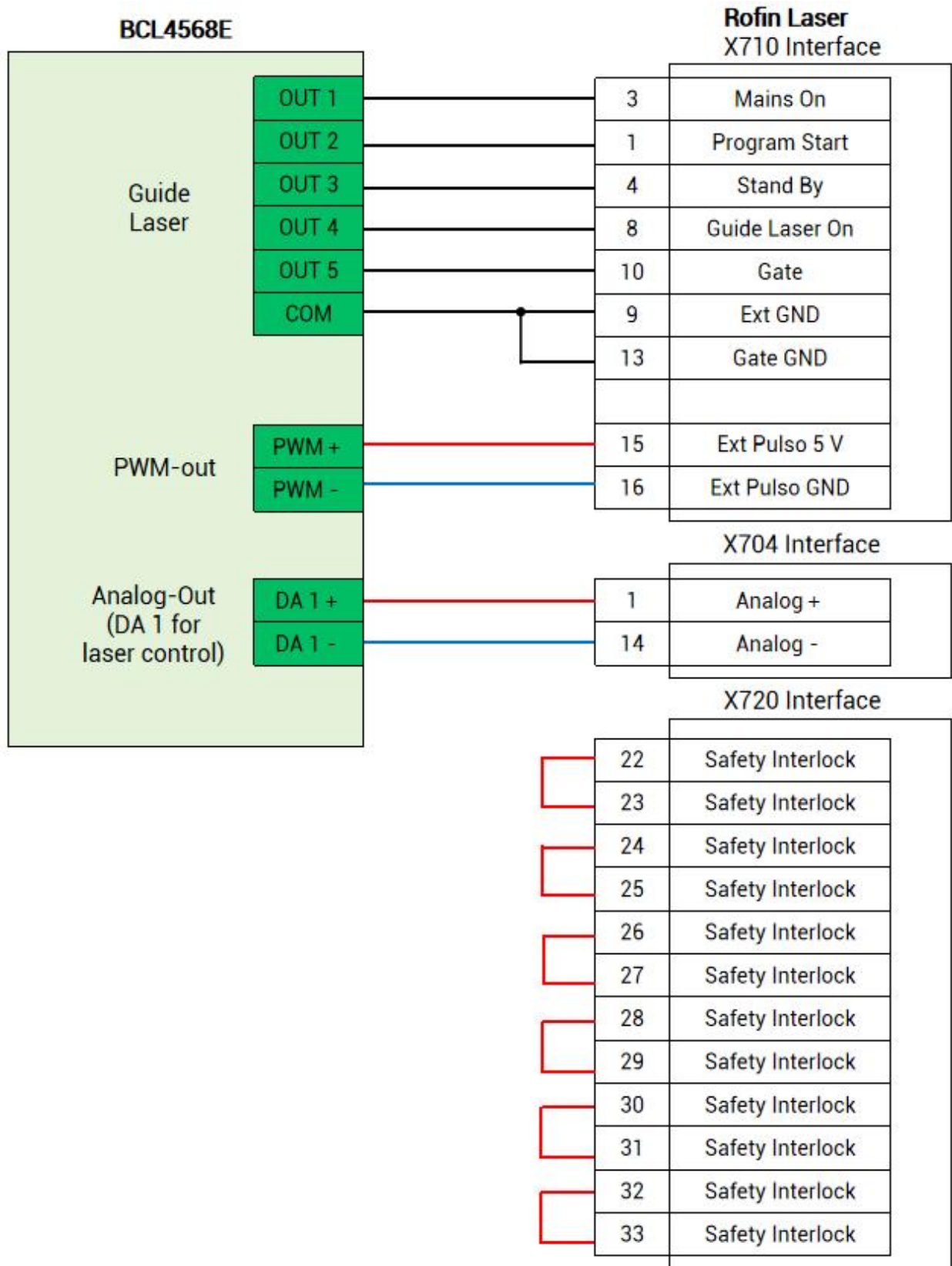


Figure 6-6 Rofin serial communication wiring

Chapter 7 Config Tool

Open *HypCutRevo/HypCut* and access *Config Tool*.

- HypCutRevo: In the User Menu, click on the avatar, enter the password to switch to **Manufacturer** mode. The default password is BOCHU. The password can be modified via the BOCHU Packaging Tool; please contact the technical support team for assistance. Return to the User Menu and click *Config Tool*.

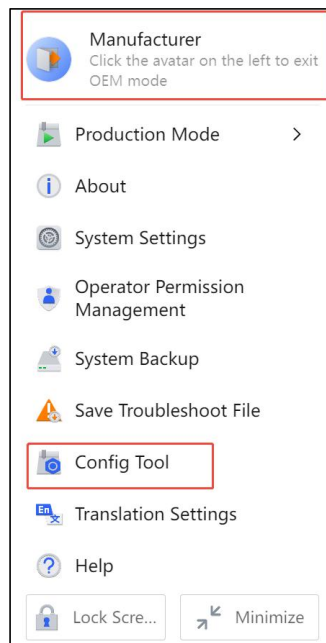


Figure 7-1 Open HypCutRevo and access config tool

- HypCut: Click **Settings**, then switch to **About Machine** tab. At the bottom under **Permission management**, select **Expert** from the dropdown menu. Enter the password 61259023 and log in. At the bottom of the **Global** page, click *Config Tool*.

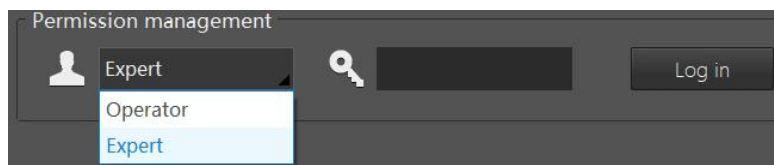


Figure 7-2 Access expert mode and enter config tool

⚠ Caution: Parameters must be set according to the actual device. Incorrect settings may lead to unpredictable consequences! In *Config Tool*, input ports are shadowed in red, while output ports in green.

7.1 Bus Scan

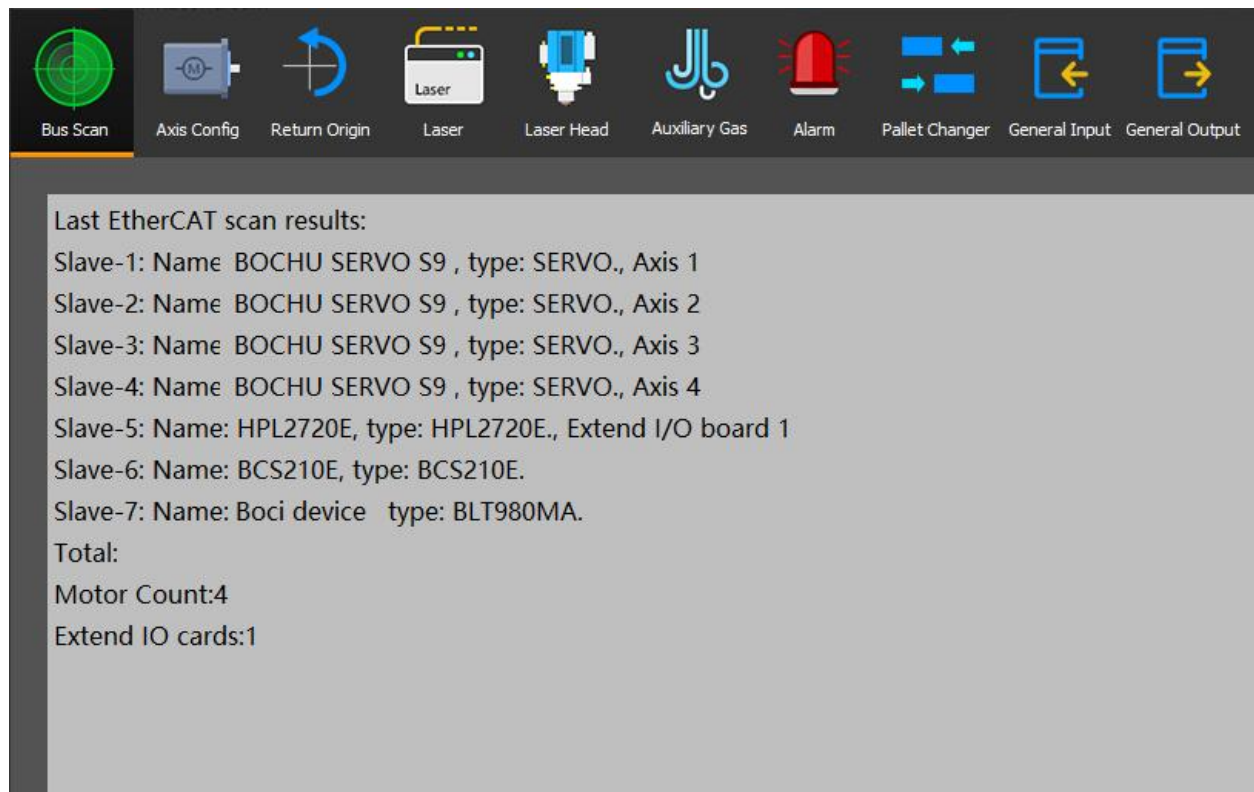


Figure 7-3 Bus scan

- Step 1** Prior to initiating the scan, confirm that all slave stations have been connected to the host via network cables in a series manner, and verify an alarm-free status upon successful power-up.
- Step 2** It is recommended to daisy-chain EtherCAT slave stations in the following sequence: Host → X-axis → Y-axis → Z-axis → Other common axis (if applicable) → Terminal Board → Additional Slave Stations → BLT Cutting Head. For Non-BLT cutting heads, connect the amplifier before the cutting head, then terminate with the cutting head.
- Step 3** After scanning, verify that the displayed slave station count matches the physically connected quantity. If the scanned station count is less than actual connections, inspect the connection status of absent slave stations.
- Step 4** Upon successful scan and correct identification of all slave stations, proceed to configure axis-specific parameters. If the scan fails, reference the corresponding solution based on the prompt code displayed.

7.2 Axis Config

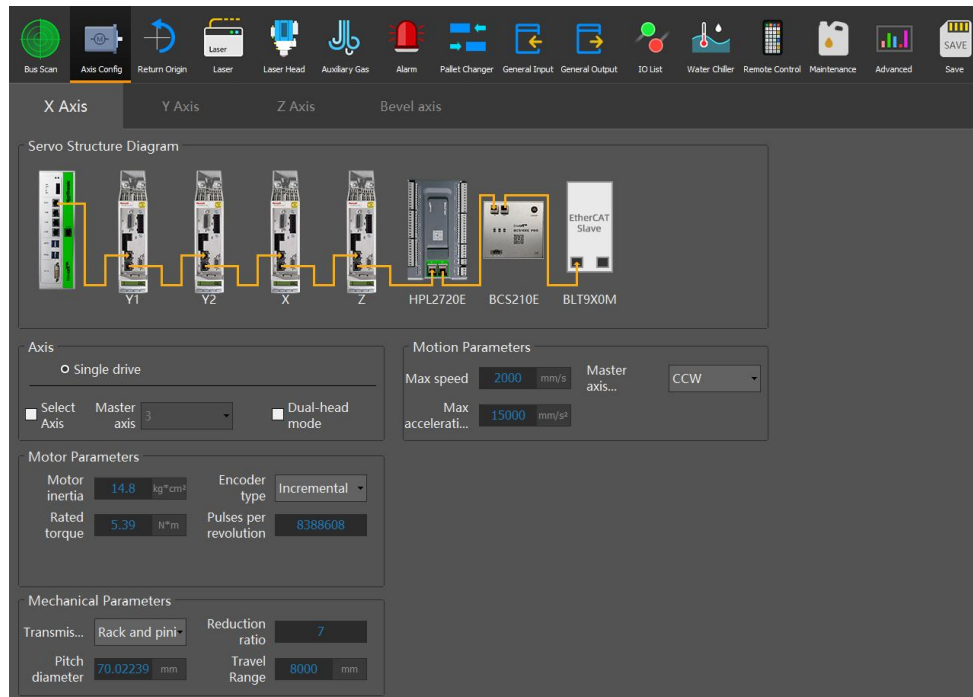


Figure 7-4 Axis config

- **Axis:** Select the drive configuration (single-drive or dual-drive) for the X/Y-axis based on the physical mechanical structure, then assign the corresponding Axis ID.
- **Motor Parameters:** Populate the four fundamental parameters (motor inertia, encoder type, rated torque, and pulses per revolution) for each axis's drive motor according to the specifications in the purchased motor selection manual.
 - **Brake Signal:** Parameter exclusive to the Z-axis, controlling the brake signal for Z-axis motors equipped with holding brakes. This critical safety feature prevents head collisions caused by gravitational descent of the Z-axis after loss of servo enable or power failure.

Table 7-1 Driver Pulses per Revolution Reference

Driver Brand	Pulses per Revolution Reference Value
Yaskawa $\Sigma 7$	1048576
Bosch Rexroth	3600000
Panasonic A5	1048576
Panasonic A6	8388608
Googoltech	360000

Driver Brand	Pulses per Revolution Reference Value
Moli	360000
Jiaqiang、WSX	10000

➤ Mechanical Parameters:

- Transmission structure: Select the appropriate transmission mechanism (rack and pinion, leadscrew, linear motor, or other). Default configuration specifies rack and pinion for the X/Y-axis and leadscrew for the Z-axis.
- Pitch diameter: Required when the transmission structure is configured as rack and pinion.

⚠ Notice: For helical gears commonly used in laser processing equipment, the helix angle coefficient β is typically set to: $\cos(\beta) = 0.9437$.

- Screw lead: Defined as the linear distance traveled by the nut per full rotation of the screw. When the transmission structure uses a leadscrew, this value must match the nameplate specifications.
- Pole pitch: In linear motors, this refers to the distance between two adjacent electrodes, typically defining the motor's structural and performance characteristics. A smaller pole pitch contributes to higher positioning resolution and maximum velocity. This value must be entered based on the nameplate specifications.
- Transmit lead: When utilizing alternative transmission mechanisms, specify the corresponding transmission lead based on the type of drive mechanism employed.

Table 7-2 Transmission Structures and Calculation Formula Reference

Type	Calculation Formulas
Helical Gear	Pitch Diameter [D] = Number of Teeth [z] × Module [n] / $\cos(\beta)$
Spur Gear	Pitch Diameter [D] = Number of Teeth [z] × Module [n]
LeadScrew	Screw Lead [P]
Others	Transmit Lead = Feed per Revolution [S]

- Reduction ratio: Configure the reduction ratio accurately. Verify this ratio using the selection manual or nameplate information on the gearbox.

- Travel range: Set the machine envelope in the software to define soft limit boundaries. The actual effective motion range can subsequently be measured via the *Travel Measurement* function. Exceeding the hard limit range is prohibited.
- Max speed/acceleration: Enter the predefined maximum acceleration and velocity limits of the machine tool. All subsequent velocity/acceleration settings in the software shall not exceed these values.
- Master axis motor direction: Verify actual movement direction aligns with software display when traversing X/Y/Z axes in $\pm$ directions. If directions are inverted, modify this parameter (CW/CCW).
- Master-Slave motor direction: Select motion direction for dual-drive axes. After confirmation, execute the *YMonitor* function to check for torsional deflection.
- Sync-Axis Alarm Settings: Configure the permissible deviation range and maximum deviation threshold between dual-drive axes after enabling. When *Excessive dual-drive error* is activated, the system triggers warnings or faults based on the set torque deviation threshold to prevent mechanical torsion damage from excessive axis misalignment.
- Y-Axis check: Verifies motion direction and synchronization status of dual-drive axes to eliminate torsional deformation. Execute detection strictly following the recommended steps in the pop-up dialog. Confirm motor directions (default: reverse) to prevent axis twisting.
- Height Controller Type: Z-axis exclusive parameter. Default: *DEMO*. Select *Bus Height Controller* during configuration. If no Z-axis movement occurs during post-installation jog debugging, verify this parameter setting.

 **Notice:** The height controller type must correspond to the actual machine configuration. If Bus height controller is selected while no Z-axis is physically installed, the cutting process may experience system latency due to awaiting unresponsive Z-axis signals.

7.3 Return Origin

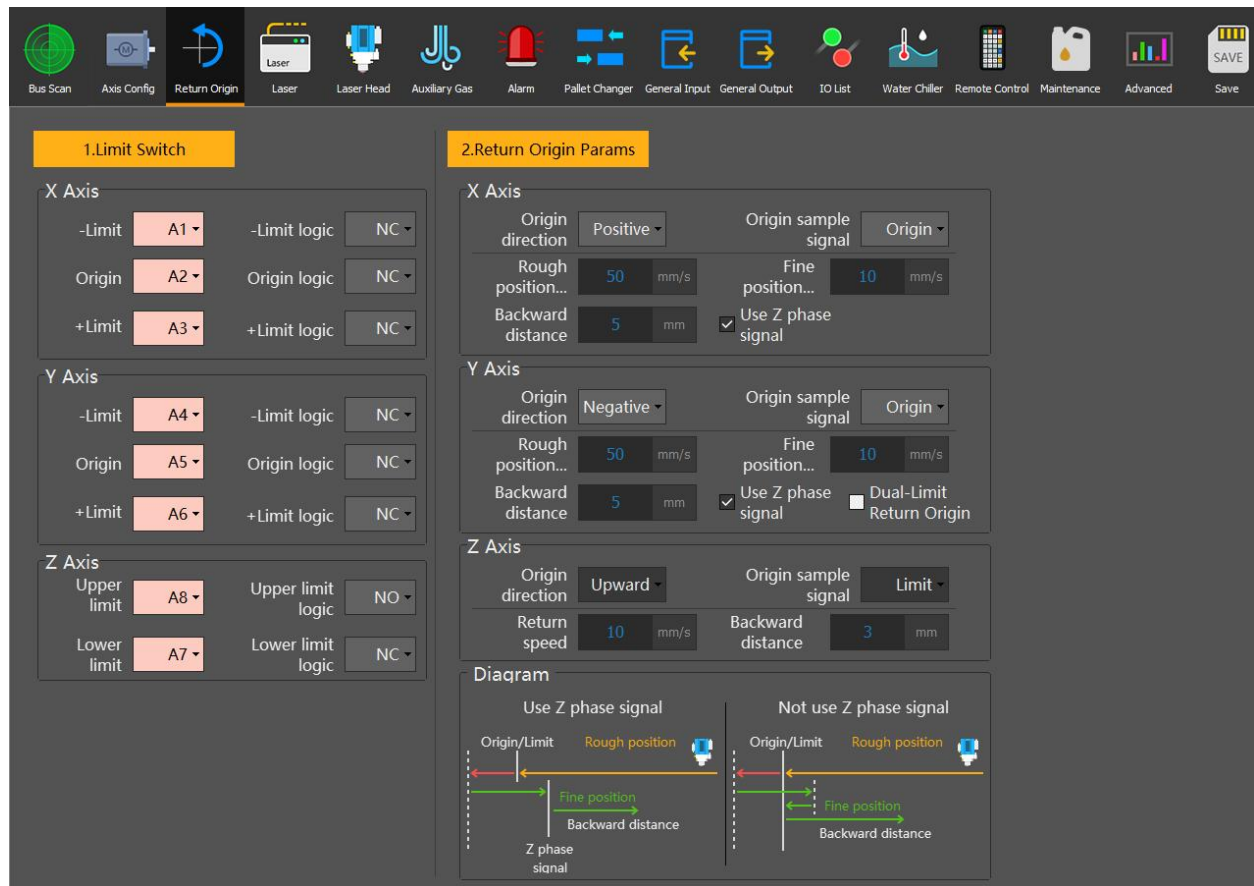


Figure 7-5 Return origin

- Limit Switch: Configure hard limit switches and origin signals for X/Y/Z axes. NPN-type (low-active) normally closed sensors are recommended for limit switches; NPN-type normally open sensors are advised for origin sensing.
- Return Origin Params: Correctly set parameters including **Origin direction**, **Origin sample signal**, **Rough/Fine position speed**, and **Backward distance** based on the physical origin configuration of the machine tool.

7.4 Laser

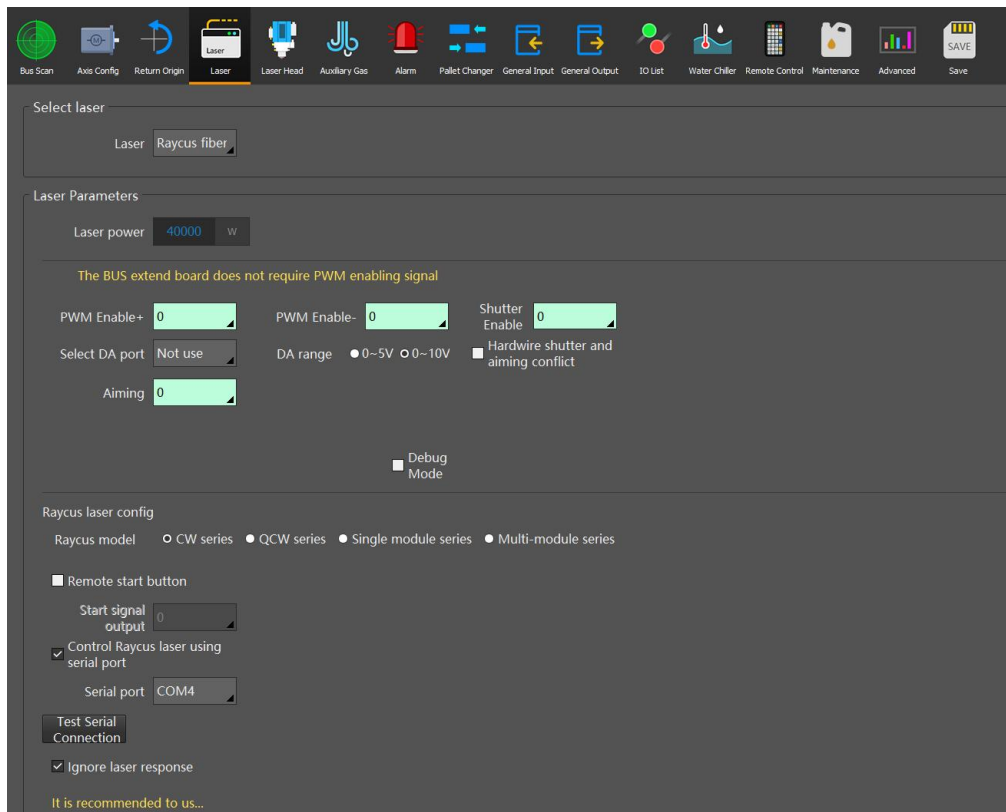


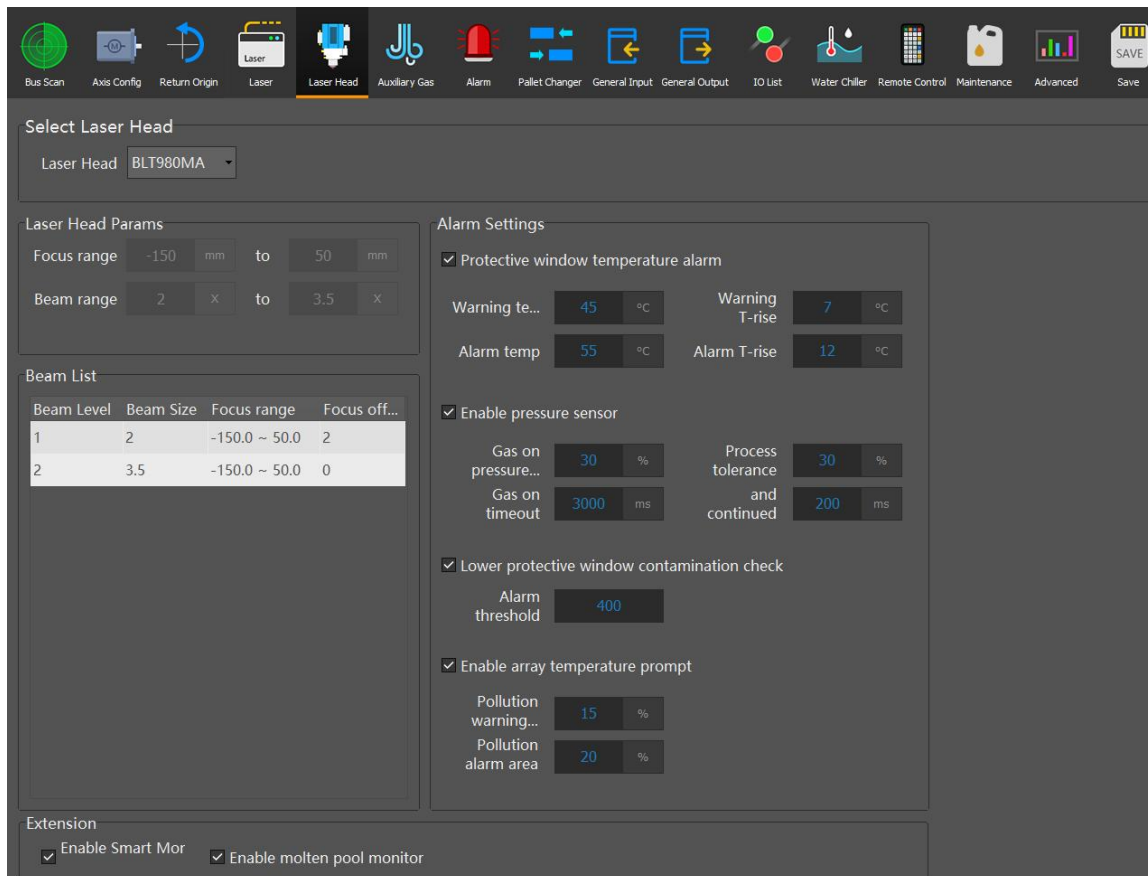
Figure 7-6 Laser

- **Select Laser:** Select the appropriate laser type based on the integrated laser source. Supported manufacturers include IPG, RAYCUS, GW, TRUMPF, nLight, Maxphotonics, BWT, among others. For IPG, RAYCUS, and TRUMPF lasers, specify the exact model and control method, with remote start capability enabled.
- **Laser power:** Configure the correct laser power value. The system references this value for energy control calibration.
- **PWM Enable +/-:** The default PWM signal incorporates an isolated relay to prevent light leakage, eliminating external PWM enable signals in most applications. For custom setups requiring additional PWM enable signals, assign the corresponding output.
- **DA port:** Regulates laser peak power through analog voltage adjustment at the DA port.
- **Laser Control Method:** Select from serial control, network control, or hardwire control.
- **Remote start button:** When configured, the laser can be remotely initiated directly from the cutting system.

7.5 Laser Head

Supports BLT series, ProCutter series, ProCutter-Zoom, HighYag, IPGCut, and other zoom cutting heads compatible with bus-based servo control. Select the actual cutting head model in use and configure the corresponding parameters.

7.5.1 BLT Cutting Head Configuration



Select Laser Head

Laser Head: BLT980MA

Laser Head Params

Focus range: -150 mm to 50 mm

Beam range: 2 X to 3.5 X

Beam List

Beam Level	Beam Size	Focus range	Focus off...
1	2	-150.0 ~ 50.0	2
2	3.5	-150.0 ~ 50.0	0

Alarm Settings

☒ Protective window temperature alarm

Warning te...: 45 °C

Warning T-rise: 7 °C

Alarm temp: 55 °C

Alarm T-rise: 12 °C

☒ Enable pressure sensor

Gas on pressure...: 30 %

Gas on timeout: 3000 ms

Process tolerance and continued: 30 % and 200 ms

☒ Lower protective window contamination check

Alarm threshold: 400

☒ Enable array temperature prompt

Pollution warning...: 15 %

Pollution alarm area: 20 %

Extension

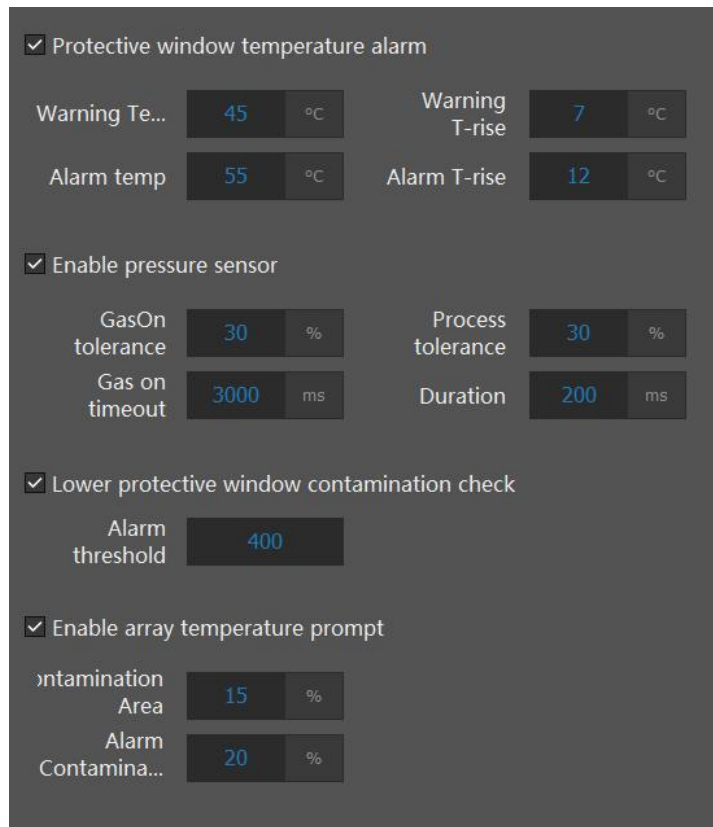
☒ Enable Smart Mor

☒ Enable molten pool monitor

Figure 7-7 BLT cutting head

- Laser Head Params: System-preset **Focus range** and **Beam range**, no manual setup required.
- Beam List: System-preset beam sizes with associated focus ranges; no manual setup required.
- Alarm Settings: Enable or disable the sensor feedback function within the BLT cutting head. After enabling the sensors, configure warning and alarm thresholds for feedback data from each sensor.

- The system comes pre-configured with corresponding parameters for protective windows temperature alarm, pressure sensor, lower protective window contamination check, array temperature prompt.
- Manual modification of alarm parameters is required when commissioning certain functions (e.g., molten pool monitoring).



The screenshot displays a configuration window with the following settings:

- ☒ Protective window temperature alarm
 - Warning Te...: 45 °C
 - Warning T-rise: 7 °C
 - Alarm temp: 55 °C
 - Alarm T-rise: 12 °C
- ☒ Enable pressure sensor
 - GasOn tolerance: 30 %
 - Gas on timeout: 3000 ms
 - Process tolerance: 30 %
 - Duration: 200 ms
- ☒ Lower protective window contamination check
 - Alarm threshold: 400
- ☒ Enable array temperature prompt
 - Contamination Area: 15 %
 - Alarm Contamina...: 20 %

Figure 7-8 Recommended alarm parameters for molten pool monitoring

➤ Extension:

- Enable Smart Monitor: When activated, the system provides intelligent monitoring functions including *Smart Pierce* and *Process Monitor*.
- Enable Molten Pool Monitor: This feature is exclusively supported by BLT MA-Series cutting heads. When enabled, the system utilizes the vision module to capture real-time molten pool images, extracts characteristic molten pool data, and intelligently optimizes cutting parameters to achieve enhanced cutting performance.

7.5.2 ProCutter Cutting Head Configuration

ProCutter cutting heads utilize analog voltage control for focus adjustment, requiring configuration of *Focus voltage (DA port)*, *Confirm Focus* output, and *Return origin (output)*. *Enable focus compensation* is supported, requiring selection of the corresponding signal output.

For ProCutter-Zoom cutting head, additionally configure *Beam-select output*.

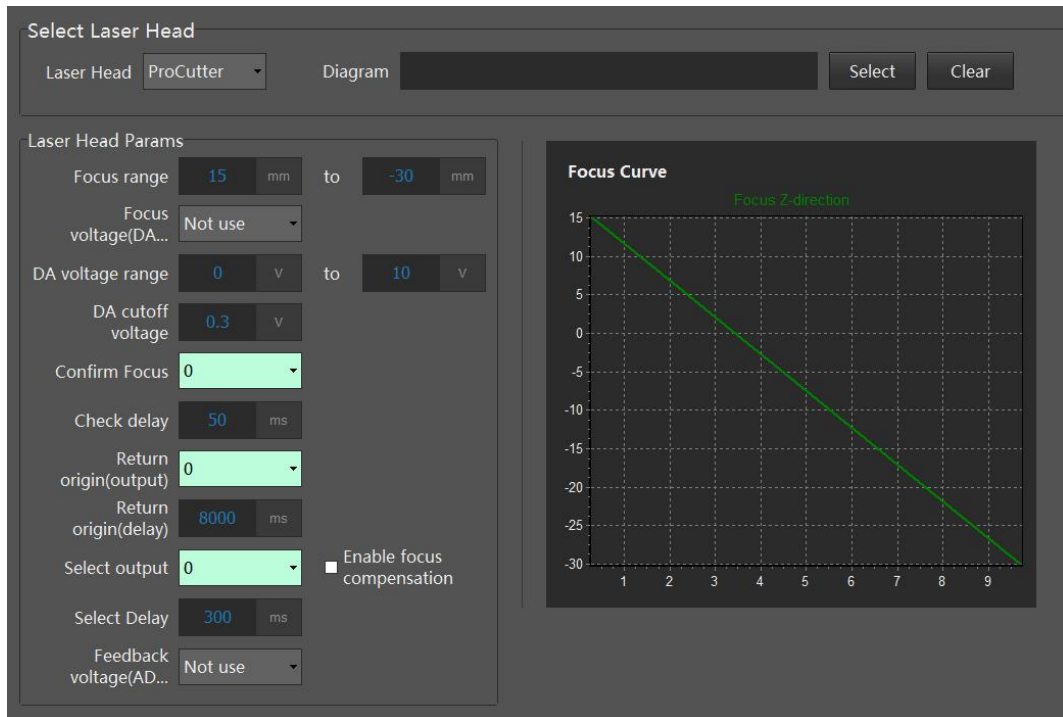


Figure 7-9 ProCutter

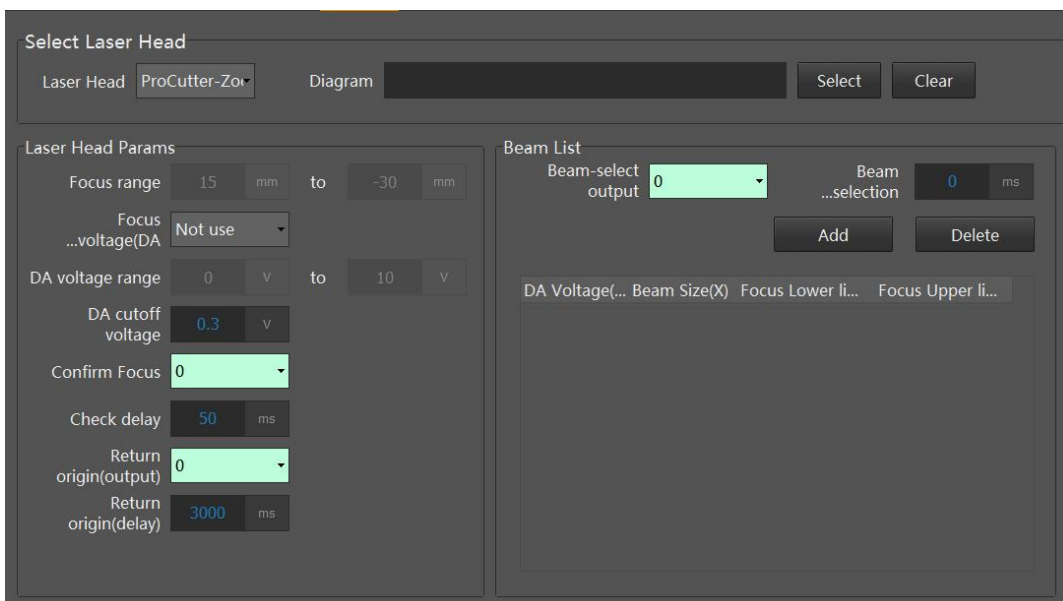


Figure 7-10 ProCutter-Zoom

7.5.3 HighYag Cutting Head Configuration

HighYag cutting heads employ analog voltage control for both focus and beam modulation, requiring configuration of *Focus voltage (DA port)* and *Beam voltage (DA port)*.

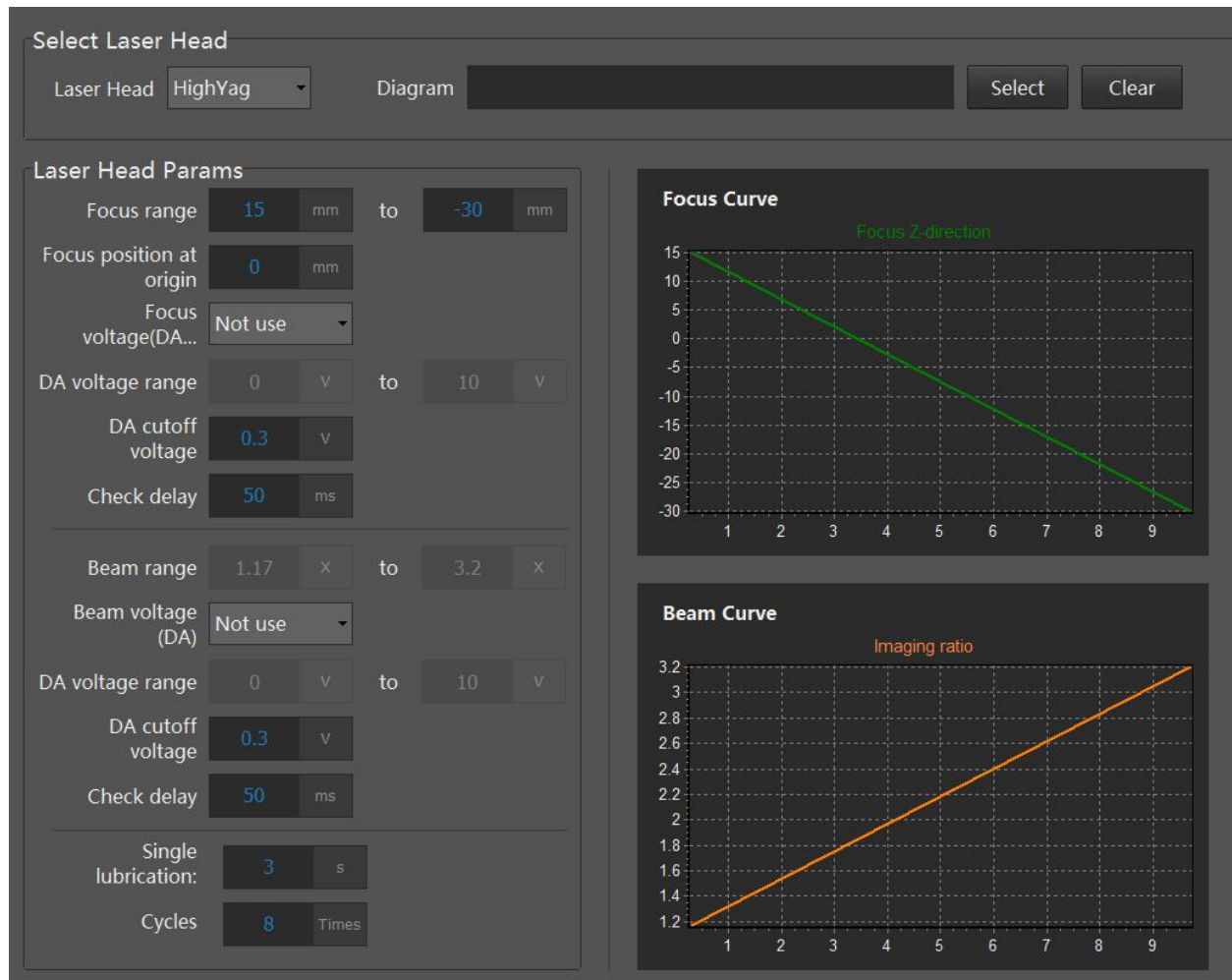


Figure 7-11 HighYag cutting head

7.5.4 AxisK (Common) Cutting Head Configuration

Configure manually *Focus range* and *speed* parameters. The configuration methods for *Return Origin Params* and *Motor Parameters* are the same as those for [axis config](#) and [return origin](#).

Select Laser Head

Laser Head

AxisK (Common)

Diagram

Select

Clear

Basic Parameters

Focus range

15

mm

to

-30

mm

Focus position at origin

0

mm

Jog Speed

2

mm/s

Locating speed

10

mm/s

Acceleration

1500

mm/s²

Return Origin Params

Origin direction

- direction

Origin sample signal

Limit

Rough position...

50

mm/s

Fine position speed

10

mm/s

Backward distance

5

mm

☒ Use Z phase signal

Motor Parameters

Axis

8

Control mode

Position control

Screw lead

219.9961

mm

Reduction ratio

7

Pulses per revolution

8388608

Motor Direction

CW

-Limit

0

-Limit logic

NC

+Limit

0

+Limit logic

NC

Servo Params

Motor inertia

16.9

kg/cm²

Rated torque

8.34

N*m

Figure 7-12 AxisK (Common) cutting head

7.5.5 IPGCut Cutting Head Configuration

The IPGCut cutting head utilizes DA analog signals for focus adjustment. Configuration requires designation of *Focus voltage (DA port)*, *Focus control (output)*, *Confirm Focus (input)*, *Alarm check (input)*, *Alarm reset (output)*.

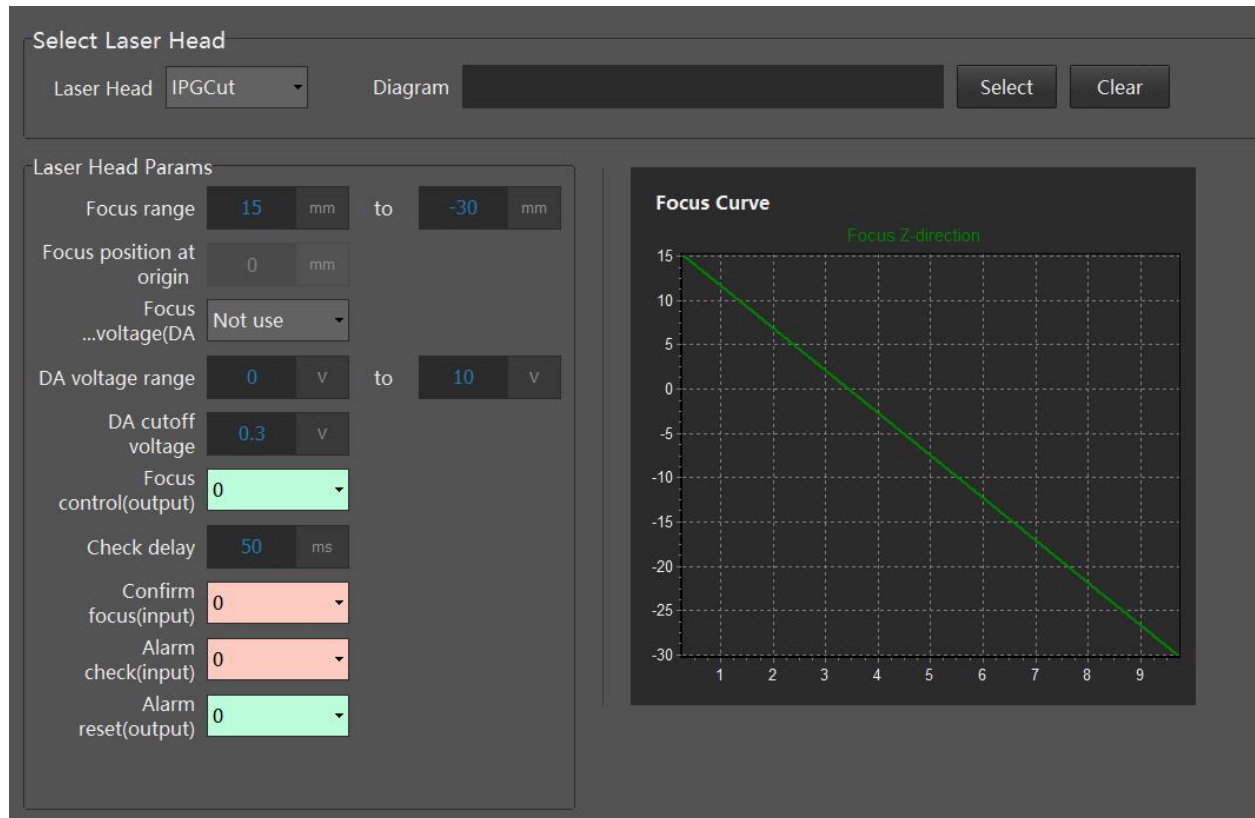


Figure 7-13 IPGCut cutting head

7.6 Auxiliary Gas

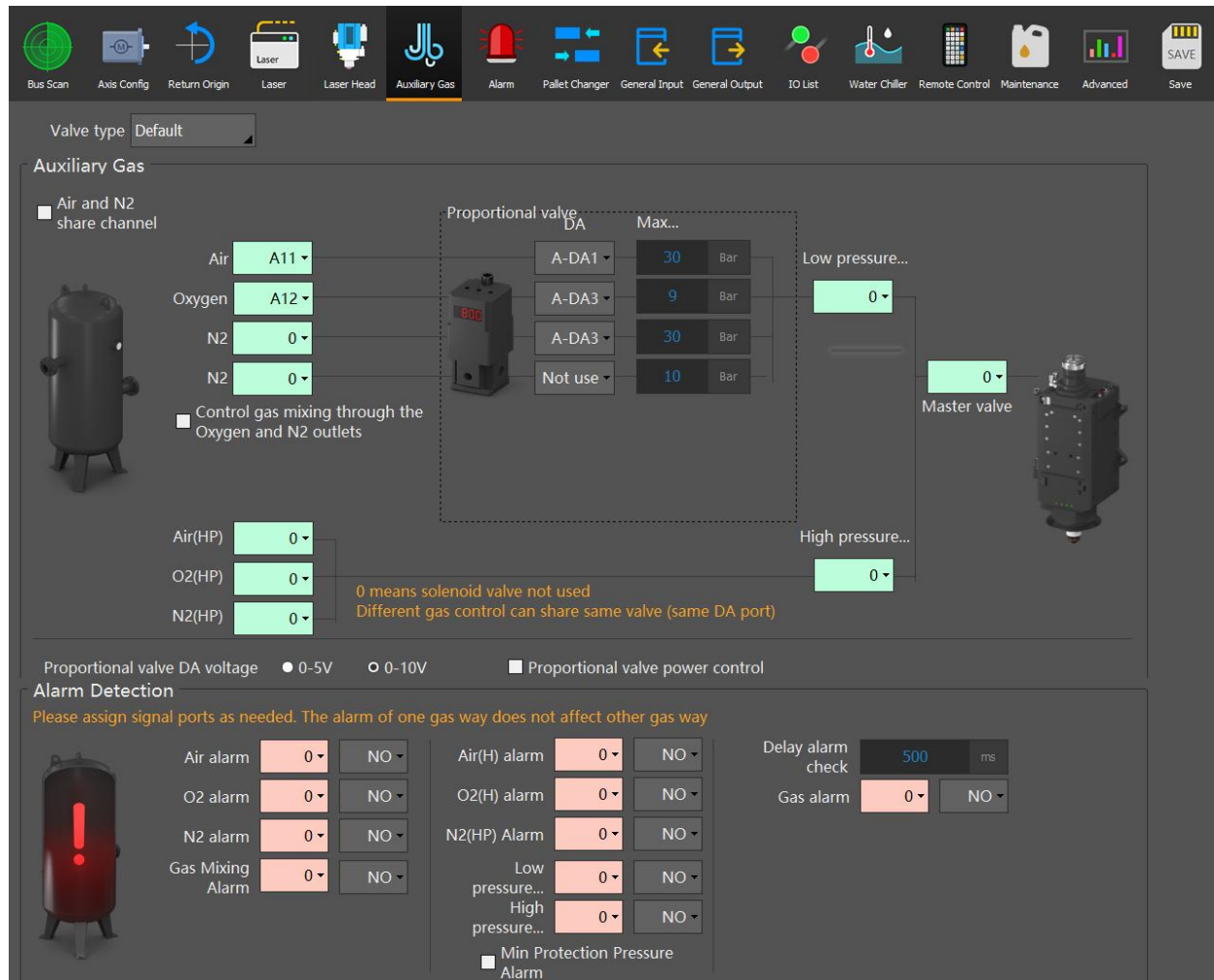


Figure 7-14 Auxiliary gas-default

Supports gas valve control via conventional analog I/O methods and Hoerbiger bus proportional valves.

- Default: The system preset corresponds to the pneumatic circuit configuration. Select the corresponding port according to the electrical schematic diagram and the actual interface.
- Bus Proportional: Pneumatic circuit configuration is not required. The system automatically identifies the air, oxygen, and nitrogen control modes for the bus proportional valve.
- Master Valve: Sets the output port used to switch auxiliary gases.
- High/Low Pressure Master Valve: Sets the output port used to switch the corresponding high-pressure or low-pressure gas.

- Air Valve: Sets the output port for the air supply.
- Oxygen Valve: Sets the output port for the oxygen supply.
- Nitrogen Valve: Sets the output port for the nitrogen supply.
- Side Blow Gas Valve: Sets the output port for the nozzle side blow cooling gas.
- DA Gas Pressure Control (Analog): Allows the user to select any analog channel (e.g., on HPL2720E adapter boards) to regulate gas pressure.
- Air and N2 share channel: This feature supports sharing solenoid valves and proportional valves for both air and nitrogen. Gas switching is controlled via a dedicated output port, which cannot be reused for other outputs. In the default state (output port closed), either air or nitrogen is enabled (the default gas when closed is configurable). When the output port opens, if the default gas is air, the solenoid valve actuates to enable nitrogen flow to the output port. Enabling the *Air and N2 share channel* feature causes both Air and Nitrogen gas types to be displayed concurrently in the software interface for the configured output.
 - When the gas type is Nitrogen, the output port opens.
 - When the gas type is Air, the output port closes.
- Alarm detection: Assigns the input port for gas alarm monitoring.
- Delay alarm check: Delays alarm verification for a set period after gas supply activation (verifies alarm input status post-delay).

7.7 Alarm

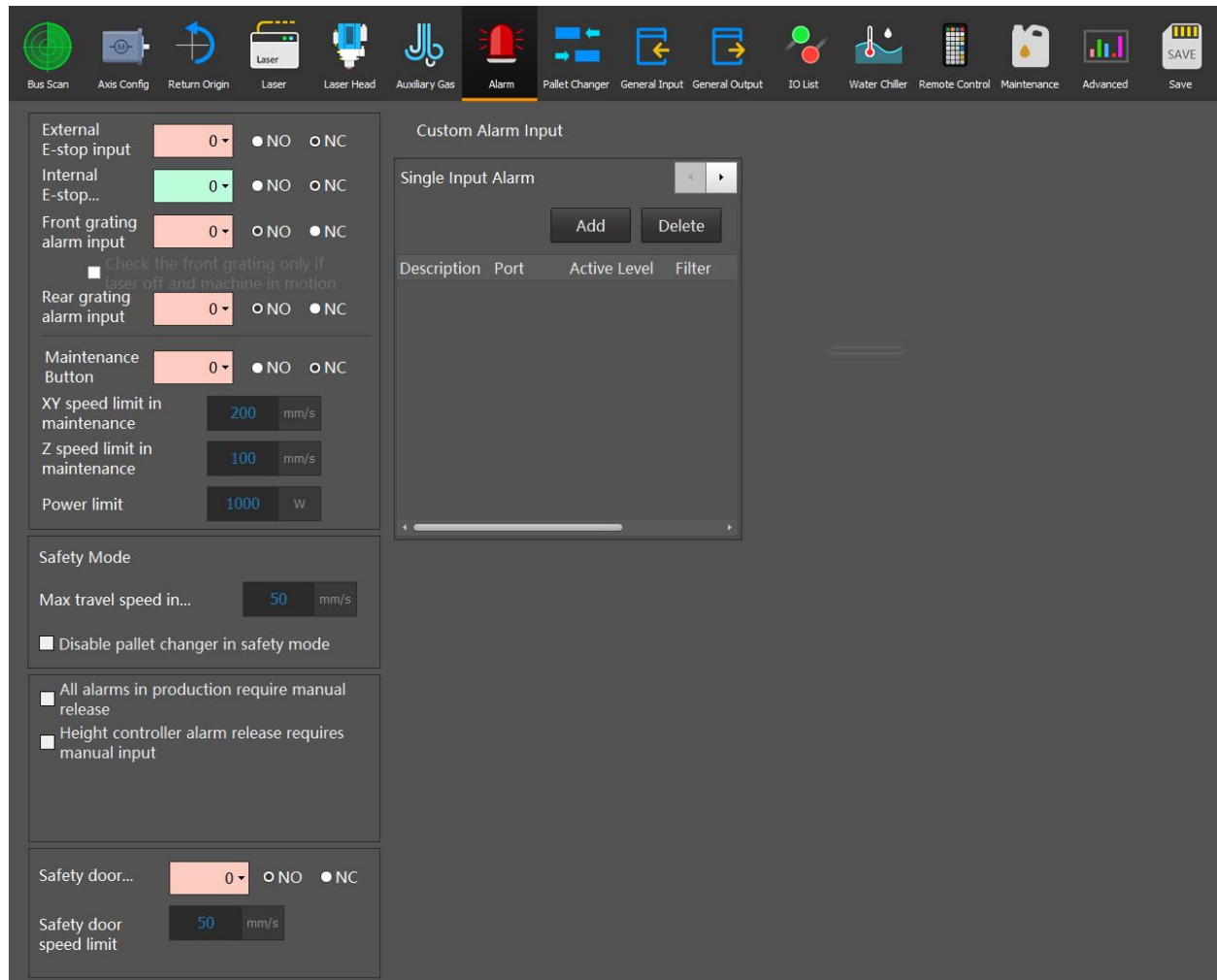


Figure 7-15 Config tool-alarm

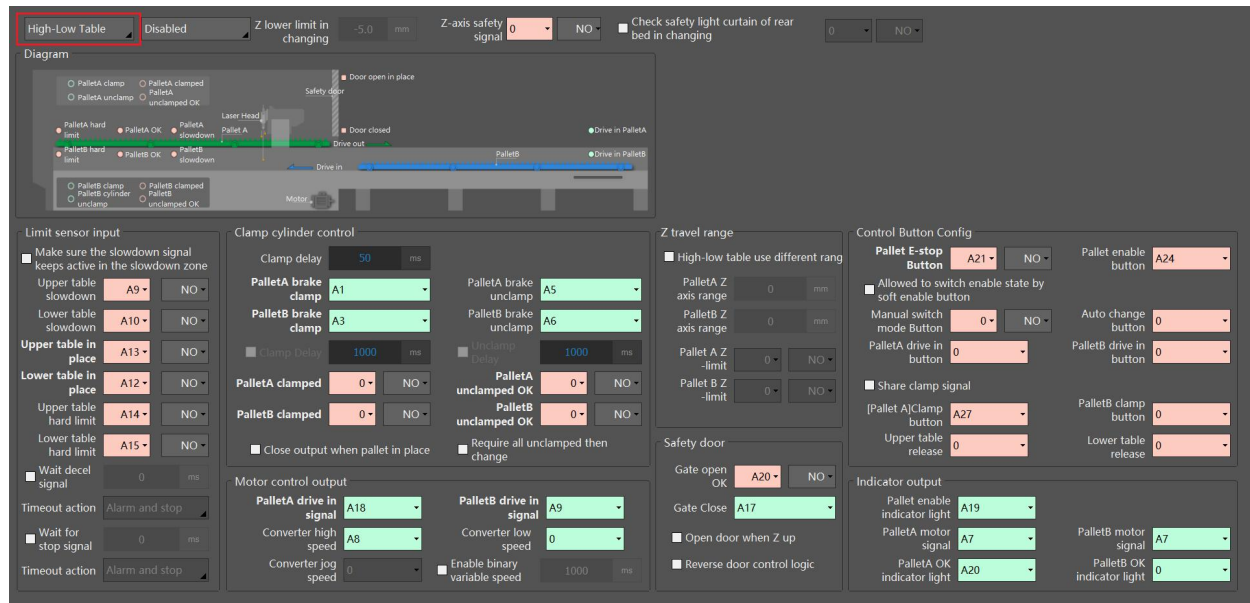
- **External E-stop input:** Configures the system connection point for independent external emergency stop buttons (e.g., emergency stop signals from a separate worktable).
- **Internal E-stop output:** Configures the output port for the software-initiated emergency stop button on the HyPanel (facilitates streamlined implementation).
- **Front/Rear grating alarm input:** Configures the corresponding light curtain alarm input port. An active input triggers a machine alarm and halt.
 - **Check the front grating only if laser off and machine in motion:** When enabled, the front grating alarm is detected only when the laser is disabled and the machine is in motion.

- **Maintenance Button:** Configures the port for the maintenance mode control switch required by EU CE certification. When activated, the device is restricted to operate within defined speed and power limits.
- **Max travel speed in safety mode:** Used in conjunction with the video monitoring system. When the monitoring system detects personnel on the work area, it triggers an alarm. Upon pressing the **Safety Mode** button on the handheld pendant, the machine enters Safety Mode. This setting defines the maximum rapid traverse speed for all axes during Safety Mode operation.
- **All alarms in production require manual release:** When enabled (via checkbox), this function appears in HypCut under **Production** → **More**. Once active, all alarms during machining must be cleared manually, with support via the handheld pendant. Deselecting the checkbox temporarily disables the function; it reactivates after software restart.
- **Height controller alarm release requires manual input:** Upon height controller alarm occurrence, X/Y-axis motion is prohibited. Manual confirmation is required to permit subsequent X/Y-axis movement.
- **Custom input alarm:** This function configures user-defined alarm parameters for designated input ports, including the triggered alarm display **Description**, **Active Level**, **Filter**, and access restrictions for alarm acknowledgment.
- **Custom input warning:** Configures user-defined parameters for designated input ports, including the triggered warning display **Description**, **Active Level**, **Filter**. Upon triggering, this condition generates only a yellow visual warning indicator and does not restrict any machine functions.
- **4-bit code alarm:** Enables configuration of 16 distinct alarm conditions (0000 to 1111) through binary-level signal combinations from four input ports. This optimizes input port utilization while accommodating alarm signal integration requirements for specialized third-party peripherals.

7.8 Pallet Changer

Supports pallet changers controlled via high-low tables, hydraulic lift tables, dual-motor exchange tables, JS exchange tables, or external I/O control consoles.

7.8.1 High-Low Table Key Configuration



The screenshot displays the 'High-Low Table' configuration interface. At the top, a 'High-Low Table' dropdown is set to 'Disabled'. Below it, a 'Diagram' shows a schematic of the pallet changer with various components labeled. The main configuration area is divided into several sections:

- Limit sensor input:** Includes checkboxes for 'Upper table slowdown', 'Lower table slowdown', 'Upper table in place', 'Lower table in place', 'Upper table hard limit', and 'Lower table hard limit'. Each has a corresponding input field (e.g., A9, A10, A13, A12, A14, A15) and a 'NO' button.
- Clamp cylinder control:** Includes 'Clamp delay' (50 ms), 'PalletA brake clamp' (A1), 'PalletB brake clamp' (A3), 'Clamp delay' (1000 ms), 'PalletA clamped' (0), 'PalletB clamped' (0), 'PalletA unclamped OK' (0), and 'PalletB unclamped OK' (0). There are also checkboxes for 'Close output when pallet in place' and 'Require all unclamped then change'.
- Motor control output:** Includes 'PalletA drive in signal' (A18), 'PalletB drive in signal' (A9), 'Converter high speed' (A8), 'Converter low speed' (0), and 'Enable binary variable speed' (1000 ms).
- Z travel range:** Includes checkboxes for 'High-low table use different range', 'PalletA Z axis range' (0 mm), 'PalletB Z axis range' (0 mm), 'Pallet A Z -limit' (0), and 'Pallet B Z -limit' (0).
- Safety door:** Includes 'Gate open OK' (A20), 'Gate Close' (A17), 'Open door when Z up', and 'Reverse door control logic'.
- Control Button Config:** Includes 'Pallet E-stop Button' (A21), 'Pallet enable button' (A24), 'Manual switch mode Button' (0), 'Auto change button' (0), 'PalletA drive in button' (0), 'PalletB drive in button' (0), '[Pallet A]Clamp button' (A27), 'PalletB clamp button' (0), 'Upper table release' (0), and 'Lower table release' (0).
- Indicator output:** Includes 'Pallet enable indicator light' (A19), 'PalletA motor signal' (A7), 'PalletA OK indicator light' (A20), 'PalletB motor signal' (A7), and 'PalletB OK indicator light' (0).

Figure 7-16 High-low table key configuration

- Detect the rear protective light curtain signal of the bed during the exchange process: On equipment with pallet changers (automatically activated post-processing), the rear machine bed area monitors light curtain signals during pallet exchange. A valid light curtain signal immediately halts the exchange sequence. This protection exclusively activates during pallet changes; non-pallet-change operations ignore rear light curtain signals to maintain uninterrupted production.
- PalletA OK signal: Detects signal confirming full insertion of the high table. Movement halts upon verification.
- PalletB OK signal: Detects signal confirming full insertion of the low table. Movement halts upon verification.
- PalletA clamp: Activates output during pneumatic cylinder clamping of the high table.
- PalletA unclamp: Activates output during pneumatic cylinder unclamping of the high table.

- PalletB clamp: Activates output during pneumatic cylinder clamping of the low table.
- PalletB unclamp: Activates output during pneumatic cylinder unclamping of the low table.
- PalletA Push signal: Controls the pallet change motor's rotation direction to drive the worktable into the high position.
- PalletB Push signal: Controls the pallet change motor's rotation direction to drive the worktable into the low position.
- Pallet E-Stop Btn: Triggers the software alarm "Pallet Emergency Stop" when activated, prohibiting all pallet change operations.

7.8.2 Hydraulic Lift Table Key Configuration

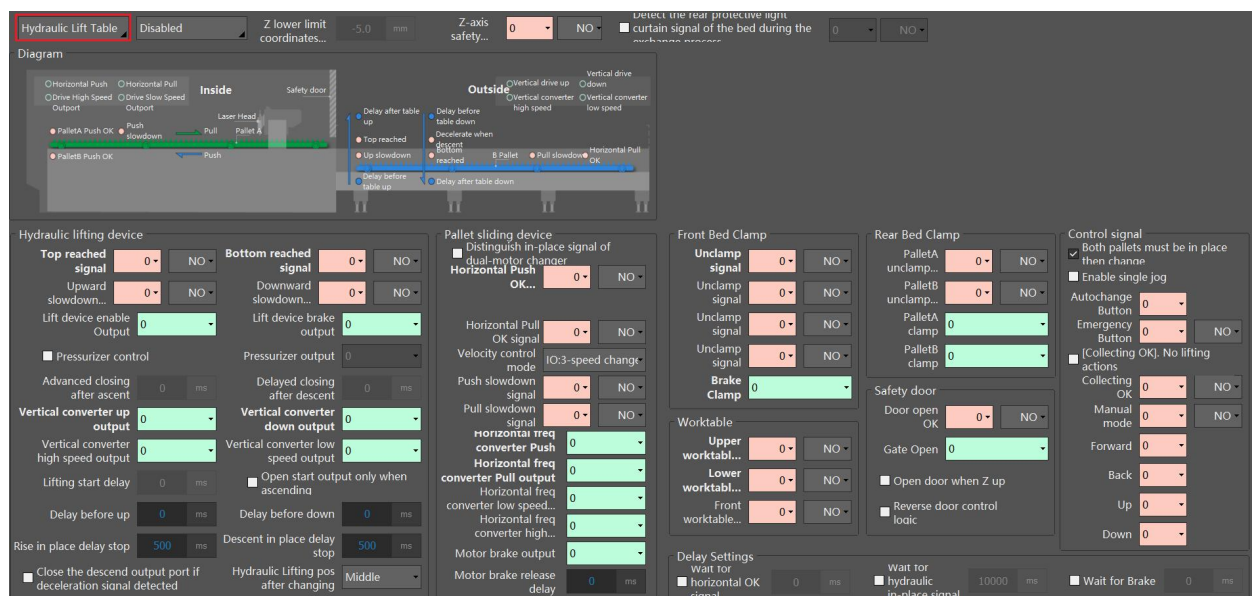


Figure 7-17 Hydraulic lift table key configuration

- Top reached signal: Detects signal confirming full elevation.
- Bottom reached signal: Detects signal confirming full descent.
- Vertical converter up output: Controls hydraulic upward movement.
- Vertical converter down output: Controls hydraulic downward movement.
- Horizontal Push OK signal: Detects signal confirming full horizontal insertion. Stops motion upon verification.
- Horizontal freq converter Push output: Controls motor rotation for worktable insertion.

- Horizontal freq converter Pull output: Controls motor rotation for worktable retraction.
- Front Bed Unclamp signal: Verifies complete disengagement of front bed clamping mechanism.
- Front Bed Brake Clamp: Output port for front bed clamping. Active state indicates engagement.
- Upper worktable detection: Monitors worktable existence in rear bed's upper carrier frame.
- Lower worktable detection: Monitors worktable existence in rear bed's lower carrier frame.

7.8.3 Dual Pallet Changer Key Configuration

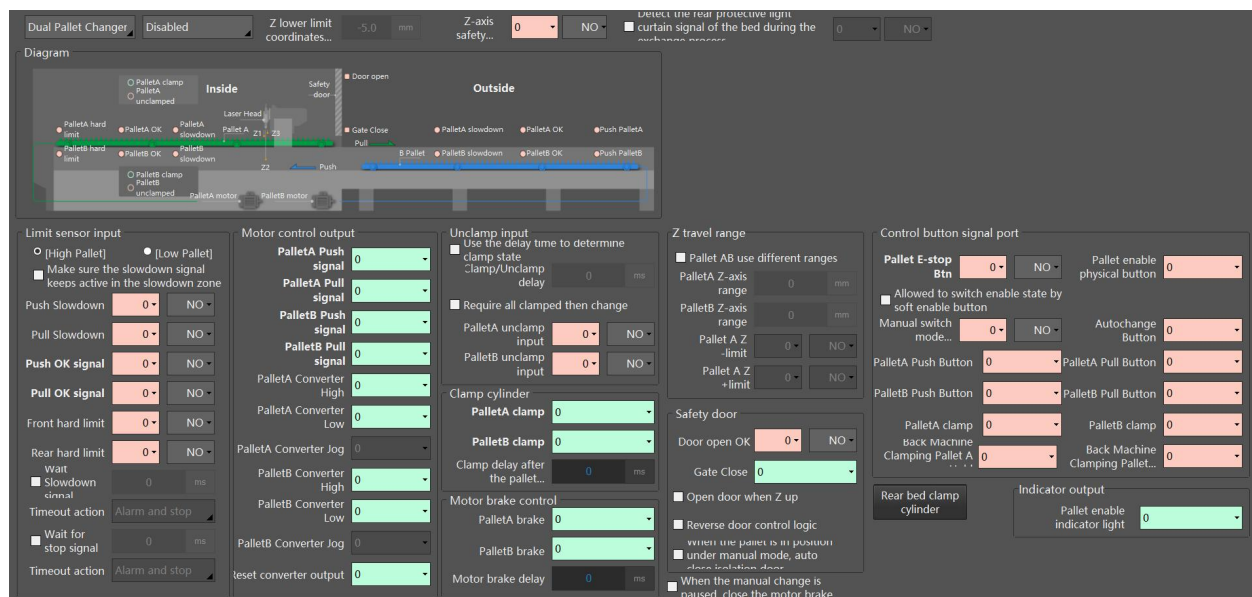


Figure 7-18 Dual pallet changer key configuration

- High Pallet Push/Pull OK signal: Detects signal confirming full insertion or retraction of the high table. Stops motion upon verification.
- Low Pallet Push/Pull OK signal: Detects signal confirming full insertion or retraction of the low table. Stops motion upon verification.
- PalletA Push/Pull signal (Motor control output): Controls rotation direction of the high table pallet change motor for insertion/retraction.
- PalletB Push/Pull signal (Motor control output): Controls rotation direction of the low table pallet change motor for insertion/retraction.

- Use the delay time to determine clamp state: When enabled (checkbox selected), the system utilizes a clamp disengagement delay timer after deactivating the high/low table clamp engagement outputs. Expiration of this delay confirms brake release for subsequent operations. When disabled (checkbox deselected), the system uses physical clamp disengagement input signals as the definitive confirmation of successful release.
- PalletA/B Unclamp input: Detects signal confirming full pneumatic cylinder disengagement on high/low tables. A valid signal confirms clamp release and permits axis movement.

7.8.4 JS Pallet Changer Key Configuration

Config tool enables adding operational buttons to the pallet changer workstation interface or creating input port mapping buttons.

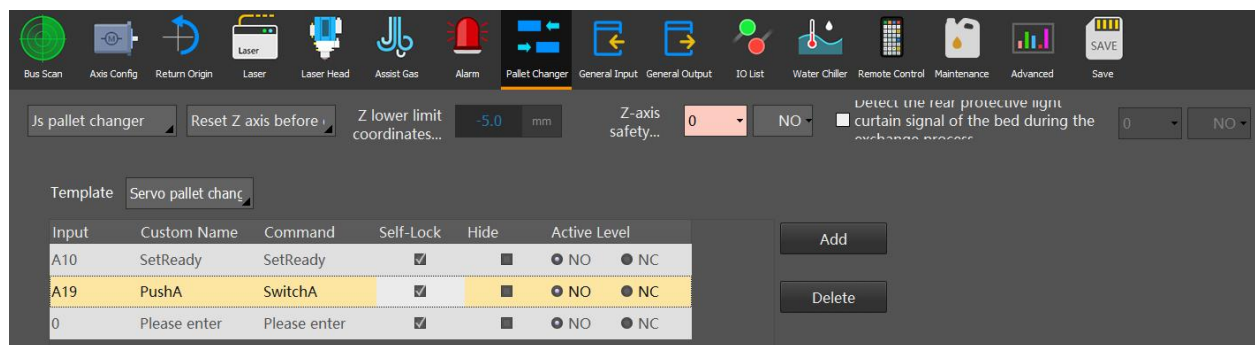


Figure 7-19 JS pallet changer

- Custom Name: Defines the button label text in the pallet changer interface.
- Command: Specifies the corresponding JS function name in the control code.
- Hide: Determines whether the button is hidden in the operational interface.

7.9 General Input

Select the functional designation from the **Function Selection** dropdown menu, then configure the corresponding **Input** and **Active Level** as required.

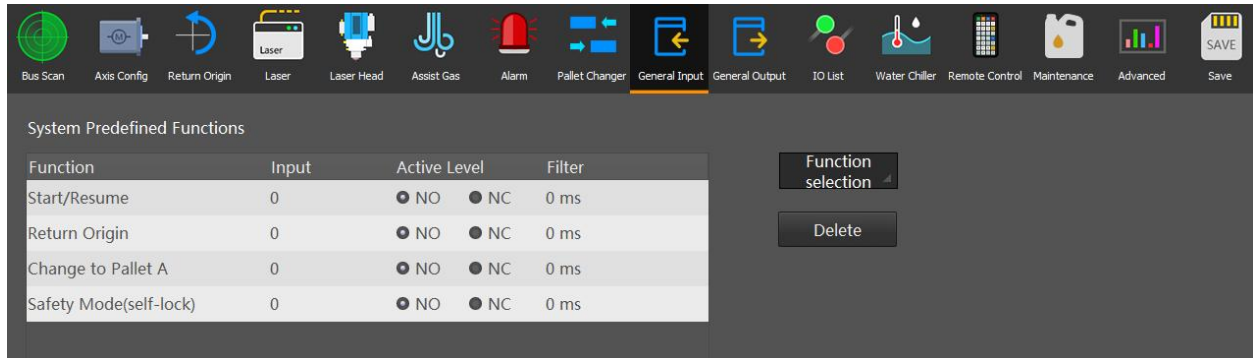


Figure 7-20 Config tool-general input

7.10 General Output

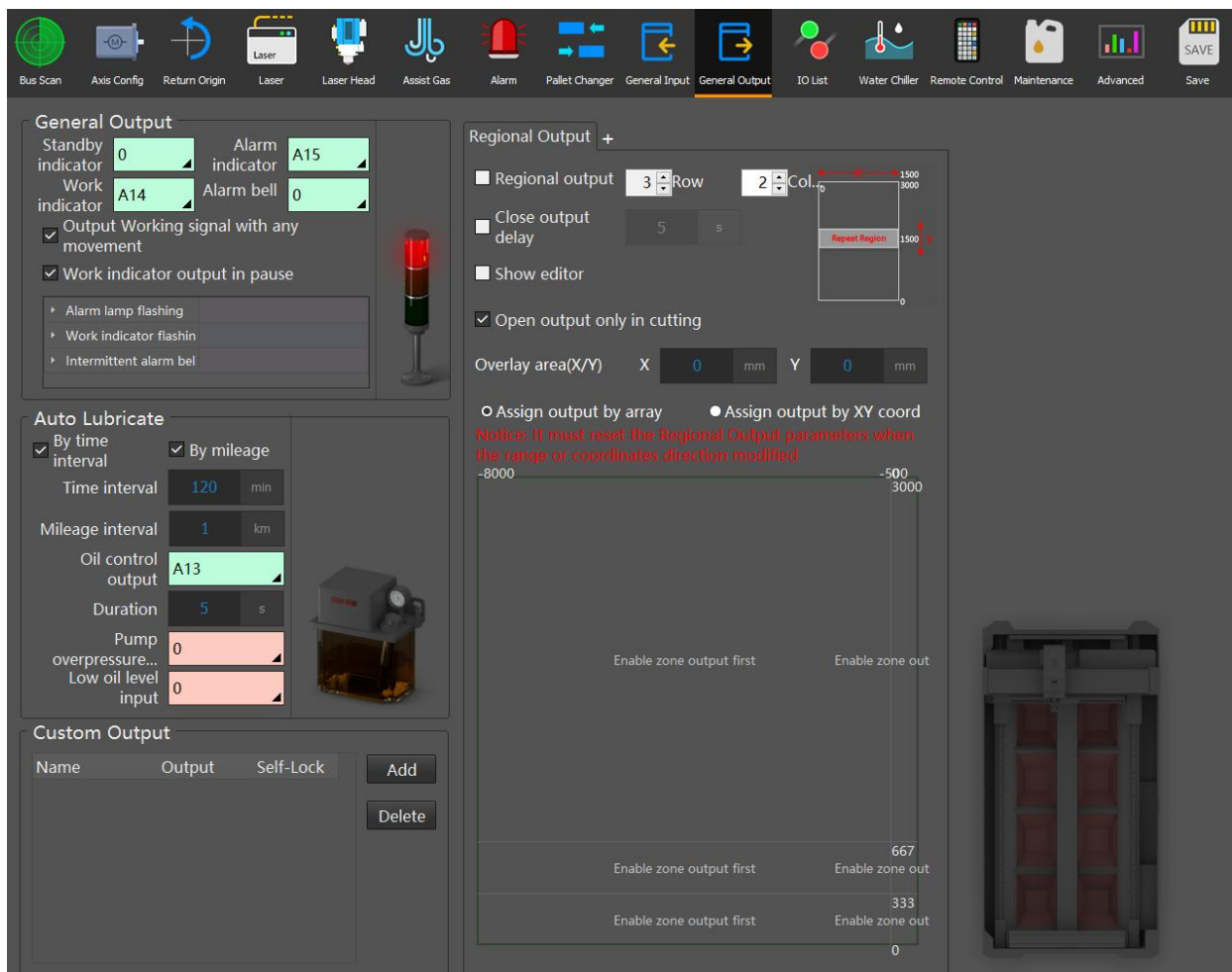


Figure 7-21 Config tool-general output

- General Output: Configures the machine's tri-color status indicator and audible alarm

system, with recommended operational mappings: Processing Active = Yellow indicator; Standby State = Green indicator; Alarm Condition = Red indicator with audible alarm activation.

- Auto Lubricate: When configured, activates the output port at programmed time or distance intervals after HypCutRevo/HypCut software startup. Maintains output duration per settings before deactivation. Supports pump overpressure and low-oil-level input signal integration.
- Custom Output: Configures user-defined output ports, displaying control buttons on the HypCut software's *Custom Production* tab, with selectable latching or momentary contact operation modes as needed.
- Regional Output: Configures the output ports and functions of regional dust collection.

7.11 I/O List

The centralized I/O configuration overview table enables inspection and modification of all machine I/O parameters including *Custom Name* and *Filter* settings within this unified interface.

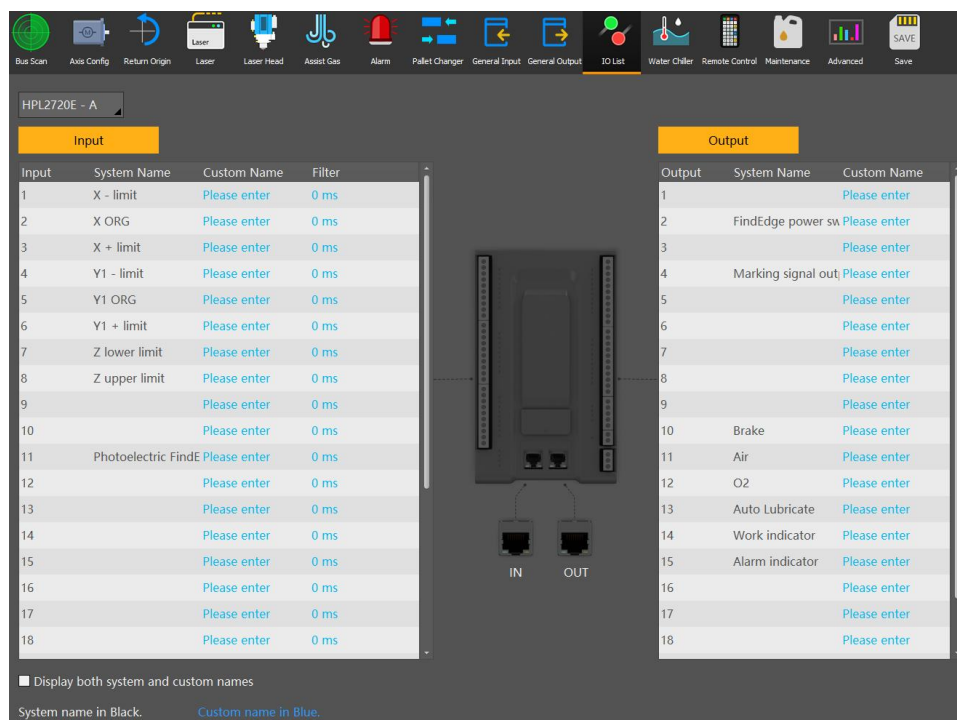


Figure 7-22 Config tool-I/O list

7.12 Water Chiller

The system is currently compatible with Teyu and Hanli brand water chillers; select the operational chiller model and configure its communication IP address settings.

Upon successful communication verification, water chiller monitoring and temperature configuration can be performed within the *Diagnosis* page of *HypCut* software.

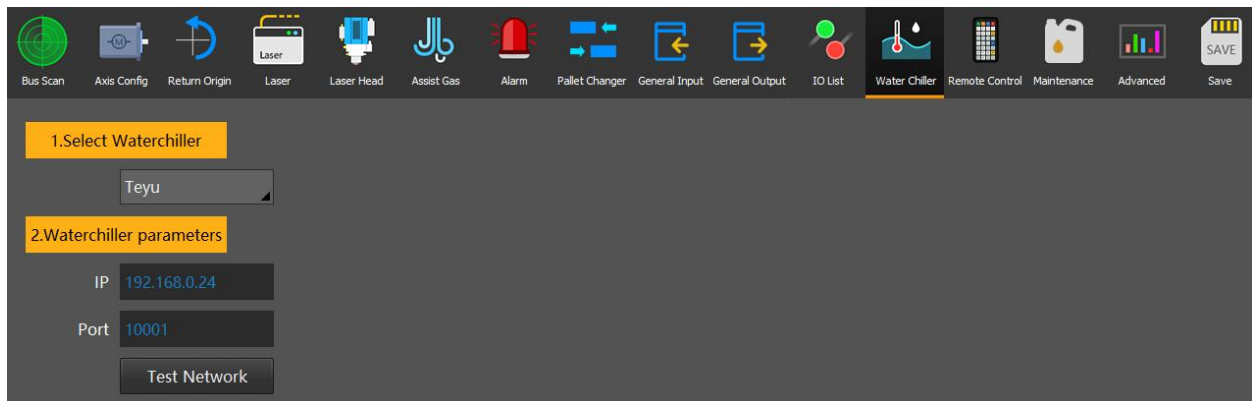


Figure 7-23 Config tool-water chiller

7.13 Remote Controller



Figure 7-24 Remote controller

- Remote controller custom button configuration: Both V8 and V6H units support function assignment to custom buttons. Select the desired function name to assign. Visual coding:
 - Light background: Triggers on single press.
 - Dark background: Requires simultaneous Fn key press.
- Axis Jog Setting: Defines directional behavior for axis jog buttons on remote controller and HyPanel.

7.14 Maintenance

Click **Function selection** to choose a predefined function name or **Custom** to manually enter a name, then configure the corresponding **Maintenance Cycle**, **Reminder Type**, and **Early Warning**.

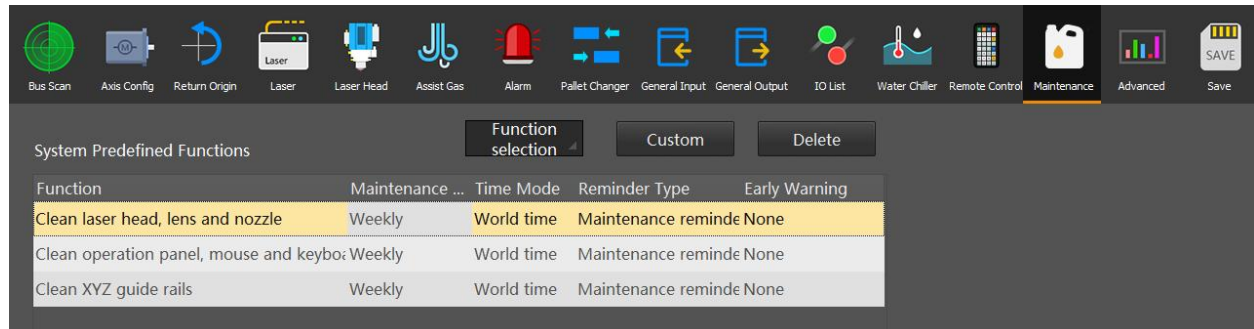


Figure 7-25 Maintenance

7.15 Advanced

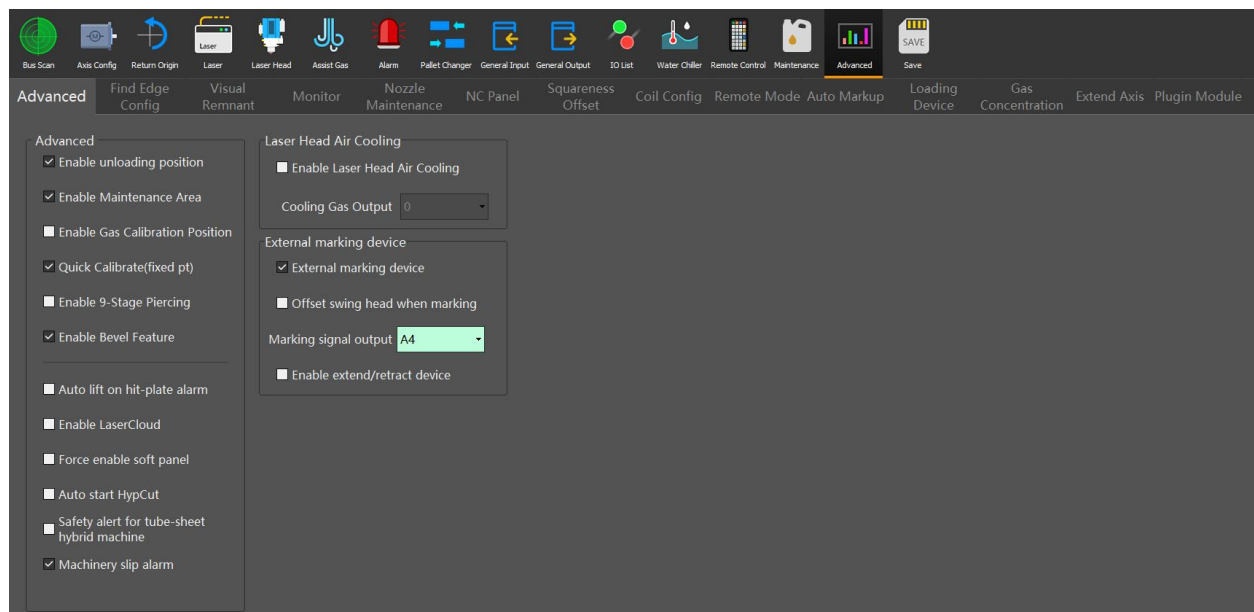


Figure 7-26 Advanced

- **Enable auto clean nozzle:** Activates/deactivates the nozzle cleaning system. Requires installation of a dedicated cleaning brush assembly at a fixed machine location.
- **Enable unloading position:** Activates/deactivates the specialized unloading position function for automated systems or pallet changer integration.
- **Enable Maintenance Area:** Activates/deactivates the rapid-return position function. Programs a fixed reference point at the machine front for one-touch access during

operations.

- Enable Gas Calibration Position: Activates/deactivates the gas calibration positioning function for precision alignment at a fixed reference location.
- Quick Calibrate (fixed pt): Activates/deactivates instant calibration functionality. Requires installation of a stainless steel calibration block at a fixed reference location.
- Enable 9-Stage Piercing: When enabled, the technique supports configuration of up to nine distinct piercing stages.
- Enable Bevel Feature: Activates beveling functions. Provides swing-axis parameter configuration in HypCut *Diagnosis* → *Machine* for basic bevel cutting operations.
- Auto lift on hit-plate alarm: Triggers automatic cutting head retraction upon sheet collision detection when enabled.
- Enable LaserCloud: Activates compatibility with RayBox systems when enabled.
- Safety alert for tube-sheet hybrid machine: Once enabled, the safety alarm will be triggered upon start-up once the motion controller is occupied by other software. The alarm will prohibit Y-axis motion, and will be erased when the cutting head position is confirmed as safe.
- Find Edge Config: Configures I/O parameters for optical edge detection and photoelectric sensing systems.
- Visual Remnant: Sets communication parameters for vision-based remnant recognition cameras or line-laser profile scanners.
- Monitor: Configures surveillance cameras with selectable human-detection alerts and options to restrict machine motion/laser emission.
- Nozzle Maintenance: Enables I/O and motor axis configuration for nozzle replacement/cleaning procedures when activated.
- NC Panel: Configures CNC control panel operation in standalone or LAN-connected environments.
- Squareness Offset: Configures vertical alignment correction to improve cutting

perpendicularity deviations.

- Coil Config: Sets motor parameters, mechanical settings, motion profiles, and I/O signals for uncoiling, leveling, and recoiling axes.
- Loading Device: Enables PLC-controlled loading systems with communication parameters and register address configuration.
- Extend Aixs: Enables and configures parameters for extended machine axes.
- Plugin Module: Supports vision component downloads during network-connected operation.

7.16 Save

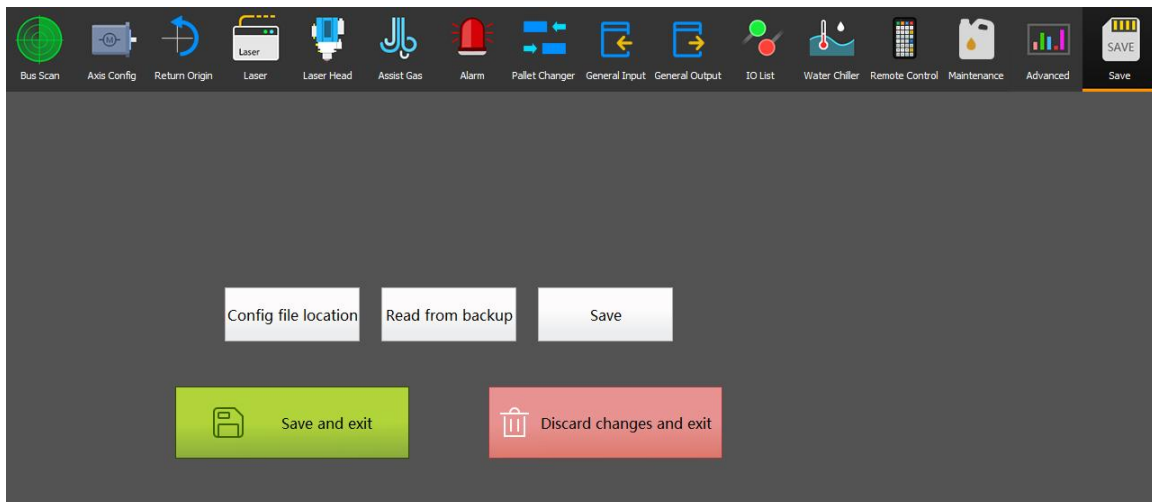


Figure 7-27 Save

- Config file location: Click to locate the system background configuration storage folder. Perform with caution!
- Read from backup: Imports and reads locally saved parameter files to facilitate rapid system recovery and batch deployment.
- Save: Stores all modified parameters configured within the platform interface.
- Save and exit: Commits parameter modifications, exits the *Config Tool*, and automatically launches *HypCutRevo/HypCut*.
- Discard changes and exit: Abandons all parameter modifications, exits the *Config Tool*, and automatically launches *HypCutRevo/HypCut*.

Chapter 8 Wiring Precautions

8.1 Drag Chain Wiring

- When releasing the 4-pin cable from the coil, it is necessary to prevent the cable from twisting (the cable must be released along the tangential direction) and the cable must be laid straight. This should be done before laying the cables, to give the cables time for stress relief. Because the manufacturing process cannot completely guarantee that the cable is straight and free of distortion, the printed logo on the surface of the cable rotates in a tiny spiral.

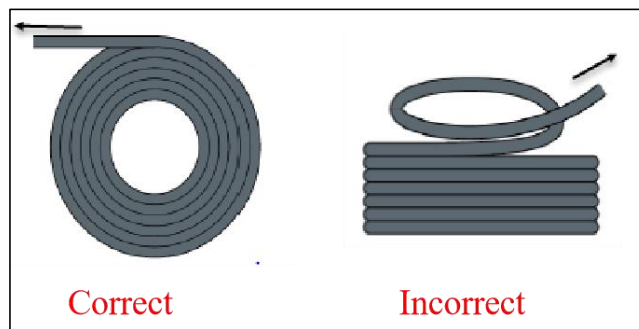


Figure 8-1 Cable releasing

- Cables are not allowed to be twisted when installed in a closed space, and twisting during installation may cause damage to the core wire stranding. This effect is gradually strengthened during the operation of the cable, resulting in back-twisting, which eventually leads to the breakage of the core wire and failure.
- The cables must be laid loosely next to each other in the drag chain support. Spacers should be used to separate the cables as much as possible. A minimum clearance of 10% of the cable diameter must be maintained between cables and adjacent spacer, separators, or neighboring cables.

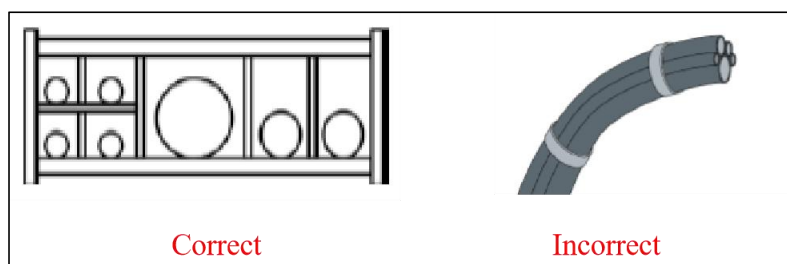


Figure 8-2 Cable laying

- The cables should be installed according to the weight and size of the cables. The larger and heavier cables should be placed outside; the smaller and lighter cables should be placed inside. The cables can also be placed from the inside out in descending order of size. Do not place one cable on top of another without using a spacer.
- For vertically suspended drag chains, keep more free space for the vertical support, because the cables will be stretched during operation. After a short run, it is necessary to check that the cables run along the center area and adjust them if necessary.
- For a self-supporting drag chain, cables are fastened to moving and fixed points. Suitable cable supports from the supplier are required. Cable ties have very limited applicability when operating at high accelerations. So you should not bundle multiple cables together. Cables should not be fixed or tied to any moving parts of the drag chain. The gap between the fixed point and the bending area should be wide enough.



Figure 8-3 Self-supporting and sliding

- It is recommended to fix the cable on the moving point for sliding drag chains. A small cable protection zone is required at the fixing point (Refer to the instructions from the drag chain supplier).

- Please ensure that the cable runs along the center area with the desired bending radius. Do not apply tension to the cable (do not pull it too tightly), otherwise, the friction inside the drag chain will cause the cable sheath to wear; do not let the cable be too loose in the drag chain, otherwise, it will easily cause abrasion of the cable and the inner wall of the drag chain, or tangled with other cables.

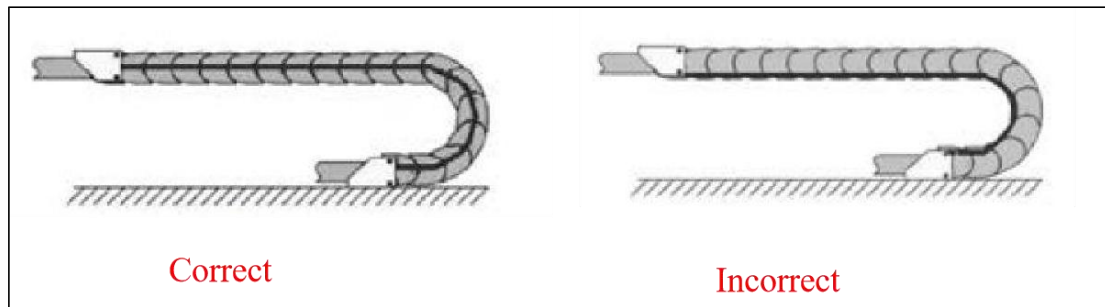


Figure 8-4 Cable runs along the center area of the drag chain

- If the cable does not run smoothly, check whether it is twisted along the longitudinal axis during operation. The cable should slowly rotate at a certain fixed point until it runs freely.
- Given the size of cables and drag chains, their length characteristics vary considerably. During the first few hours, the cable naturally elongated. For drag chains, it takes more hours for this to happen. Such a large discrepancy can be remedied by regularly checking the cable installation locations. It is recommended to do regular inspections, every three months for the first year and at every maintenance thereafter. This includes checking that the cables are completely free to move within the intended bending radius and making adjustments if necessary.

8.2 Machine Tool Wiring

1.Power Supply (Power) Wiring

- Strong Electricity:
 - Strict separation of strong and weak electricity.
 - Auxiliary devices such as circuit breakers and filters should be added to strong electricity.
- Weak Electricity (24 VDC for example):
 - Distinguish the positive and negative wires of the power supply in color, e.g., the red

wire is connected to the positive pole, and the blue wire is connected to the negative pole.

- Loads with relatively large interference (e.g., servos and solenoid valves) are powered separately from the controller.

Select the appropriate diameter for the power cable according to the power. The table below shows the cable diameter and its corresponding power.

Table 8-1 Cable Diameter and Corresponding Power

Cable Spec (mm ²)	Cross Section (mm ²)	25°C Copper Wire Ampacity (A)	Single-Phase 220 V Load Power (W)	Three-Phase 380 V Load Power (W)
1.5	1.38	15	3300	9476.8
2.5	1.78	25	5500	13163.2
4	2.25	32	7040	16848.8
6	2.85	45	9900	23693.6
10	7*1.35	60	13200	31591.2
16	7*1.7	80	17600	42121.6
25	7*2.14	110	24200	57917.6

2. Grounding Wiring

- The ground wiring should use the standard yellow-green dual-color wire.
- It is recommended to use multi-point grounding, for some high-frequency signals (PWM, pulse, encoder, capacitance, etc.) in the laser cutting machines.
- The machine tool uses galvanized grounding screws and a special grounding wire for grounding. The resistance between the grounded metal body and the main grounding point should be $\leq 0.1 \Omega$.

3. Signal (Control) Wiring

- Signal wire color, e.g., black.
- Select appropriate wire gauge for signal wires based on power requirements.

- 24 VDC solenoid valve is recommended. Add absorption circuits at both ends of the solenoid valve, that is, connect a freewheeling diode in parallel at both ends of the solenoid valve (pay attention to the direction, withstand current, and withstand voltage), as shown in the figure below:

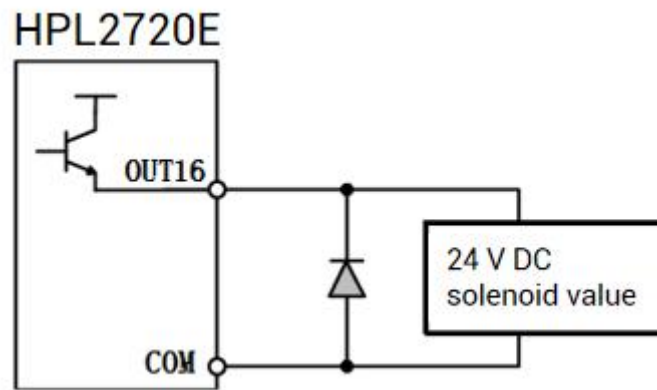


Figure 8-5 Connect a freewheeling diode in parallel at both ends of the Solenoid Valve

- It is recommended that the digital signal (PWM) shielding layer be grounded at both ends, and the analog signal (DA) shielding layer be grounded at one end. Single-ended grounding can avoid low-frequency current noise on the shielding layer; double-ended grounding can effectively eliminate high-frequency interference. If the transmission cable is very long, it is recommended to ground at multiple points to ensure that the shielding layer is at the same potential.
- The resistance from the cutting head connected to the amplifier to the shell of the machine tool is $\leq 1 \Omega$ and the resistance to the grounding point of the electrical cabinet is $\leq 6 \Omega$.

4.Other Specifications

- Each cable should be marked clearly and accurately.
- Cables are parallel and not crossed, and the harnesses should be straight and leveled.
- When using BOCHU cables, select appropriate wire types according to the layout space to avoid cable stacking or tangling.
- All connections must be securely fastened to prevent loosening, which could cause sparking or short circuits.

- Wiring should avoid forming current loops to prevent antenna effects. Current loops between the signal source, transmission line, and load can create magnetic field antennas, causing interference. Such situations must be avoided during wiring. The wiring schematic is shown below:

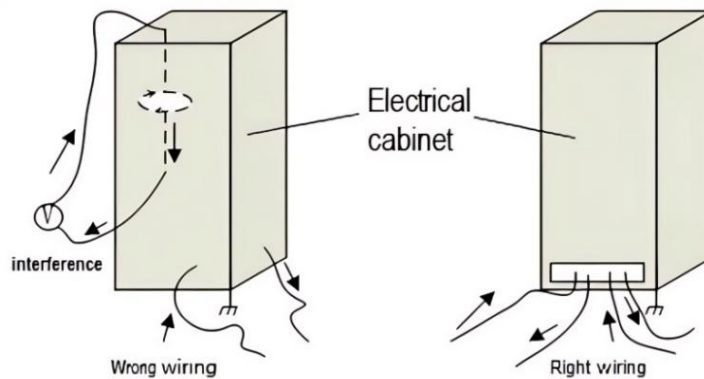


Figure 8-6 Cabinet wiring

- It is recommended to use a star connection for wiring, not to use a serial connection, as shown in the following figure:

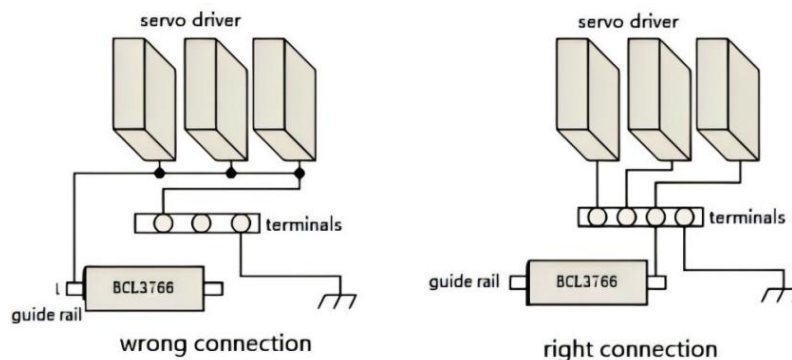


Figure 8-7 Star connection

8.3 Assembly Requirements

- Handle control cards with extreme care. Before touching circuit components or inserting/removing control cards, wear anti-static gloves or discharge static electricity by contacting a properly grounded metal object. Failure to comply may cause electrostatic discharge (ESD) damage to the BMC228B master motion controller card.
- Except for the USB interface, all other interfaces must be connected/disconnected ONLY when the system is powered off. Live plugging/unplugging (while powered on) may result in permanent damage to internal components due to electrical surges.

- Handle with care. Avoid applying physical pressure or placing heavy objects on the control card. Mechanical stress (e.g., bending) may deform the card, leading to circuit failure or functional impairment.

8.4 Environmental Requirements

- Temperature and Humidity: The installation environment must comply with the equipment's operating temperature (0 to 60°C) and humidity (10% to 90%, non-condensing) requirements. Avoid high-temperature or humid environments to prevent impacts on equipment stability.
- Ventilation and Heat Dissipation: Ensure the equipment is installed in a well-ventilated location and avoid prolonged exposure in enclosed spaces. Do not block the heat dissipation vents of the main unit or other modules during installation.
- Dust and Interference Protection: The installation environment should minimize dust particles and electromagnetic interference sources. Avoid placing high-frequency equipment, strong magnetic fields, or high-power motors near the installation location.
- Anti-Static Measures: Operators must adopt anti-static measures during installation and debugging, such as wearing anti-static gloves or contacting properly grounded metal objects.

8.5 Electrical Safety

- Power-Off Operation: When performing equipment wiring or maintenance, always cut off the power supply to prevent accidental electric shock or equipment damage.
- Grounding Reliability: All equipment grounding wires must be securely connected to the main grounding point. The ground resistance should not exceed 4 Ω to ensure electromagnetic compatibility.
- Cable Installation: Ensure all cable connections are secure and not loose to prevent sparking or other electrical faults caused by poor connections.
- Electrical Overload Protection: Overload protection devices, such as circuit breakers and filters, must be considered in the electrical distribution design to ensure the safety of the electrical system.

Chapter 9 FAQ

This chapter describes potential post-installation system issues and corresponding troubleshooting procedures. If the methods below fail to resolve the problem, promptly contact technical support for assistance.

9.1 Host Fails to Boot System

- Verify secure connections of all power cables to the host unit and display, and confirm nominal 24V DC supply voltage.
- If the host unit powers on but displays no output, inspect display power connections and validate input voltage compliance.
- If the display functions yet system boot fails (indicating potential OS corruption), execute the following:
 1. Press Win+R, manually launch explorer.exe via the Run dialog.
 2. Perform a cold reboot and observe whether the host interface initializes normally.
 3. If successful, conduct a comprehensive antivirus scan. If boot failure persists, initiate [system restore](#) to the last known functional configuration.

9.2 Touchscreen Display Failure

- Verify secure connection of the display power connector and validate nominal 24V DC supply voltage.
- Inspect proper seating of the BC-Link interface cable.

9.3 Potential OS Corruption or Severe System Lag

If the system requires restore to factory settings due to virus or system lag caused by too many files, please follow the procedures below to restore the system.

Step 1 Restore HyPanel2/HypTronic3.

Step 2 Upon initial startup, press and hold the **Restore** button. Release the key after the screen is on, and you will enter the restore page in Step 3.



Figure 9-1 Restore button

You can also press **Delete** to enter the BIOS interface below.



Figure 9-2 BIOS Interface

By pressing the key **ALT+F3** on the BIOS page, the prompt window will show. Click **Yes** and press **Enter**, the system will be restored automatically and enter the restoration page.

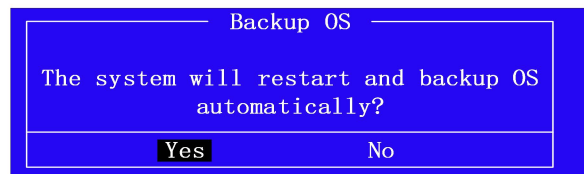


Figure 9-3 Restore and backup the system

Step 3 Select **auto_restore** and press **Enter**.

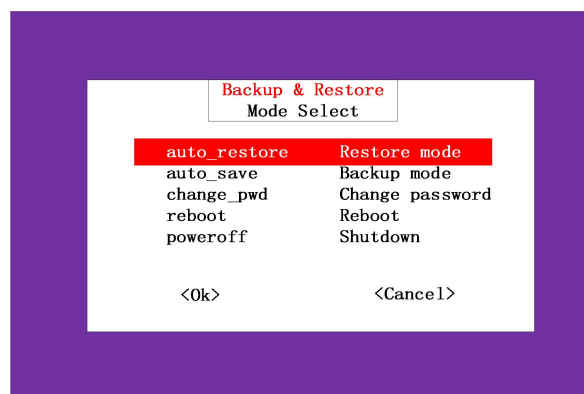


Figure 9-4 Restore page

Step 4 Select **Yes**, and press **Enter**.

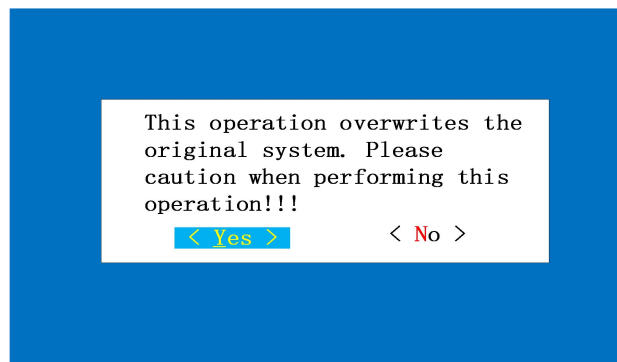


Figure 9-5 Click yes to confirm

Step 5 The system starts auto-restoration, and the process will finish once the progress bar is complete.

```

Partclone
Partclone v0.3.18 http://partclone.org
Starting to check image (-)
Calculating bitmap... Please wait...
done!
File system: NTFS
Device size: 322.1 GB = 78645759 Blocks
Space in use: 11.8 GB = 2886388 Blocks
Free Space: 310.3 GB = 75759371 Blocks
Block size: 4096 Byte

Elapsed: 00:00:02 Remaining: 00:01:28 Rate: 7.80GB/min
Current Block: 67406 Total Block: 78645759

Data Block Process:
[Progress Bar] 2.20%

Total Block Process:
[Progress Bar] 0.09%

```

Figure 9-6 System is under restoration

9.4 Encryption Card Not Detected at Startup

Identify and remove any unauthorized USB devices connected.

9.5 System Halts at F3 Interface During Boot

If startup freezes at the F3 prompt preventing system access, resolve using these methods:

- Press **F3** to enter the System Restore interface. If the restoration fails, shut down and reboot.
- Access a Preinstallation Environment (PE) system and reboot to resume normal boot sequence.
- Execute system repair via **F3** if OS corruption persists.

 **Caution:** Before troubleshooting abnormal startup conditions, remove all USB peripherals and retry the boot sequence.

9.6 HyPanel Black Screen

9.6.1 Screen Power Supply Troubleshooting

- The screen has a maximum power consumption of 24 V, 2 A. Ensure the power supply can provide sufficient power (considering the total power consumption of all loads connected to the power supply). If the power supply does not meet the requirements, replace it with a

switching power supply that meets the power demand, ensuring a single-channel current output greater than 2 A (MEAN WELL switching power supplies are recommended).

- Set the multimeter to the DC voltage (V) range. Insert the red probe into the multimeter's voltage terminal and the black probe into the COM terminal.
- Measure the voltage at the power supply terminals before connecting them to the screen. Ensure the voltage is between 23 V and 25 V. If the voltage is outside this range, replace the power supply.
- Plug the power supply terminal into the screen and measure the voltage at the screen end (24 V to 0 V).
 - If the measured voltage is 0 V, immediately disconnect the power supply terminals. This indicates a potential short circuit in the screen's power input. Contact technical support for repair/return.
 - If the measured voltage is approximately -24 V, this indicates reversed polarity. Immediately disconnect the power supply terminals and reconnect them correctly.

9.6.2 Ethernet Port LED Status Check

After connecting the Ethernet cable, check the status of the BClick LED indicator:

- If the indicator is yellow, contact technical support to resolve the issue.
- If the yellow indicator is off, check the green LED indicator on the BClick terminals at both the screen end and the host end.
 - If the green indicator is not flashing at either end, contact technical support for device repair/return.
 - If the green indicators are flashing at both ends, replace the Ethernet cable.

9.7 BSOD

Here are the steps to solve this problem:

- Run anti-virus software to clean the system and see if the problem can be solved.

- Check whether uninstalling recently installed software or drivers can be solved. If this is the case, please confirm the compatibility with the software provider.
- Check if restoring the system can solve the problem.
- If all the above methods fail to work, please get in touch with BOCHU technical support.

9.8 False Emergency Stop Activation

- If the emergency stop condition is resolved quickly after activation, it may be a false activation caused by connecting USB HUB, wireless network adapter, or other USB peripherals to the HyPanel. Typically, the rear USB port on the HyPanel is intended for a wireless keyboard/mouse receiver, while the front USB port is for USB flash drives. Connecting other peripherals may lead to USB-related issues.
- If the system is slow to recover or unable to recover after an emergency stop, and peripheral-related issues have been ruled out, please contact technical support for screen repair.

9.9 Hard panel connection timeout troubleshooting

- If this alarm occurs when the network cable at the host or screen is shaky, insert the gold finger or network cable again, or replace the network cable.
- While the alarm remains, the touch screen and USB peripherals do not work, insert the gold finger again.
- If the software prints an alarm message accompanied by a *HKB USB Device Removed* message, try replacing the powered USB HUB with a powered one or using a USB to network port converter.
- If the software prints the alarm message and displays a non-zero thread wait time, resolve the issue by upgrading the HypCut software to version 2022B or later.

9.10 USB Device Error

Step 1 Check whether the device is functioning well, replug the USB device, or replace the USB port and retest.

Step 2 Check if the USB extension cable is too long.

Step 3 USB 3.0 devices, such as USB drives and other adapters, may interfere with 2.4G wireless receivers, such as wireless keyboards and mouse, resulting in lagging. This originates from the problem raised by Intel, that is, USB 3.0 devices with poor shielding effect will interfere with 2.4G devices. The following measures can be taken to solve the problem:

1. Replace to USB device with a better shielding effect or a wired USB device.
2. Connect USB3.0 devices or wireless devices to the USB2.0 extension cable.
3. Keep USB3.0 devices away from wireless devices.
4. If there is still a problem, please get in touch with BOCHU technical support.

9.11 Master Motion Controller Card Firmware Upgrade

9.11.1 Automatic Upgrade

Step 1 Install HypCutRevo/HypCut software and check the *Drivers*.

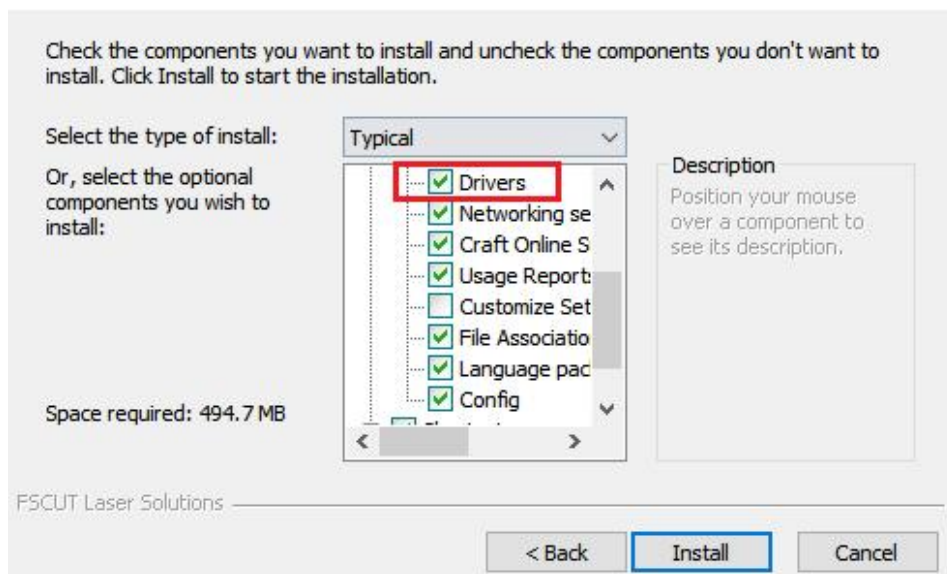
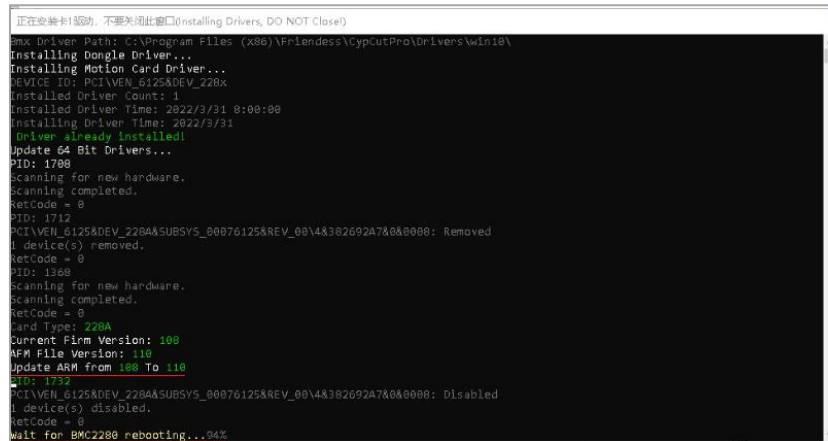


Figure 9-7 check the Drivers

Step 2 During installation, the firmware version of the master motion controller card is automatically compared. If the original firmware version of the master motion controller card is lower, the software will automatically upgrade it. During the upgrade process, the version number and progress can be viewed in the window, as shown in the figure below.



```

正在安装卡! 驱动, 不要关闭此窗口! (Installing Drivers, DO NOT Close!)
Dmg Driver Path: C:\Program Files (x86)\Friendess\CyCutPro\Drivers\win10\
Installing Dongle Driver...
Installing Motion Card Driver...
DEVICE ID: PCI\VEN_6125&DEV_228x
Installed Driver Count: 1
Installed Driver Time: 2022/3/31 0:00:00
Installing Driver Time: 2022/3/31
Driver already installed!
Update 64 Bit Drivers...
PID: 1700
Scanning for new hardware.
Scanning completed.
RetCode = 0
PID: 1712
PCI\VEN_6125&DEV_228A&SUBSYS_00076125&REV_00\4&302692A7&0&0000: Removed
1 device(s) removed.
RetCode = 0
PID: 1368
Scanning for new hardware.
Scanning completed.
RetCode = 0
Card Type: 228A
Current Firm Version: 100
AFM File Version: 110
Update ARM from 100 To 110
PID: 1732
PCI\VEN_6125&DEV_228A&SUBSYS_00076125&REV_00\4&302692A7&0&0000: Disabled
1 device(s) disabled.
RetCode = 0
Wait for BMC2280 rebooting...94%
  
```

Figure 9-8 Check the version during installation

Step 3 After the upgrade is completed, the master motion controller card firmware will automatically load and restart. If the system shows no prompts, open the **Settings** → **About Machine** interface after software installation to check and confirm the upgraded firmware, and it should function properly.

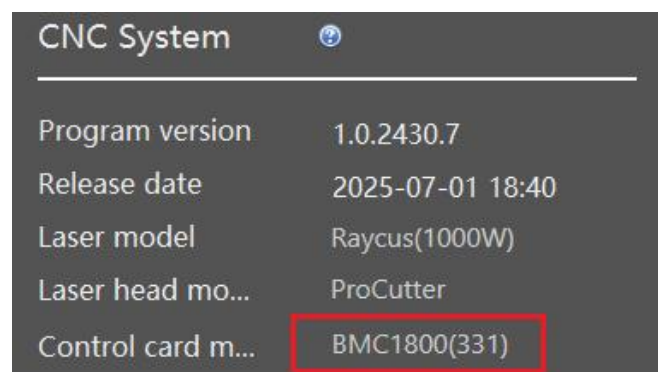


Figure 9-9 Confirm firmware update

Step 4 Some hosts do not support the "hot-plug" feature. After the upgrade is completed, you may be prompted with the message: "An important hardware driver update is available. Please confirm and restart your computer after the installation is complete." Click **OK** to restart your computer for successful recognition. If the device still does not function properly after restarting, please contact technical support.

9.11.2 Manual Upgrade

Step 1 Open the HypCut installation directory C:\Program Files (x86)\Friendess\HypCut\drivers, and copy the firmware that needs to be upgraded into this folder.

Step 2 Close the software, open the HypCut installation directory C:\Program Files (x86)\Friendess\HypCut\drivers, and double-click the InstallDrv.exe program.

Step 3 For subsequent steps, refer to Steps 2 – 4 of the [Automatic Upgrade](#).



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