OPERATION INSTRUCTIONS

ESTUN Robotics C3E Series

Operation Instructions of Control Cabinet

ESTUN Robotics C3E Series Control Cabinet

Operation Manual

E-0803EN-04

Thank you for purchasing ESTUN robots.

Before using the robot, be sure to read the SAFETY PRECAUTION and understand the content. ESTUN is committed to prove the products. All specifications and designs are subject to change without notice.

All statements, information, and advice provided in this manual have been carefully processed, but no guarantee is given for their complete accuracy. We shall not be held liable for any direct or indirect losses arising from the use of this manual.

Users are solely responsible for the application of any products and should exercise caution when using this manual and the associated products.

The interpretation of all content in this manual belongs to ESTUN Robotics Engineering Co., Ltd.

Revision History

Revision	Date	Content
01	2022.09	Initial release.
02	2023.05	Updated the section of "Basic Specifications", and deleted model ER20-1745-PV
03	2023.11	Added ER20B-1760-HI model, add information about the integrated electric cabinet; updated the basic parameter information table; updated the ESView software and the picture of the teach pendant
04	2024.06	Updated Table 1-2 Control cabinet installation parameters in Section 1.4 to include cable allowance, plug size, and cable bend radius to the robot base.

Safety Precautions

This Chapter describes the content to be observed for the safe use of the robot. Before using, be sure to read and understand the content in this Chapter.

Companies and individuals using Estun Robotics should be familiar with the local and national standards and laws. Appropriate safety facilities shall be provided to protect users. Before use (installation, operation, maintenance and repair), please be sure to read and understand this Manual as well as other ancillary materials thoroughly, and use it after being familiar with all knowledge on equipment, safety and precautions. However, Estun would not guarantee that the user will absolutely not be injured even if he follows completely all the safety information given in the Manual.

Definition of users

The users of this manual are defined as follows.

1. Operators

   ● To perform the power ON/OFF operation of the robot;

   ● To start the robot program from the operation panel;

   ● To restore system alarm status;

   ● **Must not work inside the safety fence.**

2. Programmers

   ● To operate the robot;

   ● To teach the robot in a safe area;

   ● To perform the operations in a safe area;

   ● **The above-mentioned personnel must receive training on the robot.**

3. Maintenance personnel

   ● To operate the robot;

   ● To teach the robot in a safe area;

   ● To carry out the robot maintenance (repair, adjustment, replacement);

   ● To perform the operations in a safe area;

   ● **The above-mentioned personnel must receive specialist training on the robot.**

Safety Symbols

If the manual contains instructions marked as follows, users must read them carefully and follow strictly.

Symbol	Definition
⚠️ Danger	**This symbol indicates a high potential for serious danger that could result in death or severe injury if not avoided.**

Symbol	Definition
⚠️ WARNING	**This symbol indicates a moderate or low potential for danger that could result in minor or moderate injuries if not avoided.**
⚠️ Caution	**This symbol indicates potential risks that, if disregarded, could lead to equipment damage, data loss, decreased device performance, or unpredictable outcomes.**
💡 IMPORTANT	**This symbol indicates mandatory precautions and restrictions to be followed.** **It may also indicate warnings or precautions that do not pose a risk of equipment damage.**
📖 Note	**This symbol provides additional information to the main text, emphasizing and supplementing the content.**

Safety Precautions

1. Precautions before use:

⚠️ Caution	DO NOT use the robot in the following situations, as it can have an impact on the robot, peripheral devices, and potentially cause harm to operators: • In flammable environments • In potentially explosive environments • In environments with high levels of radiation • In water or high humidity environments • For transporting people or animals • As a climbing device (climbing onto or suspending beneath the robot)

⚠️ Caution	During robot operation, programming, and maintenance, personnel must prioritize safety. At a minimum, the following items should be worn: • Appropriate work clothes • Safety shoes • Safety helmet

⚠️ Caution	Operations within the safety zone require specialized training on the robot. For more information regarding training, please consult ESTUN Robotics Engineering Co., Ltd.

2. Installation precautions:

(1) Follow the specified methods for handling and installing the robot.

When handling and installing the robot, follow the methods specified by Estun Robotics. Using incorrect methods may result in the robot tipping over and causing accidents;

(2) During the initial operation of the robot, start at low speed, gradually increase speed, and check for any abnormalities;

(3) It is strictly prohibited to move the robot's axes, as it may cause personal injury and equipment damage;

(4) Take precautions when wiring and piping between the robot, the cabinet, and peripheral equipment. Put the pipes, wires or cables through a pit or covered with a protective lid, to avoid stepped by personnel or run over by a forklift;

(5) Ensure proper grounding for all peripheral devices;

(6) Draw an area clearly indicates the safety area. Install a fence or hang a warning board to ensure the safety operation of the robot, and keep unauthorized personnel outside the safety area;

(7) Exercise caution when disassembling the robot to avoid injury from falling components;

3. Precautions for operation

(1) Unexpected movement may occur on any operating robot, which will cause severe injuries or damages in the working area. Test (safe door, brake, safe indicators, etc.) must be performed on each safety measures before using the robot. Before turn on the system, make sure that no one is in the working space;

(2) Never hang any tools above the robot. Falling of these tools may cause damage to equipment;

(3) Never lean on the cabinet. Never touch any buttons without permission. Unexpected movement of the robot may cause personnel injuries and equipment damage;

(4) Do not wear gloves when using the teach pendant. Operate with gloves may cause an operation error;

(5) Programs, system variables, and other information can be saved on the memory card or USB memories. Be sure to save the data periodically in case that the data is lost;

(6) Turn off the power when adjusting peripheral equipment;

(7) Never set motion range or load condition exceeds the rated range. Incorrect setting may cause personnel injury and equipment damage;

(8) Observe the following precautions when teaching inside the working space of the robot

- Do not enable the system unless the mode is switched to manual, and make sure that all auto-control is cut off;
- Speed must be limited under 250mm/s at manual mode. Only authorized person with fully understand of the risks can adjust the robot to rated speed manually;
- Be careful about rotating joints to prevent hair and clothes involved. Take precautions of injury or damage caused by the manipulator or other auxiliary devices;
- Check the motor brake to avoid personnel injuries caused by unexpected situation;
- Always have an escape plan in mind in case the robot comes towards you unexpectedly;
- Ensure that there is a place to retreat to in case of emergency.

Under any circumstances, do not stand under any robot arm to prevent abnormal motion of the robot or connection with other people.

DANGER

A carbon dioxide fire extinguisher needs to be placed on site to prevent the robot system from catching fire.

CAUTION

Safety Precautions

Operations such as handling, setup, teaching, adjustment, and maintenance must be conducted within a safety area by personnel who have received professional training in robotics.

For more information regarding training, please contact ESTUN Robotics Engineering Co., Ltd.

Precautions for users

Operators

(1) Before operate the robot, you should press emergency stop button, which is on the teach pendant or the upper right of electric cabinet, in order to check whether the indicator of Servo Ready is not light, and make sure the power of the indicator is turnoff.

(2) In course of operation, never allow the non-work personnel to touch the control cabinet. Otherwise, the robot might bring some unexpected movements, which can cause personal injury or equipment damage.

(3) When you install a device on the robot, the power supplies of the control cabinet and the device must be cut off (OFF), and then hang a caution sign. If you power on in your installation, it might cause the danger of electric shock, or the robot might bring some unexpected movements, which can cause personal injury.

(4) E-stop

- The E-stop is independent of the electrical control of all robots, and it can stop all robot motions;

- E-stop means that all power supplies to the robot are disconnected, but the power to the brake on the servomotor is not disconnected. The robot can work again after releasing E-stop button and re-starting the robot.

There're several buttons for emergency stopping the robot. On the teach pendant and at the upper right of control cabinet, each of these places has one red button, as shown in the left side. Certainly, users can also set the E-stop button as required.
The E-stop button must be installed in an accessible position so that the robot can be stopped in an emergency.

Operators shall pay attention to the high-voltage danger of the power line of the servomotor, as well as the power line connecting the fixture and other devices.

E-stop is just used for stopping the robot in the case of an emergency. That is to say, it cannot be used in the normal stop.

Programmers

While teaching the robot, and in some cases, the programmer needs to enter the range of the robot's movement, so be sure to keep himself safe.

> ⚠ **Caution**
>
> **ON/OFF enabling is done by operating a Mot button on the teach pendant. When pressing this button, the servomotor is enabled, and disabled when releasing it.**

To ensure the safe use of the teach pendant, the following rules must be observed:

● Ensure that the enable button works at all times.

● Disconnect the enabling timely when temporarily stopping the robot, programming or testing.

● When entering the robot working space, the teach pendant shall bring the teach pendant to avoid other people operating the robot without the programmer is informed.

● The teach pendant must not be placed within the working space of the robot to prevent abnormal actions in case of collision between the robot and the teach pendant.

Maintenance personnel

(1) Pay attention to the parts in the robot that are prone to become hot

Some parts of the robot in normal operation will become hot, especially the servomotor and reducer, which may cause burns when being approached or touched. When it is inevitable, protective equipment such as heat-resistant gloves should be worn.

> ⚠ **Caution**
>
> **Before touching these parts with your hands, try to feel the temperature of these parts by approaching with your hand, in case you are scalded. Wait for enough time after machine halt, so that the hot parts can be cooled down, and then you can carry out the maintenance work.**

(2) Safety precautions on removing parts

Ensure that the internal parts such as the gears are no longer rotating, and then you can open the lid or the protection device. You shall not open the protection device when the gears and bearings are rotating. If necessary, use the auxiliary device to make the internal unfixed parts remains its original position.

The initial test upon repair, installation and maintenance shall be carried out by following the steps below:

● Clean up the robot and all maintenance and installation tools in the working space of the robot.

● Install all the protective measures.

● Ensure that people are standing outside the safe range of the robot.

● Pay special attention to the working conditions of the parts repaired during testing.

In case of robot repair, do not use the robot as a ladder, and do not climb on the robot to avoid falling.

(3) Safety precautions on pneumatic/hydraulic components

After turning off the air source or hydraulic pump, a few residual gas or liquid exists in the pneumatic system or hydraulic system. Beware these gases or liquid, which have a certain energy; we must take some measures to prevent the residual energy from damaging to the human body and equipment. Therefore, it is necessary to release the residual energy in the system before maintaining the pneumatic or hydraulic components.

<table>
<tr><td>

⚠ Caution

</td><td>

Mount a safety valve to avoid accidents.

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</table>

(4) The power supply need be opened in many cases of fault diagnosis, but it must be shut when the maintenance or repair is carried, moreover, you should cut off other power supply connections.

(5) Brake detection.

In general, the brake can be worn in the normal operation. Therefore, the brake detection is necessary by following the steps below.

    a) Move each joint to a position, where the joint can bear the maximum load.

    b) Shut down the robot and brake.

    c) Mark every joint of the robot.

    d) Examine whether any joint moves after waiting for a moment.

(6) Safety precautions for adding lubricating oil

When add lubricating oil to the reducer, it might do harm to the person and the equipment. Therefore, you must obey the below safety information before adding lubricating oil:

- Wear the protective measures (e.g. gloves, etc.) when refueling or draining oil to prevent damage to maintenance personnel caused by high-temperature oil or reducer.
- Be cautious when opening the oil chamber cover. Keep away from the opening as there may be pressure in the oil chamber to cause splashing.
- Oil filling shall be made according to the fuel gauge, which shall be not too full. Check the oil indicator port after oil filling.
- Oil of different designations cannot be added to the same reducer, and the remaining oil must be cleaned up before using the oil of different designation.
- Drain the oil completely or check the oil indicator port after oil filling.

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📖 NOTE

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Before emptying the oil in the reducer, you can run the robot for a period of time to heat the oil, to allow easier draining.

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</table>

Safety precautions for robot

In an emergency, any arm of the robot that clips the operator shall be removed. Please ask our technicians for details to ensure the safe removal.

Small robot arms can be removed manually, but for large robots, cranes or other small equipment may be required.

Before releasing the joint brake, the mechanical arm needs to be fixed first to ensure that the mechanical arm will not cause damage again to the person trapped under the action of gravity.

Ways to stop robot

The stopping of robots has the following three ways.

Power-Off Stop

Servo power is turned off and the robot stops immediately. Servo power is turned off when the robot is moving, and the motion path of the deceleration is uncontrolled.

The following processing is performed at Power-Off stop:

- An alarm is generated and servo power is turned off, and the robot operation is stopped immediately.

- Execution of the program is paused.

For the robot in motion, frequent power-off operations through E-stop buttons will cause robot failure. The system configuration for daily power-off stop should be avoided.

Alarm Stop

The motion of the robot is decelerated and stopped through a control command after the robot system issues an alarm (except for the power failure alarm). The following processing is performed at Controlled stop:

- The robot system issues an alarm due to overload, failure, etc. (except for power failure alarms).

- The servo system sends a command "Control Stop" along with a decelerated stop. Execution of the program is paused.

- The servo power is turned off.

Hold

The robot is decelerated until it stops, and servo power remains on.

The following processing is performed at Hold:

- The robot operation is decelerated until it stops. Execution of the program is paused.

Safety precautions for tools and peripheral equipment

The external equipment of the robot may still be running after the robot is turned off, so damage to the power cord or power cable of the external equipment may also cause bodily injury.

Warning and Caution Signs

Symbol	Description
	Electric shock Attention should be paid to the danger of high voltage and electric shock at the place where this sign is affixed.
	High temperature Be cautious about a section where this label is affixed, as the section generates heat. If you have to inevitably touch such a section when it is hot, use a protective provision such as heat-resistant gloves.
	No stepping Do not step on or climb the robot as it may adversely affect the equipment, and cause the bodily injury to operators.
	Wounding by robot There is a danger of wounding by robot when working within the motion range of robot.
	No disassembly Users are prohibited from disassembling the part affixed with this sign. Disassembly shall be carried out by professionals using professional tools.

Preface

This document describes how to use the C3E control cabinet, which is a compact horizontal cabinet that is smaller in size compared to standard vertical cabinets.

This manual is intended for the following robot models.

Electrical Cabinet	Model
C3E Stacked Cabinet	ER20-1780-HI
	ER20-1780-F
	ER20-1780
	ER20/10-2000-HI
	ER20/10-2000-CW
	ER30-1880
	ER35-1880-LI
C3E Integrated Cabinet	ER20B-1760-HI
	ER20B/10-2010-HI
	ER20B-1760
	ER30B-1810-F
	ER35B-1810
	ER35B-1810-LI

CONTENTS

Chapter 1 Product Information

1.1 Information on nameplate
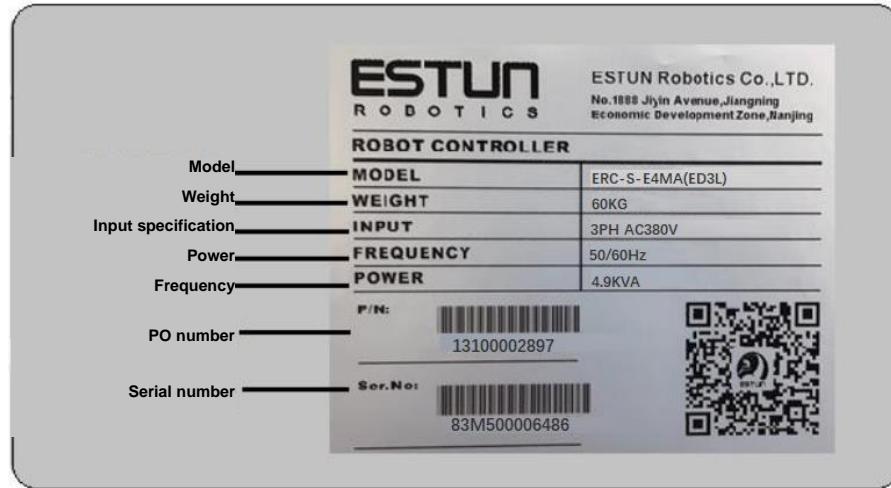
Figure 1-1 C2E Electrical Cabinet Nameplate Information

1.2 Designation

			Mark	Spec.
			S	Low-load drive
			M	Medium-load drive
			L	Heavy-load drive

Mark
A
B
...

Compact electrical cabinet
C1: ER3~50KG-SR
C2: ER8~20KG-MI
C3: ER8~35KG
Standard electrical cabinet
S1: ER8~35KG
S2: ER45~220KG
S3: ER350~60KG

Figure 1-2 Designation
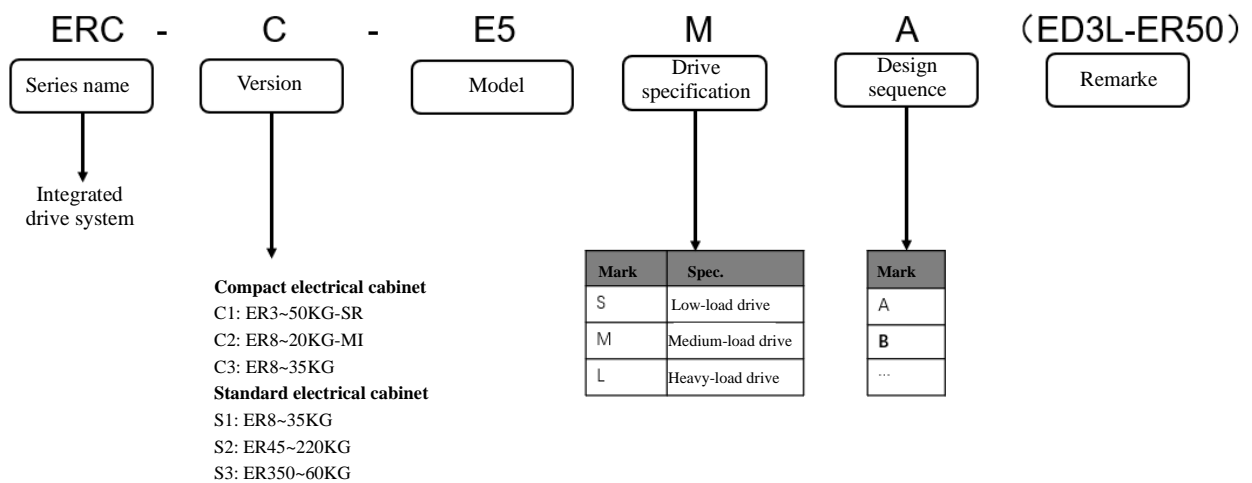
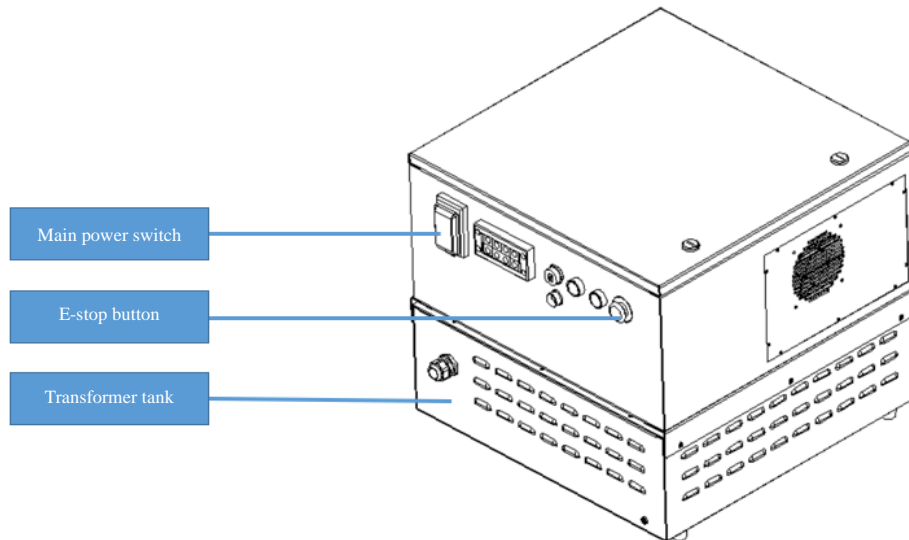## 1.3 Components

Description of appearance

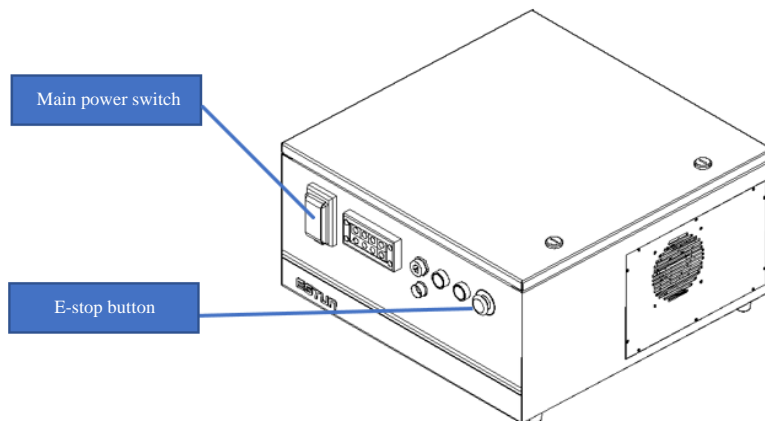Figure 1-3 Description of appearance (ER20-1780, ER20-1780-F, ER20-1780-HI, ER20/10-2000-HI, ER30-1880, ER35-1880-LI)

Figure 1-4 Description of appearance (ER20B-1760-HI, ER20B/10-2010-HI, ER20B-1760, ER30B-1810-F, ER35B-1810, ER35B-1810-LI)

Internal structure

NOTE   Inside the control cabinet, multi-core cables should be used for wiring. Avoid leaving excessively long wiring and check for any cable entanglement.
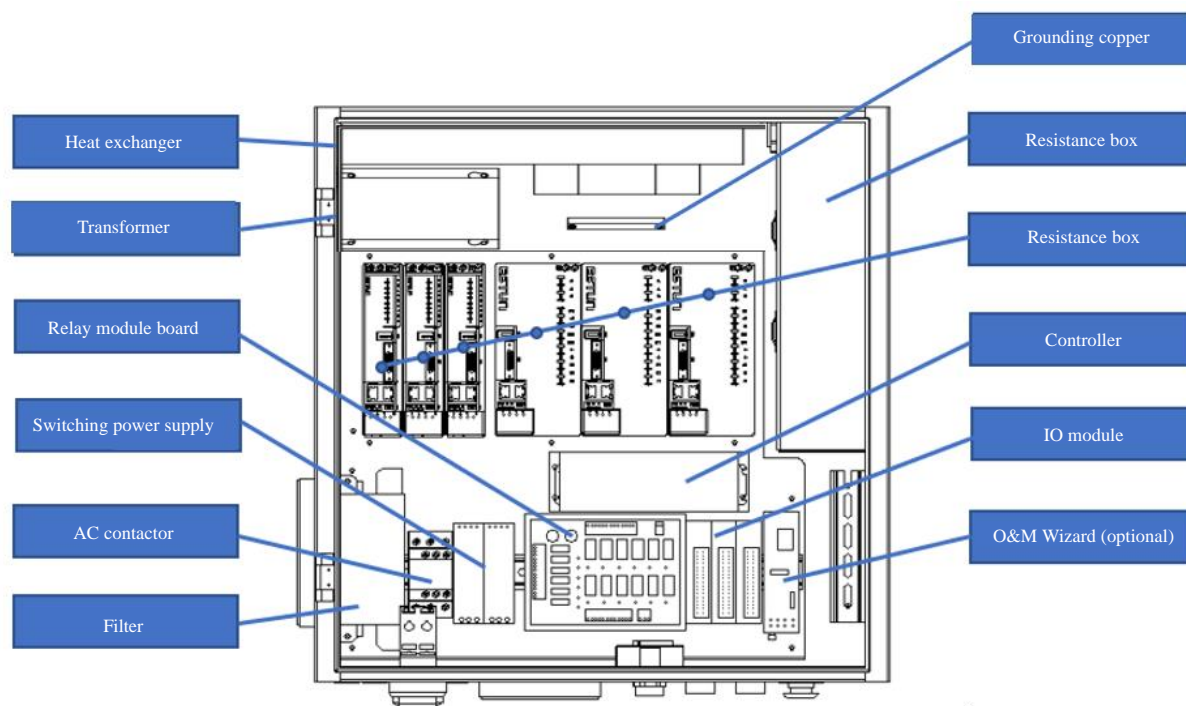
Heat exchanger

Transformer

Relay module board

Switching power supply

AC contactor

Filter

Grounding copper

Resistance box

Resistance box

Controller

IO module

O&M Wizard (optional)

Figure 1-5 Internal structure

External interface

Through-wall plate

LAN interface

Power LED

Fault LED

E-stop switch

Protective cover (power control switch included)

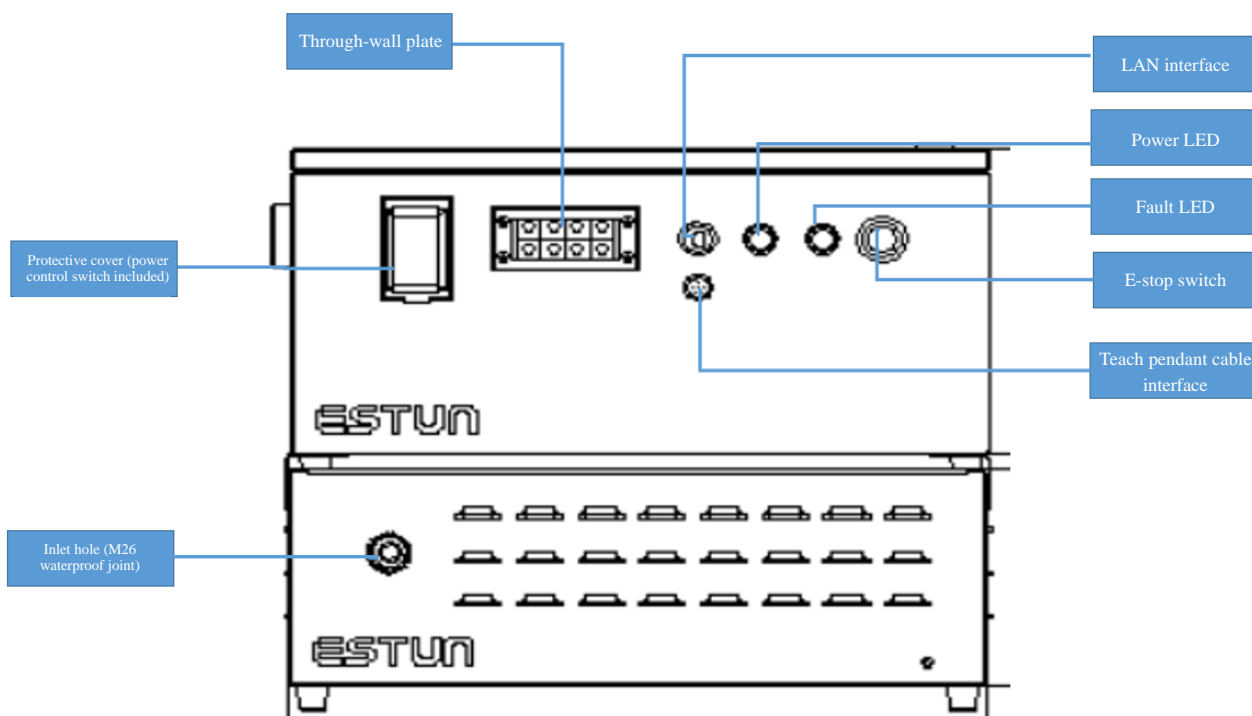Teach pendant cable interface

Inlet hole (M26 waterproof joint)

Figure 1-6 External interface (ER20-1780, ER20-1780-F, ER20-1780-HI, ER20/10-2000-HI, ER30-1880, ER35-1880-LI)
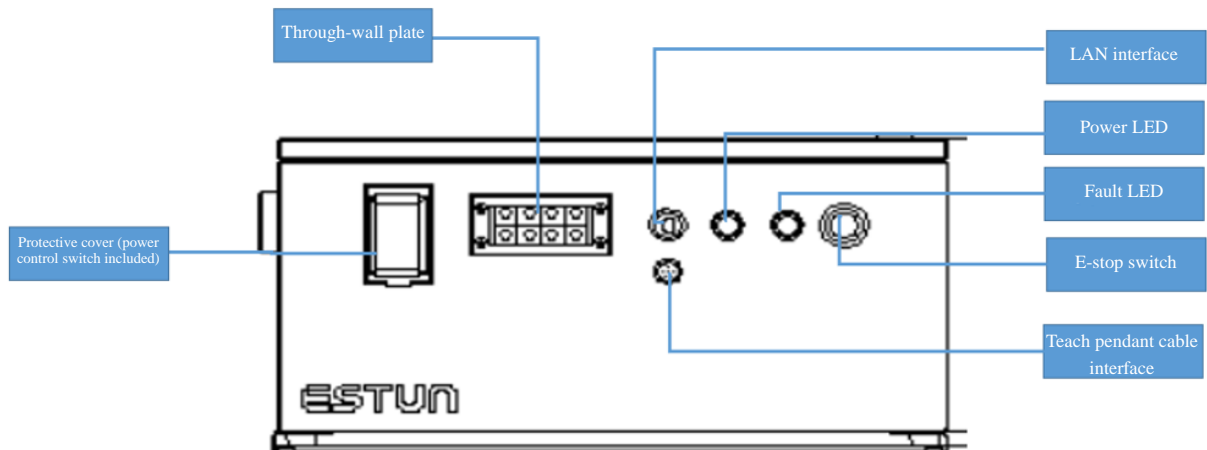
Figure 1-7 External interfaces (ER20B-1760-HI, ER20B/10-2010-HI, ER20B-1760, ER30B-1810-F, ER35B-1810, ER35B-1810-LI)

1.4 Basic parameters

Table 0-1 Basic parameters list of control cabinet

Model	Dimensions(mm) (L*W*H)	Self-weight (kg)	Rated power (kW)	Reference energy consumption (Kw/h)	Applicable model
C3E stacked	570*570*520	60	4.9	1.14	ER20-1780
				1.25	ER20-1780-F
				1.61	ER20-1780-HI
				1.3	ER20/10-2000-HI
				1.33	ER30-1880
				1.12	ER35-1880-LI
C3E integrated	600*660*280	60	3	1.09	ER20B-1760-HI
				1.3	ER20B/10-2010-HI
				1.17	ER20B-1760
				0.91	ER30B-1810-F
				1.34	ER35B-1810
				1.34	ER35B-1810-LI

Table 0-2 Control cabinet installation parameters

Control cabinet installation environment	Ventilated, not airtight
Minimum installation range	600*660*280 (mm, L*W*H)
Ambient working temperature	Temperature: 0°~45°C Humidity: 20%~80%RH
Communication interface with peripherals	Standard: EtherCAT , Modbus TCP , TCP/IP; Optional: Profinet, Profibus, CCLINK, EtherNet IP
Total cable length to robot	Standard: 5m Options: 10m, 20m, 15m, 10m (flexible), 15m (flexible), 20 (flexible)
Space for cables to the robot base	Non-flexible cables: ≥800mm

	Flexible cables: ≥300mmm
To robot base heavy duty connector plug size	120*45*75.5 (mm, L*W*H)
Power cable bending radius	Non-flexible cables: ≥690mmm
	Flexible cables: ≥200mmm
Encoder cable bending radius	Non-flexible cables: ≥400mmm
	Flexible cables: ≥200mmm
IO cable bending radius	Non-flexible cables: ≥260mmm
	Flexible cables: ≥130mmm
Noise level	50-75dB

Table 0-3 Control cabinet specifications

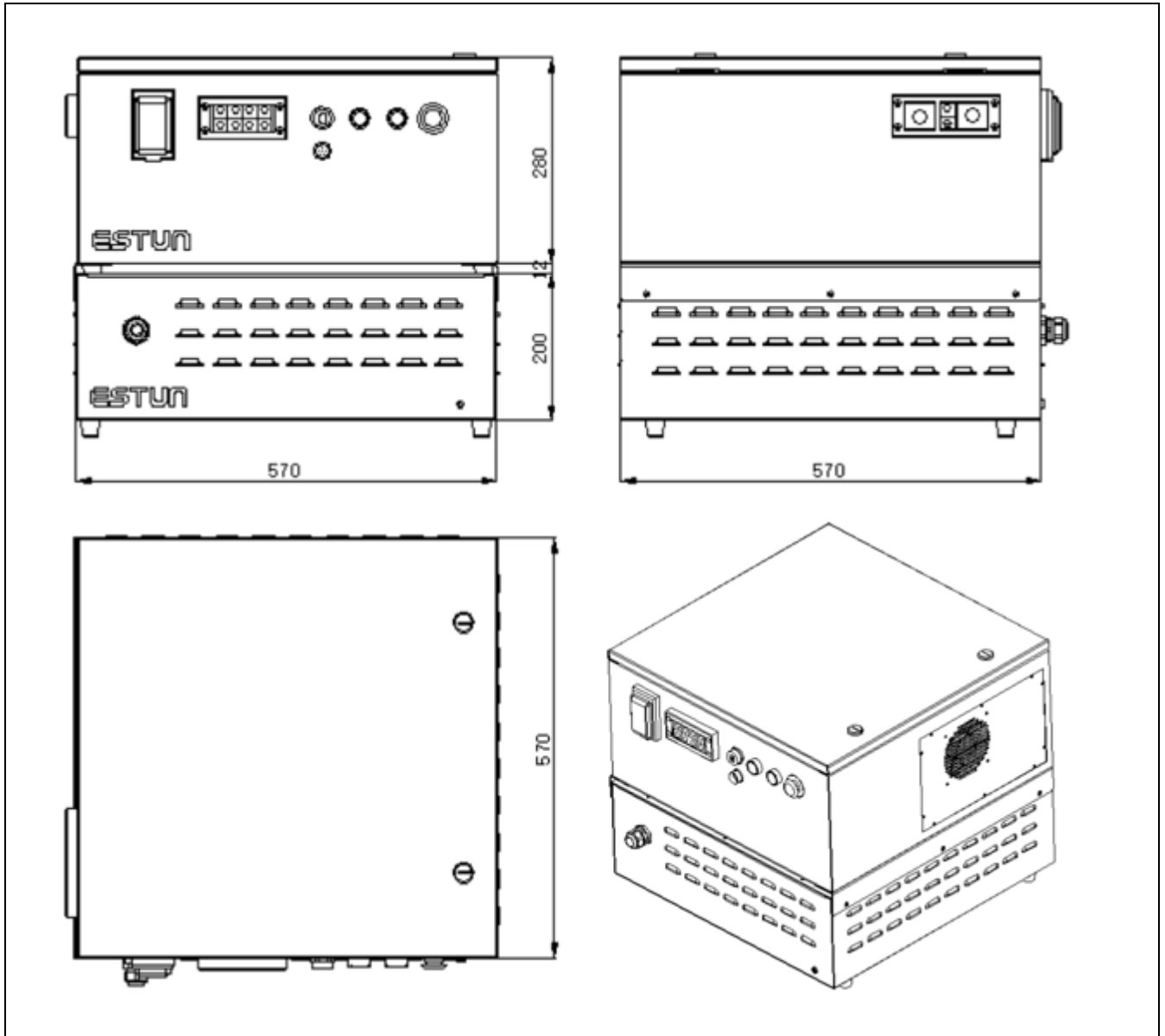| Item	Spec.
Mains power supply for electrical cabinet (introduction mode 1)	Three-phase AC 380V-400V, 50/60Hz
Number of control axes	4~6
Storage environment	Temperature: -25℃~55℃ Humidity: Below 95%RH (no condensation, no freezing)
Insulation resistance	100mΩor more
Vibration strength	4.9m/s²
Shock resistance	19.6m/s²
Altitude	Below 1,000m
EMC test standards	IEC 61800-3:2017
IP grade	IP54

1.5 Overall dimensions

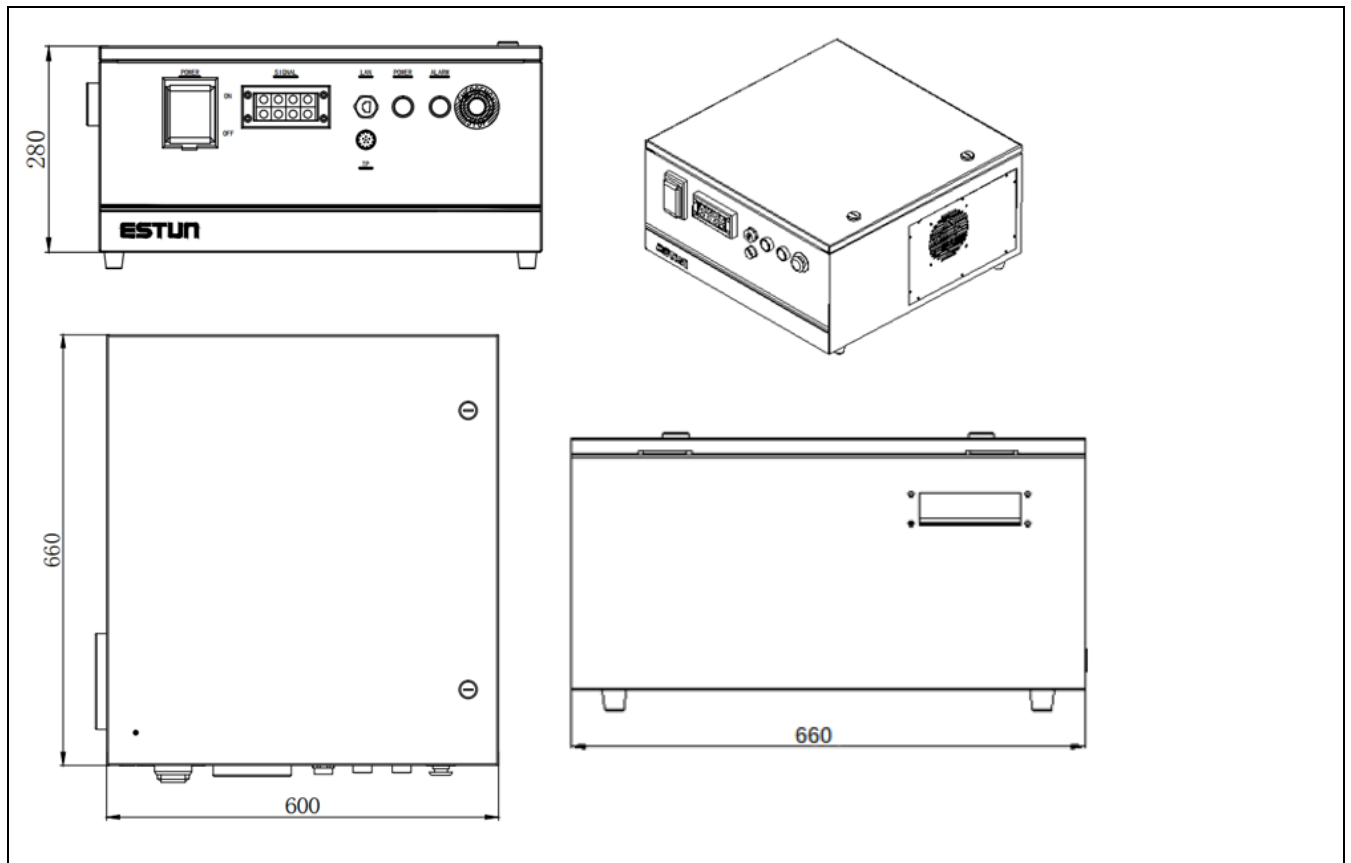Figure 1-8 Product Dimensions (ER20-1780, ER20-1780-F, ER20-1780-HI, ER20/10-2000-HI, ER30-1880, ER35-1880-LI)

Figure 1-9 Product Dimensions (ER20B-1760-HI, ER20B/10-2010-HI, ER20B-1760, ER30B-1810-F, ER35B-1810, ER35B-1810-LI)

Chapter 2 Transportation & Installation

2.1 Transportation

1. Handle horizontal control cabinets on pallets during transportation.

2. During transportation, avoid vibration, dropping, or impacting the control cabinet. Excessive vibration or impact can have harmful effects on its performance. Moisture protection measures should also be taken.

2.2 Installation

2.2.1 Installation guidelines

Environmental requirements:

- The operating environment temperature should be between 0°C and 45°C. During transportation and maintenance, the temperature range should be -25°C to 55°C.

- The relative humidity should not exceed 95%RH, and there should be no condensation.

- The installation site should have minimal dust, powder, oil fumes, and water.

- Flammable substances, corrosive liquids, and gases are not allowed in the operating area.

- The control cabinet should be installed in a low vibration or low impact energy environment (vibration below 0.5G).

- There should be no nearby electrical interference sources (e.g. gas shielded welding TIG equipment).

- There should be no potential hazards of collision with moving equipment (e.g. forklifts).

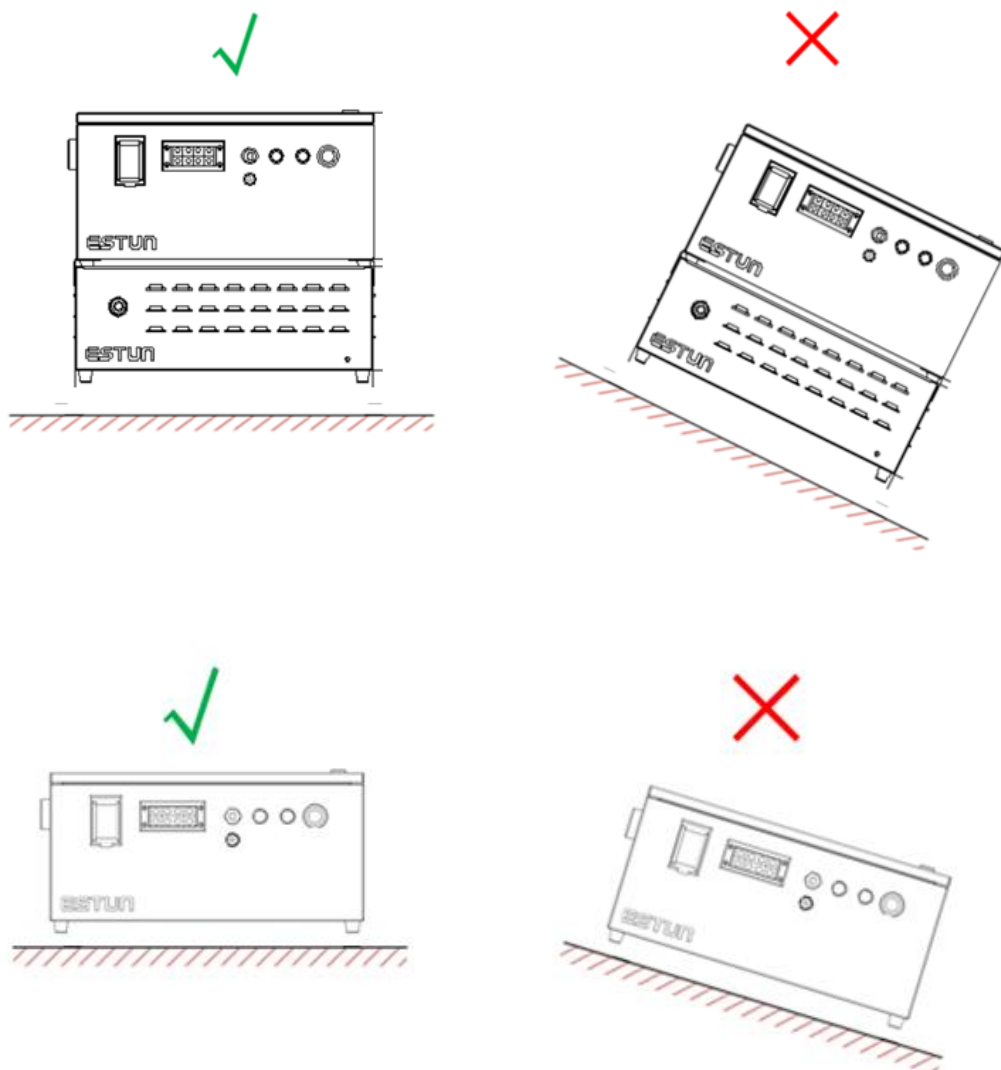- There should be no ion or non-ion interference.

Instructions for users:

Please refer to the Instructions for Users and standardize your work.
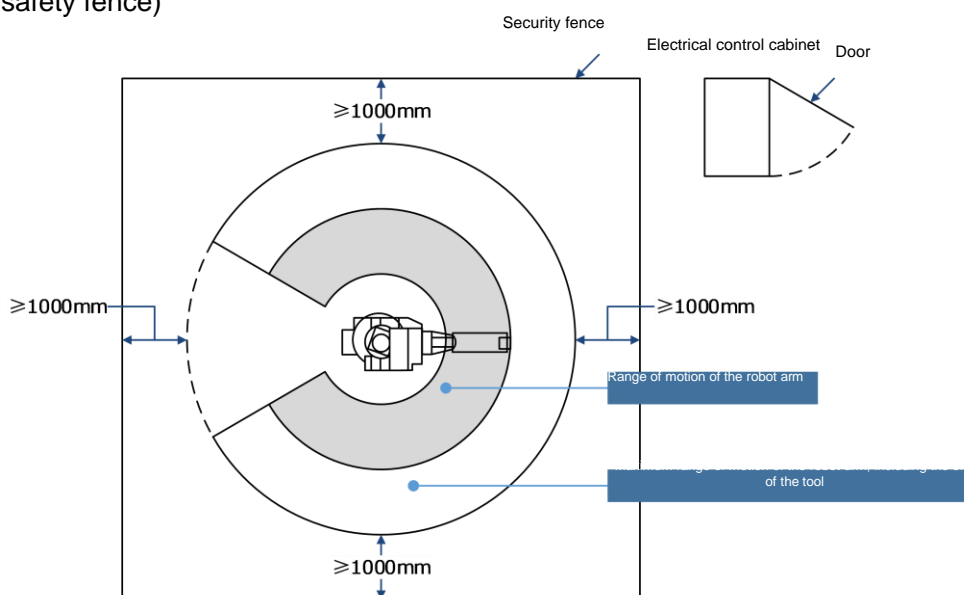
2.2.2 Installation mode

The standard installation scenario requires a stable surface. The surface must be flat and must not be inclined.

2.2.3 Installation location

- The control cabinet should be installed outside the range of robot movement (within a safety fence)

- The control cabinet should be installed in a position where the robot's actions can be clearly observed.

- The control cabinet should be installed in a location that allows easy access for door inspection, with a minimum distance of 500 mm from front and rear walls to maintain clear maintenance pathways.

- There should be a distance of at least 200 mm on both sides of the control cabinet to ensure proper airflow.

- The control cabinet should be installed at a height between 0.6 meters and 1.7 meters from the ground

Chapter 3 Wiring & Connection

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<tr>
<td rowspan="1">⚠️ WARNING</td>
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- The system must be electrically grounded to avoid fire, electric shock and bodily injury.
- Turn off the main power switch prior to wiring and inspection to avoid electric shock and bodily injury.
- Be sure to turn off the main power supply for at least 5 minutes prior wiring and inspection. There may be residual high-voltage inside the control cabinet even if power off. Therefore, never touch the power terminals.
- The main power supply cannot be powered on when the cabinet door is not closed, this is because the safety interlock so mounted would prevent the main power supply from powering on.
- The electric control cabinet is in E-stop mode when wiring, and any matters incurred shall be under the responsibility of users. Operation inspection shall be performed once the wiring is done.
- The robot's electrical cabinet is a dedicated control device designed with power capacity considerations for only a minimal amount of external I/O requirements. Therefore, it is not allowed for users to connect external power sources, including but not limited to additional axes, and definitely not to connect power strips. Doing so may result in fault alarms or even cause a fire in the electrical cabinet.
- Avoid frequently turning the main power on and off for the electrical cabinet, and ensure that the time interval between each power cycle is at least 1 minute.

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<td rowspan="1">⚠️ Caution</td>
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- Perform the wiring or inspection only by professional technicians.
- Perform the wiring according to the rated capacity provided in the Manual.
- Make sure that all circuit connections are securely fixed.
- Do not touch the circuit boards directly with your hands.
- Integrated circuit boards may experience malfunctions due to electrostatic discharge.
- The robot's electrical cabinet should not be opened or accessed by users.
- If the customer's power supply is unstable, it is recommended for the customer to purchase additional equipment such as an UPS and connect it to the robot. This will protect the controller and ensure stable operation, avoiding the loss of system files.

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</table>

3.1 Precautions for cable connection

- LV cables shall be used to connect between control cabinet and peripheral equipment.
- The signal cables of the control cabinet shall be laid in a distance far away from the main power supply circuit, while the HV power supply line shall not be parallel to the signal cables of the control cabinet. Where unavoidable, metal tube or metal slot shall be used to prevent the interference of electric signal. If the cables must be arranged in a cross way, the power cables and signal cables shall be laid in a perpendicular way.
- Confirm the socket and cable number to prevent equipment damage arising from incorrect connection.
- All non-workers shall be evacuated from the site when connecting cables. Be sure to put all cables in underground cable trench with cover.

Piping　　Wiring duct　　Wiring
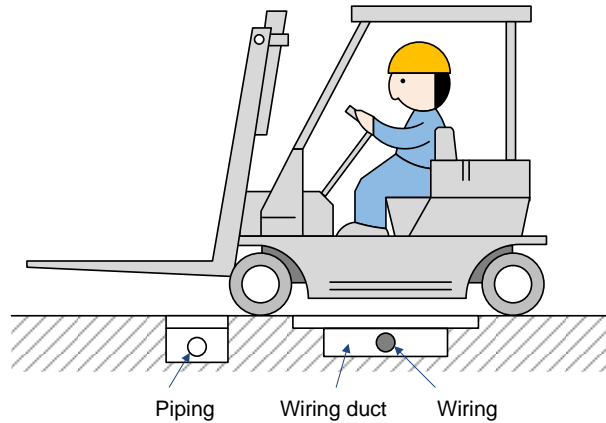
● The wiring and routing of encoder cables must be separated from power cables. If they are placed in the same cable conduit, isolators must be used to keep them separated.
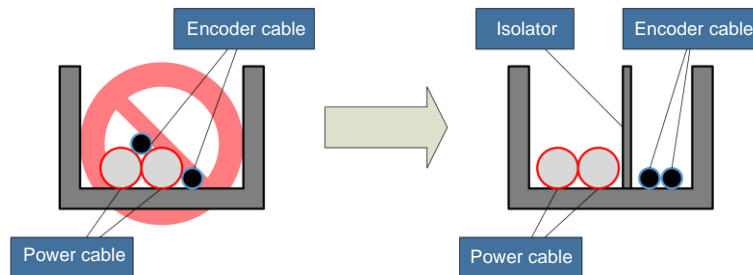
3.2 Residual-current circuit breaker

The power supply of the robot control device may have high-frequency leakage currents, which can sometimes cause the unintended operation of the residual current devices or residual current protection relays installed on the upper-level robot control device.

When selecting a leakage protector, the following conditions should be met to avoid unintended operation:

1. The leakage protector should be a Type B residual current device;

2. The sensitivity current of the leakage protector should be ≥300mA.
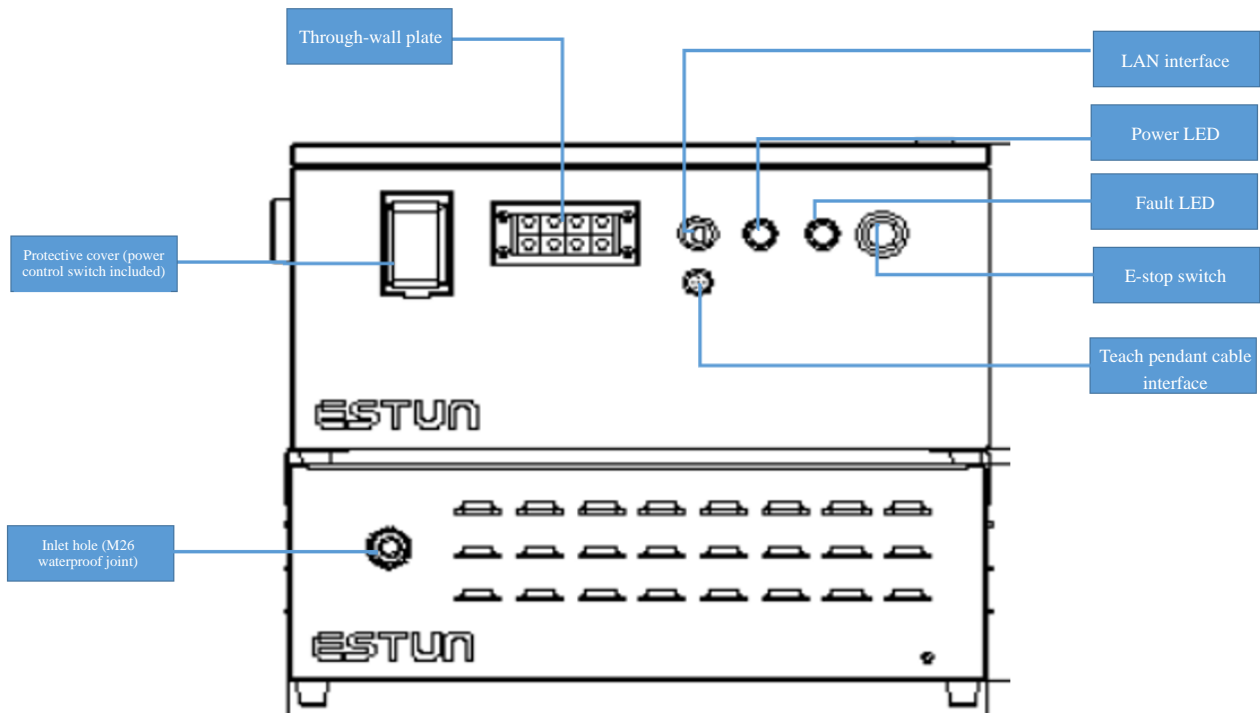
3.3 External interface definition

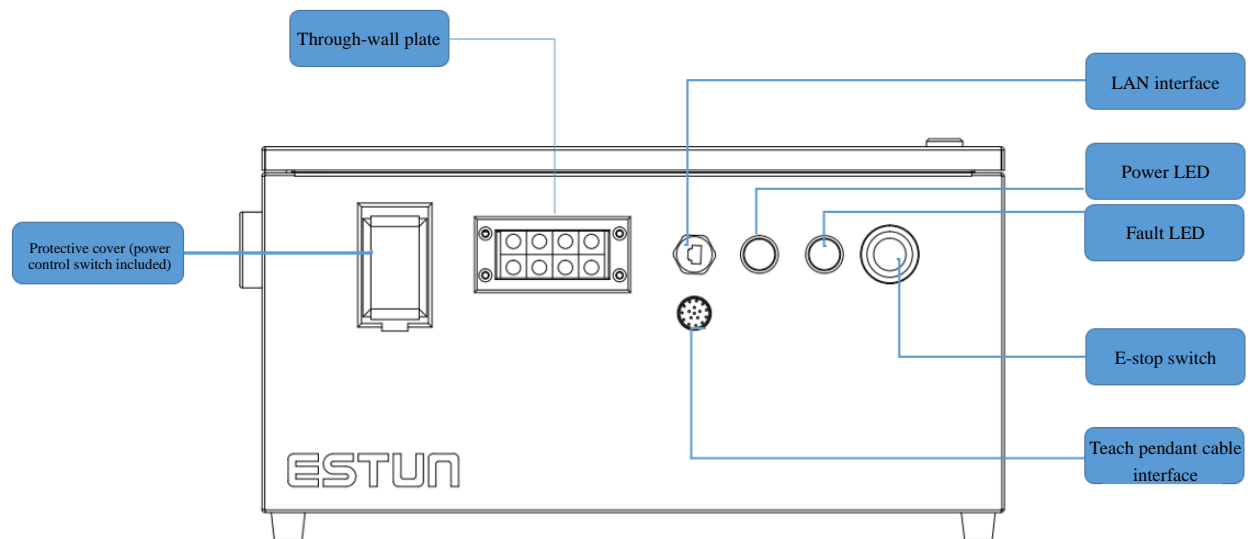Figure 3-1 External interface (ER20-1780, ER20-1780-F, ER20-1780-HI, ER20/10-2000-HI, ER30-1880, ER35-1880-LI)

Figure 3-2 External interface (ER20B-1760-HI, ER20B/10-2010-HI, ER20B-1760, ER30B-1810-F, ER35B-1810, ER35B-1810-LI)

S/N	Name	Description
1	Mains power cable	-
2	IO cable interface	Undefined input and output signal interfaces (24-pin)
3	RJ45 interface	Communication interface to the vision module

S/N	Name	Description
4	Encoder cable	Motor encoder cable interface for each axis of the robot to collect the robot position signal and connect to the robot body using a special cable.
5	Demonstrator cable interface	Cable interface for the robot teach pendant.
6	Through-wall plate	—
7	Reserved interface for heavy-duty connectors	—
8	IO cable interface	**IO modules are optional for the user.** System interface: 9DI/8DO; System interface: 16DI/16DO, user interface: 7DI/8DO; System interface: 32DI/32DO, user interface: 23DI/24DO; System interface: 48DI/48DO, user interface: 39DI/40DO.

3.4 Power supply wiring

Description

The control cabinet uses a three-phase AC 380V-400V power supply. Please follow the diagram below to create the power cable and connect it correctly. When wiring, please note:

Three phases: L1, L2, L3, PE (There is a transformer inside the cabinet, or an external transformer box is provided simultaneously)

Diagram	Pin	Description
	L1	Three-phase power wiring
	L2	
	L3	
	PE	Protective earth

ESTUN does not provide the control cabinet input power cable. Users should either self-wire or purchase from ESTUN (ER12 to ER35 models currently come standard with input power cables). When users select cables, they must comply with the relevant safety regulations. Below are the recommended cable specifications (varying by control cabinet model).

Model	Wire Gauge		Rated Current (A)
	AWG	Cross-sectional Area (mm²)	
ERC-C3-□□S□(ED3L)	13	4	10.4

Electrical principle

The three-phase AC power is filtered by a filter, then the transformer converts the three-phase AC 380V voltage to three-phase AC 200V (for electric control cabinets using 200V power supply for servo drives). In case of temporary power frequency interruption, voltage drop, or drive unit alarm, the servo power will be cut off, and a power-off action will be triggered.
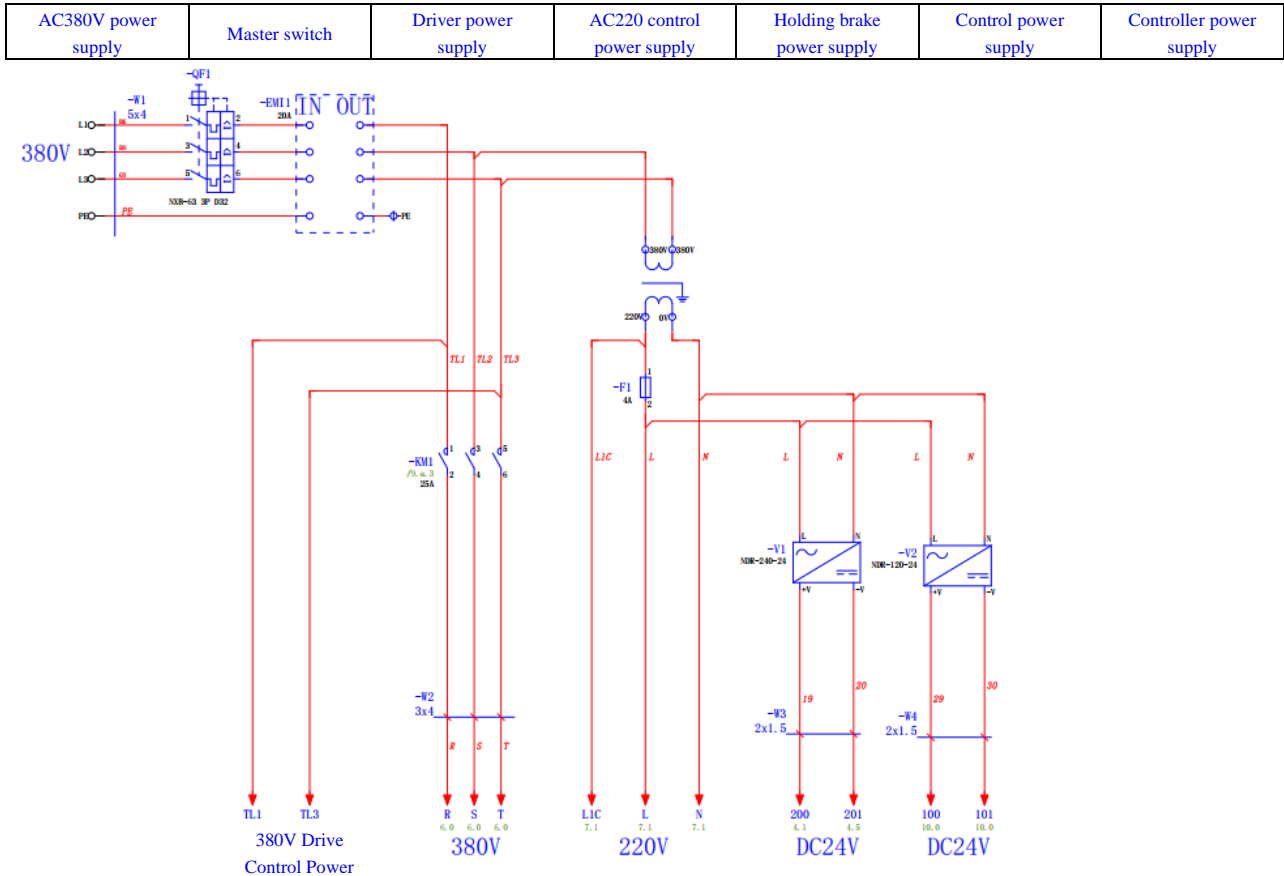
Power distribution

AC380V power supply	Master switch	Driver power supply	AC220 control power supply	Holding brake power supply	Control power supply	Controller power supply

Figure 3-3 Three-phase Power Distribution

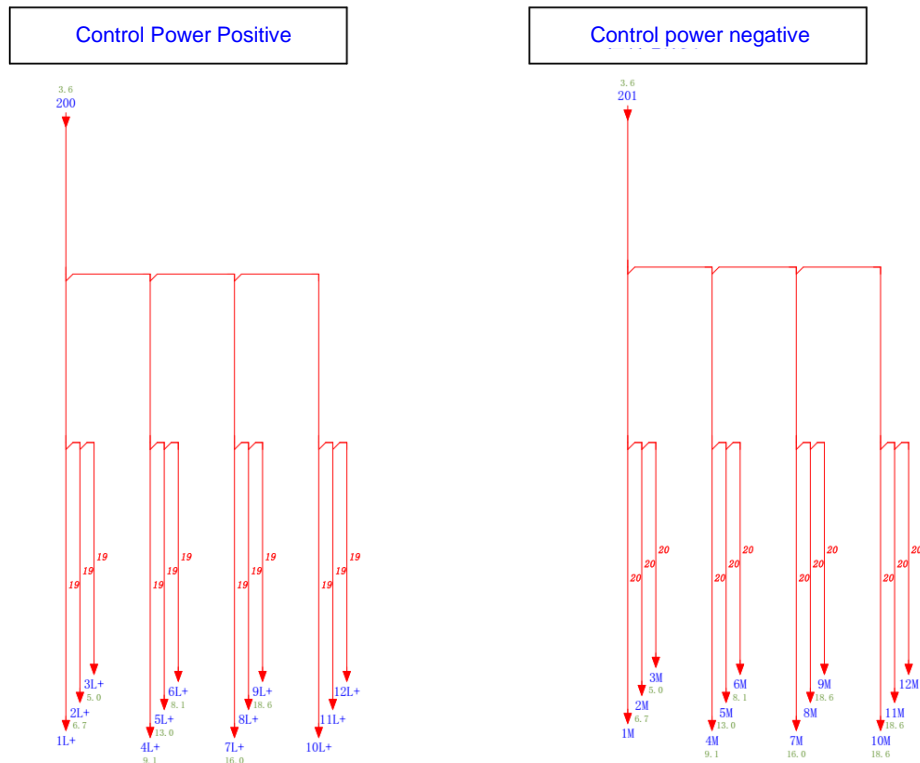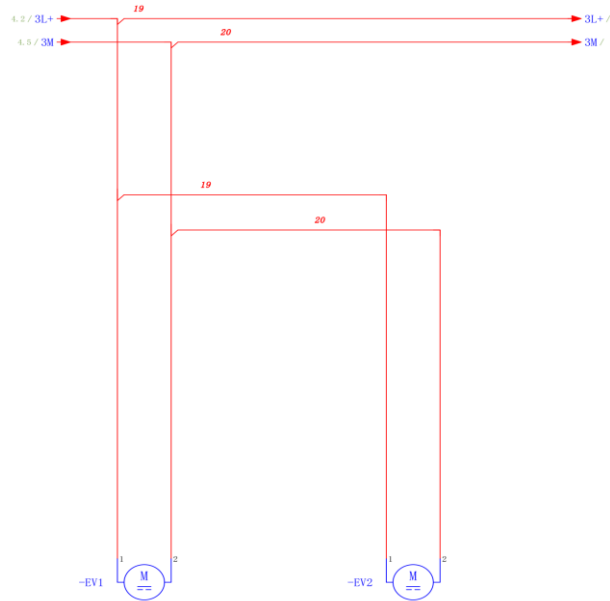## Control power supply 24V

Control Power Positive	Control power negative

Figure 3-4 Control power supply 24V

Cooling fan

EV1~EV2 DC fans
Attention! The fan blows towards the heat sink!

Figure 3-5 Cooling fan

DC 24V control loop

Servo power-on LED	Servo main power control	Servo alarm circuit	Availability of E-stop teach pendant	E-stop circuit

If an external serial-in E-stop is required, remove the brake wire from the terminal
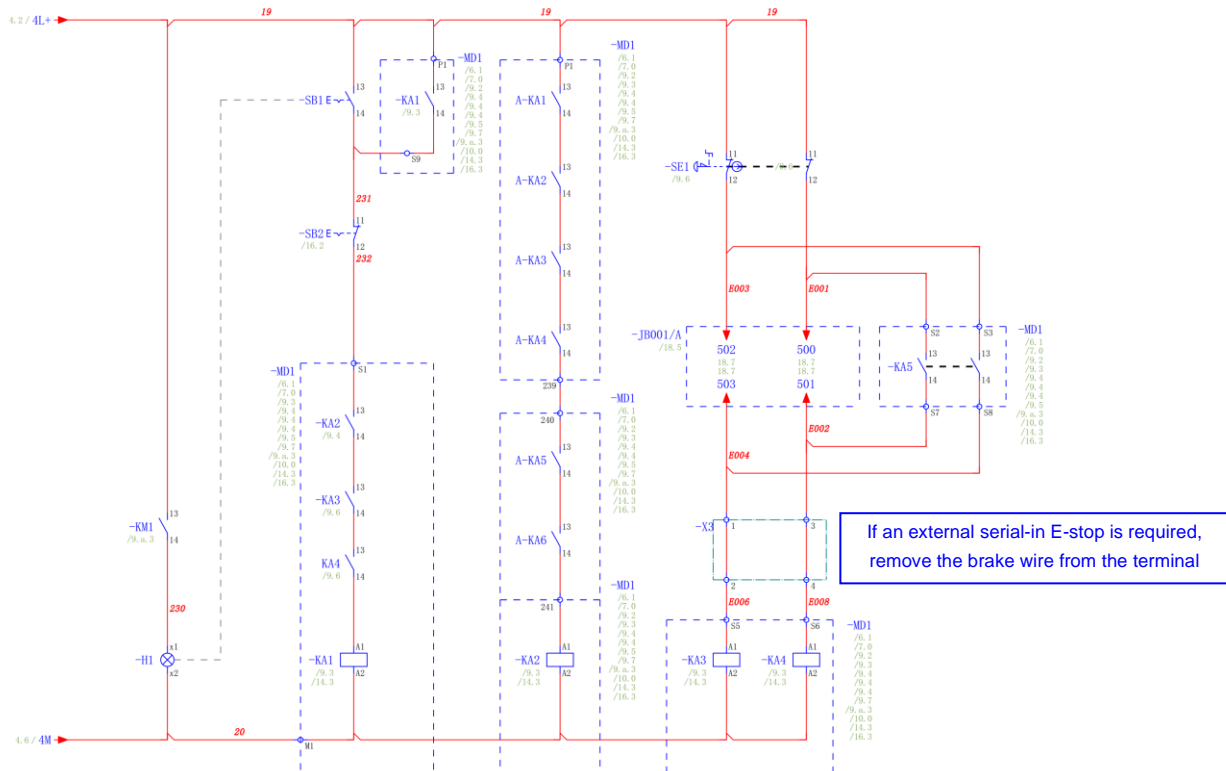
Figure 3-6 DC 24V control loop

AC 220V control loop

Servo main contactor control
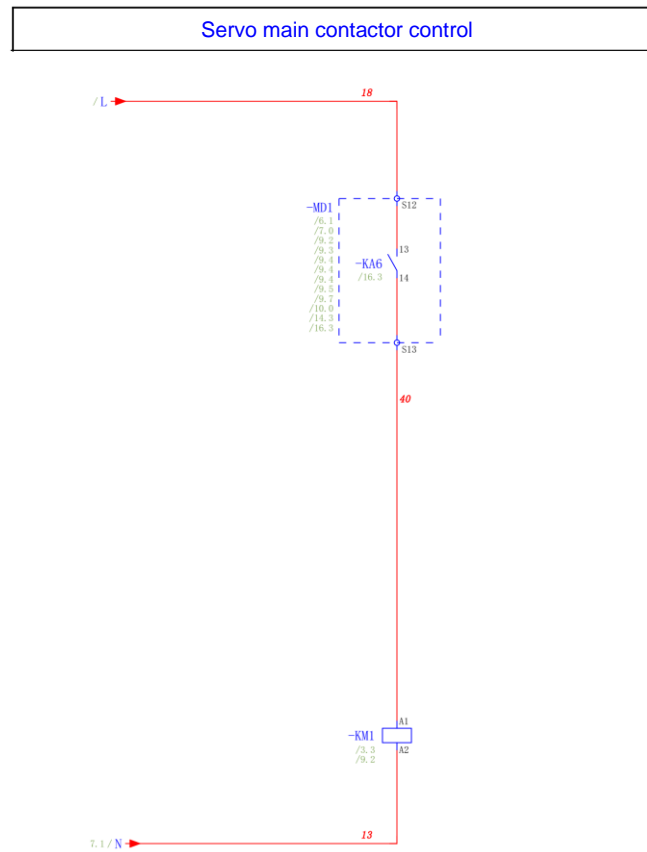
Figure 3-7 AC220V control loop

Motor brake
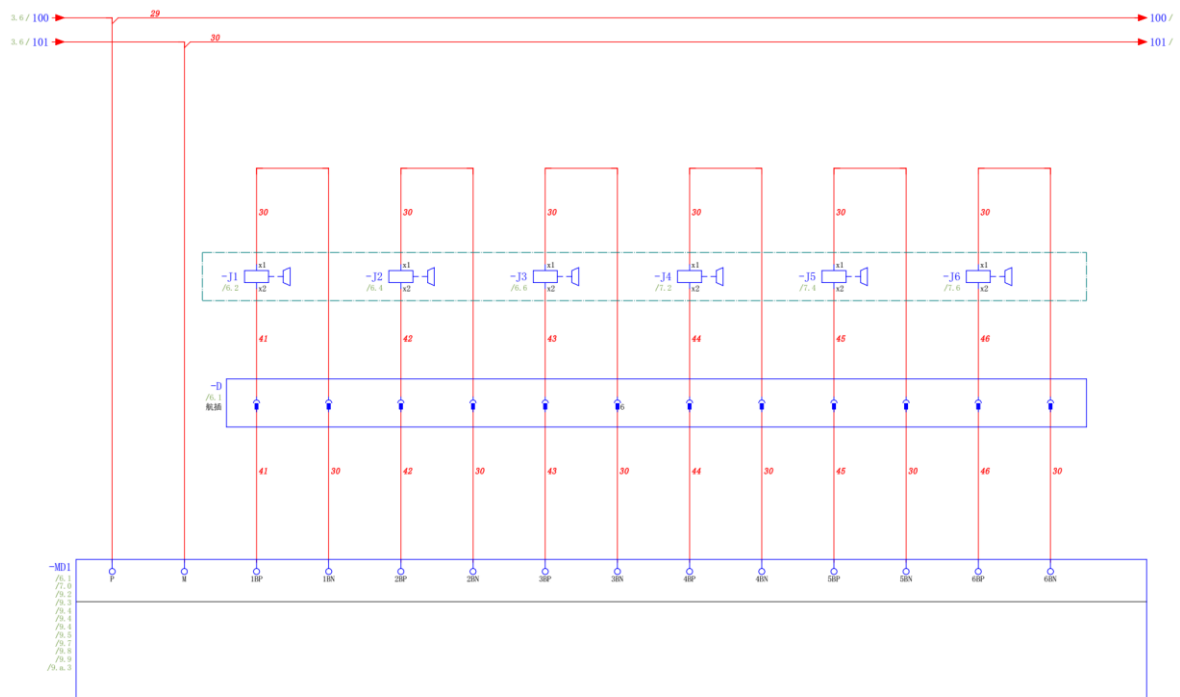
Figure 3-8 Motor brake

3.5 Teach pendant

3.5.1 Precautions for using teach pendant

1. Handle with care and avoid dropping, throwing, or striking the teach pendant, as this may cause damage or malfunction. When not in use, hang it on the dedicated holder to prevent accidental dropping (our internal drop test result is satisfactory at a height of 1 meter);
2. Do not use sharp objects such as screws, knives, or pen tips to operate the touch screen. This may damage the touch screen. Use your fingers or a stylus pen to operate the touch screen;
3. When no USB devices are connected, make sure to cover the USB ports with protective caps to avoid exposing them to dust, which could cause interruptions or failures;
4. When using USB plugs, do not apply excessive force. Normal use is sufficient;
5. If the USB is not recognized, unplug the USB drive, power off, and then plug it back in after powering on;
6. When using the E-stop button or key, do not apply excessive force. Normal use is sufficient;
7. The power-on time is 40 seconds for the system to start up properly. Do not power off prematurely to avoid file loss;
8. When storing cables, do not place them under heavy machinery to avoid crushing, cutting, or pulling them apart;
9. Follow our defined wiring guidelines to avoid connection errors and potential issues;
10. The teach pendant is not explosion-proof. Do not use it in explosive environments or work units;
11. Keep the teach pendant away from water, oil, and similar environments;
12. The new T76 teach pendant can be used with all models, while the old one is only compatible with PNP module control cabinets.
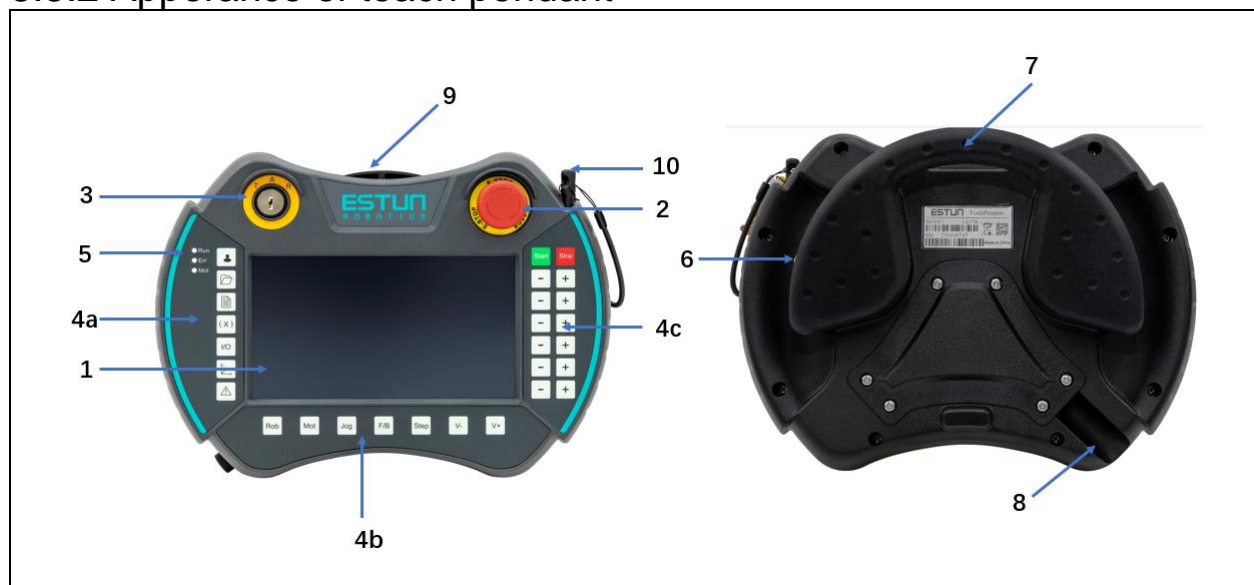
3.5.2 Apperance of teach pendant

Figure 3.9 Exterior of the Teach Pendant

S/N	Description
1	Display
2	E-stop button
3	Mode selector switch
4a, 4b, 4c	Global function buttons
5	Status LED
6	Servo enable switch
7	Suspension handle
8	Cable access area

S/N	Description
9	USB slot
10	Stylus pen

Name	Description
Processor	335X basic frequency 800mHZ, DDRⅢ 512M
Memory/Storage	NANDflash 512M
LCD screen	TFT 7 Inch 800*480
Touchscreen	4-wire resistive screen
Operating system	Linux
External USB	2.0*1
Indicator lights	Indicator LEDs: 3 pcs
Communication	ETHERNET (100M)
Accessories	Emergency stop; key switch; enable switch (3 digits)
Display color quality	16-bit color
Power consumption	24V 1A
Compatible power supply models	DC24V1A and above
Housing material, color	ABS/PC; BLACK/GRAY
Operating environment	Operating temperature: 0°C to 45°C
Storage temperature	-20°C to 70°C

3.5.3 Teach pendant interface definition
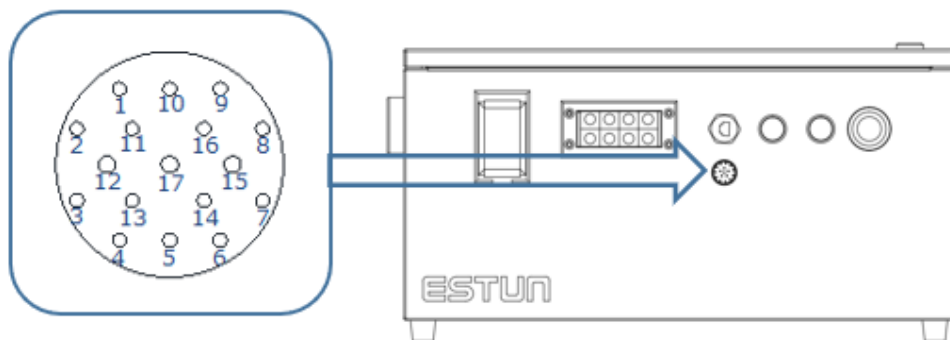
Pin	Definition	Description	Pin	Definition	Description
1	+24V	24V power supply	10	—	Reserved
2	GND	Power ground	11	—	Reserved
3	ES1+	E-stop 1+	12	ED2+	Teach pendant enable 2+
4	ES1-	E-stop 1-	13	TD+	Teach pendant EtherNet transfer data+

Pin	Definition	Description	Pin	Definition	Description
5	ES2+	E-stop 2+	14	TD-	Teach pendant EtherNet transmit data-
6	ES2-	E-stop 2-	15	RD+	Teach pendant EtherNet receive data+
7	ED1+	Teach pendant enable 1+	16	RD-	Teach pendant EtherNet receive data-
8	ED1-	Teach pendant enable 1+	17	ED2-	Teach pendant enable 2-
9	—	Reserved	—	—	—

3.5.4 Teach pendant connection

This product can be equipped with a teach pendant for robot teaching and programming. The connection is illustrated as shown in the figure below. For detailed operation of the teach pendant, please refer to the programming manual of the teach pendant.
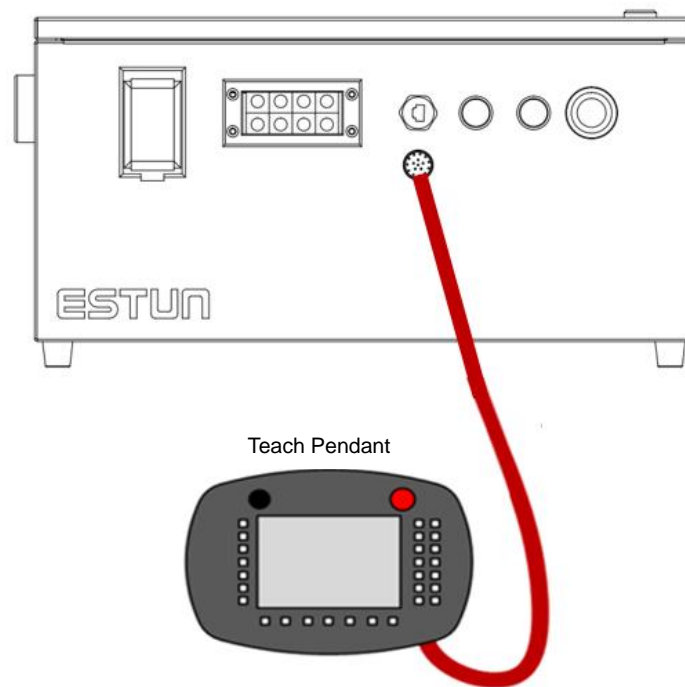
Teach Pendant

3.5.5 Electrical principle
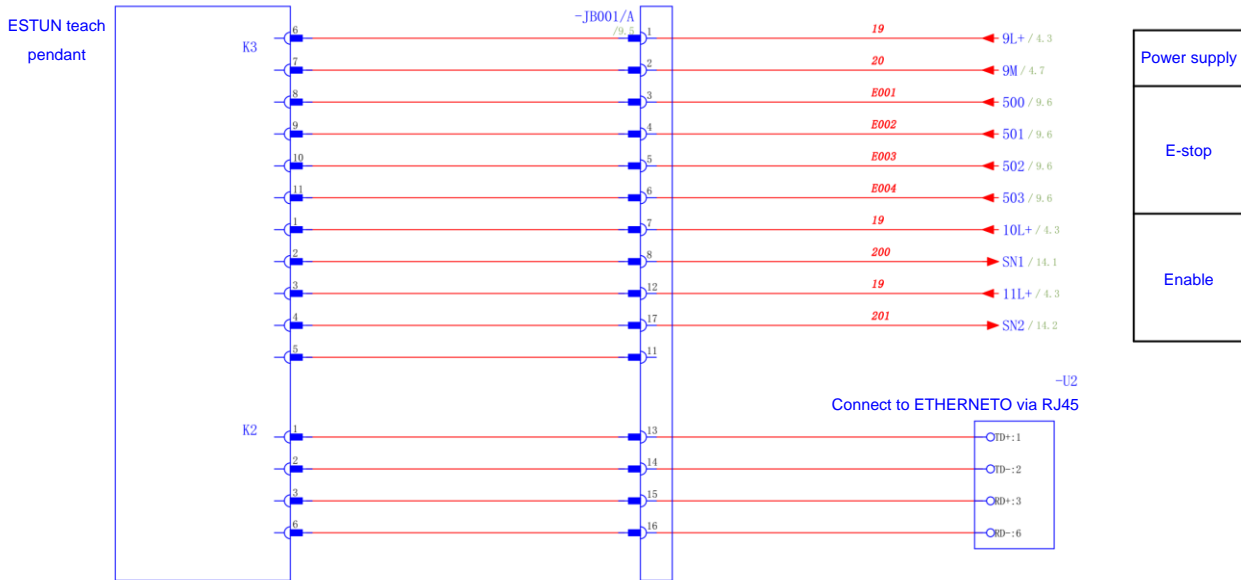
Figure 3-10 Teach pendant wiring

3.6 IO wiring

3.6.1 IO wiring

IO Interface definition
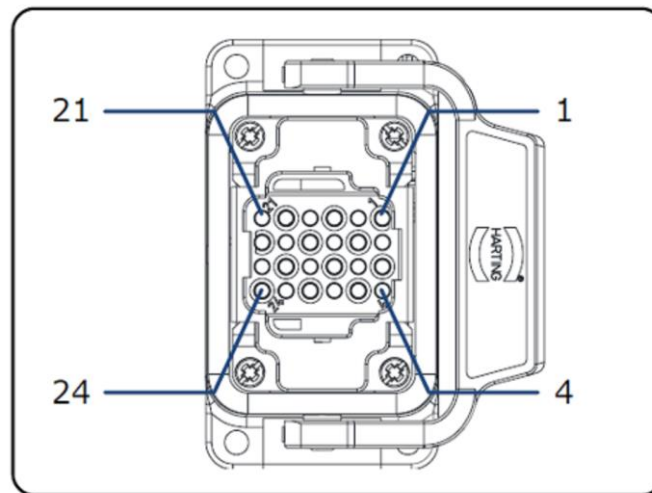
Pin	Definition	Pin	Definition
1	L01	13	L13
2	L02	14	L14
3	L03	15	L15
4	L04	16	L16
5	L05	17	L17
6	L06	18	L18

Pin	Definition	Pin	Definition
7	L07	19	L19
8	L08	20	L20
9	L09	21	L21
10	L10	22	L22
11	L11	23	L23
12	L12	24	L24

> **NOTE** Aviation plug on body side

Signal specifications

The technical specifications of the digital input/output expansion module EC4-1616BWE are shown in the table below

Table 3-2 Table of technical parameters EC4-1616BWE

Interface parameters	
Bus protocol	EtherCAT
Number of I/O stations	Depending on the master
Data transmission medium	Ethernet/EtherCAT CAT5 cable
Transmission distance	≤100 m (station-to-station distance)
Transmission rate	100 Mbps
Bus interface	2xRJ45
Technical parameters	
Configuration mode	Via Master
Power supply	18 to 36 VDC
Electrically isolated	500 V
Weight	Approx. 140 g
Dimensions	102 mmx72 mmx25 mm
Operating temperature	-10~+60℃
Storage temperature	-20~+75℃
Relative humidity	95%, non-condensing
IP grade	IP20
Digital input	
Rated voltage	24 VDC (±25%)
Number of signal points	16
Signal type	PNP
"0" signal voltage (PNP)	-3~+3 V
"1" signal voltage (PNP)	15~30 V

Input filtering	3 ms
Input current	4 mA
Isolation method	Optocoupler isolation
Isolation withstand voltage	500 V
Channel indicator	Green LED
Transistor output	
Rated voltage	24 VDC（±25%）
Number of signal points	16
Signal type	PNP
Load type	Resistive load, inductive load
Single-channel rated current	250mA
Port protection	Over-voltage, over-current protection
Isolation method	Optocoupler isolation
Isolation withstand voltage	500 V
Channel indicator	Green LED
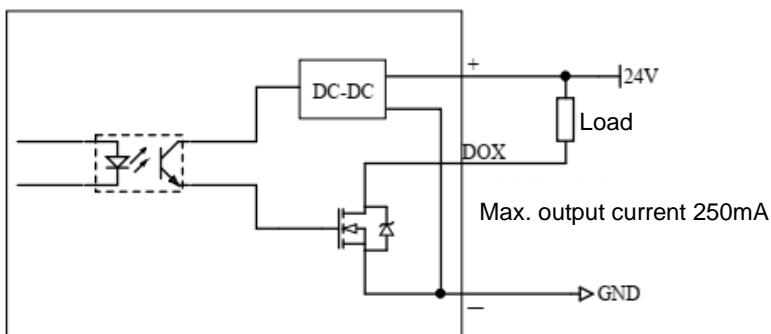
Figure 3-11 DO NPN type wiring diagram
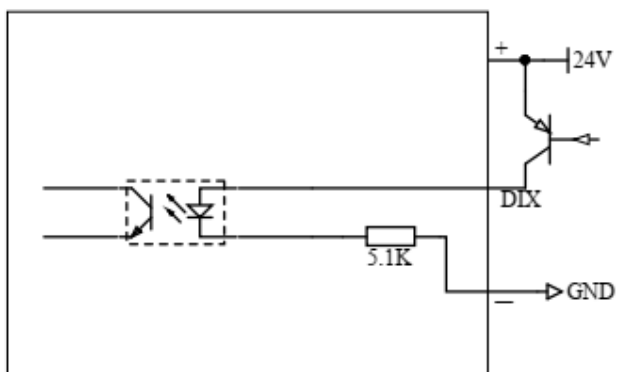
Figure 3-12 DI PNP type wiring diagram

Max. output current 250mA
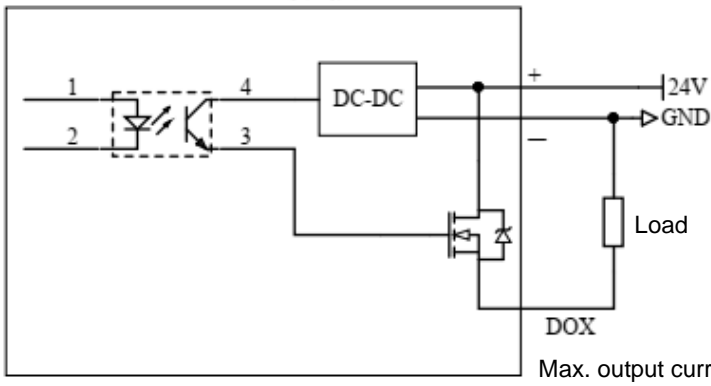
Figure 3-13 DO PNP type wiring diagram
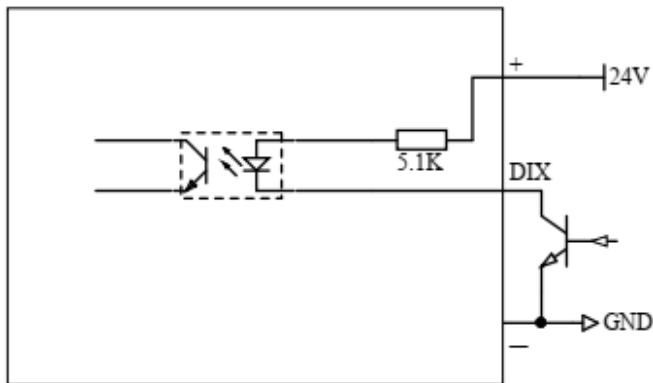
Figure 3-14 DI NPN type wiring diagram

3.6.2 Encoder Interface Definition
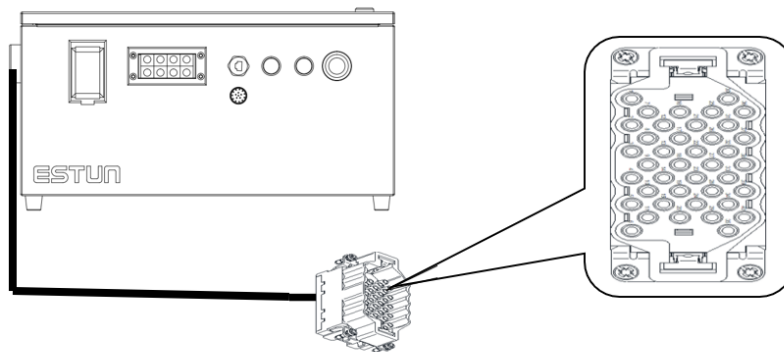
Table 3-1 Encoder

| Pin	Definition	Description	Pin	Definition	Description
1	S1＋		21	S4＋	
2	S1－		22	S4－	
3	—	Wiring of the J1 motor encoder	23	—	Wiring of the J4 motor encoder
4	—		24	—	
5	5V-1		25	5V-4	
6	0V-1		26	0V-4	

Pin	Definition	Description	Pin	Definition	Description
7	S2＋		27	S5＋	
8	S2－		28	S5－	
9	－		29	－	
10	－	Wiring of the J2 motor encoder	30	－	Wiring of the J5 motor encoder
11	－		31	－	
12	5V-2		32	5V-5	
13	0V-2		33	0V-5	
14	S3＋		34	S6＋	
15	S3－		35	S6－	
16	－		36	－	
17	－	Wiring of the J3 motor encoder	37	－	Wiring of the J6 motor encoder
18	5V-3		38	5V-6	
19	0V-3		39	0V-6	
20	－		40	－	

3.7 Controller

The controller is the motion control device of the robot system, which receives instructions from the teach pendant and sends control signals. It is the core component of the system.
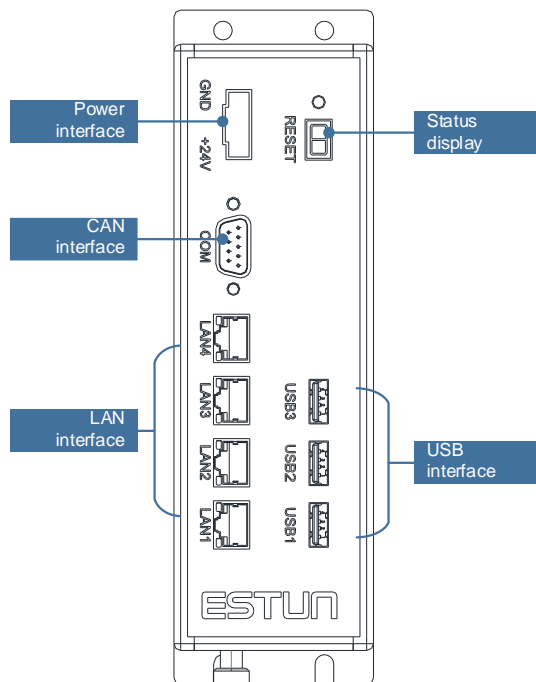
Item	Description
Power supply interface	Connected to switching power supply (DC 24V±10%)

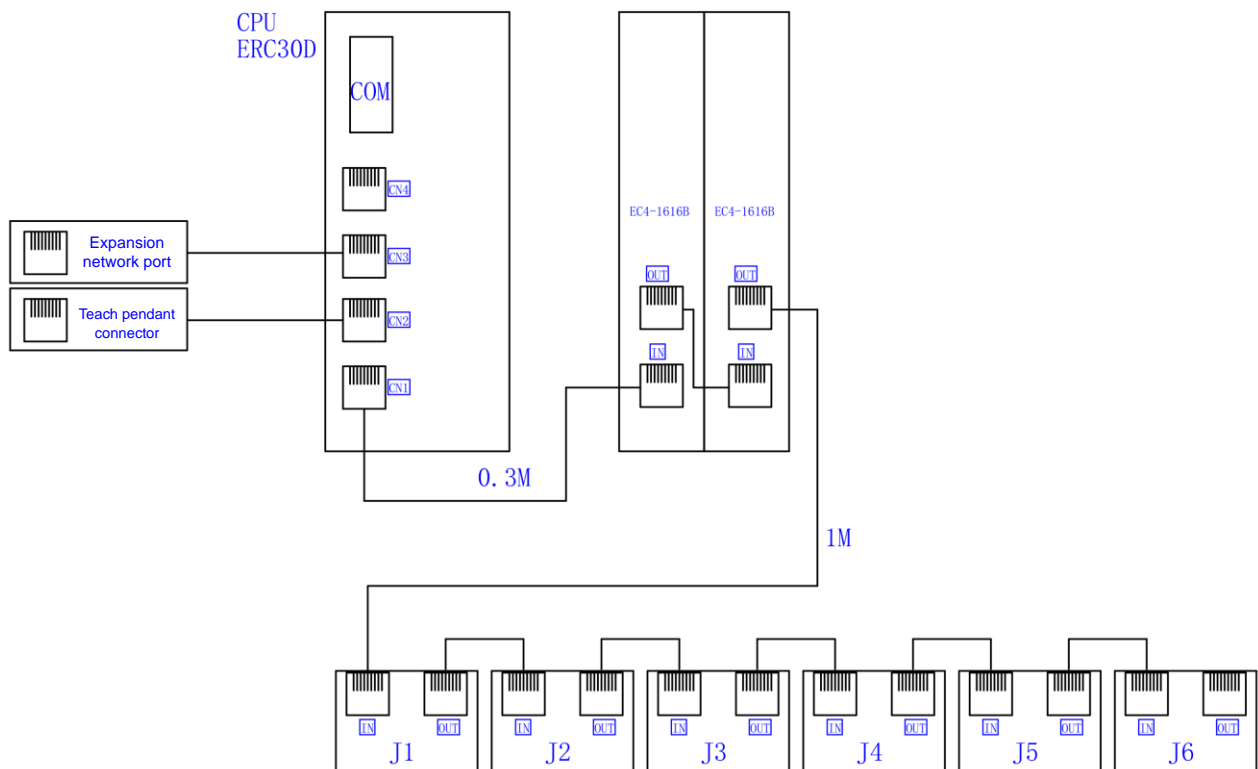| Item	Description
Serial interface	—
LAN interface	Standard RJ45 connectors (3 in total), connected to: ● RJ45 connector of the Teach pendant ● Coupler ● RJ45 connector of the control cabinet
Status display	7-segment LED digital display tube
USB interface	—

Communication connections

Figure 3-15 Communication Connection Diagram
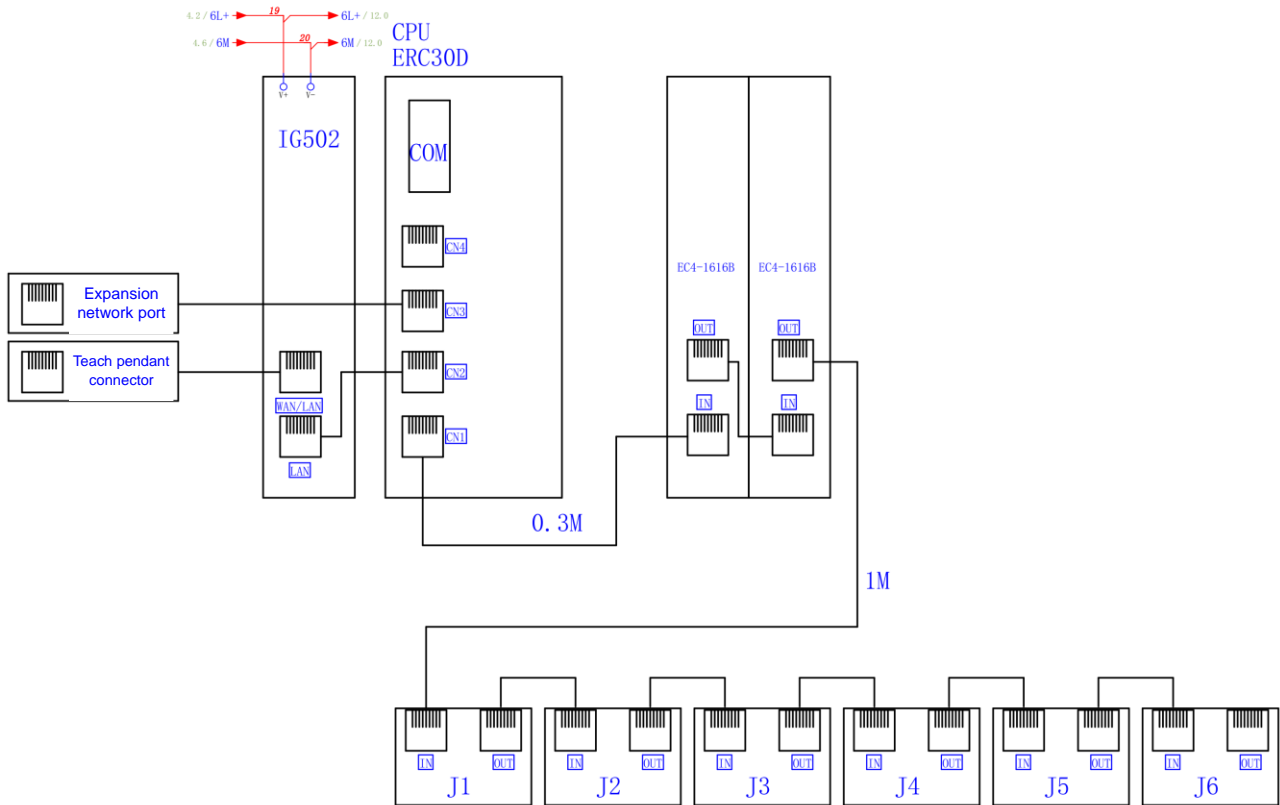
Optional O&M Wizard
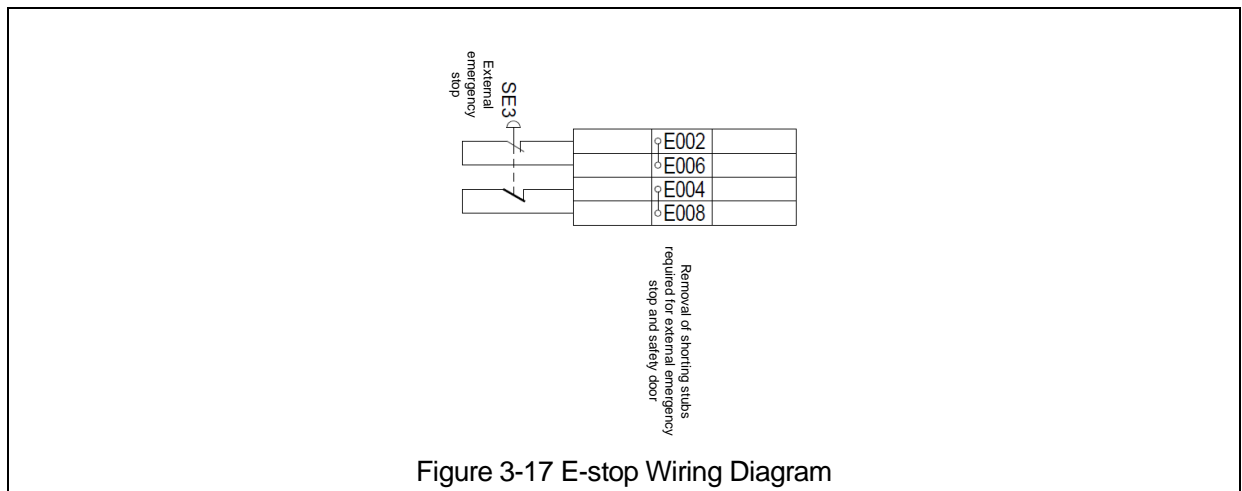

Figure 3-16 Communication Connection Diagram (without O&M Wizard)

E-stop wiring

Figure 3-17 E-stop Wiring Diagram

NOTE

Wiring terminals E002 and E006 may connect to external emergency stop signals, and wiring terminals E004 and E008 may connect to external emergency stop signals. When there is an external emergency stop or safety door signal, the splice should be removed.
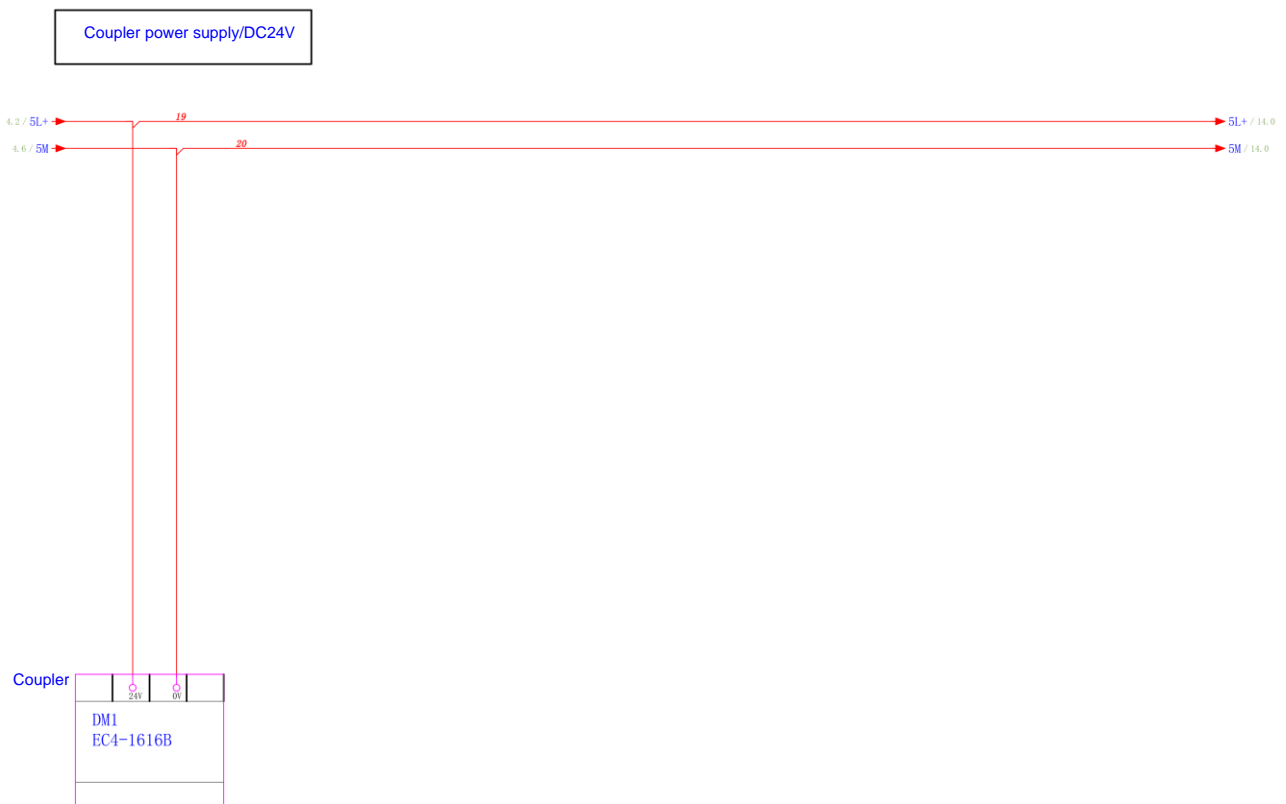
Coupler power supply

Coupler power supply/DC24V
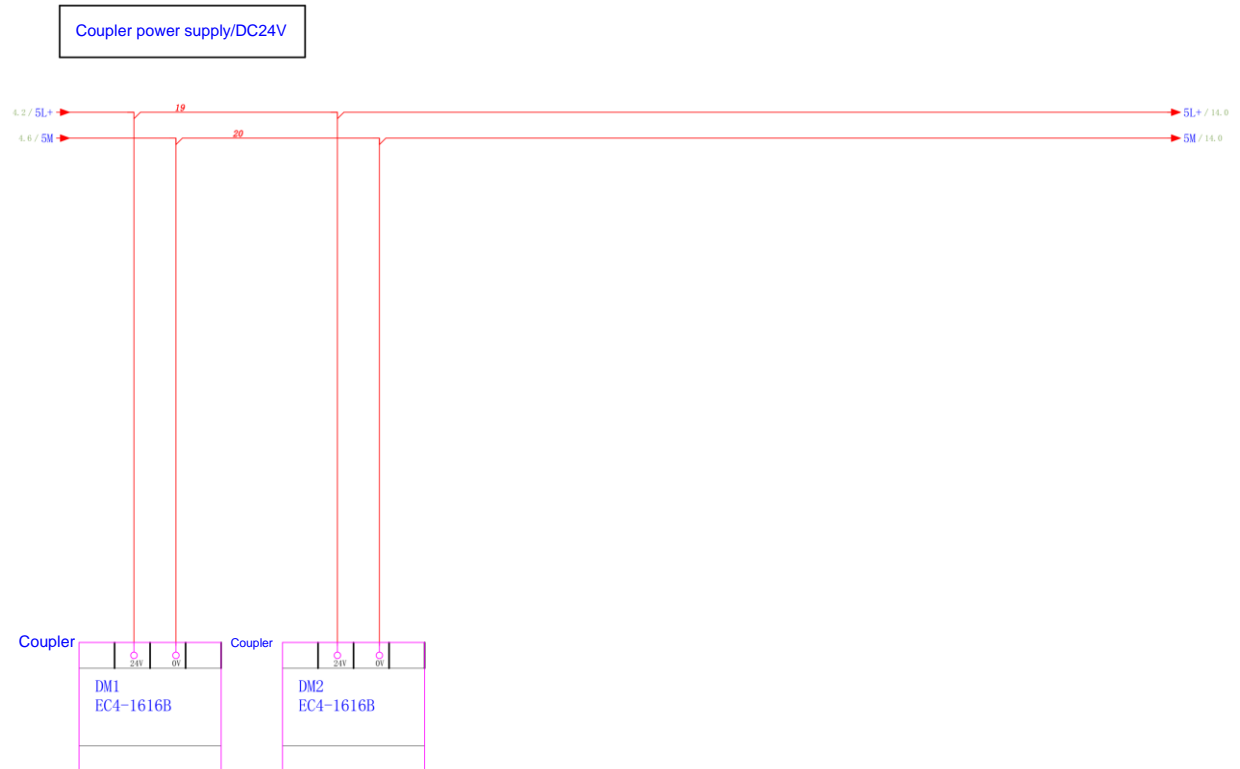
Figure 3-18 Coupler power supply

Coupler power supply/DC24V

Figure 3-19 Controller Power Supply

Input module

Teach pendant enable	Remote stop	Safety gate	System E-stop	Remote start	Remote reset	Remote mode	Module power supply

Reload program	Reserved	Module power supply

Figure 3-20 Input module

Output module

Program run	Alarm	Availability of teach pendant	Excitation status	System mains power	Visual trigger	Remote locking	Reload program completed	Module power supply

Reserve	Module power supply
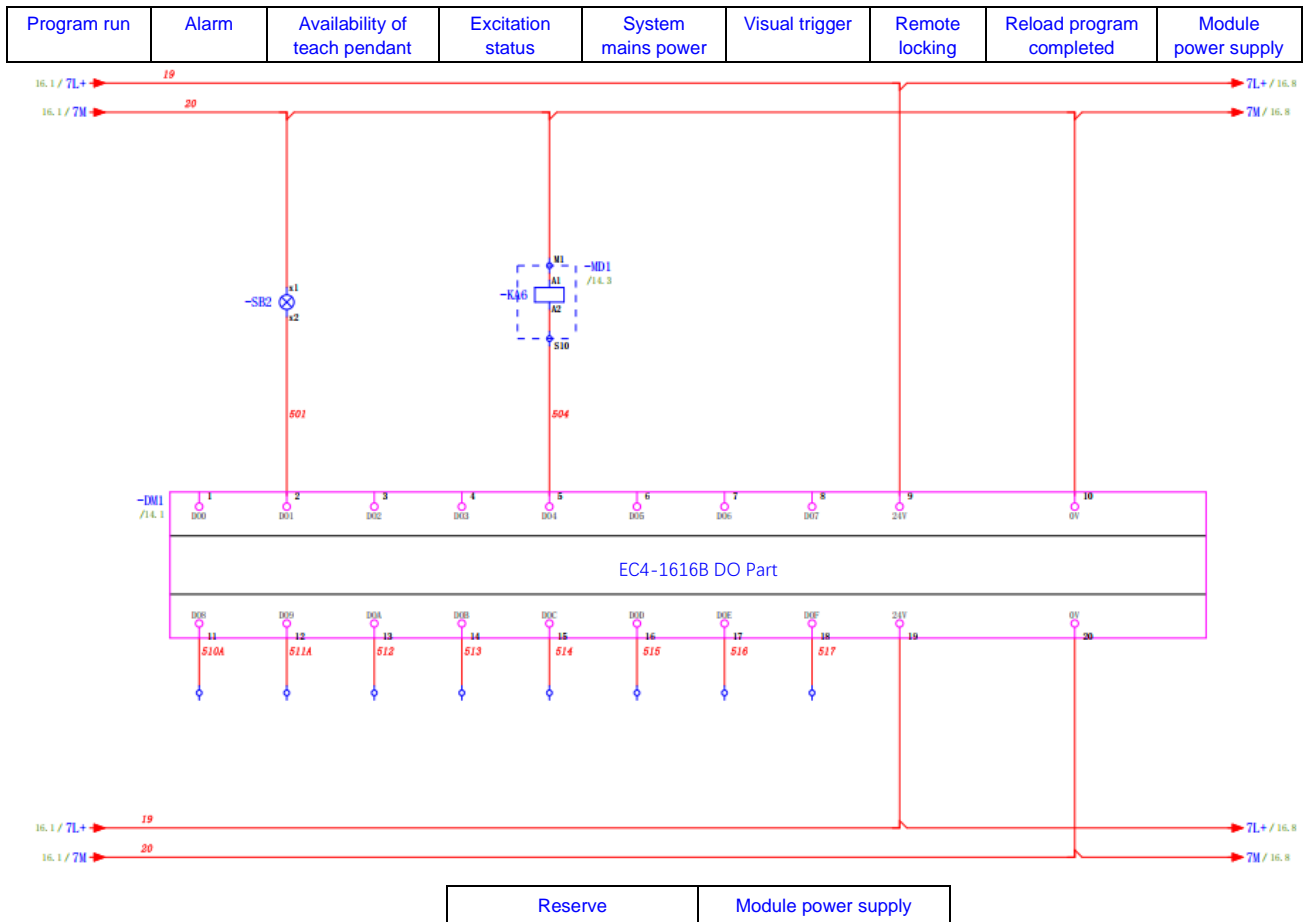
Figure 3-21 Output module

3.8 Relay module

The model of the relay module is 11261100001 (relay module ER-Relay-A). Its integrated 18 LED indicators indicate the current status in detail, which has a guiding effect on the maintenance of the internal lines of the control cabinet.

No.	Description	LED ON	LED OFF
1	Servo mains indicator	ON	OFF
2	E-stop LED	No E-stop	With E-stop
3			
4	Servo alarm LED	No alarm	With alarm
5	Teach pendant LED	Not provided	Provided
6	Servo power LED	ON	OFF

Axis alarm status LED, corresponding to the alarm status of each of the 6 axes.
LED ON: no alarm. LED OFF: alarm present

Brake output LED, corresponding to the brake status of each of the 6 axes.
LED ON: brake invalid. LED OFF: brake valid

Figure 3-22 Relay module schematic diagram LEDs

The electrical schematic diagram of relay module is shown below.
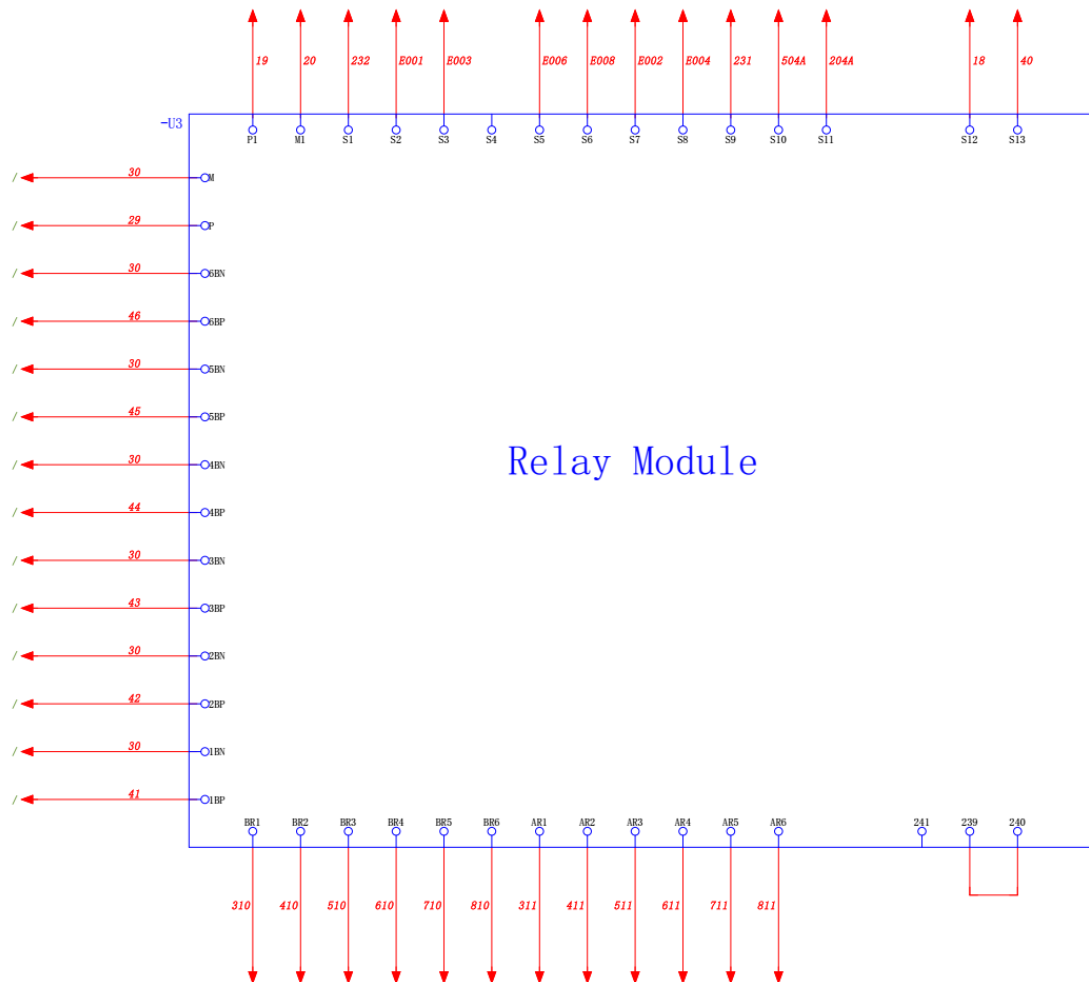
Figure 3-23 Relay module

Chapter 4 Debugging

4.1 Checks before power-on

Before powering on the control cabinet, please check and confirm the following items, and make necessary adjustments if needed.

S/N	Content
1	Inspect the appearance of the control cabinet both inside and outside.
2	Check if the fastening screws are securely connected.
3	Verify the status of connectors and installation locations of each unit in the control cabinet.
4	Connect the cables between the control cabinet and the robot.
5	Disconnect the power supply from the circuit breaker and connect the input power supply cable.
6	Confirm the input power supply voltage.
7	Press the emergency stop button on the control panel and power on.
8	Verify the interface signals between the control cabinet and the robot.
9	Confirm and set various parameters.
10	Release the emergency stop on the operating panel.
11	Confirm the movement of each axis under manual feed.
12	Verify the operation of each interface signal.
13	Confirm the operation status of peripheral device control interface signals.

4.2 Use of teach pendant

4.2.1 Connection of teach pendant

Please refer to "4.2.1 Connection of teach pendant" for the connection and wiring method of the teach pendant.

4.2.2 Editing method

The modification of drive unit parameters can be completed by following the steps below.

Step 1: When the main power is turned on, the control cabinet undergoes an initialization diagnosis.

The teach pendant screen will display the initialization screen as shown in the figure below.
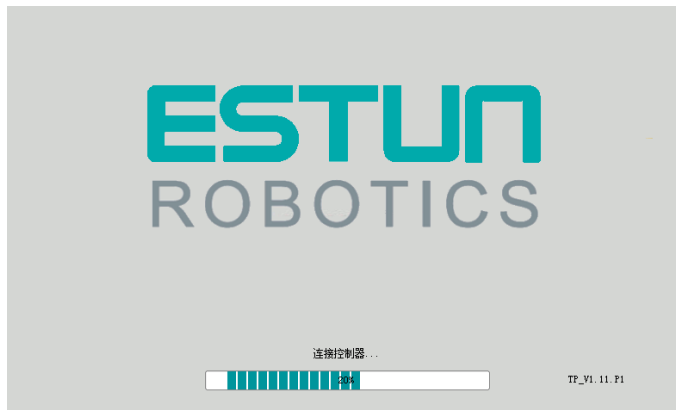
Step 2: After initialization is completed, check the system's operating status using the status indicator LEDs on the teach pendant. The Run indicator LED should be continuously on, and the Err indicator LED should be off, indicating a normal operating state.

Step 3: When the teach pendant displays the Home screen, select " Servo PnFn setting ".

Step 4: Select the "Set Pn Parameters" tab. When the teach pendant displays the "Set Pn Parameters" screen, choose the tab corresponding to the desired drive axis (e.g., Axis 1) and click the "Set" button.

Step 5: In the parameter dialog box that appears, set the desired parameters.

> **NOTE** Please note that the teach pendant can only be used to set certain Pn parameters. If you wish to set more parameters, please use the operating panel.

4.3 Use of ESView software

4.3.1 Connecting the servo drive unit

To perform online operations, connect the PC and the servo drive unit using a USB-RS485 (RJ45) communication cable.

Please follow the guided steps below to connect the servo drive unit.

Step 1: Disconnect the main power supply.

Step 2: Open the power protective cover and toggle the switch "ON" to "OFF" to disconnect the control power.

Step 3: Unlock the latch on the control cabinet door to open it.

Step 4: Check and wait for all indicator lights in the cabinet to turn off (generally for at least 5 minutes).

Step 5: Refer to the connection diagram in the provided figure below, and use a USB-RS485 (RJ45) communication cable to connect the PC and the servo drive unit.

Plug USB into PC

USB-RS485 (RJ45) communication cable

Insert the RJ45 plug into the servo drive unit interface
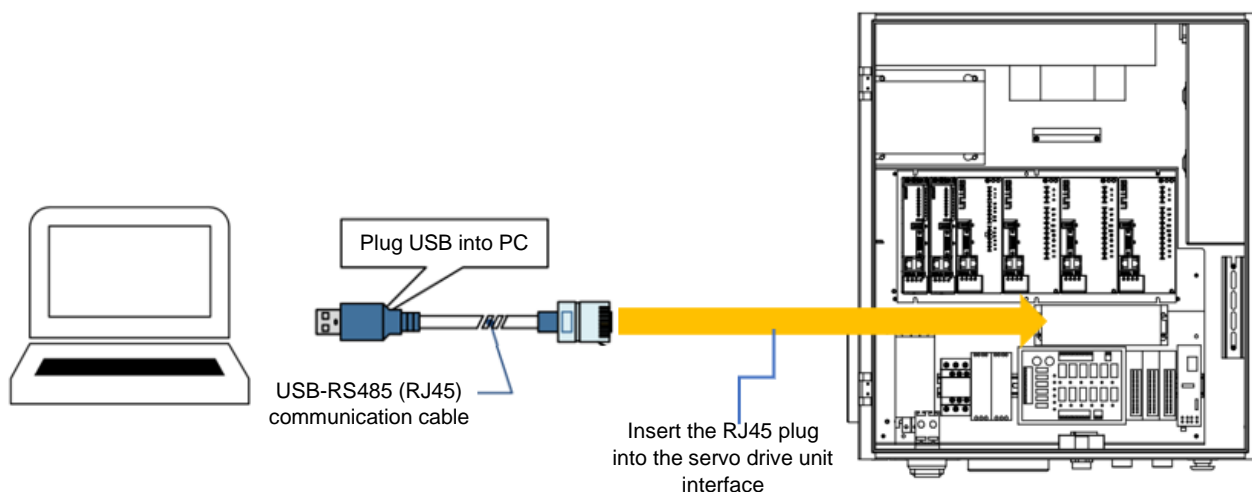
Step 6: Open the protective cover and toggle the switch "OFF" to "ON" to switch on the control power.

At this point, the PC has successfully connected to the servo drive unit.

4.3.2 Installing ESView

System Requirements

Users are required to have a personal computer that meets the following basic conditions:

Item	Description
OS	Windows 7 (32-bit/64-bit) Windows 10 (32-bit/64-bit) Description: English, Chinese (Simplified) versions of the above OS
CPU	1.6GHz and above
Memory	System memory 1GB and above Graphics card memory 64MB and above
Hard disk capacity	At least 1GB remaining
Serial communication function	USB port RJ45 port
Display	1027×768 pixels and above 24bit color (TrueColor) and above

Preparation before installation

Please make the following preparations before installation: Windows operating system, communication cable, and decompression software.

Log in to the official website of ESTUN at www.estun.com and navigate to the "Downloads" section to find and download the ESView V4 software.

If you are unable to obtain the software or require assistance, please contact ESTUN engineers.

- Power on your computer and start Windows.
- If Windows is already running, close any other software that is currently running.
- Copy the compressed file of ESView V4 to any directory on your personal computer.
- If your personal computer is already connected to a drive unit, disconnect the connection.

- If you want to reinstall ESView V4, it is recommended to uninstall any previously installed ESView V4 software first.

Software installation

To ensure a successful installation, please close other running software and ensure that the Windows user has administrator privileges.

Follow the guided steps below to install ESView V4.

Step 1: Open and extract the ESView V4 compressed file to any directory on your personal computer.

Step 2: Double-click and run the ESView V4 installer to enter the ESView V4 installation wizard, as shown in the figure.
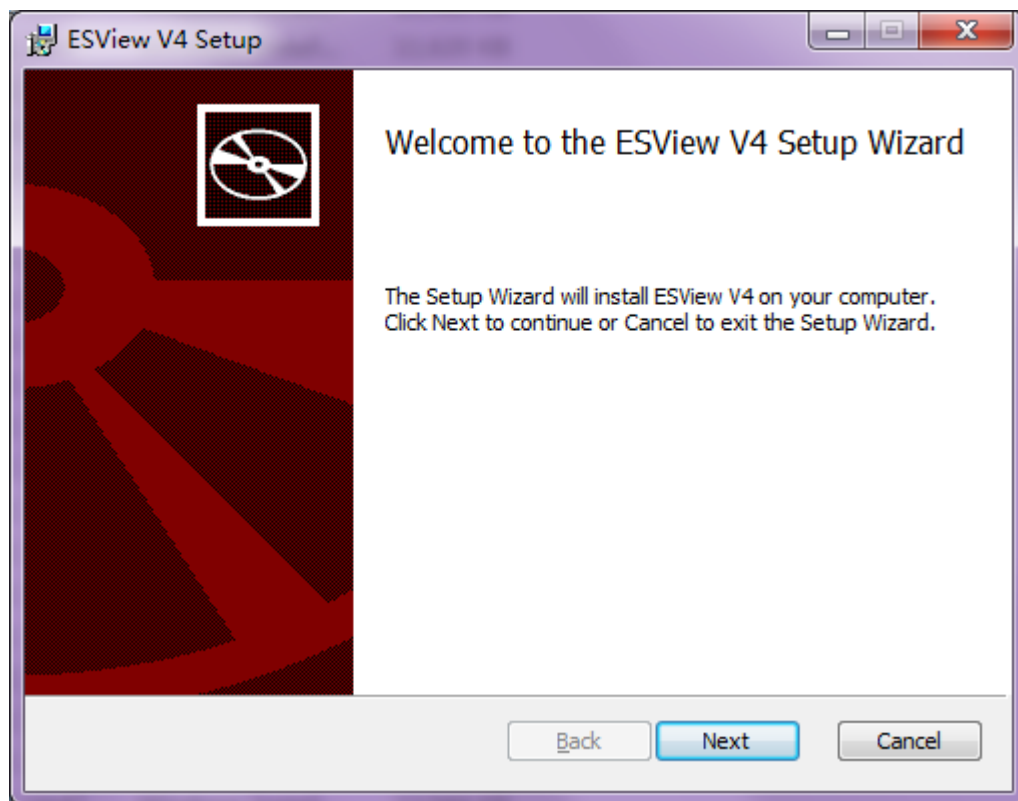
Figure 4-1 ESView Installing Interface

Step 3: Follow the prompts in the installation wizard to install ESView V4 on your PC.

----End

Installing USB Driver

After successfully installing the ESView V4 software, you may also need to install the USB driver. If it has been successfully installed, you may skip the description in this section.

NOTE	USB driver can only identify 1 port, if you change the USB port on the PC side, you need to reinstall the USB driver or use the previous port.

Follow the steps below to install the USB driver:

Step 1   Connect the drive unit to the PC using a USB connection cable after installing ESView V4.

Step 2   Locate and extract the "USB Drivers.rar" file to any directory within the ESView V4 software installation folder (default location: C:\ESView V4).

Step 3   Open "Device Manager":

- For Windows 7, select "Start" → "Control Panel".

  Click "Device Manager" in "All Control Panel Items" to bring up the "Device Manager" window.

- For Windows 10, right-click on "Start", then select "Device Manager" from the menu.

Step 4   As shown in the figure, "Other Devices" → "ESTUN USB COMM" in "Device Manager" indicates the device with driver issue.
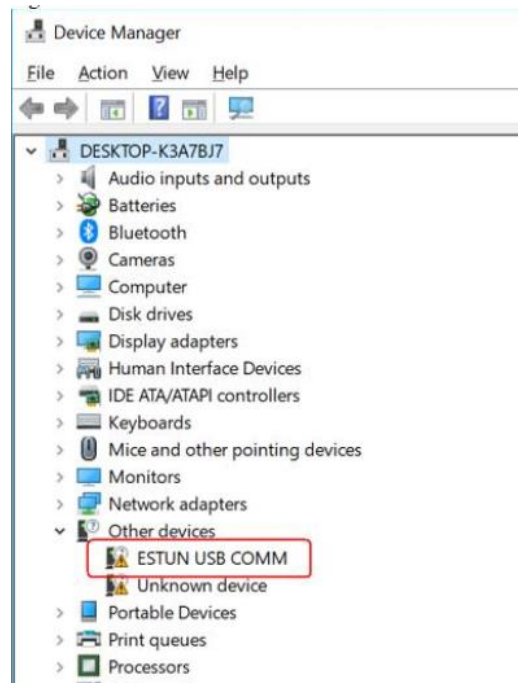
Figure 4-2 Unrecognized found in Device Manager

Step 5   Right-click on "ESTUN USB COMM" and choose "Update Driver Software" from the menu, as shown in the figure.

Figure 4-3 Update Driver Software

Step 6   In the "Update Driver Software" dialog, select "Browse my computer for driver software" , as shown in the figure.
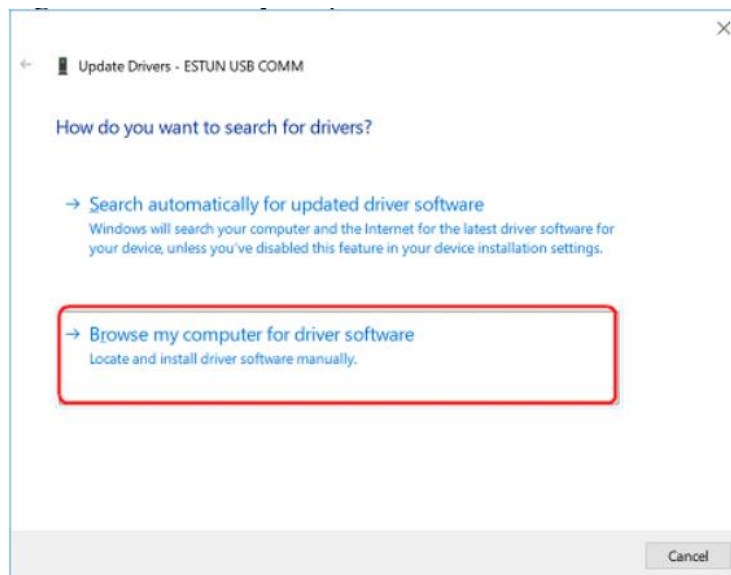
Figure 4-4 Browse your computer for driver software

Step 7　Select "Choose from your computer's list of device drivers" as shown in the figure.
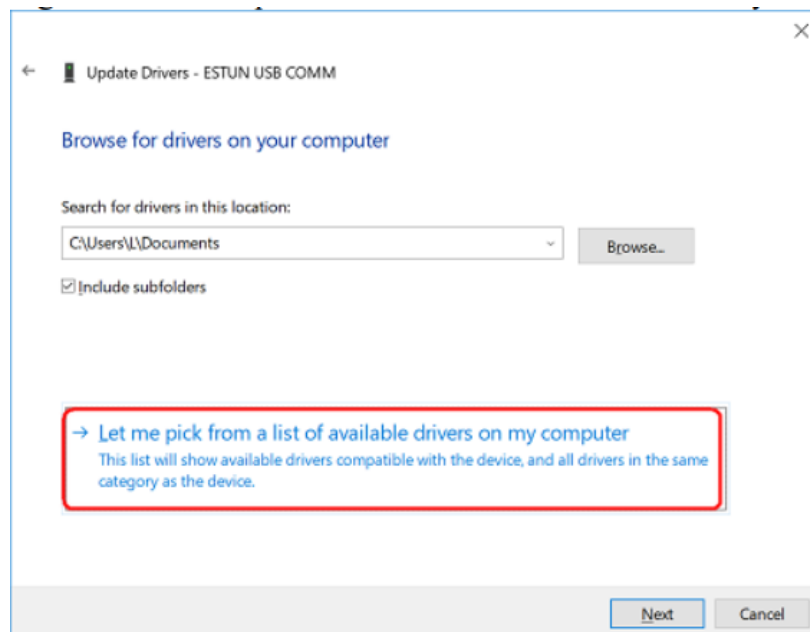
Figure 4-5 Select from the computer's list of device driver programs

Step 8　Select "Next" as shown in the figure.
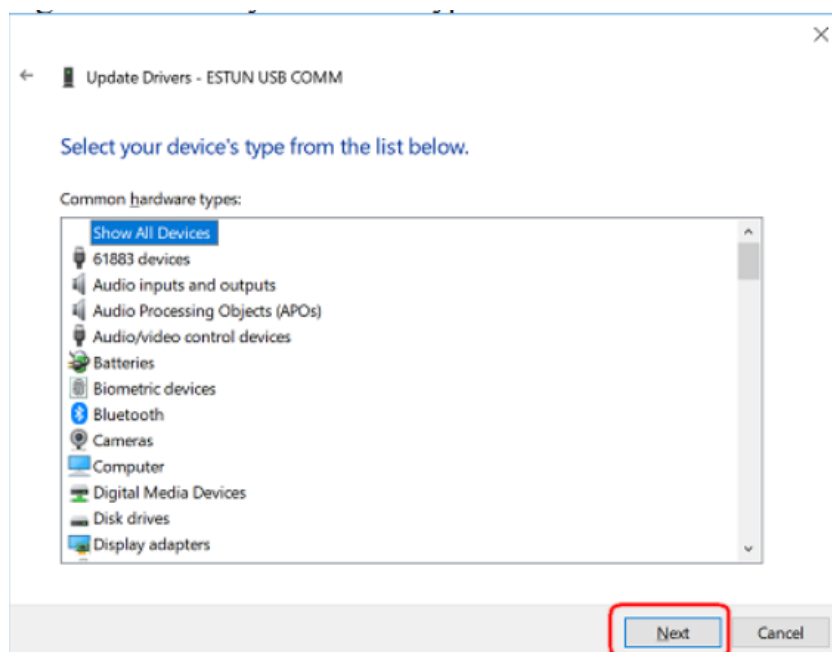
Figure 4-6 Display all devices

Step 9   Select "Install from Disk" as shown in the figure.
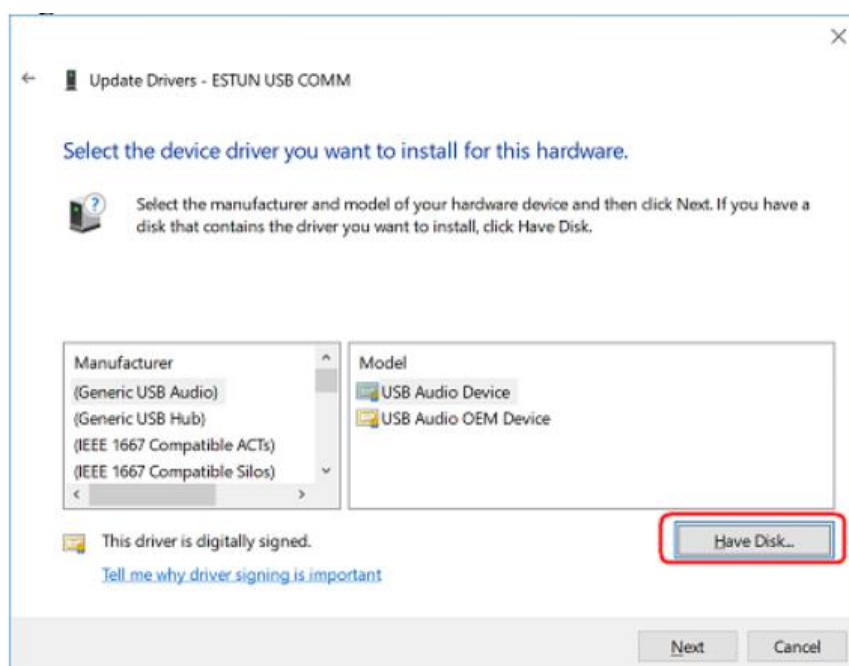
Figure 4-7 Install from Disk

Step 10 Click "Browse" in the "Install from Disk" dialogue box that pops up, as shown in the figure.
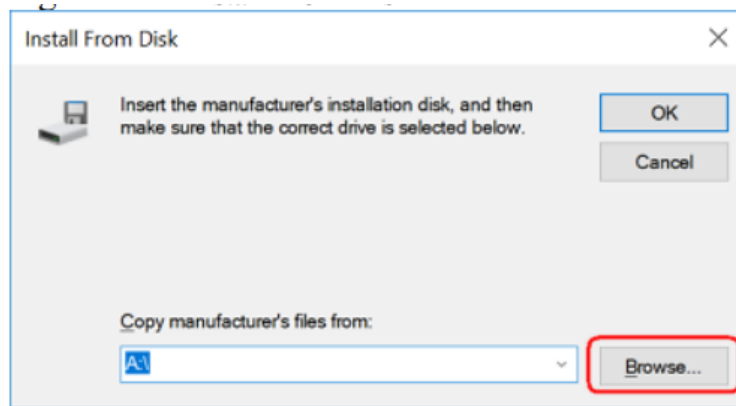
Figure 4-8 Browse files

Step 11 In the "Find File" dialog box, set the "Find Range" to the directory "\USB Drivers\windows_drivers" that was extracted from the ESView V4 compressed file.

Step 12 Select "usb_dev_bulk.inf" and click "Open," as shown in the figure.
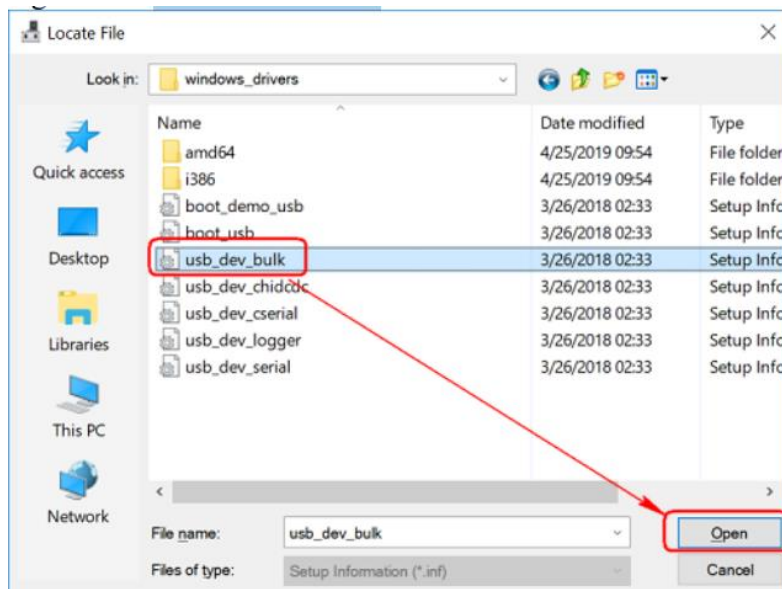
Figure 4-9 Find and Open the Driver File

Step 13 Return to the "Install From Disk" dialog box and click "OK".

Step 14 Select "Generic Bulk Device" and click "Next", as shown in the figure.
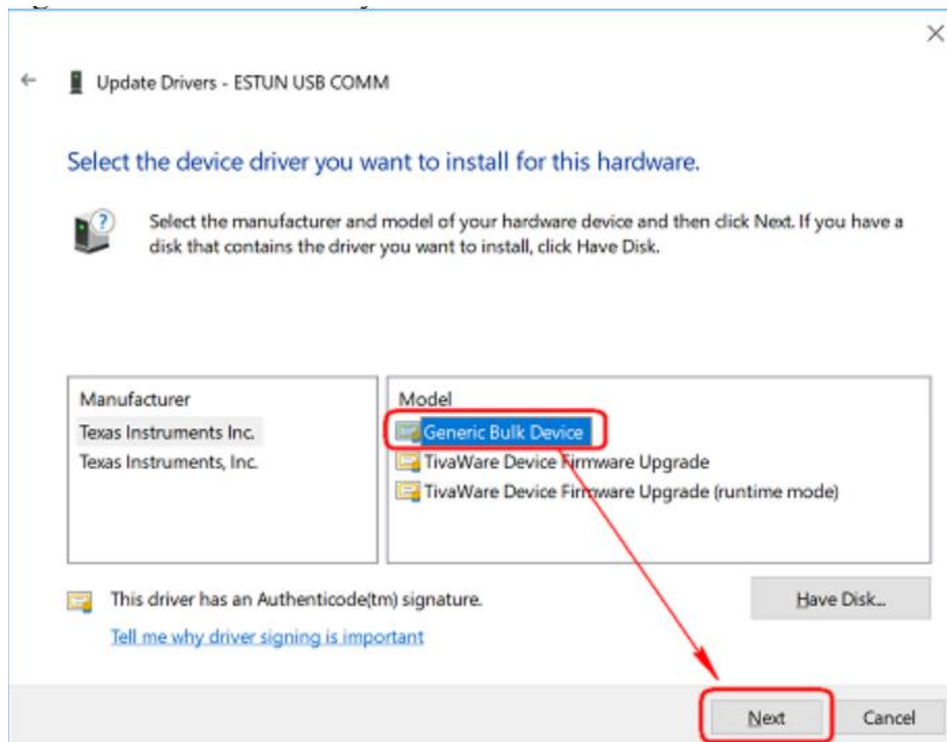
Figure 4-10 Select the Driver to Install

Step 15 In the "Update Driver Warning" that pops up, click "Yes", as shown in the figure.
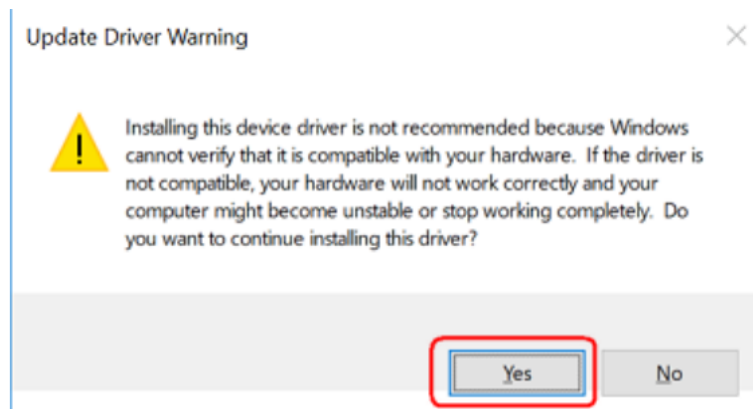
Figure 4-11 Confirm Driver Installation

Step 16 After a moment, select "Install" in the "Windows Security" dialog box, as shown in the figure.
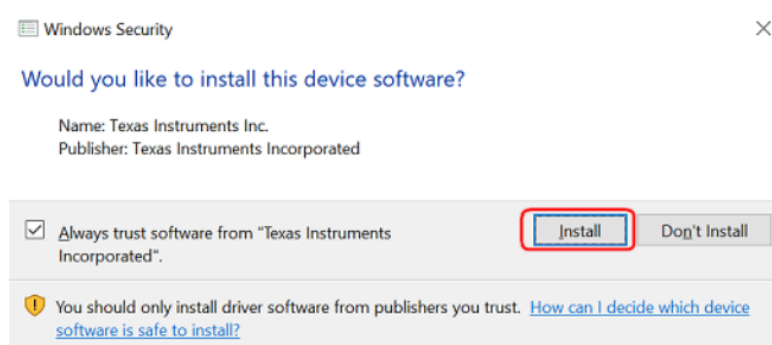
Figure 4-12 Confirm Device Installation

Step 17 The driver will automatically install on the PC, and upon completion, it will display the installation result. Click "Close", as shown in the figure.
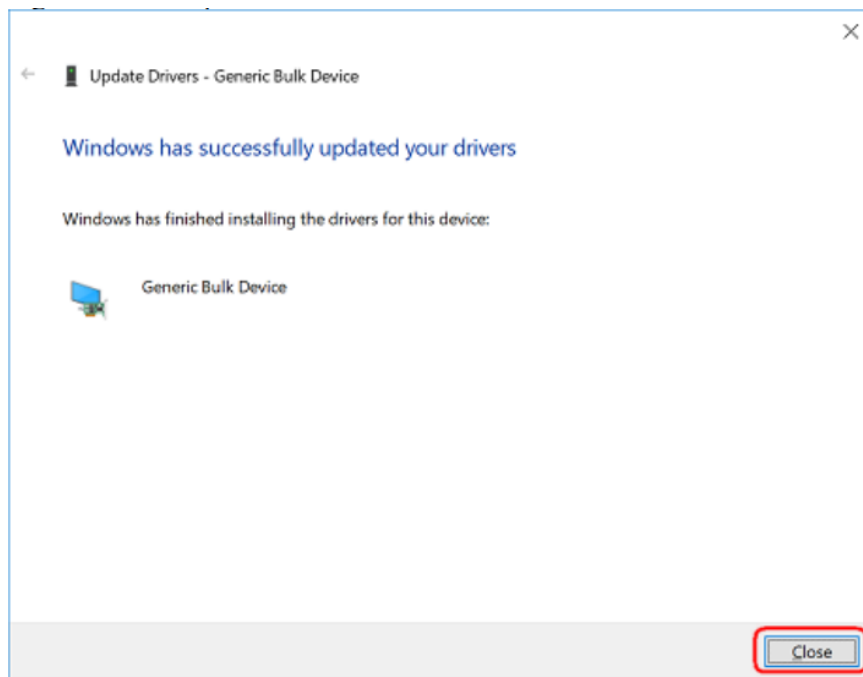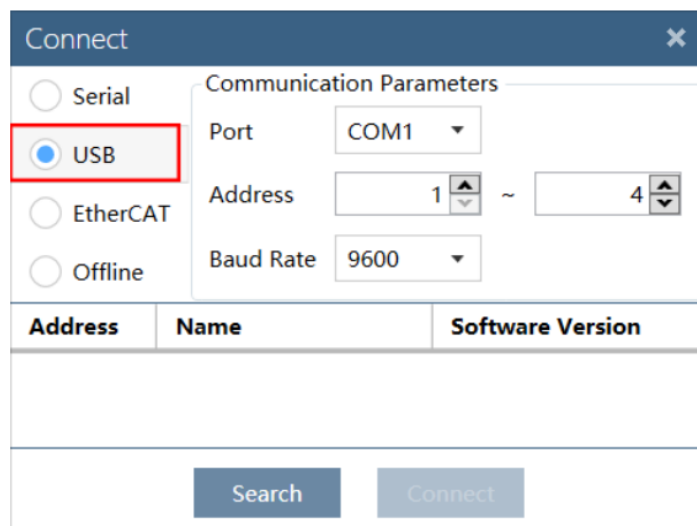
Figure 4-13 Complete Driver Installation

4.3.3 Enabling ESView

Online operation

Through online operation, parameters of the servo drive can be uploaded, downloaded, and more. It is recommended to perform an online operation the first time you configure a drive.

Users need a USB connection cable to connect the PC to the drive before performing online operations.

Step 1: Connect the drive unit to the PC using a USB connection cable.

Step 2: From the Windows Start menu, select "All Programs → ESView V4 → ESView V4" or double-click the shortcut of the "ESView V4" program on the desktop.

Step 3: After launching the ESView V4 program, the "Communication Settings" dialog box will automatically appear.
If the user has already enabled ESView V4, select the menu "Home" → "Connect Servo" from the ESView V4 program.
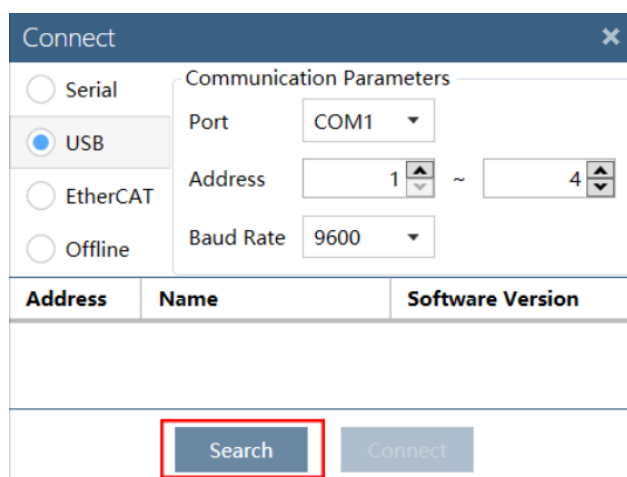
Step 4: Select "USB".

Figure 4-14 Select Connection Method
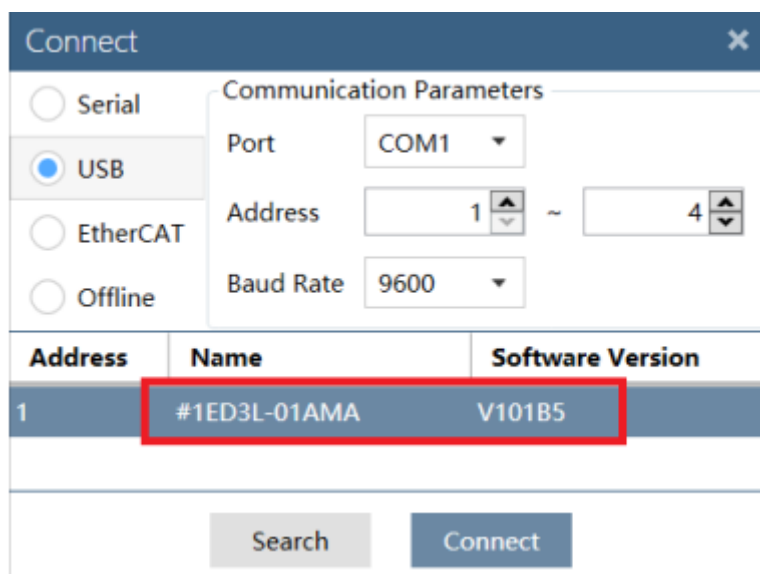
Step 5: Click "Search".

Figure 4-15 Search for Device

Step 6: Select the detected device.

Figure 4-16 Select the Device to Connect

If the "Search" does not find any device, please check the connection between the device and the PC and ensure that the ESView V4 software is the latest version.

Step 7: Click "Connect".

Figure 4-17 Connect the Device

Step 8: After entering the main window of ESView V4, the connected device will be displayed in the "Device" column on the left side.

Figure 4-18 Connected Device Status

Now, the user can perform necessary real-time settings on the driver or motor online.

NOTE	• Connected online devices or created offline devices will be displayed in the "Device" column.
	• To delete a device, click ![icon] at its top right corner and click "OK" in the pop-up prompt box.

----END

Offline Operation

In offline operation, users can perform image operations such as oscilloscope, FFT, mechanical analysis, etc., without the need to connect any devices.

Although there is no need to connect the actual drive unit, certain functionalities are limited and cannot be configured correctly.

Step 1: From the Windows Start menu, select "All Programs" → "ESView V4" → "ESView V4".

Or find and double-click the "ESView V4" program shortcut on the desktop.

Step 2: After launching the ESView V4 program, the "Connect" dialog box will automatically pop up.

If the user has already enabled ESView V4, select the menu "Home" → "Connect Servo" from the ESView V4 program.
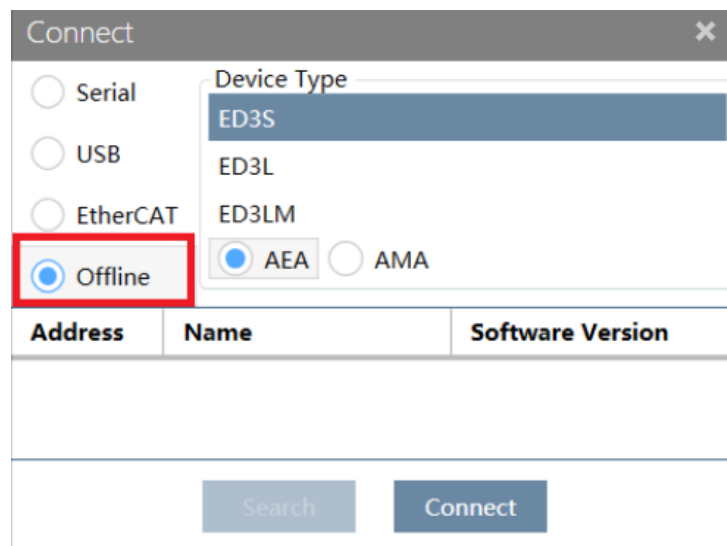
Step 3: Select "Offline".

Figure 4-19 Select Offline

Step 4: Choose the "Device Type" you want to configure, such as "ED3L".
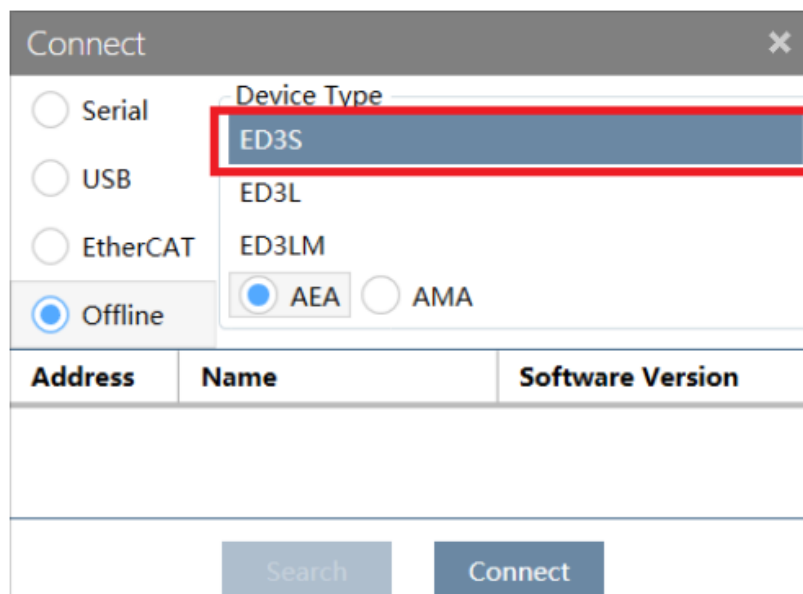

Figure 4-20 Select Device Type

Step 5: After entering the main window of ESView V4, the created offline device will be displayed in the "Device" column on the left side.
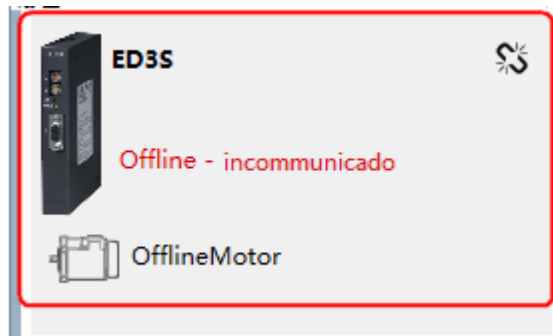
Figure 4-21 Created Device Status

NOTE

- Certain functionalities are limited and cannot be configured correctly in offline operation.

- Connected online devices or created offline devices will be displayed in the "Device" column. To delete a device, click the icon at its top right corner and click "OK" in the pop-up prompt box.

4.3.4 Parameter settings

In the "Parameter Edit" window, users can perform the following operations:

- Upload Parameters
- Edit Parameters
- Save Parameters
- Download Parameters
- Restore Factory Values

To open the "Parameter Edit" window, follow the guided steps below:

Step 1: In the main window of ESView V4, select "Parameters" → "Parameter Edit".

Figure 4-22 Select parameter editing

Step 2: The "Parameter Edit" window will appear in the "Function Display Area."
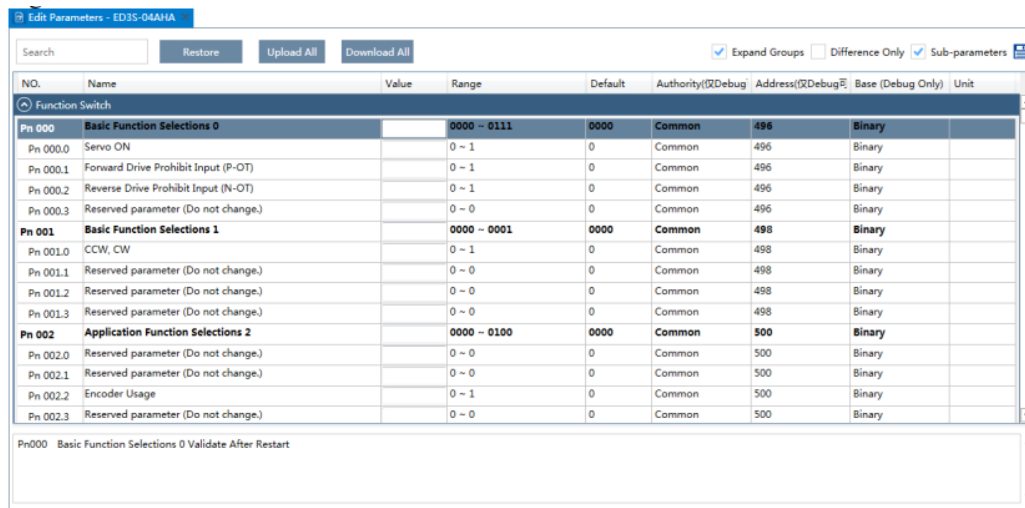
Figure 4-23 Parameter Edit Window

Uploading Parameters

There are two ways to upload parameters: "Upload All" and "Upload Selected Items."

- Upload parameters

− In the "Parameter Edit" window, click on "Upload All." After a moment, ESView V4 will read and display the settings of all parameters from the drive unit in the "Device Value" column.
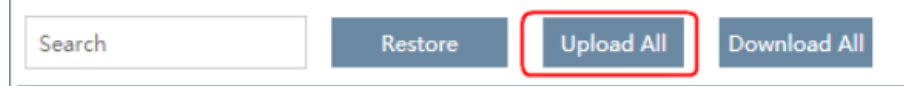
− Users can also right-click on any non-editable area of the parameter list and select "Upload All" from the pop-up menu.
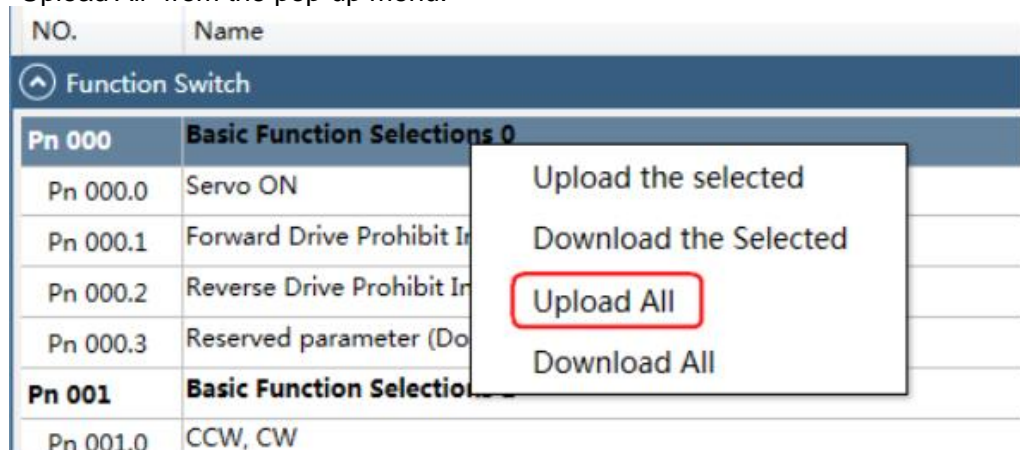
- Upload some parameters

In the "Parameter Edit" window, users can either drag the mouse to select specific parameters or hold down the "Ctrl" key on the keyboard and individually select the parameters to be read. Then, right-click on one of the selected items and choose

"Upload Selected Items" from the pop-up menu.

Edit Parameters

After successfully uploading parameters, users can directly modify the desired parameters in the "Device Value" column, and the parameters will be updated accordingly.

Figure 4-24 Display after editing parameters

When editing parameters, detailed explanations for each parameter will be displayed below the parameter list, providing assistance for user configuration.

Figure 4-25 Detailed description of parameters

> **NOTE**
>
> In the "Parameter Editing" window, click on the "Search" input box and enter the keywords you need to find. Keywords include "NO.", "Name", "Device Value", "Range", "Default Value", "Unit", and any characters within the detailed description of the parameter. To search for multiple items simultaneously, add one or more spaces between the keywords. The window will list all parameters that match any of the keywords.

Save Parameters

Procedure:

Users can save the current parameter settings to a local path on the PC.

Step 1: Click 🖫 in the "Parameter Editing" window.

Figure 4-26 Save Parameters

Step 2: Then, in the "Save As" dialog box that pops up, choose the path where you want to store the parameter file.

Step 3: Click "Save."

----END

Import Parameters

By performing the "Parameter Import" operation, users can download the parameter settings from an offline parameter file to the connected device.

Step 1: In the main window of ESView V4, select "Parameters → Parameter Import".
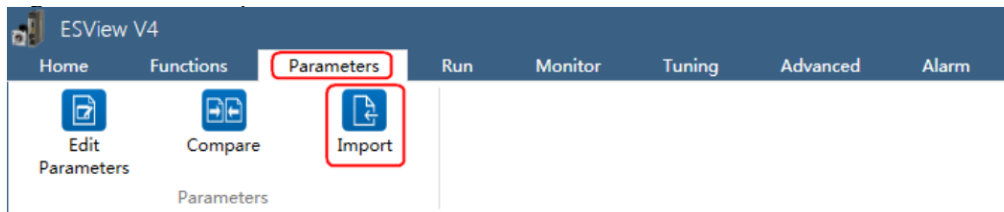
Figure 4-27 Select Parameter to Import

Step 2: In the "Open" dialog box that pops up, select and open a correct offline file (with the extension "*.esvpa").

Step 3: The "Function Display Area" will show the "Parameter Import" window, and the parameter settings from the selected offline file will also be displayed in the "Local Value" column.

Figure 4-28 Display the Parameter Import Window

Step 4: In the "Parameter Import" window, users can perform operations such as "Edit" parameters and "Download" parameters.

    ----END

Download Parameters

- Download Parameters
  - In the "Parameter Editing" window, click "Download All". After a moment, the edited parameters will be written to the driver.

– Users can also right-click on any non-editable area of the parameter list, and then select "Download All" from the pop-up menu.
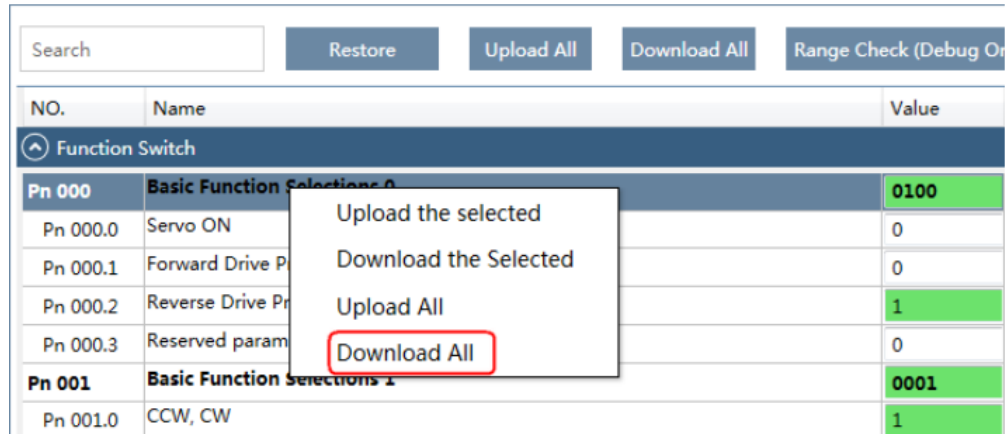
- Download Selected Parameters

In the "Parameter Editing" window, drag the mouse to select some parameters, or hold down the "Ctrl" key on the keyboard and select the parameter values one by one that need to be downloaded. Then right-click on one of the selected items and select "Download Selected" from the pop-up menu.
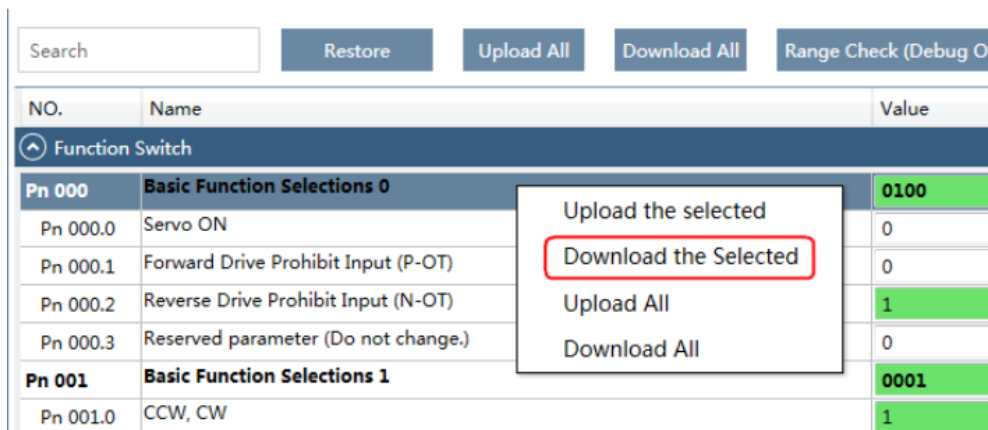
NOTE	Users must use online operation to download parameters to the drive. If the page prompts "Download Parameters Failed", please check the connection between the drive and the PC.

Restore Factory Values

CAUTION	Performing "Restore Factory Values" will reset the parameters in the drive unit (excluding certain specified parameters) to their default settings. Please proceed with caution.

Step 1: In the "Parameter Edit" window, click on "Restore Factory Values."
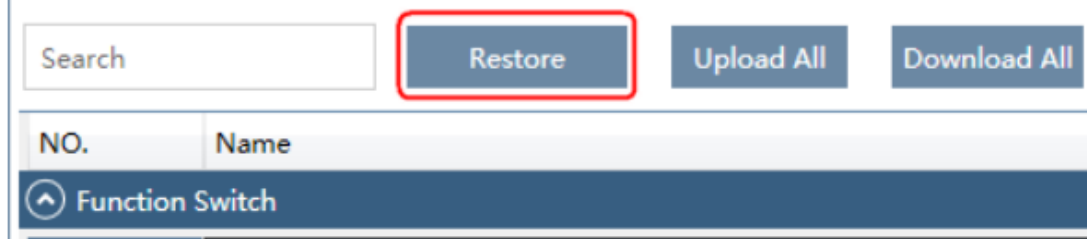
Figure 4-29 Restore factory values

Step 2: After confirming the action, click "OK" in the pop-up warning box.
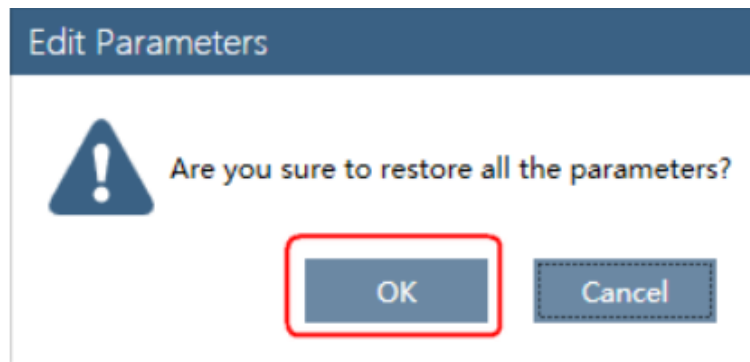
Figure 4-30 Determine the reset parameters

Step 3: ESView V4 will send the restore factory values command to the drive unit, and the device will begin the restore operation.

----END

4.4 Definition of parameters

Instructions for use

When indicating a parameter change, the effective time of the change is as follows:
"Restart": The change takes effect only after the power is restored.
"Immediately": The change takes effect immediately after the parameter settings are confirmed.

No.	Name	Scope	Unit	Factory value	When to take effect
Pn000	Basic function settings 0	0000~1111	–	0000	Restart

Parameter No.

Detailed explanation of parameters

Pn000.0: Servo ON	
0	External S-ON is valid
1	External S-ON is not valid. Motor excitation signal automatically turned on after /S-RDY output

Pn000.1: Reserved

Pn000.2: Reserved

Pn000.3: Reserved

Detailed explanation of parameters

No.	Name	Scope	Unit	Factory value	When to take effect
Pn000	Basic function settings 0	0000~0111	–	0110	Restart

	Pn000.0: Servo ON
	External S-ON is valid
	External S-ON is not valid. Motor excitation signal automatically turned on after /S-RDY output

Pn000.1: Reserved

Pn000.2: Reserved

Pn000.3: Reserved

No.	Name	Scope	Unit	Factory value	When to take effect
Pn003	Application function settings 3	0000~1111	–	0000	Restart

Pn003.0: Reserved

Pn003.1: Reserved

	Pn003.2: Low-speed compensation
	No low-speed compensation
	There is no low-speed compensation to prevent motor crawling, but sometimes it may cause low-speed vibrations in the motor. The strength of compensation depends on the valu of Pn129.

Pn003.3: Overload enhancement (not valid for EM3A type motors)
No enhancement of motor overload capacity.
Enhancement of motor overload capacity.

No.	Name	Scope	Unit	Factory value	When to take effect
Pn005	Application function settings 5	1000~1301	–	1000	Restart

Pn005.0: Torque feed-forward method

General torque feedforward

High-speed torque feedforward

Pn005.1: Reserved

Pn005.2: Deviation ala m enable

Disable deviation alarm

Enable deviation alarm, triggers an alarm when the deviation counter value exceeds the setting of Pn504

Reserved

Reserved

Pn005.3: Reserved

No.	Name	Scope	Unit	Factory value	When to take effect
Pn006	Application function settings 6	0000~0104	–	0004	Restart

Pn006.0: Bus type

	Not using bus control, but the internal speed parameter control
	Reserved
	Using EtherCAT bus

Pn006.1: Reserved

Pn006.2: Low-frequency vibration suppression switch

	Not enabling low-frequency vibration su pression function
	Enabling low-frequency vibration suppression function

Pn006.3: Reserved

No.	Name	Scope	Unit	Factory value	When to take effect
Pn008	Application function settings 8	0000~0001	–	0001	Restart

Pn008.0: Alarm/warning selection	
	Alarm
	Warning

Pn008.1: Axis shielding	
	Axis enable
	Axis shielding

Pn008.2: Reserved

Pn008.3: Reserved

No.	Name		Scope	Unit	Factory value	When to take effect
Pn100	Application function settings 100		0000~0036	–	0000	Restart

Pn100.0: Load Inertia Setting Selection
Manually set the percentage of load inertia (Pn106)
Use conventional inertia online identification when the load inertia remains unchanged
Use conventional inertia online identificat on when the load inertia change slightly
Use conventional inertia online identification when the load inertia changes significantly
Use vertical inertia online identification when the load inertia remains unchanged
Use vertical inertia online identification when the load inertia changes slightly
Use vertical inertia online identification when the load inertia changes significantly

Pn100.1: Tuning Mode Selection
0 - Manual adjustment mode
1 - Standard automatic tuning (balancing responsiveness and stability)
2 - Stable automatic tuning (prioritizing stability, minimizing overshoot or oscillation)
3 - Position ng automatic tuning (prioritizing responsiveness, minimizing positioning time)
In the following situations, automatic tuning cannot be effective, and Pn100.1 should be set to 0: • The motor's maximum speed is less than 100 rpm • The motor's acceleration and deceleration rate is less than 5,000 rpm/s • Significant mechanical clearance exists during motion • Significant speed-load differences exist during motion

Pn100.2: Reserved

Pn100.3: Reserved

No.	Name	Scope	Unit	Factory value	When to take effect
Pn102	Speed loop gain	1~4000	Hz	250	Immediately
	This value determines the magnitude of the speed loop gain.				
Pn103	Speed loop integral time	1~4096	0.25ms	80	Immediately
	Decreasing this value will shorten the positioning time and improve the speed response.				
Pn104	Position loop gain	0~1000	1/s	40	Immediately
	This value determines the amount of gain in the position loop. Increasing this value increases the servo rigidity of the position control, but too large a value may cause oscillations.				
Pn105	Torque command filter time constants	0~2500	0.025ms	40	Immediately
	Setting the torque command filter can eliminate or reduce mechanical vibration, but may introduce mechanical vibration if not set properly.				
Pn106	Percentage of load inertia	0~20000	%	0	Immediately
	Ratio of load inertia to motor rotor inertia. Set value = (Load inertia/Motor rotor inertia) x 100				
Pn127	Low-speed measurement filtering	0~100	0.25 ms	4	Immediately
	This parameter is used for filtering at low-speed measurement. If the value is set too high, the measurement will lag at low speed.				
Pn305	JOG speed	0~6000	rpm	50	Immediately
	The magnitude of the speed command when the JOG is running and the direction is determined by the keys.				
Pn500	Positioning error	0~5000	1 pulse	10	Immediately
	When the deviation counter value is less than this value, the /COIN signal is output.				
Pn506	Basic waiting process	0~500	10 ms	50	Immediately
	The standard setting is to turn off the servo while the /BK output (brake activation) is active. In this case, due to the mechanical construction and characteristics of the brake, the mechanical system may experience slight movement under the influence of gravity. By using the user constant to delay the servo-off action, this movement can be eliminated. This parameter only affects motor stop or lower speeds.				
Pn508	Brake waiting time	10~100	10 ms	50	Immediately
	If the delay after servo-off exceeds the value set by this parameter, the /BK signal will be output. The /BK signal will also be output if either the **brake waiting speed** or the **brake waiting time** meets the specified conditions.				

No.	Name	Scope	Unit	Factory value	When to take effect
Pn511	Output signal distribution	0000~0004	–	0002	Restart

H0002

Pn511.0: Assign signals for CN13-20, 21/CN13-45, 46/CN13-3, 4/CN13-28, 29/CN13-12, 13/CN13-37, 38

| COIN/VCMP |
| TGON |
| S-RDY |
| CLT |
| WARN |

Pn511.1: Reserved

Pn511.2: Reserved

Pn511.3: Reserved

| Pn704 | Bus communication nodes | 0~127 | – | 1 | Restart |

To set the node number of the drive unit in the communication network.

| Pn840 | Encoder selection | 0000~FF03 | – | 0003 | Immediately |

H0003

Pn840.0: Encoder type

17-bit absolute encoder

Pn840.1: Reserved

Pn840.2: Reserved

Pn840.3: Reserved

Chapter 5 Troubleshooting

5.1 Alarm check

During the operation of the robot, alarms that occur can be viewed using the teach pendant or ESView.

Once an alarm occurs, the robot will stop its motion and the user will need to take necessary actions to resolve the issue before resuming robot operation.

In the case of multiple alarms, only the information of the last alarm will be displayed in the message prompt bar.

When an alarm occurs during the robot's motion, it will immediately stop its motion. The teach pendant will display the alarm icon, and users can access the System Log interface to view detailed information about the alarm.

Step 1: Click on the "Log Management" tab or ⚠ button on the Home page to enter the "Log Management" page. Click the "Alarm" button below to view the current alarm information.
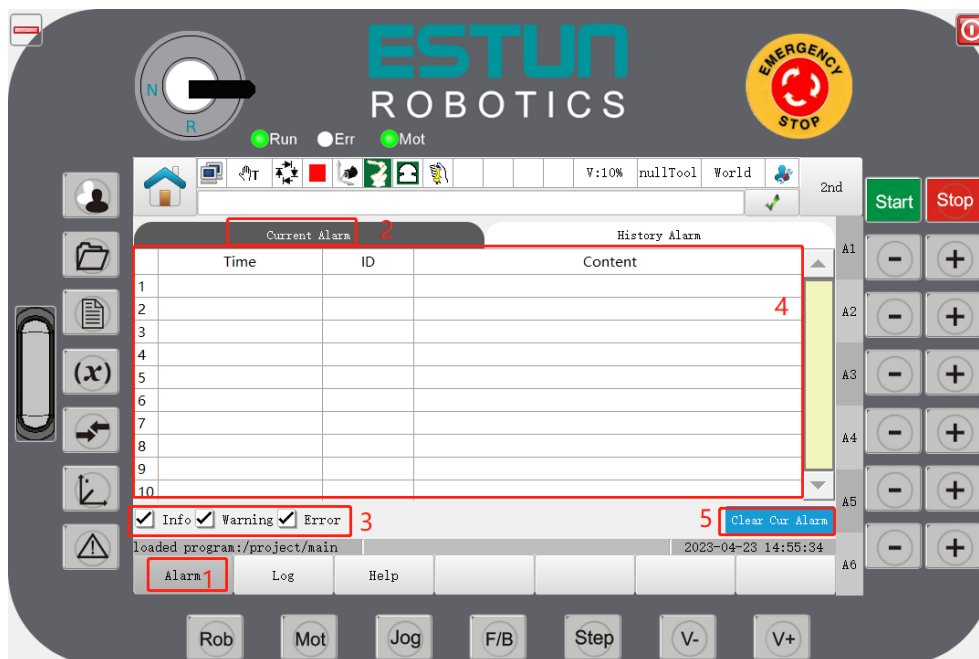
Step 2: Click on the "Content" of the current alarm to see detailed information such as phenomenon, root cause analysis, and handling methods.
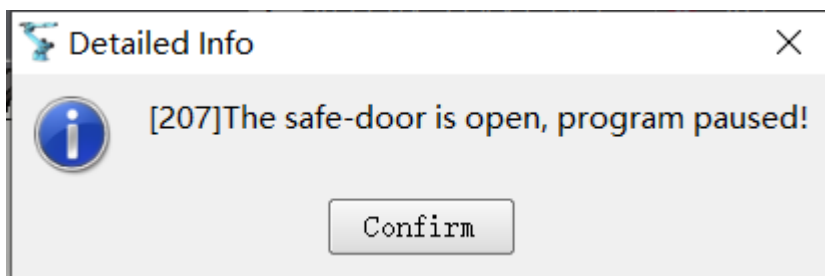
Step 3: If the current alarm has been confirmed as resolved, click the "Clear Current Alarm" button below to clear the current alarm.

Step 4: Click on "Historical Alarms" at the top to access the "Historical Alarms" tab. Click the "Retrieve Historical Alarms" button to get historical alarm information.
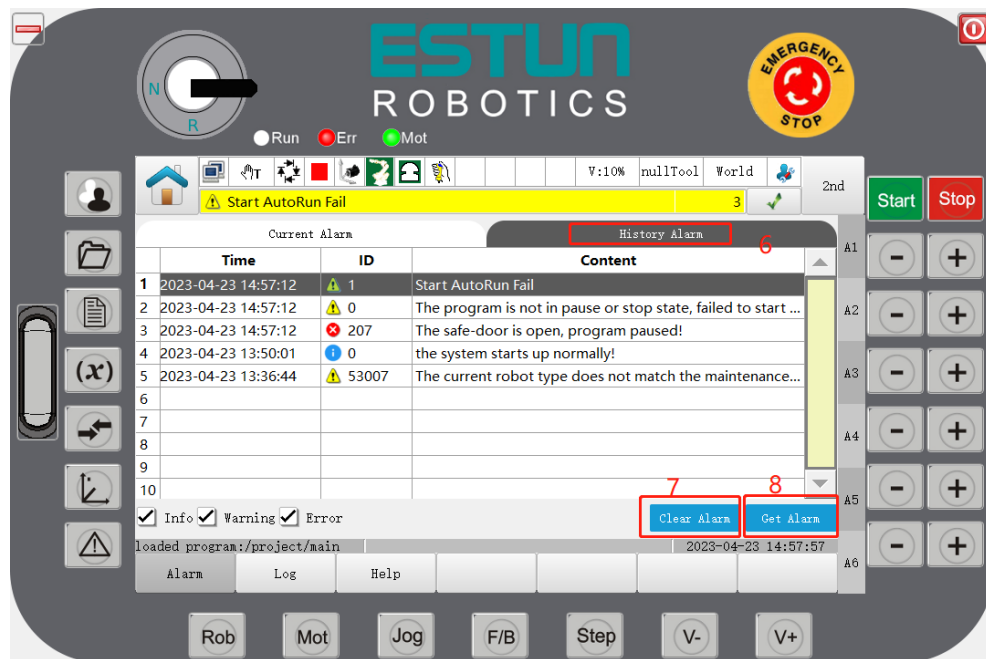
5.2 Log

Step 1: On the "Log Management" page, click the "Logs" button below to switch to the "Log" tab.

Step 2: Users can view controller or teach pendant logs based on actual needs.
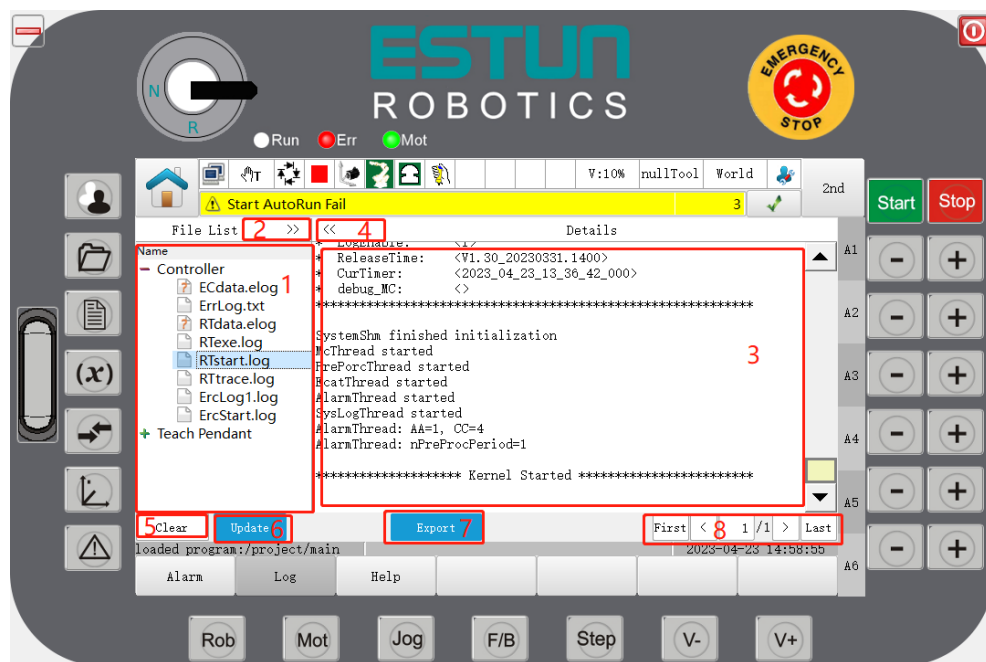
5.3 Help

In the "Log Management" page, you can check for relevant alarm details through "Help."

Step 1: Click the "Help" button below on the "Log Management" page to switch to the "Help" tab.
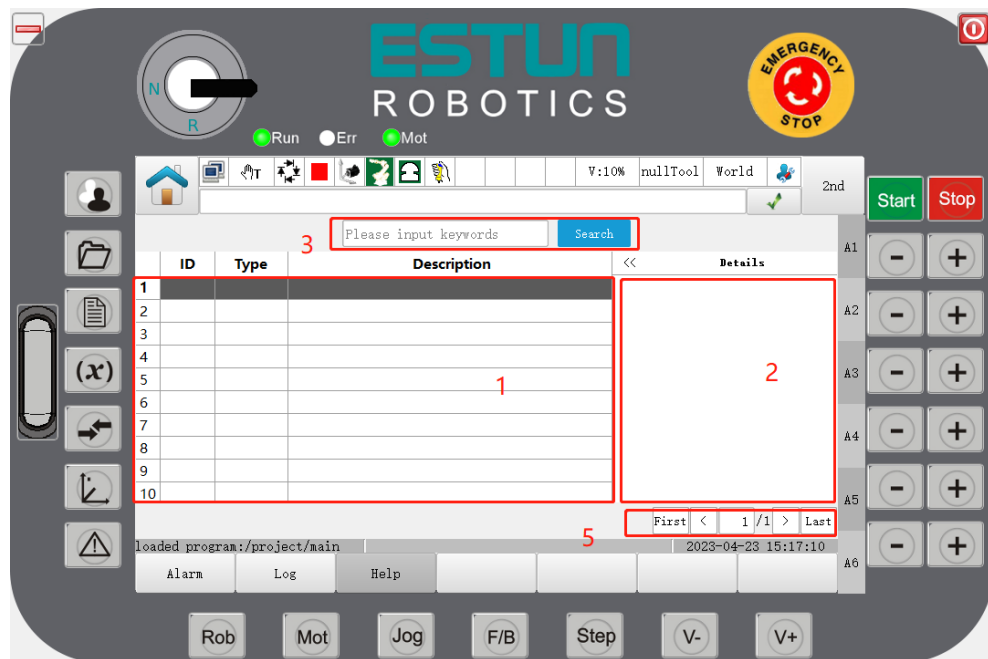
Step 2: Click on the "Search Box", enter the "Alarm Number" or "Keyword", and click "OK" and then "Search" to find detailed information about related alarms, as shown in the figure below.
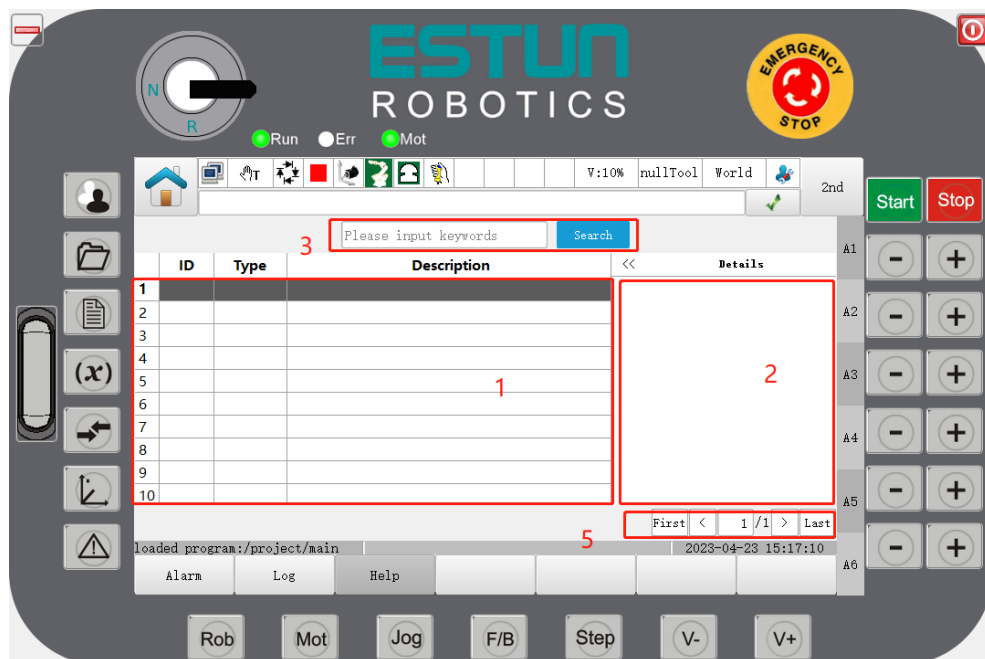
5.4 Alarm list

No.	Name	Cause of fault	Solution
A.01	Parameter destruction	The parameters stored in the EEPROM may be disturbed or accidentally damaged	Restore factory settings (Fn001) and reconfigure parameters
		The drive unit may be damaged	Replace the servo drive board

No.	Name	Cause of fault	Solution
A.02	ADC conversion channel malfunction	Wiring errors in the analog input channels can lead to damage of the drive unit's analog input channels (currently applicable only to general-purpose drives)	Ensure correct wiring for analog input interface
		Excessive analog input voltage (beyond the allowable differential input voltage of ±10V) can cause damage to the drive unit's analog input channels (currently applicable only to general-purpose drives)	Provide permissible differential input voltage for analog input
		The drive unit may be damaged	Replace the servo drive unit
A.03	Overspeed	Errors in the drive unit parameter settings, such as improper electronic gear ratio configuration	• Check if the electronic gear ratio setting is within the specified range: Input pulse frequency * electronic gear ratio < 500kHz • If > 500kHz, reduce the set speed (system command value)
		Incorrect phase sequence of the motor power cables	• Check the motor power cables • Ensure that the power cables, encoder cables, and corresponding drive units are properly connected for each axis motor
A.04	Overload	Parameter setting errors	Set the correct values for Pn840.2 and Pn005.3
		Incorrect phase of motor Incorrect phase sequence of the motor power cables Damage or short circuit of the power cables	Properly make and connect the power cables, ensuring that the U, V, W, and GND of the motor correspond to the drive unit
		Undersized selection Excessive mechanical load	Select a servo drive unit with appropriate specifications, ensuring sufficient margin
		Poor initial running-in of the new equipment	If the motor produces abnormal noise or overheats during operation, check the motor load or the drive unit's PID parameters. Additionally, perform regular lubrication and maintenance to ensure proper functioning; ensure that the mechanical connections are secure and free from any jamming or binding
		The brake is not disengaged	When using a brake motor, ensure that the brake is correctly engaged (brake operating voltage: 24V) before operating the motor
		Damage to the drive unit or motor	• Replace the servo drive unit • Replace the servo motor

No.	Name	Cause of fault	Solution
A.05	Position deviation counter overflow	Incorrect drive unit parameter settings in position control mode, such as excessively low thrust limit value leading to motor stalling	Set the correct thrust limit parameter value for the drive unit
A.06	Position deviation pulse overflow	Drive unit parameter setting error, such as position deviation pulse exceeding the value of parameter Pn504	• Set Pn005.2 = 0 • Set the correct value for Pn504
A.07	Inappropriate configuration of electronic gear ratio and desired pulse frequency	Improper electronic gear configuration	To meet the condition of not generating A07 alarm: Sent pulse frequency * electronic gear ratio < 32767 * 10000
A.07		Excessive pulse frequency	To meet the condition of not exceeding the maximum speed: If the maximum speed is 4500mm/s = 75r/s, sent pulse frequency * electronic gear ratio < 75 * motor encoder resolution
A.08	Issue with current detection channel 1	Excessive U-phase current	Perform Fn005 operation to bias the current channel and then restore factory settings
A.08		Drive unit malfunction	Replace the servo drive unit
A.09	Issue with current detection channel 1	Excessive V-phase current	Perform Fn005 operation to bias the current channel and then restore factory settings
A.09		Drive unit malfunction	Replace the servo drive unit
A.12	Overcurrent	Improper drive unit parameter settings, such as PID parameters	Set reasonable PID parameters to avoid excessive gain causing motor vibration or abnormal noise
A.12		Damage to the power cables Incorrect phase sequence of the motor power cables Phase error of the motor	Check the U, V, W phase sequence of the motor power line to ensure it corresponds to the drive unit side
A.12		Damage to the encoder cables	Separate the encoder cable from the main circuit power supply line to reduce potential interference
A.12		Drive unit damage	• Only connect the power line without sending commands from the host computer, and after power on/off, check if the servo itself is faulty • Replace the servo drive unit
A.12		Motor damage	Replace the servo motor

No.	Name	Cause of fault	Solution
A.13	Overvoltage	Insufficient discharge capacity of the drive unit leads to increased pump energy, elevated bus voltage, and potential alarms A13, A15, and A16	Replace the small resistor with a high-power discharge resistor
		Power supply voltage issues	Check if the main circuit power supply voltage is within the allowable range
A.14	Undervoltage	Low main circuit power supply voltage	• Check if the main circuit power supply voltage is within the allowable range. • Short-circuit between ⊕1 and ⊕2
		Damaged drive unit	Replace the servo drive unit
A.15	Discharge resistor damaged	Faulty discharge resistor	• Replace the discharge resistor ⚠️ CAUTION For PRONET series drive units with a power of 400W or below using external discharge resistors, set Pn521.0=0
		Damaged drive unit	Replace the servo drive unit
A.16	Abnormal regeneration	High power supply voltage	The power supply voltage should meet the requirements: • 200V drive unit power supply range: 200~230VAC +10%~-15% • 400V drive unit power supply range: 380~440VAC +10%~-15%
		Excessive DC bus voltage	• Increase acceleration and deceleration time • Select a suitable external regeneration resistor (in principle, the resistance should be as small as possible within the specified range, and the power should be increased. Additionally, for individual drive units of 400W or below, if an external regenerative resistor is used, set Pn521.0=0)
		Incorrect connection of motor power lines U, V, W, and GND, or short circuit between motor phases U, V, W, and GND	Ensure correct wiring of motor power lines
		Damaged drive unit	Replace the servo drive unit
		Damaged motor	Replace the servo motor

No.	Name	Cause of fault	Solution
A.18	IGBT overheating alarm	IPM temperature detection exceeding the set threshold	Check the ambient temperature and reduce the load
A.1D	Temperature sensor on the drive board disconnected	Temperature sensor not connected or damaged	Please contact ESTUN or an authorized distributor
A.20	Open phase in the power line	One phase of the main circuit power supply not connected	Ensure correct wiring of the main circuit power supply line
A.25 A.26 A.27	Motor power lines U/V/W experiencing overcurrent	Mechanical binding	Check if there are any obstacles in the operation of the load
		Incorrect phase sequence of motor power lines UVW	Ensure correct wiring of motor power lines
A.39	Module current exceeds limits	Detection of module working current exceeding the set parameters	Check and reset Pn8403
A.40	Motor power level is not within the specified range	Incorrect setting of Pn8403	Check and reset Pn8403
A.42	Incorrect motor model	Incompatibility between motor and drive unit	Re-select the appropriate model
A.43	Incorrect servo drive unit/encoder model	Mismatch between drive power and motor encoder resolution	• Check if Pn8402 parameter corresponds to the drive unit power • Check if Pn8400 parameter corresponds to the drive unit encoder resolution • The absolute motor phase value is incorrect, and the motor needs to be written with phase using the Fn012 motor phase writing operation
A.45	Absolute encoder multi-turn information error	Error in multi-turn information	Perform clearing operations using Fn010 and Fn011
		Battery box voltage remaining below 25V for an extended period	Ensure that the battery voltage in the battery box is 36V

No.	Name	Cause of fault	Solution
A.46	Absolute encoder multi-turn overflow	Overflow of multi-turn information	• If it is running unidirectionally for a long time, try setting PN0071=1 for shielding • Perform clearing operations using Fn010 and Fn011
A.47	Low battery voltage	Encoder battery voltage below 25V	• Ensure that the battery box voltage is 36V
A.48	Battery voltage under-voltage	Encoder battery voltage below 31V	• Perform clearing operations using Fn010 and Fn011
A.49	Encoder feedback position jump	Excessive acceleration in motor feedback or interference in encoder feedback signal	• Try winding a magnetic ring around the encoder cable and motor power lines (at least 3 turns or more) • Try connecting one wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, and ensure that the shield layer is grounded at both ends
A.50	Serial encoder communication timeout	Poor contact of encoder cable connector on the drive unit side	Ensure correct assembly of the encoder cable
		Poor contact of encoder connector on the motor side	Ensure proper connection of the contact elements in the encoder cable
		Welding defects, soldering errors, cold joints, or poor connections at the connectors on both ends of the encoder cable	Ensure the encoder cable is free from damage or breakage
		Damaged encoder cable	Strictly prohibit hitting the motor shaft and rear cover during motor installation to prevent damage to the motor encoder
		Damaged drive unit	Replace the drive unit
		Damaged motor	Replace the motor
A.51	Absolute encoder detects overspeed alarm	Battery not connected or insufficient battery voltage	• Ensure the battery box voltage is 36V • Perform a reset using the Fn010 and Fn011 operations
		Motor experiencing excessive acceleration due to external reasons when the battery voltage is normal and the drive unit is not powered	
A.52	Serial encoder absolute state error	External interference	• Try winding a magnetic ring around the encoder cable and motor power lines (at least three turns) • Try connecting a wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, with both ends of the shield layer grounded
		Damaged encoder cable	Replace the encoder cable

No.	Name	Cause of fault	Solution
		Damaged drive unit	Replace the drive unit
		Damaged motor	Replace the motor
A.53	Serial encoder calculation error	External interference	• Try winding a magnetic ring around the encoder cable and motor power lines (at least three turns) • Try connecting a wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, with both ends of the shield layer grounded
		Damaged encoder cable	Replace the encoder cable
		Damaged drive unit	Replace the drive unit
		Damaged motor	Replace the motor
A.54	Serial encoder control field parity bit or stop bit error	External interference	• Try winding a magnetic ring around the encoder cable and motor power lines (at least three turns) • Try connecting a wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, with both ends of the shield layer grounded
		Damaged encoder cable	Replace the encoder cable
		Damaged drive unit	Replace the drive unit
		Damaged motor	Replace the motor
A.55	Serial encoder communication data checksum error	External interference	• Try winding a magnetic ring around the encoder cable and motor power lines (at least three turns) • Try connecting a wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, with both ends of the shield layer grounded
		Damaged encoder cable	Replace the encoder cable
		Faulty drive unit	Replace the drive unit
		Damaged motor	Replace the motor

No.	Name	Cause of fault	Solution
A.56	Serial encoder stop bit error in status field	External interference	• Try winding a magnetic ring around the encoder cable and motor power lines (at least three turns) • Try connecting a wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, with both ends of the shield layer grounded
		Damaged encoder cable	Replace the encoder cable
		Faulty drive unit	Replace the drive unit
		Damaged motor	Replace the motor
A.58	Serial encoder data is empty	Incorrect parameter setting for drive unit encoder type (Pn840.0)	Correctly set Pn8400 according to the motor's model
		Loss of motor phase, requiring re-writing of phase to serial encoder EEPROM	Perform a rephasing operation on the motor to write the phase value into the serial encoder's EEPROM
		External interference	• Try winding a magnetic ring around the encoder cable and motor power lines (at least three turns) • Try connecting a wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, with both ends of the shield layer grounded
		Faulty drive unit	Replace the drive unit
A.59	Serial encoder data format error	Incorrect parameter setting for drive unit encoder type (Pn840.0)	Correctly set Pn8400 according to the motor's model
		Loss of motor phase, requiring re-writing of phase to serial encoder EEPROM	Perform a rephasing operation on the motor to write the phase value into the serial encoder's EEPROM
		External interference	• Try winding a magnetic ring around the encoder cable and motor power lines (at least three turns) • Try connecting a wire from the shield layer of the encoder cable to the motor body • Use shielded twisted-pair cables for the encoder cable, with both ends of the shield layer grounded

No.	Name	Cause of fault	Solution
A.70	EtherCAT synchronization signal error	EtherCAT master station configured with incorrect cycle settings	Ensure the main station is set with the correct communication cycle
		SYNC0 not synchronized with the drive unit	• Ensure SYNC0 is synchronized with the drive unit • Alarming can be reset using status word 6040
A.71	EtherCAT synchronization module error	Faulty drive unit	Replace the drive unit
A.80	External data line or address line or RAM abnormal	Faulty drive unit	Replace the drive unit
A.00	No error displayed	—	—

Chapter 6 Maintenance

6.1 Maintenance precautions

Before performing maintenance, please carefully read the following content and ensure a thorough understanding of the methods for safe maintenance.

⚠️ **DANGER**	• Maintenance of the robot system must be carried out by personnel who have received safety training. Trained personnel refer to individuals who have undergone safety training in accordance with the laws and regulations of their respective countries, specifically designed to provide knowledge on industrial robots, their operation, programming, inspection, and related regulations. • Do not disassemble parts that are not described in this manual or perform maintenance using methods different from those specified. This could result in the robot system malfunctioning or serious safety issues. • Do not enter the robot's workspace while it is powered on. • Always verify the robot's movement from outside the safety barrier after replacing components. • Before formal operation, confirm the correct operation status of the emergency stop switch and safety door switch.

⚠️ **WARNING**	• Except for maintenance operations, do not open the control cabinet cover to avoid electrical hazards. • Always replace components after turning off the power to the control cabinet and associated devices. • Do not disconnect motor connectors while the power is on. • Perform maintenance, inspections, and other tasks in teams of two, with one person maintaining a posture to immediately press the emergency stop button and the other person remaining vigilant to complete the task quickly and ensure a clear path for retreat.

⚠️ **CAUTION**	• Do not disassemble parts that are not covered in this manual. • Maintenance personnel must keep the robot key secure, and unauthorized personnel should not modify programs or parameters.

6.2 Daily inspection

To ensure the normal functioning of the product and protect it from damage, it is necessary to perform regular maintenance and inspections.

If the equipment is located in the following environments, reduce the inspection interval:

- Temperature, humidity, dust, and vibration in the environment

- High-temperature environment

- Frequent start-stop situations

- Environments with AC power and load fluctuations

- Environments with significant vibration or impact

- Environments with corrosive substances, such as acids or alkalis

To ensure the proper functioning of the product and prevent damage, daily confirmation should be made for the following items:

Item	Content	Solution
Installation environment	Check the control cabinet and surrounding cables for abnormalities	● Verify if the installation brackets are vibrating. ● Check for loose or corroded connections at cable terminals.
Input voltage	Input power voltage	● Confirm if the input voltage is within the allowable range. ● Check for any significant load starting in the vicinity.
Terminals	Control cabinet terminals	● Ensure that the bolts on both sides of the input, output, and other terminals are tightened.

6.3 Regular inspection

Regular inspections should be conducted on areas that are difficult to inspect during operation. It is essential to maintain the control cabinet in a clean state and effectively remove accumulated dust from the product surface to prevent dust, especially metal dust, from entering the internal components.

（●: Replace   ○: Check）

Inspection Frequency			Maintenance			Inspection Parts	Content	Inspection/Handling Method
Weekly	3 months	1 year	4 years	5 years	8 years			
○						Electric cabinet body	Splash, dust and other impurities adhered	Visual confirmation, cleaning
○						Rear body of control cabinet	Splash, dust and other impurities adhered, and other debris should be closely inspected, with particular emphasis on checking whether the transformer terminals are covered in dust, to prevent short circuits	Visual confirmation, cleaning
○						Warning label on electrical cabinet	Peeling, defacement	Visual confirmation, cleaning. Replace the sticker when there are obvious stains or the surface begins to peel
○						Fan	Normal operation confirmation	Visual confirmation, cleaning
○						Filter sponge	Dirt and blockage	Visual confirmation, cleaning and replacement
○						Teach pendant console, electric cabinet operation panel, other operating switches	Confirm the function of indicator light, operation switch, button switch, etc.	Visual confirmation
						Teach pendant control table, control cabinet operation panel	Check the E-stop button and enable the switch	Please make sure that all E-top buttons and enable switches can effectively cut off the servo power during operation.
	○		●		●	Cable set, teach	Make sure there is no	Visual check. Tighten. If the

						pendant cable, other external wiring	damage, broken, loose joints	cable is damaged, replace it.
	○				●	Teach pendant	Confirmation of damage, cleaning of operation position, confirmation of LCD display	Visual check and cleaning. When the display of the LCD screen becomes obviously dark, replace the teach pendant.
					●	Overhaul		

⚠ CAUTION	Use a soft cloth to remove dust when cleaning. Do not use equipment such as air blowers to blow away dust. Wind pressure can cause dust to enter the fan and the blade to rotate at a speed exceeding the specified speed, which may cause fan failure or affect its life. Use a vacuum cleaner only on the blade part, do not vacuum on the rotating part and the main body. This may cause the fan to fail or affect its life.

6.4 Items to confirm during installation adjustment

During installation adjustment, follow the table below to confirm the adjustment.

S/N	Content
1	Contents
2	Inspect the outside and inside outlook of control cabinet
3	Check the fixing screws are properly connected
4	Confirm the installation positions of connectors and control cabinet units.
5	Connect the cable between control cabinet and robot.
6	Disconnect the power supply of the breaker and connect the input power cable.
7	Check and confirm the input power voltage.
8	Press the emergency stop button on the operation panel to switch on the power.
9	Confirm the interface signal between the control cabinet and the robot.
10	Confirm and set the parameters.
11	Contact emergency stop of operation panel.
12	Confirm the motion of each axis under manual feed.
13	Confirm the signal action of each interface.

6.5 List of spare parts

Table 6-1 Spare Parts List of ER20-1780 Robot ED3L Control Cabinet

S/N	P/N	Name	Qty.
1	51600000145	Switching power supply DRL-24V120W1EN[DELTA]	1

2	51600000144	Switching power supply　DRL-24V240W1EN[DELTA]	1
3	13200000908	Straight-end network cable　VS-IP20-IP20-LI/1.5-CAT5E	1
4	13200000905	Straight-end network cable　VS-IP20-IP20-LI/0.3-CAT5E/prefreezing	2
5	13200001469	Straight-end network cable　VS-IP20-IP20-LI/0.2-CAT5E	5
6	11200000541	Extended module　ER-Relay-A-BJ-Relay module	1
7	51400000013	Circuit breaker　NXB-63 3P D32	1
8	52911610002	Axial flow fan　SJ1238HD2BPL	3
9	52900000472	Fan　SJ1751HD2BAL 5000RPM	2
10	52200000469	IO module EC4-1616BWE(PNP)	1
11	31600000353	Tubular resistor　1200W40Ω*2+1000W40Ω+500W25Ω+200W45	1
12	11200000532	ED3L servo drive　ED3L-30DEA-R1[JZ]	2
13	11200000531	ED3L servo drive　ED3L-20DEA-R1[JZ]	1
14	11200000485	ED3L servo drive　ED3L-08AEA-R1[JZ]	1
15	11200000484	ED3L servo drive　ED3L-04AEA-R1[JZ]	2

Table 6-2 Spare Parts List of ER20/10 Robot ED3L Control Cabinet

S/N	P/N	Name	Qty.
1	51600000145	Switching power supply　DRL-24V120W1EN[DELTA]	1
2	51600000144	Switching power supply　DRL-24V240W1EN[DELTA]	1
3	13200000907	Straight-end network cable　VS-IP20-IP20-LI/1.0-CAT5E	1
4	13200000905	Straight-end network cable　VS-IP20-IP20-LI/0.3-CAT5E/prefreezing	2
5	13200001469	Straight-end network cable　VS-IP20-IP20-LI/0.2-CAT5E	5
6	11200000532	ED3L servo drive　ED3L-30DEA-R1[JZ]	2
7	11200000531	ED3L servo drive　ED3L-20DEA-R1[JZ]	1
8	11200000485	ED3L servo drive　ED3L-08AEA-R1[JZ]	1
9	11200000484	ED3L servo drive　ED3L-04AEA-R1[JZ]	2
10	11200000541	Extended module　ER-Relay-A-BJ-Relay module	1
11	52200000469	IO module　EC4-1616BWE(PNP)	1
12	31600000353	Tubular resistor　1200W40Ω*2+1000W40Ω+500W25Ω+200W45	1
13	52911610002	Axial flow fan　SJ1238HD2BPL	1
14	52900000472	Fan　SJ1751HD2BAL 5000RPM	2
15	51400000013	Circuit breaker　NXB-63 3P D32	1

Table 6-3 Spare Parts List of ER30~ER35 Robot ED3L Control Cabinet

S/N	P/N	Name	Qty.
1	51600000145	Switching power supply　DRL-24V120W1EN[DELTA]	1
2	51600000144	Switching power supply　DRL-24V240W1EN[DELTA]	1
3	13200000907	Straight-end network cable　VS-IP20-IP20-LI/1.0-CAT5E	1
4	13200000905	Straight-end network cable　VS-IP20-IP20-LI/0.3-CAT5E/prefreezing	2
5	13200001469	Straight-end network cable　VS-IP20-IP20-LI/0.2-CAT5E	5
6	11200000532	ED3L servo drive　ED3L-30DEA-R1[JZ]	2
7	11200000531	ED3L servo drive　ED3L-20DEA-R1[JZ]	1
8	11200000485	ED3L servo drive　ED3L-08AEA-R1[JZ]	2
9	11200000484	ED3L servo drive　ED3L-04AEA-R1[JZ]	1
10	11200000541	Extended module　ER-Relay-A-BJ-Relay module	1
11	52200000469	IO module　EC4-1616BWE(PNP)	1
12	31600000356	Tubular resistor　1200W40Ω*2+1000W40Ω+500W25Ω*2+200W	1

13	52911610002	Axial flow fan SJ1238HD2BPL	1
14	52900000472	Fan SJ1751HD2BAL 5000RPM	2
15	51400000013	Circuit breaker NXB-63 3P D32	1

Table 6-4 Spare Parts List of ER20B -1760-HI Robot ED3L Control Cabinet

S/N	P/N	Name	Qty.
1	52911610002	Axial flow fan SJ1238HD2BPL	4
2	15000000053	Robot controller ERC30E	1
3	51433300001	Common fuse base RT18-32	1
4	51500000076	AC contactor NXC-22 220V	2
5	52300000297	Mushroom head button NP8-02ZS/1 Red	1
6	51410510012	Load switch body V2C	1
7	51410520006	Load switch panel KCF-1PZC	1
8	51400000013	Circuit breaker NXB-63 3P D32	1
9	25100000070	PNP type EC4 kit 16DI/16DO 7DI/8DO, for customer use	1

Table 6-5 Spare Parts List of ER20B-1760 Robot ED3L Control Cabinet

S/N	P/N	Name	Qty.
1	51600000145	Switching power supply DRL-24V120W1EN[DELTA]	1
2	51600000144	Switching power supply DRL-24V240W1EN[DELTA]	1
3	13200000908	Straight-end network cable VS-IP20-IP20-LI/1.5-CAT5E	1
4	13200000905	Straight-end network cable VS-IP20-IP20-LI/0.3-CAT5E/prefreezing	2
5	13200001469	Straight-end network cable VS-IP20-IP20-LI/0.2-CAT5E	5
6	11200000541	Extended module ER-Relay-A-BJ-Relay module	1
7	51400000013	Circuit breaker NXB-63 3P D32	1
8	52911610002	Axial flow fan SJ1238HD2BPL	3
9	52200000469	IO module EC4-1616BWE(PNP)	1
10	31600000371	Tubular resistor 1200W40Ω*2+750W25Ω+500W25Ω+200W45Ω	1
11	11200000532	ED3L servo drive ED3L-30DEA-R1[JZ]	2
12	11200000487	ED3L servo drive ED3L-20AEA-R1[JZ]	1
13	11200000485	ED3L servo drive ED3L-08AEA-R1[JZ]	1
14	11200000484	ED3L servo drive ED3L-04AEA-R1[JZ]	2

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