INOVANCE

AC800 Series

Intelligent Machine Controller

Hardware

User Guide

A00

Document No. 19011381

Preface

Thank you for purchasing the AC800 intelligent machine controller developed and manufactured independently by Inovance.

Before using this product, carefully read this guide and the related manuals mentioned in this guide.

Note
◆ In the drawings of this guide, covers or casings may be removed to show the details of the equipment. Remember to install the covers or casings as specified before working on the equipment.
◆ The drawings in the manual are shown for description only and may not match the product you purchased.
◆ The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual. The latest guide can be downloaded from our website www.inovance.com.
◆ In case of any problem during use, contact our agents or customer service center. Customer service: 400-777-1260, Email: UM@inovance.cn

Unpacking

The equipment is delivered with the following accessories:

1) A 3-pin plug for power wiring
2) Two 6-pin plugs for DI/DO and communication wiring
3) A user guide

If any of these items are missing or damaged, contact your dealer or sales representative immediately

Related Documents

Documents related to the controller are as follows:

AC800 Series Intelligent Machine Controller Hardware User Guide

AC800 Series Intelligent Machine Controller User Guide

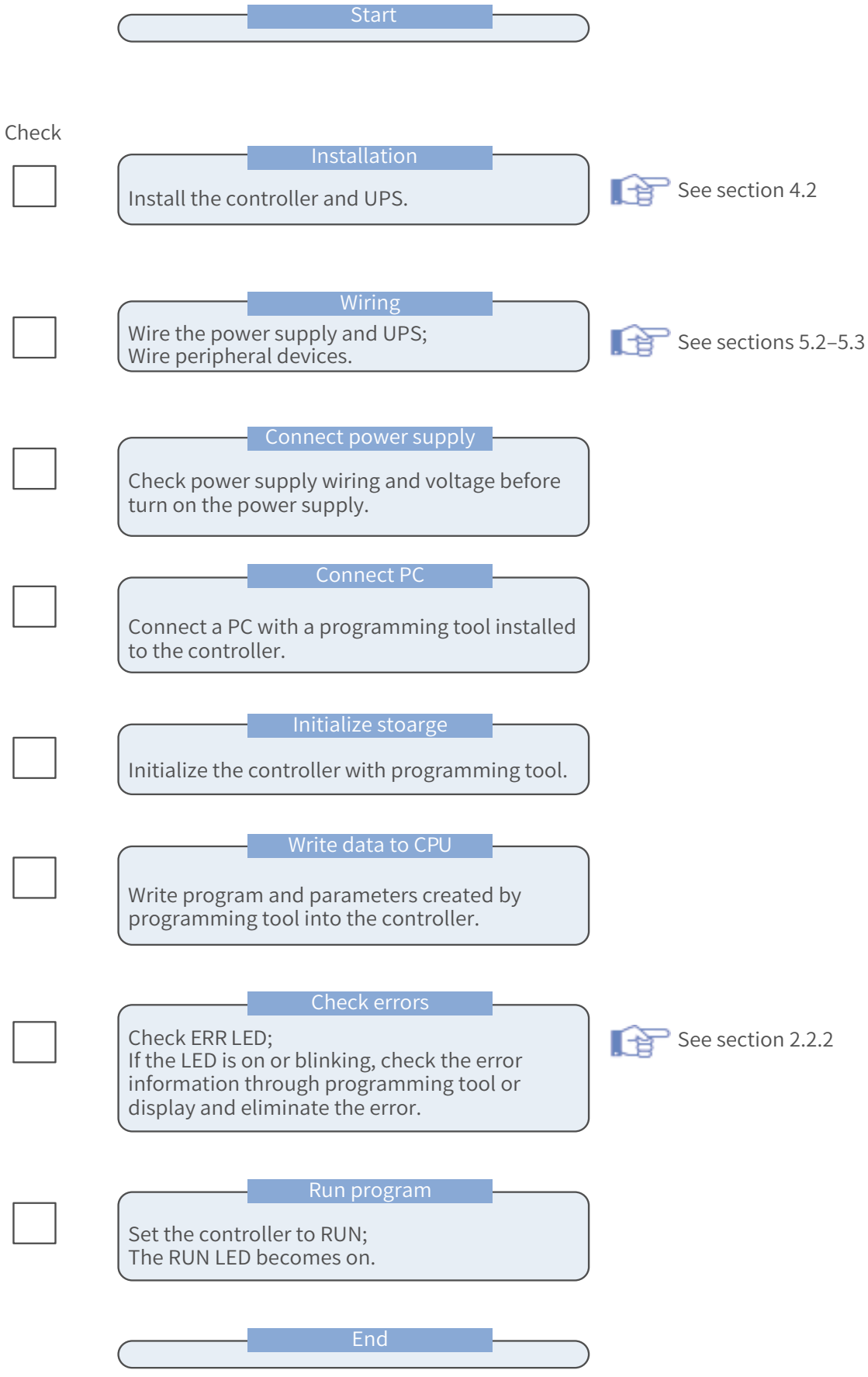
Medium-sized PLC Software User Guide

Product Features

- Appearance: Booksize all-metal design, with good heat dissipation and EMC performance.
- Axis capacity: Dual EtherCAT bus interfaces supporting up to 256 axes, electronic cam and electronic gear.
- Abundant motion control functions. Provides robot motion models and related function blocks, as well as PTP, CNC, and CAM motion function blocks.
- Information network: supports 2-channel 1 Gbps Gigabit Ethernet, ModbusTCP, and OPC UA Sever.
- Expandability: 4-channel high-speed USB interface, supporting keyboard and mouse operation, and development of other drivers. Support for multifunctional expansion cards to meet customized needs.
- Maintenance: Field diagnosis through an LCD display, pluggable connectors, and replaceable fan and battery.
- Ease of use: Codesys-based IEC programming model platform, supporting various function libraries.

Contents

System Startup Process



About this Guide

For the users who use this product for the first time, read the manual carefully. If in doubt concerning some functions or performances, contact the technical support personnel of Inovance to ensure correct use.

Standard Compliance

See the nameplate for standard compliance of a product.

Certification	Mark	Directive		Standard
CE certification		EMC directive	2014/30/EU	EN 61800-3
		LVD directive	2014/35/EU	EN 61800-5-1
		RoHS directive	2011/65/EU	EN 50581
TUV certification		-		EN 61800-5-1
UL certification		-		UL61800-5-1 C22.2 No.14-13
EAC certification		--		CU-TR
KCC certification		--		--
3C certification		--		--

- Any final equipment or device that integrates our products shall not be deemed CE compliant. It is the integrator's responsibility to prove the compliance.
- For more information about certification, consult our agent or sales persons.

Revision History

Date	Version	Description
2021-01	A00	First release

1 Safety Precautions

Disclaimer

1. Before installing, using, and maintaining this product, read the safety precautions carefully.

2. To avoid personal injury and equipment damage, follow the signs on the equipment and all the safety instructions in this user guide.

3. The "CAUTION", "WARNING" and "DANGER" signs are only supplements to the safety instructions.

4. Use this equipment in its intended environment. Damage caused by improper use is not covered by the warranty.

5. Inovance shall not be liable for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions

The "DANGER" sign indicates that failure to comply with the notice will result in severe personal injuries or even death.

The "WARNING" sign indicates that failure to comply with the notice may result in severe personal injuries or even death.

The "CAUTION" sign indicates that failure to comply with the notice may result in minor or moderate personal injury or damage to the equipment.

Safety Instructions

Unpacking
 ◆ Before unpacking, check that the exterior package of the equipment is not damaged, soaked, damp, or deformed. ◆ Unpack layer by layer. Violent knocking is strictly prohibited. ◆ When unpacking, check the equipment and accessories for damage, rust, and scratches. ◆ After unpacking, check the packing list to ensure that no item is missing.

WARNING

- Do not proceed if the equipment and accessories are damaged, corroded or used.
- Do not proceed in case of water seepage inside the equipment, component missing or damage.
- Do not install the equipment if the packing list is inconsistent with the product you received.

1. Read these safety instructions carefully.
2. Keep this user guide properly for future reference.
3. Before cleaning the device with a damp cloth, unplug the power cable. Do not use liquids or decontamination sprays to clean the equipment.
4. For equipment with a power cable, an easily accessible socket must be provided nearby.
5. Do not use the equipment in a humid environment.
6. Ensure that the device is placed on a reliable surface before installation. Accidental drop may cause damage to the equipment.
7. Before plugging the power cable of the equipment, check that the voltage of the socket is suitable.
8. Run the power cable in a place where people do not easily trip, and do not put anything on the cable.
9. Obey all warning signs on the equipment.
10. If the device will not be used for a long time, disconnect the power cable from the socket to avoid damage caused by excessive voltage ripple.
11. To avoid fire or short circuit, liquid ingress is not allowed in the equipment.
12. To ensure safety, the equipment cover must only be opened by a qualified engineer.
13. In case of the following situations, contact a technical person:

The power cable or connector is damaged;

Liquid ingress in the equipment;

The equipment was used in an excessively humid environment;

The equipment does not work properly, even if you operate it in strict accordance with the user guide;

The equipment is dropped or damaged;

Obvious damage on the surface of the equipment.

14. To avoid damage, the equipment must only be put in a place where temperature ranges from -20° C (-4° F) to 60° C (140° F).

Important notes

WARNING

Whenever working on the hardware, disconnect the voltage supply first. To avoid damage to sensitive power components caused by surge, do not wiring the equipment when the power is on. Only professional technicians are allowed to open the housing.

CAUTION

Before touching the circuit board, ground yourself to remove static electricity on your body. To avoid damage caused by static electricity, use a grounding wrist strap. Place all electronic components on a static-free surface or in an anti-static bag.

Danger

The controller is equipped with a real-time clock circuit powered by a battery. If the battery is incorrectly placed, there is a danger of explosion. Therefore, you should only use a battery that the manufacturer recommends, or equivalent. Dispose of used batteries according to the manufacturer's instructions.

- According to IEC 704-1: 1982, the sound pressure level of the operator's location should not be higher than 70 dB (A)

Disclaimer: This safety instruction complies with the requirements of IEC 704-1. Inovance assumes no legal responsibility for the accuracy of its contents

2 Product Information

The booksize all-metal AC800 controller delivers a variety of network interfaces and powerful motion control performance. The controller supports multiple interfaces, including up to 2 Gigabit Ethernet ports, 2 EtherCAT interfaces, 2 USB2.0 interfaces, 2 USB3.0 interfaces, 1 RS485 interface, 1 RS232 interface, and multi-function expansion interfaces.

The controller features wide working temperature range (-5 to 55 ° C) and excellent EMC performance. The controller is equipped with an Intel Celeron or Core i CPU with excellent computing capabilities, a 4 GB or above DDR4 memory and a large SSD, which make it a perfect match for high-load computing applications.

2.1 Nameplate and Model Number

Description of Model Number

AC810-0122-U0R0

Mark	Description
A	A series controller

Mark	Structure
P	Controller+display
C	Booksize
M	Modular
R	Rack
T	Tower

Mark	Series
7	700
8	800
9	900

Mark	CPU
0	Celeron
1	Core i series

Mark	Model
0	AC810
1	AC801
2	AC802 AC812

Mark	Software
R0	Software specifications+version

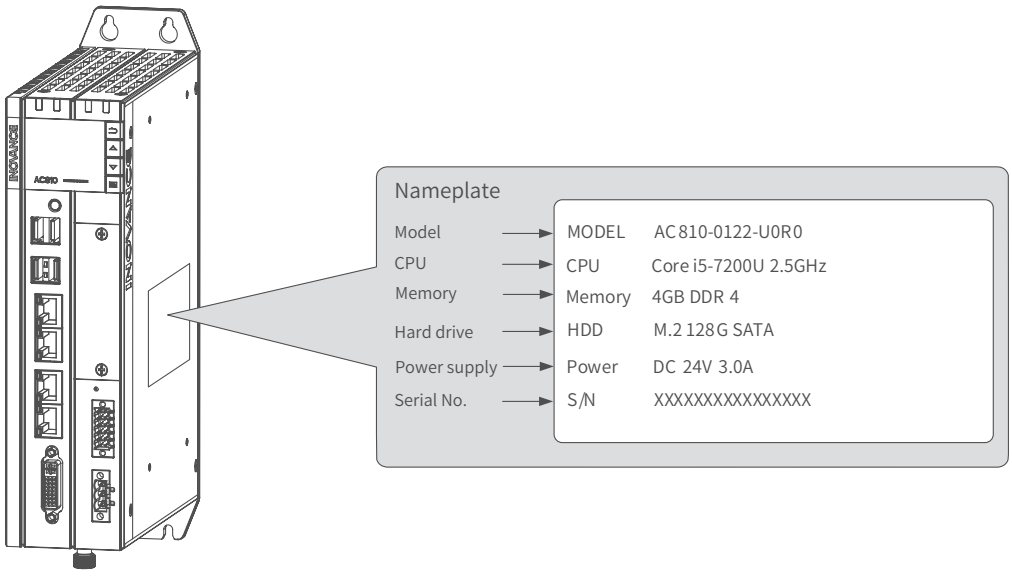
Mark	System Version
0	0

Mark	System
W	Windows
L	Linux
U	Ubuntu
V	Vxworks

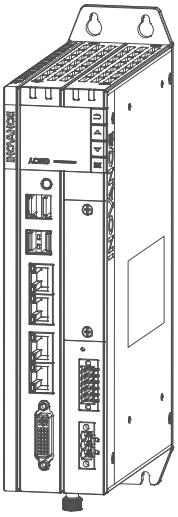
Mark	Hardware
First 2 digits	CPU (00–99)
3rd digit	Memory : 2^{n}×1G(1G~16G Max512G) (n is the third digit)
4th digit	SSD: 2^{n}×32G(32G~256G Max16T) (n is the fourth digit)

Mark	Expansion Card
First 3 digits	CAN: CAN expansion card
	HIO: HSIO expansiion card
	FER: ferroelectric memory card
	FAN: fan assembly
4th digit	Version

Description of Nameplate



2.2 Components and Functions



The AC800 series includes the following controllers and accessories:

Product Type	Description	Model	Serial No.
Booksize controller	Intel Core i7 U; 4 G memory; 128 G hard drive; 2 USB2.0 interfaces; 2 USB3.0 interfaces; 4 network ports; DVI-D; with display; multi-function expansion slot; internal Mini-PCIE expansion slot	AC812-0322-U0R0	01440143
Booksize controller	i5-7200u; 4 G memory; 128 G hard drive; 2 USB2.0 interfaces; 2 USB3.0 interfaces; 4 network ports; DVI-D; with display; multi-function expansion slot; internal Mini-PCIE expansion slot	AC810-0122-U0R0	01440038
Booksize controller	3855u; 4 G memory; 128 G hard drive; 2 USB2.0 interfaces; 2 USB3.0 interfaces; 4 network ports; DVI-D; with display; multi-function expansion slot; internal Mini-PCIE expansion slot	AC802-0222-U0R0	01440101
Booksize controller	3855u; 4 G memory; 64 G hard drive; 2 USB2.0 interfaces; 2 USB3.0 interfaces; 4 network ports; DVI-D; with display; internal Mini-PCIE expansion slot	AC801-0221-U0R0	01440103

2.2.1 Appearance

The external interfaces of the controller are shown in the following figure:

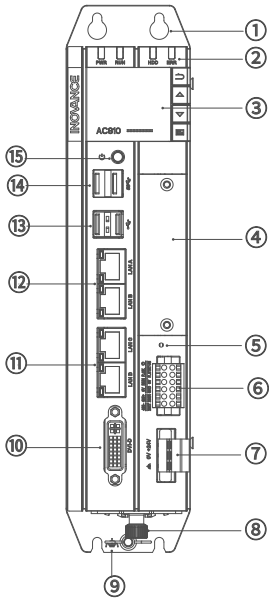
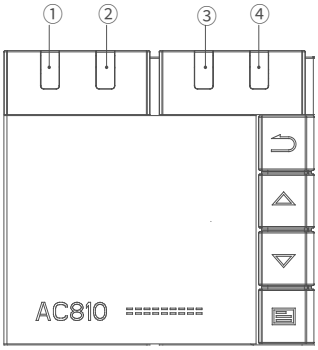


Figure 2-1 Controller interfaces

No.	Interface Name	Description
1	Rear earhook	Standard component
2	State indicator	For the specific definition of the indicators, see section 2.2.2
3	Display and buttons	For specific functions and operations, see section 6
4	Multi-functional expansion card slot	For CAN/optical fiber/RS232/RS485/high-speed I/O
5	Reset	Pinhole reset button
6	I/O communication interface	3 DI/2 DO, RS485/RS232, for details on the pins, see section 5.3.3
7	Power supply terminal	24 V voltage input
8	Fan slot locker	Remove this to replace the fan and RTC battery
9	Grounding terminal	Controller grounding
10	DVI-D interface	Standard DVI-D Display interface
11/12	LAN port	4 LAN ports: 2 for Ethernet and 2 for EtherCAT
13/14	USB Port	2 USB 2.0 ports and 2 USB 3.0 ports
15	Power button	Controller startup control

2.2.2 LED State Indicators



The indicators are described as follows:

No.	LED	Name	Function	State	Definition
1	PWR	Power indicator	Power status	Green	Off: abnormal On: normal
2	RUN	Running status indicator	Operational	Green	Off: user program is not running Blinking: recognizing device On: user program is running
3	HDD	Hard drive indicator	Hard drive state	Green	Off: no hard drive detected Blinking: hard drive is working
4	ERR	Error indicator	Operation error	Red	Off: normal Blinking: Low battery On: 1. overtemperature; 2. user program error; 3. system failure;

2.2.3 Power Button

The controller power button is located under the front panel of the controller. See the following for the details:

No.	Operation	Result
1	Power-on	The controller is turned on
2	Pressing the button after power-on	No operation
3	Long pressing the button after power-on	The controller is shut down
4	Pressing the button after the controller is shut down but power is still on	The controller is turned on

2.2.4 External Expansion Card Slot

AC800 series controller supports a multi-function expansion card, which can be used as an interface for CAN communication, optical fiber, COM, Ethernet port, and high-speed I/O.

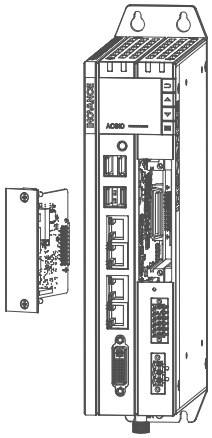


Figure 2-2 Expansion card slot

2.2.3 Display and Buttons

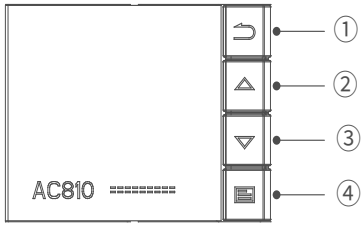


Figure 2-3 Display

The controller display is used to display basic information and perform simple commissioning. The specifications of the display are shown in the following table.

Item	Description
Dimensions	31.46*36.68
Visible area	16.3*28.78
Type	FSTN negative display
Resolution	128*64

Functions of the buttons are described in the following table:

Item	Description
Button 1	Back
Button 2	Page up
Button 3	Page down
Button 4	Enter

The display shows the information on the following. For detailed operation instructions, see section 7.

(1) system operation

(2) controller status

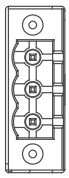
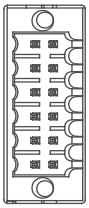
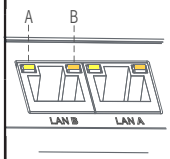
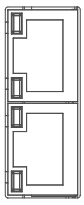
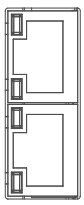
(3) fault and commissioning

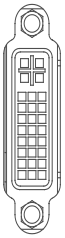
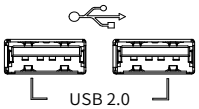
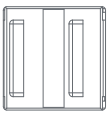
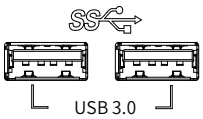
(4) basic controller information: basic hardware information, software version, and IP address

(5) upgrade and download progress

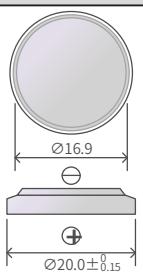
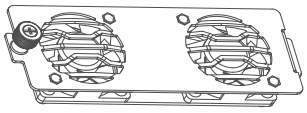
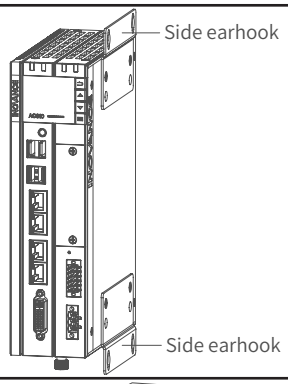
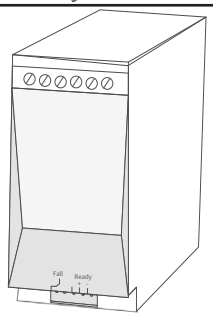
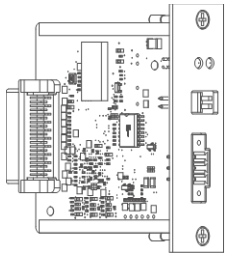
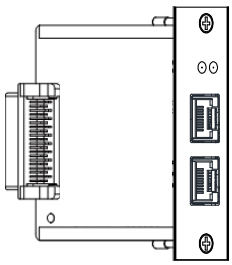
2.2.5 Interfaces

The following table summarizes all the interfaces of the controller:

<table>
<tr><th>No.</th><th>Name</th><th>Function</th><th>Description</th><th>Type</th></tr>
<tr><td>1</td><td>Input power supply</td><td>24 VDC (–20% to +20%)</td><td>3-pin pluggable 5.08 Eurostyle terminal, spring crimping, with fixing screws, black</td><td>  </td></tr>
<tr><td>2</td><td>I/O communication terminal</td><td>3DI and 2DO
RS485 interface
RS232 interface</td><td>2 * 6-pin pluggable 3.5 mm Eurostyle terminals, spring crimping, with fixing screws, black</td><td>  </td></tr>
<tr><td>3</td><td>EtherNET network port</td><td colspan="2">4 LAN ports: LAN A, LAN B, LAN C and LAN D (top to bottom).
Intel Ethernet controller chip compliant with 802.1Qav, IEEE1588/802.1AS and 802.3az and Intel® AMT (Intel AMT supports Core i processors with specific SKU). Four standard RJ-45 Ethernet interfaces. The LED indicators are described as follows:
<table>
<tr><th>Indicator</th><th>Function</th><th>Color</th><th>State</th><th>Meaning</th></tr>
<tr><td rowspan="5">  </td><td rowspan="3">A:Link/Act</td><td rowspan="3">Yellow</td><td></td><td>Off:
No connection</td></tr>
<tr><td></td><td>Blinking:
Sending and receiving data</td></tr>
<tr><td></td><td>On:
Connected</td></tr>
<tr><td rowspan="2">B:Speed</td><td rowspan="2">Green/ orange</td><td></td><td>Off:
1. connection at 10 Mbps
2. no connection</td></tr>
<tr><td></td><td>On:
Connection at 100 Mbps</td></tr>
<tr><td></td><td></td><td></td><td></td><td>On:
Connection at 1000 Mbps</td></tr>
</table>
Description:
<table>
<tr><th>Port</th><th>Function</th><th>Function</th></tr>
<tr><td>LAN A</td><td>Ethernet 1</td><td>1. System program commissioning
2. User program download and commissioning
3. MODBUS TCP protocol
4.Socket (TCP, UDP)</td></tr>
<tr><td>LAN B</td><td>Ethernet 2</td><td>1. MODBUS TCP protocol
2. Socket (TCP, UDP)</td></tr>
<tr><td>LAN C</td><td>EtherCAT1</td><td>1.EtherCAT protocol
2. auto scan
3. independent axis/IO</td></tr>
<tr><td>LAN D</td><td>EtherCAT2</td><td>1.EtherCAT protocol
2. auto scan
3. independent axis/IO</td></tr>
</table></td><td> 
  </td></tr>
<tr><td>4</td><td>EtherCAT interface</td><td colspan="2"></td><td></td></tr>
</table>

<table>
<tr><th>No.</th><th>Name</th><th>Function</th><th>Description</th><th>Type</th></tr>
<tr><td>5</td><td>DVI socket</td><td>Standard DVI-D communication</td><td>Standard DVI-I socket, white plastic, with shielded housing</td><td>  </td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">USB2.0</td><td colspan="3" rowspan="2">The controller provides 4 USB interfaces, all of which support plug-and-play and hot plugging, and can connect up to 127 external devices. Two USB 2.0 and two USB 3.0. The interfaces conform to the USB EHCI, Rev. 2.0 standard. Pin definition is as below:
 
USB 2.0
USB 2.0
Pin | Signal Name | Function
1 | VCC | Power
2 | DATA- | USB2.0 differential data signal
3 | DATA+
4 | GND | Power ground</td><td rowspan="2">  </td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">USB3.0</td></tr>
<tr><td colspan="3">USB 3.0
 
USB 3.0
Pin | Signal Name | Function
1 | VCC | Power
2 | DATA- | USB2.0 differential data signal
3 | DATA+
4 | GND | Power ground
5 | SSRX- | HS reception DIFF data signal
6 | SSRX+
7 | GND | Signal ground
8 | SSTX- | HS transmission DIFF data signal
9 | SSTX+</td><td>  </td></tr>
</table>

2.2.6 Spare Parts and Options

No.	Name	Illustration	Description	Ordering code
1	RTC button battery CR2032		3 V, 230 mAh	09050002
2	Fan assembly		70,000 Hours at 40 °C , 65% humidity, 90% CL	98050167
3	Side earhook bracket		The booksize controller is installed through an earhook. A side earhook is available as an option for special scenarios.	20181483
4	UPS		An external UPS is required for power failure retention. The controller supports Weidmüller's CP DC BUFFER 24V 20A.	72030012 (Part no.: 24 VDC BUFFER 5AS)
5	CAN expansion card 1		GA10-CAN1: 4-pin pluggable terminals; CANopen communication with a stepper drive or AC drive at a rate of up to 1Mbps.	01480011
6	CAN expansion card 2		GA10-CAN2: RJ45 connector; CANopen communication with a stepper drive or AC drive at a rate of up to 1Mbps.	01480016

3 Product Specifications

3.1 Basic Specifications

The AC800 series includes two controllers, AC802 and AC810, whose basic specifications are shown in the following table:

Item	AC801-0221-U0R0	AC802-0222-U0R0	AC810-0122-U0R0	AC812-0322-U0R0
Power supply	24 VDC (–20% to 20%)	24 VDC (–20% to 20%)	24 VDC (–20% to 20%)	24 VDC (–20% to 20%)
CPU	Intel 3855U, 1.6G Hz	Intel 3855U, 1.6 GHz	Intel i5-7200U, 2.5 GHz	Intel i7 U, 2.7 GHz
Memory capacity	4 GB	4 GB	4 GB	4 GB
Memory type	DDR4 SO-DIMM	DDR4 SO-DIMM	DDR4 SO-DIMM	DDR4 SO-DIMM
Hard drive capacity	64GB	128GB	128GB	128GB
Hard disk type	M.2(M key) SSD	M.2(M key) SSD	M.2(M key) SSD	M.2(M key) SSD
SPI FLASH	64Mbit	64Mbit	64Mbit	64Mbit
Expansion slot	Not supported	Supported	Supported	Supported
Programming method	61131-3-compliant programming languages (LD, ST, SFC, CFC)	IEC 61131-3-compliant programming languages (LD, ST, SFC, CFC)	IEC 61131-3-compliant programming languages (LD, ST, SFC, CFC)	IEC 61131-3-compliant programming languages (LD, ST, SFC, CFC)
Program execution mode	Compile and run	Compile and run	Compile and run	Compile and run
User program storage space	128 MB	128 MB	128 MB	128 MB
User data storage capacity	128 MB	128 MB	128 MB	128 MB
EtherCAT communication	1 (each supports up to 128 slaves)	2 (each supports up to 64 slaves)	2 (each supports up to 128 slaves)	2 (each supports up to 128 slaves)
Modbus TCP communication	2 (each supports up to 63 slaves)	2 (each supports up to 63 slaves)	2 (each supports up to 63 slaves)	2 (each supports up to 63 slaves)
Modbus (serial port) communication	2 (each supports up to 31 slaves)	2 (each supports up to 31 slaves)	2 (each supports up to 31 slaves)	2 (each supports up to 31 slaves)
CANopen communication	Not supported	1 (each supports up to 63 slaves)	1 (each supports up to 63 slaves)	1 (each supports up to 63 slaves)
Power failure retention memory	5 MB, requires external UPS	5 MB, requires external UPS	5 MB, requires external UPS	5 MB, requires external UPS
Dimensions (mm)	225 (H) * 60 (W) * 160 (D)	225 (H) * 60 (W) * 160 (D)	225 (H) * 60 (W) * 160 (D)	225 (H) * 60 (W) * 160 (D)
Weight (kg)	< 2.5 Kg	< 2.5 Kg	< 2.5 Kg	< 2.5 Kg
Cooling method	Natural cooling	Natural cooling	Fan cooling	Fan cooling
Battery life	3 years at 25° C, non-energized			

3.2 Environmental Specifications

The environmental specifications of the controller are shown in the following table:

<table>
<tr><th>Item</th><th colspan="2">Parameter Type</th><th>Operation</th><th>Transport</th><th>Storage</th></tr>
<tr><td rowspan="8">Environmental data (IEC60721-3)</td><td colspan="2">Class</td><td>IE33</td><td>IE22</td><td>IE12</td></tr>
<tr><td colspan="2">Temperature</td><td>-5–55°C</td><td>-40–70°C</td><td>-25–70°C</td></tr>
<tr><td colspan="2">Humidity</td><td colspan="3">10–95%, no-condensation</td></tr>
<tr><td rowspan="4">Vibration</td><td>Frequency</td><td>5-200Hz</td><td rowspan="5">2M2</td><td rowspan="5">1M2</td></tr>
<tr><td>Displacement</td><td>3.5 mm (direct installation) (< 8.4 Hz)</td></tr>
<tr><td>Acceleration</td><td>1 g (direct installation) (> 8.4 Hz)</td></tr>
<tr><td>Direction</td><td>3 axial directions</td></tr>
<tr><td colspan="2">Impact (collision)</td><td>15 g, 11 ms, half sine wave, 3 axial directions</td></tr>
<tr><td colspan="2">Altitude/air pressure</td><td>0–2000 m</td><td colspan="2">0–3000 m (⩽ 70 kPa)</td></tr>
</table>

3.3 EMC Specifications

The EMC specifications of the controller are shown in the following table:

No.	Item	Standard	Description
1	Conducted emission Power supply terminal	IEC61131-2:2007	Class A
2	Radiated emission Controller	IEC61131-2:2007	Class A
3	ESD	IEC61131-2:2007 IEC 61000-4-2: 2002	±6 kV, (contact discharge) ±8 kV, (air discharge)
4	RS: Radiated susceptibility	IEC61131-2:2007 IEC 61000-4-3: 2002	80 - 1000MHz 10V/m, 1710M-1784M 10V/m 1880M-1960 M 10V/m
5	EFT/Burst, DC Power supply terminal	IEC61131-2:2007 IEC 61000-4-4: 2006	±2 kV, direct injection (5/50ns, 5/100kHz)
6	EFT/Burst, Communication and signal port	IEC61131-2:2007 IEC 61000-4-4: 2006	±2 kV, capacitive coupling clamp (5/50ns, 5/100kHz)
7	CS: Conducted susceptibility DC Power supply terminal	IEC61131-2:2007 IEC 61000-4-6: 2003	(0.15-80)MHz, (1kHz, AM 80%) 10V, CDN
8	CS: conducted susceptibility Communication and signal port	IEC61131-2:2007 IEC 61000-4-6: 2003	(0.15-80)MHz, (1kHz, AM 80%) 10 V, electromagnetic clamp
9	Surge DC Power supply terminal	IEC61131-2:2007 IEC 61000-4-5: 1995	±1 kV (line to ground) ±0.5 kV (line to line)
10	Surge Communication and signal port	IEC61131-2:2007 IEC 61000-4-5: 1995	±1 kV (line to ground)

4 Installation and Fixing

4.1 Installation Requirements

4.1.1 Installation Environment

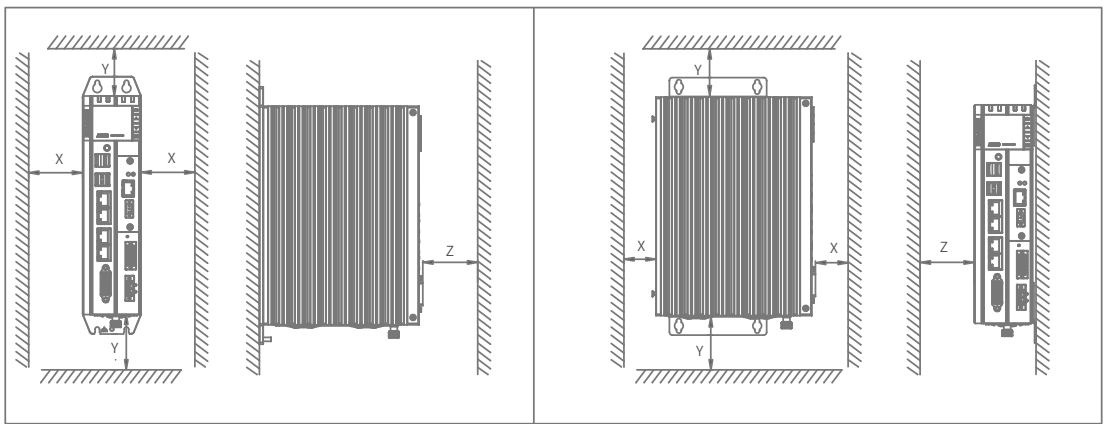
When installing the controller on the guide rail, take the operability, maintainability, and robustness into account. Do not install the module in a location which is subject to

- ambient temperature exceeding the range of -5 °C to 55 °C
- ambient humidity exceeding the range of 5% to 95%RH
- drastic temperature change and condensation
- corrosive and flammable gas
- conductive powders such as dust and iron powder, oil mist, salt, and organic solvents
- direct sunlight
- strong electric and magnetic fields
- vibration

4.1.2 Installation Space

To facilitate ventilation and module replacement, keep enough space between the module and its surroundings.

Installation diagram



Rear earhook bracket installation Side earhook bracket installation

Figure 4 -1 Installation space for booksize controller

The clearances are shown in the following table:

Direction	Min. dimension requirements (mm)
X	50
Y	100
Z	50

4.1.3 Safety Precautions

Precautions when installing the controller:

- Before installation, ensure that the controller is powered off;
- To avoid damage to the controller, do not drop or impact the controller's housing, terminal block,and connector;
- Do not disassemble the controller, otherwise the controller may be damaged;
- To avoid damage to the terminal and controller, tighten all fasteners to the specified torque;
- The left panel of the controller is equipped with an aluminum plate for heat dissipation. Exert extreme caution to avoid burn.

4.2 Installation

4.2.1 Installation Dimensions

The installation dimensions of the controller are shown in the following figure:

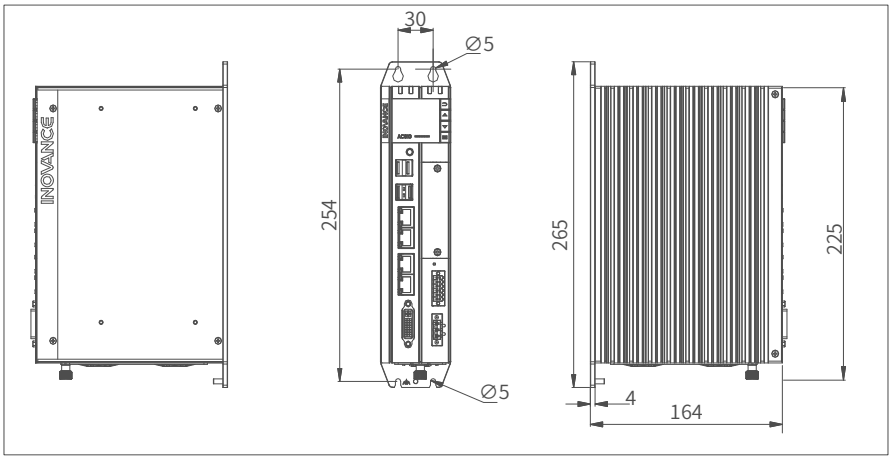


Figure 4-2 Installation dimensions (rear earhook)

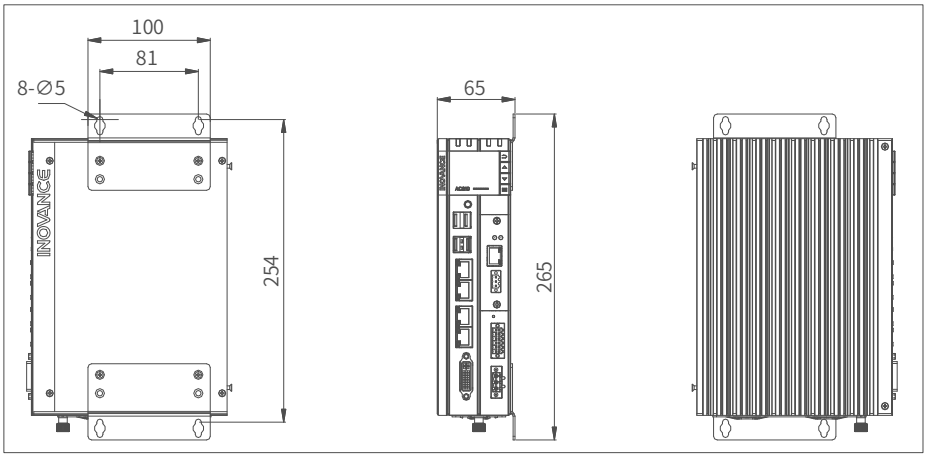
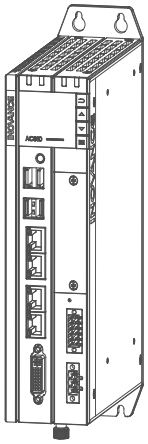


Figure 4-3 Installation dimensions (side earhook)

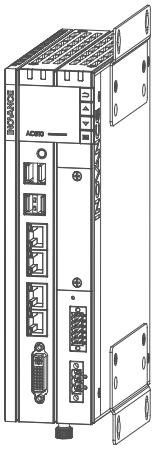
4.2.2 Installation Methods

The booksize controller can be installed through a rear earhook (booksize) or a side earhook (wall-mounted) to be adapted to cabinets of different sizes. The controller must be tightened with four screws to a tightening torque of 1.2 N.m. The controller is delivered with a rear earhook for booksize installation. The side earhook is optional for special occasions.

1) Rear earhook

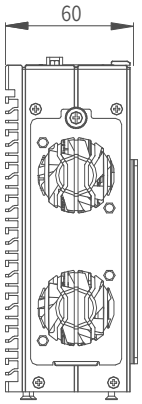


2) Side earhook



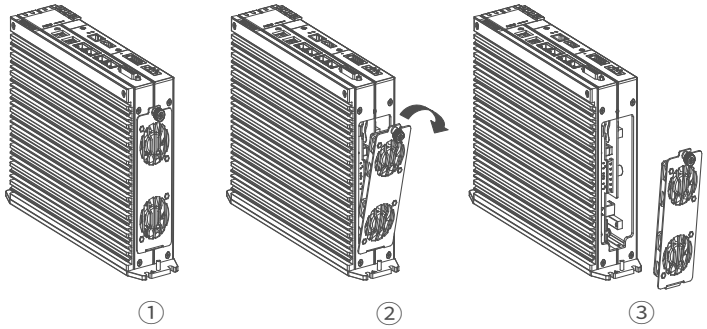
4.3 Installing and Removing the Fan

Fan (mm)



1 Removal

The bottom fan is removed as follows:



1) Unscrew the screws on the fan with your hand;

2) Pull out the fan assembly in the direction shown in the figure. Be careful not to damage the bottom wedge;

3) Remove the fan assembly.

2 Installation

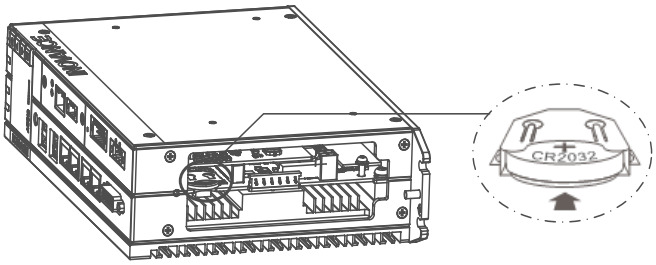
Install the fall in revere order.

4.4 Installing and Removing the Battery

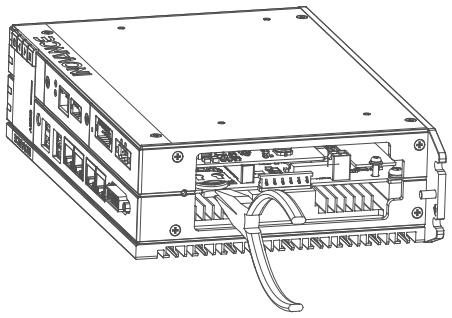
The battery can only be removed and installed after the fan is removed. Remove the fan as instructed in section 4.3 first.

Replacing the battery

1) Loosen the screws on the bottom of the controller and open the fan cover. You can see the battery as shown below.



2) Hold the battery with flat-nose pliers and take it out. Push the new battery into the battery slot with your hand.



Precautions:

1) After replacing the battery, the controller needs to be manually started.
2) When removing the battery, clamp the battery with flat-nose pliers. Be careful not to touch the surrounding parts to avoid damage. Live working is not allowed.
3) When installing the battery, see the label at the bottom of the battery to identify the battery's positive and negative poles.
4) After replacing the battery, power on the controller and check if the controller reports battery failure. If such an error is reported, check that the battery is installed correctly.
5) If the controller is powered on without any error, recalibrate the system clock.
6) Dispose of the replaced battery properly to avoid environmental pollution and personal injury.

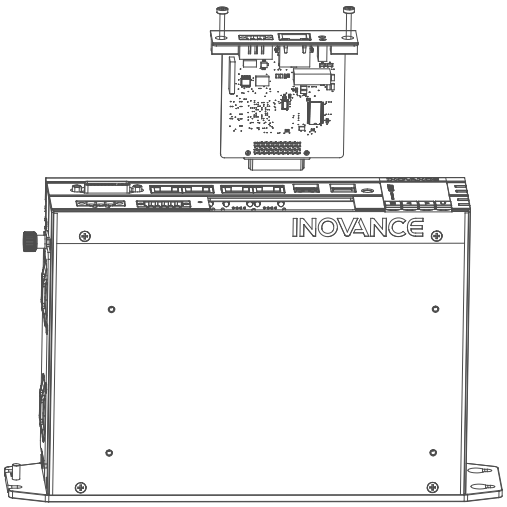
4.5 Installing and Removing the Expansion Card Slot

Removal

1) Loosen the screws on the cover of the slot with a screwdriver.

2) Pull the captive screws on both sides to the outside with both hands and take out the expansion slot.

The following diagram shows an expansion card which is completely removed from the slot:

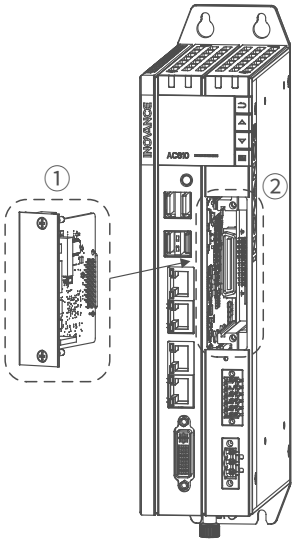


Installation

1) As shown in the figure below, insert the new expansion card ① into the card slot ② . Avoid hitting and scratching and ensure the direction is correct.

2) Ensure that the plane of the expansion card slot is level with the top cover of the controller.

3) Tighten the fixing screws on both sides of the expansion card cover with a screwdriver.



5 Wiring

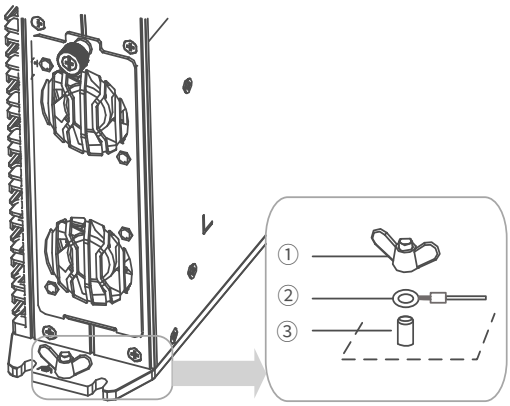
5.1 Wiring Instructions

This section describes the precautions for wiring the controller.

5.1.1 Grounding

A ground point is set on the power terminal of the controller and the rear earhook (⏚). Choose one of the grounding points as needed, and ground the controller with a grounding wire that is as thick and short as possible (less than 30 cm). It is recommended to use the grounding point on the rear earhook as possible.

A wing nut is used for grounding, with a tightening torque of 0.55–0.8 N.m:



1-wing nut; 2-grounding cable; 3-Grounding screw

Figure 5 -1 Grounding diagram

Grounding of shielded cable

Shielded cables must be used for communication signal cables. Ground as close to the module as possible so that the cable is not interfered with by electromagnetic induction. The exposed shield of the shielded cable must touch the grounding point as much as possible to ensure good contact.

Do not solder a PVC wire to the shield of the shielded cable for grounding. This will increase the high frequency impedance and attenuate the shielding effect. The shield of the communication signal cable needs to be grounded at both ends.

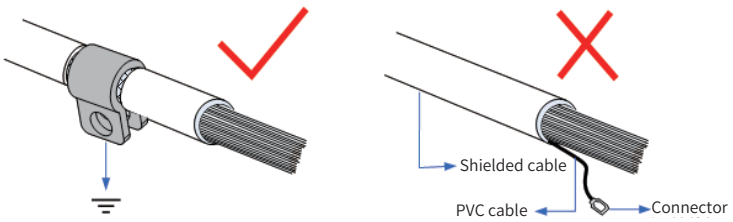


Figure 5-2 Grounding of shielded cable

5.1.2 Requirements

Low-voltage cables (< 1 KV) are generally divided into four types. Only cables of the same type can be put together to form a cable harness. Cables of different types should be separated and should not be crossed. If cross cannot be avoided, cross cables perpendicularly.

No.	Category	Description
1	Category I	Ethernet and EtherCAT interfaces
2	Category II	Low-speed digital communication signals (RS232 and RS485) and DI/DO signals
3	Category III	Low-voltage AC power distribution cable or DC power cable (such as DC 24 V power cable for a switching power supply)
4	Category IV	Input and output cables, welding machine cables, and power converter power cables

Keep a certain distance between different types of cables. For cables below 30 m, the minimum distance allowed is shown in the figure below.

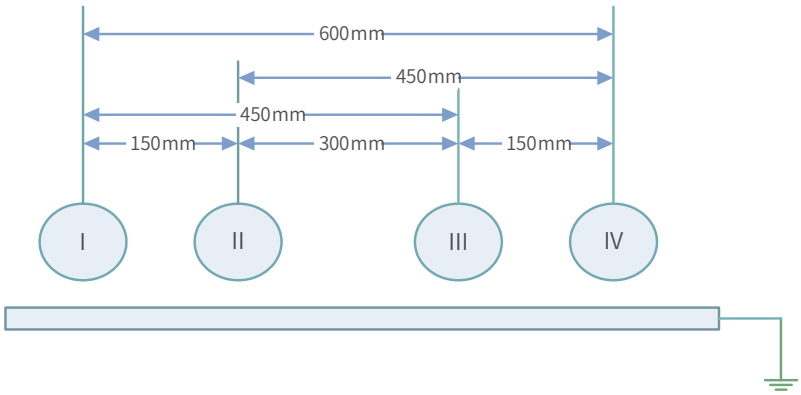


Figure 5-3 Distances between different types of cables

NOTE

- If two cables run parallel for an extended length, increase the distances accordingly.
- You can also install spliced shielding plates between different types of cables. To reduce cross interference, route all cables as closely as possible to the grounded structural components of the cabinet, such as the cabinet's mounting plate or rack components.

5.1.3 Installation of the Filter

If the controller is subject to a strong interference source (such as an AC drive), it is recommended to use an additional noise filter to suppress the interference.

The filter should be installed as close as possible to the power supply of the controller. Fix the filter to the conductive backplane through screws, and protect the area around the screws with paint to ensure reliable grounding. The outgoing and incoming cable for the filter should be routed separately to avoid noise coupling on the cable.

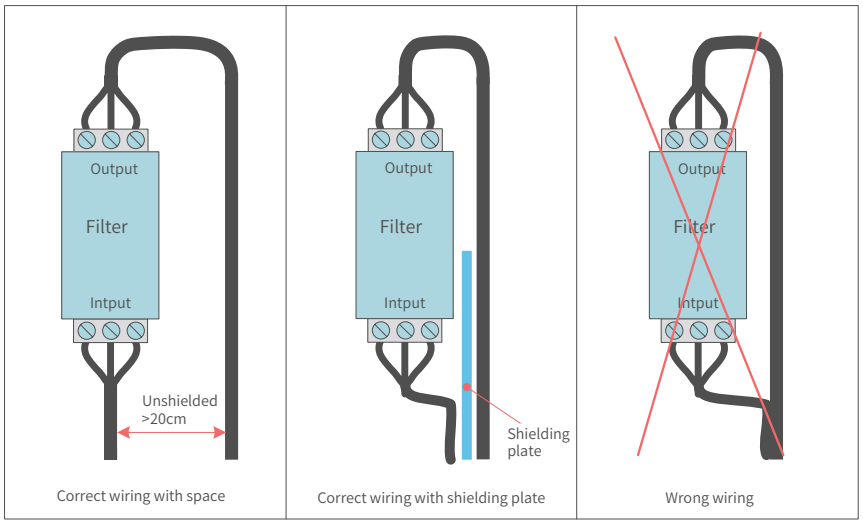


Figure 5-4 Filter installation

5.2 Wiring of Power Input Terminal

The power input terminal is a 3-pin screw-fixed pluggable terminal with a pitch of 5.08 mm. To facilitate wiring, replacement and maintenance, use a spring clamp crimping terminal. The following illustration shows how the power cable connector is inserted into the power input terminal:

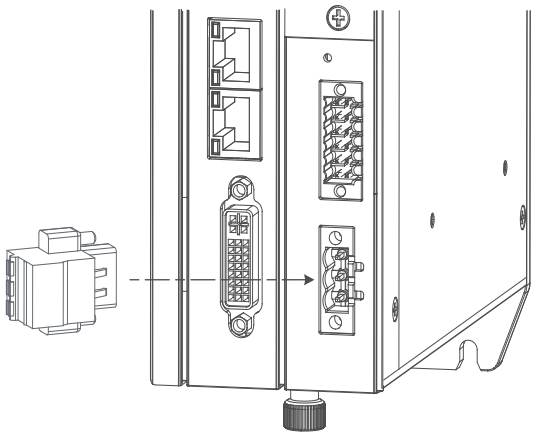
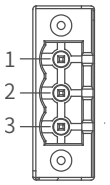


Figure 5-5 Wiring of power input terminal

1) Definition of the power terminal

Terminal	No.	Name	Type	Function
	1	+24 V	Input	DC input positive
	2	0 V	Input	DC input negative
	3	⏚	Grounding	Housing PE

2) Specifications of input power supply

No.	Item	Specifications
1	Input voltage	24 VDC (–20% to +20%)
2	Input current	3 A
3	Foolproof	Yes
4	Short-circuit protection	Yes

Note: power input is equipped with a fuse.

3) Power cable preparation

The power input cable uses a pin terminal. For preparation instructions, see section 5.8.

5.3 Wring of I/O Communication Interface

The IO/communication interface is a 12-pin (dual-row) 3.5 mm pitch terminal, which includes UPS auxiliary signal, RS-232 signal, RS-485 signal, startup signal, PLC program start/stop control signal and power status signal. Use a screw-fixed spring clamp crimping terminal to facilitate wiring, replacement and maintenance.

The following illustration shows how the I/O communication cable connector is inserted into the I/O terminal:

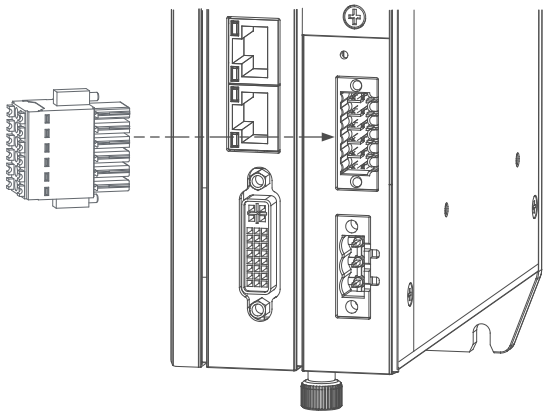
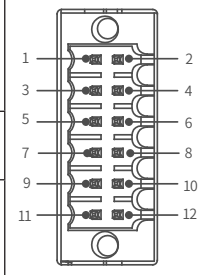


Figure 5-6 Wiring of User terminal

5.3.1 Wring of I/O Communication Interface

1 Definition of I/O communication interface

Description	Function	Signal Name	No.	I/O communication interface	No.	Signal Name	Function	Description
Starts the PLC through a 500ms high level width pulse	On signal (works with UPS or remote start)	⏻	1		2	P_STATUS	Power-on signal	Active after the controller is powered on
Enables power failure retention during ON-OFF switchover	Power failure detection signal	P_OK	3		4	P_STATUS	Operation status signal	Active after the controller is powered on
OFF during RUN; ON during STOP	RUN/STOP	RUN	5		6	0 V	DO reference ground	--
--	input common terminal	0 V	7		8	GND	communication reference ground	--
COM1	RS485+	485+	9		10	232R	RS232 reception	--
	RS485-	485-	11		12	232T	RS232 transmission	--

NOTE

The status control signals in the above table are dedicated I/Os and cannot be used otherwise.

2 Specifications of status control signals

The specifications of the status control signals are described in the following table:

Item	Input Signal (pins 1/3/5)		Output Signal (pins 2/4)
I/O Type	DC digital input		Transistor, high-level output
I/O Mode	SOURCE		SOURCE
In./out. Voltage Class	24 V (–20% to +20%)	OFF voltage: > 5 V	24 V (–20% to +20%)
		ON voltage: < 15 V	
ON response time	Less than 10 ms (hardware response time)		0.5 ms below (hardware response time)
OFF response time	Less than 10 ms (hardware response time)		0.5 ms below (hardware response time)

Item	Input Signal (pins 1/3/5)	Output Signal (pins 2/4)
Isolation mode	Optocoupler isolation	Optocoupler isolation
Short circuit-proof output	N/A	Yes

3 RS-485 specifications:

RS485 communication supports the Modbus RTU protocol and free protocol.

No.	Item	Specifications
1	Station No.	1 to 247
2	Communication rate (bps)	4.8K,9.6K,19.2K,38.4K,57.6K,115.2K
3	Data length	8 bits
4	Parity bit	None, odd, even
5	Stop bit	1,2
6	Max. number of stations	32

4 RS-232 specifications:

The communication specifications supported by the RS232 bus are as follows:

No.	Item	Specifications
1	Number of slaves	1
2	Communication rate (bps)*	300,600,1.2K,2.4K,4.8K,9.6K,19.2K,38.4K,57.6K,115.2K

NOTE When you use an RS-232 to RS-485 converter, it is recommended to use an external power supply to power the converter. If external power supply is unavailable, the communication baud rate should not exceed 9.6 Kbps.

5.3.2 Wiring of UPS and status I/Os

To enable power failure retention, a 24 VDC BUFFER 5AS UPS is required. The recommended wiring method for UPS and other I/O control signals is shown in the figure below:

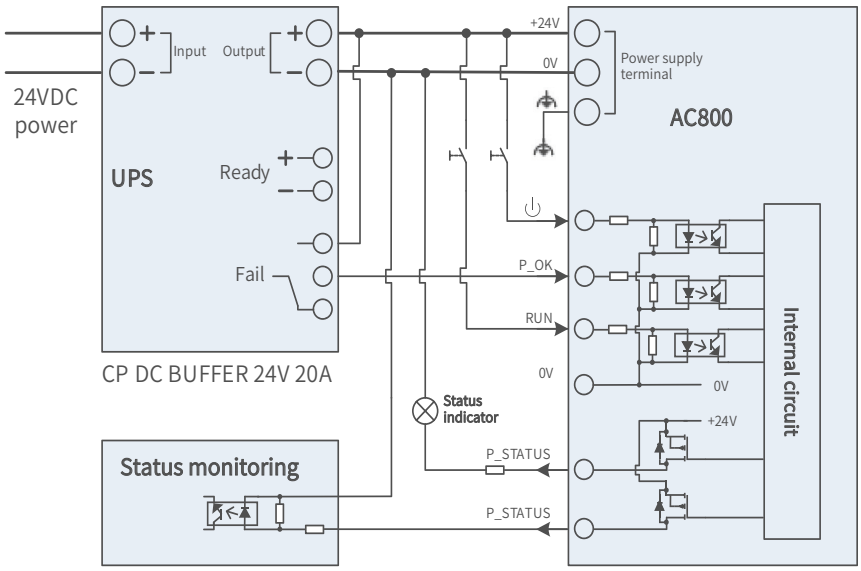


Figure 5 -7 UPS connection

Note: The 0V signal has been internally connected to the power supply terminal and no additional wiring is required.

UPS external power supply: The UPS needs a 24 VDC power supply. It is recommended to use a switched mode power supply with a load capacity above 10 A.

Wiring of P_OK power failure detection signal: See the above figure. When a power failure occurs, the signal turns from ON to OFF, and the PLC saves data and shuts down.

Wiring of power-on signal: If a power failure occurs, take measures according to the following situations:

- If the power is recovered before the UPS runs out of power, press the power button on the PLC to turn it on. If the PLC is in a cabinet and it is difficult to reach the button, it is recommended to connect the 24V power supply to the ⏻ signal through a non-self-lock switch which can be used to start the PLC.
- If the power is recovered after the UPS runs out of power, a UPS charging signal is sent to the PLC and the PLC starts.

NOTE

Normally, only the two signals associated with P_OK must be connected. The other status signals can be connected as needed.

5.3.3 RS485 Bus Wiring Instructions

The RS485 bus topology is shown below. Using shielded twisted cables to connect 485 bus is recommended. The 485+ and 485- terminals are connected with a twisted pair cable. A 120 Ω termination resistor is attached to both ends of the bus to prevent signal reflection. All RS485 reference grounds are connected with each other. Up to 32 nodes can be connected and the distance between each node and the bus must be less than 3 m.

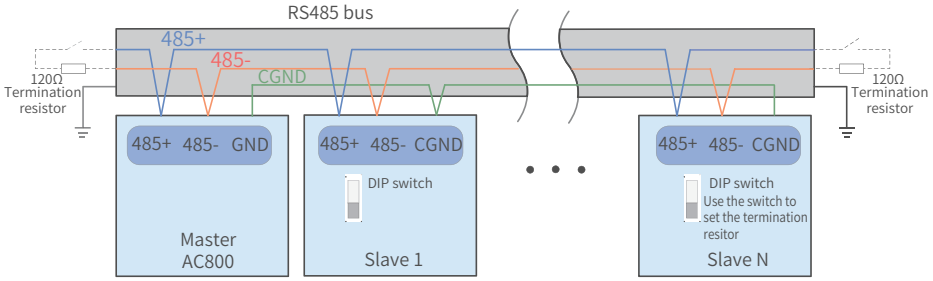


Figure 5-8 RS485 communication connection

Multi-node connection

When there are a large number of nodes, the daisy chain topology must be used. If a branch line connection is required, the distance from the bus to the node should be less than 3 m and as short as possible. Star connection is strictly prohibited. The following diagram shows the common bus topologies:

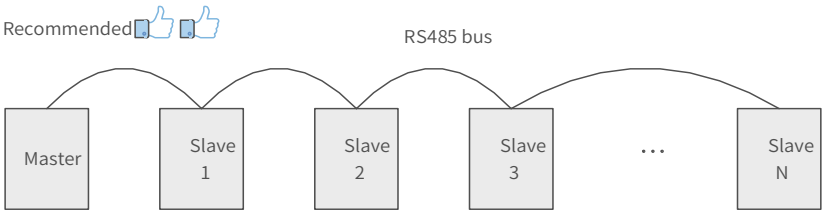


Figure 5-9 Daisy chain

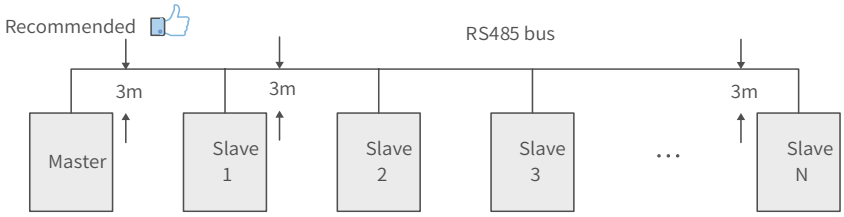


Figure 5-10 Branch line

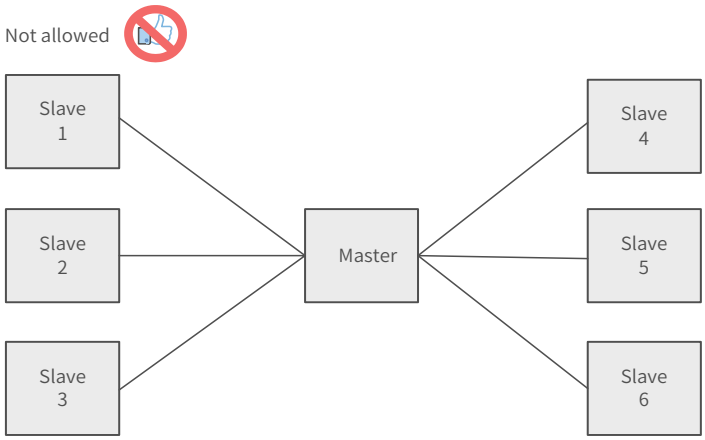
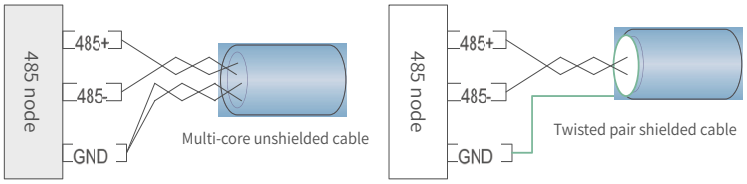


Figure 5-11 Star

Terminal wiring

The controller provides three terminals (485+, 485- and GND) for RS485 communication. Ensure that the RS485 bus contains three cables, and the terminals are connected correctly. If you are using shielded cables, the shielding layer must be connected to the GND terminal, rather than any other location (including housings and equipment ground terminals).

Due to the attenuation effect of the cable, it is recommended to use AGW26 or thicker cables for a connection length greater than 3 m. it is recommended to connect the 485+ and 485- terminals with twisted pair cables.



a Multi-core unshielded cable b Twisted pair shielded cable

Figure 5-12 Terminal wiring diagram

- Recommended cable 1: Multi-core cable with twisted-pair cables. One pair of twisted-pair cables are connected to 485+ and 485- terminals, and the other are twisted together as the GND cable.
- Recommended cable 2: Shielded twisted-pair cable. The twisted-pair cable is used for 485+ and 485- terminals, and the shield is connected to the GND.

NOTE

The shield must only be connected to GND, not to the field ground.

5.3.4 RS232 Bus Wiring Instructions

When you use an RS-232 to RS-485 converter, it is recommended to use an external power supply to power the converter. external power supply is unavailable, the baud rate should not exceed 9.6 Kbps.

5.5 Wring of Network Ports

The controller provides 4 Gigabit network ports, which are described as follows:

No.	Port	Function
1	LAN A	Programming port (used for downloading and monitoring)

No.	Port	Function
2	LAN B	Modbus/TCP communication port
3	LAN C	EtherCAT master port
4	LAN D	

5.5.1 Communication Specifications

1. Gigabit Ethernet specifications

Number of ports and hardware characteristics

2 standard Ethernet interfaces: LAN A which supports standard MODBUS/TCP protocol, and LAN B which supports program download and monitoring.

Supported protocols and settings: MODBUS/TCP

Item	Modbus/TCP master/slave
Station No.	1~247
Communication rate	10M/100M/1000M adaptive Ethernet Interface
Data length	8 bits
Parity bit	None, odd, even
Stop bit	1,2
Max. number of stations	64
Special function	Diagnosis

2. EtherCAT communication specifications

The LAN C and LAN D interfaces support EtherCAT communication:

Item	Specifications
Communication protocol	EtherCAT protocol
Service supported	FoE, CoE (PDO, SDO)
Min. sync period of 12-axis cam	500 us (typical)
Max. synchronous jitter	±40 us
max. number of axes	256
Synchronization mode	Distributed clock for the servo and I/O synchronization for I/O
Physical layer	100BASE-TX
Baud rate	100 Mbit/s (100Base-TX)
Duplex mode	Full duplex
Topology	Ring topology
Transmission medium	Network cable, see the next section for cable specifications
Transmission distance	Less than 100 m between two nodes
Number of slaves	256
EtherCAT frame length	44–1498 bytes
Process data	Max. 1486 bytes per Ethernet frame
Synchronization jitter of two slave stations	< 1 us
Update time	About 30 us for 1,000 digital inputs and outputs About 100 us for 32 servo axes
Ring network	Not supported
Auto scan	Supported

5.5.2 Ethernet Cabling

Networking diagram

With the Ethernet port, the controller can be connected point-to-point with devices such as a computer and HMI through an Ethernet cable.

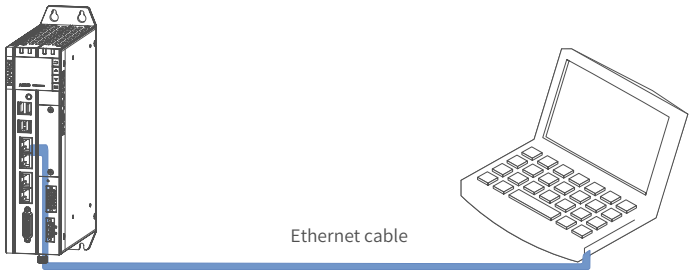


Figure 5-13 Connection between controller and PC

The controller can also be connected to a hub or switch, which is further connected with other network devices, through an Ethernet cable to achieve multi-point connection.

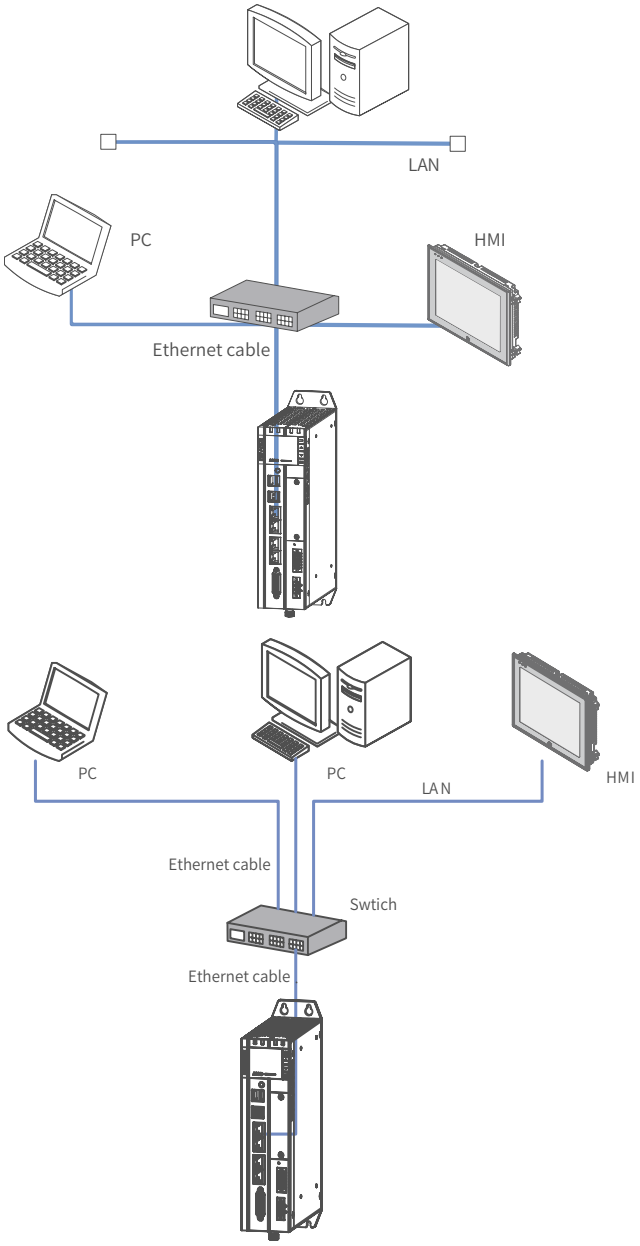


Figure 5 -14 Connection between CPU module and other devices through a switch

5.5.3 EtherCAT Cabling

Networking diagram

With the EtherCAT port, the controller can be connected to various servo drives, slave modules or expansion modules that support EtherCAT communication.

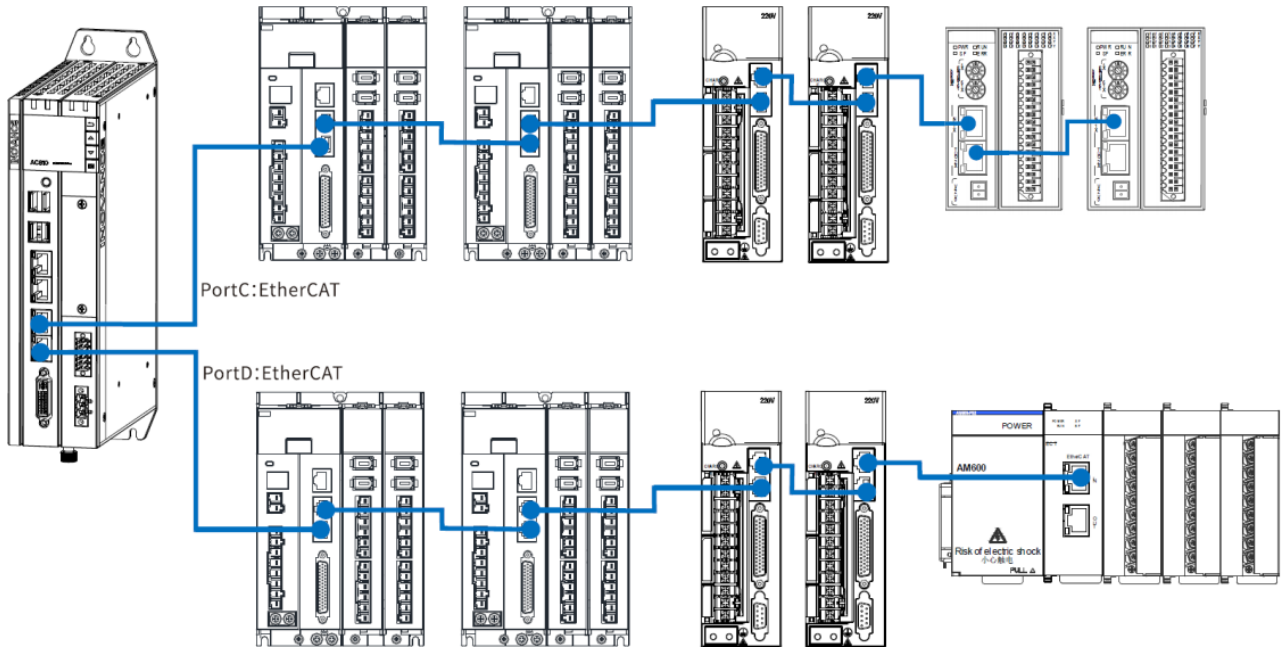


Figure 5 -15 Connection between CPU module and other devices through EtherCAT port

5.5.4 Requirements on Communication Cable

Connection of RJ45 cable

Connection: Insert the cable connector into the RJ45 port of the communication module until you hear a click sound.

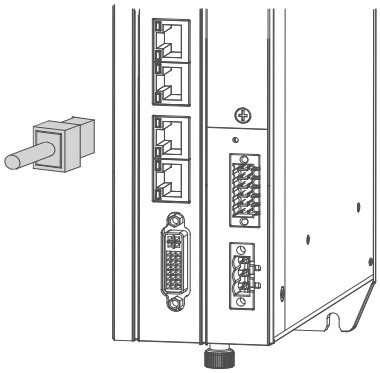


Figure 5 -16 Connection of RJ45 cable

Removal: Press the release tab of the connector to pull out the connector and module horizontally.

Requirements on Ethernet cable

Use Cat 5e shielded twisted pair (STP) cables with an iron-shelled connector

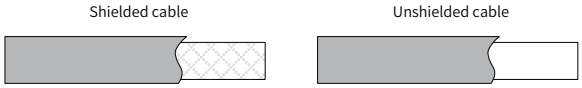


Figure 5-17 Requirements on Ethernet cable

Cable Preparation

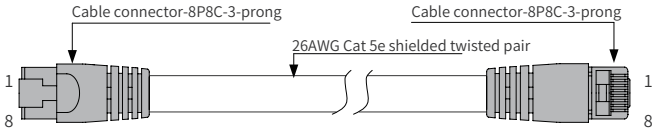


Figure 5 -18 EtherCAT cable preparation

Signal pins

Pin	Signal (Ethernet 1000 Mbps)	Signal Direction	Signal Description
1	TD+	Output	Data transmission+
2	TD-	Output	Data transmission-
3	RD+	Input	Data reception+
4	--(DC+*)	--(bidirectional)	Not used (data C+)
5	--(DC-)	--(bidirectional)	Not used (data C+)
6	RD-	Input	Data reception–
7	--(DD+)	--(bidirectional)	Not used (data D+)
8	--(DD-)	--(bidirectional)	Not used (data D-)

*Note: The definition of pins 4, 5, 7, and 8 under 1000 Mbps differs from that under 100 Mbps. Pay attention to the information in parentheses.

■ Length requirements:

When an EtherCAT bus is used, the length of the cable between the devices must not exceed 100 meters. Exceeding this length will attenuate the signal and affect communication.

■ Technical requirements:

1) 100% continuity test, no short circuit, open circuit, misalignment and poor contact;

2) The cable length is within the allowable tolerance range;

Use a shielded cable as the EtherCAT bus for network data transmission, with the following specifications:

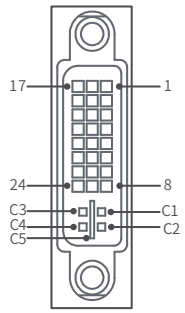
Item	Specifications
Cable type	Flexible crossover cable, S-FTP, Cat 5e
Complied standards:	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TI Abulletin TSB, EIA/TIA SB40-A&TSB36
Conductor cross section	AWG26
Conductor type	Twisted pair
Pair	4

5.6 Display Interface

The controller provides a standard DVI-D display interface with the following specifications (no cable is provided):

Item	Specifications
Signal Type	DVI-D (digital signal)
Description	24+1
Number of channels	1
Max. resolution	1920 x 1200 @60Hz

The DVI-D interface is detailed in the following table:

Illustration	Pin	Signal	Pin	Signal
	1	TMDS data 2-	13	TMDS data 3+
	2	TMDS data 2+	14	+5 V power supply
	3	TMDS data 2/4 mask	15	GND (+5 V circuit)
	4	TMDS data 4-	16	Hot plug detection
	5	TMDS data 4+	17	TMDS data 0-
	6	DDC clock	18	TMDS data 0+
	7	DDC data	19	TMDS data 0/5 mask
	8	Analog vertical synchronization	20	TMDS data 5-
	9	TMDS data 1-	21	TMDS data 5+
	10	TMDS data 1+	22	TMDS clock mask
	11	TMDS data 1/3 mask	23	TMDS clock+
	12	TMDS data 3-	24	TMDS clock-
	C1	Analog vertical synchronization	C4	Analog horizontal synchronization
	C2	Analog green	C5	AGND (RGB circuit)
	C3	Analog blue		

NOTE

It is recommended to use a standard DVI-D cable. If your display does not provide a DVI-D interface, you can use a DVI to VGA converter.

5.7 USB Port

The controller provides 4 USB ports: 2 USB2.0 ports (③ and ④ in the figure below), and 2 USB3.0 ports (① and ② in the figure below).

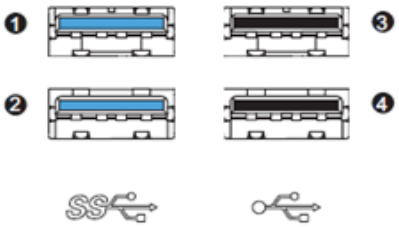


Figure 5 -19 USB port

The specifications of the USB ports are as follows:

Item	USB2.0	USB3.0
Max. communication rate	480Mbps	5.0Gbps
Max. output current at 5 V	500mA	900mA
Max. communication distance	5 m	3 m
Isolated	No	No

NOTE

- For industrial applications, select industry-level USB devices to ensure reliability.
- To prevent interference, avoid long distance connection and run the cable according to the routing specifications.
- If interference cannot be removed, install a magnetic ring at both ends of the communication cable to filter the interference.

5.8 Cable Selection and Preparation

5.8.1 Cable Selection

Signal	Material Name	Applicable Cable Diameter	
		Chinese standard/ MM2	AWG
Power signal cable	Pin terminal	0.8-2.5	18-12
User signal cable	Pin terminal	0.2-1.5	24-16
Grounding cable	Tubular lug	⩾ 2	⩽ 14
Ethernet cable	--	--	--

5.8.2 Cable Preparation

1 Pin terminal cable

Preparation procedure:

1) Strip the insulation layer for a length of 6 mm.

2) Pass the cable through the cable marking sleeve.

3) Insert the exposed conductor into the terminal, and then crimp the terminal with a crimping tool recommended by the terminal manufacturer.

4) Use a 20 mm heat-shrink tube (Φ3) to wrap the copper tube of the terminal and then perform heat shrink.

5) Insert the terminal into the screw terminal block.

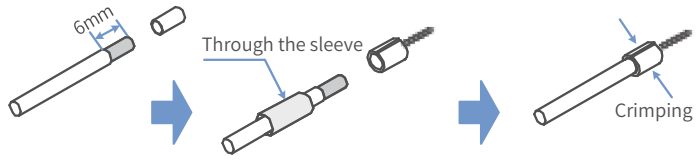


Figure 5-20 Preparation of pin terminal cable

2 Cord end terminal cable

Preparation procedure:

1) Remove the insulation layer of the cable so that a length of 6mm of the conductor is exposed, and put the cable through a cable marking sleeve.

2) Insert the exposed conductor into the terminal, and then crimp the terminal with a crimping tool recommended by the terminal manufacturer.

3) Insert the terminal into the terminal block and fix it with a screwdriver to a tightening torque not more than 0.45 N.m.

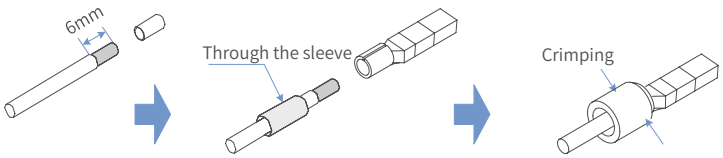
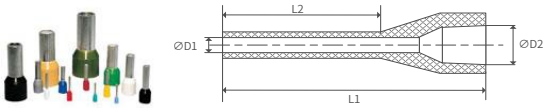


Figure 5-21 Preparation of cord end terminal cable

For the 2*6-pin dual-row connector used for I/O and communication, the requirements are as follows:



Category	Terminal Size	Length of Metal Part L2	Stripping Length
Tubular end with sheath (max. conductor OD: 2.6 mm)	1.00mm² [H1.0/18D]	12 mm	15 mm
	0.75mm² [H0.75/18D]	12 mm	14 mm
	0.50mm² [H0.5/16D]	10 mm	12 mm
	0.34mm² [H0.34/12D]	8 mm	10 mm
	0.25mm² [H0.25/12D]	8 mm	10 mm
Naked end	1.50mm² [H1.5/10D]	10 mm	10 mm
Tubular end with sheath (crimping two conductors)	2 x 0.20mm² [H0.5/16D]	10 mm	12 mm
	2 x 0.34mm² [H0.5/16D]	12 mm	15 mm

6 Operating Instructions

6.1 Power-on

safety precautions
 ◆ Do not touch the terminal when the power is on. Failure to comply may result in electric shock. ◆ Do not disassemble this product. Especially when the power is on or shortly after the power is turned off. Because high voltage can be generated by the voltage boost inside the power supply, which may cause electric shock. In addition, internal sharp parts and high temperatures may cause injuries.
 It takes about 15 to 25 or 70 to 80 seconds from power-on to entering the operating mode. During this period, the output remains OFF or a value corresponding to module/slave settings, and external communication is unavailable. To avoid malfunction of external devices, you should construct a fail-safe circuit with "Output during Operation" of the power supply unit.

6.1.1 PLC Startup

The PLC becomes operable after the following time since power-on. Before the PLC enters the operating state, the RUN LED indicator is off.

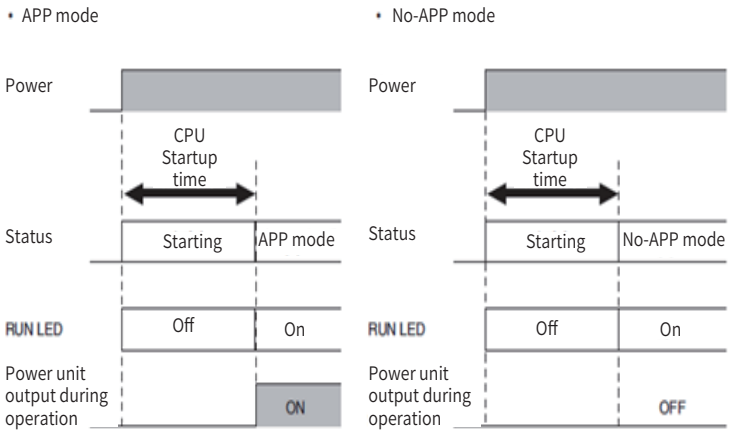
PLC startup time after power-on

- If the programming port (enp1s0) is set to a static IP address, it takes about 15 to 25 seconds for the PLC to enter operating mode.
- If the programming port (enp1s0) is set to a DHCP-assigned address, but no DHCP server or network connection is available, it takes about 70 to 80 seconds for the PLC to enter operating mode.

1) Some EtherCAT slaves allow you to set the maximum waiting time (1–200s), but the PLC only becomes operable when the EtherCAT master starts operation, regardless of the waiting time.
2) The EtherCAT master function module treats a slave that has not been activated within the maximum waiting time as an error.

6.1.2 Operation when PLC is Operable

If there is an app when the PLC becomes operable, the PLC enters operating state immediately. You can also change the setting to make the PLC to enter stop state instead. If the operation mode of the user program (App) is "NO-APP" when the power is on, the PLC immediately enters No-APP state.



6.2 Power-off

safety precautions
WARNING ◆ The AC800 series controller will continue to operate normally for a certain period of time when an instantaneous power failure occurs, so it may receive error signals from external devices affected by the instantaneous power failure. ◆ Take fail-safe measures externally and monitor the power supply voltage on the external device side as necessary, and also take safety measures in the user program.

See the table below.

Power-off voltage

UPS Code	Power input	Power-off voltage
72030012	DC24V	Below 22.5 V

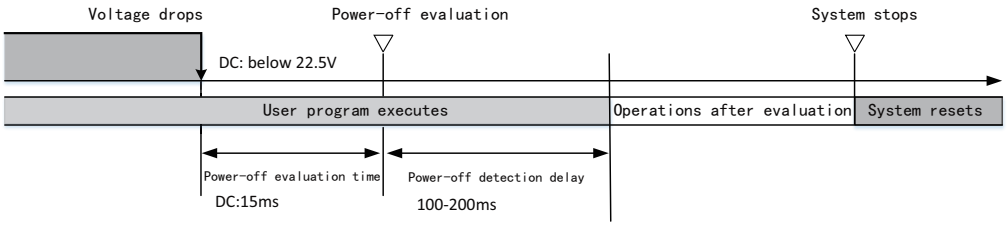
Power Type

Power Type	Power-off evaluation time
Non-UPS	Power off immediately
UPS	15 ms

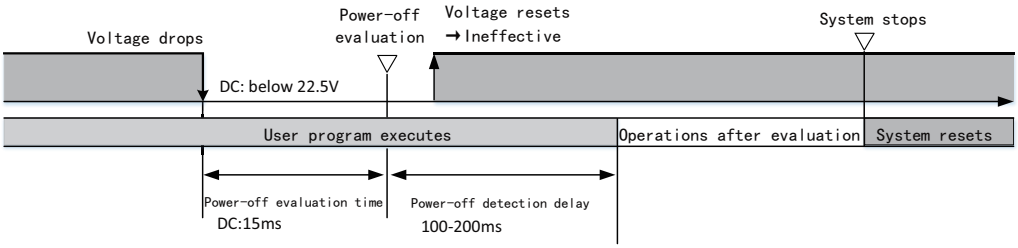
6.2.1 Operation at Power-off

When a power failure occurs because the following power-off evaluation time is exceeded, the user program is terminated. The PLC is stopped when the operations after power-off evaluation are performed (see section 6.2.3).

Power Type	Time before power-off
Non-UPS	Power off immediately
UPS	Above 15 ms



After the power-off evaluation time, even if the voltage is reset, the PLC still stops running, as shown in the following figure:



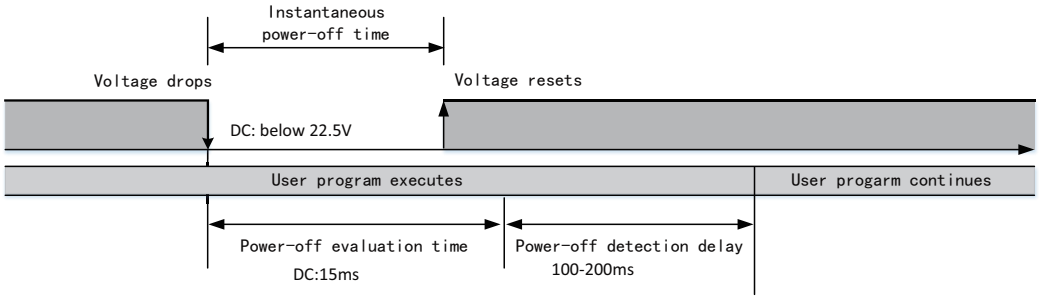
The times in the above figure are described as follows:

Item	Description
Power-off evaluation time	The time after the power supply voltage drops until the UPS power supply detects that the power supply is off. Before it is determined that the power supply is off, the PLC continues to operate.
Power-off detection delay	The period from the time when the UPS detects that the power supply is off to the time when the PLC starts to perform power-off operations.

6.2.2 Operations at Instantaneous Power-off

When an instantaneous power-off occurs within the following time, the user program will continue to be executed.

Power Type	Time before Power-off
Non-UPS	Power off immediately
UPS	Below 15 ms



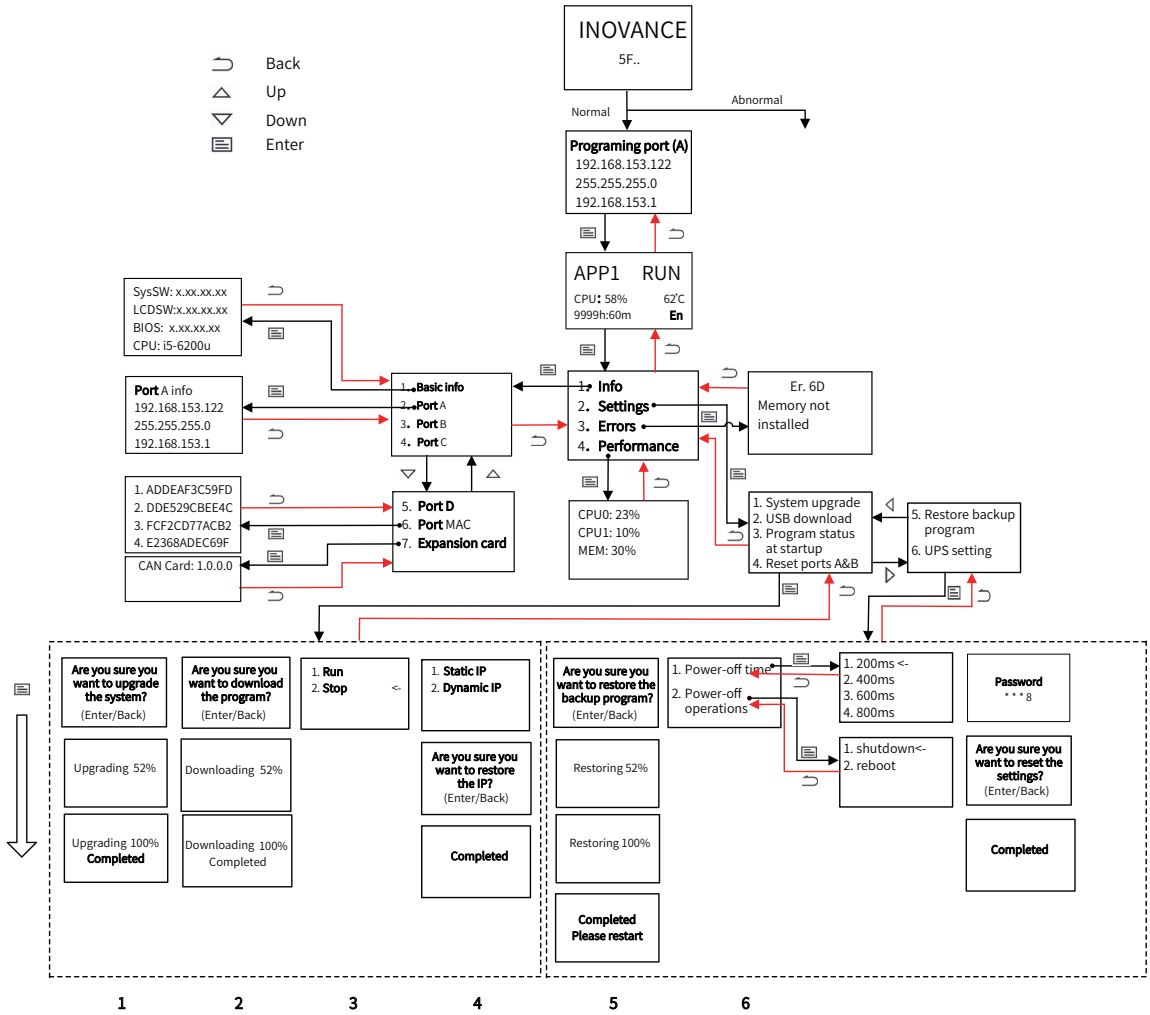
6.2.3 Operations after Power-off Estimation

If the UPS determines that the power supply is off, it notifies the PLC through I/O to perform the following operations before the PLC stops.

Item		Description
Processing	Transferring user program (Including online editing)	Interrupt. The controller will be in a no-app state at the next power-on, waiting for the user application program to be downloaded.
	Executing user program	The execution is terminated and the data is saved in the hard drive.

6.3 Display

6.3.1 Menus



After the PLC is turned on, the BIOS starts and the main page, which includes the Inovance logo and self-test codes, displays.

- If no error occurs, you will see the programming interface page;
- If any error occurs, the error code and detailed error information will display (see section 6.3.3.3 for details).

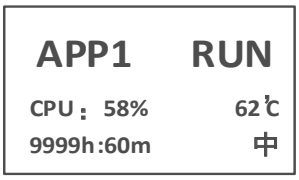
Programming interface page: Display the network information of the programming interface (network port A). You can connect to the interface to configure the PLC and download programs. Press "Enter" or wait 30 seconds, you will exit the programming interface page and return to the main page.

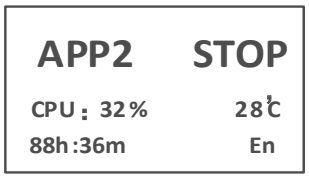
NOTE

To prevent endless loop caused by improper programming, you can force the application program not to run at next PLC startup by pressing the combination key "Back" + "Enter", +, in the programming interface page. (see section 6.3.3.2 (4) for details).

6.3.2 Main Page

The main page is the most frequently used page when the PLC is running. It is used to display the current status parameters of the PLC, including the application running status (such as "APP1 RUN"), the total CPU occupancy rate, temperature, the operation duration and the current system language

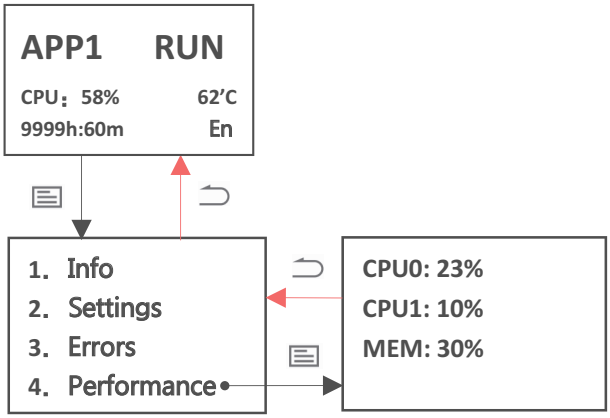




You can check the running status of multiple applications by pressing the "Up" and "Down" keys

- Long press the Enter key for 3 seconds to switch the system language
- Press Enter to enter the "Main Menu" interface

Note: Through "Main Menu"-"Performance", you can also view the individual occupancy rate of each CPU core and memory occupancy (see section 6.3.3.4 for details)



6.3.3 Main Menu

1 Info

The "Info" menu provides basic information such as PLC related version numbers and the CPU model, as well as information about each network port:

(1) Basic information

Category	Definition	Display
SysSW	Board software version	SysSW: 1.10.40.0 LCDSW: 1.0.20.0 BIOS: 5.12.0.3 CPU: i5- 6200u
LCDSW	Display software version	
BIOS	BIOS version	
CPU	CPU model	

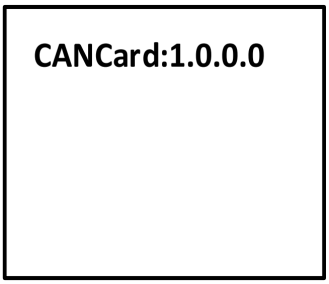
(2) Network port information

Network port screenprint	Function	Network port information	Physical address [Note]	Remarks
LAN A	EtherNET	Port A info 192.168.153.122 255.255.255.0 192.168.153.1	1. ADDEAF3C59FD 2. DDE529CBEE4C 3. FCF2CD77ACB2 4. E2368ADEC69F	Support factory recovery, see section 6.3.3.2 (5) for details
LAN B				--
LAN C	EtherCAT			
LAN D				--

[Note] The physical address of each network port can be viewed through "Network Port MAC".

(3) Expansion card

The equipment supports CAN expansion cards (option). After inserting the CAN card, you can check the software version of the card through the following screen. If the information fails to show, reconnect the card. If the problem remains, contact Inovance.



2 Settings

(1) Password

The Settings menu contains high permission level operations on the PLC. If you have not set a password through the InoProShop tool (see xxxxxx for details) or you set the password to "0000" (regarded as no password), you can use the Settings menu directly. If you have set a valid 4-digit password through the InoProShop tool, you will be prompted to enter the password when entering the submenu of Settings.

Password page

- After you enter the password page, the first digit of the password, which is 0, flashes. Press the Up/Down keys to cycle through digits from 0 to 9.
- When you get the desired digit, press "Enter" to input the digit.
- Every time one digit is input, the focus will move to the next input field. Enter the digits in sequence to input the whole password.
- You cannot backspace any input digit because no such function is provided. You have to press the Back key to return to the previous menu, and then press the Enter key to re-enter the password page.

Entering the password

- The digit that you are currently inputing will be displayed in plain text. After pressing Enter, the digits

will be ciphered.

- After you input the last digit and press Enter, if the password is wrong, all digits will be cleared you have to re-enter the password.
- If the password is correct, press Enter to enter the next menu.

NOTE

Within 5 minutes after entering the correct password, you will enter the menu that requires permission without prompting for the password again. After 5 minutes or when the password is changed, you will be prompted to enter the password again when you re-enter the menu that requires permission.

(2) System upgrade

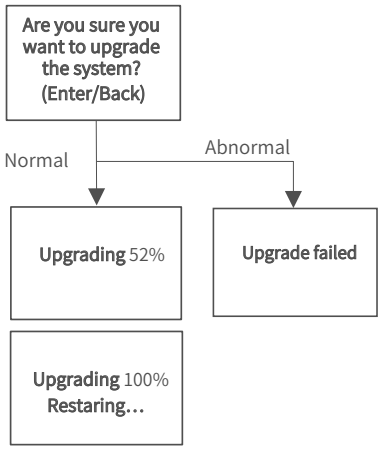
You can use the System Upgrade menu to upgrade the PLC system. After the upgrade is successful, you can view the current version information through Information-Basic Information menu.

Insert the USB drive containing the system upgrade package into any USB interface of the PLC, and select the System Upgrade menu to upgrade the system as instructed. When the upgrade progress reaches 100%, the PLC restarts. If any error occurs during upgrade, an "upgrade failed" message displays.

Requirements for upgrade

a. A USB drive containing the system upgrade package provided by the manufacturer;

b. The upgrade package is in the root directory of the USB drive (if there are multiple upgrade packages, only the upgrade package in the root directory is valid).



NOTE

1) The system will be upgrade in an exclusive mode, that is, all key operations are temporarily disabled until the upgrade is successful or fails.
2) USB upgrade and InoProShop tool upgrade cannot be performed at the same time. If you start the system upgrade through the USB drive first, and then perform the upgrade again with the InoProShop tool, the tool will prompt "Firmware is being updated". If you start the system upgrade through the InoProShop tool first, and then perform the upgrade again through the USB drive, the display will prompt "Software tool is upgrading the system, please try again later."

(3) Download USB program

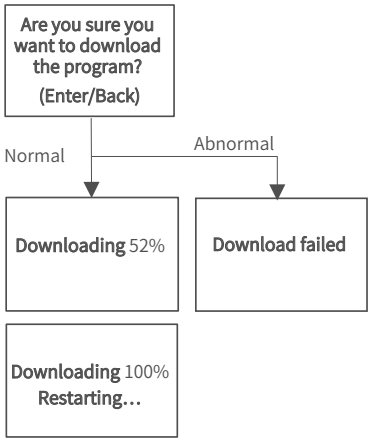
You can use the Download USB Program menu to download the application program package in the USB drive and replace the application program in PLC.

Insert the USB drive containing the application program package into any USB interface of the PLC, and enter the "Download USB program" menu to download the program as instructed. When the download progress reaches 100%, a "download successful" message displays. If any error occurs during upgrade, a "download failed" message displays.

Requirements for download

a. The USB drive contains the application package named Application.userprg, which is packaged and generated by InoProShop.

b. The package is in the root directory of the USB drive (if there are multiple packages, only the package in the root directory is valid).



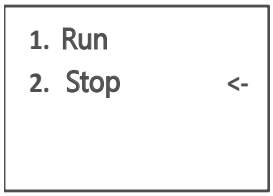
NOTE

1) The program download is performed in an exclusive mode, that is, all key operations are temporarily disabled until the download is successful or fails.
2) USB download and InoProShop tool download cannot be performed at the same time. If you download the program through a USB drive first, and then perform the download again with the InoProShop tool, the tool will prompt "USB drive is updating firmware or downloading application program". If you download the program through InoProShop first, and then perform the download again through the USB drive, the display will prompt "Software tool is downloading program, please try again later".

(4) Program status at startup

You can use the Program Status at Startup menu to set the status of the application program at the next PLC startup (the factory default is "1. Run program at startup").

Select this menu to enter the setting page. "<-" indicates the default startup status of the application program set in the PLC. Use the Up and Down keys to select the status, and press the Enter key to confirm the selection. After the setting is completed, "<-" will move to the selected item. If there are multiple applications in the PLC, this operation will take effect for all of them.



NOTE

Error handling

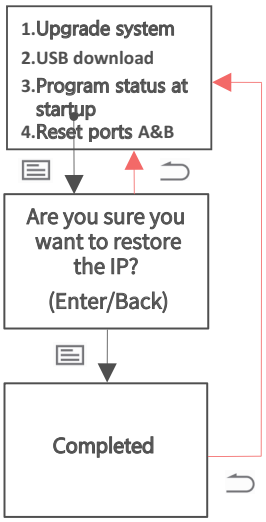
If any error occurs, the screen will show the error code in most cases. See section 3 Errors for details. If the screen does not show the error code and does not repond to any key operation, the PC may be freezing due to, for example, an infinite loop in the application. You can terminate and delete the application.

Steps

1. Press Back+Enter for 5s at the startup screen to set "Program status at startup" to "Stop".
2. Reset the equipment through InoProShop (see Medium Size PLC Programming Software User Guide) and download the correct application.

(5) Reset network ports A and B

You can use Reset Network Ports A and B to restore the network ports A and B to the default IP or dynamic IP (as shown in the figure below). After the restoration is done, by setting the PC to the same network segment as the PLC, you can connect to and operate the PLC through a cable (For example, you can connect to port A by setting the PC to 192.168.1.X, and to port B by setting PC to 192.168.2.X).

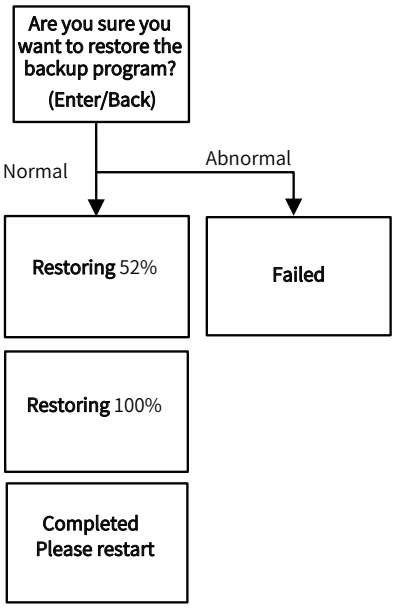


The network port information is shown in following table:

Network port screenprint	LAN A	LAN B
Factory default	Port A info 192.168.1.88 255.255.255.0 192.168.11	Port B info 192.168.2.88 255.255.255.0 0. 0. 0. 0

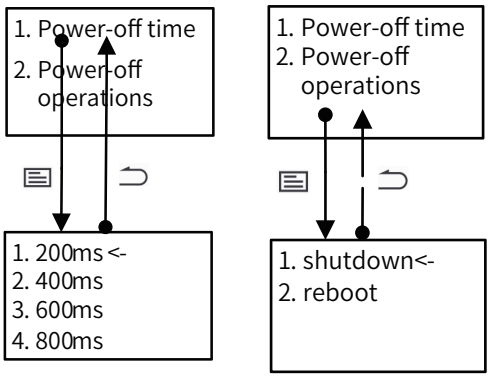
(6) Restore backup program

You can use Restore Backup Program to restore the APP to the latest backup program, no matter if it is online-modified or downloaded. The latest one is determined according to the modification time. The detailed procedure is as follows. After the restoration is done, restart the controller so that the latest back program can be applied to the APP.



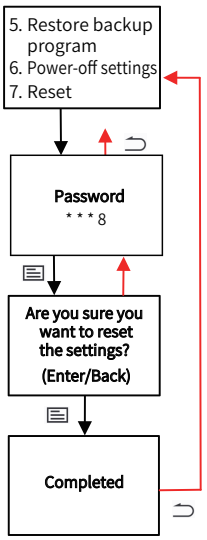
(7) UPS settings.

You can use the UPS Settings menu to set the UPS power-off time and power-off operation. You can set the power-off time to 200 ms, 400 ms, 600 ms, and 800 ms, and set the power-off operation to restart and shutdown.



(8) Restore default settings

You can use the Restore Default Settings menu to restore the PLC to default settings, clear user password and application programs.



3 Errors

Startup error

After the PLC starts, it performs the BIOS self-test and displays the Inovance logo and self-test codes. If an error is detected during the self-test, you will be led to the error page, which shows the error code and detailed information (for details, see Appendix I).

If if error occurs during startup, see Appendix I or contact the manufacturer for support.

BIOS error

The display stays on the startup interface and displays the Inovance logo, which is caused by two errors that may occur during BIOS startup:

- After the self-test codes are sent, the system fails to be loaded. The display stays on the startup interface, showing the Inovance logo and self-test codes. After two minutes, the "Er.A1 Failed to switch BIOS to OS" message displays. You can return to the startup interface by pressing the Back key.
- No self-test code is sent when the BIOS starts. The display stays on the startup interface, showing the Inovance logo and self-test codes. After one minute, the "Er.A2 No BIOS data was received" message

displays to warn the user that the BIOS self-test codes have not been sent. You can return to the startup interface by pressing the Back key.

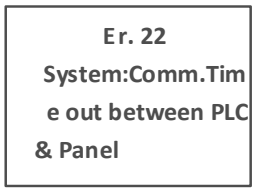
Program and system error

■ Error window

When the display stays on the programming interface page or the main page, if an error occurs in the program or system, the screen will show the error code and detailed information. You can return to the previous interface through the Back key. If there are multiple errors, you can use the Up and Down keys to view the full information of an error, and use the Enter key to display the next error.

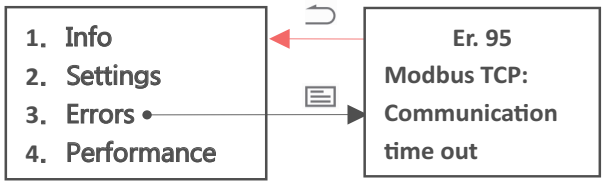
NOTE

Special error Er.22 indicates that the communication between the display and the PLC is disconnected. It is due to system crash or communication timeout between the screen and board daemon process caused by an endless loop in an application program. In this case, the display cannot obtain and display PLC information, and cannot be operated by keys. The user can restart the computer and use the key combination Back+Enter on the programming interface page to forcibly modify the APP's next startup status to "stop". When the error is removed, the error information will be cleared.



■ Errors menu

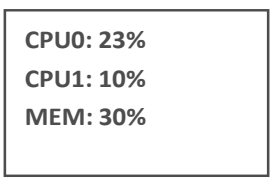
You can view the detailed information of current errors of the PLC through the Errors menu. If there are multiple errors, you can use the "Up" and "Down" keys to view the full information of an error, and use the Enter key to switch to the next error (for details, see Appendix 1).



If the PLC is free from any error, it will display "NO ERROR!!".

4 Performance

You can use the Performance menu to view the status parameters related to PLC performance, including the CPU core occupancy rate and memory occupancy rate.



6.3.4 Page Switchover

When you switch pages on the display panel:

1) The screen will automatically turn off if there is no key operation for 15 minutes (the screen will not turn off when there is an error window). When the screen is off, press any key to wake up the screen.

2) The programming interface page displays for 30 seconds before switching to the active page.

3) Apart from the programming interface page and error page, if you stay on a page for 2 minutes without pressing any key, the screen will switch to the active page.

4) When you insert a USB drive and it is correctly recognized by the system, the display will directly switch to the Settings menu, which is convenient for further operations. However, this does not apply to an interactive page (a page related to upgrade, download, password input, and network port recovery).

6.4 System Upgrade

There are two ways to upgrade the PLC system

(1) InoProShop

You can connect to the PLC with the InoProShop tool and select the PLC firmware upgrade package and accessory firmware upgrade package provided by the manufacturer to upgrade the PLC (see InoProShop User Guide for details)

(2) USB drive

You can upgrade the PLC by inserting a USB flash drive on the PLC and carry out the upgrade procedure on the display (see Setting (2) in section 6.3.3)

7 Programming Tool

7.1 Obtaining the Programming Tool

You can obtain the user programming software InoProShop and all kinds of documents of the controller by the following ways:

- You can obtain a CD copy of the installation files from any distributor.
- You can download the software installation package for free on the Service and Support–Downloads page at www.inovance.com.

Due to the continuous improvement of products and information by the company, you are recommended to timely update the software and related documents.

7.2 Programming Environment and Software Installation

7.2.1 Environmental Requirements

A desktop PC or portable PC meeting the following requirements:

1) OS: Windows 7 or 10, 64-bit is recommended
2) Memory: more than 4 GB
3) Space: more than 5 GB free hard drive space.

The PC and AC800 controller are connected in the following way:

Connection Method	Requirements	Remarks
LAN network cable connection (recommended)	A free LAN network port in the local network and a network cable	Support long distance connection between the PC and controller. For example, you can program a controller which is operating in the workshop just in your office. Faster communication rate.

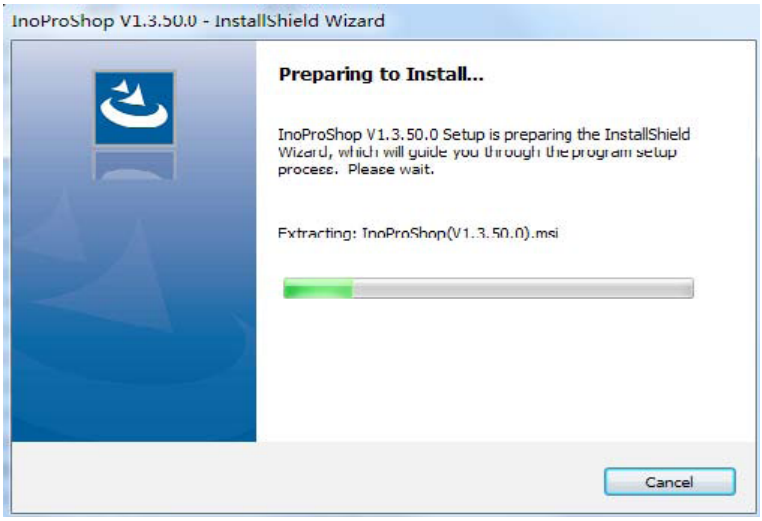
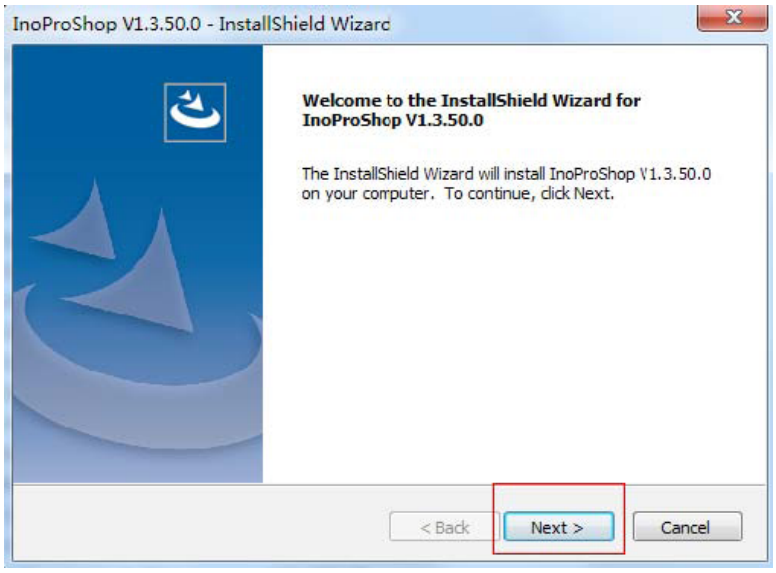
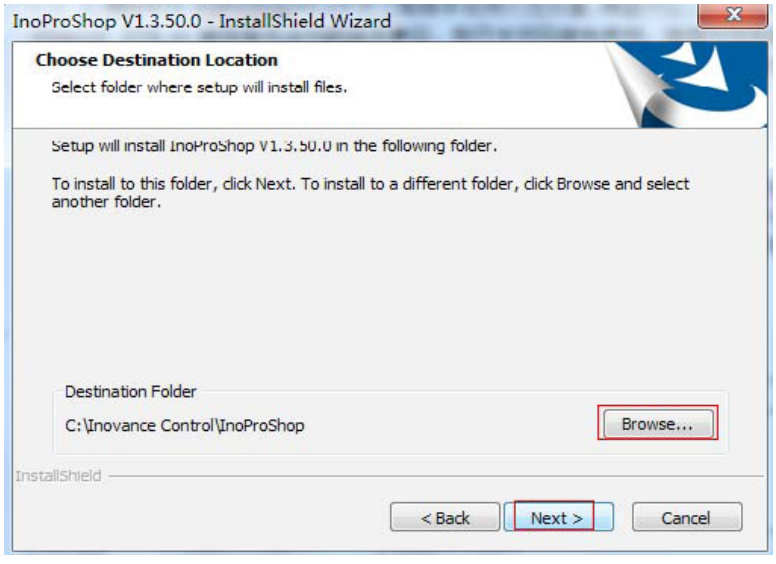
7.2.2 Installation

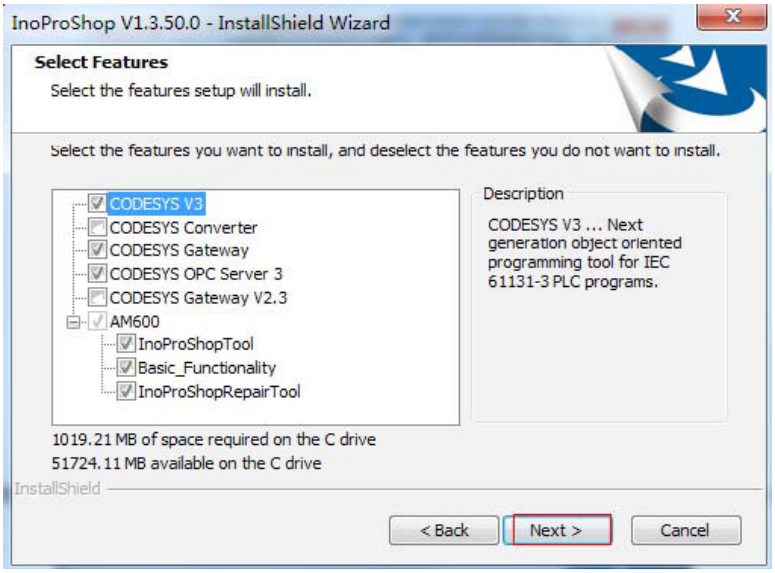
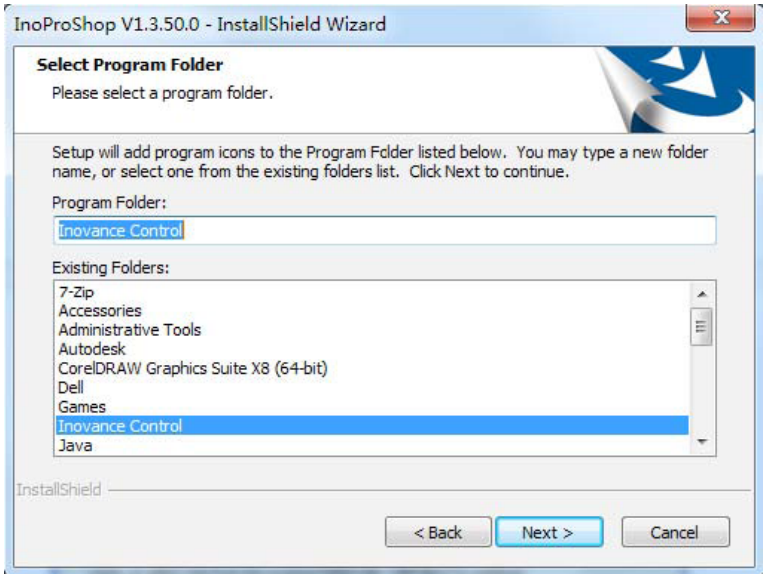
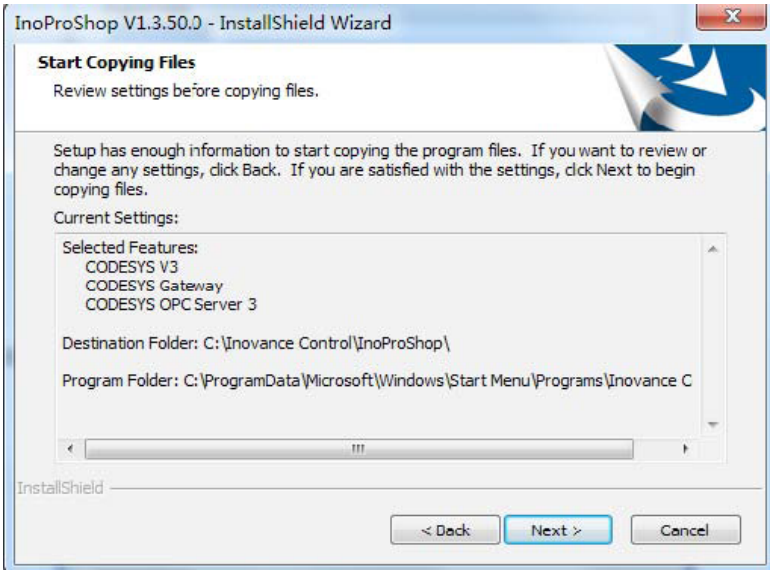
Before installation

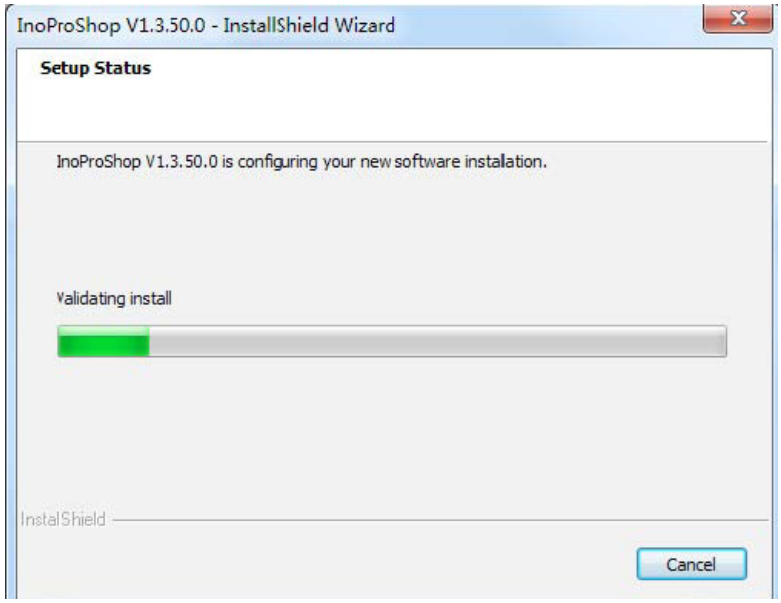
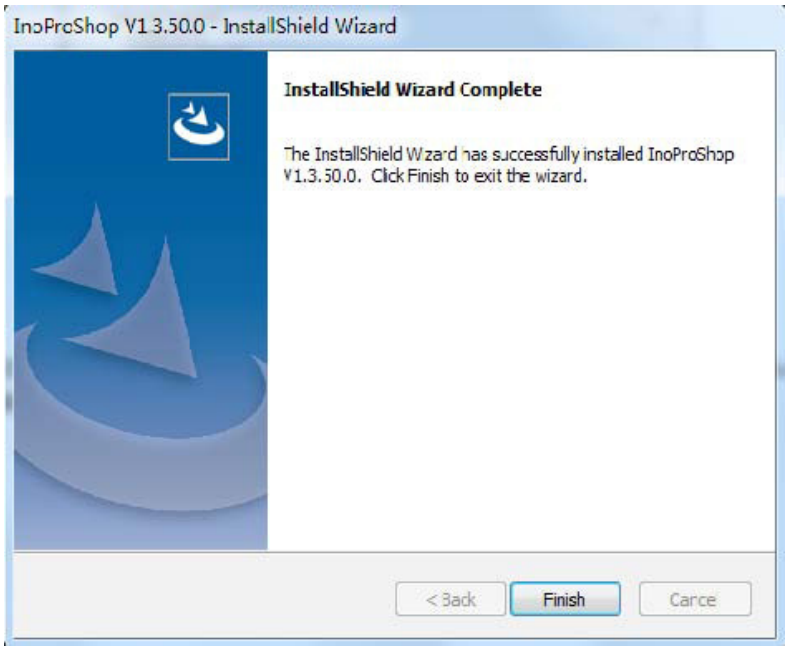
- If you install InoProShop for the first time, ensure that there are at least 5 GB free space on the target drive.
- If you are upgrading InoProShop, first backup your files, uninstall the old version of InoProShop, and restart the computer.

Installation

In the directory where the installation files are located, double-click the InoProShop (V*.*.*.*).exe file (V*.*.*.* is the version of InoProShop. Make sure you have the latest version).

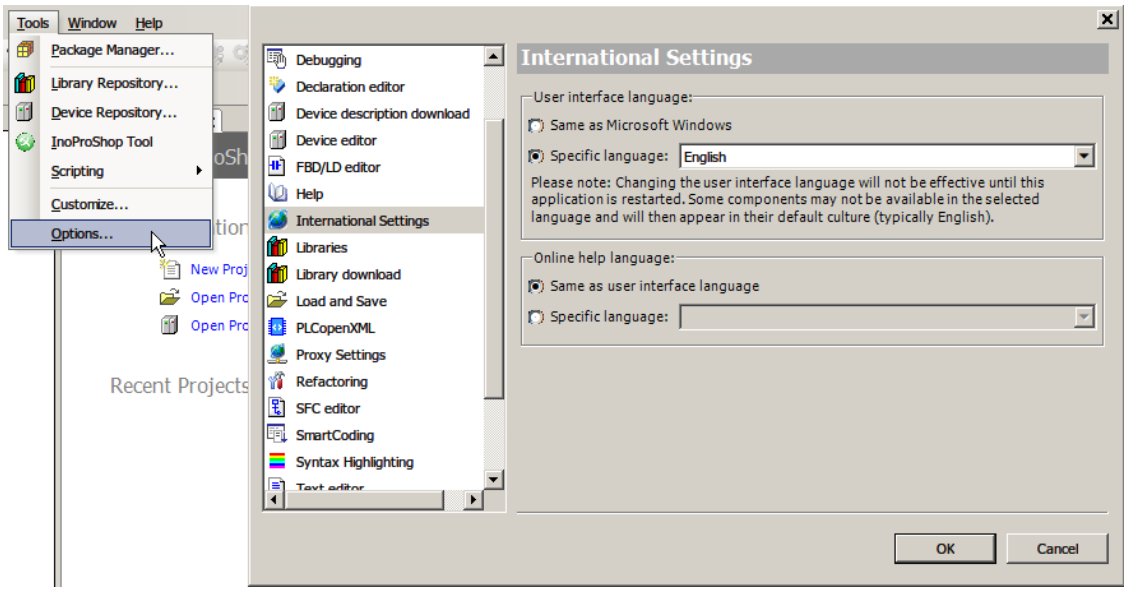
Steps	Description	Interface
1	The installation wizard appears and prepares for the installation	
2	Click Next to start the installation	
3	Select the installation path and click Next	

Steps	Description	Interface
4	Select components that you want to install and click Next	
5	Click Next	
6	Click Next	

Steps	Description	Interface
7	Wait until the Installation Wizard Complete window appears, and click "Finish" to complete the installation.	 

Language setting

The default interface language of InoProShop is Simplified Chinese. If you need to switch to another language, click Tool - Options - International Settings on the main page of the software to select the language.



7.2.3 Uninstalling InoProShop

You can uninstall InoProShop directly from the Control Panel as follows:

1) Quit InoProShop and ensure that Gateway is closed. If there is a CoDeSys icon in the task bar, right click the icon and select Exit to close Gateway.
2) Select Start -> Settings -> Control Panel.
3) Double-click Add or Remove Programs.
4) Select InoProShop in the list.
5) Click Remove.

8 Maintenance

When using the controller and its accessories, users need to carry out daily or periodical inspections to ensure that the controller are always in the best condition.

8.1 Periodical Maintenance and Inspection

The parts of the controller may deteriorate due to environmental conditions, therefore, periodical inspection is required. The interval is recommended to be 6–12 months, and can be shortened according to the environment conditions. Takes measures when the inspection is not passed.

Inspection Items

No.	Item	Description	Standard	Measure
1	Power supply	Measure the power terminal block and check that the voltage change is within the allowed range	DC 24V(+20% /-20%)	Use a multimeter to measure the terminals, and control the supply voltage within the allowable range.
2	Environment	The ambient temperature is suitable (when the controller is in a cabinet, the temperature in the cabinet is the ambient temperature)	-5–55 ℃	Use a thermometer to measure the ambient temperature and control the ambient temperature within 0 to 55 ℃ .
		The ambient humidity is suitable (when the controller is in a cabinet, the humidity in the cabinet is the ambient humidity)	10–90%RH, no condensation	Use a hygrometer to measure the ambient humidity control the ambient humidity within 10 to 90%RH. The temperature changes drastically, so check for condensation.
		Direct sunlight	Not allowed	Provide a shelter.
		Dust, dirt, salt, and iron filings	Not allowed	Remove them and provide a shelter.
		Droplets of water, oil, and chemicals.	Not allowed	Remove them and provide a shelter.
		Corrosive gas or flammable gas	Not allowed	Use an odor or gas sensor to detect.
		Vibration or shock to the controller	The vibration and shock resistance should meet relevant requirements	Install cushioning materials for vibration and shock resistance.
		Interference sources	Not allowed	Keep the controller away from any interference sources or take shielding measures.
3	Installation and wiring	Cable connectors are fully inserted and locked	Looseness is not allowed	Fully insert the connector and lock it with screws.
		External wiring screws are securely fastened	Looseness is not allowed	Use a Phillips screwdriver to tighten the screws.
		External wiring terminals are properly distanced	Ensure a proper distance	Check visually and correct.
		Broken external cables	Not allowed	Check visually and replace the cable.

No.	Item	Description	Standard	Measure
4	Real-time clock battery (button battery)	Service life	No "battery voltage low" alarm on the controller.	The design life of the battery at 25 °C is 5 years, and its service life is 0.75 to 5 years, which varies with the model and ambient temperature. If this predefined period is exceeded, replace the battery no matter if it can still work normally or not. For the replacement method, see section 4.4.
5	Cooling fan	Service life	No "Fan is abnormal" alarm on the controller.	The design life of the fan at 40 °C is 70,000 hours, and its service life varies with the ambient temperature. If the predefined period is exceeded, replace the fan no matter if it can still work normally or not. For the replacement method, see section 4.3.

Tool

- Phillips head screwdriver
- Multimeter or digital meter
- Industrial alcohol and cotton cloth
- Pliers

Measuring instruments required for different occasions

- Oscilloscope
- Thermometer, humidity meter

8.2 Maintenance of the Battery

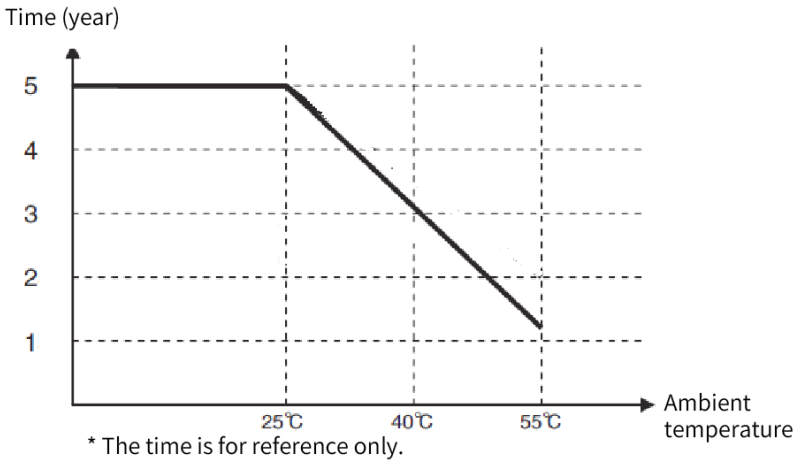
Purpose of the battery

A battery is required for the RTC timing of the clock in the controller and for keeping the CMOS data when the power is off. If the battery is not installed or the battery is bing discharged, the clock will stop timing, and the CMOS data will be lost when the power is off.

Battery life and replacement interval

The actual life of the battery is related to the application scenario of the controller. The curve below shows the longest life and is for reference only.

When the controller prompts that the battery is abnormal, replace the battery in time to ensure that the clock function of the controller is normal.

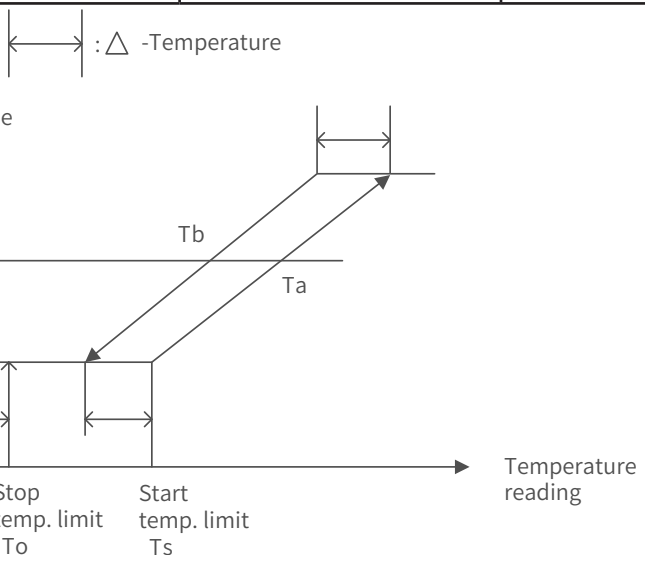


8.3 Maintenance of the Fan

Purpose of the fan

If the temperature in the controller reaches or exceeds the predefined temperature, the fan will automatically start to cool down the controller. When the temperature of the controller drops below the fan stop temperature, the fan will stop.

Name	Stop temperature To	Start temperature limit Ts	Upper temperature limit Tf
Temperature thresholds	40°C	45°C	75°C



Fan life and replacement interval

Code	Model	The service life of the fan (=maximum life time)
98050167	AC810-FAN1	70,000 hours

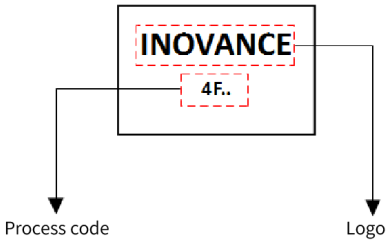
When the controller prompts that the fan is abnormal, replace the fan in time to ensure heat dissipation of the controller.

Appendix

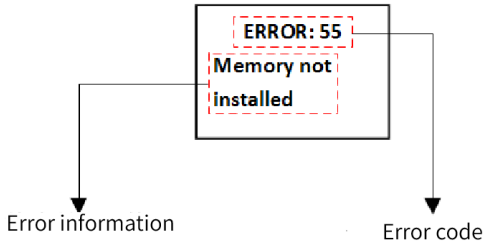
Appendix 1 Process Codes and Error Codes during BIOS Startup

Note: BIOS process coding and fault coding are independent of other fault codings of the controller.

1 The BIOS process code display is shown in the following figure:



2 The BIOS Fault code display is shown in the following figure:



BIOS Code	Description
Process Code	
0x15	Pre-memory North Bridge initialization is started
0x19	Pre-memory South Bridge initialization is started
0x32	CPU post-memory initialization is started
0x3B	Post-Memory South Bridge initialization is started
0x4F	DXE IPL is started
0x60	DXE Core is started
0x61	NVRAM initialization
0x62	Installation of the South Bridge Runtime Services
0x69	North Bridge DXE initialization is started
0x70	South Bridge DXE initialization is started
0x72	South Bridge devices initialization
0x78	ACPI module initialization
0x79	CSM initialization
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect

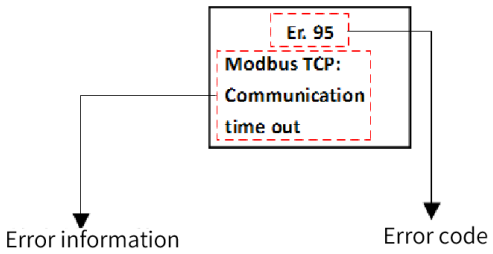
BIOS Code	Description
Process Code	
0x98	Console input devices connect
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9C	USB Detect
0x9D	USB Enable
0xA0	IDE initialization is started
0xA2	IDE Detect
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xB2	Legacy Option ROM Initialization
0xB4	USB hot plug
Eorror code (when a BIOS error occurs, contact the manufacturer)	
0x0E	Microcode not found
0x0F	Microcode not loaded
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or memory modules do not match
0x53	Memory initialization error. No usable memory detected
	Note: If the buzzer sounds 6 times during startup, it means that the memory is installed improperly or is not installed. Contact the manufacturer for a solution.
0x54	Unspecified memory initialization error
0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x5C	PEI phase BMC self-test failure
0xAB	Setup Input Wait
0xD0	CPU initialization error
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error
0xD3	Some of the Architectural Protocols are not available
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available
0xDD	DXE phase BMC self-test failure

BIOS Code	Description
Process Code	
0xE8	S3 Resume Failed
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xF8	Recovery PPI is not available
0xF9	Recovery capsule is not found
0xFA	Invalid recovery capsule
0xA1	Failed to switch BIOS to OS
0XA2	No BIOS data was received

Appendix 2 Controller Related Error Codes

Note: The controller related fault coding is independent of other fault codings

The controller fault display is shown in the following figure:



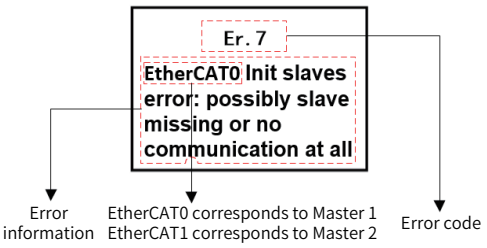
Error Code	Description	Remedy
Serial port 0 (Modbus/RTU)		
0x70	Modbus RTU0:Slave address setting error	Set a correct slave address
0x71	Modbus RTU0:Frame length error	Correct the data frame
0x72	Modbus RTU0:Illegal data address	Correct the data address
0x73	Modbus RTU0:CRC check failed	1. Check that the termination resistor is set correctly 2. Improve the wiring, for example, by removing any possible source of interference
0x74	Modbus RTU0:Illegal function	Check the slave instruction code
0x75	Modbus RTU0:Communication time out	1. Check that the slave is working properly 2. Check the wiring for disconnection 3. Check that the termination resistor is set correctly 4. Improve the wiring, for example, by removing any possible source of interference
0x76	Modbus RTU0:Illegal data value	Check the data range written by the slave
0x77	Modbus RTU0:Buffer overflow	Reduce communication load
0x78	Modbus RTU0:Server device failure	Check slave communication equipment
0x79	Modbus RTU0:Serial port setting error	Check the communication configurations
Serial port 1 (Modbus/RTU)		
0x80	Modbus RTU1:Slave address setting error	Set a correct slave address
0x81	Modbus RTU1:Frame length error	Correct the data frame
0x82	Modbus RTU1:Illegal data address	Correct the data address

Error Code	Description	Remedy
0x83	Modbus RTU1:CRC check failed	1. Check that the termination resistor is set correctly 2. Improve the wiring, for example, by removing any possible source of interference
0x84	Modbus RTU1:Illegal function	Check the slave instruction code
0x85	Modbus RTU1:Communication time out	1. Check that the slave is working properly 2. Check the wiring for disconnection 3. Check that the termination resistor is set correctly 4. Improve the wiring, for example, by removing any possible source of interference
0x86	Modbus RTU1:Illegal data value	Check the data range written by the slave
0x87	Modbus RTU1:Buffer overflow	Reduce communication load
0x88	Modbus RTU1:Server device failure	Check slave communication equipment
0x89	Modbus RTU1:Serial port setting error	Check the communication configurations
Ethernet (MODBUS TCP)		
0x90	Modbus TCP:Slave address setting error	Set a correct slave address
0x91	Modbus TCP:Frame length error	Correct the data frame
0x92	Modbus TCP:Illegal data address	Correct the data address
0x93	Modbus TCP:CRC check failed	1. Check that the termination resistor is set correctly 2. Improve the wiring, for example, by removing any possible source of interference
0x94	Modbus TCP:Illegal function	Check the slave instruction code
0x95	Modbus TCP:Communication time out	1. Check that the slave is working properly 2. Check the wiring for disconnection 3. Check that the termination resistor is set correctly 4. Improve the wiring, for example, by removing any possible source of interference
0x96	Modbus TCP:Illegal data value	Check the data range written by the slave
0x97	Modbus TCP:Buffer overflow	Reduce communication load
0x98	Modbus TCP:Server device failure	Check slave communication equipment
0x9A	Modbus TCP：Destination XX is unreachable	1. Check that the slave is working properly 2. Check the wiring for disconnection 3. Check master hardware 4. Improve the wiring, for example, by removing any possible source of interference
0x9B	Modbus TCP：Protocol identifier error	Check protocol identifier
CPU error		
0x21	System:Runtime crashed	
0x22	System:Comm.Timeout between PLC & LCD Panel	1. Power on again 2. Contact the manufacturer
Permission error		
0x23	Authentication failed, please contact the supplier!	Contact the manufacturer
Battery fault		
0x24	Battery voltage is too low or battery is in reverse, please check the battery!	1. Check that the button battery is installed correctly 2. Replace the button battery
Fan fault		
0x25	Fan is broken!	1. Check the fan 2. Replace the fan as needed

Appendix 3 EtherCAT Related Fault Codes

Note: EtherCAT fault coding is independent of other fault codings of the controller

The EtherCAT fault display is shown in the following figure:



Error Code	Description	Remedy
Serial port 0 (Modbus/RTU)		
0x01	Error:communication lost ! check the cables !	Check cable connection between PLC and the first slave
0x02	Working counter for sync unit group is wrong! Warning: number of slaves has changed or is different to the configuration!	1. Check the network connection of the slave in question 2. Read the 0x300 group error counters of the ESC register of the slave in question, including reception error counter, forward reception error counter, ECAT processing unit counter, and PDI error
0x03	Distributed clock is always same value! Change in and out connector of slave	Check that the network input and output cables of the slave are not swapped
0x04	1.Networkadapter could not be opened 2.Networkadapter could not be found	1. Set EtherCAT master configuration selection->General->EtherCAT NIC settings->Network name to "eth1", and tick "Select network by name" 2. Contact the manufacturer for replacement
0x05	1.Second Networkadapter could not be found 2.Second Networkadapter could not be opened	1. Set EtherCAT master configuration selection->General->EtherCAT NIC settings->Network name to "", and tick "Select network by name" 2. Contact the manufacturer for replacement
0x06	Second Networkadapter usess the MAC-ID as first network adapter	Replace the PLC
0x07	Init slaves error: possibly slave missing or no communication at all	1. Check the hardware connection. Scan the EtherCAT master through auto scan, compare the configuration of the scan result with the manually configured configuration, and find out the slave which exists in the configuration, but not in the scan result. 2. Replace the input network cable of the slave (Note: an EtherCAT network cable looks the same as a CANopen network cable. Do not confuse the part numbers.) Scan again.
0x08	1.Address: <addr> VendorID does not match -> All stopped . 2.Address: <addr> VendorID does not match -> try to continue. 3.Address: <addr> Revision Number does not match -> All stopped. 4.Address: <addr> Revision Number does not match -> try to continue	Scan the EtherCAT master through auto scan, compare the configuration of the scan result with the manually configured configuration, and find out the inconsistency.
0x09	1.Address: <addr> ProductID does not match -> All stopped. 2.Address: <addr> ProductID ProductID does not match ->try to continue.	Scan the EtherCAT master through auto scan, compare the configuration of the scan result with the manually configured configuration, and find out the inconsistency

Error Code	Description	Remedy
0x0A	Read of product or vendor ID not successfull, more slaves in config as real?	Restart the EtherCAT master
0x0B	SDO write error	1. Check that the device allows write access to this object dictionary 2. Check that the slave is not offline
0x0C	SDO timeout	1. Check that the slave is not offline 2. Check the slave for EMC interference
0x0D	Emergency from device:<> Error code: <> Error register: <> Error field: <>	Check the slave for any fault
0x0E	IDN write error	1. Check that the device allows write access to this object dictionary 2. Check that the slave is not offline
0x0F	IDN timeout	1. Check that the slave is not offline 2. Check the slave for EMC interference
0x10	1.watchdog for opmode expired. Address: 2.Some devices not operational.	1. Read the 0x300 group error counters of the ESC register of the slave in question, including the reception error counter (0x0300 + y * 2: 0x0301 + y * 2, where y represents port number 0-3). When the value of the reception error counter > 0, if y = 0, replace the cable of the IN port of the slave, if y = 1, replace the cable of the Out port of the slave 2. Replace the slave device.
0x65	AL Status read from slave address <> status <> Unspecified error	1. Check if the max. running time of the task is greater than the configured time in Task Configuration-> Monitoring. Remedies: 1. Optimize the code or modify the task time configuration so that the max. running time is less than 0.8 * configured time; 2. Read the 0x300 group error frame register of all slave ports. Such as the reception error counter, forward reception error counter, ECAT processing unit counter, PDI error counter and connection loss counter. The value of one or more error counter values is too large. Check for interference.
0x66	No memory	
0x6A	Firmware and EEPROM does not match	Replace the firmware
0x6B	Firmware update not successful	Update the firmware again
0x75	Invalid requested state change	
0x76	Unknown requested state	
0x77	Bootstrap not supported	
0x78	No valid firmware	
0x79	Invalid mailbox configuration	
0x7A	Invalid mailbox configuration	
0x7B	Invalid sync manager configuration	
0x7C	No valid inputs available	
0x7D	No valid outputs	
0x7E	Synchronization error	
0x7F	Sync manager watchdog	
0x80	Invalid Sync Manager Types	
0x81	Invalid Output Configuration	
0x82	Invalid Input Configuration	
0x83	Invalid Watchdog Configuration	

Error Code	Description	Remedy
0x84	Slave needs cold start	
0x85	Slave needs INIT	
0x86	Slave needs PREOP	
0x87	Slave needs SAFEOP	
0x88	Invalid input mapping	
0x89	Invalid output mapping	
0x8A	Inconsistent settings	
0x8B	Free-Run not supported	
0x8C	Synchronization not supported	
0x8D	Free-Run needs 3 buffer mode	
0x8E	Background watchdog	
0x8F	No valid inputs and outputs	
0x90	Fatal Sync error	
0x91	No Sync error	
0x92	Cycle Time too small	
0x94	Invalid DC SYNCH Configuration	
0x95	Invalid DC Latch Configuration	
0x96	PLL Error	
0x97	Invalid DC IO Error	
0x98	Invalid DC Timeout Error	
0x99	DC invalid Sync Cycle Time	
0x9A	DC Sync0 Cycle Time	Adjust the DC synchronization period of Sync0
0x9B	DC Sync1 Cycle Time	Adjust the DC synchronization period of Sync1
0xA5	MBX_AOE	
0xA6	MBX_EOE	
0xA7	MBX_COE	
0xA8	MBX_FOE	
0xA9	MBX_SOE	
0xB3	MBX_VOE	
0xB4	EEPROM no access	Change the EEPROM access address, or data length
0xB5	EEPROM error	
0xB6	External hardware not ready	
0xD4	Detected Module and Configured does not match	Scan the EtherCAT master device through auto scan, compare the configuration of the scan result with the manually configured configuration, and find out the inconsistency

Shenzhen Inovance Technology Co., Ltd.
Add.: Building E, Hongwei Industry Park, Liuxian Road, Baocheng No. 70 Zone, Bao' an District, Shenzhen
Tel: +86-755-2979 9595
Fax: +86-755-2961 9897
http://www.inovance.com

Suzhou Inovance Technology Co., Ltd.
Add.: No. 16 Youxiang Road, Yuexi Town, Wuzhong District, Suzhou 215104, P.R. China
Tel: +86-512-6637 6666
Fax: +86-512-6285 6720
http://www.inovance.com

19011381A00