XSA330-W

IoT Industrial controller

User manual [Hardware]

Wuxi Xinje Electric Co., Ltd.

V1.2 EN

Electrostatic protection

Please observe the following simple protective measures before using the equipment to protect yourself and the product from injury:
Before using the equipment, be sure to disconnect the power supply to avoid electric shock. Do not touch any components on the CPU or board when the device is turned on.
Disconnect the power before making any hardware configuration changes. Sudden electric shock when connecting jumpers or installing boards may damage sensitive electronic components.

FCC

Note: According to Article 15 of FCC Rules, this equipment has been tested and determined to conform to the Class A digital equipment standard. These restrictions are intended to provide reasonable protection against harmful interference to the operation of the system in a commercial environment. This equipment will generate, consume and transmit radio frequency energy. If it is not correctly installed and used according to the manual, it may cause harmful interference to the equipment

Attension

1. Misuse may cause danger, personal injury or serious injury, and may cause serious property loss.
2. Do not install and use the damaged IoT industrial controller, the IoT industrial controller without parts, or the IoT industrial controller whose model does not meet the requirements. There is risk of injury.
3. Please design a safety loop outside the IoT industrial controller to ensure that the whole system can operate safely even if the circuit is abnormal. Risk of causing malfunction.

4. Do not bind the controller wiring and power wiring together. In principle, they should be separated by 10cm. Misoperation and product damage may be caused.

Notes

1. Please install and use this product under the environmental conditions specified in the general specifications of the manual. Do not use it in damp, high temperature, places with dust, smoke, conductive dust, corrosive gas, combustible gas, vibration and impact. It may cause electric shock, fire, misoperation, product damage, etc.
2. Do not directly touch the conductive part of the product. It may cause malfunction.
3. Please use the matching DIN rail to fix the product and install it on a flat surface. Incorrect installation may cause misoperation and product damage.
4. When processing the screw hole, please do not let the cutting powder and wire chips fall into the product shell. It may cause malfunction.
5. When connecting the expansion module with the expansion cable, please make sure that the connection is tight and the contact is good. It may lead to poor communication and misoperation.
6. When connecting peripheral devices, expansion devices, batteries and other devices, be sure to power off. It may cause malfunction.
7. Do not disassemble or assemble this product without authorization. The product may be damaged.
8. Please plug and unplug the connecting cable when the power is off. It may cause damage to the cable and misoperation.
9. When disassembling the expansion device, peripheral device and battery, please disconnect the power first. It may cause misoperation, failure, etc.
10. When the product is discarded, please treat it as industrial waste

Danger

1. Please correctly connect the AC or DC power supply to the special power terminal of IoT industrial controller. The controller may be burnt due to the wrong power supply. Before wiring the controller, be sure to disconnect all external power supplies. Risk of electric shock.
2. Please use a $2mm^2$ wire for the third grounding of the grounding terminal of the controller and expansion equipment, and do not share the grounding with the strong current system.
3. Do not conduct external wiring to the empty terminal. It may cause misoperation and product damage.
4. When connecting terminals with wires, be sure to tighten them, and do not let conductive parts contact other wires or terminals. It may cause misoperation and product damage.
5. After the IoT industrial controller is powered on, do not touch the terminal. Risk of electric shock.
6. Please do not wire or disconnect the terminal with electricity. Risk of electric shock.
7. Before changing the program in IoT industrial controller, be sure to stop the running program. Misoperation may be caused.

Statement of responsibility

We have checked that the contents of this manual are consistent with the hardware and software described, because errors are inevitable, we cannot guarantee complete consistency. However, we will often check the data in the manual and make necessary corrections in future editing. Welcome your valuable comments.

March, 2021

Catalog

Preface

- Scope of application of the manual

This manual is applicable to XSA330-W series IoT industrial controllers and the specific models.

- Conventions in the manual

Due to space limitation, certain abbreviations may be used in the manual to replace the original names. Now, these names that may be involved are listed in the table below for comparison.

Abbreviation	Explanation
XSA330-W	XSA330-W series IoT Industrial controller
Peripherals	Programming software, HMI, network module and other equipment
Programming software	CoDeSys software

1. Product overview

1. 1 Product features

XSA330-W seriesis an IoT industrial controller for motion control based on X86+FPGA platform. It uses Intel Apollo Lake multi-core processor, which can well support the stable operation of CoDeSys core. Realize industrial level data security under the super capacitor power-off holding, and provide customers with integrated and intelligent system solutions.

Features:

- Based on CoDeSys programming platform, support LD, FBD, IL, ST, SFC, CFC language programming
- Based on EtherCAT bus control, it can be connected to 64 axis control system at most
- Support EtherNet/IP, OPC/UA, ModbusTCP and other communication protocols
- Two independent communication interfaces RS485 and RS232, which are convenient to operate with traditional equipment
- TPM2.0 encryption, industrial data security
- Built in super capacitor to maintain power failure and ensure data security in case of abnormal power failure

1.2 Model Composition and list

1.2.2 Model list

The specific model and description of XSA330-W series are shown in the table:

Model	Description
XSA330-W series	Intel ® Celeron ® J3455, memory 4G, hard disk 128G, 16X/16Y, 2-channel USB2.0, 2-channel USB3.0, 2-channel Ethernet communication, 2-channel EtherCAT communication, 2 sets of encoders, 2-channel RS232 or RS485 (BIOS control), 1 DP interface, Windows 10 system

1.3 Description of each part

1.3.1 XSA330-W series structure composition

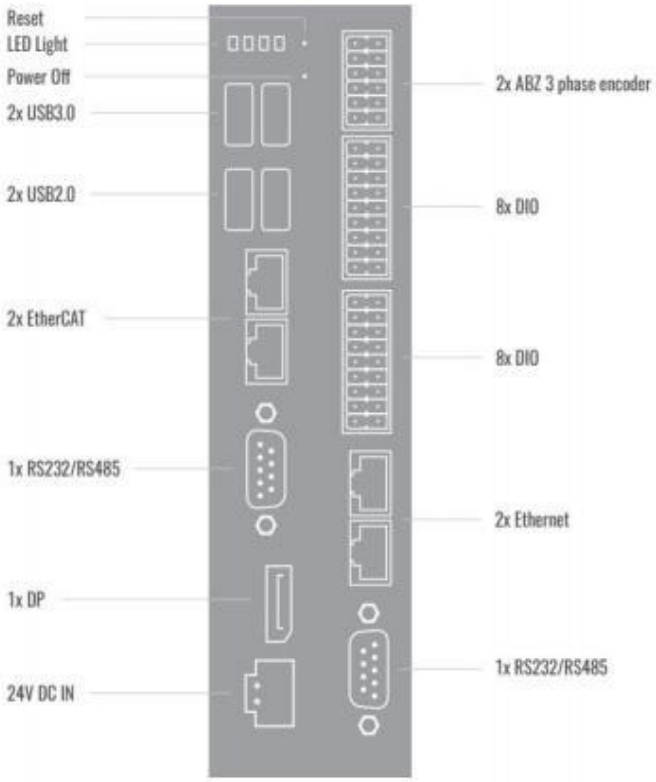


Figure 1-1 XSA330-W interface diagram

1.3.2 LED indicator light

XSA330-W seriespanel has 4 LED status indicators, as shown in Figure 1-2.

Figure 1-2 XSA330-W indicator light diagram

LED	Name	Description
PWR	Power supply	Shutdown: blue is normally on The system works normally: green is normally on The system does not enter or the system is abnormal: red is normally on
SATA	SATA hard disk detection	Data interaction: blue flashing/no data: off
RUN	Run indicator	Error (program exception Stop): off Normal operation: green normally on
ERR	Error indicator	No error: Off

		Yes (power off): red, normally on

1.3.3 Shut down button

XSA330-W seriesis equipped with a shutdown button (pinhole structure), which can be forced to shut down by pressing for 4 seconds, as shown in Figure 1-3.

Figure 1-3 shut down button

1.3.4 Reset button

XSA330-W seriesis equipped with a Reset key (pinhole structure). Short press can restart the system. Long press can reset the BIOS (clear CMOS) in power off status, as shown in Figure 1-4.
CMOS is powered by the button battery on the motherboard. Clearing CMOS will permanently erase the previous system settings and set them to the original (factory setting) system settings. The steps are as follows:

(1) Turn off the controller and disconnect the power supply
(2) Press the Clear CMOS key for 3-5 seconds with a slender pin, and then release it
(3) Start the controller, press the [Del] key to enter BIOS settings during startup, and reload the optimal default value
(4) Save and Exit Settings

Figure 1-4 Reset button

1.3.5 Power supply input

XSA330-W seriesis equipped with a 24V 4PIN phoenix terminal, as shown in Figure 1-5.
Please use the adapter or switching power supply provided with the device, and do not connect the power supply with a voltage exceeding 25.2V, otherwise the motherboard will be burnt due to overvoltage.

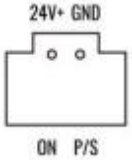


Figure 1-5 power supply input interface

Signal	Description
24V+	Power Supply
GND	0V
ON	PC_ON 3V output
P/S	24V 1A output

Terminal instructions:

① 24V+ and GND: IPC power supply

② ON and GND: ON/Off of IPC

③ P/S and GND: The series indicator shows the system operation status.

1.3.6 DP interface

XSA330-W seriesis equipped with a DP display interface, which can realize high definition transmission of signals at high speed, and also has good anti-interference capability. The interface is shown in Figure 1-6.

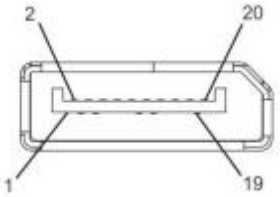


Figure 1-6 DP display interface

Pin	Signal	Function	Pin	Signal	Function
1	ML_Lane 0(p)	True signal of channel 0	11	GND	Ground
2	GND	Ground	12	ML_Lane 3(n)	Auxiliary signal of channel 3
3	ML_Lane 0(n)	Auxiliary signal of channel 0	13	GND	Ground
4	ML_Lane 1(p)	True signal of channel 1	14	GND	Ground
5	GND	Ground	15	AUX_CH(p)	Real signal of auxiliary channel
6	ML_Lane 1(n)	Auxiliary signal of channel 1	16	GND	Ground
7	ML_Lane 2(p)	True signal of channel 2	17	AUX_CH(n)	Auxiliary signal of auxiliary channel
8	GND	Ground	18	Hot Plug	Hot plug detection
9	ML_Lane 2(n)	Auxiliary signal of channel 2	19	DP_PWR Return	Interface power return
10	ML_Lane 3(p)	True signal of channel 3	20	DP_PWR	Power supply

1.3.7 Ethernet interface (LAN)

XSA330-W seriesis equipped with four Ethernet interfaces (2 * Ethernet+2 * EtherCAT), as shown in Figure 1-7, supporting 10/100/1000Mbps and conforming to IEEE 802.3az. The port adopts a standard RJ-45 jack with LED indicators to indicate the connection and transmission status.

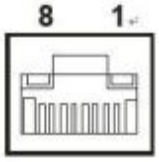


Figure 1-7 Ethernet port

LED indicator	
Left LED	Right LED
Orange	Green
10 / 100/ 1000 Link	Transmission

<table>
<tr><th>RJ45 port</th><th colspan="2">Function</th></tr>
<tr><td rowspan="7">Ethernet</td><td colspan="2">Support Modbus-TCP, UDP and other communication protocols. It can be used to upload and download programs, online monitoring, remote monitoring, etc., and can communicate with other TCP IP devices in the LAN</td></tr>
<tr><td>Item</td><td>Parameter</td></tr>
<tr><td>Communication protocol</td><td>MODBUS TCP</td></tr>
<tr><td>Communication speed</td><td>1000Mbps</td></tr>
<tr><td>Max network nodes</td><td>30</td></tr>
<tr><td>Max station spacing</td><td>100 m</td></tr>
<tr><td>Network topology</td><td>Linear</td></tr>
<tr><td rowspan="8">EtherCAT</td><td colspan="2">EtherCAT bus control, control cycle ≤ 1ms.</td></tr>
<tr><td>Item</td><td>Specification</td></tr>
<tr><td>Physical layer</td><td>100BASE-TX (IEEE802.3)</td></tr>
<tr><td>Baud rate</td><td>1000[Mbps] (full duplex)</td></tr>
<tr><td>Topology</td><td>Line</td></tr>
<tr><td>Cable</td><td>JC-CB twisted pair (shielded twisted pair)</td></tr>
<tr><td>Cable length</td><td>Up to 100m between nodes</td></tr>
<tr><td>Com port</td><td>1Port (RJ45)</td></tr>
<tr><td>EtherCAT Indicators (LED)</td><td>[Run] RUN Indicator
[L/A IN] Port0 Link/Activity Indicator (Green)
[L/A OUT] Port 1 Link/Activity Indicator (Green)</td></tr>
</table>

Station Alias (ID)	Range: 0~65535 Address: 2700h
Explicit Device ID	Not support
Mailbox protocol	COE (CANopen Over EtherCAT)
SyncManager	4
FMMU	3
Touch Probe	2 channels
Synchronization mode	DC (SYNCO event synchronization) SM (SM event synchronization)
Cyclic time (DC communication cycle)	500, 1000, 2000, 4000[μs]
Communication object	SDO[Service data object] PDO[Process data object]
Max allocated number of single station PDO	TxPDO: 4 [piece] RxPDO: 4 [piece]
Mailbox communication interval in PreOP mode	1ms
Email	SDO request and SDO information

1.3.8 USB interface

The XSA330-W seriesis equipped with two USB2.0 and two USB3.0 interfaces. The USB interface supports the plug and play function, allowing users to connect or disconnect the device at any time without shutting down the controller. USB interface conforms to USB EHCI, Rev 2.0 Standards. Pins are defined as follows.

Figure 1-8 USB port

USB2.0		
Pin	Signal	Function
1	VCC	Power supply
2	DATA-	Differential signal
3	DATA+	
4	GND	Power supply ground
USB3.0		
Pin	Signal	Function
1	VCC	Power supply

2	DATA-	Differential signal
3	DATA+	
4	GND	Power supply ground
5	SSRX-	High speed receiving differential data signal
6	SSRX+	
7	GND	Signal ground
8	SSTX-	High speed sending differential signal
9	SSTX+	

1.3.9 Serial port

XSA330-W seriesis equipped with corresponding RS232 and RS485 communication serial ports. For DB9 serial ports, the change of BIOS settings can realize the switching function between RS232 and RS485, and realize the communication between devices.

Series	Default	
	DB9 interface (RS232)	DB9 interface (RS485)
XSA330-W *	2	0

Note: When the two DB9 interfaces leave the factory, they are RS232 serial ports by default. If you need RS485 serial ports, please modify them in the BIOS path in Advanced>Super IO Configuration>Serial Port 1 Configuration>COM Mode>RS485 Mode. See Section 5.9 for details.

DB9 communication port (RS232/RS485)

The pin definitions are as follows:

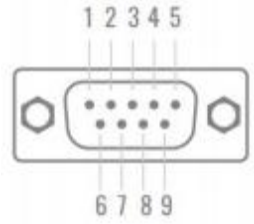


Figure 1-9 RS232/RS485 serial port

Pin	RS232 (DB9)	Description	RS485 (DB9)	Description
1	DCD	Carrier detection	DATA-	B: RS485-
2	RXD	Receive data	DATA+	A: RS485+
3	TXD	Send data	NC	/
4	DTR	Data terminal ready	NC	/
5	GND	Signal ground	GND	Signal ground
6	DSR	Data ready	NC	/
7	RTS	Send request	NC	/
8	CTS	Clear send	NC	/
9	RI	Ringing prompt	NC	/

Note: NC means no connection.

1.3.10 I/O terminals

The XSA330-W IoT industrial controller is equipped with 16 groups of digital I/Os, in which X0~X7 are 200KHz high-speed inputs. The I/O are used to realize the triggering of data collection, controling, counting and other functions. The interfaces are shown in the following table.

Digital IO_1 interface definition			
Pin	Name	Pin	Name
1	X0	2	Y0
3	X1	4	Y1
5	X2	6	Y2
7	X3	8	Y3
9	X4	10	Y4
11	X5	12	Y5
13	X6	14	Y6
15	X7	16	Y7
17	X COM0	18	Y COM0

Digital IO_2 interface definition			
Pin	Name	Pin	Name
1	X10	2	Y10
3	X11	4	Y11
5	X12	6	Y12
7	X13	8	Y13
9	X14	10	Y14
11	X15	12	Y15
13	X16	14	Y16
15	X17	16	Y17
17	X COM1	18	Y COM1

1.3.11 Encoder

The XSA330-W IoT industrial controller is equipped with two sets of three-phase encoders. Through the design of dual differential encoder interface, the closed loop control of position locking can be completed. The interfaces are shown in the following table.

Encoder interface definition			
Pin	Name	Pin	Name
1	A1+	2	A1-

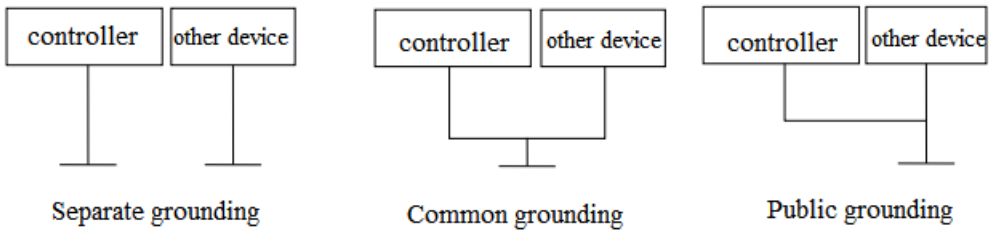
3	B1+	4	B1-
5	Z1+	6	Z2-
7	A1+	8	A1-
9	B1+	10	B1-
11	Z1+	12	Z2-

2. Specification parameters

2.1 General specification

Item	Specification
Anti-noise	Noise voltage 1000Vp-p 1us pulse 1 minute
Air	No corrosive and combustible gas
Working temperature	-25℃~60℃
Storage temperature	-40~+80℃
Ambient humidity	5%~95% (no condensation)
Installation	DIN-Rail mounting
Ground (FG)	The third type of grounding (not common grounding with strong current system)※

※: It is better to adopt separate grounding or common grounding instead of public grounding.



Separate grounding　　Common grounding　　Public grounding

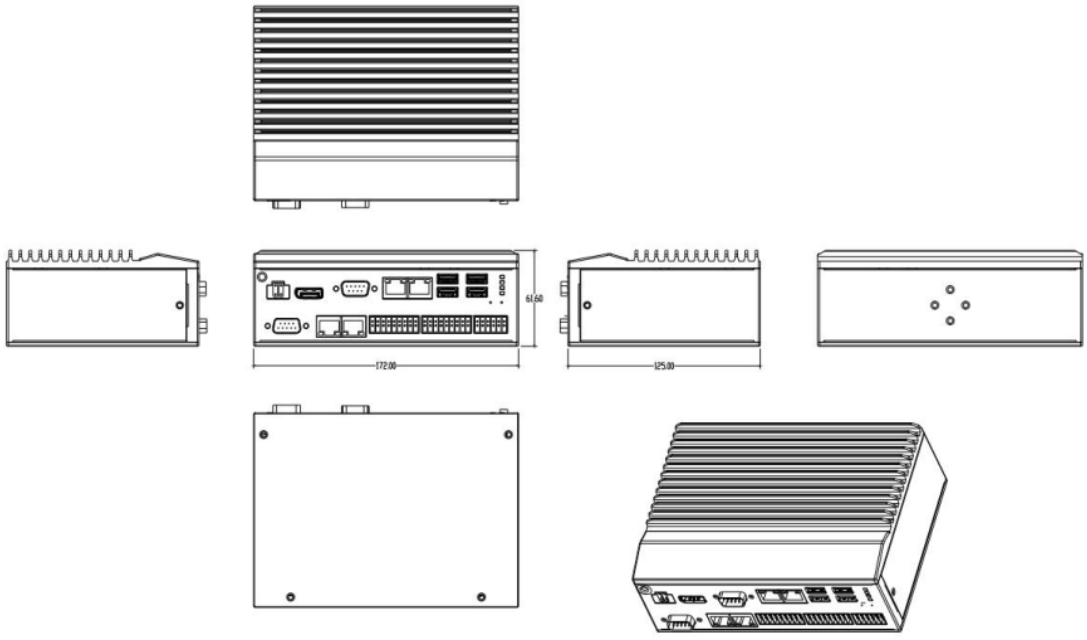
2.2 Performance

XSA330-W series:

Item	Definition
CPU	Intel ® Celeron® J3455
BIOS	AMI UEFI BIOS at 64 Mb
Memory	4G LPDDR4 2400MT/s (max 16GB)
Display	DP, max resolution 4096 × 2160@60Hz
Ethernet	4 × Intel I211AT Gb E (2× EtherCAT+2× Ethernet)
TPM	2.0

Storage	1 × M.2 2280 (128G standard)
External I/O	2× USB2.0, 2× USB3.0
	2× RS-232/ RS-485 BIOS control
	IO: 16 inputs, 16 outputs
	2× Encode
	4× LED (PWR\SATA\RUN\ ERR)
Extension	1× M.2 2280 SSD or 4G LTE communication
Power supply	24V DC IN, 4PIN Phoenix, ACPI management
Power consumption	20W(typical) ~ 60W(max)
Dimension	172×125×61.6mm
Weight	0.5kg
System	Windows 10 IOT LTSC, Linux
Installation	DIN-rail installation
Working temperature	-20°C~ 60°C with 0.7m/s gas
Storage temperature	-40°C~85°C 60° C @ 95% (no condensation)
Relative humidity	10~95%@40°C (no condensation)
ESD	Contact discharge ± 4KV, air discharge ± 8KV
Protection	IP30

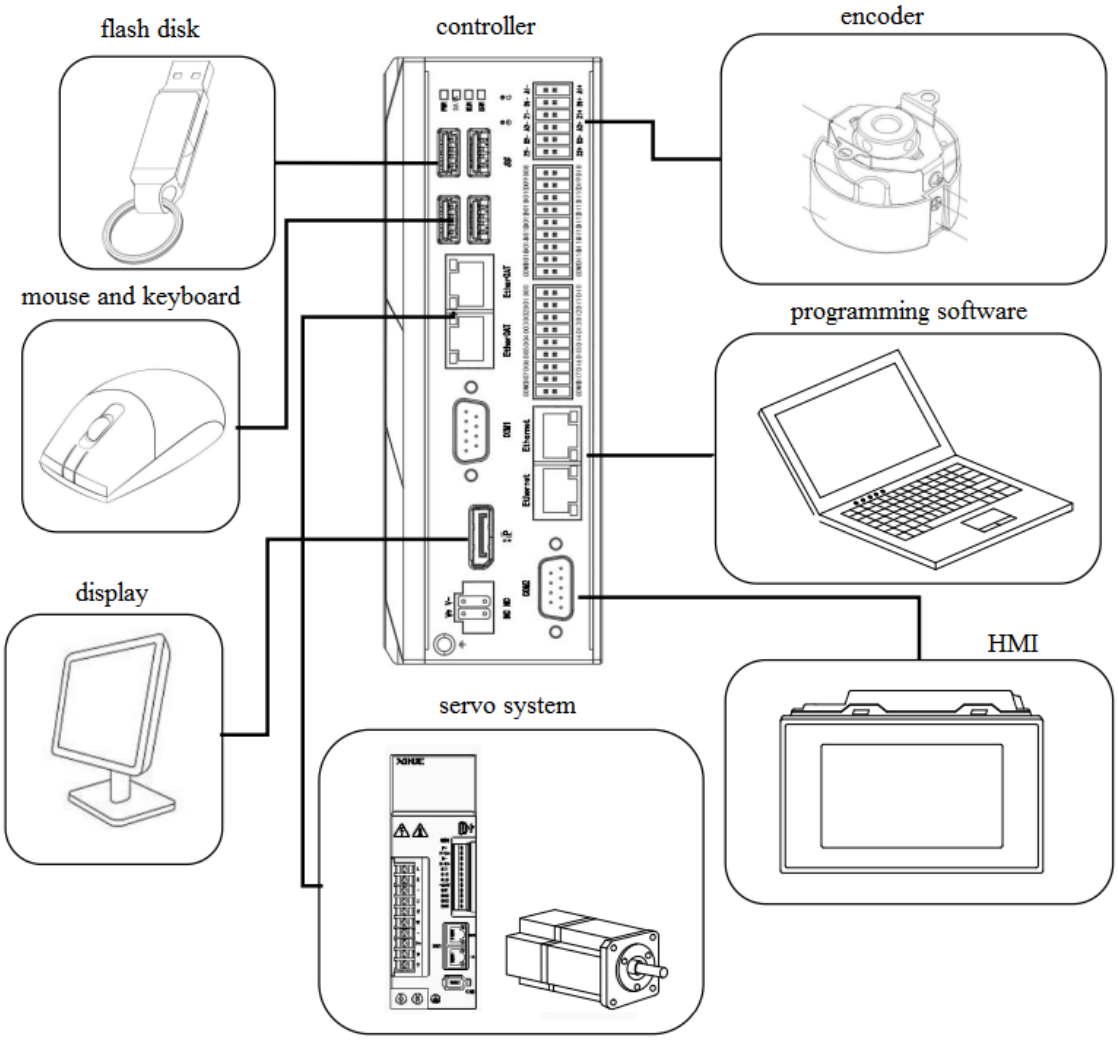
2.3 Dimension



3. System composition

3.1 system composition

The following figure is a system structure diagram (illustrated with XSA330-W) based on the basic configuration of the XSA330-W series. Through this diagram, you can roughly understand the connection of the XSA330-W seriesIoT industrial controller and peripheral equipment, as well as the typical applications of each communication, connection, and expansion port of each controller. XSA330-W seriesinvolves a variety of peripherals, such as touch screen, USB peripherals, serial communication equipment, servo motor, etc.

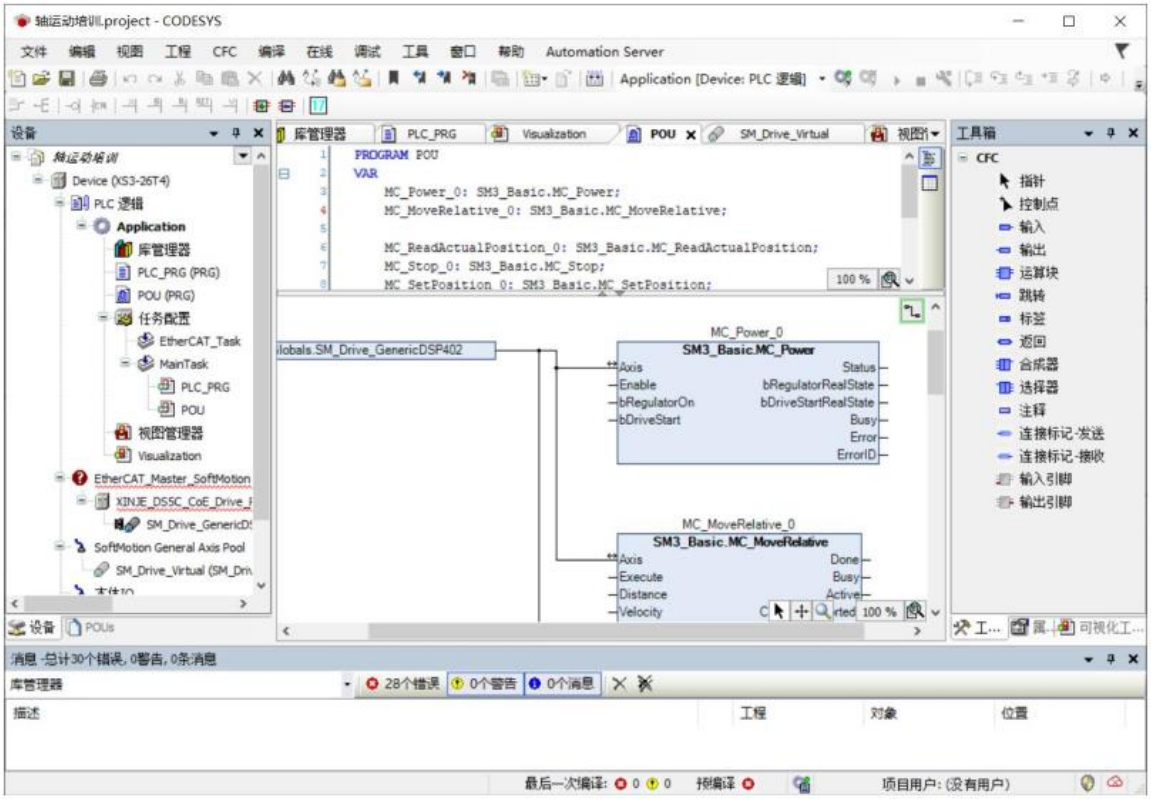


Note: The connecting devices of the above communication ports are only for example, and the actual communication ports can connect multiple devices.

3.2 Programming software

The programming software CoDeSys is a powerful PLC software programming tool, which can support the IEC61131-3 standard IL, ST, FBD, LD, CFC, SFC six PLC programming languages. To run programs on the controller, CoDeSys RTE needs to install programming software on a personal PC. After programming, use the OP cable or network cable to connect the serial port or Ethernet port with the XSA330-W to download or upload programs.

Codesys software interface (fit for XSA330-W series)



3.3 Unpacking inspection

Before opening the package, please check whether the product model marked on the outer package is consistent with the product model ordered. After opening the package, first check whether the surface of the industrial controller is mechanically damaged, and then carefully check whether the accessories are complete according to the packing list or the order contract. If the surface of the industrial controller is damaged or the product content does not meet the requirements, please do not use it and contact the dealer immediately.

Note	To prevent static electricity from damaging the industrial controller, touch the effective grounding metal before touching the controller circuit objects to release static charges carried by the body, and wear anti-static gloves.

3.4 Packing list

When unpacking the packing box, please check whether the accessories are obviously damaged and confirm whether the accompanying accessories are consistent. See Table 3 - 1 for specific accessories.

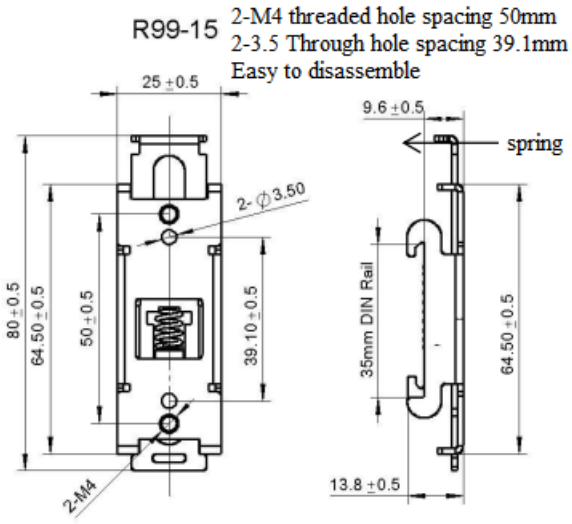
Packing accessories		
1	XSA330-W seriesIoT Industrial controller	1 piece
2	Rail mounting kit (including screws)	1 set
3	Supporting terminal	1 set

3.5 Production installation

1. Installation method

The XSA330-W seriesIoT industrial controller is installed with the matching guide rail.

Please use the rail R99- 15 DIN to install.



First, install the black rail buckle on the bottom of the controller with two screws, then fix the end with spring on the top of the DIN rail, and then gently push against the side of the spring to fix the entire buckle on the rail. To remove, gently push one end of the spring to remove the product.

2. Installation environment

Please install the product under the environmental conditions specified in Section 2.1.1.

3.6 Power supply

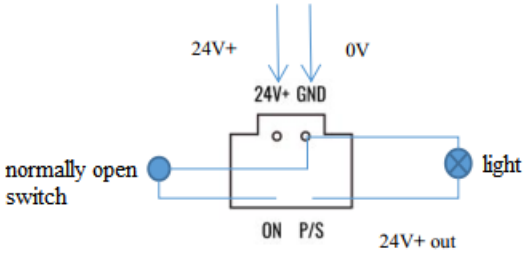
3.6.1 DC power supply

XSA330-W seriesIoT industrial controller only supports DC power supply, 24V+ is connected to DC power supply positive, GND is connected to DC power supply negative.

DC power supply type

Item	Content
Rated voltage	DC24V
Allowable voltage range	DC22.8V~25.2V
Input current (basic unit only)	120mA
Allowable instantaneous power-off time	10ms DC24V
Impact current	10A DC26.4V
Maximum power consumption	60W

3.6.2 Power supply wiring



(1) 24V+ and GND: IPC power supply
(2) ON and GND: turn ON/OFF IPC
(3) P/S and GND: serial connection light shows the RTE operation status

4. I/O

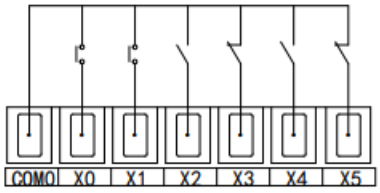
4.1 Input specification

The input of XSA330-W seriesindustrial intelligent controller supports NPN and PNP modes. The wiring mode is described below.

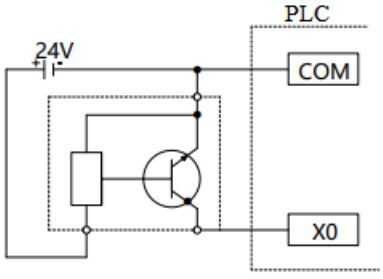
Input (X) terminal

Input signal voltage	DC24V±10%
Input signal current	7mA/DC24V
Input ON current	Above 4.5mA
Input OFF current	Below 1.5mA
Input response time	About 10ms
Input signal mode	Contact input or NPN open collector transistor
Circuit insulation	Photoelectric coupling insulation
Input action display	The LED lights up when the input is ON

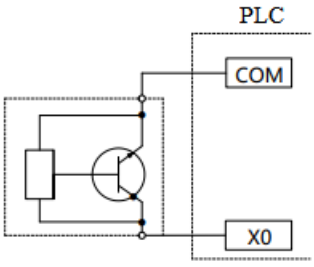
NPN wiring example:



Button wiring diagram

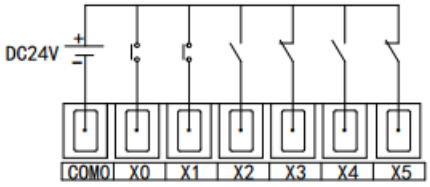


3-wire proximity switch(NPN) wiring

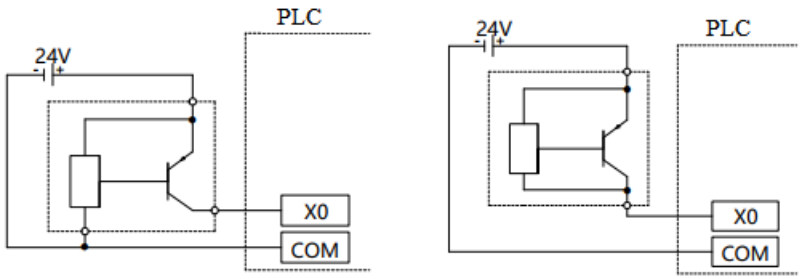


2-wire proximity switch(NPN) wiring

PNP wiring example:



Button wiring diagram



3-wire proximity switch(PNP) wiring 2-wire proximity switch(PNP) wiring

- Input terminal

Since there is no built-in DC24V power supply in the controller, external DC24V power supply is required for input wiring.

- Input circuit

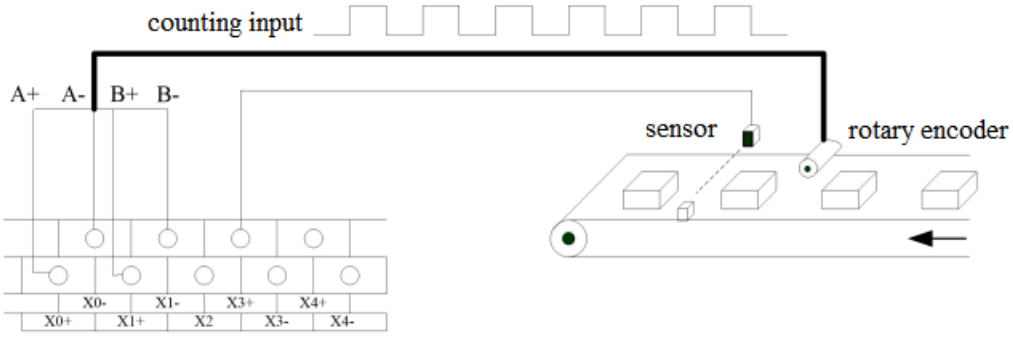
The input primary circuit and secondary circuit are isolated by optical coupler, and the secondary circuit is equipped with C-R filter. This is set to prevent misoperation caused by vibration of input contact or noise mixed with input line. Because of the above reasons, for the changes of input ON → OFF, OFF → ON, the response time lags about 50us in the programmable controller. Digital filter is built in the input terminal.

- Input sensitivity

The input current of the controller is DC24V 7mA, but for reliable operation, when it needs to be turned on, the current is more than 4.5mA, and when it is turned off, the current is less than 1.5mA.

Encoder input interface

The XSA330-W seriesof industrial intelligent controller supports differential input mode, and the maximum measurement frequency can reach 1MHz. Its specification parameters and wiring mode are as follows.



Note: when the counting frequency is higher than 25Hz, please select a high-speed counter.

Differential input:

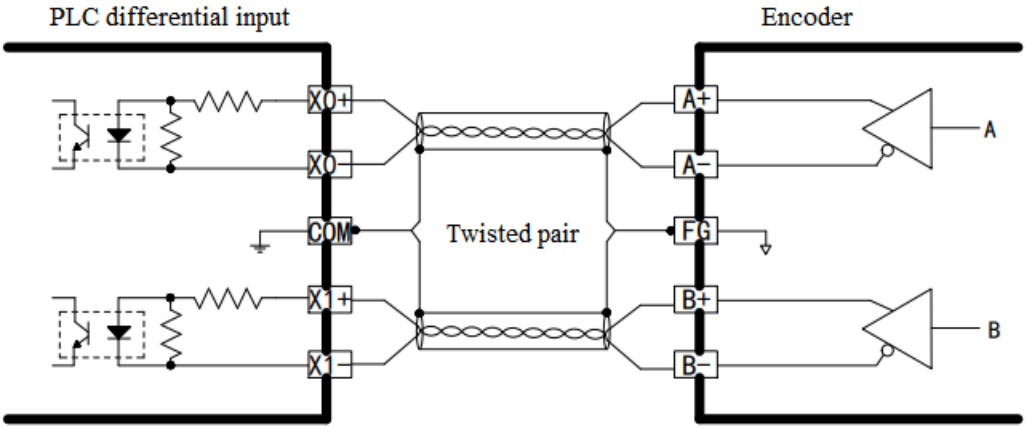
Pin	Name	Note	Pin	Name	Note
1	Z2+	Encoder Z2 phase +	7	Z2-	Encoder Z2 phase -
2	B2+	Encoder B2 phase +	8	B2-	Encoder B2 phase -
3	A2+	Encoder A2 phase +	9	A2-	Encoder A2 phase -
4	Z1+	Encoder Z1 phase +	10	Z1-	Encoder Z1 phase -
5	B1+	Encoder B1 phase +	11	B1-	Encoder B1 phase -
6	A1+	Encoder A1 phase +	12	A1-	Encoder A1 phase -

Differential signal specification

Item	Specification
Input signal	5V differential signal
Input max frequency	1MHz
Circuit insulation	Photoelectric coupling insulation
Input action display	-

Note: The Z-phase function is still under development.

Differential input wiring example:



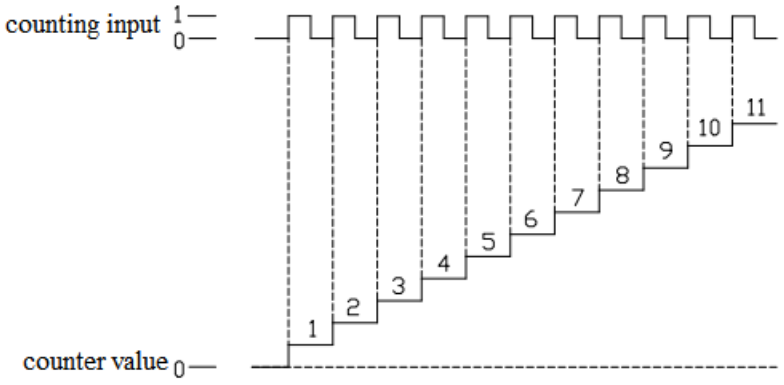
Connect with encoder diagram

4.2 Encoder high speed counter input

XSA330-W serieshigh-speed counting function has two counting modes, incremental mode and AB phase mode.

(1) Incremental mode

In this mode, the input pulse signal is counted, and the count value increases with the rising edge of each pulse signal.

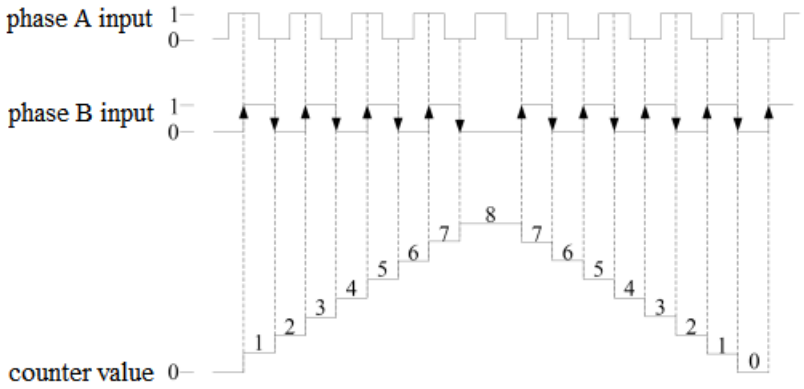


(2) AB phase mode

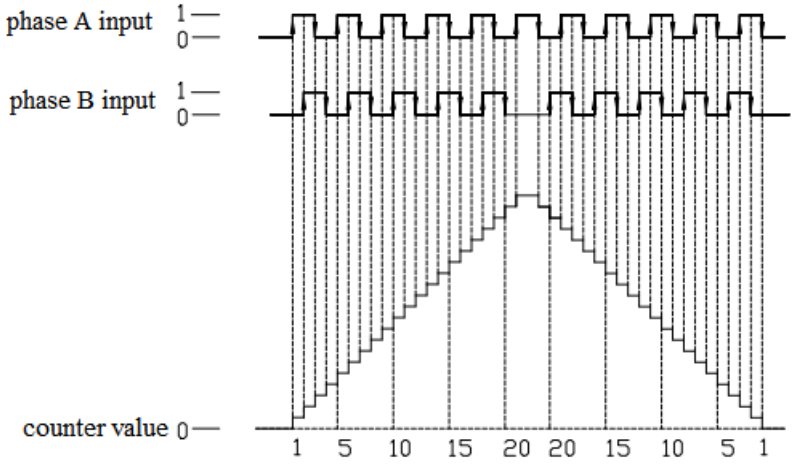
In this mode, the high-speed count value is incremented or decremented according to two differential signals (phase A and phase B).

It can also be divided into two modes: frequency doubling mode and frequency quadrupling mode, but the default counting mode is frequency quadrupling mode.

frequency doubling mode:



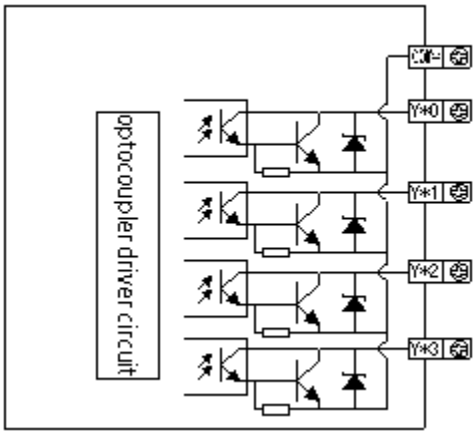
frequency quadrupling mode:



4.3 Output specification

Normal transistor output:

External power		Below DC5~30V
Circuit insulation		Light coupling insulation
Action indicator		LED
Max load	Resistant load	0.3A
	Inductive load	7.2W/DC24V
	Lamp load	1.5W/DC24V
Mini load		DC5V 2mA
Response time	OFF→ON	Below 0.2ms
	ON→OFF	Below 0.2ms



Note: When the high-speed pulse output function is used, the controller can output 100KHz~200KHz pulses, but it cannot ensure that all the servos operate normally.
Please connect a resistance of about 500 ohms between the output end and the 24V power supply.

4.4 Transistor output processing

Normal transistor output

- Output Terminals

  The transistor output of the controller unit has 2~3 common outputs.

- External Power Supply

  Please use DC5~30V power supply to drive the load.

- Circuit Isolation

  Inside PLC, we use photoelectric couplers to isolate between internal circuits and output transistors; besides, the COM terminal blocks are separate from each other.

- Response Time

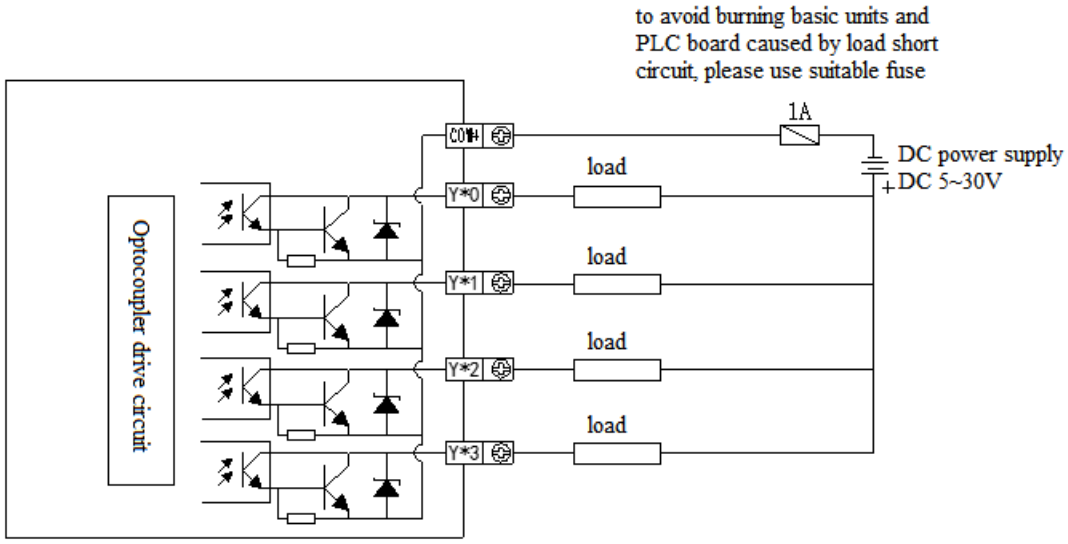
The time interval that PLC from photoelectric couplers energizing (or cutting) to transistor ON (or OFF) is below 0.2ms.

- Output current

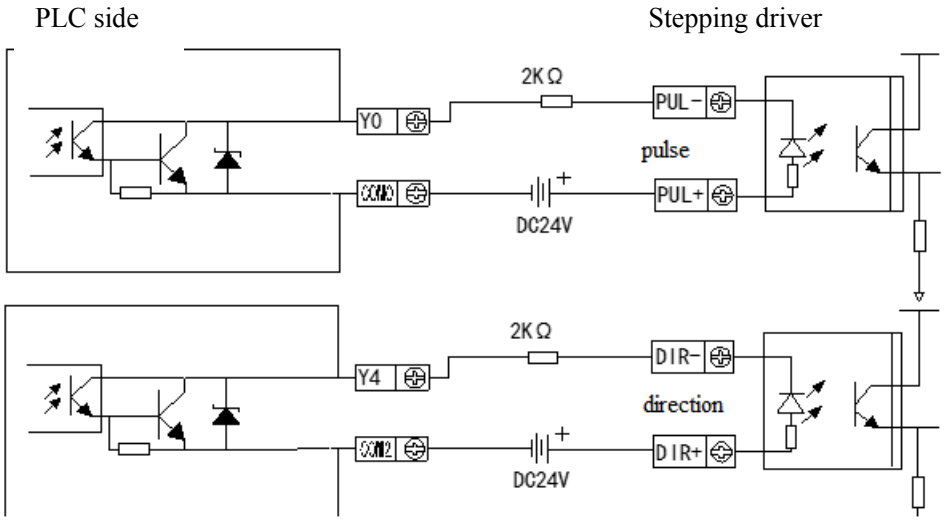
The current it outputs is 0.3A per point.

- Open circuit current

Below 0.1mA



E.g.: Below is the connection of controller and stepping driver diagram:



(Make sure the driver's photoelectric coupling input terminal has 8~15mA reliable current)

5. BIOS setting

5.1 BIOS explanation

BIOS is a basic input/output control program stored in Flash Memory. This program is a bridge between the motherboard and the operating system, and is responsible for managing the relevant parameter settings between the motherboard and the expansion card. When the controller is activated, it will first be controlled by the BIOS program. First, it will execute a POST self-test, which will detect all hardware devices and confirm the synchronization of hardware parameters. When all tests are completed, it transfers control of the system to the operating system (OS). Since BIOS is the only channel between hardware and software, how to properly set the parameters in BIOS will determine whether your computer runs stably and works in the best state. Therefore, the correct setting of BIOS is a key factor for system stability, thus ensuring that the system performance can reach the best state. CMOS Setup will store the set data in the CMOS SRAM built in the motherboard. When the power is off, the lithium battery on the motherboard continues to power the CMOS SRAM. The BIOS setup utility allows you to configure.

(1) Hard disk drives and peripherals
(2) Video display types and display options
(3) Password protection
(4) Power management function

 Note	As the BIOS version of the motherboard is constantly upgraded, the BIOS description in this manual is for reference only. We do not guarantee that the relevant contents in this manual are consistent with the information you have obtained.

5.1.1 CMOS setup

When the controller starts, the BIOS enters the power on self-test (Post) program. The self-test program is a series of diagnostic programs fixed in the BIOS. When the self-test program is completed, no errors are encountered. If you want to enter the BIOS, press DEL or ESC until you enter the BIOS interface. If this information disappears before you respond, you can shut down and restart your computer, or press<Ctrl>+<Alt>+<Delete>at the same time to restart the computer.

5.1.2 Function keys and auxiliary instructions

↑ (up button)	Move to the previous item
↓ (down button)	Move to the next item
← (left button)	Move to the left item
→ (right button)	Move to the right item

ESC	Exit the present interface
Enter	To confirm
+	Change the setting state or increase the value content
—	Change the setting state or decrease the value content
F1	To show the help document
F2	To load the last setting value
F3	To load the optimized value
F4	Store the set value and leave the CMOS SETUP program

Auxiliary description of the main screen
When you are in the Setup main screen, the main settings of the corresponding options are displayed below as the options move.
If you want to leave the auxiliary description window, just press the [ESC] key.

5.2 Main menu

When you enter the CMOS setup setting menu, you can see the main menu shown in Figure 5-1 at the top of the screen. In the main menu, you can select different setting options. Press the left and right direction keys to select. After selecting the submenu, the detailed setting options will be displayed at the bottom.

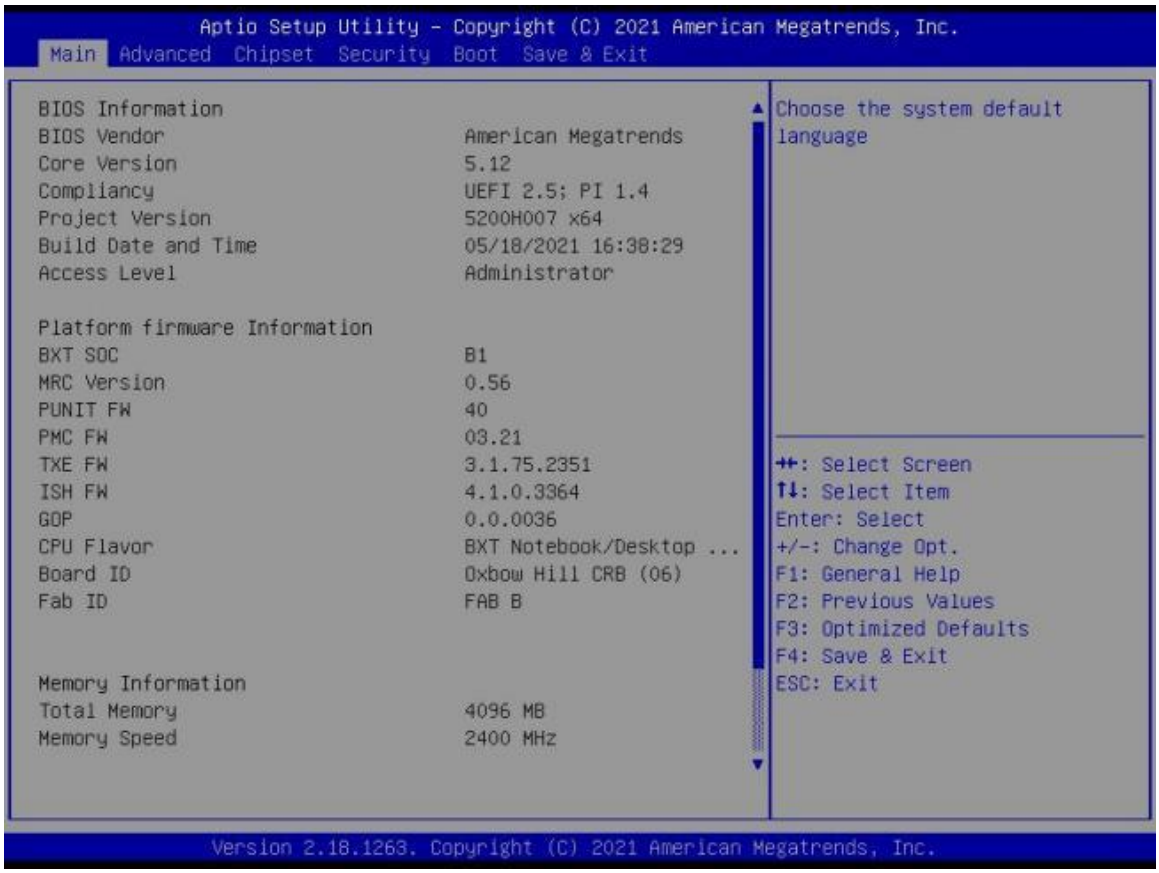


Figure 5-1 main menu

(1) Main (standard CMOS function setting): set the date, time, etc

(2) Advanced: (Advanced BIOS function settings)

Set the special functions provided by BIOS, such as CPU, USB, PCI, network port, etc

(3) Chipset: (Chipset Performance Settings)

Set North Bridge, South Bridge and other equipment options

(4) Security (set administrator/user password)

(5) Boot (Boot item configuration feature)

(6) Save&Exit:

This option includes discard changes/exit without saving/exit with saving, etc

5.3 Main (standard CMOS setting)

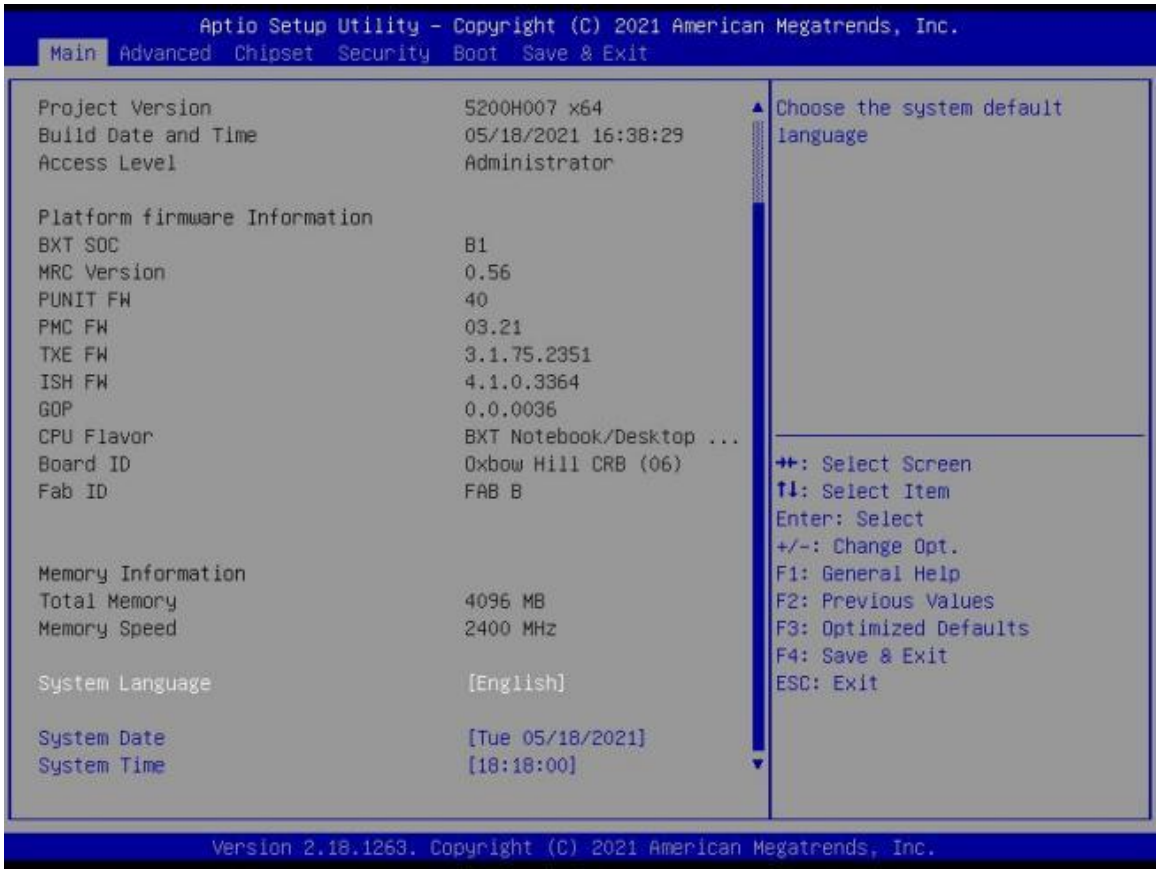


Figure 5-2 Main menu

(1) System Language: set the language in the computer

(2) System Date (mm: dd: yy)

Set the date in the computer in the format of "Sunday/Month/Day/Year"

(3) System Time (hh: mm: ss)

Set the time in the computer in the format of "hour/minute/second"

5.4 Advanced BIOS setting

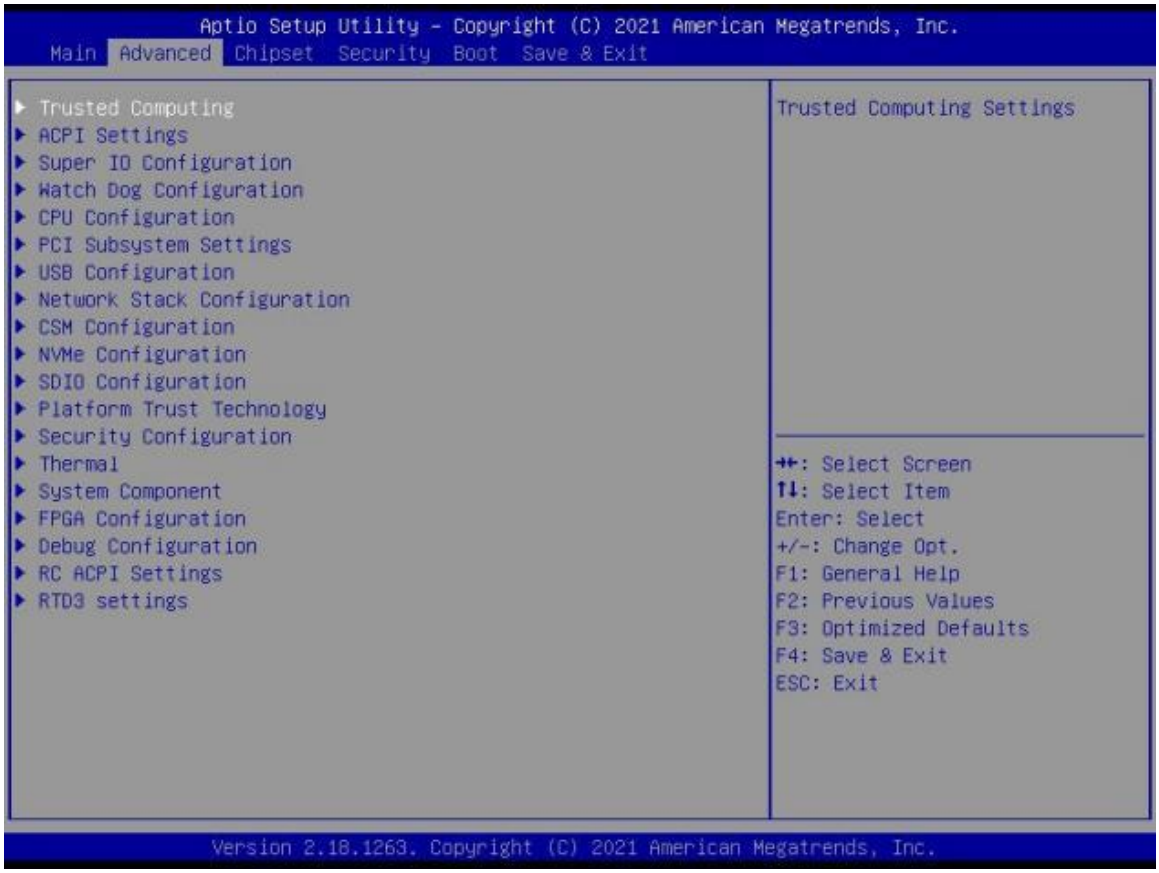


Figure 5-3 advanced menu

(1) Trusted Computing
(2) ACPI Settings
(3) SMART Settings
(4) Super IO Configuration
(5) Watch Dog Configuration
(6) CPU Configuration
(7) PCI Subsystem Settings
(8) USB Configuration
(9) Network Stack Configuration
(10) CSM Configuration
(11) NVMe Configuration
(12) SDIO Configuration
(13) Platform Trust Technology
(14) Security Configuration
(15) Thermal
(16) System Component

(17) FPGA Configuration
(18) Debug Configuration
(19) RC ACPI Settings
(20) RTD3 Settings

5.5 Chipset setting

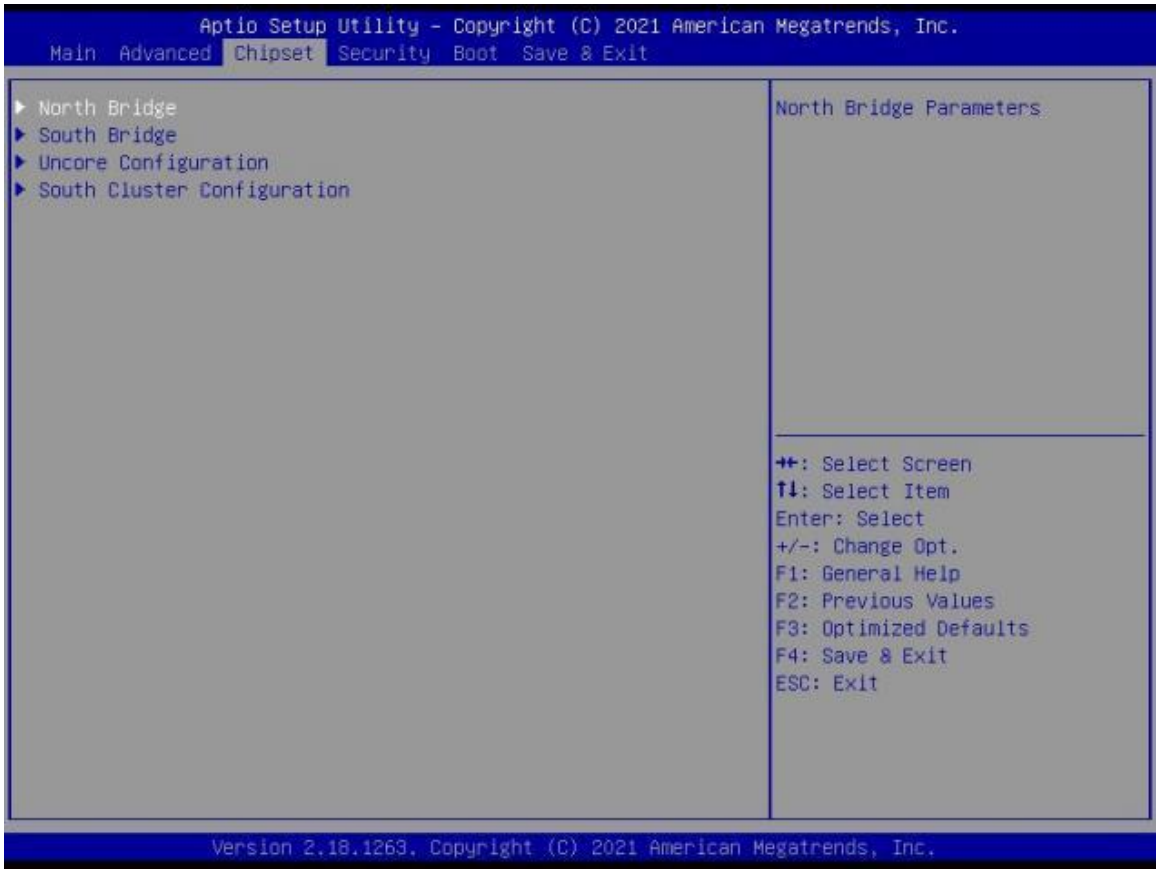


Figure 5-4 Chipset menu

(1) North Bridge
(2) South Bridge
(3) Uncore Configuration
(4) South Cluster Configuration

5.6 Security setting

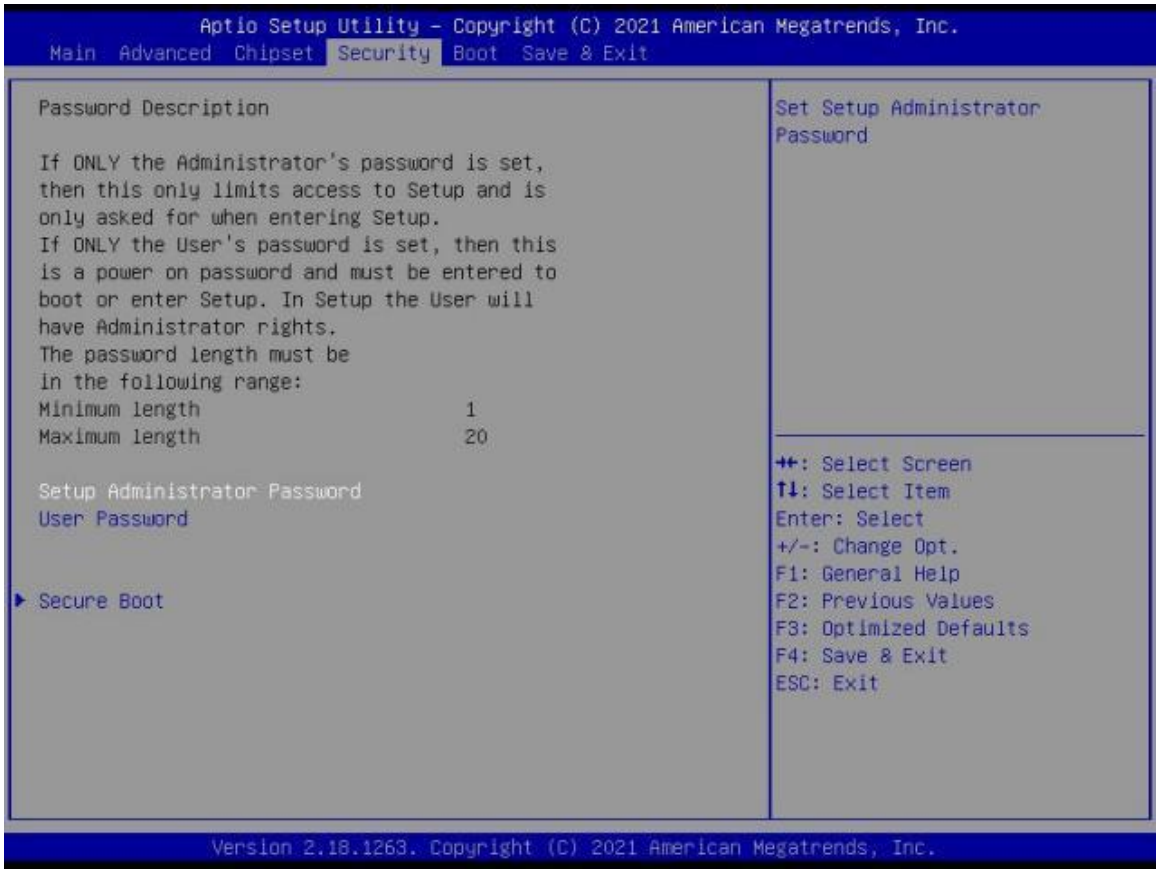


Figure 5-5 security menu

(1) Setup Administrator Password: Set the superuser password option, which has the highest authority. When you select this function, the following message will appear: Crate New Password******

Enter the password, up to 20 characters, and press the<Enter>key. The BIOS requires the same password to be input again. After the input is completed, the BIOS saves the set password. Once you use the password function, you will be asked to enter the password each time before entering the BIOS setup program. This prevents any unauthorized person from using your controller.

(2) User Password: Set the user password option. This password permission will be restricted, and some settings cannot be changed. When you select this function, the following message will appear: Crate New Password******

Enter the password, up to 20 characters, and press the<Enter>key. The BIOS requires the same password to be input again. After the input is completed, the BIOS saves the set password. Once you use the password function, you will be asked to enter the password before entering the BIOS setup program.

(3) Secure Boot: security boot settings

5.7 Boot setting

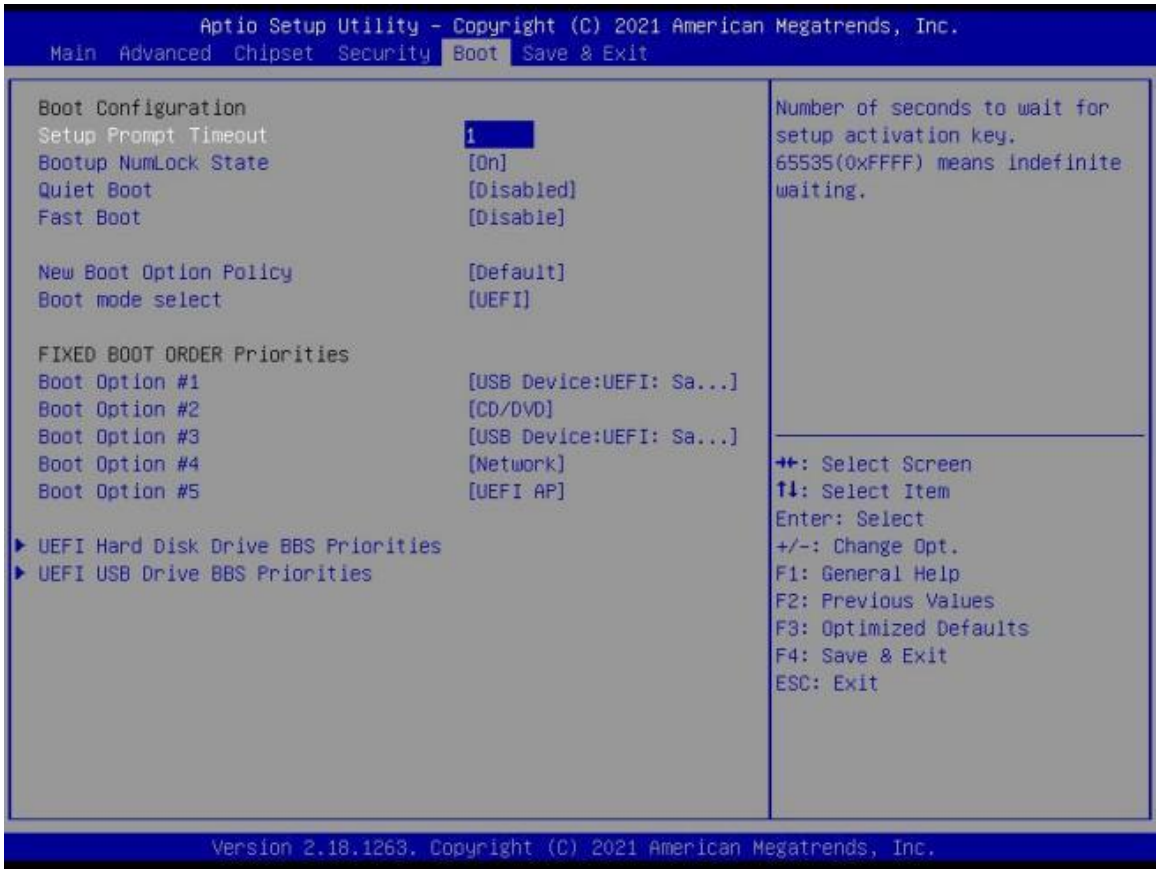


Figure 5-6 Boot menu

(1) Boot Configuration

Setup Prompt Timeout: Set prompt time

The power on POST displaying dwell time. The larger the value, the longer the dwell time.

Bootup NumLock State: Num Lock state after system startup.

The set values are: [On]/[Off]. This option specifies the status of the Num Lock key on the keyboard after the controller is started.

Quiet Boot: static start.

The set values are [Disabled]/[Enabled]. This option specifies whether to display LOGO when the controller starts.

(2) Boot Option Priorities

Boot Option # 1: First boot option. Use this option to select which disk to start from.

Fast Boot: quick start

The set values are [Disabled]/[Enabled]. This option specifies whether to perform hardware self-test at startup.

(3) New Boot Option Policy: new boot policy

5.8 Save and exit

Figure 5-7 Save and exit menu

(1) Save Options

Save Changes and Reset: save changes and restart

Discard Changes and Reset: Discard changes and restart

(2) Defaults Options

Restore Defaults: Load Optimal Defaults

This option in the main menu allows the user to restore all BIOS options to optimized values. The optimization default value is the default value set to optimize the performance of the motherboard. If you select YES and press Enter, you can save all the settings to CMOS SRAM and leave the BIOS setup program. If you do not want to save, select NO to return to the main menu.

Save as User Defaults: save as user defaults

Restore as User Defaults: Restore to user defaults

(3) Boot Override: direct boot

5.9 Set COM port mode

Select Advanced → Super IO configuration

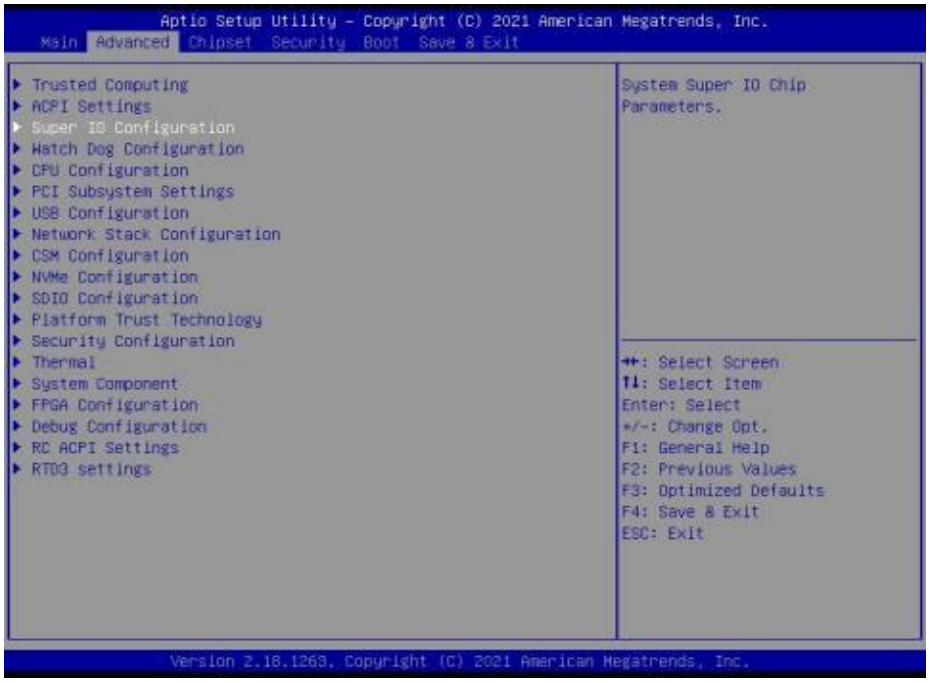


Figure 5-8 (a) set com port mode

Select the COM port, enter, there is COM Mode options, please select RS232 RS485.

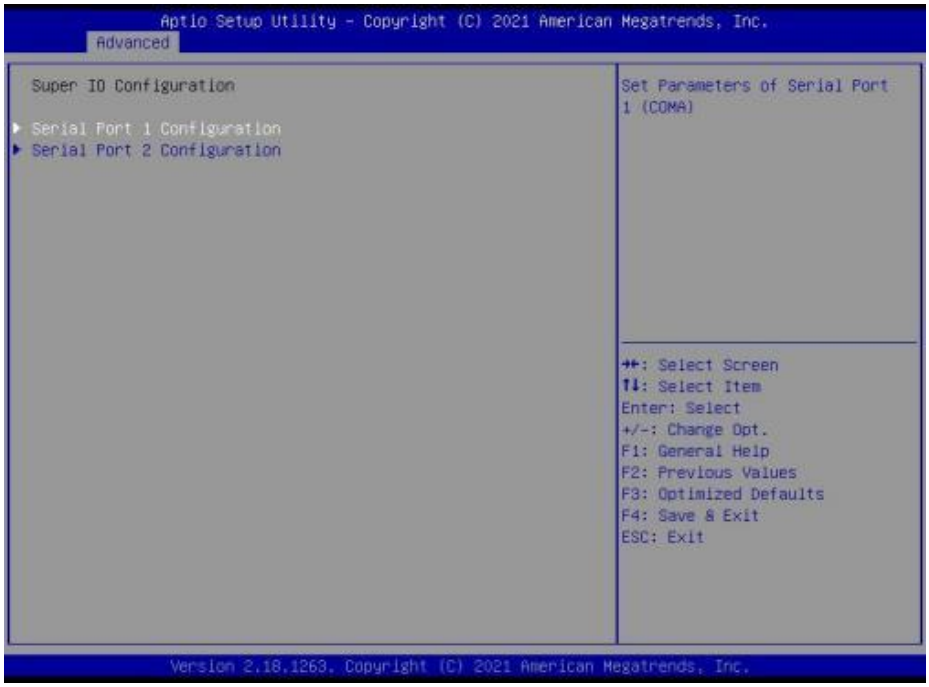


Figure 5-8 (b) set com port mode

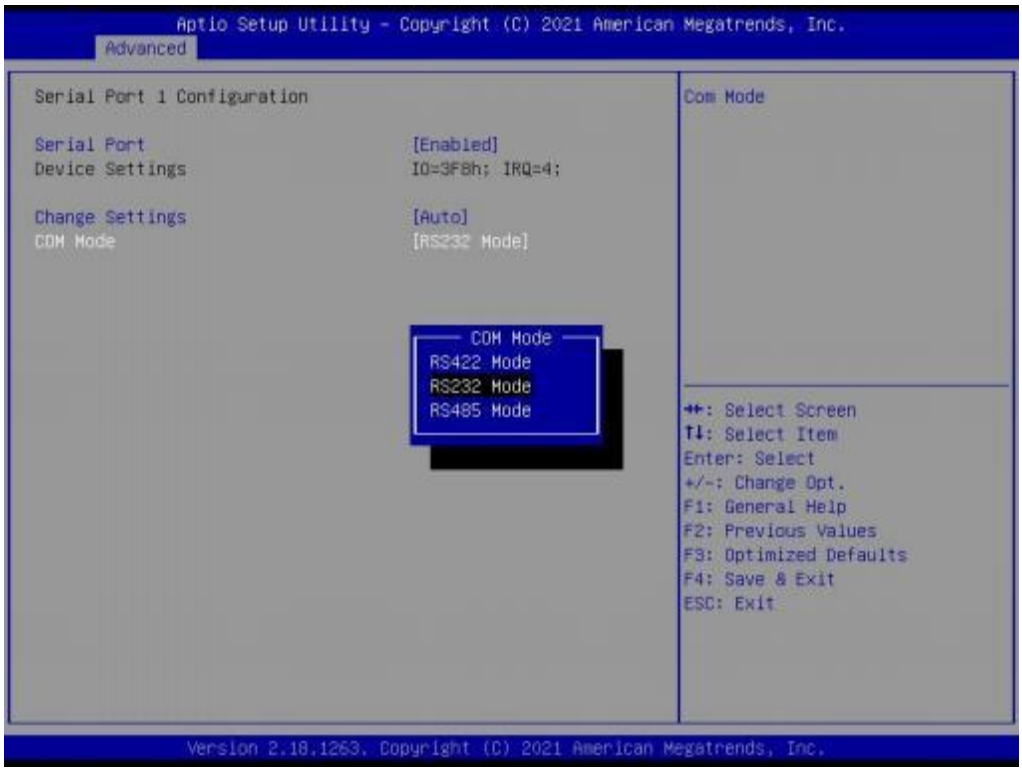


Figure 5-8 (c) set com port mode

6. Operation, commissioning and maintenance

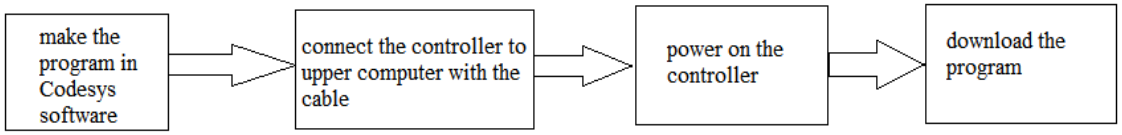
6.1 Operation and commissioning

- Product inspection

After receiving the product, please first check whether the input and output terminal block of the product is intact and whether there are missing parts. Generally speaking, the controller can be directly connected to the power cable for power on inspection, and the PWR and RUN indicators should be always on.

- Programming and downloading

After confirming that the product is in good condition, the controller can be programmed in the CoDeSys IDE of the PC. The finished program can be downloaded to the controller. The general operation steps are as follows:



Note: The CoDeSys IDE version of the upper computer program needs to be greater than or equal to the CoDeSys RTE version on the controller.

- Program debugging

Ideally, the controller is in normal operation, but if the program in the controller is found to be incorrect and needs to be modified, it is necessary to rewrite the program to the controller in operation.
(1) Connect the controller and the computer through RS232 serial port or Ethernet port.
(2) Upload the program in the controller.
(3) Modify the uploaded program, and save the modified program.
(4) Pause the operation of the controller and download the modified program to the controller.
(5) Monitor the controller through ladder diagram monitoring, free monitoring and other functions.
(6) If the requirements are still not met, continue to modify the program and download it to the controller until the requirements are met.

- Controller indicator

When the controller is in normal operation, the indicator lights PWR and RUN should always be on. When the indicator ERR is always on, it indicates that there is a problem in the controller operation. Please correct the program in time.
If the indicator PWR is not on, there is a problem with the power supply. Check the power wiring.

6.2 Routine maintenance

- Regular inspection of products

Although the motion controller has certain anti-interference and strong stability, it should also develop the habit of regular inspection and maintenance of the controller.
The inspection items include:

(1) Whether the input/output terminals and power terminals of the controller are loose or not
(2) Whether the communication port is intact
(3) Whether the power indicator can be lit
(4) Sweep the accumulated dust outside the controller to prevent dust and conductive dust from falling into each interface of the controller
(5) Try to make the operation and storage environment of the controller conform to the standards described in Section 2.1.1 of this manual

- Battery

There is no component in the programmable controller that can seriously shorten its life, so it can be used all the time. The controller has clock and data retention functions, and its battery needs to be replaced regularly.
Battery specification and model: CMOS (two-wire connection).

The service life of the battery is generally 3 years.
Replace the battery as soon as possible after it is found that the battery level has dropped.
Please power on the controller immediately after replacing the battery, otherwise the battery may be exhausted.

- Discard

When it is determined to discard this product, please treat it as industrial waste.

7. Q&A

Q1: Abnormal startup

(1) The power indicator does not light up after the controller is powered on
a. Check whether the controller is connected correctly and whether the power socket is powered.
b. Check the controller power adapter, plug and unplug the power cable, display data cable, keyboard and mouse cable, and confirm whether the display is correctly connected to the host computer.
c. Check whether the positive and negative poles of the power plug are connected reversely.

(2) The power indicator is on, but the display does not show
a. Check the power supply and switch of the display.
b. Check whether the data cable of the display is in poor contact.
c. If DisplayPort or VGA converter is used, replace it with another brand converter.
d. Observe the keyboard and mouse indicators. If the keyboard indicators and mouse indicators are on, replace the monitor for troubleshooting.

(3) The motherboard fails to self check after power on
Press the [Del] key to reset CMOS or clear CMOS

(4) The mouse and keyboard cannot be used after startup
a. Check whether the keyboard lock is locked and release the keyboard lock.
b. If not, check whether the connection between the motherboard and the backplane, keyboard and mouse are correct.
c. Check whether the keyboard and mouse are connected with one to two adapters. If yes, connect the keyboard and mouse reversely.
d. Replace the one to two connector.
e. Replace the mouse and keyboard

(5) Unable to boot the system from the hard disk after power on

a. Press the "Del" key to enter the CMOS hard disk parameter setting, check if the boot sequence are correct.
b. After booting with optical disk drive or floppy disk drive, check whether the hard disk has a boot system or whether the hard disk is partitioned normally and has activated the boot partition.
c. Press F8 during startup to select the last correct configuration to start the operating system.
d. Replace the hard disk with a new one and reinstall the system.

Q2: System crashes or blue screen during operation
(1) Check whether the controller temperature is too high.
(2) Check whether the wrong or expired driver is installed.
(3) Check whether the system is infected with viruses.
(4) Whether the system files, applications and disks are damaged.

Q3: The device driver could not be installed correctly
(1) Check whether the driver is correct and up to date.
(2) Whether the driver needs the support of the patch of the operating system.
(3) Whether the resources occupied by other devices conflict with the resources occupied by the devices to be driven.
(4) If it is a peripheral device, replace a slot and reinstall the driver.
(5) Replace the device and reinstall the driver.

Q4: BIOS updating method
(1) Prepare a UEFI startup flash disk. If not, make one.
(2) Please copy the required BIOS files and batch processing to the root directory of the USB drive.
(3) Start up, press F7, select the prepared UEFI flash disk, enter, and enter the shell.
(4) Enter FS0: Enter (if no other storage device is connected, it is fs0:).
(5) Run flash.nsh, update the BIOS, and power off is not allowed in the process.
(6) After updating the BIOS, power off, then power on, restart the controller, enter BIOS settings, and press F3 to load the BIOS optimized defaults (press Enter to select Y).

Q5: Notice
The following conditions may cause a refresh failure and fail to boot.
(1) Power failure during refreshing.
(2) There is a virus in the flash disk.
(3) BIOS file is damaged.
(4) Non UEFI system.
In case of failure to boot after refreshing, you can try to clear the BIOS. If the situation persists, please return to the factory for maintenance.