XL series PLC extension module

User manual

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This manual includes some basic precautions which you should follow to keep you safe and protect the products. These precautions are underlined with warning triangles in the manual. About other manuals that we do not mention please follow basic electric operating rules.

Precautions

Please follow the precautions. If not, it may lead the control system incorrect or abnormal, even cause fortune lose.

Correct Application

The models could only be used according to the manual, and an only be used along with the peripheral equipment recognized or recommended by X Company. They could only work normally in the condition of be transported, kept and installed correctly, also please operate and maintain them according to the recommendation.

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Without exact paper file allowance, copy, translate or using the manual is not allowed. Disobey this, people should take the responsibility of loss. We reserve all the right of expansions and their design patent.

Duty Declare
We have checked the manual; its content fits the hardware and software of the products. As mistakes are unavoidable, we couldn’t promise all correct. However, we would check the data in the manual frequently, and in the next edition, we will correct the necessary information. Your recommendation would be highly appreciated

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1. Module information summary

This chapter introduces the model, appearance, general specification, installation method, software configuration and PID function of XL series expansion module. This series of modules are suitable for XL series PLC models.

1-1. Module model and configuration

XL series PLC not only has powerful functions of logic processing, data operation and high-speed processing, but also has functions of A/D and D/A conversion. By using input-output expansion module and analog module, XL series PLC has been widely used in process control systems such as temperature, flow and liquid level.

Model and function

Model	Function
XL-EnXmY	N inputs, m outputs, NPN input, relay/transistor output
XL-E4AD2DA	4 channels analog input (14 bits), 2 channels analog output (12 bits). Input output is voltage/current optional
XL-E8AD-A	8 channels analog input (14 bits), current bipolar input
XL-E8AD-V	8 channels analog input (14 bits), voltage bipolar input
XL-E4DA	4 channels analog output (12 bits), current/voltage optional
XL-E4PT3-P	4 channels PT100 temperature measurement, with PID function
XL-E4TC-P	4 channels thermocouple temperature measurement, with PID function

Module configuration

XL series expansion module can be installed on the right side of the main unit and expansion module of XL series PLC.

- The number of digital input and output is octal.
- The number of analog input and output is decimal.
- XL3 series can connect up to 10 extension modules, XL5/XL5E/XLME series can connect up to 16 extension modules, XL1 does not support extension modules. The type is not limited, it can be digital or analog input and output, temperature control module and so on.

Note: When the number of right extension modules connected by XL series PLC is more than 5, it is necessary to connect a terminal resistance module XL-ETR to the right of the last module (requiring the hardware version of XL series right extension module to be H3.1 or more).

1-2. Dimension

The shape and size of XL series analog, temperature, 8-16 points I/O modules are shown in the following figure:

(unit: mm)

The shape and size of XL series 32-point I/O modules are shown in the following figure:

(unit: mm)

1-3. Part name and function

Name	Function	
Fixed buckle	fix the PLC unit and extension module	
Module model	The extension module model	
Extension port	To connect other modules	
I/O terminal	Connect analog input and output, external devices, removable	
Power LED	PWR	The LED lights up when the module has power supply.
	COM	When the module communication port communicates normally, the LED lights on.
	ERR	When there is an error in the module, the LED is always on or flickering (red). When the ERR LED is always on, it indicates that the module has serious application errors and can not be used. It is necessary to adjust the mode of use and switch the PLC to STOP state. When the ERR LED flickers, there are application errors, abnormal work and abnormal data in the module, but the PLC is still RUN.
I/O LED	Input output ON indicator	

1-4. General specification

Operating Environment	No corrosive gas
Ambient Temperature	0℃~60℃
Store Temperature	-20~70℃
Ambient Humidity	5~95% RH
Store Humidity	5~95% RH
Installation	Can be fixed with M3 screw or directly installed on DIN46277 rail (width: 35mm)
Operating Environment	No corrosive gas

1-5. Module installation

Installation steps

1. Check installation environment

Check the suitability of special function module installation site

2. Installation preparation

Prepare for installation of special modules

3. Module installation

Install the module on the right side of PLC

4. Debugging

Check whether the module is installed correctly

Installation environment

Do not install in the following environments:

- Places in direct sunlight
- Environment temperature exceeded 0-50 centigrade
- Environment humidity exceeded 35-85%
- Where dew occurs because of dramatic changes in temperature
- Places with corrosive and flammable gases
- Dust, iron scraps, salt, smoky places
- Places directly affected by vibration and shock
- Places for spraying water, oil and medicine
- A place where a strong magnetic field or electric field is produced

Installation

XL series analog input and output, temperature control module can be installed on the right side of the main unit and expansion module of XL series PLC. The installation can use DIN46277 guideway (35 mm wide).

- Use DIN46277 guideway

The basic unit and expansion module are installed on the DIN46277 guideway (35 mm wide). To dismantle, just pull down the assembly hook of DIN guide rail and take off the product.

Wiring requirement

Apart from the XL series 32-point extension module, which needs to use an external terminal for wiring, other modules can directly insert the cable into the corresponding wiring hole.

Cautions:

1. Please confirm the specifications and select the appropriate modules.
2. When processing screw holes and wiring, do not let chips and wire chips fall into the module.
3. Before connecting, please reconfirm the specifications of modules and connecting equipment to ensure that there is no problem.
4. When connecting, please pay attention to whether the connection is firm or not. If the connection falls off, it will cause data incorrect, short circuit and other faults.
5. Installation, wiring and other operations must be carried out after cutting off all the power supply.

1-6. Configuration of the module

When the module is in use, the corresponding configuration in the upper computer programming software of PLC is needed first, so that the module can be used normally. Following is an example of module XL-E4AD2DA to illustrate how to configure it in the software. The steps are as follows:

Open the programming software, click "Module" in the left menu:

It will show the configuration window, please select correct module name and information:

Please select the module name, then set the paramters of the module, such as filter paramters, input range and so on. then click write to PLC.

Then cut the power supply and power on the PLC again to make the settings effective!

Note: please use software version 3.5.1 and higher to configure the modules.

1-7. Terminal resistance module XL-ETR

When the number of right extension modules of XL series PLC is more than 5, the terminal resistance module XL-ETR must be used together.

XL-ETR is only applicable to XL series right extension modules of hardware version H3.1 and above.

Dimension

Unit: mm

Installation

When using, please install XL-ETR on the right side of the last extension module and connect the interface slot of the module as shown in the following figure:

2. I/O extension module XL-EnXmY

This chapter mainly introduces the specification of XL-EnXmY module, terminal description, input definition number assignment, external connection, appearance size diagram and related programming examples.

2-1. Module features and specifications

XL series PLC can expand XL-EnXmY input and output module externally. Each XL3 series PLC can expand 10 modules, XL5/XL5E can expand 16 modules, XL1 does not support expansion module. The module is rich in types and compact in shape, which makes it possible for more input and output points and meets the actual production needs.

Models

Model		Function
NPN input	PNP input	
XL-E8X8YR	-	8 channels digital input, 8 channels relay output
XL-E8X8YT	-	8 channels digital input, 8 channels transistor output
XL-E16X	-	16 channels digital input
XL-E16YR	-	16 channels relay output
XL-E16YT	-	16 channels transistor output
XL-E16X16YT	-	16 channels digital input, 16 channels transistor output
XL-E32X	-	32 channels digital input

XL-E32YT	-	32 channels transistor output

Module specification

Item	Specification
Power supply	DC24V ±10%
Environment	Non-corrosive gas
Temperature	0℃~60℃
Humidity	5~95%
Installation	Direct mounting on DIN46277 (35 mm wide) rail

2-2. Terminal descriptions

XL-E8X8YR, XL-E8X8YT terminal arrangement:

XL-E16X terminal arrangement:

XL-E16YR, XL-E16YT terminal arrangement:

XL-E16X16YT terminal arrangement:

L+	X0	X1	X2	X3	•	X10	X11	X12	X13	COM0	Y0	Y1	Y2	Y3	COM2	Y10	Y11	Y12	Y13
M	X4	X5	X6	X7	•	X14	X15	X16	X17	COM1	Y4	Y5	Y6	Y7	COM3	Y14	Y15	Y16	Y17

XL-E32X terminal arrangement:

L+	X0	X1	X2	X3	•	X10	X11	X12	X13	•	X20	X21	X22	X23	•	X30	X31	X32	X33
M	X4	X5	X6	X7	•	X14	X15	X16	X17	•	X24	X25	X26	X27	•	X34	X35	X36	X37

XL-E32YT terminal arrangement:

COM0	Y0	Y1	Y2	Y3	COM2	Y10	Y11	Y12	Y13	COM4	Y20	Y21	Y22	Y23	COM6	Y30	Y31	Y32	Y33
COM1	Y4	Y5	Y6	Y7	COM3	Y14	Y15	Y16	Y17	COM5	Y24	Y25	Y26	Y27	COM7	Y34	Y35	Y36	Y37

Note: When connecting X terminal, external DC24V power supply is needed. Please connect 24V + to L + terminal and 24V - to M terminal. In addition, M terminal is also the common terminal of input point X. The input and output wiring of module is same to the input and output wiring of XL body.

Wiring head specifications

When wiring the module, its wiring head should meet the following requirements:

(1) The stripping length is 9 mm;

(2) Flexible conductors with bare tubular ends are 0.25-1.5 square meter.

(3) Flexible conductor with tubular pre-insulated end is 0.25-0.5 square meter.

2-3. I/O definition number

The addresses of the input and output terminals of the XL Series I/O Extension Module are as follows:

- **#1~#16 extension module input terminal X0~X37 definition:**

	#1	#2	#3	#4	#5	#6	#7	#8
X0	X10000	X10100	X10200	X10300	X10400	X10500	X10600	X10700
X1	X10001	X10101	X10201	X10301	X10401	X10501	X10601	X10701
…	…	…	…	…	…	…	…	…
X7	X10007	X10107	X10207	X10307	X10407	X10507	X10607	X10707
X10	X10010	X10110	X10210	X10310	X10410	X10510	X10610	X10710
…	…	…	…	…	…	…	…	…
X17	X10017	X10117	X10217	X10317	X10417	X10517	X10617	X10717
X20	X10020	X10120	X10220	X10320	X10420	X10520	X10620	X10720
…	…	…	…	…	…	…	…	…
X27	X10027	X10127	X10227	X10327	X10427	X10527	X10627	X10727
X30	X10030	X10130	X10230	X10330	X10430	X10530	X10630	X10730
…	…	…	…	…	…	…	…	…
X36	X10036	X10136	X10236	X10336	X10436	X10536	X10636	X10736
X37	X10037	X10137	X10237	X10337	X10437	X10537	X10637	X10737
	#9	#10	#11	#12	#13	#14	#15	#16
X0	X11000	X11100	X11200	X11300	X11400	X11500	X11600	X11700
X1	X11001	X11101	X11201	X11301	X11401	X11501	X11601	X11701
…	…	…	…	…	…	…	…	…
X7	X11007	X11107	X11207	X11307	X11407	X11507	X11607	X11707

X10	X11010	X11110	X11210	X11310	X11410	X11510	X11610	X11710
…	…	…	…	…	…	…	…	…
X17	X11017	X11117	X11217	X11317	X11417	X11517	X11617	X11717
X20	X11020	X11120	X11220	X11320	X11420	X11520	X11620	X11720
…	…	…	…	…	…	…	…	…
X27	X11027	X11127	X11227	X11327	X11427	X11527	X11627	X11727
X30	X11030	X11130	X11230	X11330	X11430	X11530	X11630	X11730
…	…	…	…	…	…	…	…	…
X36	X11036	X11136	X11236	X11336	X11436	X11536	X11636	X11736
X37	X11037	X11137	X11237	X11337	X11437	X11537	X11637	X11737

- **#1~#16 extension module output terminal Y0~Y37 definition:**

	#1	#2	#3	#4	#5	#6	#7	#8
Y0	Y10000	Y10100	Y10200	Y10300	Y10400	Y10500	Y10600	Y10700
Y1	Y10001	Y10101	Y10201	Y10301	Y10401	Y10501	Y10601	Y10701
…	…	…	…	…	…	…	…	…
Y7	Y10007	Y10107	Y10207	Y10307	Y10407	Y10507	Y10607	Y10707
Y10	Y10010	Y10110	Y10210	Y10310	Y10410	Y10510	Y10610	Y10710
…	…	…	…	…	…	…	…	…
Y17	Y10017	Y10117	Y10217	Y10317	Y10417	Y10517	Y10617	Y10717
Y20	Y10020	Y10120	Y10220	Y10320	Y10420	Y10520	Y10620	Y10720
…	…	…	…	…	…	…	…	…
Y27	Y10027	Y10127	Y10227	Y10327	Y10427	Y10527	Y10627	Y10727
Y30	Y10030	Y10130	Y10230	Y10330	Y10430	Y10530	Y10630	Y10730
…	…	…	…	…	…	…	…	…
Y36	Y10036	Y10136	Y10236	Y10336	Y10436	Y10536	Y10636	Y10736
Y37	Y10037	Y10137	Y10237	Y10337	Y10437	Y10537	Y10637	Y10737
	#9	#10	#11	#12	#13	#14	#15	#16
Y0	Y11000	Y11100	Y11200	Y11300	Y11400	Y11500	Y11600	Y11700
Y1	Y11001	Y11101	Y11201	Y11301	Y11401	Y11501	Y11601	Y11701
…	…	…	…	…	…	…	…	…
Y7	Y11007	Y11107	Y11207	Y11307	Y11407	Y11507	Y11607	Y11707
Y10	Y11010	Y11110	Y11210	Y11310	Y11410	Y11510	Y11610	Y11710
…	…	…	…	…	…	…	…	…
Y17	Y11017	X11117	X11217	X11317	X11417	X11517	X11617	X11717
Y20	Y11020	Y11120	Y11220	Y11320	Y11420	Y11520	Y11620	Y11720
…	…	…	…	…	…	…	…	…
Y27	Y11027	Y11127	Y11227	Y11327	Y11427	Y11527	Y11627	Y11727
Y30	Y11030	Y11130	Y11230	Y11330	Y11430	Y11530	Y11630	Y11730
…	…	…	…	…	…	…	…	…

Y36	Y11036	Y11136	Y11236	Y11336	Y11436	Y11536	Y11636	Y11736
Y37	Y11037	Y11137	Y11237	Y11337	Y11437	Y11537	Y11637	Y11737

2-4. External connection

Input terminal wiring method:

Button wiring example

2-wire (NO/NC) proximity switch wiring example

3-wire (NPN) proximity switch wiring example

XL-E32X, XL-E16X16YT and XL-E32YT modules need external terminals. Xinje provides adapter terminals and connection cables for users to choose from. A list of module models and adapter terminals and connecting cables:

Module	Terminal	Cable
XL-E32X	JT-E32X	JC-TE32-NN05（0.5m）
XL-E16X16YT	JT-E16X16YT	JC-TE32-NN10（1.0m）
XL-E32YT	JT-E32YT	JC-TE32-NN15（1.5m）

- **Terminal appearance** **(Unit: mm)**

- **Wiring method**

When wiring, press the spring switch with the slotted screwdriver, insert the wire into the corresponding holes, and loosen the spring switch. The length of the cable skin stripping is 1.5 cm.

- **Connection cable**

External terminals need to cooperate with the use of connecting cables, Xinje provides JC-TE32-NNN05, JC-TE32-NN10, JC-TE32-NN15 three different length of cables for users to choose and purchase. When connecting, please note that the end closing to the transparent heat shrinkable tube connects the module, the other end connects to the terminals, can not be reversed!!!

Wiring diagram:

Output wiring method:

Relay type

Transistor type

2-5. Module parameters

Positive and negative logic can be adjusted and filtering time can be adjusted. There are two configuration modes:

A. Set through the software

B. Set through SFD register

Module number	SFD address	Module number	SFD address
#1	SFD350~SFD359	#9	SFD430~SFD439
#2	SFD360~SFD369	#10	SFD440~SFD449
#3	SFD370~SFD379	#11	SFD450~SFD459
#4	SFD380~SFD389	#12	SFD460~SFD469
#5	SFD390~SFD399	#13	SFD470~SFD479
#6	SFD400~SFD409	#14	SFD480~SFD489
#7	SFD410~SFD419	#15	SFD490~SFD499
#8	SFD420~SFD429	#16	SFD500~SFD509

The first 20 bytes of OMMAND information are allocated as follows:

- **XL-E8X8Y**

	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6~Byte19
Bit7	X0~X3 filtering time	X4~X7 filtering time	-	-	-	-	-
Bit6			X3 logic	X7 logic	Y3 logic	Y7 logic	-
Bit5			-	-	-	-	-
Bit4			X2 logic	X6 logic	Y2 logic	Y6 logic	-
Bit3			-	-	-	-	-
Bit2			X1 logic	X5 logic	Y1 logic	Y5 logic	-

Bit1			-	-	-	-	-
Bit0			X0 logic	X4 logic	Y0 logic	Y4 logic	-
Notes	Filtering time (unit: ms): 1~5, 10(default), 15, 20, 25, 30, 35, 40, 45, 50		Note: 0 is positive logic, 1 is negative logic				-

- **XL-E16X**

	Byte0	Byte1	Byte2	Byte3	Byte 4	Byte 5	Byte 6	Byte 7	Byte8~ Byte19
Bit7	X0~X3 filtering time	X4~X7 filtering time	X10~X13 filtering time	X14~X17 filtering time	-	-	-	-	-
Bit6					X3 logic	X7 logic	X13 logic	X17 logic	-
Bit5					-	-	-	-	-
Bit4					X2 logic	X6 logic	X12 logic	X16 logic	-
Bit3					-	-	-	-	-
Bit2					X1 logic	X5 logic	X11 logic	X15 logic	-
Bit1					-	-	-	-	-
Bit0					X0 logic	X4 logic	X10 logic	X14 logic	-
Notes	Filtering time (unit: ms): 1~5, 10(default), 15, 20, 25, 30, 35, 40, 45, 50				Note: 0 is positive logic, 1 is negative logic				-

- **XL-E16X16Y**

	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Explanation
Byte0	X0~X3 filtering time								Filtering time (unit: ms): 1~5, 10(default), 15, 20, 25, 30, 35, 40, 45, 50
Byte1	X4~X7 filtering time								
Byte2	X10~X13 filtering time								
Byte3	X14~X17 filtering time								
Byte4	X0 logic	-	X1 logic	-	X2 logic	-	X3 logic	-	Note: 0 is positive logic, 1 is negative logic
Byte5	X4 logic	-	X5 logic	-	X6 logic	-	X7 logic	-	
Byte6	X10 logic	-	X11 logic	-	X12 logic	-	X13 logic	-	
Byte7	X14 logic	-	X15 logic	-	X16 logic	-	X17 logic	-	
Byte8	Y0 logic	-	Y1 logic	-	Y2 logic	-	Y3 logic	-	
Byte9	Y4 logic	-	Y5 logic	-	Y6 logic	-	Y7 logic	-	
Byte10	Y10 logic	-	Y11 logic	-	Y12 logic	-	Y13 logic	-	

Byte11	Y14 logic	-	Y15 logic	-	Y16 logic	-	Y17 logic	-	
Byte 12~19	-	-	-	-	-	-	-	-	

- **XL-E16Y/XL-E32Y**

	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Explanation
Byte0	Y0 logic	-	Y1logic	-	Y2 logic	-	Y3 logic	-	Note: 0 is positive logic, 1 is negative logic
Byte1	Y4 logic	-	Y5 logic	-	Y6 logic	-	Y7 logic	-	
Byte2	Y10 logic	-	Y11 logic	-	Y12 logic	-	Y13 logic	-	
Byte3	Y14 logic	-	Y15 logic	-	Y16 logic	-	Y17 logic	-	
Byte4	Y20 logic	-	Y21 logic	-	Y22 logic	-	Y23 logic	-	
Byte5	Y24 logic	-	Y25 logic	-	Y26 logic	-	Y27 logic	-	
Byte6	Y30 logic	-	Y31 logic	-	Y32 logic	-	Y33 logic	-	
Byte7	Y34 logic	-	Y35 logic	-	Y36 logic	-	Y37 logic	-	
Byte8~19	-	-	-	-	-	-	-	-	

- **XL-E32X**

	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Explanation
Byte0	X0~X3 filtering time								Filtering time (unit: ms): 1~5, 10(default), 15, 20, 25, 30, 35, 40, 45, 50
Byte1	X4~X7 filtering time								
Byte2	X10~X13 filtering time								
Byte3	X14~X17 filtering time								
Byte4	X20~X23 filtering time								
Byte5	X24~X27 filtering time								
Byte6	X30~X33 filtering time								
Byte7	X34~X37 filtering time								
Byte8	X0 logic	-	X1 logic	-	X2 logic	-	X3 logic	-	Note: 0 is positive logic, 1 is negative logic
Byte9	X4 logic	-	X5 logic	-	X6 logic	-	X7 logic	-	
Byte10	X10 logic	-	X11 logic	-	X12 logic	-	X13 logic	-	
Byte11	X14 logic	-	X15 logic	-	X16 logic	-	X17 logic	-	
Byte12	X20 logic	-	X21 logic	-	X22 logic	-	X23 logic	-	
Byte13	X24	-	X25	-	X26	-	X27	-	

	logic		logic		logic		logic		
Byte14	X30 logic	-	X31 logic	-	X32 logic	-	X33 logic	-	
Byte15	X34 logic	-	X35 logic	-	X36 logic	-	X37 logic	-	
Byte 16~19	-	-	-	-	-	-	-	-	

Note:
In positive logic, X terminal is ON, X-terminal signal is ON, X terminal is OFF and X-terminal signal is OFF.
In negative logic, X terminal is ON, X terminal signal is OFF, X terminal is OFF, X-terminal signal is ON.
Default is positive logic, usually without modification.

2-6. Dimension

The shape and size of XL series 8-16 I/O modules are shown in the following figure:

(Unit: mm)

The shape and size of XL series 32 I/O modules is shown in the following figure:

(Unit: mm)

2-7. Application

In this chapter, the application of this module will be exemplified. XL3-16R is slave station with an extended XL-E8X8YR to communicate with XINJE HMI.
Communication between Extended Module XL-E8X8YR and Xinje TG765 HMI.

In this example, as the main communication station, the HMI reads the input point state of the extended module to the local coil state of the HMI, and writes the coil state of the internal HMI to the output point of the extended module. The corresponding relationship is as follows:
Hardware connection:

The module XL-E8X8YR is attached to XL3-16R, and the RS485 communication terminal AB of XL3-16R is connected to the AB terminal of the PLC port of TG765 respectively.
Communication parameter settings: the baud rate is 19200 bps, 8 data bits, 1 stop bit, even parity, PLC Modbus station number is 1, then cut the power supply and power on again.
For TG765 HMI: please set the PLC type to Modbus RTU (panel is master). The baud rate is 19200 bps, 8 data bits, 1 stop bit, even parity.

Program application:

The corresponding relationship between the module input and output address and the local coil address is as follows:

Local coil address		Module I/O	Related modbus address
PSB500	↔	X10000	K20736
PSB501	↔	Y10000	K24832

HMI screen:

Edit the status of extension module X10000, place a lamp, the object type of lamp is 0X, corresponding Modbus address coil is 20736; select function button, button function is to copy the coil status of X10000 to PSB500 when pressing the button; edit PSB500 lamp, the lamp object type is PSB, the coil number is 500.

Edit the PSB501 status, place a lamp, the lamp object type is PSB, the coil number is 501. When the function button is pressed, copy the status of PSB501 to extension module Y10000. Edit the status of extension module Y10000, the lamp object type is 0x, the modbus address is 24832.

Download the program into the HMI. Then make them to communicate.

3. Analog I/O module XL-E4AD2DA

This chapter mainly introduces XL-E4AD2DA module specifications, terminal, input definition number allocation, working mode settings, external connections, analog-to-digital conversion diagrams, appearance size diagrams and related programming examples.

3-1. Module features and specifications

XL-E4AD2DA analog input and output module converts four channels of analog input values into digital values, two channels of digital values into analog values, and transmits them to the main unit of PLC, and real-time data interaction with the main unit of PLC.

Module features

- Four-channel analog input: Voltage input and current input can be selected.
- 14-bit high-precision analog input.
- 2-channel 12-bit analog output.
- As an extension module of XL series, XL3 can connect up to 10 modules, XL5/XL5E can expand 16 modules, XL1 does not support extension modules.

Module specification

Items	Analog input (AD)		Analog output (DA)	
	Voltage input	Current input	Voltage output	Current output
Analog input range	0~5V, 0~10V, -5~5V, -10~10V	0~20mA, 4~20mA, -20~20mA	-	
Max input range	DC ±15V	-40~40mA	-	
Analog output range	-		0~5V, 0~10V, -5~5V, -10~10V (Exterior load resistance 2KΩ~1MΩ)	0~20mA, 4~20mA (Exterior load resistance is less than 500Ω)
Digital input range	-		12 bits binary data	

		(0~4095 or -2048~2047)
Digital output range	14 bits binary data (0~16383 or -8192~8191)	-
Resolution	1/16383(14Bit)	1/4095(12Bit)
Integrated precision	1%	
Conversion speed	2ms per channel	2ms per channel
Module power supply	DC24V ±10%,150mA	
Installation	Fixed with M3 screws or directly installed on orbit of DIN46277 (Width: 35mm)	

3-2. Terminal description

Terminal arrangement

Terminal signal

Name		Function
Indicator light	PWR	The indicator lights up when the module has a power supply.
	COM	When the module port communicates normally, the indicator lights on.
	ERR	When there is an error in the module, the indicator is always on or flickering (red). When the ERR LED is always on, it indicates that the module has serious application errors and can not be used. It is necessary to adjust the mode of use and switch the PLC to STOP state. When the ERR LED flickers, there are application errors, abnormal work and abnormal data in the module, but the PLC is still RUN.
Terminal	L+	Module 24V power supply input +
	M	Module 24V power supply input -
	C0	VI0, AI0 input ground
	VI0	Channel 1 AD voltage input
	AI0	Channel 1 AD current input
	C1	VI1, AI1 input ground

	VI1	Channel 2 AD voltage input
	AI1	Channel 2 AD current input
	C2	VI2, AI2 input ground
	VI2	Channel 3 AD voltage input
	AI2	Channel 3 AD current input
	C3	VI3, AI3 input ground
	VI3	Channel 4 AD voltage input
	AI3	Channel 4 AD current input
	C0	VO0, AO0 output ground
	VO0	Channel 1 DA voltage output
	AO0	Channel 1 DA current output
	C1	VO1, AO1 output ground
	VO1	Channel 2 DA voltage output
	AO1	Channel 2 DA current output

Wiring head specification

When wiring the module, its wiring head should meet the following requirements:

(1) The stripping length is 9 mm;

(2) Flexible wires with bare tubular ends are 0.25-1.5 square.

(3) Flexible wires with tubular pre-insulated end is 0.25-0.5 square.

3-3. I/O address

XL series analog module does not occupy I/O unit, the converted value is directly sent to the PLC register, the corresponding channel definition number of the PLC register is as follows:

Module 1 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10000	Y10000
1CH	ID10001	Y10001
2CH	ID10002	Y10002
3CH	ID10003	Y10003
Channel	DA signal	
0CH	QD10000	Y10004
1CH	QD10001	Y10005

Module 2 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10100	Y10100
1CH	ID10101	Y10101
2CH	ID10102	Y10102
3CH	ID10103	Y10103
Channel	DA signal	
0CH	QD10100	Y10104
1CH	QD10101	Y10105

Module 3 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10200	Y10200
1CH	ID10201	Y10201
2CH	ID10202	Y10202
3CH	ID10203	Y10203
Channel	DA signal	
0CH	QD10200	Y10204
1CH	QD10201	Y10205

Module 4 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10300	Y10300
1CH	ID10301	Y10301
2CH	ID10302	Y10302
3CH	ID10303	Y10303
Channel	DA signal	
0CH	QD10300	Y10304
1CH	QD10301	Y10305

Module 5 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10400	Y10400
1CH	ID10401	Y10401
2CH	ID10402	Y10402

3CH	ID10403	Y10403
Channel	DA signal	
0CH	QD10400	Y10404
1CH	QD10401	Y10405

Module 6 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10500	Y10500
1CH	ID10501	Y10501
2CH	ID10502	Y10502
3CH	ID10503	Y10503
Channel	DA signal	
0CH	QD10500	Y10504
1CH	QD10501	Y10505

Module 7 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10600	Y10600
1CH	ID10601	Y10601
2CH	ID10602	Y10602
3CH	ID10603	Y10603
Channel	DA signal	
0CH	QD10600	Y10604
1CH	QD10601	Y10605

Module 8 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10700	Y10700
1CH	ID10701	Y10701
2CH	ID10702	Y10702
3CH	ID10703	Y10703
Channel	DA signal	
0CH	QD10700	Y10704
1CH	QD10701	Y10705

Module 9 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10800	Y11000
1CH	ID10801	Y11001
2CH	ID10802	Y11002
3CH	ID10803	Y11003
Channel	DA signal	
0CH	QD10800	Y11004
1CH	QD10801	Y11005

Module 10 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10900	Y11100
1CH	ID10901	Y11101
2CH	ID10902	Y11102
3CH	ID10903	Y11103
Channel	DA signal	
0CH	QD10900	Y11104
1CH	QD10901	Y11105

Module 11 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11000	Y11200
1CH	ID11001	Y11201
2CH	ID11002	Y11202
3CH	ID11003	Y11203
Channel	DA signal	
0CH	QD11000	Y11204
1CH	QD11001	Y11205

Module 12 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11100	Y11300
1CH	ID11101	Y11301
2CH	ID11102	Y11302

3CH	ID11103	Y11303
Channel	DA signal	
0CH	QD11100	Y11304
1CH	QD11101	Y11305

Module 13 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11200	Y11400
1CH	ID11201	Y11401
2CH	ID11202	Y11402
3CH	ID11203	Y11403
Channel	DA signal	
0CH	QD11200	Y11404
1CH	QD11201	Y11405

Module 14 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11300	Y11500
1CH	ID11301	Y11501
2CH	ID11302	Y11502
3CH	ID11303	Y11503
Channel	DA signal	
0CH	QD11300	Y11504
1CH	QD11301	Y11505

Module 15 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11400	Y11600
1CH	ID11401	Y11601
2CH	ID11402	Y11602
3CH	ID11403	Y11603
Channel	DA signal	
0CH	QD11400	Y11604
1CH	QD11401	Y11605

Module 16 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11500	Y11700
1CH	ID11501	Y11701
2CH	ID11502	Y11702
3CH	ID11503	Y11703
Channel	DA signal	
0CH	QD11500	Y11704
1CH	QD11501	Y11705

Note:
(1) Banning unused channels can improve the scanning speed of input/output.
(2) When the input enable switch is turned off during operation, the corresponding input channel will not collect data. (Data display is 0)
(3) When the enable switch of output is turned off during operation, the corresponding output channel keeps the original data unchanged.

3-4. Working mode settings

There are two ways to set the working mode (the effect of these two ways is equivalent):
(1) Configuration through the software
(2) Setting up by Flash Register

Set through the software

Please use XDPpro v3.5.1 or higher version software to configure the module.
Open the software, click module in the left menu,

Choose the module type, and set each channel's parameters in the above window. Then click write to PLC, cut the power supply and power on again to make the settings effective.

Note: The first-order low-pass filtering method weighs this time sampling value and the output value of the last filtering to get the effective filtering value; the filter coefficient is set by the user to 0-254, the smaller the value, the more stable the data, but may lead to data lag; therefore, when set to 1, the filtering effect is strongest and the data is the most stable; when set to 254, the filtering effect is the weakest; default is 0 (no filtering).

Set by Flash register

The input and output channels of the expansion module can be selected in two modes: voltage and current. Current is 0-20mA, 4-20mA, and -20-20mA. Voltage is 0-5V, 0-10V, -5-5V and -10-10V. It is set by special FLASH data register SFD in PLC. As follows:

Module no.	SFD register	Module no.	SFD register
#1	SFD350~SFD359	#9	SFD430~SFD439
#2	SFD360~SFD369	#10	SFD440~SFD449
#3	SFD370~SFD379	#11	SFD450~SFD459
#4	SFD380~SFD389	#12	SFD460~SFD469
#5	SFD390~SFD399	#13	SFD470~SFD479
#6	SFD400~SFD409	#14	SFD480~SFD489
#7	SFD410~SFD419	#15	SFD490~SFD499
#8	SFD420~SFD429	#16	SFD500~SFD509

Note: As shown above, each register sets four-channel modes. Each register has 16 bits. From low to high, each four bit will set four-channel modes in turn.

SFD bit definition

Take the first module as an example to illustrate how to set it up.

<table>
<tr><th></th><th>Bit7</th><th>Bit6</th><th>Bit5</th><th>Bit4</th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th><th>NOTE</th></tr>
<tr><td>Byte0</td><td colspan="8">AD channel 1, channel 2 filtering parameter</td><td rowspan="2">AD filtering parameter</td></tr>
<tr><td>Byte1</td><td colspan="8">AD channel 3, channel 4 filtering parameter</td></tr>
<tr><td rowspan="3">Byte2</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td><td rowspan="12">Set the AD and DA module input range, Byte2 low 4-bit set AD channel 1, high 4-bit set AD channel 2. Byte3 low 4-bit set AD channel 3, high 4-bit set AD channel 4. Byte4 low 4-bit set DA channel 1, High 4-bit set DA channel 2.</td></tr>
<tr><td colspan="4">AD2</td><td colspan="4">AD1</td></tr>
<tr><td>-</td><td colspan="3">000：0~10V 010：0~20mA
001：0~5V 011：4~20mA
100：-10~10V 110：-20~20mA
101：-5~5V</td><td>-</td><td colspan="3">000：0~10V 010：0~20mA
001：0~5V 011：4~20mA
100：-10~10V 110：-20~20mA
101：-5~5V</td></tr>
<tr><td rowspan="3">Byte3</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">AD4</td><td colspan="4">AD3</td></tr>
<tr><td>-</td><td colspan="3">000：0~10V 010：0~20mA
001：0~5V 011：4~20mA
100：-10~10V 110：-20~20mA
101：-5~5V</td><td>-</td><td colspan="3">000：0~10V 010：0~20mA
001：0~5V 011：4~20mA
100：-10~10V 110：-20~20mA
101：-5~5V</td></tr>
<tr><td rowspan="3">Byte4</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">DA2</td><td colspan="4">DA1</td></tr>
<tr><td>-</td><td colspan="3">000：0~10V 010：0~20mA
001：0~5V 011：4~20mA
100：-10~10V
101：-5~5V</td><td>-</td><td colspan="3">000：0~10V 010：0~20mA
001：0~5V 011：4~20mA
100：-10~10V
101：-5~5V</td></tr>
<tr><td>Byte5
~
Byte19</td><td colspan="8">-</td></tr>
</table>

Example: the input channels of the first module are 0-20mA, 4-20mA, 0-10V and 0-5V respectively, the filter coefficients of the first and second channels are 254, the filter coefficients of the third and fourth channels are 100, and the output channels of the first and the zero channels are 0-10V and 0-20mA respectively.

Method 1:

You can configure it directly in the PLC software, as shown above.

Method 2:
Set the SFD as follows:
SFD350=64FEH SFD351=2301H SFD352=0002H

3-5. External wiring

For external connection, to avoid interference, use shielding wire and connect the ground to the single point of shielding layer.

Voltage input

Voltage output

Current input

XL-E4AD2DA current input wiring:

Current output

Note: current output no need DC24V power supply.

3-6. Analog digital conversion diagram

The relationship between input analog quantities and converted digital quantities is shown in the following table:

0~5V analog input	0~10V analog input
-5~5V analog input	-10~10V analog input
0~20mA analog input	4~20mA analog input
-20~20mA analog input	

The relationship between the output digital quantity and its corresponding analog data is shown in the following table:

0~5V analog output	0~10V analog output
-5~5V analog output	**-10~10V analog output**
0~20mA analog output	**4~20mA analog output**

Note:

(1) When the AD voltage input is suspended, the corresponding ID register is 16383; when the AD current input is suspended, the corresponding ID register is 0.

(2) When the input data exceeds K4095, the analog data of DA conversion remains unchanged at 5V, 10V or 20mA.

3-7. Dimension

(Unit: mm)

3-8. Application

Example: The output signal of one-channel pressure sensor needs to be collected (pressure sensor performance parameters: detection pressure range 0Mp~10Mp, output analog signal 4~20mA), and output one-channel 0V~10V voltage signal to frequency converter.

Analysis: As the pressure detection range of pressure sensor is 0Mp~10Mp, the analog output is 4~20mA, and the digital conversion range of expansion module is 0~16383, we can skip the analog amount of 4~20mA in the intermediate conversion process, which directly means that the pressure detection range is 0~16383 in the corresponding digital range of 0Mp~10Mp; 10Mp/16384=0.0006103515 is pressure corresponding to each digital number 1. The real-time pressure of the current pressure sensor can be calculated by multiplying the real-time value collected in the ID register of the expansion module by 0.0006103515. For example, the ID register is 4096, and the corresponding pressure is 2.5Mp.

Similarly, the range of the set number in the extended module register QD is 0-4095 corresponding to the output voltage signal 0V-10V, 10V/4096=0.0024414, which indicates the corresponding output voltage value for each set number in the extended module register QD; for example, it is now necessary to output 3V voltage value, 3V/0.0024414=1229, and send the calculated value to the extended module register QD.

Note: Please use floating-point number to calculate, otherwise it will affect the accuracy of calculation and even can not be calculated!

Explanation:

SM0 is a constant ON coil and has been in ON state during the operation of PLC.

The PLC starts to run. The analog acquisition first calculates the pressure value corresponding to each digit 1 collected by the expansion module, and then converts the digital quantity (integer) collected in the ID10000 register into floating-point numbers. So as long as the real-time value collected in the expansion module ID10000 register is multiplied by the pressure value corresponding to each digit 1 collected by the expansion module, the real-time pressure values are calculated.

Similarly, the analog output first calculates the voltage value corresponding to each digit 1 collected by the expansion module, divides the set target voltage value by the voltage value corresponding to each digit 1 collected by the expansion module, and then obtains the required number (floating point number). As the QD10000 register can only store integers, it is necessary to convert the floating point number to integer and transmit to QD10000.

4. Analog input module XL-E8AD-A

This chapter mainly introduces XL-E8AD-A module specifications, terminal instructions, input definition number allocation, working mode settings, external connections, analog-to-digital conversion diagrams, appearance size diagrams and related programming examples.

4-1. Module features and specifications

XL-E8AD-A analog input module converts 8 analog current input values into digital values, and transmits them to the main unit of PLC, and interacts with the main unit of PLC in real time.

Module features

- 8-channel analog input: current input.
- 14-bit high-precision analog input.
- As a special function module of XL series, XL3 can connect up to 10 modules, XL5/XL5E can expand 16 modules, XL1 does not support expansion modules.

Module specification

Item	Analog input
	Current input
Analog input range	0~20mA, 4~20mA, -20～20mA
Max input range	-40~40mA
Digital output range	14 bits binary data (0~16383 or -8192~8191)
Resolution	1/16383（14Bit）
Integrated precision	1%
Conversion speed	2ms/1 channel
Module power supply	DC24V ±10%, 150mA
Installation	Fixed with M3 screws or directly installed on rail of DIN46277 (Width: 35mm)

4-2. Terminal descriptions

Terminal arrangment

Terminal signal

Name		Function
Indicator light	PWR	The indicator lights up when the module has a power supply.
	COM	When the module port communicates normally, the indicator lights on.
	ERR	When there is an error in the module, the indicator is always on or flickering (red). When the ERR LED is always on, it indicates that the module has serious application errors and can not be used. It is necessary to adjust the mode of use and switch the PLC to STOP state. When the ERR LED flickers, there are application errors, abnormal work and abnormal data in the module, but the PLC is still RUN.
Terminal	L+	Module 24V power supply input +
	M	Module 24V power supply input -
	C0	AI0 output ground
	AI0	Channel 1 AD current input
	C1	AI1 output ground
	AI1	Channel 2 AD current input
	C2	AI2 output ground
	AI2	Channel 3 AD current input
	C3	AI3 output ground
	AI3	Channel 4 AD current input
	C4	AI4 output ground
	AI4	Channel 5 AD current input
	C5	AI5 output ground
	AI5	Channel 6 AD current input

	C6	AI6 output ground
	AI6	Channel 7 AD current input
	C7	AI7 output ground
	AI7	Channel 8 AD current input

Wiring head specification

When wiring the module, its wiring head should meet the following requirements:
(1) The stripping length is 9 mm;
(2) Flexible wires with bare tubular ends are 0.25-1.5 square.
(3) Flexible wires with tubular pre-insulated end is 0.25-0.5 square.

4-3. I/O address

XL series analog module does not occupy I/O unit, the converted value is directly sent to the PLC register, the corresponding channel definition number of the PLC register is as follows:

Module 1 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10000	Y10000
1CH	ID10001	Y10001
2CH	ID10002	Y10002
3CH	ID10003	Y10003
4CH	ID10004	Y10004
5CH	ID10005	Y10005
6CH	ID10006	Y10006
7CH	ID10007	Y10007

Module 2 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10100	Y10100
1CH	ID10101	Y10101
2CH	ID10102	Y10102
3CH	ID10103	Y10103
4CH	ID10104	Y10104
5CH	ID10105	Y10105

6CH	ID10106	Y10106
7CH	ID10107	Y10107

Module 3 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10200	Y10200
1CH	ID10201	Y10201
2CH	ID10202	Y10202
3CH	ID10203	Y10203
4CH	ID10204	Y10204
5CH	ID10205	Y10205
6CH	ID10206	Y10206
7CH	ID10207	Y10207

Module 4 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10300	Y10300
1CH	ID10301	Y10301
2CH	ID10302	Y10302
3CH	ID10303	Y10303
4CH	ID10304	Y10304
5CH	ID10305	Y10305
6CH	ID10306	Y10306
7CH	ID10307	Y10307

Module 5 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10400	Y10400
1CH	ID10401	Y10401
2CH	ID10402	Y10402
3CH	ID10403	Y10403
4CH	ID10404	Y10404
5CH	ID10405	Y10405
6CH	ID10406	Y10406
7CH	ID10407	Y10407

Module 6 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10500	Y10500
1CH	ID10501	Y10501
2CH	ID10502	Y10502
3CH	ID10503	Y10503
4CH	ID10504	Y10504
5CH	ID10505	Y10505
6CH	ID10506	Y10506
7CH	ID10507	Y10507

Module 7 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10600	Y10600
1CH	ID10601	Y10601
2CH	ID10602	Y10602
3CH	ID10603	Y10603
4CH	ID10604	Y10604
5CH	ID10605	Y10605
6CH	ID10606	Y10606
7CH	ID10607	Y10607

Module 8 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10700	Y10700
1CH	ID10701	Y10701
2CH	ID10702	Y10702
3CH	ID10703	Y10703
4CH	ID10704	Y10704
5CH	ID10705	Y10705
6CH	ID10706	Y10706
7CH	ID10707	Y10707

Module 9 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10800	Y11000
1CH	ID10801	Y11001
2CH	ID10802	Y11002
3CH	ID10803	Y11003
4CH	ID10804	Y11004
5CH	ID10805	Y11005
6CH	ID10806	Y11006
7CH	ID10807	Y11007

Module 10 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10900	Y11100
1CH	ID10901	Y11101
2CH	ID10902	Y11102
3CH	ID10903	Y11103
4CH	ID10904	Y11104
5CH	ID10905	Y11105
6CH	ID10906	Y11106
7CH	ID10907	Y11107

Module 11 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11000	Y11200
1CH	ID11001	Y11201
2CH	ID11002	Y11202
3CH	ID11003	Y11203
4CH	ID11004	Y11204
5CH	ID11005	Y11205
6CH	ID11006	Y11206
7CH	ID11007	Y11207

Module 12 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11100	Y11300
1CH	ID11101	Y11301
2CH	ID11102	Y11302
3CH	ID11103	Y11303
4CH	ID11104	Y11304
5CH	ID11105	Y11305
6CH	ID11106	Y11306
7CH	ID11107	Y11307

Module 13 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11200	Y11400
1CH	ID11201	Y11401
2CH	ID11202	Y11402
3CH	ID11203	Y11403
4CH	ID11204	Y11404
5CH	ID11205	Y11405
6CH	ID11206	Y11406
7CH	ID11207	Y11407

Module 14 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11300	Y11500
1CH	ID11301	Y11501
2CH	ID11302	Y11502
3CH	ID11303	Y11503
4CH	ID11304	Y11504
5CH	ID11305	Y11505
6CH	ID11306	Y11506
7CH	ID11307	Y11507

Module 15 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11400	Y11600
1CH	ID11401	Y11601
2CH	ID11402	Y11602
3CH	ID11403	Y11603
4CH	ID11404	Y11604
5CH	ID11405	Y11605
6CH	ID11406	Y11606
7CH	ID11407	Y11607

Module 16 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11500	Y11700
1CH	ID11501	Y11701
2CH	ID11502	Y11702
3CH	ID11503	Y11703
4CH	ID11504	Y11704
5CH	ID11505	Y11705
6CH	ID11506	Y11706
7CH	ID11507	Y11707

Note:
(1) Banning unused channels can improve the scanning speed of input/output.
(2) When the input enabling switch is turned off during operation, the corresponding input channel will not collect data. (Data display is 0)

4-4. Working mode settings

There are two ways to set the working mode (the effect of these two ways is equivalent):
(1) Configuration through the software
(2) Setting up by Flash Register

Set through the software

Please use XDPpro v3.5.1 or higher version software to configure the module.
Open the software, click module in the left menu,

Choose the module type, and set each channel's parameters in the above window. Then click write to PLC, cut the power supply and power on again to make the settings effective.

Note: The first-order low-pass filtering method weighs this time sampling value and the output value of the last filtering to get the effective filtering value; the filter coefficient is set by the user to 0-254, the smaller the value, the more stable the data, but may lead to data lag; therefore, when set to 1, the filtering effect is strongest and the data is the most stable; when set to 254, the filtering effect is the weakest; default is 0 (no filtering).

Set by Flash register

The input channel of the extended module is current mode, with 0-20mA, 4-20mA and -20-20mA optional. It is set by special FLASH data register SFD in PLC. As follows:

Module no.	SFD register	Module no.	SFD register
#1	SFD350~SFD359	#9	SFD430~SFD439
#2	SFD360~SFD369	#10	SFD440~SFD449
#3	SFD370~SFD379	#11	SFD450~SFD459
#4	SFD380~SFD389	#12	SFD460~SFD469
#5	SFD390~SFD399	#13	SFD470~SFD479
#6	SFD400~SFD409	#14	SFD480~SFD489
#7	SFD410~SFD419	#15	SFD490~SFD499

#8	SFD420~SFD429	#16	SFD500~SFD509

Note: As shown above, each register sets four-channel modes. Each register has 16 bits. From low to high, each four bit will set four-channel modes in turn.

SFD bit definition

<table>
<tr><th></th><th>Bit7</th><th>Bit6</th><th>Bit5</th><th>Bit4</th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th><th>NOTE</th></tr>
<tr><td>Byte0</td><td colspan="8">AD channel 2, channel 1 filtering parameter</td><td rowspan="4">AD filtering parameter</td></tr>
<tr><td>Byte1</td><td colspan="8">AD channel 4, channel 3 filtering parameter</td></tr>
<tr><td>Byte2</td><td colspan="8">AD channel 6, channel 5 filtering parameter</td></tr>
<tr><td>Byte3</td><td colspan="8">AD channel 8, channel 7 filtering parameter</td></tr>
<tr><td rowspan="3">Byte4</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td><td rowspan="15">Set the AD module input range, Byte4 low 4-bit set AD channel1, high 4-bit set AD channel2. Byte5 low 4-bit set AD channel3, high 4-bit set AD channel4, Byte6 low 4-bit set AD channel5, high 4-bit set AD channel6,
Byte7 low 4-bit set AD channel7, high 4-bit set AD channel8.</td></tr>
<tr><td colspan="4">AD2</td><td colspan="4">AD1</td></tr>
<tr><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td></tr>
<tr><td rowspan="3">Byte5</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">AD4</td><td colspan="4">AD3</td></tr>
<tr><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td></tr>
<tr><td rowspan="3">Byte6</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">AD6</td><td colspan="4">AD5</td></tr>
<tr><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td></tr>
<tr><td rowspan="3">Byte7</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">AD8</td><td colspan="4">AD7</td></tr>
<tr><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td><td colspan="4">1000：0~20mA
1001：4~20mA
1010：-20~20mA</td></tr>
<tr><td>Byte8~
Byte19</td><td colspan="8">-</td></tr>
</table>

Take the first module as an example to illustrate how to set it up.

Example: To set the working modes of input channels 1 and 0 of the first module to be 0-20 mA, input channels 3 and 2 to be 4-20 mA, input channels 5 and 4 to be 0-20 mA, input channels 7 and 6 to be -20-20 mA, filter coefficients of channels 0, 1, 2 and 3 to be 254, filter coefficients of channels 4, 5, 6 and 7 to be 100.

Method 1:
You can configure it directly in the PLC software, as shown above.

Method 2:
Set the SFD as follows:
SFD350=FEFEH SFD351=6464H SFD352=9988H SFD353=AA88H

4-5. External wiring

For external connection, to avoid interference, use shielding wire and connect the ground to the single point of shielding layer.

Current input

XL-E8AD-A current input wiring:

4-6. Analog digital conversion diagram

The relationship between input analog quantities and converted digital quantities is shown in the following table:

0~20mA analog input	4~20mA analog input
-20~20mA analog input	

4-7. Dimension

(Unit: mm)

4-8. Application

Examples of real-time reading 8 channels of data (take Module 1 as an example)

Explain:

SM0 is a constant ON coil and has been in ON state during the operation of PLC.

The PLC starts to run, and continuously writes the data of channel 0 of the module 1 into the data register D0.

Data in channel 1 is written to data register D1;

Data in channel 2 is written to data register D2.

Data in channel 3 is written to data register D3.

Data in channel 4 is written to data register D4.

The data of channel 5 is written to the data register D5.

The data of channel 6 is written to the data register D6.

The data of channel 7 is written to the data register D7.

Since all channels are used, all the channel enablers are opened.

5. Analog input module XL-E8AD-V

This chapter mainly introduces XL-E8AD-V module specifications, terminal instructions, input definition number allocation, working mode settings, external connections, analog-to-digital conversion diagrams, appearance size diagrams and related programming examples.

5-1. Module features and specifications

XL-E8AD-V analog input module converts 8 analog current input values into digital values, and transmits them to the main unit of PLC, and interacts with the main unit of PLC in real time.

Module features

- 8-channel analog input: voltage input.
- 14-bit high-precision analog input.
- As a special function module of XL series, XL3 can connect up to 10 modules, XL5/XL5E can expand 16 modules, XL1 does not support expansion modules.

Module specification

Item	Analog input
	Voltage input
Analog input range	0~5V, 0~10V, -5~5V, -10~10V
Max input range	DC±15V
Digital output range	14 bits binary data (0~16383 or -8192~8191)
Resolution	1/16383（14Bit）
Integrated precision	1%
Conversion speed	2ms/1 channel
Module power supply	DC24V±10%, 150mA
Installation	Fixed with M3 screws or directly installed on rail of DIN46277 (Width: 35mm)

5-2. Terminal descriptions

Terminal arrangment

Terminal signal

Name		Function
Indicator light	PWR	The indicator lights up when the module has a power supply.
	COM	When the module port communicates normally, the indicator lights on.
	ERR	When there is an error in the module, the indicator is always on or flickering (red). When the ERR LED is always on, it indicates that the module has serious application errors and can not be used. It is necessary to adjust the mode of use and switch the PLC to STOP state. When the ERR LED flickers, there are application errors, abnormal work and abnormal data in the module, but the PLC is still RUN.
Terminal	L+	Module 24V power supply input +
	M	Module 24V power supply input -
	C0	VI0 output ground
	VI0	Channel 1 AD voltage input
	C1	VI1 output ground
	VI1	Channel 2 AD voltage input
	C2	VI2 output ground
	VI2	Channel 3 AD voltage input
	C3	VI3 output ground
	VI3	Channel 4 AD voltage input
	C4	VI4 output ground
	VI4	Channel 5 AD voltage input
	C5	VI5 output ground
	VI5	Channel 6 AD voltage input

	C6	VI6 output ground
	VI6	Channel 7 AD voltage input
	C7	VI7 output ground
	VI7	Channel 8 AD voltage input

Wiring head specification

When wiring the module, its wiring head should meet the following requirements:
(1) The stripping length is 9 mm;
(2) Flexible wires with bare tubular ends are 0.25-1.5 square.
(3) Flexible wires with tubular pre-insulated end is 0.25-0.5 square.

5-3. I/O address

XL series analog module does not occupy I/O unit, the converted value is directly sent to the PLC register, the corresponding channel definition number of the PLC register is as follows:

Module 1 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10000	Y10000
1CH	ID10001	Y10001
2CH	ID10002	Y10002
3CH	ID10003	Y10003
4CH	ID10004	Y10004
5CH	ID10005	Y10005
6CH	ID10006	Y10006
7CH	ID10007	Y10007

Module 2 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10100	Y10100
1CH	ID10101	Y10101
2CH	ID10102	Y10102
3CH	ID10103	Y10103
4CH	ID10104	Y10104
5CH	ID10105	Y10105

6CH	ID10106	Y10106
7CH	ID10107	Y10107

Module 3 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10200	Y10200
1CH	ID10201	Y10201
2CH	ID10202	Y10202
3CH	ID10203	Y10203
4CH	ID10204	Y10204
5CH	ID10205	Y10205
6CH	ID10206	Y10206
7CH	ID10207	Y10207

Module 4 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10300	Y10300
1CH	ID10301	Y10301
2CH	ID10302	Y10302
3CH	ID10303	Y10303
4CH	ID10304	Y10304
5CH	ID10305	Y10305
6CH	ID10306	Y10306
7CH	ID10307	Y10307

Module 5 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10400	Y10400
1CH	ID10401	Y10401
2CH	ID10402	Y10402
3CH	ID10403	Y10403
4CH	ID10404	Y10404
5CH	ID10405	Y10405
6CH	ID10406	Y10406
7CH	ID10407	Y10407

Module 6 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10500	Y10500
1CH	ID10501	Y10501
2CH	ID10502	Y10502
3CH	ID10503	Y10503
4CH	ID10504	Y10504
5CH	ID10505	Y10505
6CH	ID10506	Y10506
7CH	ID10507	Y10507

Module 7 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10600	Y10600
1CH	ID10601	Y10601
2CH	ID10602	Y10602
3CH	ID10603	Y10603
4CH	ID10604	Y10604
5CH	ID10605	Y10605
6CH	ID10606	Y10606
7CH	ID10607	Y10607

Module 8 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10700	Y10700
1CH	ID10701	Y10701
2CH	ID10702	Y10702
3CH	ID10703	Y10703
4CH	ID10704	Y10704
5CH	ID10705	Y10705
6CH	ID10706	Y10706
7CH	ID10707	Y10707

Module 9 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10800	Y11000
1CH	ID10801	Y11001
2CH	ID10802	Y11002
3CH	ID10803	Y11003
4CH	ID10804	Y11004
5CH	ID10805	Y11005
6CH	ID10806	Y11006
7CH	ID10807	Y11007

Module 10 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID10900	Y11100
1CH	ID10901	Y11101
2CH	ID10902	Y11102
3CH	ID10903	Y11103
4CH	ID10904	Y11104
5CH	ID10905	Y11105
6CH	ID10906	Y11106
7CH	ID10907	Y11107

Module 11 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11000	Y11200
1CH	ID11001	Y11201
2CH	ID11002	Y11202
3CH	ID11003	Y11203
4CH	ID11004	Y11204
5CH	ID11005	Y11205
6CH	ID11006	Y11206
7CH	ID11007	Y11207

Module 12 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11100	Y11300
1CH	ID11101	Y11301
2CH	ID11102	Y11302
3CH	ID11103	Y11303
4CH	ID11104	Y11304
5CH	ID11105	Y11305
6CH	ID11106	Y11306
7CH	ID11107	Y11307

Module 13 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11200	Y11400
1CH	ID11201	Y11401
2CH	ID11202	Y11402
3CH	ID11203	Y11403
4CH	ID11204	Y11404
5CH	ID11205	Y11405
6CH	ID11206	Y11406
7CH	ID11207	Y11407

Module 14 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11300	Y11500
1CH	ID11301	Y11501
2CH	ID11302	Y11502
3CH	ID11303	Y11503
4CH	ID11304	Y11504
5CH	ID11305	Y11505
6CH	ID11306	Y11506
7CH	ID11307	Y11507

Module 15 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11400	Y11600
1CH	ID11401	Y11601
2CH	ID11402	Y11602
3CH	ID11403	Y11603
4CH	ID11404	Y11604
5CH	ID11405	Y11605
6CH	ID11406	Y11606
7CH	ID11407	Y11607

Module 16 register address:

Channel	AD signal	Channel enable switch (please turn on the swich to use this channel)
0CH	ID11500	Y11700
1CH	ID11501	Y11701
2CH	ID11502	Y11702
3CH	ID11503	Y11703
4CH	ID11504	Y11704
5CH	ID11505	Y11705
6CH	ID11506	Y11706
7CH	ID11507	Y11707

Note:
(1) Banning unused channels can improve the scanning speed of input/output.
(2) When the input enabling switch is turned off during operation, the corresponding input channel will not collect data. (Data display is 0)

5-4. Working mode settings

There are two ways to set the working mode (the effect of these two ways is equivalent):
(1) Configuration through the software
(2) Setting up by Flash Register

Set through the software

Please use XDPpro v3.5.1 or higher version software to configure the module.
Open the software, click module in the left menu,

Choose the module type, and set each channel's parameters in the above window. Then click write to PLC, cut the power supply and power on again to make the settings effective.

Note: The first-order low-pass filtering method weighs this time sampling value and the output value of the last filtering to get the effective filtering value; the filter coefficient is set by the user to 0-254, the smaller the value, the more stable the data, but may lead to data lag; therefore, when set to 1, the filtering effect is strongest and the data is the most stable; when set to 254, the filtering effect is the weakest; default is 0 (no filtering).

Set by Flash register

The input channel of the extended module is voltage mode, with 0~5V, 0~10V, -5~5V, -10~10V optional. It is set by special FLASH data register SFD in PLC. As follows:

Module no.	SFD register	Module no.	SFD register
#1	SFD350~SFD359	#9	SFD430~SFD439
#2	SFD360~SFD369	#10	SFD440~SFD449
#3	SFD370~SFD379	#11	SFD450~SFD459
#4	SFD380~SFD389	#12	SFD460~SFD469
#5	SFD390~SFD399	#13	SFD470~SFD479
#6	SFD400~SFD409	#14	SFD480~SFD489
#7	SFD410~SFD419	#15	SFD490~SFD499
#8	SFD420~SFD429	#16	SFD500~SFD509

Note: As shown above, each register sets four-channel modes. Each register has 16 bits. From low to high, each four bit will set four-channel modes in turn.

SFD bit definition

<table>
<tr><th></th><th>Bit7</th><th>Bit6</th><th>Bit5</th><th>Bit4</th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th><th>NOTE</th></tr>
<tr><td>Byte0</td><td colspan="8">AD channel 2, channel 1 filtering parameter</td><td rowspan="4">AD filtering parameter</td></tr>
<tr><td>Byte1</td><td colspan="8">AD channel 4, channel 3 filtering parameter</td></tr>
<tr><td>Byte2</td><td colspan="8">AD channel 6, channel 5 filtering parameter</td></tr>
<tr><td>Byte3</td><td colspan="8">AD channel 8, channel 7 filtering parameter</td></tr>
<tr><td rowspan="4">Byte4</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td><td rowspan="19">Set the AD module input range, Byte4 low 4-bit set AD channel1, high 4-bit set AD channel2. Byte5 low 4-bit set AD channel3, high 4-bit set AD channel4, Byte6 low 4-bit set AD channel5, high 4-bit set AD channel6,
Byte7 low 4-bit set AD channel7, high 4-bit set AD channel8.</td></tr>
<tr><td colspan="4">AD2</td><td colspan="4">AD1</td></tr>
<tr><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td></tr>
<tr><td rowspan="4">Byte5</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">AD4</td><td colspan="4">AD3</td></tr>
<tr><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td></tr>
<tr><td rowspan="4">Byte6</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">AD6</td><td colspan="4">AD5</td></tr>
<tr><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td></tr>
<tr><td rowspan="4">Byte7</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">AD8</td><td colspan="4">AD7</td></tr>
<tr><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td><td colspan="4">0000：0~10V
0001：0~5V
0010：-10~10V
0011：-5~5V</td></tr>
<tr><td>Byte8~
Byte19</td><td colspan="8">-</td></tr>
</table>

Take the first module as an example to illustrate how to set it up.

Example: To set the first module's input channels 1and 0 to 0~10V, input channels 3 and 2 to 0~5V, input channels 5 and 4 to 0~10V, input channels 7 and 6 to 0~5V, filter coefficients of channels 0, 1, 2 and 3 to 254, filter coefficients of channels 4, 5, 6 and 7 to 100.

Method 1:
You can configure it directly in the PLC software, as shown above.

Method 2:
Set the SFD as follows:
SFD350=FEFEH SFD351=6464H SFD352=1100H SFD353=1100H

5-5. External wiring

For external connection, to avoid interference, use shielding wire and connect the ground to the single point of shielding layer.

Voltage input

5-6. Analog digital conversion diagram

The relationship between input analog quantities and converted digital quantities is shown in the following table:

0~5V analog input	0~10V analog input
-5~5V analog input	**-10~10V analog input**

5-7. Dimension

(Unit: mm)

5-8. Application

Examples of real-time reading 8 channels of data (take Module 1 as an example)

Explain:

SM0 is a constant ON coil and has been in ON state during the operation of PLC.

The PLC starts to run, and continuously writes the data of channel 0 of the module 1 into the data register D0.

Data in channel 1 is written to data register D1;

Data in channel 2 is written to data register D2.

Data in channel 3 is written to data register D3.

Data in channel 4 is written to data register D4.

The data of channel 5 is written to the data register D5.

The data of channel 6 is written to the data register D6.

The data of channel 7 is written to the data register D7.

Since all channels are used, all the channel enablers are opened.

6. Analog output module XL-E4DA

This chapter mainly introduces XL-E4DA module specifications, terminal, input definition number allocation, working mode settings, external connections, analog-to-digital conversion diagrams, appearance size diagrams and related programming examples.

6-1. Module features and specifications

XL-E4DA analog output module converts four digital quantities into analog quantities, and transmits them to the main unit of PLC, and interacts with the main unit of PLC in real time.

Module features

- Four-channel analog output: Voltage and current mode can be selected.
- 12-bit high-precision analog output.
- As an extension module of XL series, XL3 can connect up to 10 modules, XL5/XL5E can expand 16 modules, XL1 does not support extension modules.

Module specification

Item	Voltage output	Current output
Analog output range	0~5V, 0~10V, -5~5V, -10~10V (Exterior load resistance 2KΩ~1MΩ)	0~20mA, 4~20mA (Exterior load resistance is less than 500Ω)
Digital input range	12 bits binary data (0~4095 or -2048~2047)	
Resolution	1/4095（12Bit）	
Integrate precision	1%	
Conversion speed	2ms/1 channel	2ms/1 channel
Module power supply	DC24V ±10%，150mA	
Installation	Fixed with M3 screws or directly installed on orbit of DIN46277 (Width: 35mm)	

6-2. Terminal description

Terminal arrangement

Terminal signal

Name		Function
Indicator light	PWR	The indicator lights up when the module has a power supply.
	COM	When the module port communicates normally, the indicator lights on.
	ERR	When there is an error in the module, the indicator is always on or flickering (red). When the ERR LED is always on, it indicates that the module has serious application errors and can not be used. It is necessary to adjust the mode of use and switch the PLC to STOP state. When the ERR LED flickers, there are application errors, abnormal work and abnormal data in the module, but the PLC is still RUN.
Terminal	L+	Module 24V power supply input +
	M	Module 24V power supply input -
	C0	VO0, AO0 output ground
	VO0	Channel 1 DA voltage output
	AO0	Channel 1 DA current output
	C1	VO1, AO1 output ground
	VO1	Channel 2 DA voltage output
	AO1	Channel 2 DA current output
	C2	VO2, AO2 output ground
	VO2	Channel 3 DA voltage output
	AO2	Channel 3 DA current output
	C3	VO3, AO3 output ground
	VO3	Channel 4 DA voltage output
	AO3	Channel 4 DA current output

Wiring head specification

When wiring the module, its wiring head should meet the following requirements:
(1) The stripping length is 9 mm;
(2) Flexible wires with bare tubular ends are 0.25-1.5 square.
(3) Flexible wires with tubular pre-insulated end is 0.25-0.5 square.

6-3. I/O address

XL series analog module does not occupy I/O unit, the converted value is directly sent to the PLC register, the corresponding channel definition number of the PLC register is as follows:

Module 1 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10000	Y10000
1CH	QD10001	Y10001
2CH	QD10002	Y10002
3CH	QD10003	Y10003

Module 2 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10100	Y10100
1CH	QD10101	Y10101
2CH	QD10102	Y10102
3CH	QD10103	Y10103

Module 3 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10200	Y10200
1CH	QD10201	Y10201
2CH	QD10202	Y10202
3CH	QD10203	Y10203

Module 4 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10300	Y10300
1CH	QD10301	Y10301
2CH	QD10302	Y10302
3CH	QD10303	Y10303

Module 5 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10400	Y10400
1CH	QD10401	Y10401
2CH	QD10402	Y10402
3CH	QD10403	Y10403

Module 6 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10500	Y10500
1CH	QD10501	Y10501
2CH	QD10502	Y10502
3CH	QD10503	Y10503

Module 7 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10600	Y10600
1CH	QD10601	Y10601
2CH	QD10602	Y10602
3CH	QD10603	Y10603

Module 8 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10700	Y10700
1CH	QD10701	Y10701

2CH	QD10702	Y10702
3CH	QD10703	Y10703

Module 9 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10800	Y11000
1CH	QD10801	Y11001
2CH	QD10802	Y11002
3CH	QD10803	Y11003

Module 10 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD10900	Y11100
1CH	QD10901	Y11101
2CH	QD10902	Y11102
3CH	QD10903	Y11103

Module 11 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD11000	Y11200
1CH	QD11001	Y11201
2CH	QD11002	Y11202
3CH	QD11003	Y11203

Module 12 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD11100	Y11300
1CH	QD11101	Y11301
2CH	QD11102	Y11302
3CH	QD11103	Y11303

Module 13 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD11200	Y11400
1CH	QD11201	Y11401
2CH	QD11202	Y11402
3CH	QD11203	Y11403

Module 14 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD11300	Y11500
1CH	QD11301	Y11501
2CH	QD11302	Y11502
3CH	QD11303	Y11503

Module 15 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD11400	Y11600
1CH	QD11401	Y11601
2CH	QD11402	Y11602
3CH	QD11403	Y11603

Module 16 register address:

Channel	DA signal	Channel enable switch (please turn on the swich to use this channel)
0CH	QD11500	Y11700
1CH	QD11501	Y11701
2CH	QD11502	Y11702
3CH	QD11503	Y11703

Note:

1) Banning unused channels can improve the scanning speed of input/output.

2) When the enabling switch of output is turned off during operation, the corresponding output channel keeps the original data unchanged.

6-4. Working mode settings

There are two ways to set the working mode (the effect of these two ways is equivalent):

(1) Configuration through the software

(2) Setting up by Flash Register

Set through the software

Please use XDPpro v3.5.1 or higher version software to configure the module.

Open the software, click module in the left menu,

Choose the module type, and set each channel's parameters in the above window. Then click write to PLC, cut the power supply and power on again to make the settings effective.

Set by Flash register

The output channels of the expansion module can be selected in two modes: voltage and current. Current is 0-20mA, 4-20mA. Voltage is 0-5V, 0-10V, -5-5V and -10-10V. It is set by special FLASH data register SFD in PLC. As follows:

Module no.	SFD register	Module no.	SFD register
#1	SFD350~SFD359	#9	SFD430~SFD439
#2	SFD360~SFD369	#10	SFD440~SFD449
#3	SFD370~SFD379	#11	SFD450~SFD459
#4	SFD380~SFD389	#12	SFD460~SFD469
#5	SFD390~SFD399	#13	SFD470~SFD479
#6	SFD400~SFD409	#14	SFD480~SFD489
#7	SFD410~SFD419	#15	SFD490~SFD499
#8	SFD420~SFD429	#16	SFD500~SFD509

SFD bit definition

Take the first module as an example to illustrate how to set it up.

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	DA2				DA1			
Byte0	-	voltage current 000：0~10V 010：0~20mA 001：0~5V 011：4~20mA 100：-10~10V 101：-5~5V			-	voltage current 000：0~10V 010：0~20mA 001：0~5V 011：4~20mA 100：-10~10V 101：-5~5V		
	DA4				DA3			
Byte1	-	voltage current 000：0~10V 010：0~20mA 001：0~5V 011：4~20mA 100：-10~10V 101：-5~5V			-	voltage current 000：0~10V 010：0~20mA 001：0~5V 011：4~20mA 100：-10~10V 101：-5~5V		
Byte2~Byte19	-							

Example: The working modes of output channel 3, channel 2, channel 1 and channel 0 are 0-10V, 0-10V, 0-20mA and 0-20mA, respectively.

Method 1:

You can configure it directly in the PLC software, the configuration method please refer to chapter 6-4.

Method 2:

Set the SFD as follows: SFD350=0022H

6-5. External wiring

For external connection, to avoid interference, use shielding wire and connect the ground to the single point of shielding layer.

Voltage output

Current output

XL-E4DA current output wiring:

Note: current output no needs to connect DC24V power supply.

6-6. Analog digital conversion diagram

The relationship between the output digital quantity and its corresponding analog data is shown in the following table:

0~5V analog output	0~10V analog output
-5~5V analog output	**-10~10V analog output**
0~20mA analog output	**4~20mA analog output**

Note: When the input data exceeds K4095, the analog data of DA conversion remains unchanged at 5V, 10V or 20mA.

6-7. Dimension

(Unit: mm)

6-8. Application

Example: real-time write 4 channels data(take module 1 as an example)

Explain:

SM0 is a constant ON coil and has been in ON state during the operation of PLC.
Write the data register D10 to output channel 0.
Write the data register D11 to output channel 1.
Write the data register D12 to output channel 2.
Write the data register D13 to output channel 3.

Since all channels are used, all the enabled bits of all channels are opened.

7. PT100 temperature module XL-E4PT3-P

This chapter mainly introduces XL-E4PT3-P module specifications, terminal instructions, input definition number allocation, working mode settings, external connections, analog-to-digital conversion diagrams, appearance size diagrams and related programming examples.

7-1. Module features and specifications

XL-E4PT3-P temperature PID control module processes 4-point PT100 temperature signals and transmits them to the main unit of PLC.

Features

- Platinum thermal resistance input, indexing number Pt100
- 4 channels input, 4 channels output
- 4 groups PID parameters, auto-tune function
- The constant current output of 1mA is not affected by the change of external environment.
- Resolution is 0.1℃
- As special function module of XL3, up to 10 modules can be connected to PLC (XL5, XL5E PLC can connect 16 modules, XL1 cannot connect extension module)

Module specifications

Item	Contents
Analog input signal	Pt100 resistor
Temperature measurement range	-100℃～500℃
Digital output range	-1000~5000, 16 bits with sign bit, binary
Control precision	±0.5℃
Resolution	0.1℃
Integrate precision	1% (relative max value)
Conversion speed	2ms/1 channel
Module power supply	DC24V±10%, 50mA

Install format	Fixed with M3 screws or directly installed on orbit of DIN46277 (Width: 35mm)

Note:

(1) When there is no signal input, the channel data is the maximum value of the digital output range.

(2) Connect Pt100 Pt thermal resistor according to actual needs.

7-2. Terminals

Terminal arrangement

Module signal

Name		Function
LED light	PWR	The indicator lights up when the module has a power supply
	COM	When the module communication port communicates normally, the indicator lights on
	ERR	When there is an error in the module, the indicator is always on or flickering (red) When the ERR lamp is always on, there are serious application errors in the module that can not be used, so the mode of use must be adjusted, and the PLC body is switched to STOP state. When the ERR lamp flickers, there are application errors, abnormal work and abnormal data in the module, but the PLC body is still RUN.
terminal	L+	External power supply 24V +
	M	External power supply 24V -
	A0	CH0 temperature input
	B0	CH0 input common terminal
	C0	CH0 input common terminal
	A1	CH1 temperature input
	B1	CH1 input common terminal
	C1	CH1 input common terminal
	A2	CH2 temperature input

	B2	CH2 input common terminal
	C2	CH2 input common terminal
	A3	CH3 temperature input
	B3	CH3 input common terminal
	C3	CH3 input common terminal
	COM0	PID output common terminal
	Y0~Y3	PID output terminals corresponding to CH0~CH3

Wiring head specifications

When wiring the module, its wiring head should meet the following requirements:
(1) The stripping length is 9 mm;
(2) Flexible conductors with bare tubular ends are 0.25-1.5 square.
(3) Flexible conductor with tubular pre-insulated end is 0.25-0.5 square.

7-3. I/O address

XL series analog module will not occupy I/O unit, the conversion value will be sent to PLC register. Each channel related PLC register address are shown as below:

Parameter	Address				
Channel		CH0	CH1	CH2	CH3
Display temperature	Module 1	ID10000	ID10001	ID10002	ID10003
	Module 2	ID10100	ID10101	ID10102	ID10103
	……	ID10x00	ID10x01	ID10x02	ID10x03
	Module 16	ID11500	ID11501	ID11502	ID11503
PID enable bit	Module 1	Y10000	Y10001	Y10002	Y10003
	Module 2	Y10100	Y10101	Y10102	Y10103
	……	Y10x00	Y10x01	Y10x02	Y10x03
	Module 16	Y11700	Y11701	Y11702	Y11703
PID output	Module 1	X10000	X10001	X10002	X10003
	Module 2	X10100	X10101	X10102	X10103
	……	X10x00	X10x01	X10x02	X10x03
	Module 16	X11700	X11701	X11702	X11703
Open circuit detection	Module 1	X10010	X10011	X10012	X10013
	Module 2	X10110	X10111	X10112	X10113
	……	X10x10	X10x11	X10x12	X10x13
	Module 16	X11710	X11711	X11712	X11713
Auto-tuning error	Module 1	X10020	X10021	X10022	X10023
	Module 2	X10120	X10121	X10122	X10123

	·····	X10x20	X10x21	X10x22	X10x23
	Module 16	X11720	X11721	X11722	X11723
Auto-tune PID control bit	Auto-tune triggered signal, start to auto-tune mode when set to 1 After auto-tune, PID parameters and temperature control period value are refreshed, the bit value is cleared to be 0. The user can read the bit to know the state. 1 means auto-tune is ongoing. 0 means auto-tune has finished.				
PID output value	Digital quantity output range is 0~4095.				
PID parameters (P, I, D)	The best PID parameters got from the PID auto-tune. If the current PID parameters cannot meet the control requirements, users can set the experience PID parameters to make the module work according to the user setting value.				
PID calculation range (Diff) Unit: 0.1℃	This function can set the temperature range of the PID operation, such as setting the relevant parameter Tdiff, the target temperature is Target, then the operation range of the PID is Target-Tdiff < T < Target + Tdiff, when T < Target-Tdiff, the output is the largest, when T > Target + Tdiff, the output is 0.				
Temperature difference value δ Unit: 0.1℃	The actual temperature display = (sampling temperature value + temperature deviation value δ)/10. When the user thinks the measured temperature is different from the actual temperature, this value can be modified to correct the temperature.				
Set temperature Unit: 0.1℃	The target temperature of the control system. Range from -100~500℃, precision degree is 0.1℃.				
Temperature control period Unit: 0.1s	The adjusting range of temperature control period is 0.1s~200s, and the minimum precision range is 0.1s. For example, when writing 5, the actual temperature control period is 0.5s.				
Adjusting Environment temperature Unit: 0.1℃	If the actual temperature deviates from the module acquisition temperature, the known temperature can be written into the corresponding register. After writing, the module calculates the difference between the acquisition temperature and the actual temperature according to the value, and saves it. Calculate temperature deviation value δ = actual input temperature-sampling temperature. (Note: Do not write this value at will, otherwise it will cause display temperature error)				
Auto-tune output range	The input of auto-tuning, the unit is % and input 100 is expressed as full scale output (if no output is found during use, the value can be read to see if it is 0).				

Note: Start signal (Y): When Y is 0, turn off the PID control and turn on the PID control when Y is 1.

From/To instruction

Parameter write insruction TO

Function: write the PLC register data to module address, the operate unit is word.
Operand:
S1: target module number, range: 10000~10015. Operand: K, TD, CD, D, HD, FD
S2: first address of module. Operand: K, TD, CD, D, HD, FD
S3: write in register numbers. Operand: K, TD, CD, D, HD, FD
D1: first address of PLC. Operand: TD, CD, D, HD, FD

Parameter read instruction FROM

Function: read the module data to the PLC regsiter, the operate unit is word.
S1: target module number, range: 10000~10015. Operand: K, TD, CD, D, HD, FD
S2: first address of module. Operand: K, TD, CD, D, HD, FD
S3: read register numbers. Operand: K, TD, CD, D, HD, FD
D1: first address of PLC. Operand: TD, CD, D, HD, FD

Note: FROM and TO only can be programmed in the sequence block, one program only supports 8 sequence blocks.

Related address definition:

The address of the read/write parameters:

Parameter	Address				Read/write
Channel	CH0	CH1	CH2	CH3	
Auto-tune bit	K0	K0	K0	K0	R/W
PID output	K1	K2	K3	K4	R
Target temperature	K5	K6	K7	K8	R/W
Kp	K9	K13	K17	K21	R/W
Ki	K10	K14	K18	K22	R/W
Kd	K11	K15	K19	K23	R/W
Diff	K12	K16	K20	K24	R/W
Control period	K25	K26	K27	K28	R/W
Output range	K29	K30	K31	K32	R/W
Temperature difference	K33	K34	K35	K36	R/W
Temperature correction	K37	K38	K39	K40	W

Besides, the module can save the setting temperature, PID parameters, temperature difference value, temperature control period, auto-tune output range, etc. The parameters will be saved after auto-tune or user modification, and be operated after re-power on.

7-4. Working mode

There are two ways to set the working mode (the effect of these two ways is equivalent):
1: Through the XDPpro software
2: Through Flash Register (FD) Settings

Set through the software

Please use XDPPro software V3.5.1 and up to set the module.
Open the software, click configure/expansion module setting, then select the module type in the following window:

Choose the module model, set the filter parameter of each channel, click write to PLC. Then download user program and run, the settings will be effective.

Note: The first-order low-pass filtering method weighted this sampling value and the output value of the last filtering to get the effective filtering value; the filter coefficient is set by the user to 0-254, the smaller the value, the more stable the data, but it may lead to data lag; therefore, when set to 1, the filtering effect is strongest and the data is the most stable; when set to 254, the filtering effect is the weakest; default is 0 (no filtering).

Set through flash register

Extension module CH0~CH3 channel can set filter coefficients through special FLASH data register FD inside PLC. As follows:

Module ID	SFD address	Module ID	SFD address
#1	SFD350~SFD359	#9	SFD430~SFD439
#2	SFD360~SFD369	#10	SFD440~SFD449
#3	SFD370~SFD379	#11	SFD450~SFD459
#4	SFD380~SFD389	#12	SFD460~SFD469
#5	SFD390~SFD399	#13	SFD470~SFD479
#6	SFD400~SFD409	#14	SFD480~SFD489
#7	SFD410~SFD419	#15	SFD490~SFD499
#8	SFD420~SFD429	#16	SFD500~SFD509

SFD bit definition

Take module 1 as an example to explain the setting method:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	NOTE
Byte0	AD channel 2, channel 1 filtering parameter								AD filtering parameter
Byte1	AD channel 4, channel 3 filtering parameter								
Byte2~Byte19	-								

7-5. External wiring

When connecting the thermal resistance, when connecting the external + 24V power supply, please use the 24V power supply on the PLC body to avoid interference.

Input wiring

Output circuit

- Output terminal: transistor output terminal, please choose DC5V ~ 30V smooth power supply.
- Circuit Insulation: Optical couplers are used for optical insulation between the internal circuit of programmable controller and the output transistor, and the common modules are also separated from each other.
- Response time: The time from the programmable controller-driven (or circuit-breaking) optical coupler to the transistor ON/OFF is no more than 0.2 ms.
- Output Current: In order to limit the temperature rising, please make 0.15A at each point.
- Open circuit leakage current: below 0.1mA.

PT100 Input characteristic curve

7-6. Dimension

(Unit: mm)

7-7. Application

Example: take module 1 as an example, do PID control for channel 0.

// open PID enable bit

// set target value

// set operation range

// set temperature control period

// write in the target value, operation range and temperature control period

// turn on auto-tune function

// set P value

// set I value

// set D value

// do manual PID control, write in P, I, D value

// read the auto-tune bit, P, I, D value and PID output value

Note:

M0 turn on PID enable
SM0 set the target value, operation range, temperature control period
M1 write in target value, operation range, temperature control period
M2 turn on the auto-tune
M3 manual set the P, I, D parameter
M4 write in manual P, I, D parameter
M5 read the auto-tuning bit, PID parameters and PID output value

Y10000 PID enable bit of channel 0

HD0 target value
HD1 operation range
HD2 temperature control period
HD3 P
HD4 I
HD5 D

8. Thermocouple temperature module XL-E4TC-P

This chapter mainly introduces XL-E4TC-P module specifications, terminal instructions, input definition number allocation, working mode settings, external connections, analog-to-digital conversion diagrams, appearance size diagrams and related programming examples.

8-1. Specifications

XL-E4TC-P can process 4-channel of thermocouple signal and send the data to the PLC.

Features

- thermocouple sensor signal input
- 4 channels input, 4 channels output
- 4 groups PID parameters, auto-tune function
- Built-in cold-terminal compensation circuit
- Resolution is 0.1℃
- As special function module of XL3, up to 10 modules can be connected to PLC (XL5, XL5E PLC can connect 16 modules, XL1 cannot connect extension module)

Specification

Item	Contents
Analog input signal	K, S, E, N, B, T, J type thermocouple
Temperature measurement range	0℃~1000℃
Digital output range	0~10000, 16 bits with sign bit, binary
Control precision	±0.5℃
Resolution	0.1℃

Integrate precision	1% (relative max value)
Conversion speed	80ms per channel
Module power supply	DC24V ±10%, 50mA
Installation	Fixed with M3 screws or directly installed on orbit of DIN46277 (Width: 35mm)

Note:

1. If no signal input, the channel data is -1.
2. According to the actual requirement to connect the thermocouple
3. The cover of device which installs thermocouple should be connected to the ground.

8-2. Terminals

Arrangment

Signal

Name		Function
Indicator light	PWR	The indicator lights up when the module has a power supply
	COM	When the module communication port communicates normally, the indicator lights on
	ERR	When there is an error in the module, the indicator is always on or flickering (red) When the ERR lamp is always on, there are serious application errors in the module that can not be used, so the mode of use must be adjusted, and the PLC body is switched to STOP state. When the ERR lamp flickers, there are application errors, abnormal work and abnormal data in the module, but the PLC body is still RUN.
Wiring terminal	L+	External power supply 24V +
	M	External power supply 24V -
	TC0+	CH0 thermocouple input +
	TC0-	CH0 thermocouple input -

	TC1+	CH1 thermocouple input +
	TC1-	CH1 thermocouple input -
	TC2+	CH2 thermocouple input +
	TC2-	CH2 thermocouple input -
	TC3+	CH3 thermocouple input +
	TC3-	CH3 thermocouple input -
	COM0	PID output common terminal
	Y0~Y3	PID output terminals corresponding to CH0~CH3

Wiring specification

When wiring the module, its wiring head should meet the following requirements:

(1) The stripping length is 9 mm;

(2) Flexible conductors with bare tubular ends are 0.25-1.5 square.

(3) Flexible conductor with tubular pre-insulated end is 0.25-0.5 square.

8-3. I/O address assignment

XL series analog module will not occupy I/O unit, the conversion value will be sent to PLC register. Each channel related PLC register address are shown as below:

Parameters	Notes				
	Channel	Ch0	Ch1	Ch2	Ch3
Display temperature Unit: 0.1 ℃	Module 1	ID10000	ID10001	ID10002	ID10003
	Module 2	ID10100	ID10101	ID10102	ID10103
	……	ID10×00	ID10×01	ID10×02	ID10×03
	Module 16	ID11500	ID11501	ID11502	ID11503
PID output (return to the X input of PLC)	Module 1	X10000	X10001	X10002	X10003
	Module 2	X10100	X10101	X10102	X10103
	……	X10×00	X10×01	X10×02	X10×03
	Module 16	X11700	X11701	X11702	X11703
	When module duty cycle output, X point should be monitored, but Y point should not be monitored, because Y point is the PID enabler.				
Connection state of thermocouple(0 is connection, 1 is disconnection)	Module 1	X10010	X10011	X10012	X10013
	Module 2	X10110	X10111	X10112	X10113
	……	X10×10	X10×11	X10×12	X10×13
	Module 16	X11710	X11711	X11712	X11713
PID auto-tune	Module 1	X10020	X10021	X10022	X10023

error signal bit(0 is normal, 1 is error)	Module 2	X10120	X10121	X10122	X10123
	·····	X10×20	X10×21	X10×22	X10×23
	Module 16	X11720	X11721	X11722	X11723
Channel enable signal	Module 1	Y10000	Y10001	Y10002	Y10003
	Module 2	Y10100	Y10101	Y10102	Y10103
	·····	Y10×00	Y10×01	Y10×02	Y10×03
	Module 16	Y11700	Y11701	Y11702	Y11703
Auto-tune PID control bit	Auto-tune triggered signal, start to auto-tune mode when set to 1 After auto-tune, PID parameters and temperature control period value are refreshed, the bit value is cleared to be 0. The user can read the bit to know the state. 1 means auto-tune is ongoing. 0 means auto-tune has finished.				
PID output value (operation result)	Digital quantity output range is 0~4095. When the PID output is analog quantity (such as steam valve open degree or silicon-controlled conduction angle), the value can be transmitted to the analog quantity output module in order to realize the control demand.				
PID parameters (P, I, D)	The best PID parameters got from the PID auto-tune. If the current PID parameters cannot meet the control requirements, users can set the experience PID parameters to make the module work according to the user setting value.				
PID calculation range (Diff) Unit: 0.1℃	This function can set the temperature range of the PID operation, such as setting the relevant parameter Tdiff, the target temperature is Target, then the operation range of the PID is Target-Tdiff < T < Target + Tdiff, when T < Target-Tdiff, the output is the largest, when T > Target + Tdiff, the output is 0.				
Temperature difference value δ Unit: 0.1℃	The actual temperature display = (sampling temperature value + temperature deviation value δ)/10. When the user thinks the measured temperature is different from the actual temperature, this value can be modified to correct the temperature.				
Set temperature Unit: 0.1℃	The target temperature of the control system. Range from 0~1000℃, precision degree is 0.1℃.				
Temperature control period Unit: 0.1s	The adjusting range of temperature control period is 0.1s~200s, and the minimum precision range is 0.1s. For example, when writing 5, the actual temperature control period is 0.5s.				
Adjusting environment temperature Unit: 0.1℃	If the actual temperature deviates from the module acquisition temperature, the known temperature can be written into the corresponding register. After writing, the module calculates the difference between the acquisition temperature and the actual temperature according to the value, and saves it. Calculate temperature deviation value δ = actual input temperature-sampling temperature. (Note: Do not write this value at will, otherwise it will cause display temperature error)				
auto-tune output range	The input of auto-tuning, the unit is % and input 100 is expressed as full scale output (if no output is found during use, the value can be read to see if it is 0).				

Note: Start signal (Y): When Y is 0, turn off the PID control and turn on the PID control when Y is 1.

From/To instruction

Parameter write insruction TO

Function: write the PLC register data to module address, the operate unit is word.
Operand:
S1: target module number, range: 10000~10015. Operand: K, TD, CD, D, HD, FD
S2: first address of module. Operand: K, TD, CD, D, HD, FD
S3: write in register numbers. Operand: K, TD, CD, D, HD, FD
D1: first address of PLC. Operand: TD, CD, D, HD, FD

Parameter read instruction FROM

Function: read the module data to the PLC regsiter, the operate unit is word.
S1: target module number, range: 10000~10015. Operand: K, TD, CD, D, HD, FD
S2: first address of module. Operand: K, TD, CD, D, HD, FD
S3: read register numbers. Operand: K, TD, CD, D, HD, FD
D1: first address of PLC. Operand: TD, CD, D, HD, FD

Note: FROM and TO only can be programmed in the sequence block, one program only supports 8 sequence blocks.

Related address definition:

The address of the read/write parameters:

Related parameters	Note				Read /write
Channel	CH0	CH1	CH2	CH3	
Auto-tune bit	K0	K0	K0	K0	R/W
PID output	K1	K2	K3	K4	R
Target temperature	K5	K6	K7	K8	R/W
Kp	K9	K13	K17	K21	R/W
Ki	K10	K14	K18	K22	R/W
Kd	K11	K15	K19	K23	R/W
Diff	K12	K16	K20	K24	R/W
Control period	K25	K26	K27	K28	R/W
Output range	K29	K30	K31	K32	R/W
Temperature difference	K33	K34	K35	K36	R/W
Temperature correction	K37	K38	K39	K40	W

Besides, the module can save the setting temperature, PID parameters, temperature difference value, temperature control period, auto-tune output range, etc. The parameters will be saved after auto-tune or user modification, and be operated after re-power on.

8-4. Working mode

Set via software

Please use XDPPro software V3.5.1 and up to set the module.
Open the software, click configure/expansion module setting, then select the module type in the following window:

Set the thermocoupler of each channel, click write to PLC and ok. Then download user program and run, the settings will be effective.
Note: The first-order low-pass filtering method weighted this sampling value and the output value of the last filtering to get the effective filtering value; the filter coefficient is set by the user to 0-254, the smaller the value, the more stable the data, but it may lead to data lag; therefore, when set to 1, the filtering effect is strongest and the data is the most stable; when set to 254, the filtering effect is the weakest; default is 0 (no filtering).

Set via Flash register

The expansion module 0CH~3CH channel can set the type of thermocouple, and it can be set through the special FLASH data register FD inside the PLC. As follows:

Module ID	SFD address	Module ID	SFD address
#1	SFD350~SFD359	#9	SFD430~SFD439
#2	SFD360~SFD369	#10	SFD440~SFD449
#3	SFD370~SFD379	#11	SFD450~SFD459
#4	SFD380~SFD389	#12	SFD460~SFD469

#5	SFD390~SFD399	#13	SFD470~SFD479
#6	SFD400~SFD409	#14	SFD480~SFD489
#7	SFD410~SFD419	#15	SFD490~SFD499
#8	SFD420~SFD429	#16	SFD500~SFD509

SFD bit definition

Take module 1 as an example to explain the setting method:

<table>
<tr><th></th><th>Bit7</th><th>Bit6</th><th>Bit5</th><th>Bit4</th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th><th>Note</th></tr>
<tr><td rowspan="2">Byte0</td><td colspan="4">TC1 channel</td><td colspan="4">TC0 channel</td><td rowspan="6">To set the thermocouple type of each channel, each channel occupies 4 bits.</td></tr>
<tr><td colspan="4">K：0000
S：0001
E：0010
N：0011
J：0100
T：0101
R：0110
B：0111</td><td colspan="4">K：0000
S：0001
E：0010
N：0011
J：0100
T：0101
R：0110
B：0111</td></tr>
<tr><td rowspan="2">Byte1</td><td colspan="4">TC3 channel</td><td colspan="4">TC2 channel</td></tr>
<tr><td colspan="4">K：0000
S：0001
E：0010
N：0011
J：0100
T：0101
R：0110
B：0111</td><td colspan="4">K：0000
S：0001
E：0010
N：0011
J：0100
T：0101
R：0110
B：0111</td></tr>
<tr><td>Byte2~Byte19</td><td colspan="8">Reserved</td><td></td></tr>
</table>

8-5. External connection

For thermocouple connection, When connect to＋24V power, please use the 24V power supply of PLC to avoid interference.

Input wiring

Output circuit

- Output terminal

  For transistor output terminals, please use DC5V~30V power supply.
- Circuit insulation

  PLC internal circuit and output transistor is optical insulation with optical coupling device. Each public module is separate.
- Response time

  The time is less than 0.2ms from PLC driving (or cut) optical coupling circuit to transistor ON/OFF.
- Output circuit

  Each point current is 0.15A to avoid over-heating.
- Open circuit leak current

  Below 0.1mA.

Thermocouple input characteristic curve

8-6. Dimension

The outline and dimension:

(unit: mm)

8-7. Programming example

Example: Do PID control for CH0 of module 1.

// open PID enable bit

// set target value

// set operation range

// set control period

// write in the target value, operation range, control period

// start the auto-tune function

// set P value

// set I value

// set D value

// do manual PID control, write in PID parameters

// read the auto-tune bit, PID parameters, PID output value

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