



XC series expansions with special functions
Operate Manual

Xinje Electronic Co., Ltd.

Catalog

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1. Modules information

1. Basic Characteristics

XC series PLCs not only have strong functions of logic operation, data operation, high speed processing etc. but also functions of A/D, D/A conversion, PID adjustment. With the expansions of analog input module, analog output module, temperature control module etc, XC series PLCs are widely used in the control system of temperature, flow, liquid level, pressure.

2. Module Names

The detailed information is:

Model	Function
XC-E8AD	8 channels analog input (14bits); there into 4 channels current input, 4 channels voltage input
XC-E4AD2DA	4 channels analog input (14bits); 2 channels analog output (12bits); current / voltage selectable
XC-E4DA	4 channels analog output (12bits); current / voltage selectable
XC-E6PT-P	-150℃~350℃, 6 channels Pt100 temperature signal sampling, 0.1 degree precision, built-in PID function
XC-E6TC-P	0℃~1000℃, 6 channels K type thermocouple temperature sampling module, 0.1 degree precision, include PID operation
XC-3AD4PT2DA	3 channels current input(14 bits), 4 channels PT100 temperature input and 2 channels voltage output (12 bits)
XC-4AD	4 channels analog input (14 bits), current / voltage selectable
XC-2DA	2 channels analog output (12 bits), current/voltage selectable

3. Dimension: (mm)

4. General Specification

Operating Environment	No corrosive gas
Ambient Temperature	0℃~60℃
Store Temperature	-20~70℃
Ambient Humidity	5~95%
Store Humidity	5~95%
Installation	Can be fixed with M3 screw or directly installed on orbit of DIN46277 (width: 35mm)
Size	63mm×102mm×73.3mm

5. Notes

- Please confirm the specifications, choose the right module
- When wiring the module, please prevent the scraps falling into the modules
- Before connecting, please confirm again the module specifications and connected device
- When connecting, please check if the connection is firm, cable broken will cause data incorrect, short circuit and other errors! Installation, layout should only be carried on after cutting the power.

2. PID Function

1. Brief introduction of PID function

Among XC series PLC special modules, digital input module (A/D module) and temperature control module both have PID control function which is widely used. There are only four parameters (K_p , K_i , K_d and Diff) should be set.

2. PID Parameters

K_p — P is proportion parameter, to control the offset of the system once it happens.

K_i — I is integral parameter, to eliminate the static error, improve the no error degree of the system.

K_d — D is differential parameter, to control the signal changing trend, decrease the system vibration.

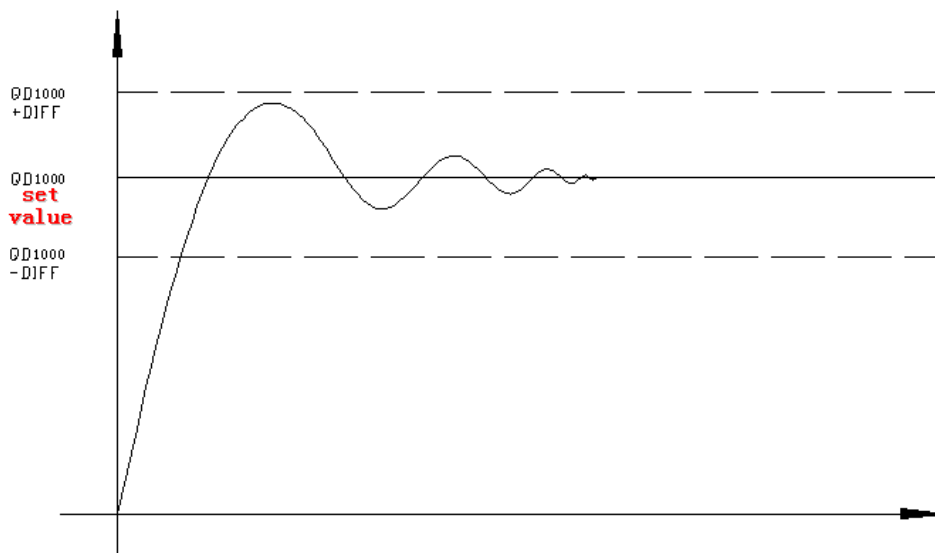
Diff — Control range, to do PID control in the defined range.

Death — Death area, compare the current PID output to the former one, if the difference is less than the death area value, the module will abandon the current PID value, send the last value to the PLC.

3. Control characteristics

The range of PID adjustment is, when the testing value is low than QD-Diff, controller outputs with the full scale; when the testing value is larger than QD+Diff, the controller stops outputting; in the range of QD-Diff to QD+Diff, carry on PID adjustment.

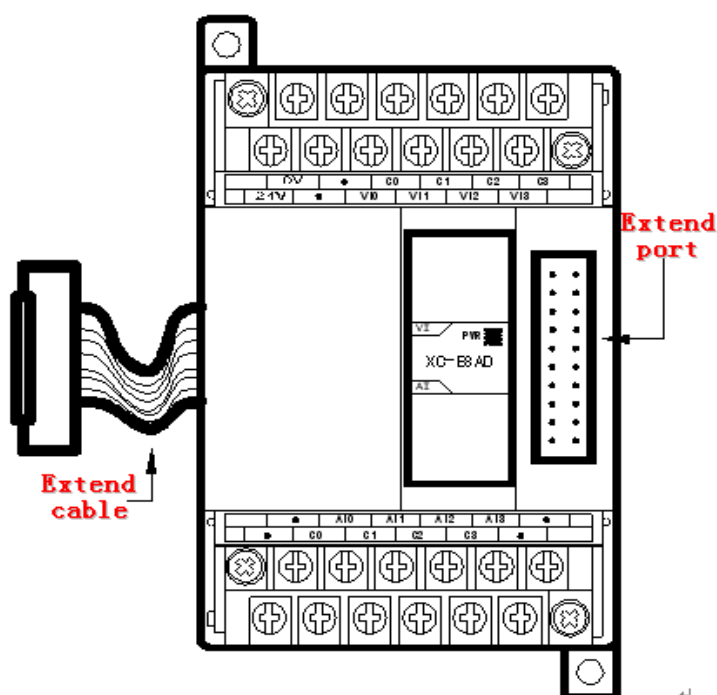
The control curve of PID:



Each parameter's reference value: $K_p=20\sim100$; $K_i=5\sim20$; $K_d=200\sim700$; $DIFF=100\sim200$.

3. Analog input module XC-E8AD

1. Specification



- 14 bits high precision analog input
- 8 channels analog input: The first four channels are current input (0~20mA, 4~20 mA); The left 4 channels are voltage input (0~5V, 0~10V)
- As special function module of XC, up to 7 models can be connected.
- PID adjustment function

Items	Current input (0CH~3CH)	Voltage input (4CH~7CH)
Analog input range	DC0~20mA、4~20mA	DC0~5V、0~10V
Max input range	0~40mA	±18V
Digital output range	14 bits binary data	
PID control value	0~4095	
Resolution	1/16383(14Bit)	
Integrate Precision	0.8%	
Conversion speed	15ms per channel	
Analog power supply	DC24V±10%,100mA	
Installation	Can be fixed with screw M3 or directly installed on orbit of DIN46277 (width: 35mm)	
Dimension	63mm×102mm×73.3mm	

2. Input address

XC series analog module doesn't occupy I/O unit, the converted data is directly transferred to PLC register. Each channel address:

I/O address list

Register address of expansion module 1:

Channel	AD signal	PID output value	PID start/stop control bit	Preset value	PID Parameters: Kp, Ki, Kd, control range Diff, dead range "Death"
0CH	ID100	ID108	Y100	QD100	Kp: QD108 Ki: QD109 Kd: QD110 Diff: QD111 Death: QD112
1CH	ID101	ID109	Y101	QD101	
2CH	ID102	ID110	Y102	QD102	
3CH	ID103	ID111	Y103	QD103	
4CH	ID104	ID112	Y104	QD104	
5CH	ID105	ID113	Y105	QD105	
6CH	ID106	ID114	Y106	QD106	
7CH	ID107	ID115	Y107	QD107	

Register address of expansion module 2:

Channel	AD signal	PID output value	PID start/stop control bit	Preset value	PID parameters: Kp, Ki, Kd, control range Diff, dead range "Death"
0CH	ID200	ID208	Y200	QD200	Kp: QD208 Ki: QD209 Kd: QD210 Diff: QD211 Death: QD212
1CH	ID201	ID209	Y201	QD201	
2CH	ID202	ID210	Y202	QD202	
3CH	ID203	ID211	Y203	QD203	
4CH	ID204	ID212	Y204	QD204	
5CH	ID205	ID213	Y205	QD205	
6CH	ID206	ID214	Y206	QD206	
7CH	ID207	ID215	Y207	QD207	

Register address of expansion module 3:

Channel	AD signal	PID output value	PID start/stop control bit	Preset value	PID parameters: Kp, Ki, Kd, control range Diff, dead range "Death"
0CH	ID300	ID308	Y300	QD300	Kp: QD308 Ki: QD309 Kd: QD310 Diff: QD311 Death: QD312
1CH	ID301	ID309	Y301	QD301	
2CH	ID302	ID310	Y302	QD302	
3CH	ID303	ID311	Y303	QD303	
4CH	ID304	ID312	Y304	QD304	

5CH	ID305	ID313	Y305	QD305	
6CH	ID306	ID314	Y306	QD306	
7CH	ID307	ID315	Y307	QD307	

Register address of expansion module 4:

Channel	AD signal	PID output value	PID start/stop control bit	Preset value	PID parameters: Kp, Ki, Kd, control range Diff, dead range “Death”
0CH	ID400	ID408	Y400	QD400	Kp: QD408 Ki: QD409 Kd: QD410 Diff: QD411 Death: QD412
1CH	ID401	ID409	Y401	QD401	
2CH	ID402	ID410	Y402	QD402	
3CH	ID403	ID411	Y403	QD403	
4CH	ID404	ID412	Y404	QD404	
5CH	ID405	ID413	Y405	QD405	
6CH	ID406	ID414	Y406	QD406	
7CH	ID407	ID415	Y407	QD407	

Register address of expansion module 5:

Channel	AD signal	PID output value	PID start/stop control bit	Preset value	PID parameters: Kp, Ki, Kd, control range Diff, dead range “Death”
0CH	ID500	ID508	Y500	QD500	Kp: QD508 Ki: QD509 Kd: QD510 Diff: QD511 Death: QD512
1CH	ID501	ID509	Y501	QD501	
2CH	ID502	ID510	Y502	QD502	
3CH	ID503	ID511	Y503	QD503	
4CH	ID504	ID512	Y504	QD504	
5CH	ID505	ID513	Y505	QD505	
6CH	ID506	ID514	Y506	QD506	
7CH	ID507	ID515	Y507	QD507	

Register address of expansion module 6:

Channel	AD signal	PID output value	PID start/stop control bit	Preset value	PID parameters: Kp, Ki, Kd, control range Diff, dead range “Death”
0CH	ID600	ID608	Y600	QD600	Kp: QD608 Ki: QD609 Kd: QD510 Diff: QD611 Death: QD512
1CH	ID601	ID609	Y601	QD601	
2CH	ID602	ID610	Y602	QD602	
3CH	ID603	ID611	Y603	QD603	
4CH	ID604	ID612	Y604	QD604	

5CH	ID605	ID613	Y605	QD605	
6CH	ID606	ID614	Y606	QD606	
7CH	ID607	ID615	Y607	QD607	

Register address of expansion module 7:

Channel	AD signal	PID output value	PID start/stop control bit	Preset value	PID parameters: Kp, Ki, Kd, control range Diff, dead range "Death"
0CH	ID700	ID708	Y700	QD700	Kp: QD708 Ki: QD709 Kd: QD710 Diff: QD711 Death: QD712
1CH	ID701	ID709	Y701	QD701	
2CH	ID702	ID710	Y702	QD702	
3CH	ID703	ID711	Y703	QD703	
4CH	ID704	ID712	Y704	QD704	
5CH	ID705	ID713	Y705	QD705	
6CH	ID706	ID714	Y706	QD706	
7CH	ID707	ID715	Y707	QD707	

Description:

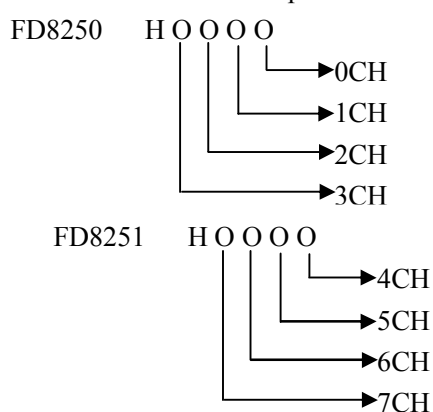
Start signal (Y): when Y is 0, close PID control, when Y is 1, start PID control.

3. Setting of working mode

1) Expansion's 0CH~3CH channels have two modes to select: current 0~20mA、4~20mA , 4CH~7CH channels have two modes to select, voltage 0~5V, 0~10V. Set via special FLASH data register FC inside PLC. See the following table:

Module	Channel's ID	
	0CH~3CH	4CH~7CH
1# module	FD8250	FD8251
2# module	FD8258	FD8259
3# module	FD8266	FD8267
4# module	FD8274	FD8275
5# module	FD8282	FD8283
6# module	FD8290	FD8291
7# module	FD8298	FD8299

Take 1# module as example:



Note: As showed in the preceding table, each register set 4 channels' mode, each register has 16 bits. From low bit to high bit, every 4 bits can set 1 channels' mode.

Each bit's definition is showed in the following table:

The following, we take module 1 as example to describe the setting format:

Register FD8250:

Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0:0~20mA 1:4~20mA	00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0:0~20mA 1:4~20mA
Channel 3				Channel 2			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0:0~20mA 1:4~20mA	00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0:0~20mA 1:4~20mA

Register FD8251:

Channel 5				Channel 4			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0: 0~10V 1: 0~5V	00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0: 0~10V 1: 0~5V
Channel 7				Channel 6			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0: 0~10V 1: 0~5V	00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter		-	0: 0~10V 1: 0~5V

E.g. 1) Set module 1 No. 3, No.2, No.1, No.0 channel's working mode separately to 0~20mA, 4~20mA, 0~20mA, 4~20mA, all the four channels are 1/2 filter, data in FD8250 is 0101H

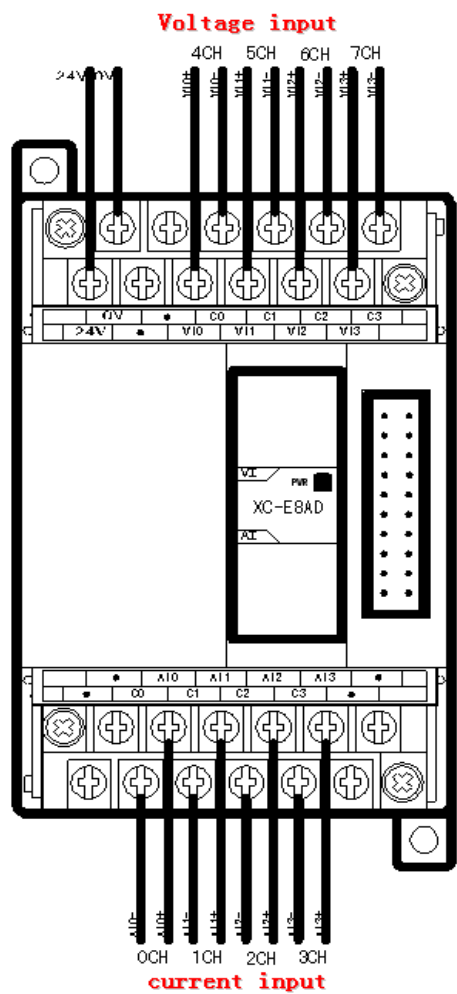
2) Set module 1 No. 7, No.6, No.5, No.4 channel's working mode separately to 0~10V, 0~5V, 0~10V, 0~5V, all the four channels don't filter, data in FD8251 is 4545H

4. Exterior connection

About exterior connection, you should note the below two items:

- When connect +24V power outside, please use the 24V power on PLC main unit to avoid interference.
- To avoid interference, please use the shield cable and single point ground with the shield layer.

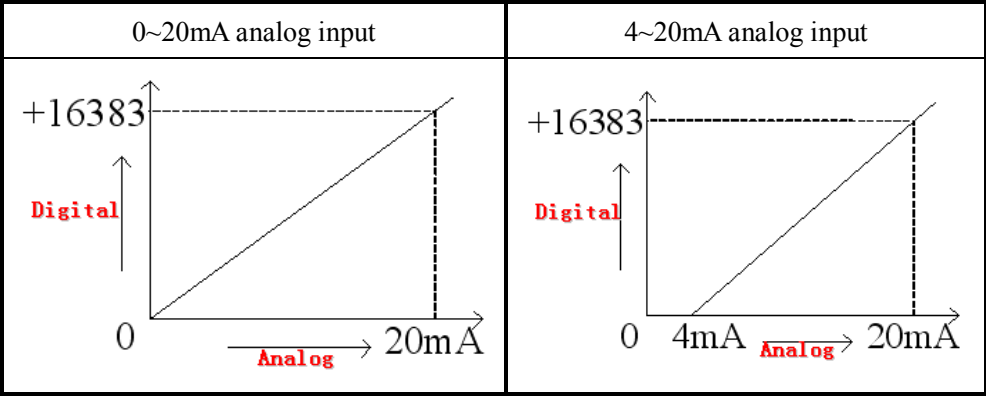
Layout diagram:



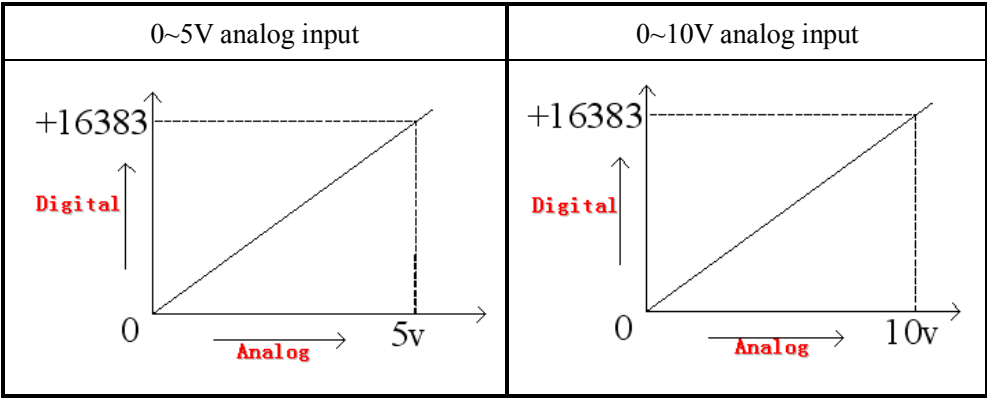
5. Analog/digital convert chart

The relationship between input analog and converted digital quantity is showed in the following chart:

Current mode of Channel 0~Channel 3:

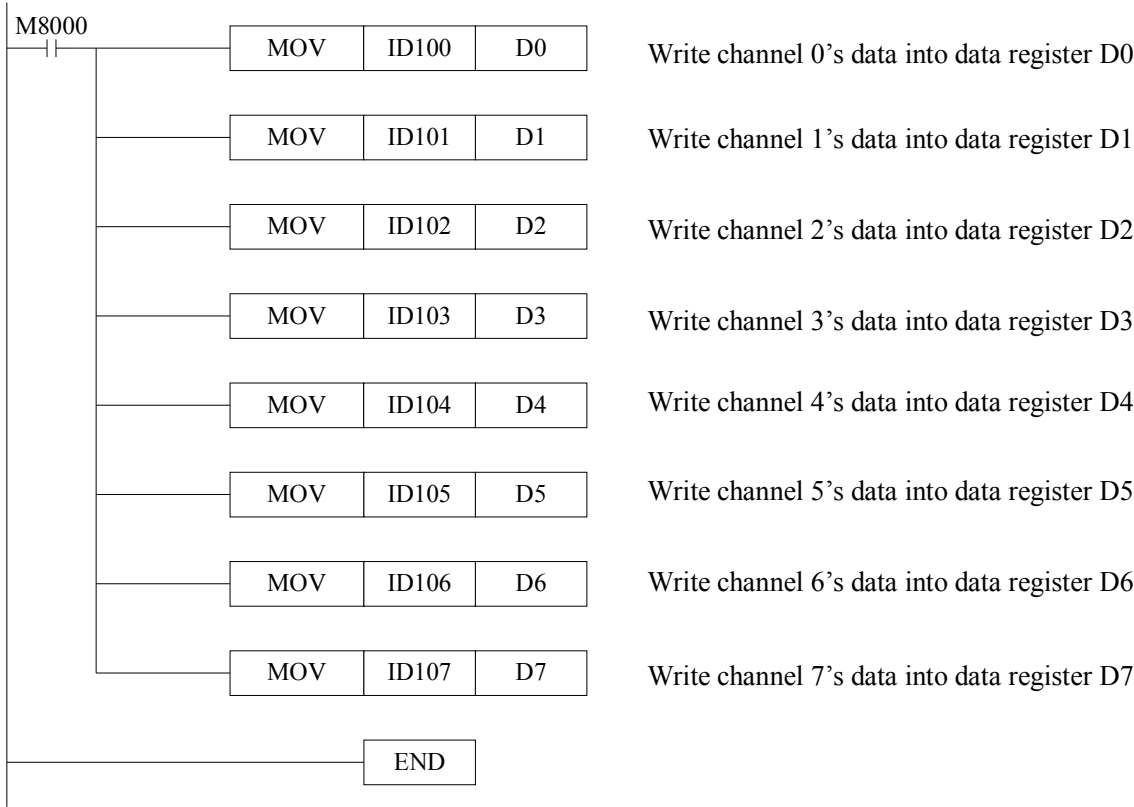


Voltage mode of Channel 4 ~ Channel 7:



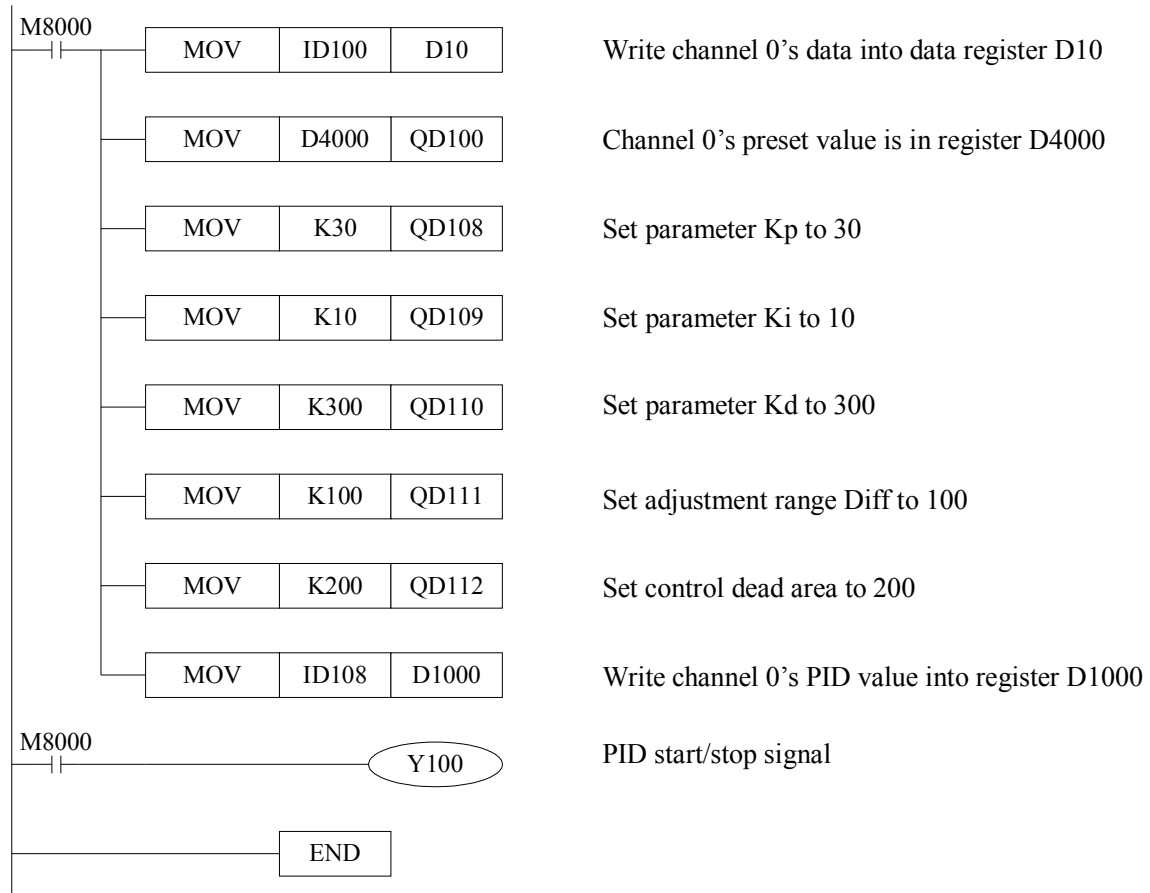
6. Programming

E.g. 1) Real time read unit 1 XC-E8AD 8 channels' data



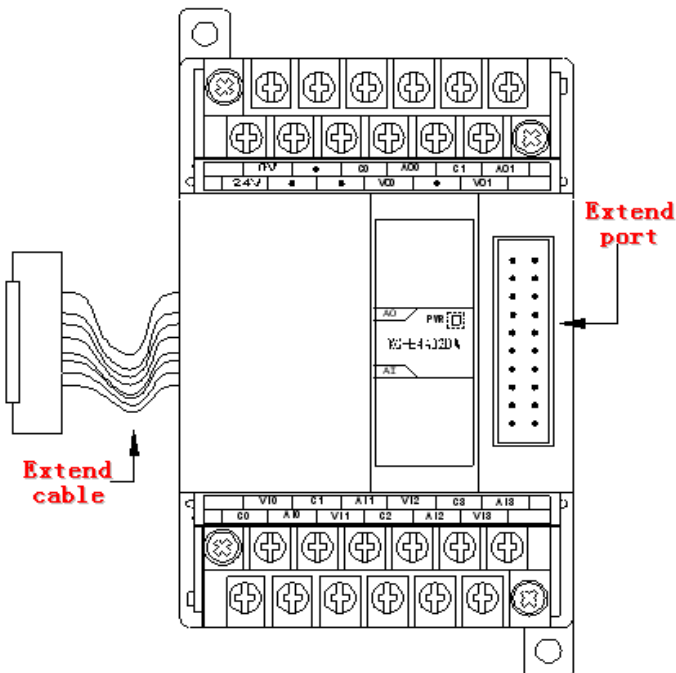
E.g.2) Application of PID control in AD modules

The following, we take XC-E8AD channel 0 as an example:



4. Analog input/output module XC-E4AD2DA

1. Specification



- 4 channels 14 bits analog input and 2 channels 12 bits analog output
- 4 channels selectable voltage 0~5V, 0~10V, current 0~20mA, 4~20mA input and 2 channels selectable voltage 0~5V, 0~10V, current 0~20mA, 4~20mA output. Set via host machine.
- As special function module of XC, up to 7 modules can be connected together
- 4 channels A/D have PID adjustment function

Items	Analog input (AD)		Analog output (DA)	
	Voltage input	Current input	Voltage output	Current output
Analog input bound	DC0~5V、0~10V	DC0~20mA、4~20mA	-	
Max input bound	DC±18V	DC0~40mA	-	
Analog output bound	-		DC0~5V、0~10V (Exterior load resistance 2KΩ~1MΩ)	DC0~20mA、4~20mA (Exterior load resistance is less than 500Ω)
Digital input bound	-		12 bits binary data (0~4095)	
Digital output bound	14 bits binary data (0~16383)		-	
Distinguish ratio	1/16383(14Bit); the converted data is stored into PLC in the format of HEX format (14Bit)		1/4095(12Bit); the converted data is stored into PLC with the format of HEX. (12Bit)	
PID control value	0~4095		-	
Integrate precision	0.8%			
Convert speed	15ms per channel		2ms per channel	
Power used by analog	DC24V±10%,100mA			
Install format	Fixed with M3 screws or directly installed on orbit of DIN46277 (Width: 35mm)			
Exterior size	63mm×102mm×73.3mm			

[Extend cable]: Realize data transfer via the connection of extend cable and PLC extend port

[Extend port]: Connect with other expansions

2. The assignment of I/O address

XC series analog modules do not occupy I/O units, the converted data is directly transferred into PLC register, analog output is also directly offered by PLC register.

Register's address of expansion 1:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter: Kp, Ki, Kd, control range Diff, dead area Death
0CH	ID100	ID104	Y100	QD102	Kp: QD106 Ki: QD107 Kd: QD108 Diff: QD109 Death: QD110
1CH	ID101	ID105	Y101	QD103	
2CH	ID102	ID106	Y102	QD104	
3CH	ID103	ID107	Y103	QD105	
Channel	DA signal	-	-	-	-
4CH	QD100	-	-	-	
5CH	QD101	-	-	-	

Register's address of expansion 2:

Channel	AD	PID output value	PID start/stop control bit	The set value	PID parameter: Kp, Ki, Kd, control range Diff, dead area Death
0CH	ID200	ID204	Y200	QD202	Kp: QD206 Ki: QD207 Kd: QD208 Diff: QD209 Death: QD210
1CH	ID201	ID205	Y201	QD203	
2CH	ID202	ID206	Y202	QD204	
3CH	ID203	ID207	Y203	QD205	
Channel	DA signal	-	-	-	-
4CH	QD200	-	-	-	
5CH	QD201	-	-	-	

Register's address of expansion 3:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter: Kp, Ki, Kd, control range Diff, dead area Death
0CH	ID300	ID304	Y300	QD302	Kp: QD306 Ki: QD307 Kd: QD308 Diff: QD309 Death: QD310
1CH	ID301	ID305	Y301	QD303	
2CH	ID302	ID306	Y302	QD304	
3CH	ID303	ID307	Y303	QD305	
Channel	DA signal	-	-	-	-
4CH	QD300	-	-	-	
5CH	QD301	-	-	-	

Register's address of expansion 4:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter: Kp, Ki, Kd, control range Diff, dead area Death
0CH	ID400	ID404	Y400	QD402	Kp: QD406 Ki: QD407 Kd: QD408 Diff: QD409 Death: QD410
1CH	ID401	ID405	Y401	QD403	
2CH	ID402	ID406	Y402	QD404	
3CH	ID403	ID407	Y403	QD405	
Channel	DA signal	-	-	-	-
4CH	QD400	-	-	-	
5CH	QD401	-	-	-	

Register's address of expansion 5:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter: Kp, Ki, Kd, control range Diff, dead area Death
0CH	ID500	ID504	Y500	QD502	Kp: QD506 Ki: QD507 Kd: QD508 Diff: QD509 Death: QD510
1CH	ID501	ID505	Y501	QD503	
2CH	ID502	ID506	Y502	QD504	
3CH	ID503	ID507	Y503	QD505	
Channel	DA signal	-	-	-	-
4CH	QD500	-	-	-	
5CH	QD501	-	-	-	

Register's address of expansion 6:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter: Kp, Ki, Kd, control range Diff, dead area Death
0CH	ID600	ID604	Y600	QD602	Kp: QD606 Ki: QD607 Kd: QD608 Diff: QD609 Death: QD610
1CH	ID601	ID605	Y601	QD603	
2CH	ID602	ID606	Y602	QD604	
3CH	ID603	ID607	Y603	QD605	
Channel	DA signal	-	-	-	-
4CH	QD600	-	-	-	
5CH	QD601	-	-	-	

Register's address of expansion 7:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter: Kp, Ki, Kd, control range Diff, dead area Death
0CH	ID700	ID704	Y700	QD702	Kp: QD706
1CH	ID701	ID705	Y701	QD703	Ki: QD707
2CH	ID702	ID706	Y702	QD704	Kd: QD708
3CH	ID703	ID707	Y703	QD705	Diff: QD709
					Death: QD710
Channel	DA signal	-	-	-	-
4CH	QD700	-	-	-	
5CH	QD701	-	-	-	

Description:

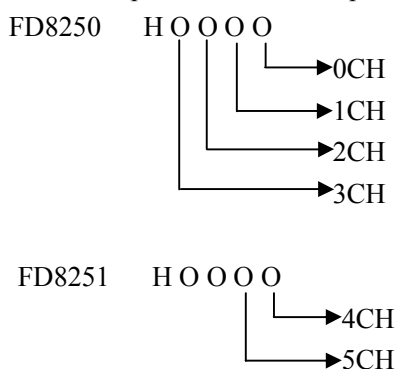
Start signal (Y): When Y is 0, close PID control; when Y is 1, start PID control.

3. Setting of working mode

1) Expansion's I/O have options of voltage mode 0~5V/0~10V, current mode 0~20mA/4~20mA. Via setting of special FLASH data register FD in PLC. See the following table:

Module	Channel's ID	
	0CH~3CH	4CH~5CH
1# expansion	FD8250	FD8251 low byte
2# expansion	FD8258	FD8259 low byte
3# expansion	FD8266	FD8267 low byte
4# expansion	FD8274	FD8275 low byte
5# expansion	FD8282	FD8283 low byte
6# expansion	FD8290	FD8291 low byte
7# expansion	FD8298	FD8299 low byte

Take 1# expansion as an example:



Note: As shown in the preceding table, every register set 4 channels mode, each register has 16 bits, from low to high, every 4 bits set 1 channel mode.

Each channel's working mode is assigned by correspond register's 4 bits. Each bit definition is showed in the following table:

The following, we take module 1 as an example to show how to set:
Register FD8250:

Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter		0: voltage input	0:0~10V	00: 1/2 filter		0: voltage input	0:0~10V
01: not filter			1:0~5V	01: not filter			1:0~5V
10: 1/3 filter		1: current input	0:0~20mA	10: 1/3 filter		1: current input	0:0~20mA
11: 1/4 filter			1:4~20mA	11: 1/4 filter			1:4~20mA
Channel 3				Channel 2			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/2 filter		0: voltage input	0:0~10V	00: 1/2 filter		0: voltage input	0:0~10V
01: not filter			1:0~5V	01: not filter			1:0~5V
10: 1/3 filter		1: current input	0:0~20mA	10: 1/3 filter		1: current input	0:0~20mA
11: 1/4 filter			1:4~20mA	11: 1/4 filter			1:4~20mA

Register FD8251 low byte:

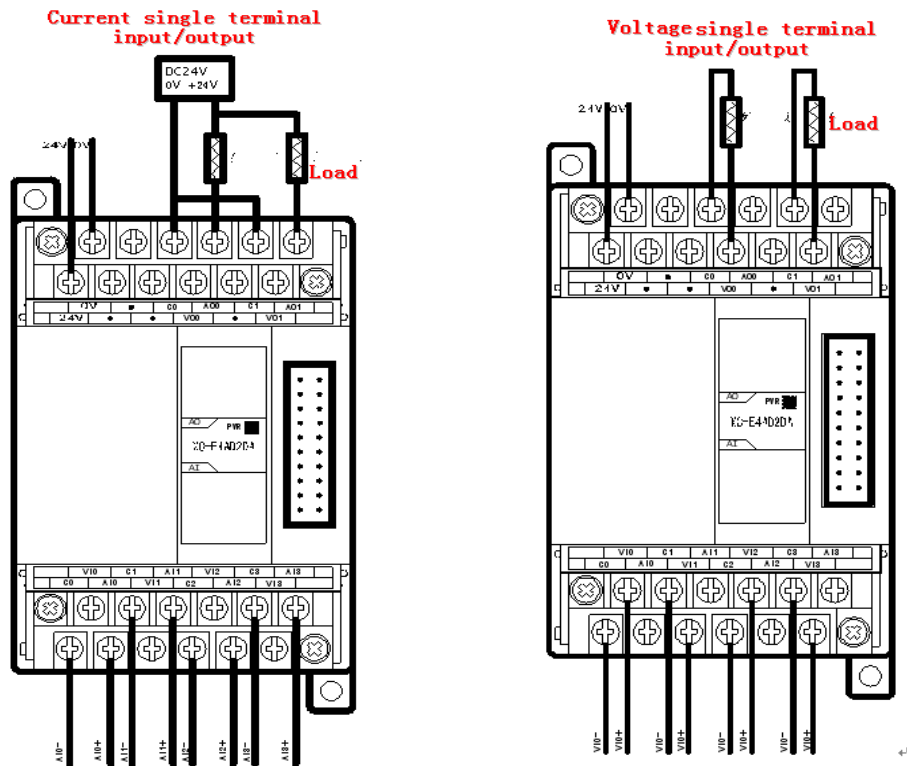
Channel 5				Channel 4			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter		0: voltage input	0:0~10V	00: 1/2 filter		0: voltage input	0:0~10V
01: not filter			1:0~5V	01: not filter			1:0~5V
10: 1/3 filter		1: current input	0:0~20mA	10: 1/3 filter		1: current input	0:0~20mA
11: 1/4 filter			1:4~20mA	11: 1/4 filter			1:4~20mA

E.g.: 1) If set the working mode of module 1 channel 3, channel 2, channel 1, channel 0 to 0~20mA, 4~20mA, 0~10V, 0~5V, filters are all 1/2 filter, value in FD8250 is 2301H

4. Exterior connection

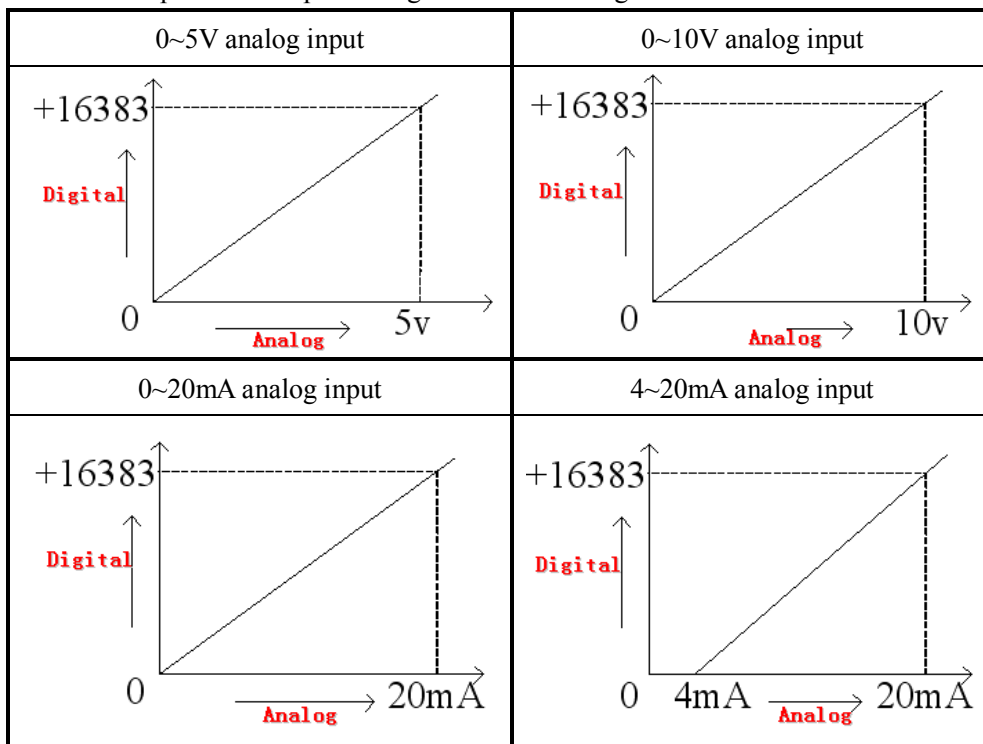
When make exterior connection, please read the following items:

- When connect +24V power outside, please choose 24V power on PLC main unit to avoid interference.
- To avoid interference, please use shield cable and single point ground with the shield layer.
- The 0~20mA or 4~20mA output of the modules need external power supply DC 24V, according to the analog output register QD, the module adjusts the loop circuit's current, but the module itself doesn't produce current.

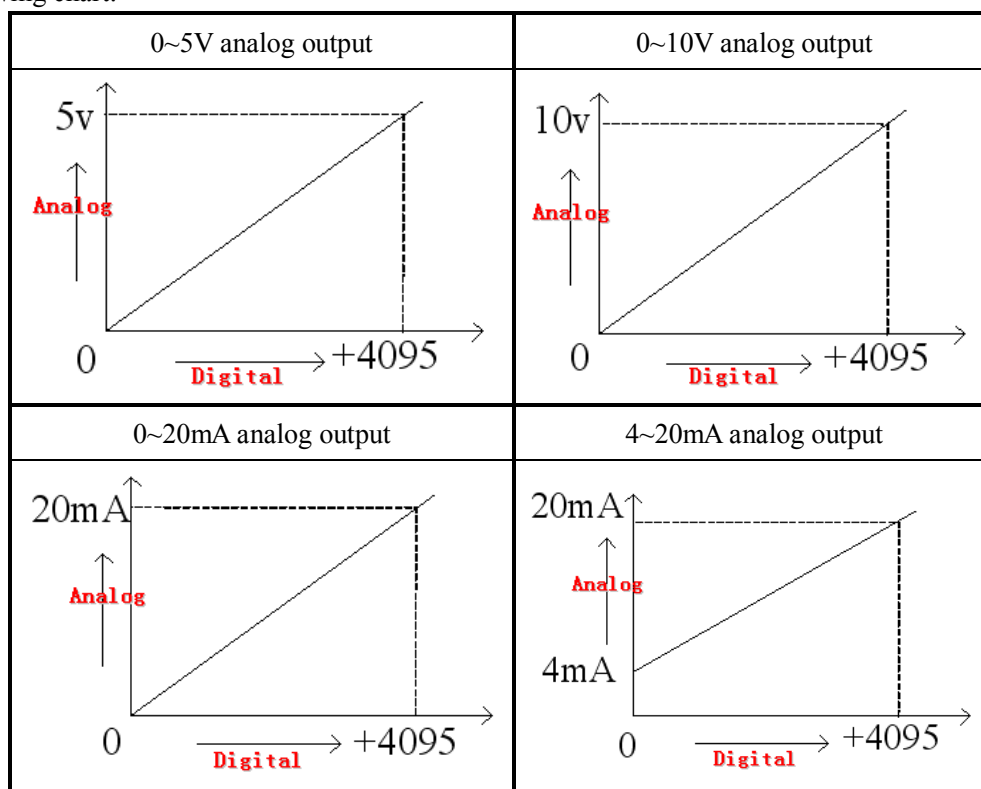


5. Analog digital conversion chart

The relationship between input analog and converted digital value is showed in the following chart:



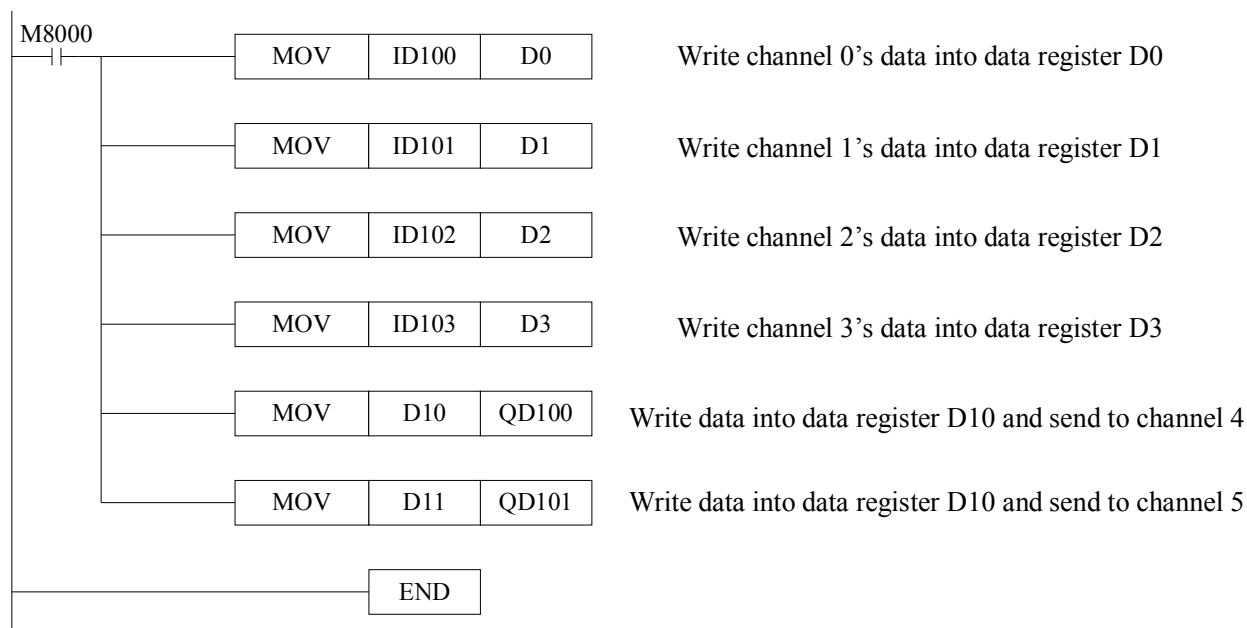
The relationship between output digital value and its corresponding analog data is showed in the following chart:



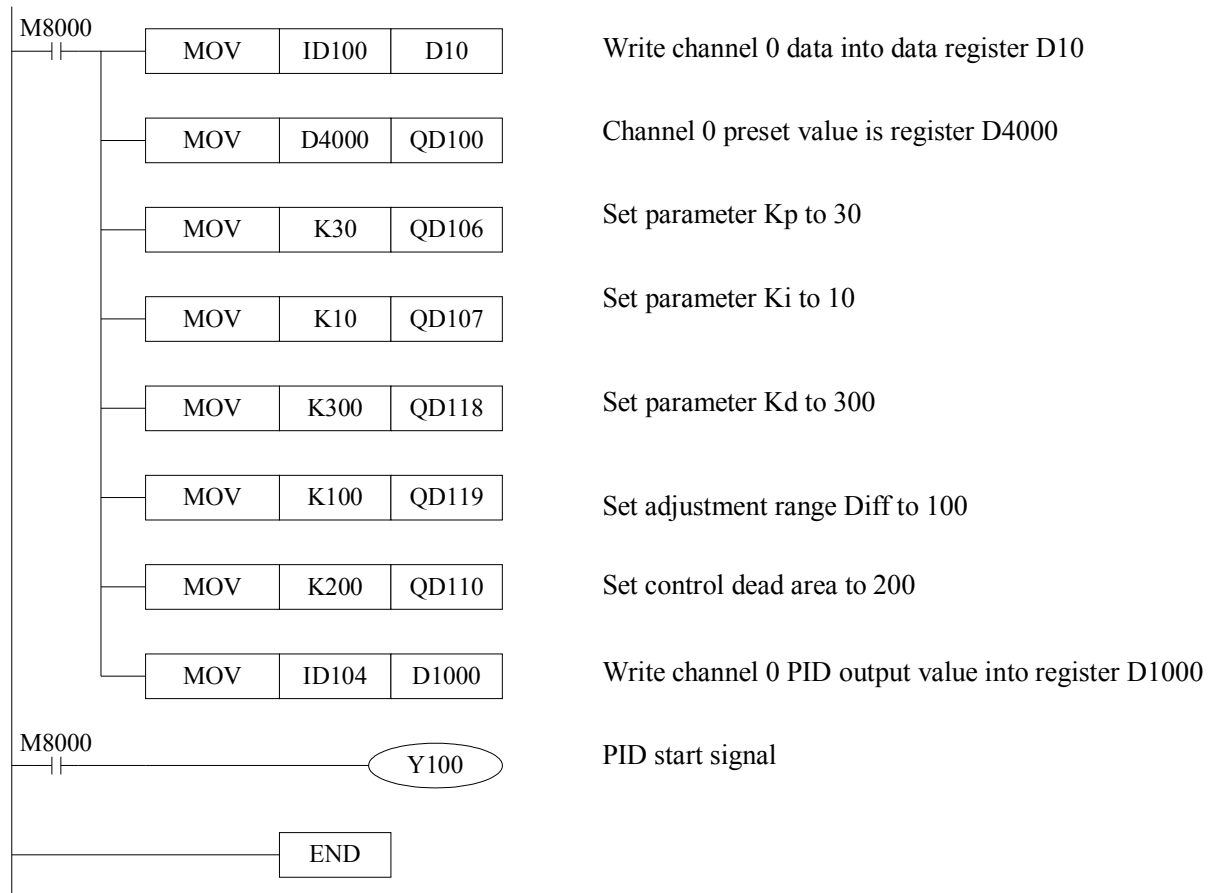
When input data exceeds K4095, analog output will keep the max value of 5V, 10V or 20mA.

6. Programming

E.g.1) Real time read 4 channels data, write 2 channels data (take expansion 1 as an example)

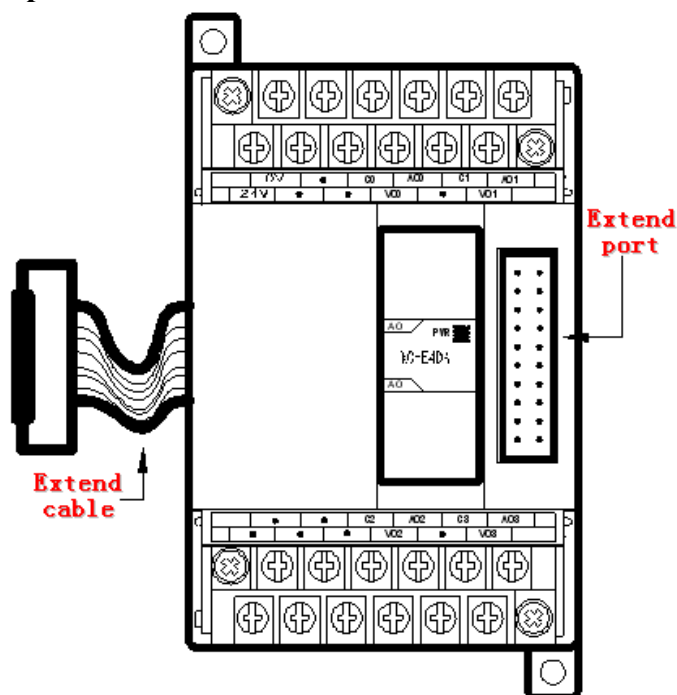


E.g.2) Applied method of PID (take expansion 1's channel 0 as example)



5. Analog output module XC-E4DA

1. Specification



- 12 bits high precision analog output
- 4 channels selectable voltage 0~5V, 0~10V, current 0~20mA, 4~20mA output
- As special function module of XC, 7 modules could be connected

Items	Voltage output	Current output
Analog output bound	DC0~5V, 0~10V	DC0~20mA, 4~20mA
Digital output bound	12 bits binary data	
Distinguish Ratio	1/4096(12Bit); the converted data is stored into PLC with the format of HEX	
Integrate precision	0.8%	
Convert speed	2ms per channel	
Insulate format	DC/DC convert, optical coupling insulation	
Power for analog using	DC 24V±10%, 100mA	
Install format	Can be fixed with M3 screws or directly installed on orbit of DIN46277 (width: 35mm)	
Exterior size	63mm×102mm×73.3mm	

[Extend cable]: Realize data transfer via connecting of extend cable and PLC extend port

[Extend port]: Connect with other expansions

2. Assignment of Output address

XC series analog module does not occupy I/O units, the converted data is directly transferred into PLC register. The output channels corresponding PLC register address is:

Output address list

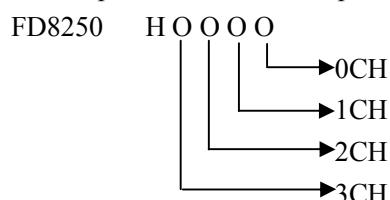
Channel	No.1 unit	No.2 unit	No.3 unit	No.4 unit	No.5 unit	No.6 unit	No.7 unit
0CH	QD100	QD200	QD300	QD400	QD500	QD600	QD700
1CH	QD101	QD201	QD301	QD401	QD501	QD601	QD701
2CH	QD102	QD202	QD302	QD402	QD502	QD602	QD702
3CH	QD103	QD203	QD303	QD403	QD503	QD603	QD703

3. Setting of working mode

1) The I/O of the module has selectable modes of voltage 0~5V, 0~10V, current 0~20mA, 4~20mA. Via the setting of special FLASH data register FD inside PLC, see the following table:

Module	Channel address	
	0CH~3CH	
1# module	D8250	
2# module	D8258	
3# module	D8266	
4# module	D8274	
5# module	D8282	
6# module	D8290	
7# module	D8298	

Take expansion 1 as an example:



Every 4 bits of the register define the working mode of one channel. Each bit definition is listed in the following table:

Take module 1 as an example:

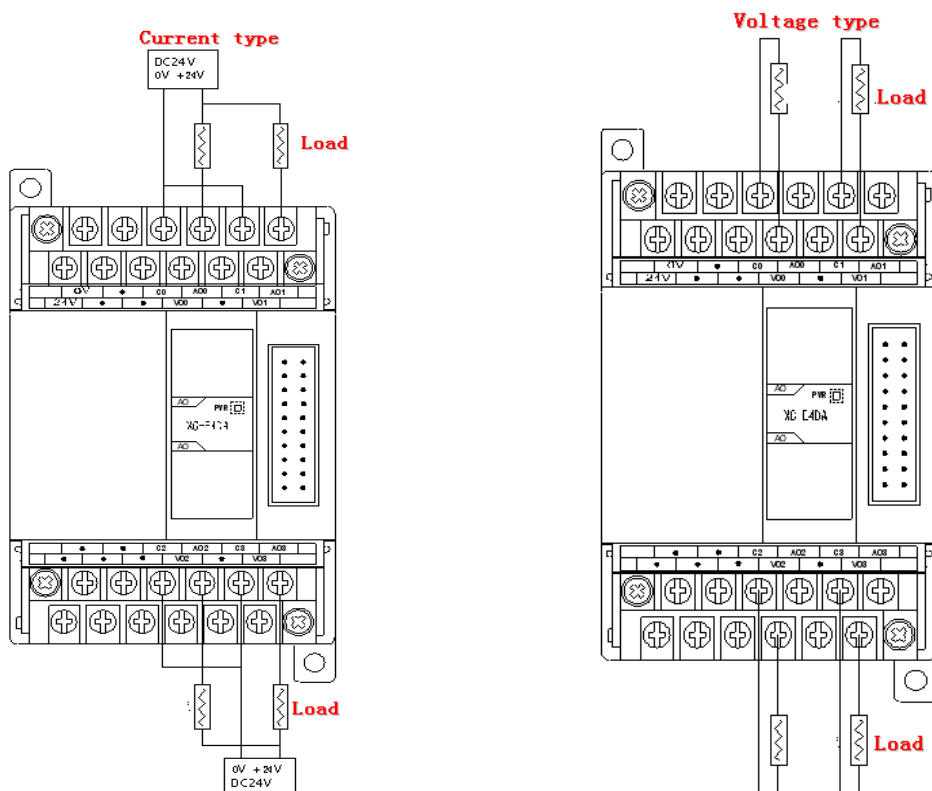
Register FD8250:

Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-		0:Voltage input	0:0~10V 1:0~5V	-		0: Voltage input	0:0~10V 1:0~5V
		1:current input	0:0~20mA 1:4~20mA			1:Current input	0:0~20mA 1:4~20mA
Channel 3				Channel 2			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
-		0: Voltage input	0:0~10V 1:0~5V	-		0: Voltage input	0:0~10V 1:0~5V
		1: current input	0:0~20mA 1:4~20mA			1: current input	0:0~20mA 1:4~20mA

4. Exterior connection

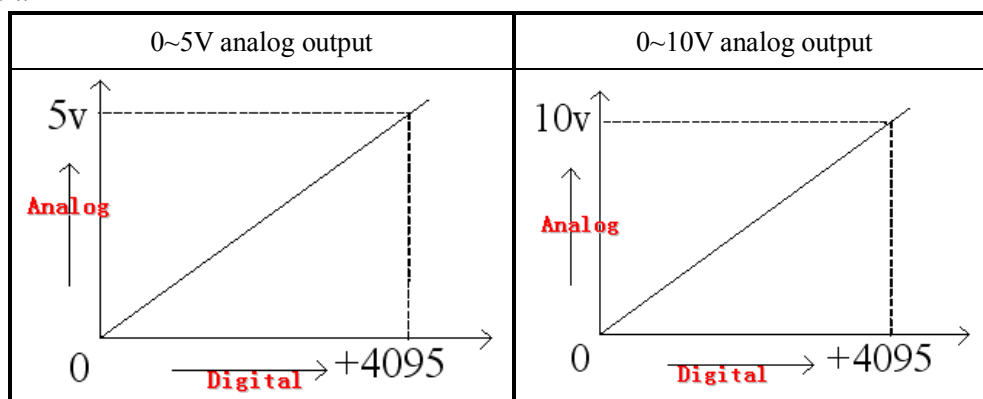
When make exterior connection, please see the following items:

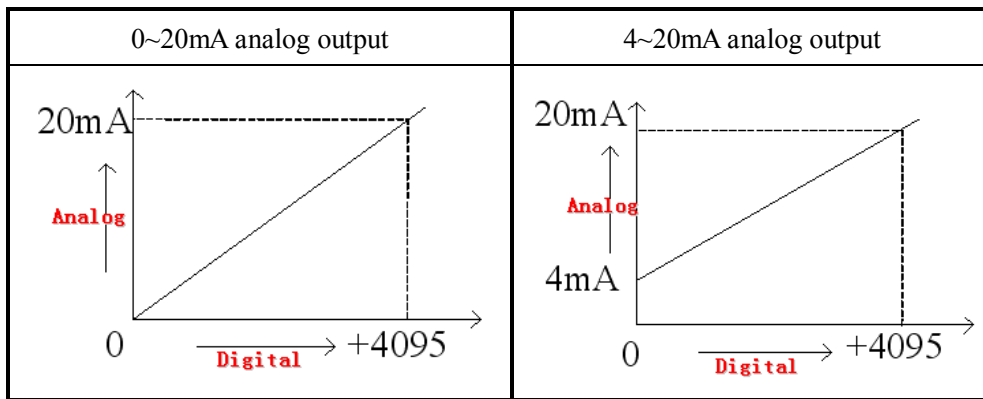
- When connect external +24V power, please use the 24V power on PLC main unit to avoid interference.
- To avoid interference, please use shield cable and single point ground with the shield layer.
- The 0~20mA or 4~20mA output need external 24V power. The module adjusts the circuit current according to the analog output register QD, but the module doesn't produce current itself.



5. Analog digital convert chart

The relationship between PLC digital input and corresponding analog output is showed in the following chart:

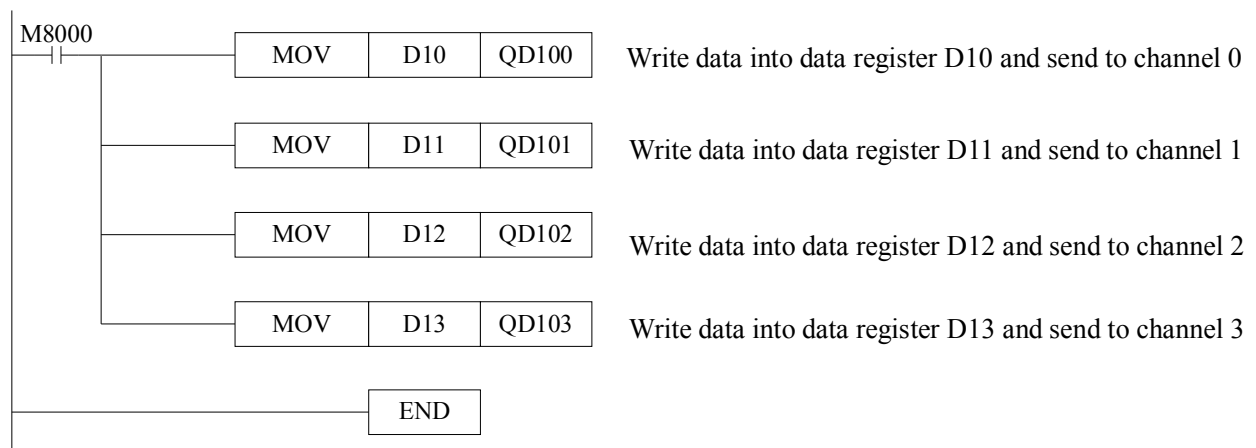




When the digital data exceed K4095, D/A analog output data will keep 5V, 10V or 20mA.

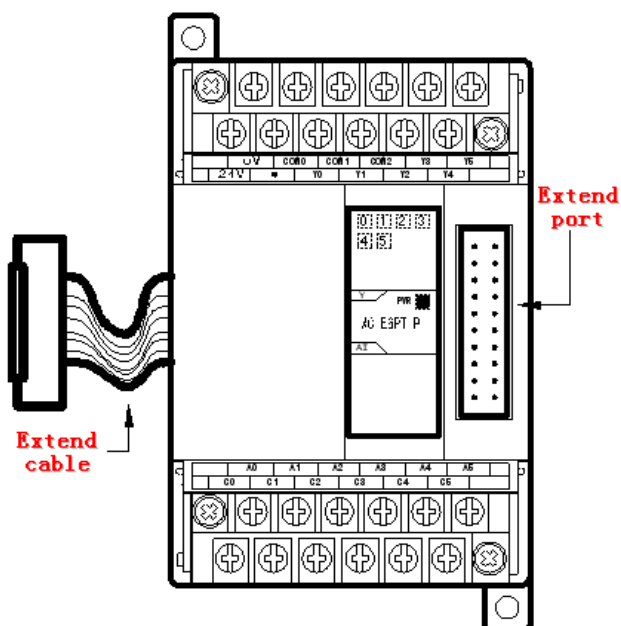
6. Programming

Real-time write data into 4 channels



6. Pt100 temperature PID control module XC-E6PT-P

1. Specification



- Platinum thermal resistance input, Pt100
- 6 channels input, 6 channels output
- 2 groups PID parameters (every 3 channels have one group of PID parameters)
- 1mA constant current output, will not be affected by the exterior environment
- Resolution is 0.1℃
- As the special function module of XC, 7 modules can be connected together

Item	Content
Analog input signal	Pt100 platinum thermo-resistance
Temperature measurement range	-100℃~350℃
Digital output bound	-1000~3500, 16 bits with sign bit, binary
Control precision	±0.5℃
Resolution	0.1℃
Integrate precision	±0.8% (relative to the max value)
Conversion speed	100ms×6 channels
Analog power	DC24V±10%, 50mA
Installation format	Fixed with M3 screws or directly installed on orbit of DIN46277 (Width: 35mm)
Dimension	63mm×102mm×73.3mm

[Extend cable]: transfer data through the extend cable and PLC extend port.

[Extend port]: Connect with other expansions

Note: 1. Without signal input, the channel data will be 3500

2. Connect to Pt100 platinum thermal resistance according to actual requirements

2. Assignment of input address

XC series analog modules don't occupy I/O units; the converted data is directly transferred into PLC register, channel register address:

Table of input definition address:

Channel	1#module	2#module	3#module	4#module	5#module	6#module	7#module
0CH	ID100	ID200	ID300	ID400	ID500	ID600	ID700
1CH	ID101	ID201	ID301	ID401	ID501	ID601	ID701
2CH	ID102	ID202	ID302	ID402	ID502	ID602	ID702
3CH	ID103	ID203	ID303	ID403	ID503	ID603	ID703
4CH	ID104	ID204	ID304	ID404	ID504	ID604	ID704
5CH	ID105	ID205	ID305	ID405	ID505	ID605	ID705

Table of output definition address:

Channel	1#module	2#module	3#module	4#module	5#module	6#module	7#module
0CH preset temperature	QD100	QD200	QD300	QD400	QD500	QD600	QD700
1CH preset temperature	QD101	QD201	QD301	QD401	QD501	QD601	QD701
2CH preset temperature	QD102	QD202	QD302	QD402	QD502	QD602	QD702
3CH preset temperature	QD103	QD203	QD303	QD403	QD503	QD603	QD703
4CH preset temperature	QD104	QD204	QD304	QD404	QD504	QD604	QD704
5CH preset temperature	QD105	QD205	QD305	QD405	QD505	QD605	QD705
First 3 channels parameter P	QD106	QD206	QD306	QD406	QD506	QD606	QD706
First 3 channels parameter I	QD107	QD207	QD307	QD407	QD507	QD607	QD707
First 3 channels parameter D	QD108	QD208	QD308	QD408	QD508	QD608	QD708
First 3 channels temperature control range	QD109	QD209	QD309	QD409	QD509	QD609	QD709
Last 3 channels parameter P	QD110	QD210	QD310	QD410	QD510	QD610	QD710
Last 3 channels parameter I	QD111	QD211	QD311	QD411	QD511	QD611	QD711
Last 3 channels parameter D	QD112	QD212	QD312	QD412	QD512	QD612	QD712
Last 3 channels temperature control range	QD113	QD213	QD313	QD413	QD513	QD613	QD713

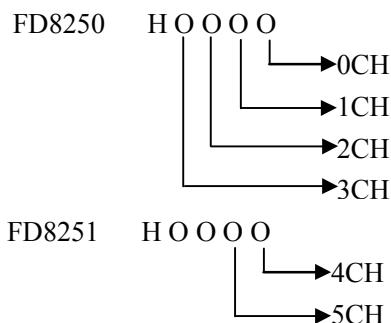
Start signal (Y): When Y is 0, close PID control; when Y is 1, start PID control

3. Setting of input filter

1) Every input of expansion has filter options, set via special FLASH data register FD in PLC. See the following chart:

Module	channel address	
	0CH~3CH	4CH~5CH
1#module	FD8250	FD8251 low byte
2# module	FD8258	FD8259 low byte
3# module	FD8266	FD8267 low byte
4# module	FD8274	FD8275 low byte
5# module	FD8282	FD8283 low byte
6# module	FD8290	FD8291 low byte
7# module	FD8298	FD8299 low byte

Take 1# module as an example:



Each bit definition is shown in the following table:

Take module 1 as an example:

Register FD8250:

Channel 2				Channel 1			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter		-	-	00: 1/2 filter		-	-
01: no filter				01: no filter			
10: 1/3 filter		-	-	10: 1/3 filter		-	-
11: 1/4 filter				11: 1/4 filter			
Channel 4				Channel 3			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/2 filter		-	-	00: 1/2 filter		-	-
01: no filter				01: no filter			
10: 1/3 filter		-	-	10: 1/3 filter		-	-
11: 1/4 filter				11: 1/4 filter			

Register FD8251:

Channel 5				Channel 4			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/4 filter		-	-	00: 1/4 filter		-	-
01: no filter				01: no filter			
10: 1/2 filter		-	-	10: 1/2 filter		-	-
11: 1/3 filter				11: 1/3 filter			

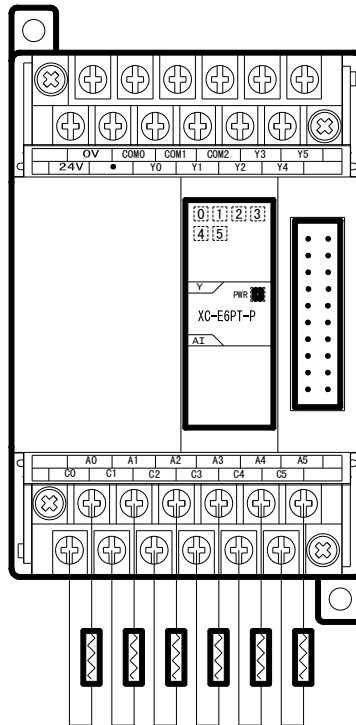
When the product is out of factory, the default value is 0, the filter format is 1/2 filter.

4. Exterior connection

About the external wiring, please see the following items:

- When connect +24V power, please use 24V power on PLC main unit to avoid interference.
- To avoid interference, please use shield cable to ground.

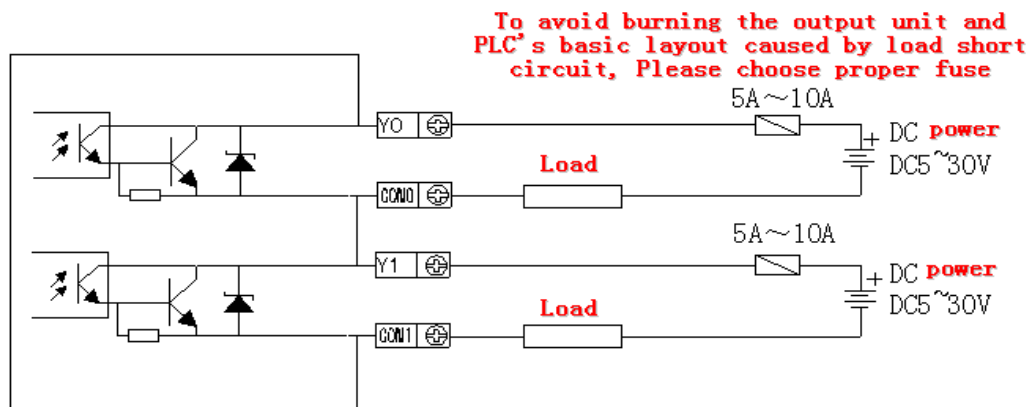
Input connection:



- Output terminals
Transistor output terminals, please choose DC 5V~30V.
- Circuit insulation
Between PLC's interior circuit and output transistor is optical insulation. Each public module is also separate.
- Response time
The time is less than 0.2ms from PLC driving (or cut) optical coupling device to transistor ON/OFF.
- Output current
Each point current is 0.8A, but to prevent temperature rising, please use as 1.2A every 4 points or 2.0A every 8 points.
- Open circuit leakage current
Below 0.1mA

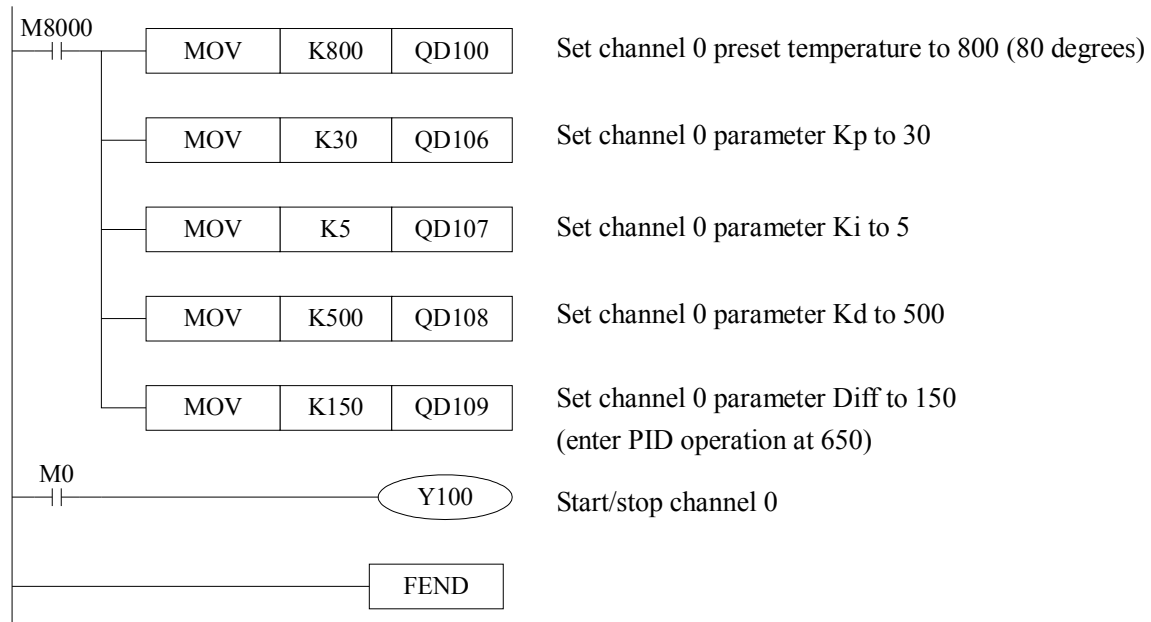
The output circuit is as the following:

Take channel 0 and channel 1 as an example:



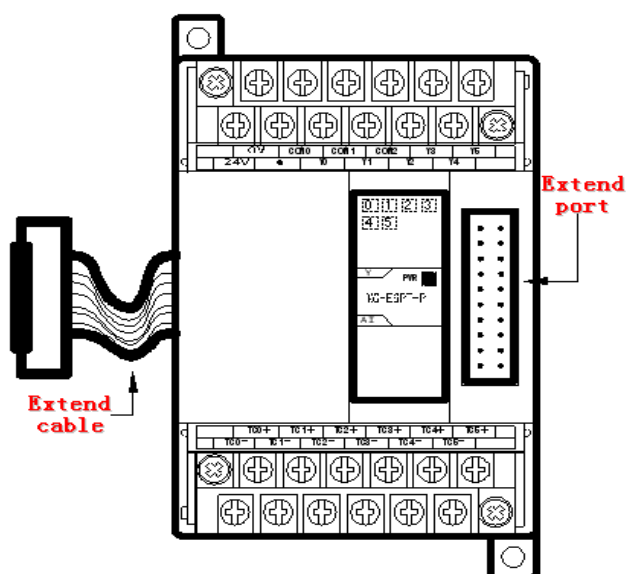
6. Programming

Program with the first channel



7. K type thermocouple temperature PID control module XC-E6TC-P

1. Specification



- K type thermocouple sensor signal input
- 6 channels input, 6 channels output
- 2 groups PID parameters (every 3 channels have one group PID parameters)
- Built-in cold-terminal compensation circuit
- Resolution is 0.1℃
- As special function module of XC , up to 7 modules can be connected

Items	Content
Analog input signal	K 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	±0.8% (compare with the max value)
Conversion speed	100ms×6 channels
Analog power	DC24V±10%, 50mA
Install format	Fixed with M3 screws or directly installed on orbit of DIN46277 (Width: 35mm)
Dimension	63mm×102mm×73.3mm

[Extend cable]: transfer data via the extend cable and PLC extend port

[Extend port]: Connect with other expansions

Note: 1. If no signal input, the channel data is 0

2. According to the actual requirement, connect to K type thermocouple

2. Assignment of input address

XC series analog modules don't occupy I/O units, the converted data is directly transferred into PLC register, and channels corresponding register address are:

Input address list

Channel	1# Expansion	2# Expansion	3# Expansion	4# Expansion	5# Expansion	6# Expansion	7# Expansion
0CH	ID100	ID200	ID300	ID400	ID500	ID600	ID700
1CH	ID101	ID201	ID301	ID401	ID501	ID601	ID701
2CH	ID102	ID202	ID302	ID402	ID502	ID602	ID702
3CH	ID103	ID203	ID303	ID403	ID503	ID603	ID703
4CH	ID104	ID204	ID304	ID404	ID504	ID604	ID704
5CH	ID105	ID205	ID305	ID405	ID505	ID605	ID705

Output address list

Channel parameter	1# Expansion	2# Expansion	3# Expansion	4# Expansion	5# Expansion	6# Expansion	7# Expansion
0CH preset temperature	QD100	QD200	QD300	QD400	QD500	QD600	QD700
1CH preset temperature	QD101	QD201	QD301	QD401	QD501	QD601	QD701
2CH preset temperature	QD102	QD202	QD302	QD402	QD502	QD602	QD702
3CH preset temperature	QD103	QD203	QD303	QD403	QD503	QD603	QD703
4CH preset temperature	QD104	QD204	QD304	QD404	QD504	QD604	QD704
5CH preset temperature	QD105	QD205	QD305	QD405	QD505	QD605	QD705
First 3 channels parameter P	QD106	QD206	QD306	QD406	QD506	QD606	QD706
First 3 channels parameter I	QD107	QD207	QD307	QD407	QD507	QD607	QD707
First 3 channels parameter D	QD108	QD208	QD308	QD408	QD508	QD608	QD708
First 3 channels temperature control range	QD109	QD209	QD309	QD409	QD509	QD609	QD709
Last 3 channels parameter P	QD110	QD210	QD310	QD410	QD510	QD610	QD710

Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/4 filter		-	-	00: 1/4 filter		-	-
01: no filter				01: no filter			
10: 1/2 filter		-	-	10: 1/2 filter		-	-
11: 1/3 filter				11: 1/3 filter			
Channel 3				Channel 2			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/4 filter		-	-	00: 1/4 filter		-	-
01: no filter				01: no filter			
10: 1/2 filter		-	-	10: 1/2 filter		-	-
11: 1/3 filter				11: 1/3 filter			

Register FD8251:

Channel 5				Channel 4			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/4 filter		-	-	00: 1/4 filter		-	-
01: no filter				01: no filter			
10: 1/2 filter		-	-	10: 1/2 filter		-	-
11: 1/3 filter				11: 1/3 filter			

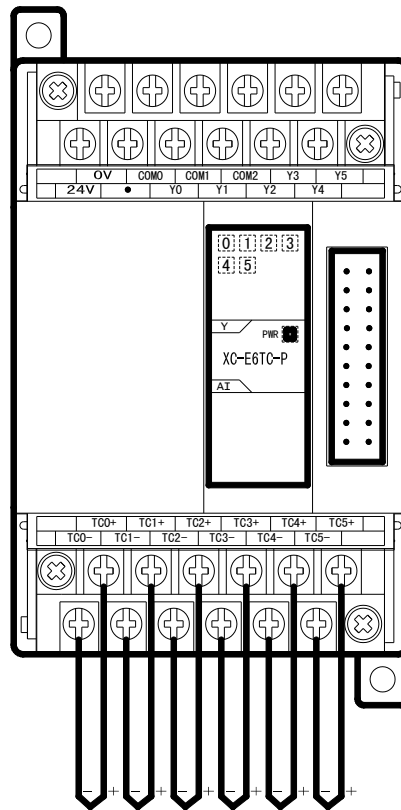
When the products are out of factory, the default value is 0, the initial filter format is 1/4 filter.

4. Exterior connection

About the exterior connection, please pay attention to the following items:

- When connect to +24V power, please use the 24V power supply on PLC main unit to avoid interference.
- To avoid interference, shielding measure is necessary for signal cables.

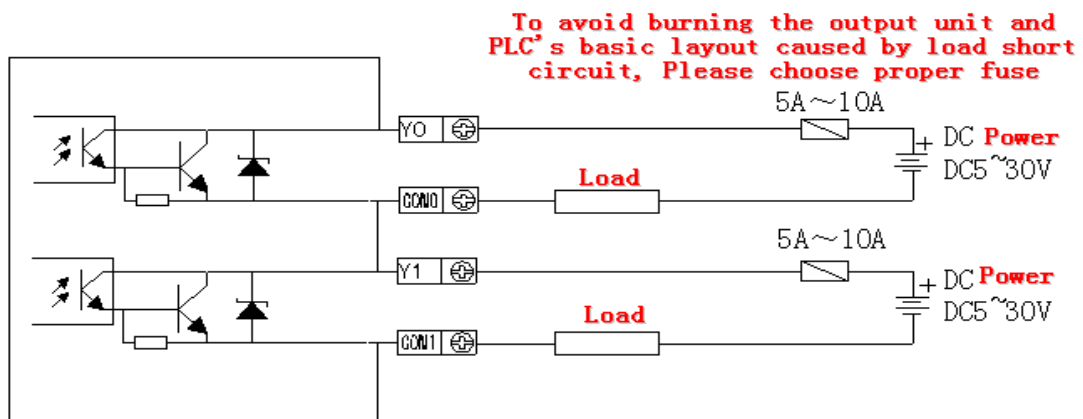
Input method:



- 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 0.8A. Prevent temperature increasing, please use as 1.2A every 4 points or 2.0A every 8 points.
- Open circuit leak current
Below 0.1mA.

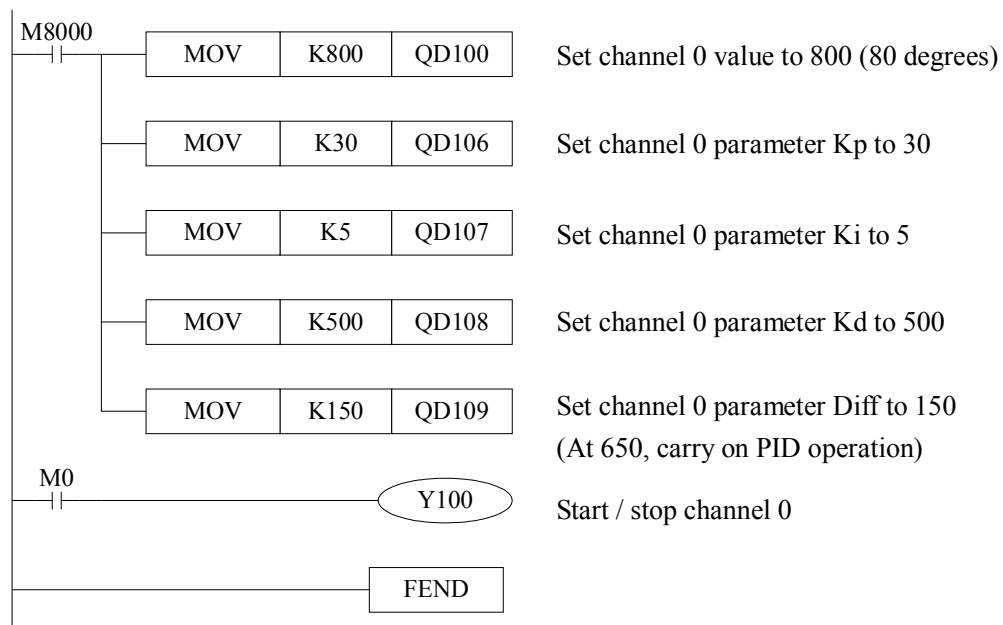
The output circuit is as the following:

Take channel 0 and channel 1 as an example:



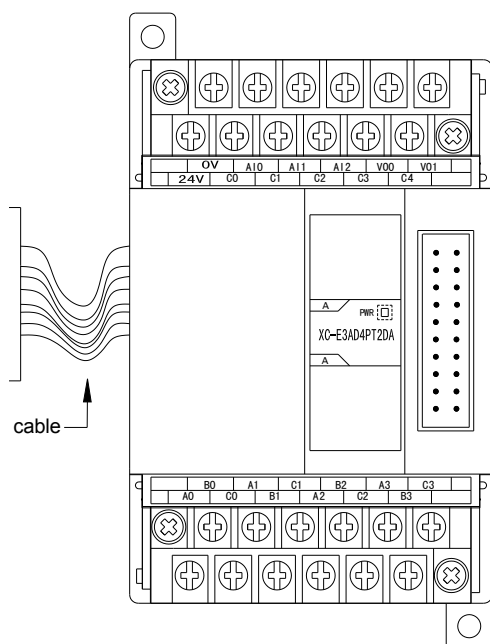
6. Program

Program with the first channel



8. XC-E3AD4PT2DA

1. Specifications



- 3 channels 14 bits current input, 4 channels PT100 temperature input and 2 channels 12 bits voltage output
- 3 channels current 0~20mA, 4~20mA input (selectable) and 2 channels voltage 0~5V, 0~10V output (selectable), set via the software
- Pt resistor signal input (PT100)
- 3 channels A/D and 4 channels PT input, with PID control function

ITEMS	Analog Current Input (AD)	Temperature Input (PT)	Analog Voltage Output (DA)
Analog Input	DC0~20mA、4~20mA	PT100	-
Temperature range	-	-100~350℃	-
Maximum Output range	DC0~40mA	-	-
Analog Output range	-	-	DC0~5V、0~10V External load resistor (2KΩ~1MΩ)
Digital Input range	-	-	12 bits binary (0~4095)
Digital Output range	14 bits binary (0~16383)	-1000~3500	-
Resolution	1/16383(14Bits); the converted data is saved into the PLC (14Bits) in the form of Hex.	0.1℃	1/4095(12Bits); the converted data is saved into the PLC (12Bits) in the form of Hex.
PID Output Value	0~K4095		-
General Precision	0.8%	±0.5℃	0.8%
Conversion Speed	20ms per channel		3ms per channel
Power Supply for Analog Using	DC24V±10%,100mA		
Installation	Fix with M3 screws or install on DIN46277 (Width: 35mm) leader directly		
Dimension	63mm×102mm×73.3mm		

[Extend Cable]: transfer data through the connection of the extend cable and PLC's extend port

[Extend Port]: Connect to other expansions

2. I/O address

XC series analog modules do not occupy I/O units, the converted value is sent to PLC register directly. Analog output is also offered by PLC register.

The first expansion registers address:

Channel	AD Signal	PID Output Value	PID start/stop bit	Preset Value	PID parameter: Kp, Ki, Kd, Diff, Death
0CH	ID100	ID107	Y100	QD102	Kp----- QD109 Ki----- QD110 Kd----- QD111 Diff----- QD112 Death----QD113
1CH	ID101	ID108	Y101	QD103	
2CH	ID102	ID109	Y102	QD104	
Channel	PT100 Signal	PID Output Value	PID start/stop bit	Preset Value	
3CH	ID103	ID110	Y103	QD105	
4CH	ID104	ID111	Y104	QD106	
5CH	ID105	ID112	Y105	QD107	
6CH	ID106	ID113	Y106	QD108	
Channel	DA Signal	-	-	-	-
0CH	QD100	-	-	-	
1CH	QD101	-	-	-	

The second expansion registers address:

Channel	AD Signal	PID Output Value	PID start/stop bit	Preset Value	PID parameter: Kp, Ki, Kd, Diff, Death
0CH	ID200	ID207	Y200	QD202	Kp----- QD209 Ki----- QD210 Kd----- QD211 Diff----- QD212 Death----QD213
1CH	ID201	ID208	Y201	QD203	
2CH	ID202	ID209	Y202	QD204	
Channel	PT Signal	PID Output Value	PID start/stop bit	Preset Value	
3CH	ID203	ID210	Y203	QD205	
4CH	ID204	ID211	Y204	QD206	
5CH	ID205	ID212	Y205	QD207	
6CH	ID206	ID213	Y206	QD208	
Channel	DA Signal	-	-	-	-
0CH	QD200	-	-	-	
1CH	QD201	-	-	-	

The third expansion registers address:

Channel	AD Signal	PID Output Value	PID start/stop bit	Preset Value	PID parameter: Kp, Ki, Kd, Diff, Death
0CH	ID300	ID307	Y300	QD302	Kp----- QD309 Ki----- QD310 Kd----- QD311 Diff----- QD312 Death----QD313
1CH	ID301	ID308	Y301	QD303	
2CH	ID302	ID309	Y302	QD304	
Channel	PT Signal	PID Output Value	PID start/stop bit	Preset Value	
3CH	ID303	ID310	Y303	QD305	
4CH	ID304	ID311	Y304	QD306	
5CH	ID305	ID312	Y305	QD307	
6CH	ID306	ID313	Y306	QD308	
Channel	DA Signal	-	-	-	-
0CH	QD300	-	-	-	
1CH	QD301	-	-	-	

The fourth expansion registers address:

Channel	AD Signal	PID Output Value	PID start/stop bit	Preset Value	PID parameter: Kp, Ki, Kd, Diff, Death
0CH	ID400	ID407	Y400	QD402	Kp----- QD409 Ki----- QD410 Kd----- QD411 Diff----- QD412 Death----QD413
1CH	ID401	ID408	Y401	QD403	
2CH	ID402	ID409	Y402	QD404	
Channel	PT Signal	PID Output Value	PID start/stop bit	Preset Value	
3CH	ID403	ID410	Y403	QD405	
4CH	ID404	ID411	Y404	QD406	
5CH	ID405	ID412	Y405	QD407	
6CH	ID406	ID413	Y406	QD408	
Channel	DA Signal	-	-	-	-
0CH	QD400	-	-	-	
1CH	QD401	-	-	-	

The fifth expansion registers address:

Channel	AD Signal	PID Output Value	PID start/stop bit	Preset Value	PID parameter: Kp, Ki, Kd, Diff, Death
0CH	ID500	ID507	Y500	QD502	Kp----- QD509 Ki----- QD510 Kd----- QD511 Diff----- QD512 Death----QD513
1CH	ID501	ID508	Y501	QD503	
2CH	ID502	ID509	Y502	QD504	
Channel	PT Signal	PID Output Value	PID start/stop bit	Preset Value	
3CH	ID503	ID510	Y503	QD505	
4CH	ID504	ID511	Y504	QD506	
5CH	ID505	ID512	Y505	QD507	
6CH	ID506	ID513	Y506	QD508	
Channel	DA Signal	-	-	-	-
0CH	QD500	-	-	-	
1CH	QD501	-	-	-	

The sixth expansion registers address:

Channel	AD Signal	PID Output Value	PID start/stop bit	Preset Value	PID parameter: Kp, Ki, Kd, Diff, Death
0CH	ID600	ID607	Y600	QD602	Kp----- QD609 Ki----- QD610 Kd----- QD611 Diff----- QD612 Death----QD613
1CH	ID601	ID608	Y601	QD603	
2CH	ID602	ID609	Y602	QD604	
Channel	PT Signal	PID Output Value	PID start/stop bit	Preset Value	
3CH	ID603	ID610	Y603	QD605	
4CH	ID604	ID611	Y604	QD606	
5CH	ID605	ID612	Y605	QD607	
6CH	ID606	ID613	Y606	QD608	
Channel	DA Signal	-	-	-	-
0CH	QD600	-	-	-	
1CH	QD601	-	-	-	

The seventh expansion registers address:

Channel	AD Signal	PID Output Value	PID start/stop bit	Preset Value	PID parameter: Kp, Ki, Kd, Diff, Death
0CH	ID700	ID707	Y700	QD702	Kp----- QD709
1CH	ID701	ID708	Y701	QD703	Ki----- QD710
2CH	ID702	ID709	Y702	QD704	Kd----- QD711

Register FD8250:

Input CH 1 (AD)				Input CH 0 (AD)			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter		-	0:0~20mA 1:4~20mA	00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter		-	0:0~20mA 1:4~20mA
Input CH 3 (PT)				Input CH 2 (AD)			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter		-		00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter		-	0:0~20mA 1:4~20mA

Low byte of register FD8251:

Input CH 5 (PT)				Input CH 4 (PT)			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter		-		00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter		-	
Output CH 0 (DA)				Input CH 6 (PT)			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
		-	0 :0~10V 1 :0~5V	00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter		-	

Low byte of register FD8252:

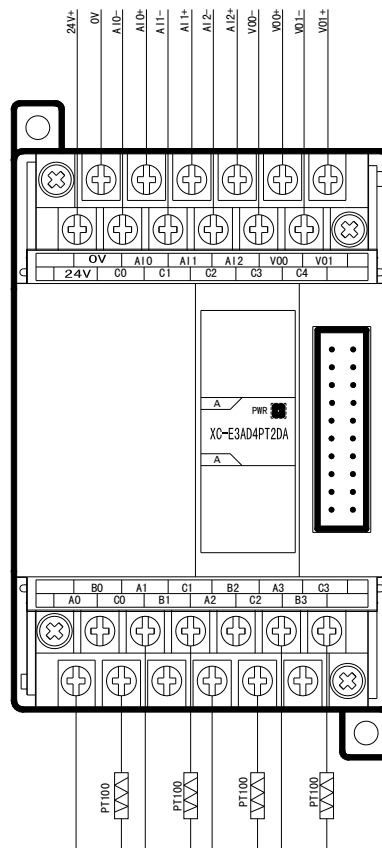
-				Output CH 1 (PT)			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	-	-	-	-	-	0 :0~10V 1 :0~5V

4. External Connection

Please note the following items:

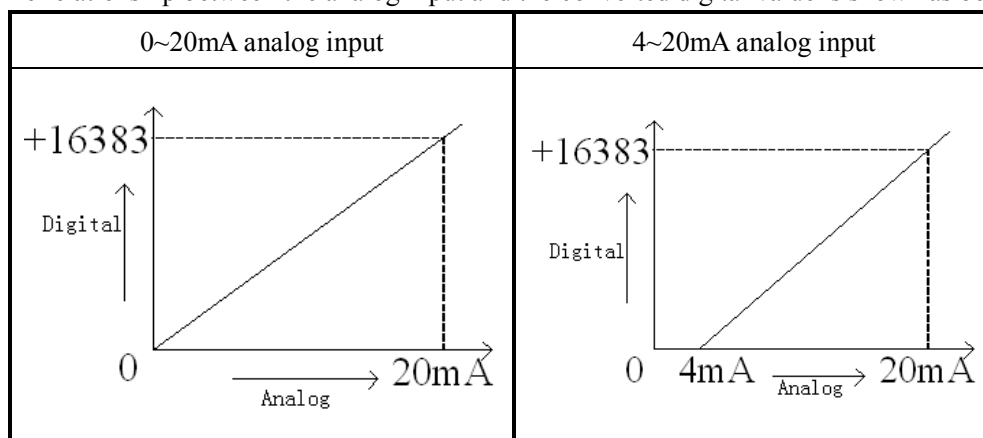
- When connect to external +24V power supply, please use the 24V power supply on PLC main unit to avoid interference.
- To avoid interference, please use shield cable, and single-point ground with the shield layer.

- The 0~20mA or 4~20mA output of the module need connect to external 24V power supply. The module adjusts the circuit current according to the QD value. The module doesn't produce current itself.

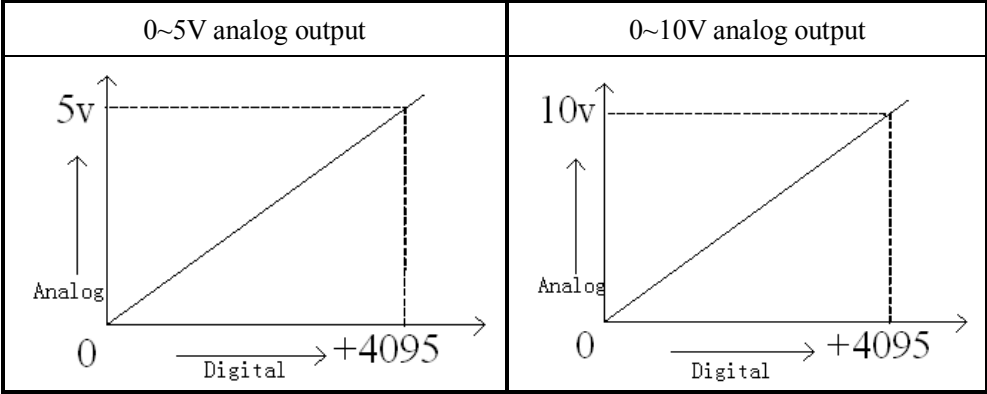


5. Analog/Digital conversion Diagram

The relationship between the analog input and the converted digital value is shown as below:

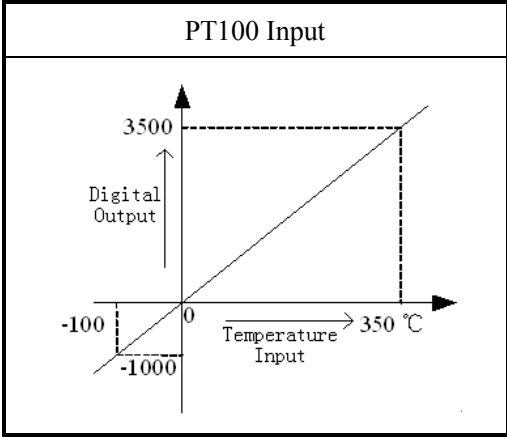


The relationship between the digital input and corresponding analog output is shown as below:



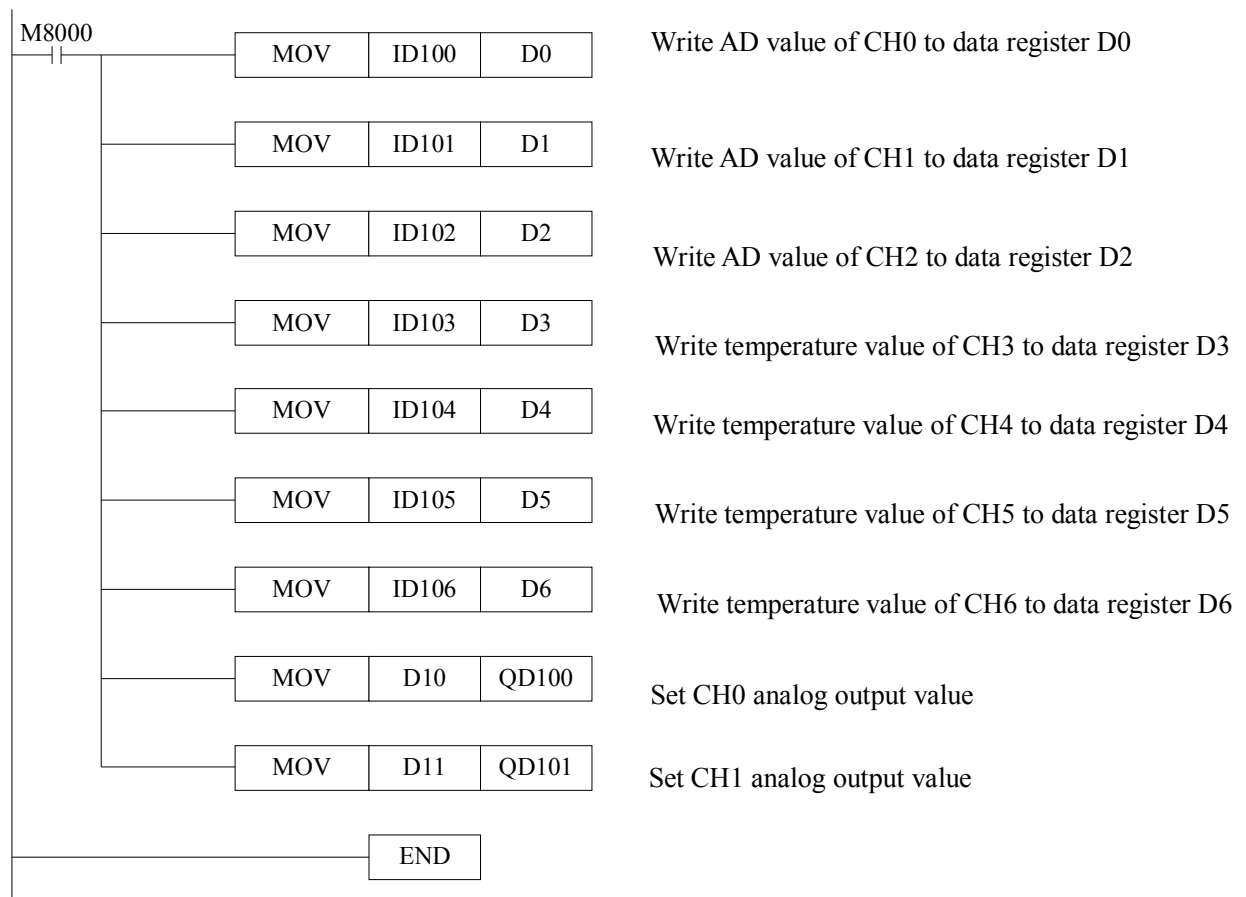
When the output value is larger than K4095, D/A converted analog value will remain 5V or 10V.

The output value of PT100 is shown as below:

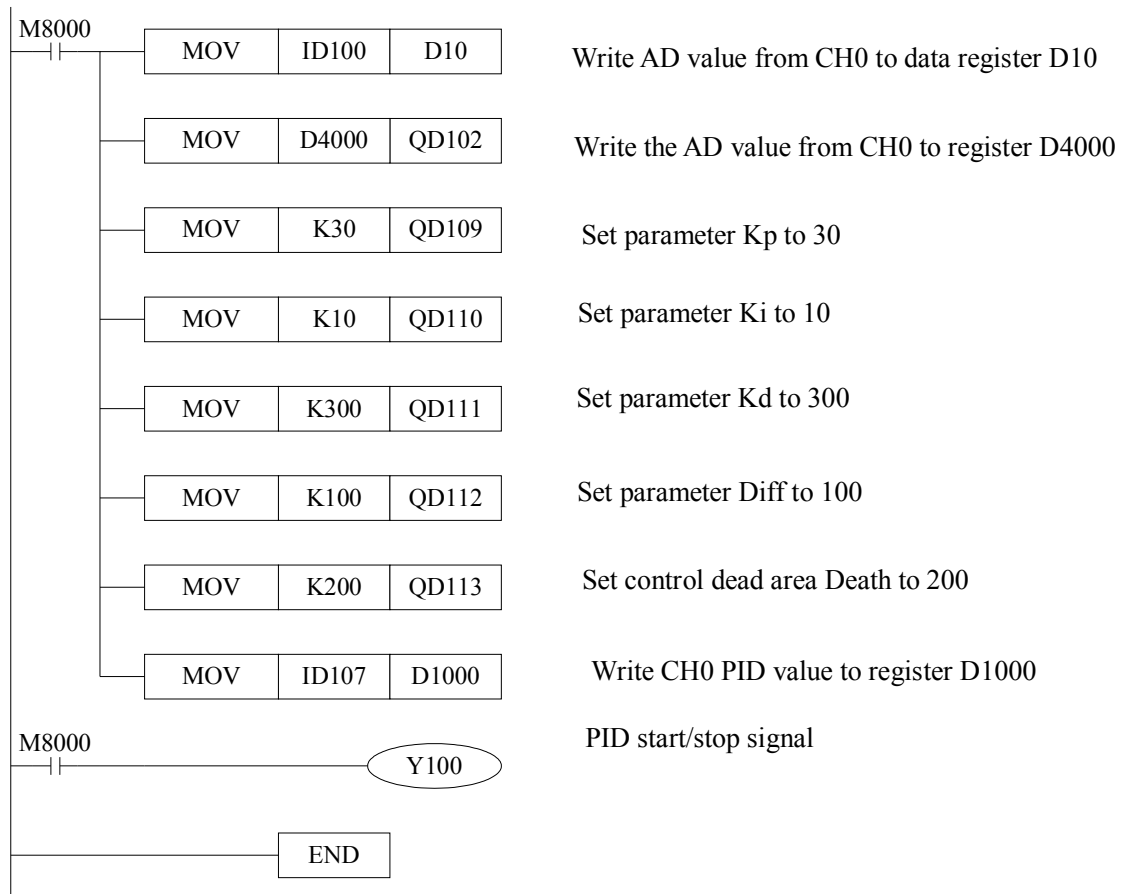


6. Program

E.g. 1) Real-time read the data of 7 channels, write data to 2 channels (take module 1 as an example)

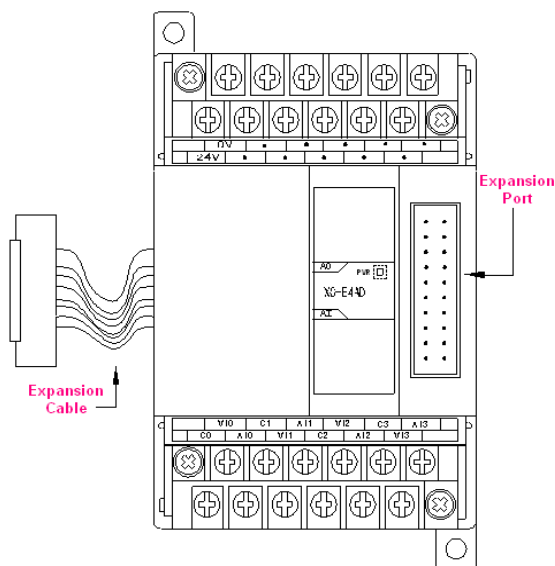


E.g.2) Application of PID function (Take CH0 of module 1 as an example)



9. Analog Input Module XC-E4AD

1. Specifications



- 4 channels 14 bits analog input
- 4 channels voltage (0~5V, 0~10V), current (0~20mA, 4~20mA) input options, set in the software.
- As expansion of XC series PLC, the PLC CPU unit can connect up to 7 modules
- 4 channels of A/D input have PID adjustment function

ITEMS	Analog Input (AD)	
	Voltage Input	Current Input
Analog Input Range	DC0~5V, 0~10V	DC0~20mA, 4~20mA
Maximum Input Range	DC±18V	DC 0~40mA
Analog Output Range	-	
Digital Input Range	-	
Digital Output Range	14 bits binary (0~16383)	
Resolution	1/16383(14Bit); the convert data is stored in PLC in the form of Hex. (14Bit)	
PID Output Value	0~K4095	
Synthesis Precision	0.8%	
Conversion Speed	20ms per channel	
Power Supply	DC24V±10%,100mA	
Installation	Fix with M3 screw or install on DIN46277 guilder (Width: 35mm) directly	
Dimension	63mm×102mm×73.3mm	

[Expansion Cable]: Transfer data through the connection of expansion cable and PLC expansion port.

[Expansion Port]: Connect to other expansion modules

2. Assignment of I/O address

XC series expansions do not occupy I/O units; the converted value is transferred to PLC register directly. Analog input is also offered by PLC register.

Register address of expansion 1:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	Preset Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "Death"
0CH	ID100	ID104	Y100	QD102	Kp----- QD106 Ki----- QD107 Kd----- QD108 Diff----- QD109 Death----QD110
1CH	ID101	ID105	Y101	QD103	
2CH	ID102	ID106	Y102	QD104	
3CH	ID103	ID107	Y103	QD105	

Register address of expansion 2:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	Preset Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "Death"
0CH	ID200	ID204	Y200	QD202	Kp----- QD206 Ki----- QD207 Kd----- QD208 Diff----- QD209 Death----QD210
1CH	ID201	ID205	Y201	QD203	
2CH	ID202	ID206	Y202	QD204	
3CH	ID203	ID207	Y203	QD205	

Register address of expansion 3:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	Preset Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "Death"
0CH	ID300	ID304	Y300	QD302	Kp----- QD306 Ki----- QD307 Kd----- QD308 Diff----- QD309 Death----QD310
1CH	ID301	ID305	Y301	QD303	
2CH	ID302	ID306	Y302	QD304	
3CH	ID303	ID307	Y303	QD305	

Register address of expansion 4:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	Preset Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "Death"
0CH	ID400	ID404	Y400	QD402	Kp----- QD406 Ki----- QD407 Kd----- QD408 Diff----- QD409 Death----QD410
1CH	ID401	ID405	Y401	QD403	
2CH	ID402	ID406	Y402	QD404	
3CH	ID403	ID407	Y403	QD405	

Register address of expansion 5:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	Preset Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "Death"
0CH	ID500	ID504	Y500	QD502	Kp----- QD506
1CH	ID501	ID505	Y501	QD503	Ki----- QD507
2CH	ID502	ID506	Y502	QD504	Kd----- QD508
3CH	ID503	ID507	Y503	QD505	Diff----- QD509
					Death----QD510

Register address of expansion 6:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	Preset Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "Death"
0CH	ID600	ID604	Y600	QD602	Kp----- QD606
1CH	ID601	ID605	Y601	QD603	Ki----- QD607
2CH	ID602	ID606	Y602	QD604	Kd----- QD608
3CH	ID603	ID607	Y603	QD605	Diff----- QD609
					Death----QD610

Register address of expansion 7:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	Preset Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "Death"
0CH	ID700	ID704	Y700	QD702	Kp----- QD706
1CH	ID701	ID705	Y701	QD703	Ki----- QD707
2CH	ID702	ID706	Y702	QD704	Kd----- QD708
3CH	ID703	ID707	Y703	QD705	Diff----- QD709
					Death----QD710

Description:

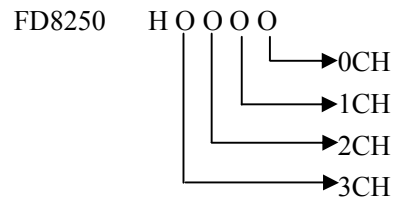
Start signal (Y): when Y is 0, close PID control, when Y is 1, start PID control

3. Setting of working mode

1) The working mode can be voltage 0~5V, 0~10V or current 0~20mA, 4~20mA, set via special FLASH data register FD inside PLC. See the following table:

Module	Channel's address
	0CH~3CH
1# expansion	FD8250
2# expansion	FD8258
3# expansion	FD8266
4# expansion	FD8274
5# expansion	FD8282
6# expansion	FD8290
7# expansion	FD8298

Take 1# expansion as example:



Note: As shown in the preceding table, every register set 4 channels mode, each register has 16 bits, from low to high, every 4 bits set 1 channel mode.

Each channel working mode is defined by corresponding FD register. Each bit definition is shown in the following table:

We take module 1 as an example to show how to set:

Register FD8250:

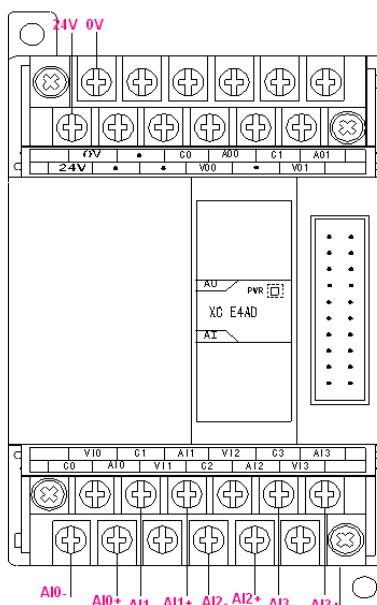
Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter		0: voltage input	0:0~10V	00: 1/2 filter		0: voltage input	0:0~10V
01: no filter			1:0~5V	01: no filter			1:0~5V
10: 1/3 filter		1: current input	0:0~20mA	10: 1/3 filter		1: current input	0:0~20mA
11: 1/4 filter			1:4~20mA	11: 1/4 filter			1:4~20mA
Channel 3				Channel 2			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/2 filter		0: voltage input	0:0~10V	00: 1/2 filter		0: voltage input	0:0~10V
01: no filter			1:0~5V	01: no filter			1:0~5V
10: 1/3 filter		1: current input	0:0~20mA	10: 1/3 filter		1: current input	0:0~20mA
11: 1/4 filter			1:4~20mA	11: 1/4 filter			1:4~20mA

E.g. If set working mode to 0~20mA, 4~20mA, 0~10V, 0~5V of module 1 channel 3, channel 2, channel 1, channel 0, filters are all 1/2 filter, the value in FD8250 is 2301H

4. Exterior connection

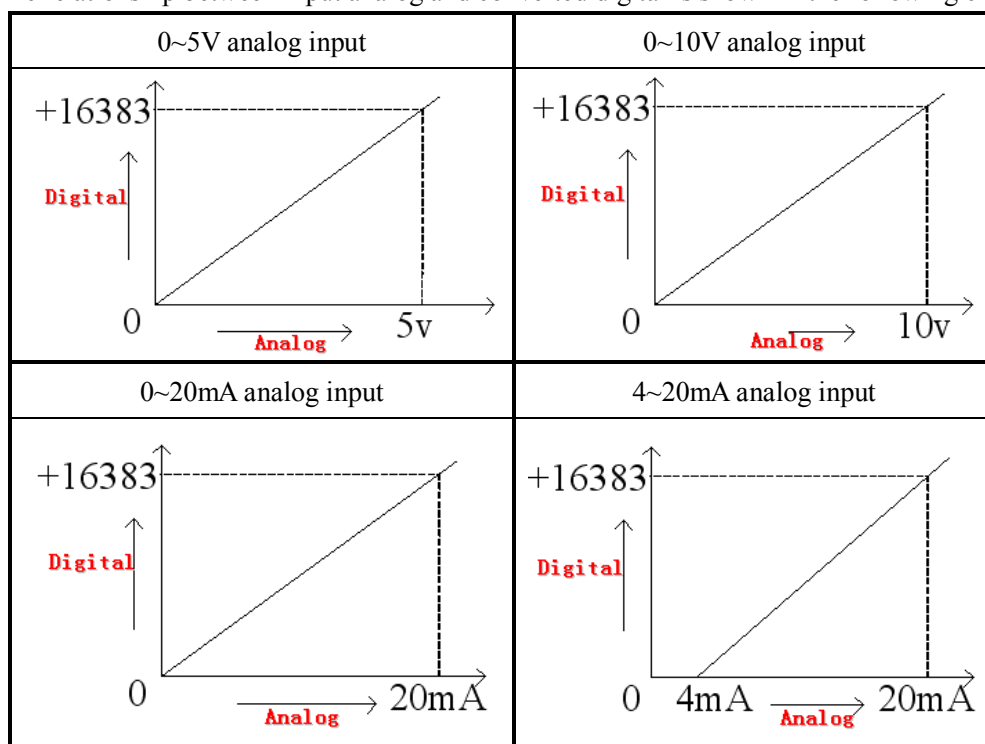
When make external connection, please note the following items:

- When connect external 24V power, please choose 24V power on PLC main unit to avoid interference.
- To avoid interference, please use shield cable and single-point ground with the shield layer.



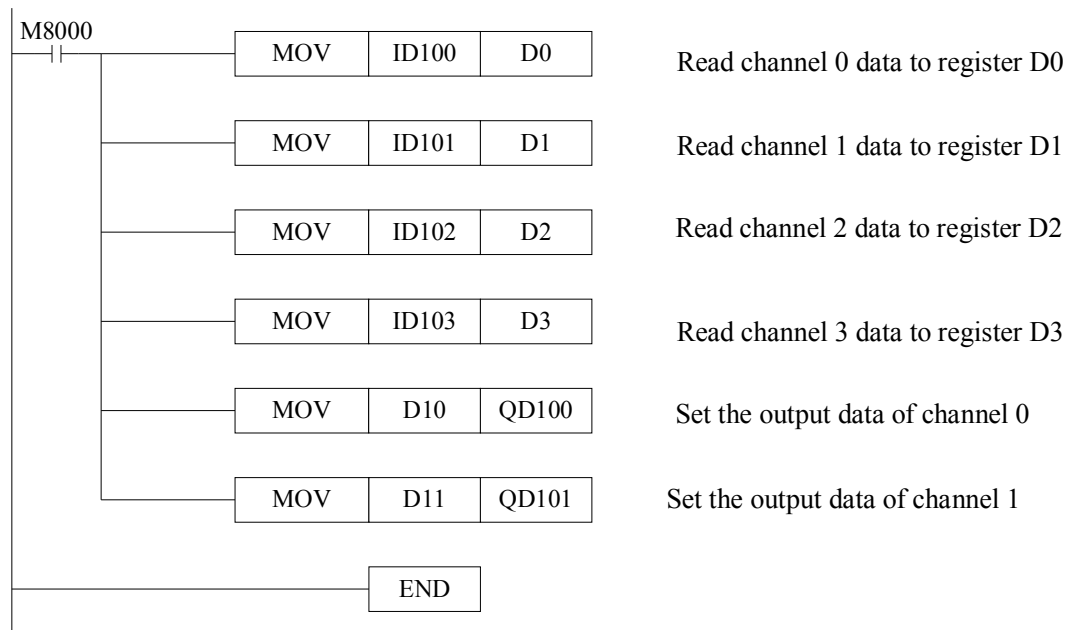
5. Analog digital conversion diagram

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

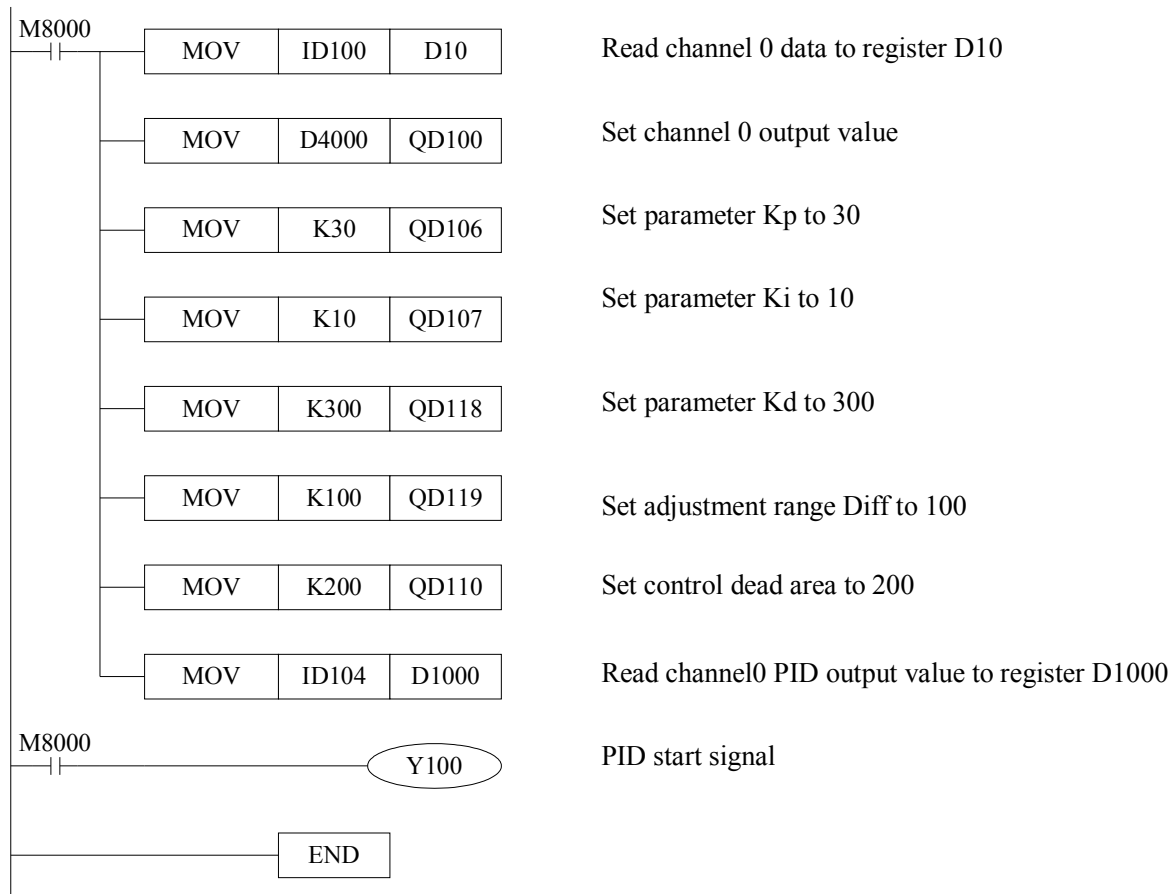


6. Programming

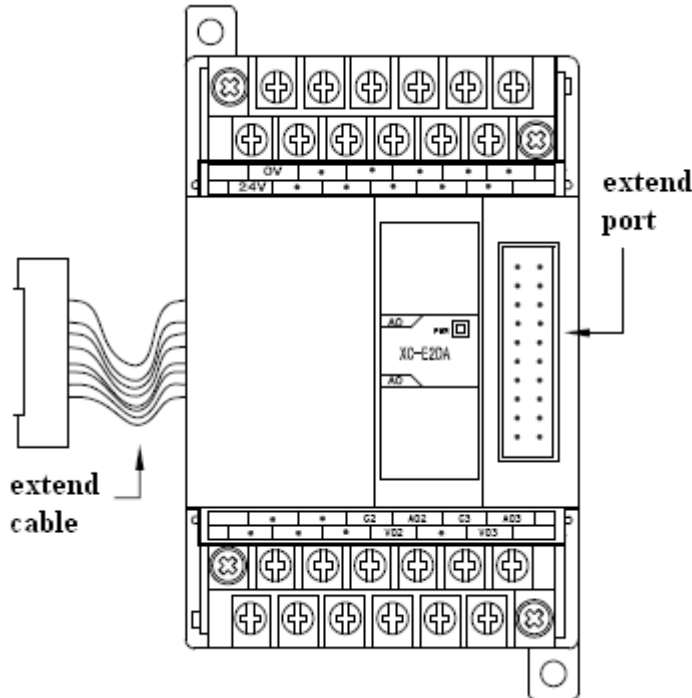
E.g.1 Real-time read the 4 channels data, write 2 channels data (take expansion 1 as an example)



E.g.2 Applied method of PID (take expansion 1 channel 0 as an example)



1. Specifications



- 12 bits high precision analog input.
- 2 channels voltage (0~5V/0~10V), currents (0~20mA/4~20 mA) output options.
- As special function module of XC series, up to 7 modules can be connected.

Items	Voltage output	Current output
Analog input	DC 0 to 5V, 0 to 10V	DC0 to 20mA, 4 to 20mA
Digital output	12 bits	
Resolution	1/4096(12 bit); the cover data is stored into PLC in the form of Hex	
General precision	0.8%	
Conversion speed	3ms per channel	
Isolation	DC/AC convert, optical-coupling isolate	
Power supply for analog using	DC24V±10%,100mA	
Installation	Fix with M3 screws or install on DIN46277 (width: 35) leader directly	
Dimension	63mm×102mm×73.3mm	

[Extend cable]: transfer data through the connection of the extend cable and PLC's extend port

[Extend port]: connect to other expansions.

2. The assignment of I/O address

XC series analog modules don't occupy I/O units, the converted value is sent to PLC register directly. Analog output is also offered by PLC register.

Register address of expansion 1~7:

Channel	1 unit	2 unit	3 unit	4 unit	5 unit	6 unit	7 unit
0CH	QD100	QD200	QD300	QD400	QD500	QD600	QD700
1CH	QD101	QD201	QD301	QD401	QD501	QD601	QD701

3. Working mode setting

1) Expansion I/O has voltage 0 ~ 5V, 0 ~ 10V, current 0 ~ 20mA, 4 ~ 20mA for selection, set the modes through the PLC internal special FLASH registers FD. Such as:

Modules	Channels No.
	0CH to 1CH
1#modules	D8250
2#modules	D8254
3#modules	D8258
4#modules	D8262
5#modules	D8264
6#modules	D8268
7#modules	D8272

Take 1# module as an example:

FD8250 H 0 0 0 0

Note: As shown in the preceding table, each register set 2 channels mode, each register has 16 bits, from low bit to high bit, every 4 bits set 1 channels mode.

Take the first module as an example:

Register FD8250:

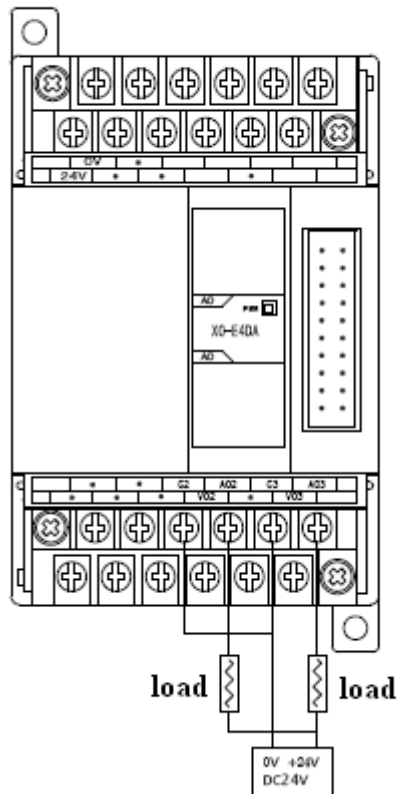
Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-		0:voltage output	0:0 to 10V 1:0 to 5V	-		0:voltage output	
		1:current output	0:0 to 20mA 1:4 to 20mA			1:current output	

3. External connection

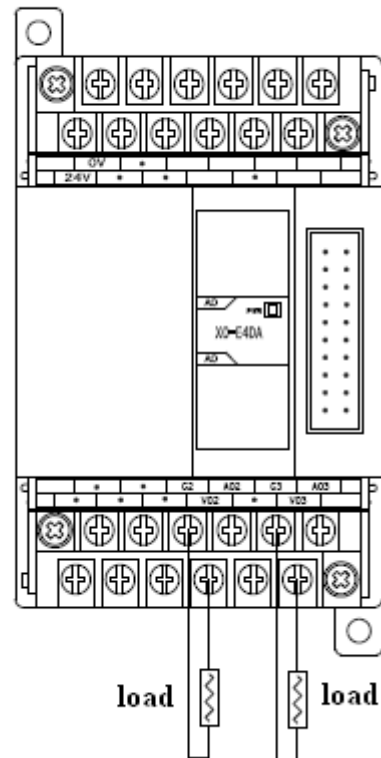
When make external connection, please note the following items:

- When connect to external +24V power supply, please use 24V power supply on PLC main unit to avoid interference.
- To avoid interference, please use shield cable, and single-point ground with the shield layer.
- The 0 ~20 mA /4 ~ 20mA current output need external 24V power supply. The module doesn't generate current but adjust the circuit current according to the QD value.

current

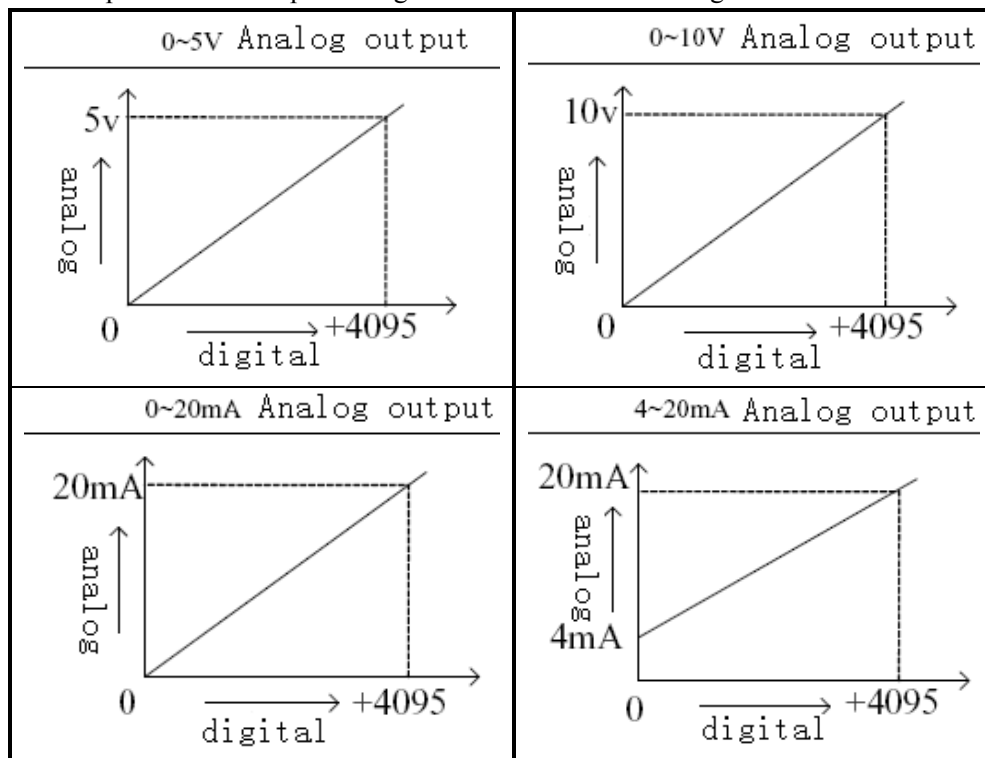


voltage



4. Analog/Digital conversion diagram

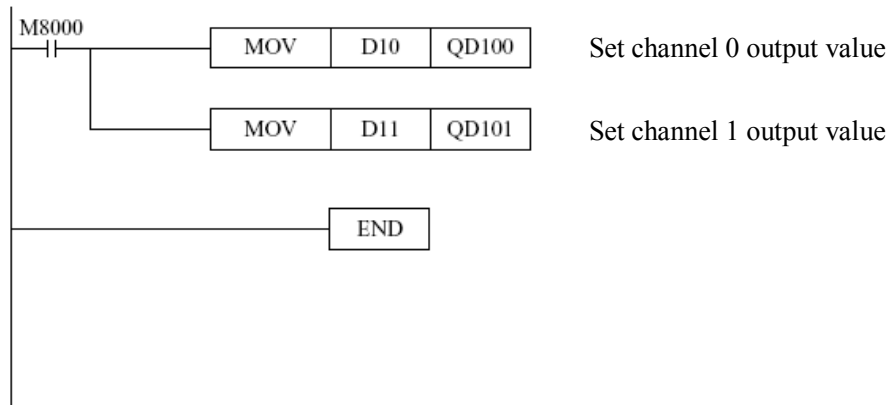
The relationship between the input analog value and the converted digital value is shown as below:



When the output value is larger than K4095, D/A converted analog value will remain 5V, 10V or 20mA.

6. Program

eg.1) Real-time write data to 2 channels





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