

# **THINGET**

## **XC series expansions with special functions**

### **Operate Manual**

Thinget Electronic Co., Ltd.

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## I、Module's information

### 1、Basic Characteristic

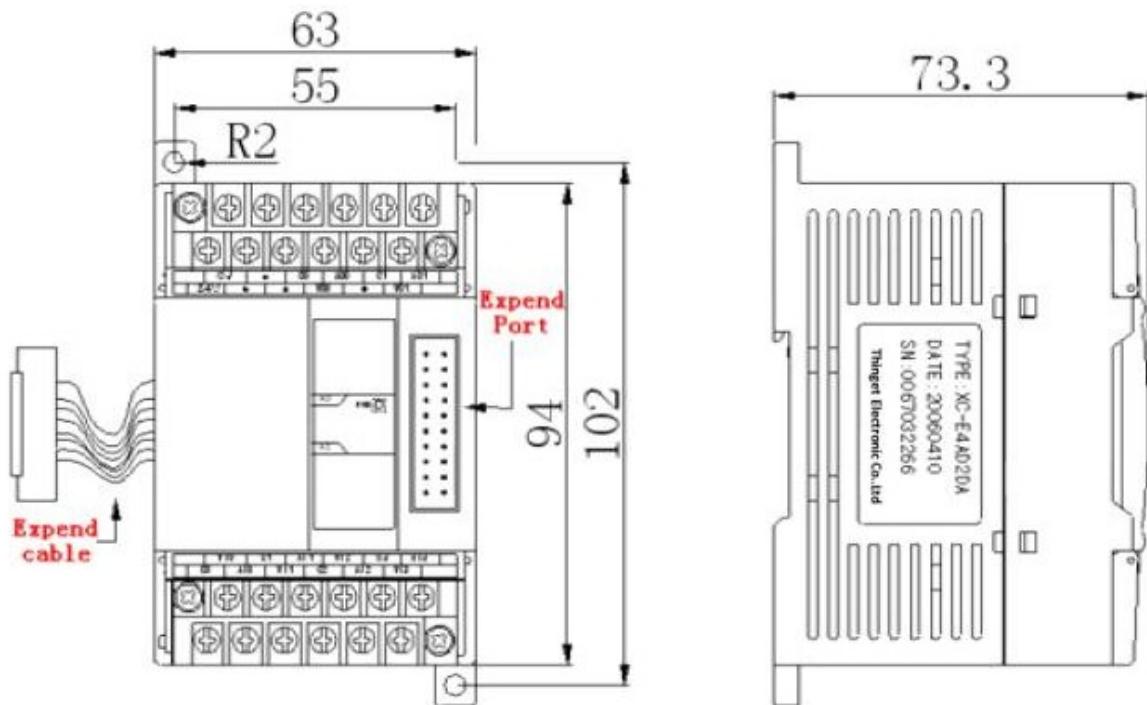
XC series PLC have not only strong functions of logic dispose、data operation、high speed disposing etc. but also functions of A/D、D/A convert、PID adjustment；With using expansions of analog input module、analog output module、temperature control module etc, XC series PLC are widely used in the control system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

### 2、Module's Name

The detailed information is the following :

Model	Function
XC-E8AD	8 channels analog input (14bit) ; 4 channels current input, 4 channels voltage input
XC-E4AD2DA	4 channels analog input (14bit); 2 channels analog output (12bit) ; current、voltage selectable
XC-E4DA	4 channels analog output (12bit) ; current、voltage selectable
XC-E6PT-P	-150°C~350°C , 6 channels Pt100 temperature sampling, 0.1 degree precision, include PID operation
XC-E6TC-P	0°C~1000°C , 6 channels K type thermocouple temperature sampling module, 0.1 degree precision, include PID operation

### 3、Exterior Size



#### **4、General Specification**

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

#### **5、Items to note when using**

- Please confirm the specification, choose suitable module
- When carry on processing the screws or layout project, please protect the scraps falling into the modules
- Before connecting, please confirm again module's specification and connected device
- When connecting, please check if the connection is fastness, cable breaking off will cause data incorrect, short circuit and other fault! Installation, layout should only be carried after cutting all power.

## II、PID Function

### 1、Brief introduction of PID function

Among XC series PLC special modules, digital input module (A/D module) and temperature control modules both have PID control function. It is widely used and flexible. When using, only four parameters (Kp、Ki、Kd and Diff) should be set.

### 2、Parameter's usage

Usage of four parameters: Proportion parameter (Kp) 、 Integral parameter (Ki) 、 Differential parameter (Kd) 、 Control proportion band (Diff)

Kp—parameter P is proportion parameter, mainly reflect system's wrap. When wrap occurs, carry on control to decrease this wrap.

Ki—parameter I is integral parameter, mainly used to eliminate whisht difference, improving system's no difference degree.

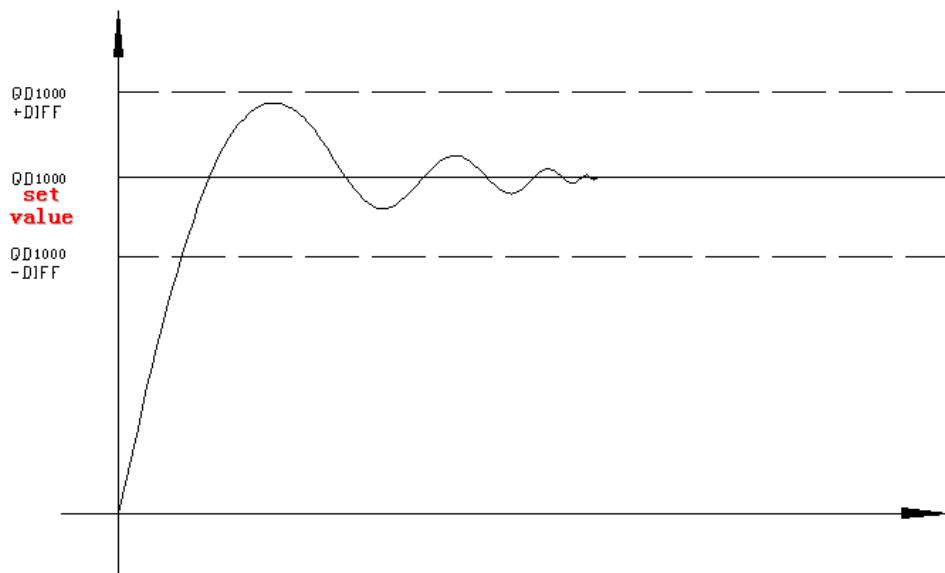
Kd-- parameter D is differential parameter, mainly used to control signal's changing trend, decrease system's shake.

Diff—Control bound means in the assigned bound, carry on PID control, out the bound, do not carry on PID control.

### 3、Control characteristic

The bound of PID adjustment is, when the testing value is low than QD-Diff, controller output with the full scale; when the testing value is larger than QD+Diff, the controller stop output; in the bound of (QD-Diff , QD+Diff) , carry on PID adjustment.

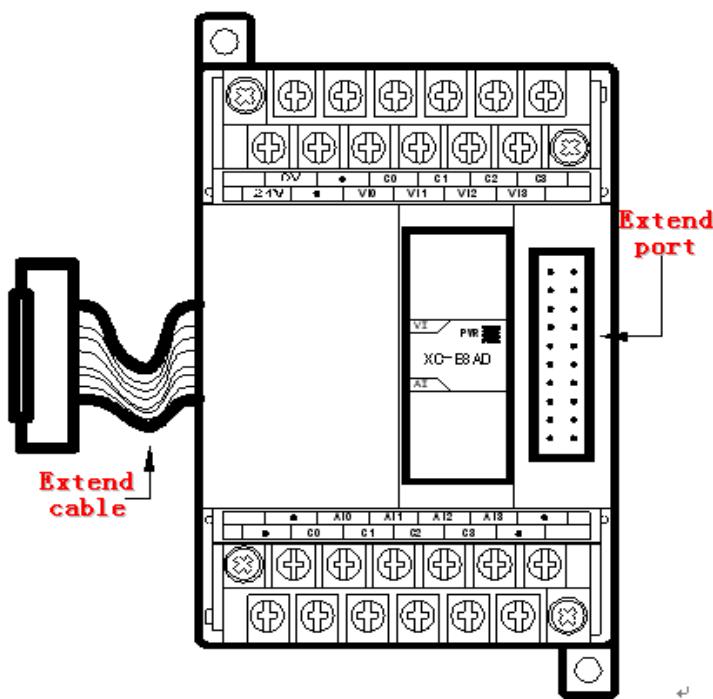
The control curve of PID is the following:



Each parameter's reference value: Kp=20~100 ; Ki=5~20 ; Kd=200~700 ; DIFF=100~200.

### III、Analog input module (XC-E8AD)

#### 1. Specification



#### Specialty :

- 14 bits high precision analog input
- 8 channels analog input : The first four channels current input (0~20mA、4~20 mA two kinds) ; The left 4 channels voltage input (0~5V、0~10V two kinds)
- As special function module of XC, 7 models could be connected at most.
- With PID adjustment function

Items	Current input (0CH~3CH)	Voltage input (4CH~7CH)
Analog input bound	DC0~20mA、4~20mA	DC0~5V、0~10V
Max input bound	0~40mA	±18V
Digital output bound	14 bits binary data	
PID control value	0~4095	
Distinguish Ratio	1/16383(14Bit)	
Integrate Precision	0.8%	
Convert speed	15ms per channel	
Power used by analog	DC24V±10%,100mA	
Install format	Can be fixed with M3 screws or directly installed on orbit of DIN46277 (width: 35mm)	
Size	63mm×102mm×73.3mm	

## 2. Input ID assignment

XC series analog module doesn't engross I/O units, the converted data is directly transferred into PLC register. Channels' correspond PLC register ID is:

### Input, output ID list

Register's ID of expansion 1:

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

Register's ID of expansion 2:

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

Register's ID of expansion 3:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameters : Kp, Ki, Kd, control bound Diff, dead bound "Death"
0CH	ID300	ID308	Y300	QD300	Kp : QD308
1CH	ID301	ID309	Y301	QD301	Ki : QD309
2CH	ID302	ID310	Y302	QD302	Kd : QD310
3CH	ID303	ID311	Y303	QD303	Diff : QD311
4CH	ID304	ID312	Y304	QD304	Death : QD312
5CH	ID305	ID313	Y305	QD305	
6CH	ID306	ID314	Y306	QD306	
7CH	ID307	ID315	Y307	QD307	

Register's ID of expansion 4:

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

Register's ID of expansion 5:

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

Register's ID of expansion 6:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameters : Kp, Ki, Kd, control bound Diff, dead bound "Death"
0CH	ID600	ID608	Y600	QD600	Kp : QD608
1CH	ID601	ID609	Y601	QD601	Ki : QD609
2CH	ID602	ID610	Y602	QD602	Kd : QD510
3CH	ID603	ID611	Y603	QD603	Diff : QD611
4CH	ID604	ID612	Y604	QD604	Death : QD512
5CH	ID605	ID613	Y605	QD605	
6CH	ID606	ID614	Y606	QD606	
7CH	ID607	ID615	Y607	QD607	

Register's ID of expansion 7:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameters : Kp, Ki, Kd, control bound Diff, dead bound "Death"
0CH	ID700	ID708	Y700	QD700	Kp : QD708
1CH	ID701	ID709	Y701	QD701	Ki : QD709
2CH	ID702	ID710	Y702	QD702	Kd : QD710
3CH	ID703	ID711	Y703	QD703	
4CH	ID704	ID712	Y704	QD704	

5CH	ID705	ID713	Y705	QD705	Diff : QD711 Death : QD712
6CH	ID706	ID714	Y706	QD706	
7CH	ID707	ID715	Y707	QD707	

### Description :

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

Parameter P : Proportion parameter, mainly reflex system's difference, carry on control as soon as difference occurs to improve the system's no difference degree.

Parameter I : Integral parameter. Mainly used to remove whisht, improve the system's no difference degree.

Parameter D : Differential parameter, mainly used to control signal's changing trend,minish system's shake.

Control bound Diff : In the assigned bound, carry on PID control. Beyond the bound, no PID control.

Dead area Death : When the current PID control value compares with the preceding PID control value. If the difference between them is less than the set dead bound's value, the module will abnegate the current PID control value, send the preceding PID control value to the PLC main unit.

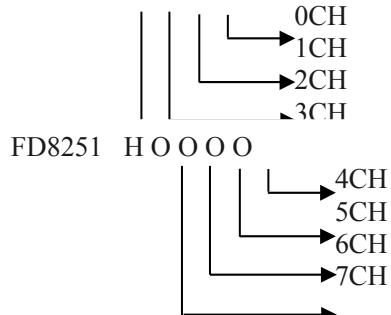
Each parameter's reference value : Kp=20~100 ; Ki=5~20 ; Kd=200~700 ; DIFF=100~200

### 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:  
FD8250 H O O O O



Note : As showed in the preceding table, each register set 4 channels' mode, each register has 10 bits. From low bit to high bit, every 4 bits separately set 4 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	-	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	-	0:0~20mA 1:4~20mA
01: not filter							
Channel 3				Channel 2			
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
00: 1/2 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	-	0:0~20mA 1:4~20mA
01: not filter							
10: 1/3 filter							
11: 1/4 filter							

Register FD8251 :

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

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

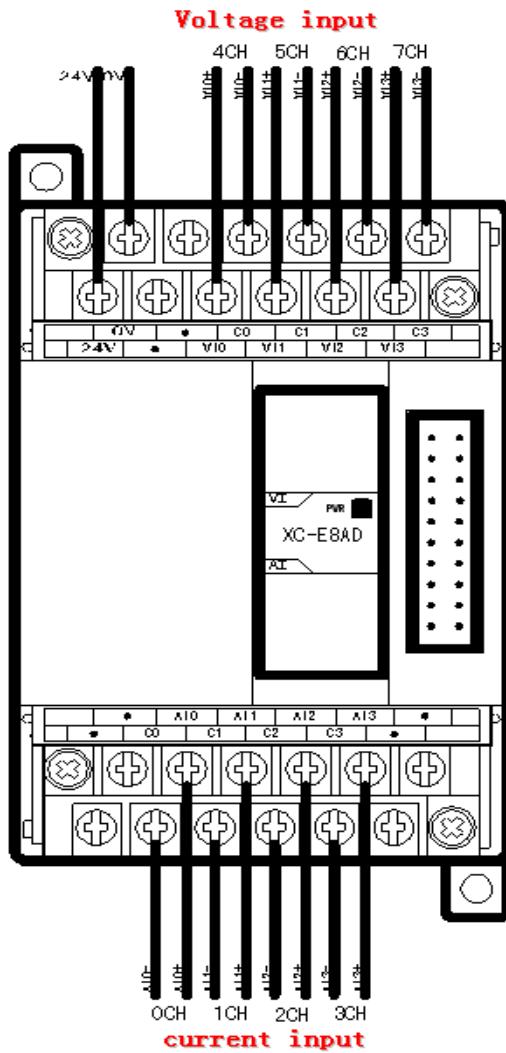
2 ) Set module 1's No. 7 、 No.6 、 No.5 、 No.4 channel's working mode separately as 0~10V、0~5V、0~10V、0~5V, all the four channels don't filter, data in FD8251 is 4545H

#### 4 . Exterior connection

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

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

Layout chart:

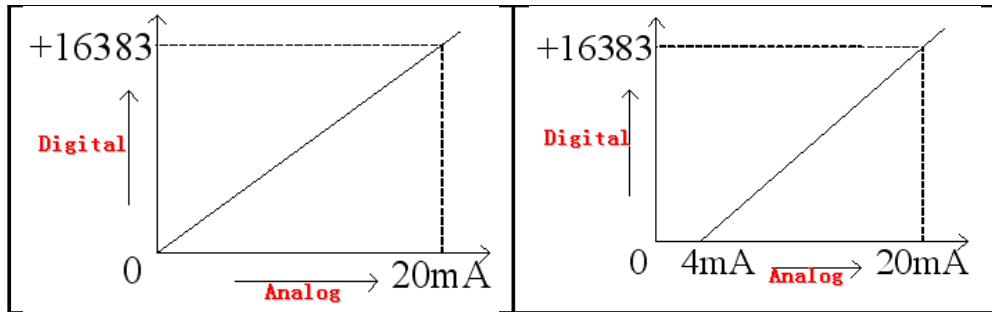


## 5 . Analog/digital convert chart

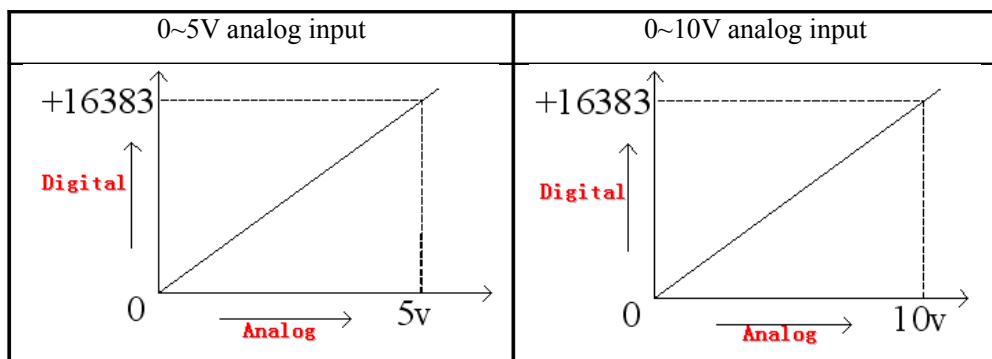
The relationship between input analog and converted digital quantity is showed in the following chart:

**Current mode of Channel 0 ~ Channel 3 :**

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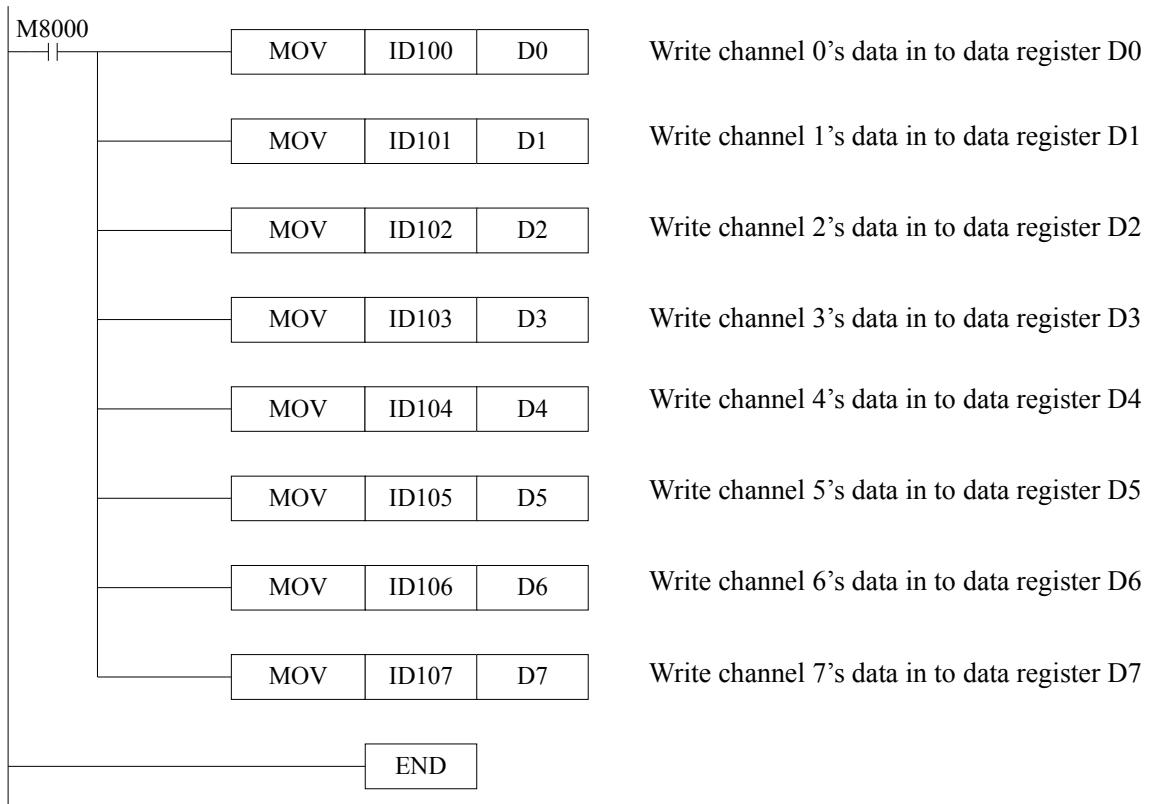


**Voltage mode of Channel 4 ~ Channel 7 :**



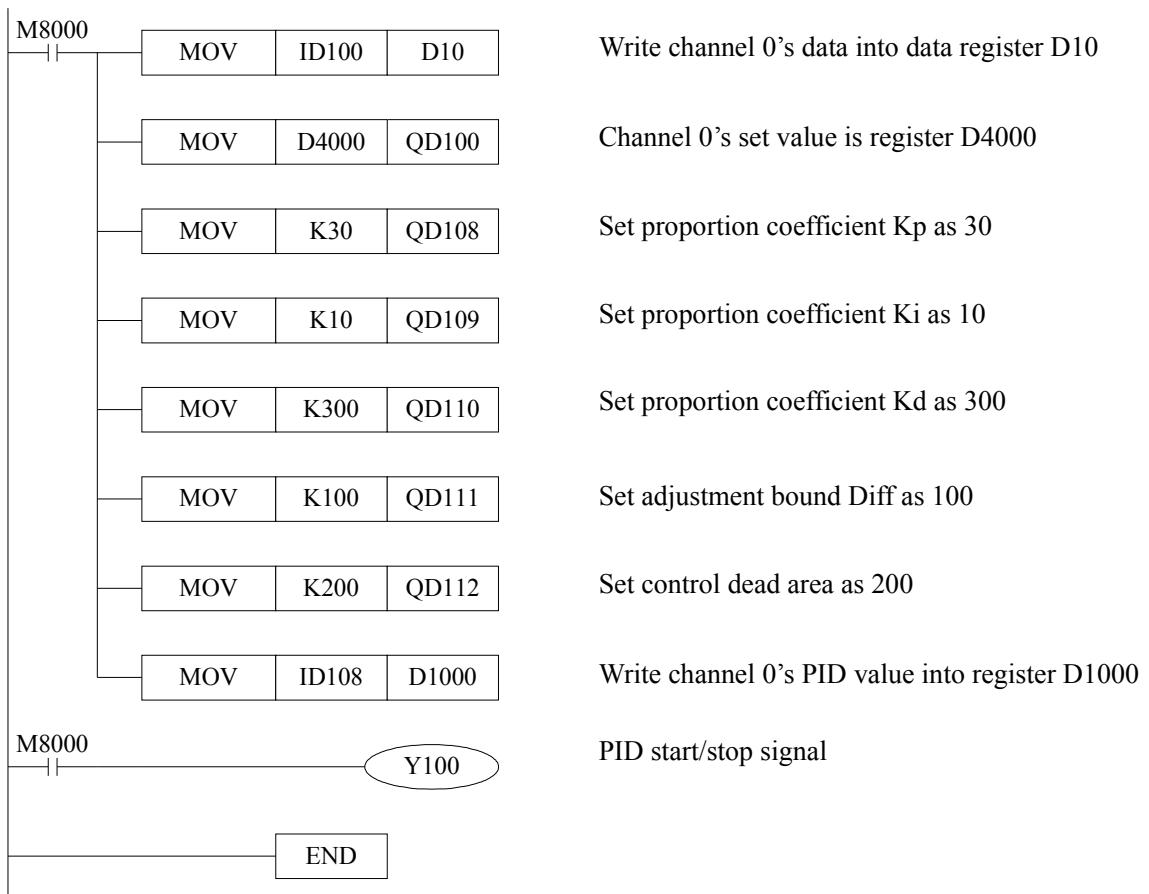
## 6 . Programming

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



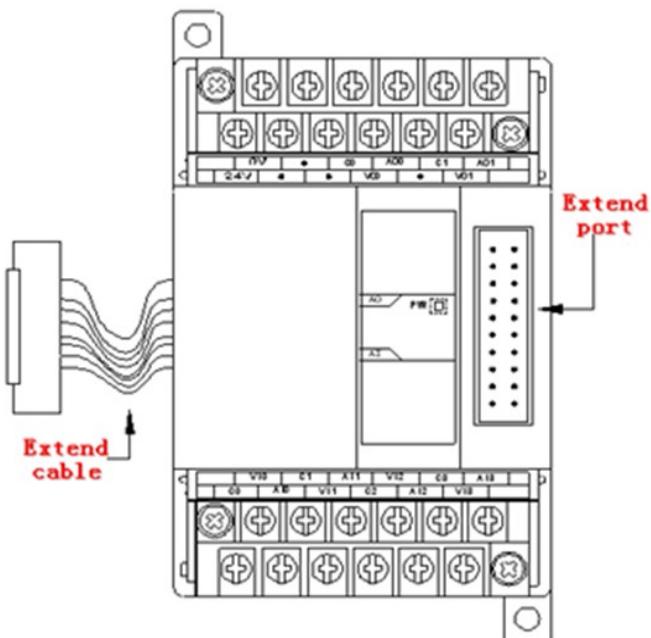
E.g.2) Application of PID control in AD modules

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



## IV、Analog input/output module XC-E4AD2DA

### 1 . Specification



#### Characteristic :

- 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, 7 modules could be connected at most
- 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 input/output ID

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

Register's ID of expansion 1:

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter : Kp, Ki, Kd, control bound Diff, dead bound 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 ID of expansion 2:

Channel	AD	PID output value	PID start/stop control bit	The set value	PID parameter : Kp, Ki, Kd, control bound Diff, dead bound 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 ID of expansion 3 :

Channel	AD signal	PID output value	PID start/stop control bit	The set value	PID parameter : Kp, Ki, Kd, control bound Diff, dead bound 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 ID of expansion 4 :

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

Register's ID of expansion 5 :

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

Register's ID of expansion 6 :

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

Register's ID of expansion 7 :

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

#### Description :

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

Parameter P : proportion parameter, mainly reflect system's difference, control as soon as difference occurs to decrease this difference.

Parameter I : Integral parameter, mainly used to remove the whisht and improve the system's no difference degree

Parameter D : differential parameter, mainly control signal's changing trend and decrease the system's shake.

Temp. control bound Diff : in the assigned bound, carry on PID control, beyond that bound, no PID control

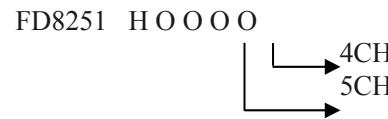
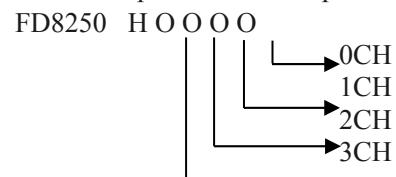
Each parameter's reference value : Kp=20~100 ; Ki=5~20 ; Kd=200~700 ; DIFF=100~200

### 3 . Setting of working mode

- Expansion's input/output all have options of voltage 0~5V、0~10V, current 0~20mA、4~20mA modes. 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 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 separately 4 channels mode.

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

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

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: voltage input 1: current input	0:0~10V 1:0~5V	00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter	0: voltage input 1: current input	0:0~10V 1:0~5V	0:0~10V 1:0~5V	0:0~10V 1:0~5V
		0:0~20mA 1:4~20mA			0:0~20mA 1:4~20mA		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: voltage input 1: current input	0:0~10V 1:0~5V	00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter	0: voltage input 1: current input	0:0~10V 1:0~5V	0:0~10V 1:0~5V	0:0~10V 1:0~5V
		0:0~20mA 1:4~20mA			0:0~20mA 1:4~20mA		0:0~20mA 1:4~20mA

Register FD8251 low byte :

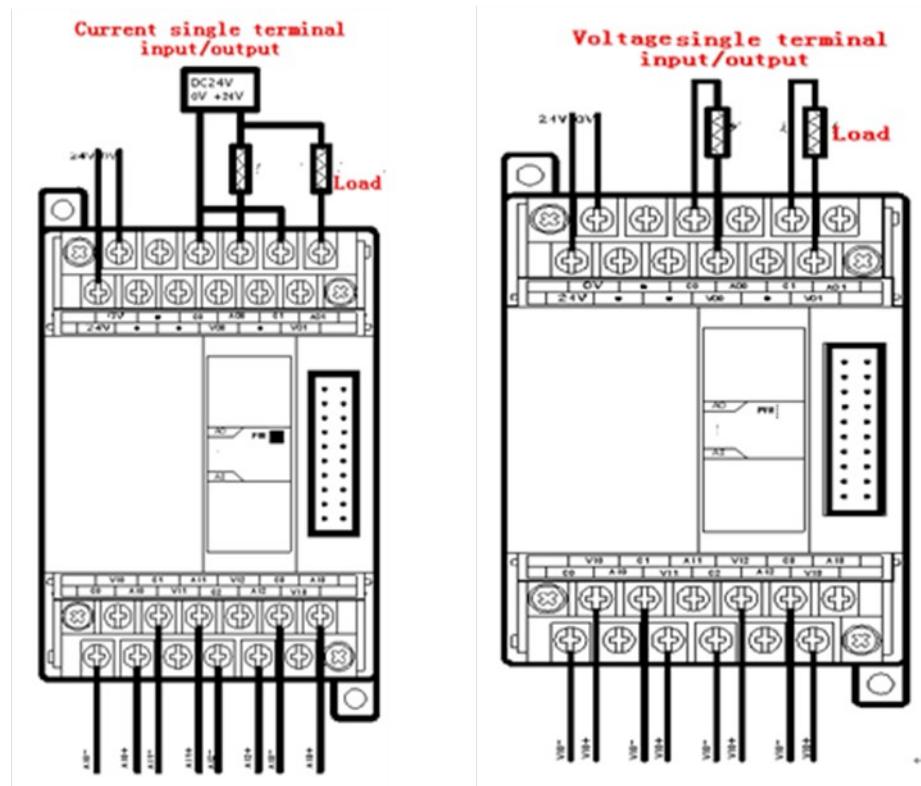
Channel 5				Channel 4			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter	0: voltage input 1: current input	0:0~10V 1:0~5V	00: 1/2 filter 01: not filter 10: 1/3 filter 11: 1/4 filter	0: voltage input 1: current input	0:0~10V 1:0~5V	0:0~10V 1:0~5V	0:0~10V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

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

#### 4 . Exterior connection

When carry on exterior connection, please note the following two items:

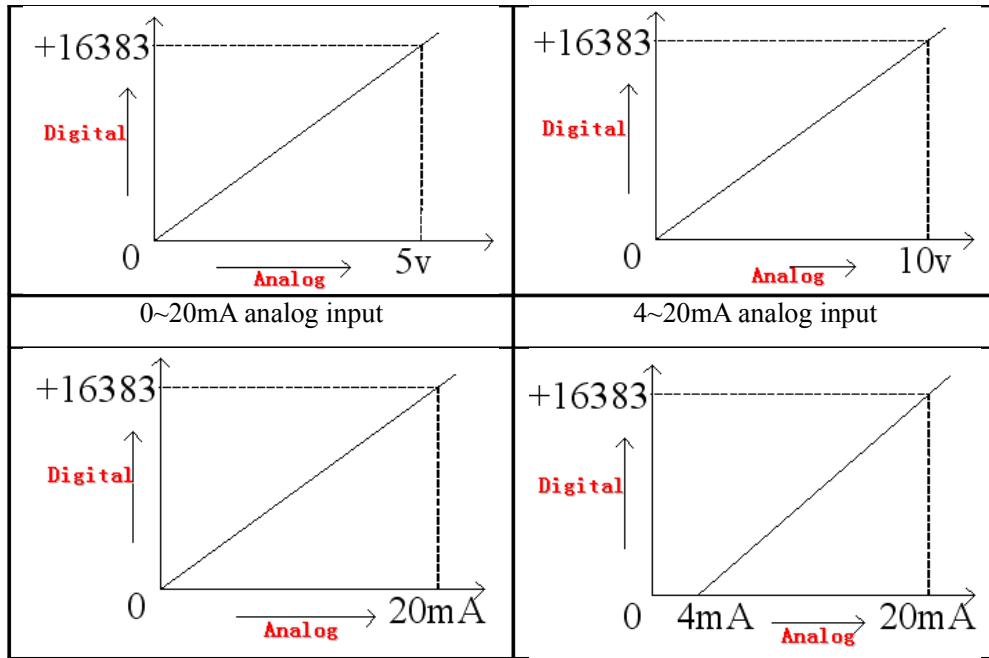
- When connect + 24V power outside, please choose 24V power on PLC main unit to avoid interfere.
- To avoid interfere, please use shield cable and single point grounding with the shield layer.
- Module's 0~20mA or 4~20mA output need 24V power from outside, according to the analog output register QD's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



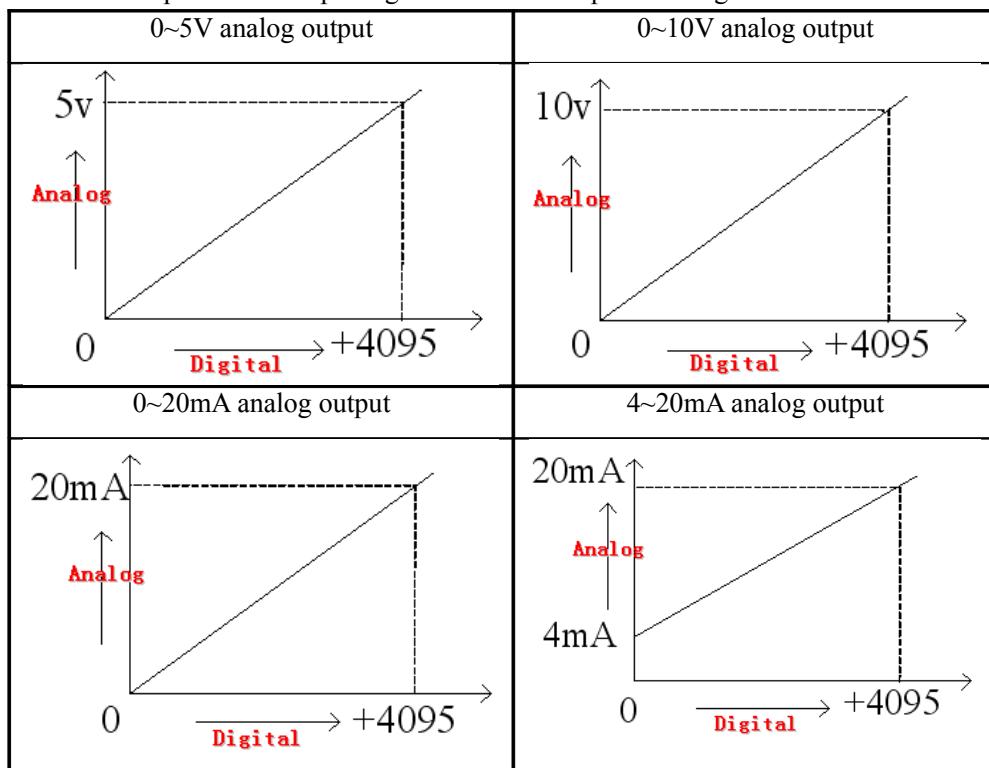
#### 5 . Analog digital convert chart

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

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



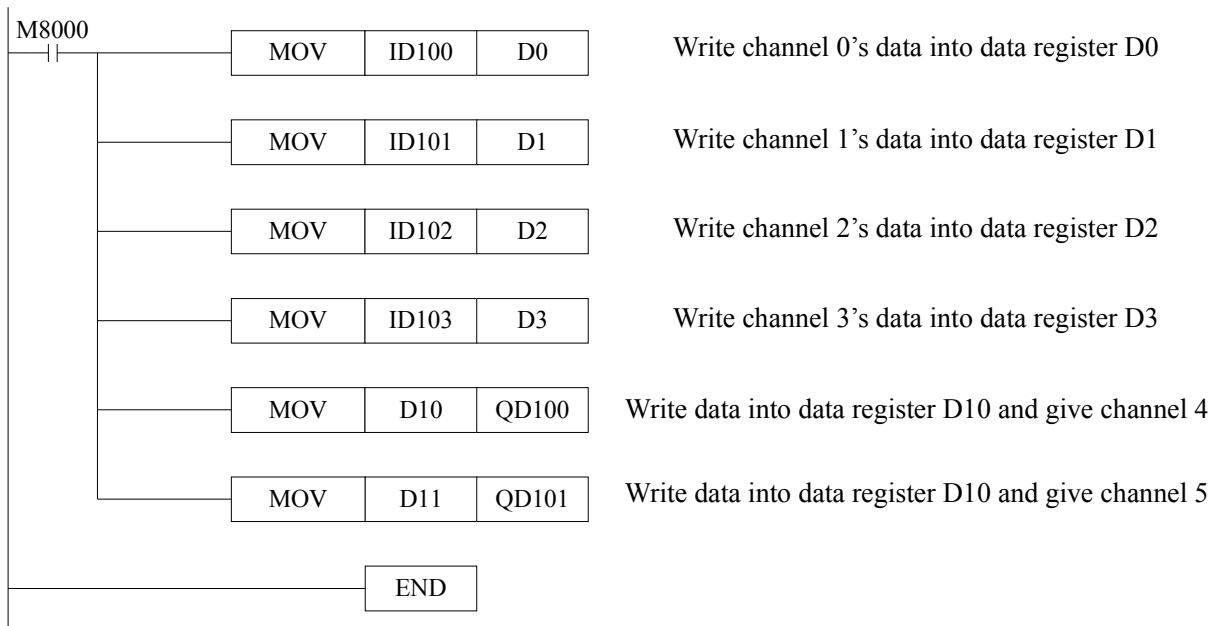
The relationship between output digital and its correspond analog data is showed in the following chart:



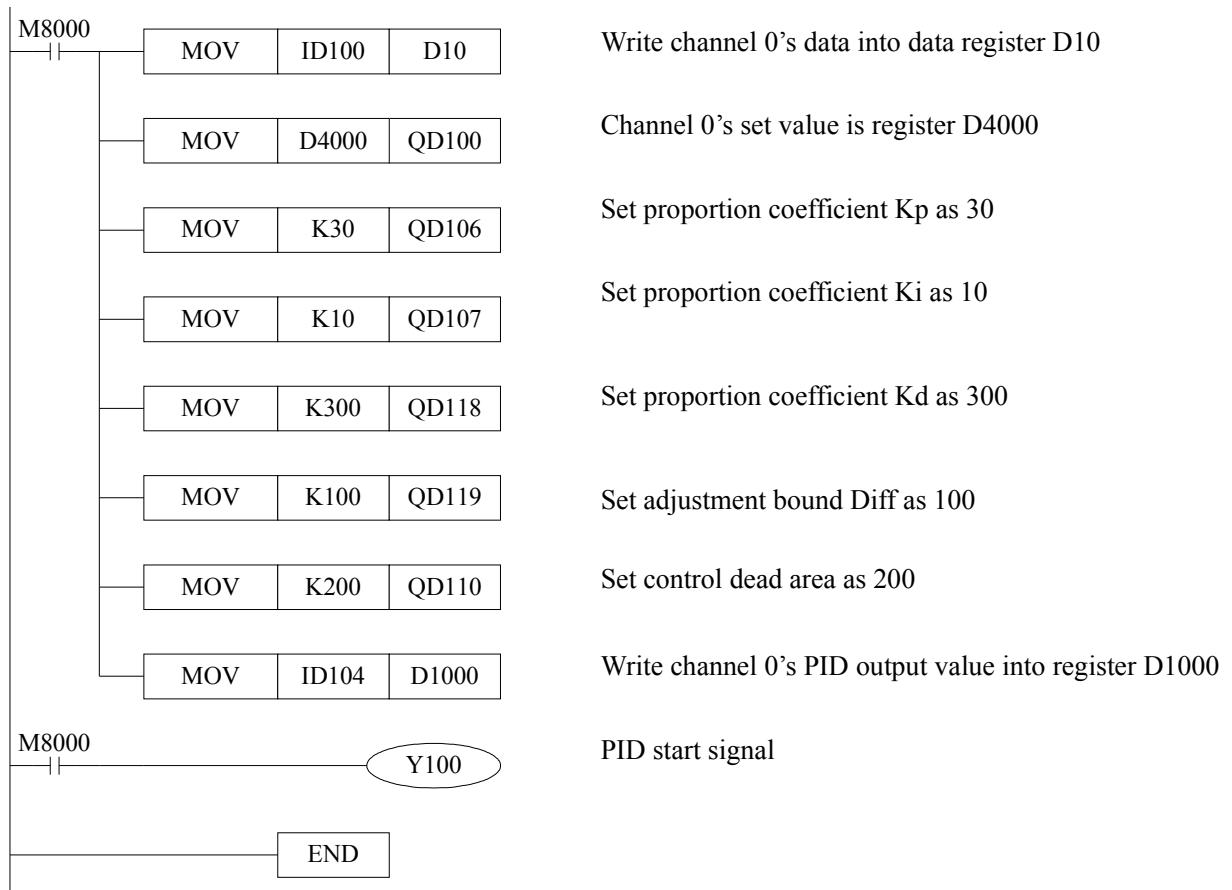
When input data exceed K4095, D/A converted output analog data keep 5V、10V or 20mA.

## 6 . Programming

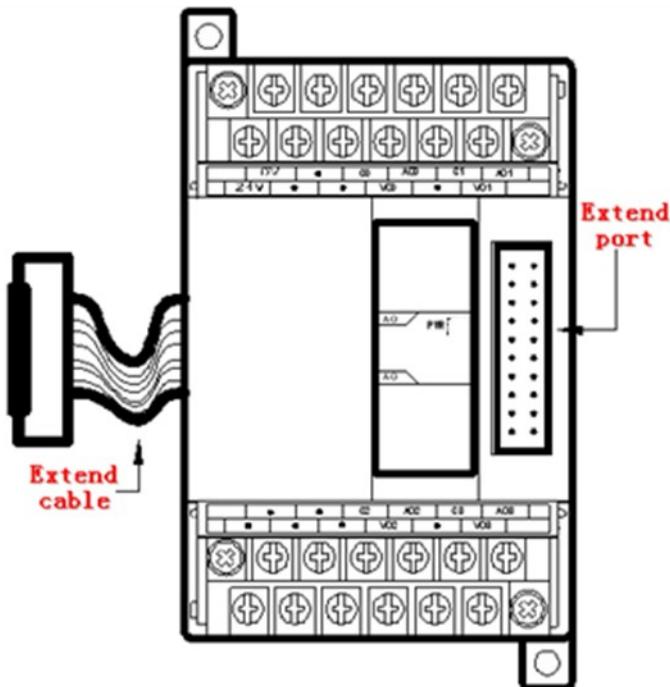
E.g.1) Real time read 4 channels data, write 2 channels data (take expansion 1 as example)



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



## 1、Specification



### Characteristic :

- 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	DC24V±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 ID

XC series analog module does not engross I/O units, the converted data is directly transferred into PLC register. The output channel's correspond PLC register ID is:

Output ID list

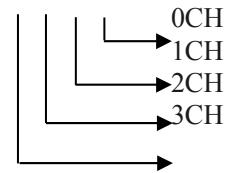
Channel	No.1 unit	No.2 unit	No.3 unit	No.4 unit	No.5 unit	No.6 unit	No.7 unit
0CH	QD100	QD200	QD300	QD400	QD500	QD600	QD700
1CH	QD101	QD201	QD301	QD401	QD501	QD601	QD701
2CH	QD102	QD202	QD302	QD402	QD502	QD602	QD702
3CH	QD103	QD203	QD303	QD403	QD503	QD603	QD703

### 3 . Setting of working mode

1 ) Each expansions' input/output have the choice of voltage 0~5V 、 0~10V , current 0~20mA 、 4~20mA modes. Via the setting of special FLASH data register FD inside PLC, see the following table:

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

Take expansion1 as the example:  
FD8250 H O O O O



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

Take module 1 as the example:

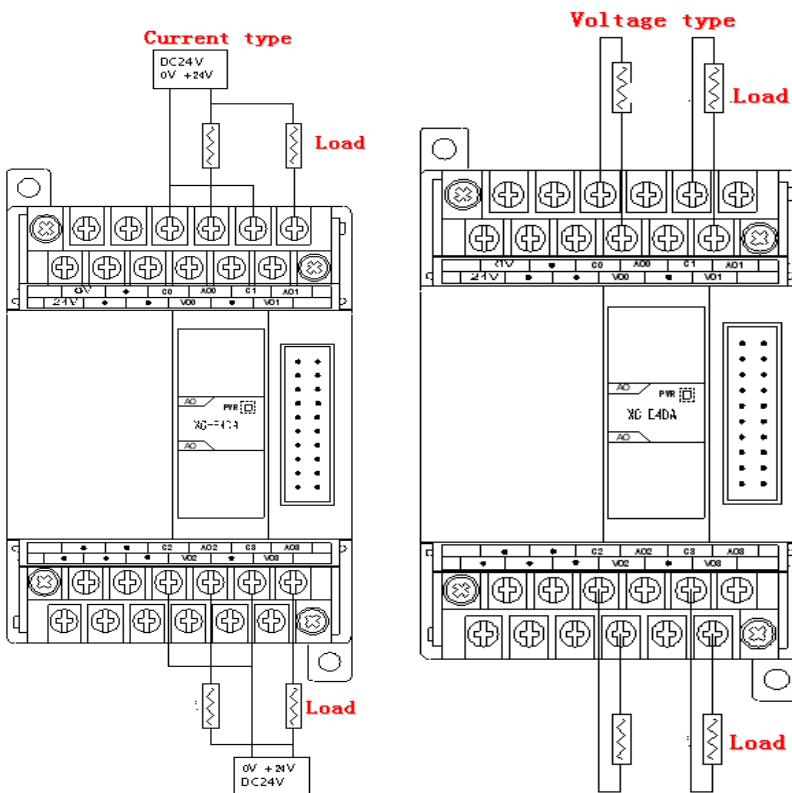
Register FD8250 :

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

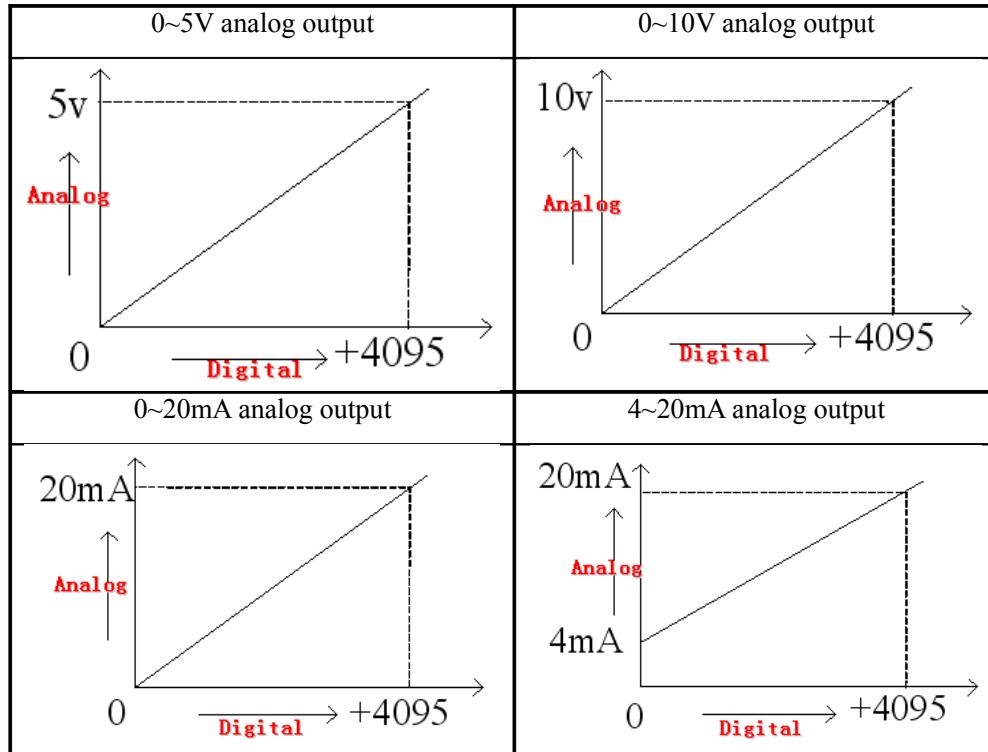
When carry on exterior connection, please note the following two items:

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



## 5 . Analog digital convert chart

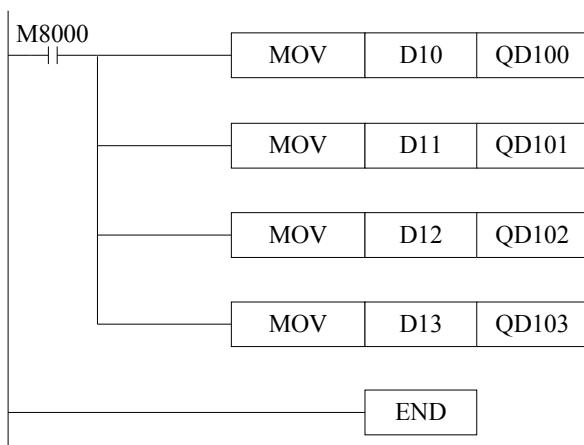
The relationship between PLC's output digital and its correspond analog data is showed in the following chart:



When the output data exceed K4095, D/A converted output analog data keep 5V、10V or 20mA

## 6 . Programming

Real time write data into 4 channels



Write data into data register D10 and give channel 0

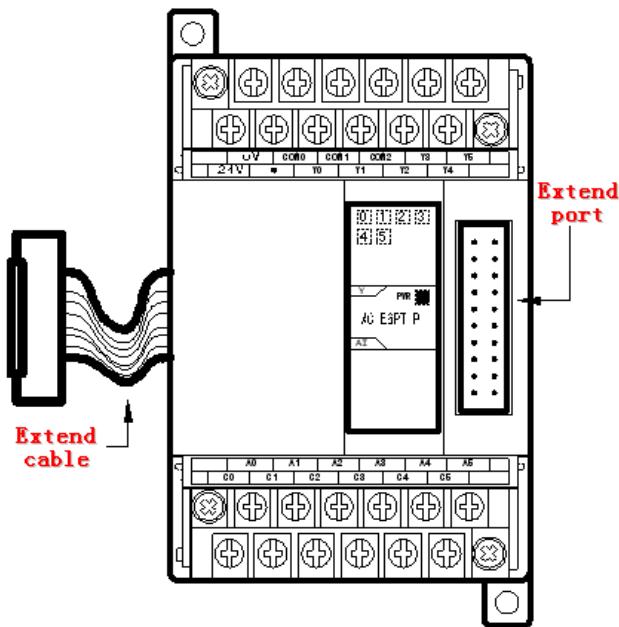
Write data into data register D11 and give channel 1

Write data into data register D12 and give channel 2

Write data into data register D13 and give channel 3

## VI. Pt100 temperature PID control module XC\_E6PT\_P

### 1 . Specification



#### Characteristic :

- Platinum thermo-resistance input, Pt100
- 6 channels input, 6 channels output
- 2 groups PID parameters (every 3 channels has a group of PID parameter)
- 1mA lasting current output, not affected by the exterior environment
- Distinguish ratio is 0.1°C
- As special function module of XC, 7 modules could be connected

Item	Content
Analog input signal	Pt100 platinum thermo-resistance
Temperature testing bound	-100°C~350°C
Digital output bound	-1000~3500 , 16 bits with sign bit, binary
Control precision	±0.5°C
Distinguish ratio	0.1°C
Integrate precision	±0.8% (relative to the max value)
Convert speed	100ms×6 channels
Analog using power	DC24V±10% , 50mA
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

**Note :** 1、Without signal input, the channel's data is 3500

2、According to the actual requirement, connect with Pt100 platinum thermo-resistance

## 2 . Assignment of input definition ID

XC series analog modules don't engross I/O units, the converted data is directly transferred into PLC register, channel's correspond PLC register's ID is:

Table of input definition ID:

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 ID:

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

channels temperature control bound							
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### Description :

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

Parameter P : proportion parameter, mainly reflect system's difference, control as soon as difference occurs to decrease this difference.

Parameter I : Integral parameter, mainly used to remove the whisht and improve the system's no difference degree

Parameter D : differential parameter, mainly control signal's changing trend and decrease the system's shake.

Temp. control bound Diff : in the assigned bound, carry on PID control, beyond that bound, no PID control

Each parameter's reference value : Kp=20~100 ; Ki=5~20 ; Kd=200~700 ; DIFF=100~200

### 3 . Setting of input filter

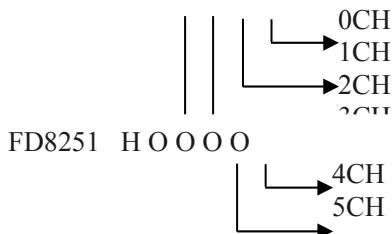
1 ) Every input of expansion has option of filter, set via special FLASH data register FD in PLC.

Seethe following chart:

Module	channel's ID	
	0CH~3CH	4CH~5CH
1#module	FD8250	FD8251low 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 example:

FD8250 H O O O O



Each channel's filter mode is assigned via correspond register's 4 bits! Each bit's definition is showed in the following table:

Take module 1 as the example:

Register FD8250 :

Channel 2				Channel 1			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00 : 1/2 filter	-	-	-	00 : 1/2 filter	-	-	-
01 : not filter				01 : not 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 : not filter				01 : not 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 : 不 filter				01 : 不 filter			
10 : 1/2 filter	-	-	-	10 : 1/2 filter	-	-	-
11 : 1/3 filter				11 : 1/3 filter			

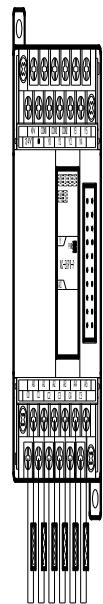
When leave the factory, the defaulted value is 0, the initial filter format is 1/2 filter.

#### 4 . Exterior connection

**About outside layout, you should note the following two items:**

- When carry on + 24V power, please use 24V power on PLC main unit to avoid interfere.
- To avoid interfere, please take shield measure with the signal cable.

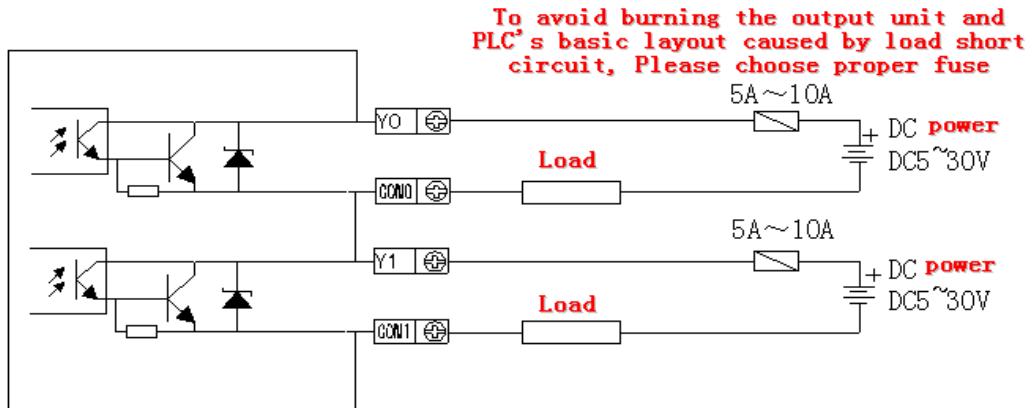
**Input connection:**



- Output terminals  
Transistor output terminals, please choose DC5V~30V flat power.
- Circuit insulation  
Between PLC's interior circuit and output transistor, use optical insulation. Each public module is also separate.
- Response time  
The time from PLC drive (or cut) optical coupling device to transistor ON/OFF, no more than 0.2ms.
- Output current  
Each point has electricity 0.8A, but to avoid temperature rising, please use as every 4 points 1.2A or every 8 points 2.0A
- Open circuit leak current  
Below 0.1mA

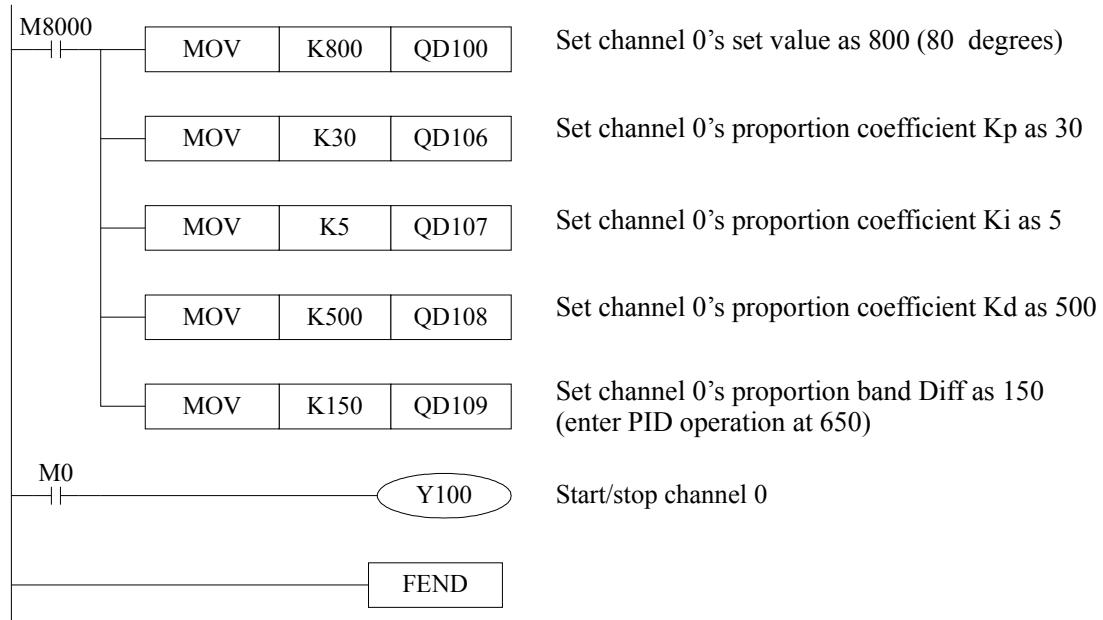
The output circuit is the following:

Take channel 0 and channel 1 as the example:



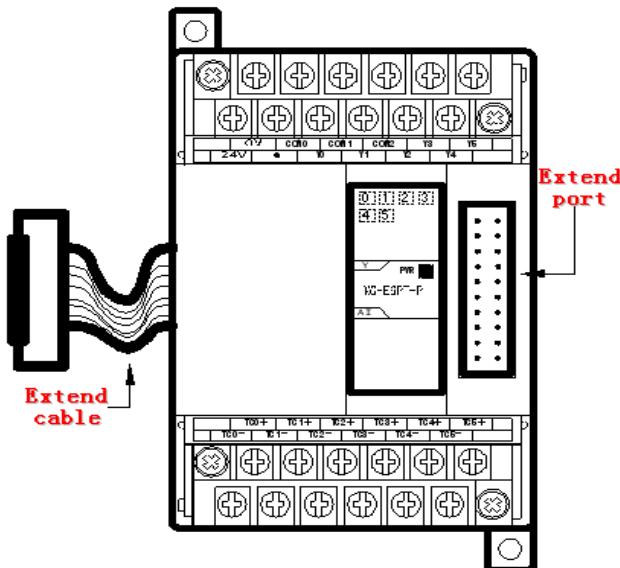
## 6 . Programming

### Program with the first channel



## VII、K type thermocouple temperature PID control module XC-EKTC-P

### 1 . Specification



#### Characteristic :

- Thermocouple K type analog input used by temperature sensor
- 6 channels input, 6 channels output
- 2 groups PID parameters (one group PID parameters every 3 channels)
- Hide cold-terminal compensate circuit inside
- Distinguish precision is  $0.1^{\circ}\text{C}$
- As special function module of XC , 7 modules could be connected at most

Items	Content
Analog input signal	K type thermocouple
Temperature testing bound	$0^{\circ}\text{C}$ ~ $1000^{\circ}\text{C}$
Digital output bound	0~10000 , 16 bits with sign bit, binary
Control precision	$\pm 0.5^{\circ}\text{C}$
Distinguish ratio	$0.1^{\circ}\text{C}$
Integrate precision	$\pm 0.8\%$ (compare with the max value)
Convert speed	100ms×6 channels
Power for analog using	DC24V $\pm 10\%$ , 50mA
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 expansion

Note : 1、If no signal input, the channel's data is 0

2、According to the actual requirement, connect with K type thermocouple

## 2 . Assignment of input ID

XC series analog modules don't engross I/O units, the converted data is directly transferred into PLC register, channel's correspond PLC register's ID is:

Input ID 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 ID list

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

Last 3 channels temp. control bound	QD113	QD213	QD313	QD413	QD513	QD613	QD713
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### Description :

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

Parameter P : proportion parameter, mainly reflect system's difference, control as soon as difference occurs to decrease this difference.

Parameter I : Integral parameter, mainly used to remove the whisht and improve the system's no difference degree

Parameter D : differential parameter, mainly control signal's changing trend and decrease the system's shake.

Temp. control bound Diff : in the assigned bound, carry on PID control, beyond that bound, no PID control

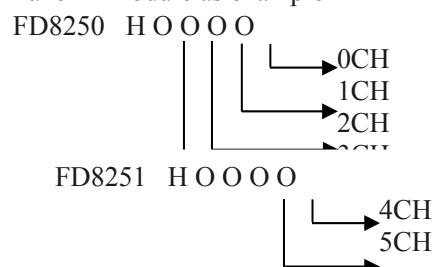
Each parameter's reference value : Kp=20~100 ; Ki=5~20 ; Kd=200~700 ; DIFF=100~200

### 3 . Input filter setting

Every input of expansions has filter option, set via special FLASH data register FD inside PLC. See the following chart :

Module	Channel's ID	
	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 example :



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

Take module 1 as example

Register FD8250 :

Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00 : 1/4 filter	-	-	-	00 : 1/4 filter	-	-	-
01 : not filter				01 : not 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 : not filter				01 : not 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 : not filter				01 : not filter			
10 : 1/2 filter	-	-	-	10 : 1/2 filter	-	-	-
11 : 1/3 filter				11 : 1/3 filter			

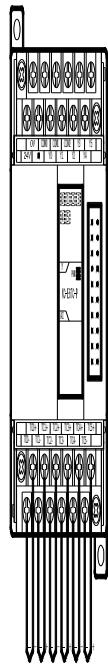
When leave the factory, their defaulted value is 0, i.e. the initial filter format is 1/4 filter

#### 4 . Exterior connection

**About the exterior connection, you should pay attention to the following two items :**

- When connect with + 24V power outside, please use the 24V power on PLC main unit to avoid interfere
- To avoid interfere, shield measure is necessary for the signal cables

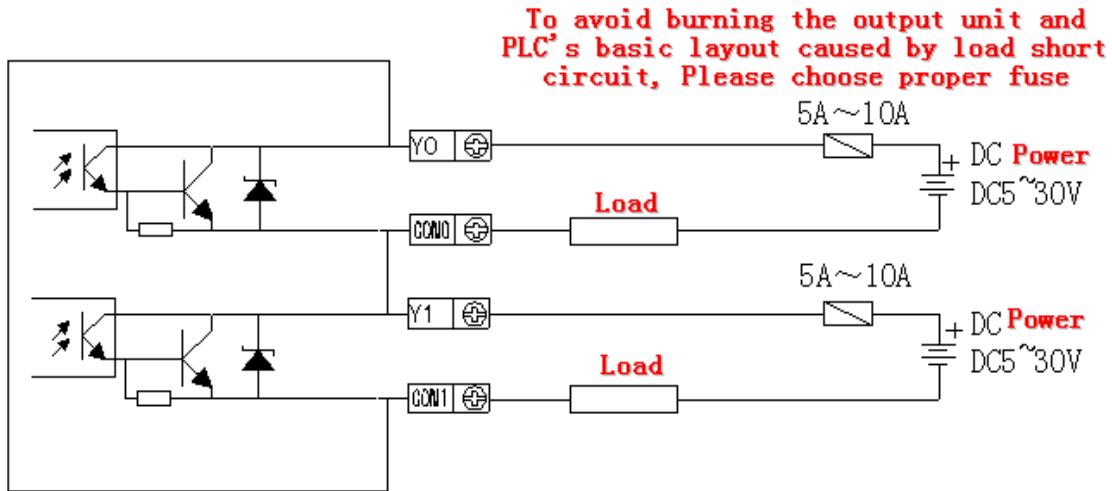
**Input method :**



- Output terminal  
For transistor output terminals, flat please use power of DC5V~30V.
- Circuit insulation  
Between PLC interior circuit and output transistor, carry on optical insulation with optical coupling device. Each public modules are separate.
- Response time  
The time form PLC drive (or cut) optical coupling circuit to transistor's ON/OFF, no more than 0.2ms
- Output circuit  
Each point's current 0.8A. But to restrict the increase of temperature,, please use in the condition of every 4 points 1.2A or every 8 points 2.0A
- Open circuit leak current  
Below 0.1mA.

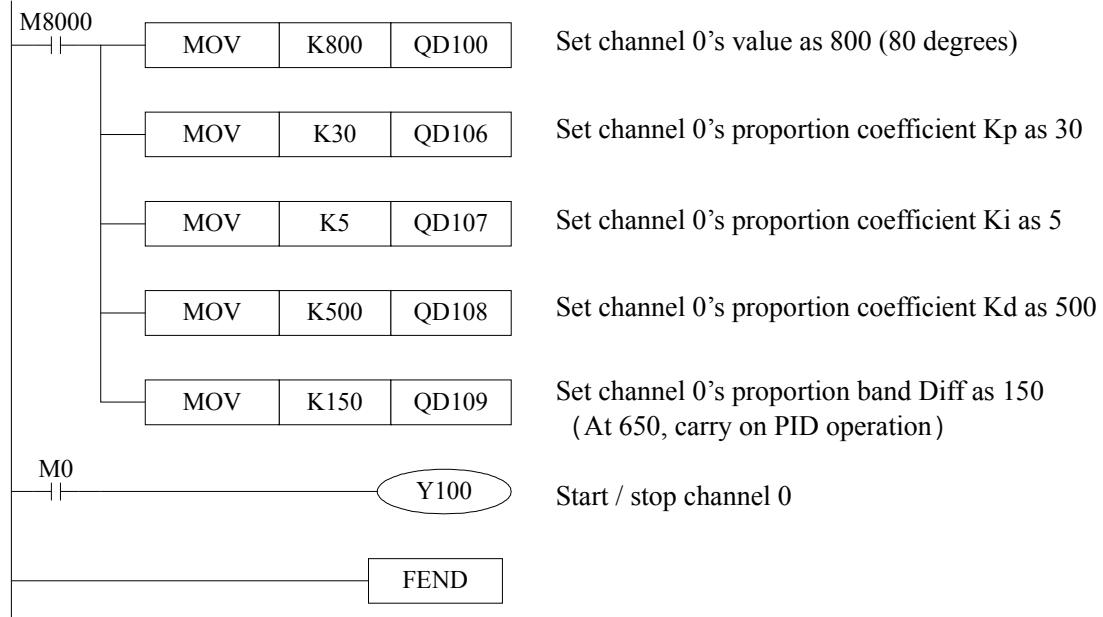
The output circuit is the following:

Take channel 0 and channel 1 as the example:



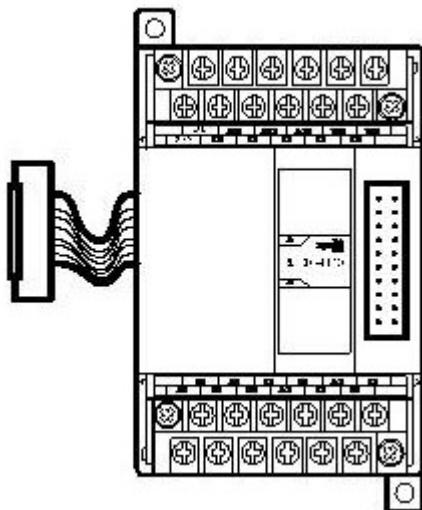
## 6 . Program

### Program with the first channel



## VIII、XC-E3AD4PT2DA

### 1 . Specifications



#### Specilities:

- 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 input (PT100)
- 3 channels A/D and 4 channels PT input, with PID adjustment function

ITEMS	Analog Current Input (AD)	Temperature Input (PT)	Analog Voltage Output (DA)
Analog Input	DC0~20mA、4~20mA	PT100	-
Temperature Testing Bound	-	-100~350°C	-
Maximum Output Bound	DC0~40mA	-	-
Analog Output Bound	-	-	DC0~5V、0~10V External load resistor (2KΩ~1MΩ)
Digital Input Bound	-	-	12 bits binary (0~4095)
Digital Output Bound	14 bits binary (0~16383)	-1000~3500	-
Distinguish	1/16383(14Bit); the converted data is stored into PLC(14Bit) in the form of Hex.	0.1°C	1/4095(12Bit); the converted data is stored into PLC(12Bit) in the form of Hex.
PID Output Value	0~K4095		-
General Precision	0.8%	±0.5°C	0.8%
Convert 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]: Via the connection of the extend cable and PLC's extend port, realize data transfer

[Extend Port]: Connect with other expansions

## 2 . Input/Output Definition

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

The first expansion's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	PT Signal	PID Output Value	PID start/stop bit	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : Kp, Ki, Kd, Diff,Death
0CH	ID600	ID607	Y600	QD602	Kp----- QD609
1CH	ID601	ID608	Y601	QD603	Ki----- QD610
2CH	ID602	ID609	Y602	QD604	Kd----- QD611
Channel	PT Signal	PID Output Value	PID start/stop bit	The Set Value	Diff----- QD612
3CH	ID603	ID610	Y603	QD605	Death---- QD613
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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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
Channel	PT Signal	PID Output Value	PID start/stop bit	The Set Value	Diff----- QD712
3CH	ID703	ID710	Y703	QD705	Death---- QD713
4CH	ID704	ID711	Y704	QD706	
5CH	ID705	ID712	Y705	QD707	
6CH	ID706	ID713	Y706	QD708	
Channel	DA Signal	-	-	-	-
0CH	QD700	-	-	-	
1CH	QD701	-	-	-	

#### Description :

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

Parameter P : Proportion parameter, mainly reflex system's difference, carry on control as soon

as difference occurs to improve the system's no difference degree.

Parameter I : Integral parameter. Mainly used to remove whisht, improve the system's no difference degree.

Parameter D : Differential parameter, mainly used to control signal's changing trend,minish system's shake.

Control bound Diff : In the assigned bound, carry on PID control. Beyond the bound, no PID control.

Dead area Death : When the current PID control value compares with the preceding PID control value. If the difference between them is less than the set dead bound's value, the module will abnegate the current PID control value, send the preceding PID control value to the PLC main unit.

Each parameter's reference value : Kp=20~100 ; Ki=5~20 ; Kd=200~700 ; DIFF=100~200

### 3 . Working Mode Setting

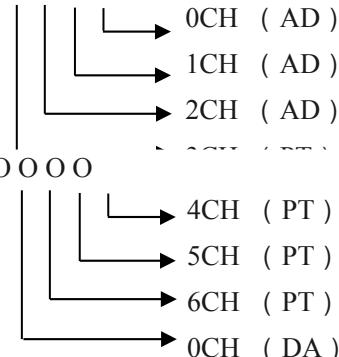
1) Expansion's input/output mode can be set via special FLASH data register FD inside PLC.

Module	Register's ID
1# Module	FD8250 、 FD8251 、 FD8252
2# Module	FD8258 、 FD8259 、 FD8260
3# Module	FD8266 、 FD8267 、 FD8268
4# Module	FD8274 、 FD8275 、 FD8276
5# Module	FD8282 、 FD8283 、 FD8284
6# Module	FD8290 、 FD8291 、 FD8292
7# Module	FD8298 、 FD8299 、 FD8270

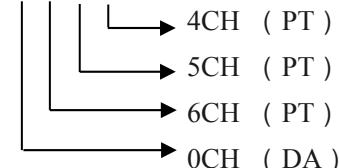
Note : As showed in the preceding table, each register set 4 channels' mode, each register has 16 bits. From low bit to high bit, every 4 bits separately set 4 channels' mode.

Take 1# module as the example:

FD8250 H O O O O



FD8251 H O O O O



FD8252 H O O O O



----- table:

The following, we take module 1 as the example to show how to set:

Register FD8250 :

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

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		-		00: 1/2 filter	-		
01: not filter				01: not filter			
10: 1/3 filter				10: 1/3 filter			
11: 1/4 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: not filter			
				10: 1/3 filter			
				11: 1/4 filter			

Low byte of register FD8252:

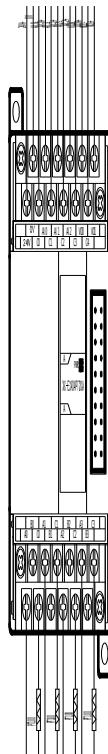
-				Output CH 1 (PT)			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	-	-	-	-	-	0 :0~10V 1 :0~5V

#### 4 . External Connection

Please note the following two items about external connection:

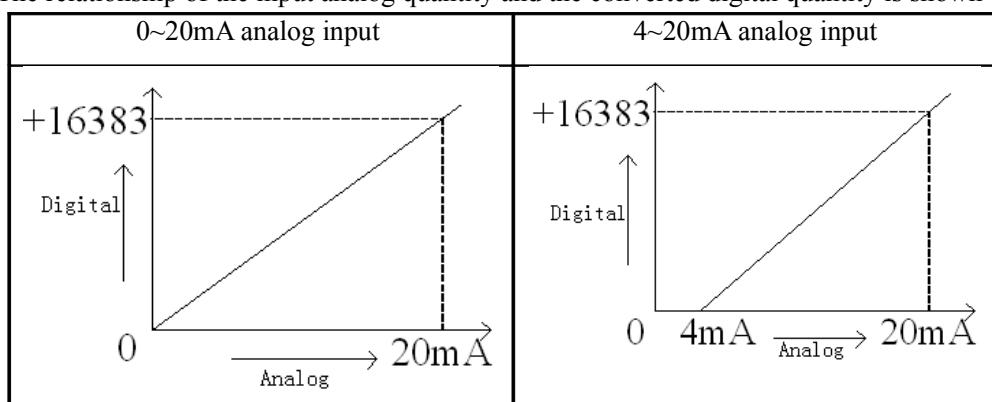
- When connect with external + 24V power supply, please use 24V power supply on PLC main unit to avoid interfere
- To avoid interfere, please use shield cable, and single-point grounding with the shield layer.

- Module's 0~20mA or 4~20mA output should be offered 24V power supply from outside. According to the QD value, adjust the circuit's current. The module itself doesn't generate current.

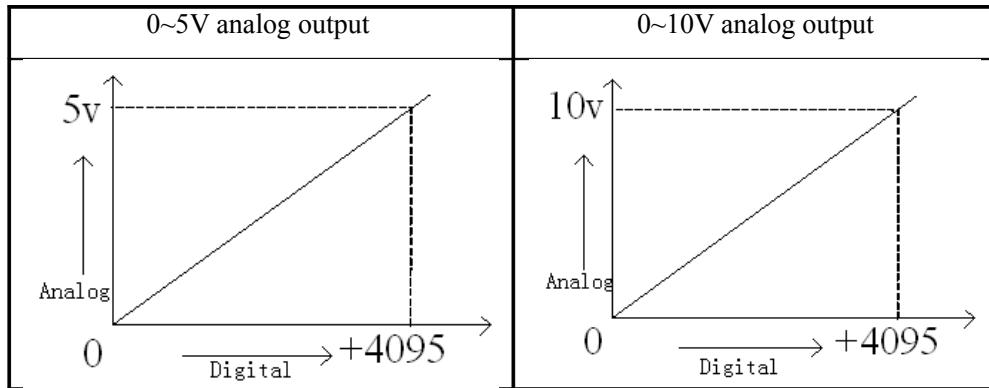


## 5 . Analog/Digital convert Diagram

The relationship of the input analog quantity and the converted digital quantity is shown below:

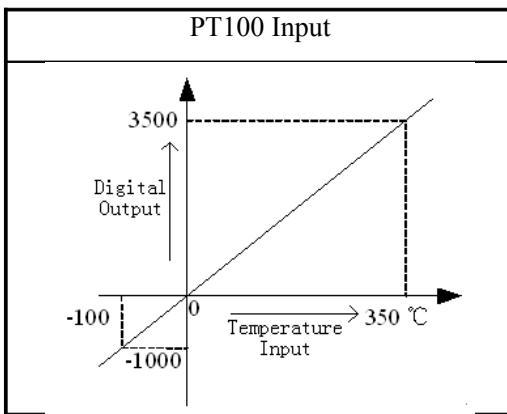


The relationship of the output digital quantity and its correspond analog quantity is shown below:



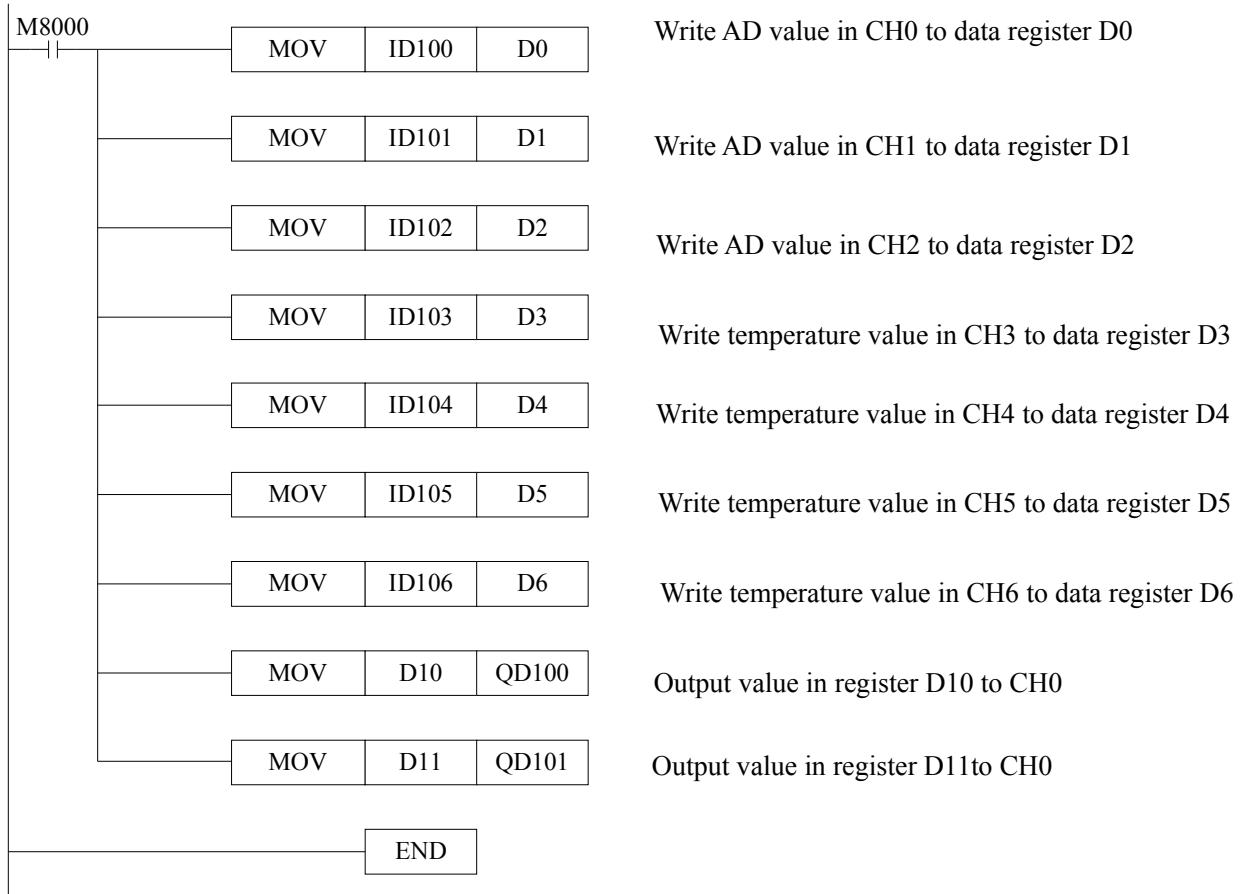
When the output value is larger than K4095, D/A converted analog value will remain 5V、10V.

The output specialty of PT100 is shown below:

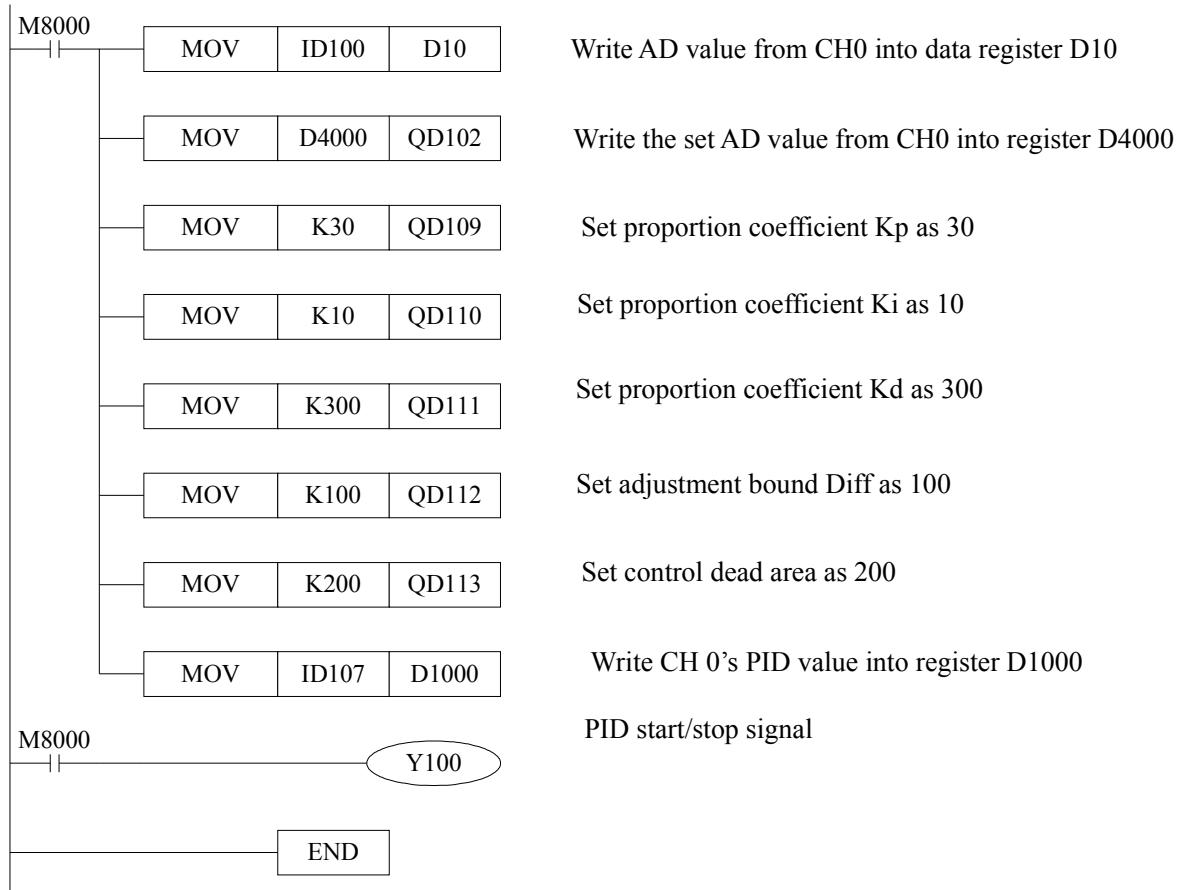


## 6 . Program

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

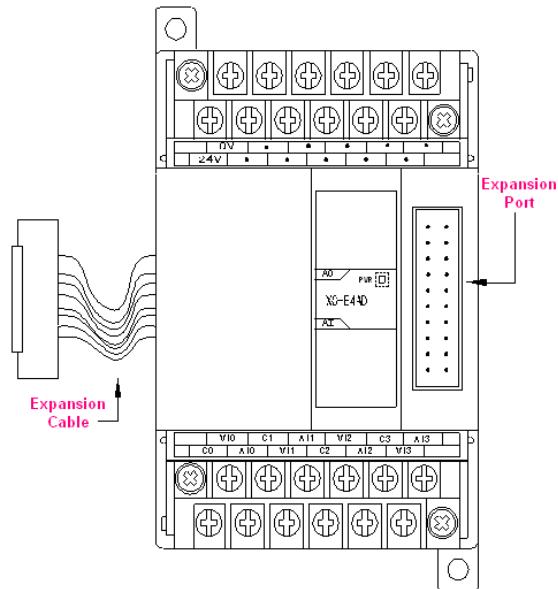


E.g.2) Application of PID (Take CH0 of module 1 as the example)



### ● Analog Input Module XC-E4AD

## 1 . Specification



## Specification:

- 4CH 14 bits analog input
  - 4CH voltage (0~5V、0~10V), current (0~20mA、4~20mA) input selectable, set via the software.
  - As expansion of XC series PLC, the PLC CPU unit can connect 7 modules
  - 4CH A/D has PID adjustment function

ITEMS	Analog Input (AD)	
	Voltage Input	Current Input
Analog Input Range	DC0~5V、0~10V	DC0~20mA、4~20mA
Maximun Input Range	DC±18V	DC0~40mA-
Analog Output Range	-	
Digital Input Range	-	
Digital Outout Range	14 bits binary (0~16383)	
Distinguish Ratio	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%	
Convert 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]: Realize data transfer via the connection of expansion cable and PLC expansion port.

[Expansion Port]: Connect with other expansion module

## **2 . Assignment of Input/Output ID**

XC series expansions do not occupy the I/O units, the converted value is delivered to PLC register directly.

Analog output is also offered by PLC register.

Register ID of expansion 1:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	The Set 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 ID of expansion 2:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	The Set 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 ID of expansion 3:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	The Set 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 ID of expansion 4:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	The Set 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 ID of expansion 5:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	The Set Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "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	

Register ID of expansion 6:

Channel	AD Signal	PID Output Value	PID Start/Stop Control Bit	The Set Value	PID Parameters: Kp, Ki, Kd, Control Range Diff, Dead Range "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	

Register ID of expansion 7:

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

#### Description :

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

Parameter P: Proportion parameter, mainly reflex system's difference, carry on control as soon as difference occurs to improve the system's no difference degree.

Parameter I : Integral parameter. Mainly used to remove whisht, improve the system's no difference degree.

Parameter D : Differential parameter, mainly used to control signal's changing trend,minish system's shake.

Control bound Diff : In the assigned bound, carry on PID control. Beyond the bound, no PID control.

Dead area Death : When the current PID control value compares with the preceding PID control value. If the difference between them is less than the set dead bound's value, the module will abnegate the current PID control value, send the preceding PID control value to the PLC main unit.

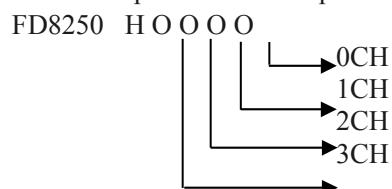
Each parameter's reference value: Kp=20~100; Ki=5~20; Kd=200~700; DIFF=100~200

### 3 . Setting of working mode

1 ) Expansion's input 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 ID
	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 separately 4 channels mode.

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

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

Register FD8250:

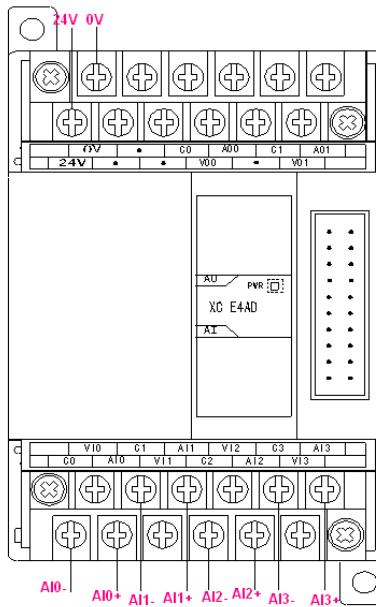
Channel 1				Channel 0			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
00: 1/2 filter	0: voltage input	0:0~10V 1:0~5V	00: 1/2 filter	0: voltage input	0:0~10V 1:0~5V	00: 1/2 filter	0:0~10V 1:0~5V
01: not filter	1: current input	0:0~20mA 1:4~20mA	01: not filter	1: current input	0:0~20mA 1:4~20mA	10: 1/3 filter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

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

#### 4 . Exterior connection

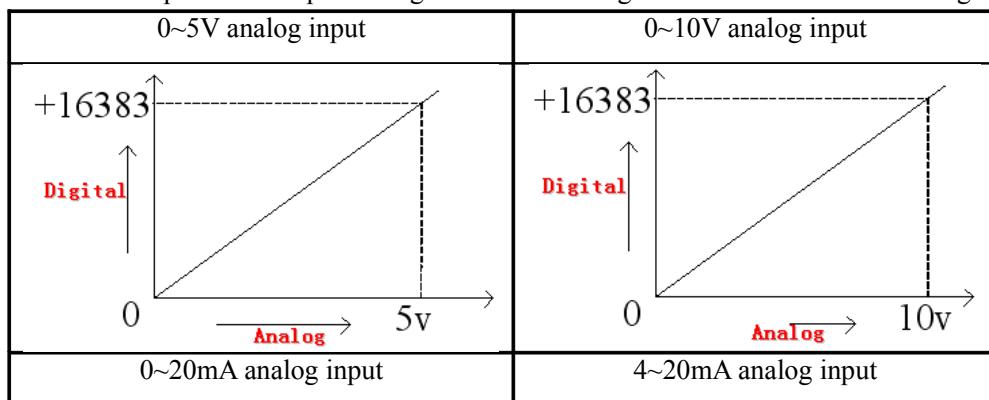
When carry on external connection, please note the following two items:

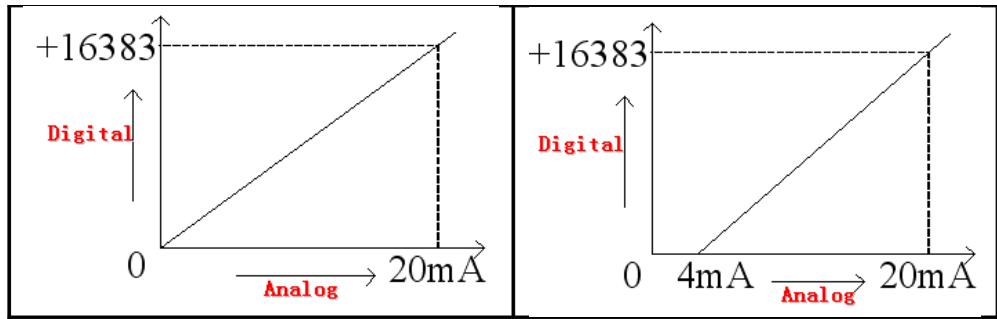
- When connect + 24V power outside, please choose 24V power on PLC main unit to avoid interfere.
- To avoid interfere, please use shield cable and single point grounding with the shield layer.



#### 5 . Analog digital convert chart

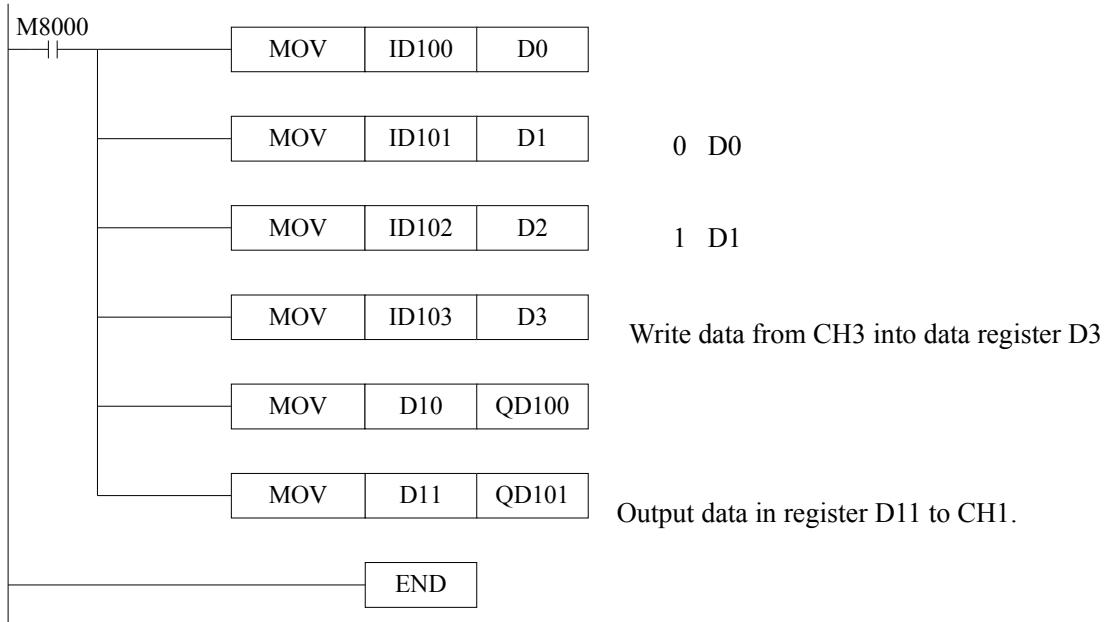
The relationship between input analog and converted digital is showed in the following chart:



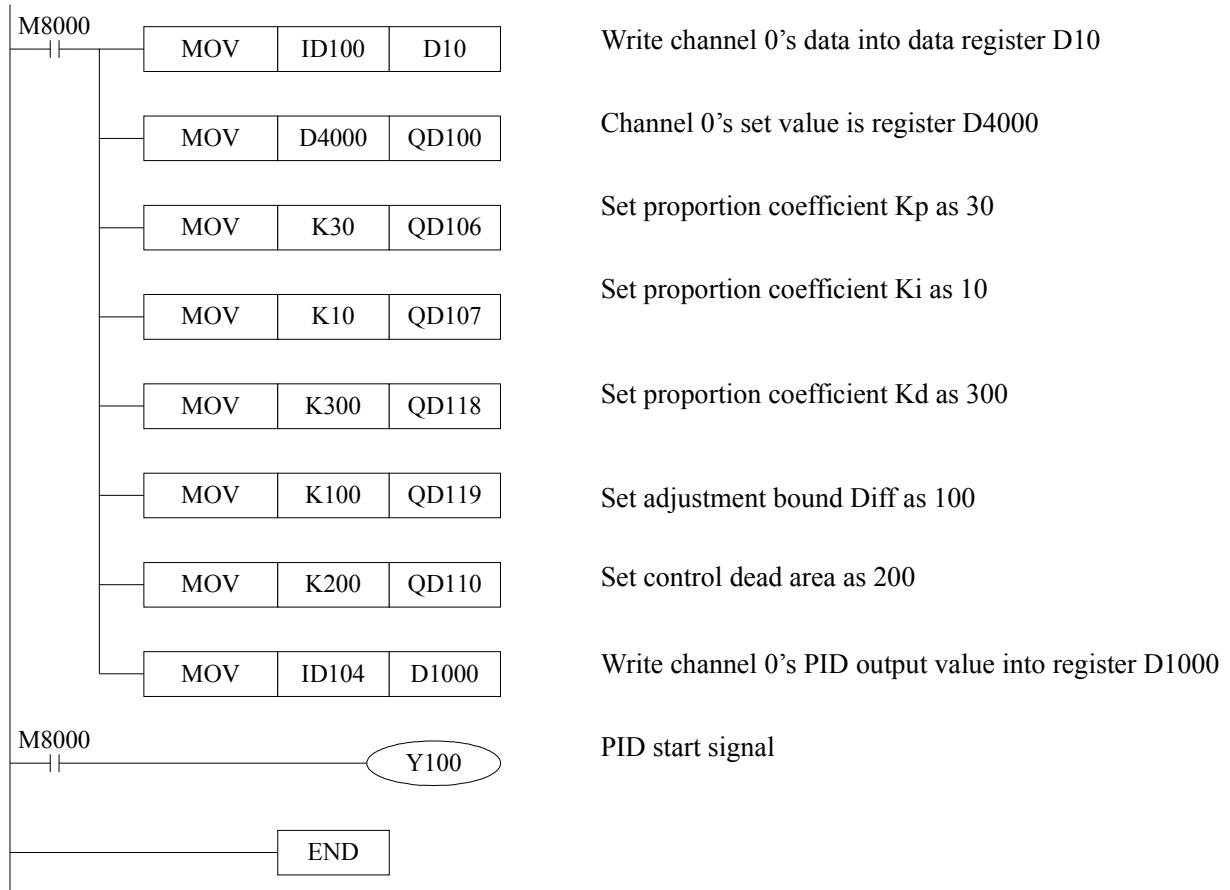


## 6 . Programming

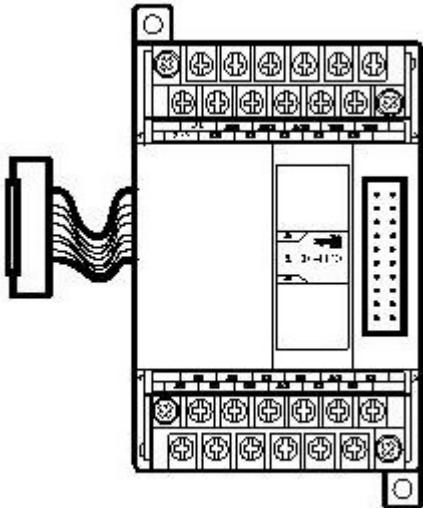
E.g.1 Real time read the 4 channels data, write 2 channels data (take expansion 1 as example)



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



## 1 . Specifications



### Specilities:

- 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 input (PT100)
- 3 channels A/D and 4 channels PT input, with PID adjustment function

ITEMS	Analog Current Input (AD)	Temperature Input (PT)	Analog Voltage Output (DA)
Analog Input	DC0~20mA、4~20mA	PT100	-
Temperature Testing Bound	-	-100~350°C	-
Maximum Output Bound	DC0~40mA	-	-
Analog Output Bound	-	-	DC0~5V、0~10V External load resistor (2KΩ~1MΩ)
Digital Input Bound	-	-	12 bits binary (0~4095)
Digital Output Bound	14 bits binary (0~16383)	-1000~3500	-
Distinguish	1/16383(14Bit); the converted data is stored into PLC(14Bit) in the form of Hex.	0.1°C	1/4095(12Bit); the converted data is stored into PLC(12Bit) in the form of Hex.
PID Output Value	0~K4095		-
General Precision	0.8%	±0.5°C	0.8%
Convert 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]: Via the connection of the extend cable and PLC's extend port, realize data transfer

[Extend Port]: Connect with other expansions

## 2 . Input/Output Definition

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

The first expansion's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	PT Signal	PID Output Value	PID start/stop bit	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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	The Set 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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : Kp, Ki, Kd, Diff, Death
0CH	ID600	ID607	Y600	QD602	Kp----- QD609
1CH	ID601	ID608	Y601	QD603	Ki----- QD610
2CH	ID602	ID609	Y602	QD604	Kd----- QD611
Channel	PT Signal	PID Output Value	PID start/stop bit	The Set Value	Diff----- QD612
3CH	ID603	ID610	Y603	QD605	Death---- QD613
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's register definition:

Channel	AD Signal	PID Output Value	PID start/stop bit	The Set Value	PID : 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
Channel	PT Signal	PID Output Value	PID start/stop bit	The Set Value	Diff----- QD712
3CH	ID703	ID710	Y703	QD705	Death---- QD713
4CH	ID704	ID711	Y704	QD706	
5CH	ID705	ID712	Y705	QD707	
6CH	ID706	ID713	Y706	QD708	
Channel	DA Signal	-	-	-	-
0CH	QD700	-	-	-	
1CH	QD701	-	-	-	

#### Description :

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

Parameter P : Proportion parameter, mainly reflex system's difference, carry on control as soon

as difference occurs to improve the system's no difference degree.

Parameter I : Integral parameter. Mainly used to remove whisht, improve the system's no difference degree.

Parameter D : Differential parameter, mainly used to control signal's changing trend,minish system's shake.

Control bound Diff : In the assigned bound, carry on PID control. Beyond the bound, no PID control.

Dead area Death : When the current PID control value compares with the preceding PID control value. If the difference between them is less than the set dead bound's value, the module will abnegate the current PID control value, send the preceding PID control value to the PLC main unit.

Each parameter's reference value : Kp=20~100 ; Ki=5~20 ; Kd=200~700 ; DIFF=100~200

### 3 . Working Mode Setting

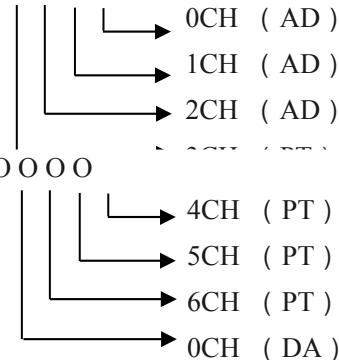
1) Expansion's input/output mode can be set via special FLASH data register FD inside PLC.

Module	Register's ID
1# Module	FD8250 、 FD8251 、 FD8252
2# Module	FD8258 、 FD8259 、 FD8260
3# Module	FD8266 、 FD8267 、 FD8268
4# Module	FD8274 、 FD8275 、 FD8276
5# Module	FD8282 、 FD8283 、 FD8284
6# Module	FD8290 、 FD8291 、 FD8292
7# Module	FD8298 、 FD8299 、 FD8270

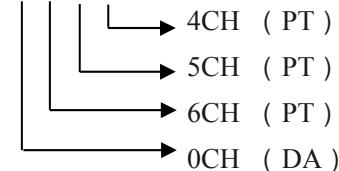
Note : As showed in the preceding table, each register set 4 channels' mode, each register has 16 bits. From low bit to high bit, every 4 bits separately set 4 channels' mode.

Take 1# module as the example:

FD8250 H O O O O



FD8251 H O O O O



FD8252 H O O O O



table:

The following, we take module 1 as the example to show how to set:

Register FD8250 :

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

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		-		00: 1/2 filter	-		
01: not filter				01: not filter			
10: 1/3 filter				10: 1/3 filter			
11: 1/4 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: not filter			
				10: 1/3 filter			
				11: 1/4 filter			

Low byte of register FD8252:

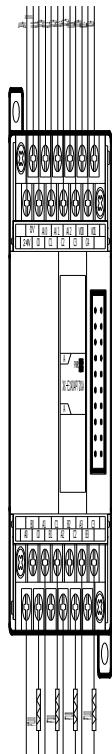
-				Output CH 1 (PT)			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	-	-	-	-	-	0 :0~10V 1 :0~5V

#### 4 . External Connection

Please note the following two items about external connection:

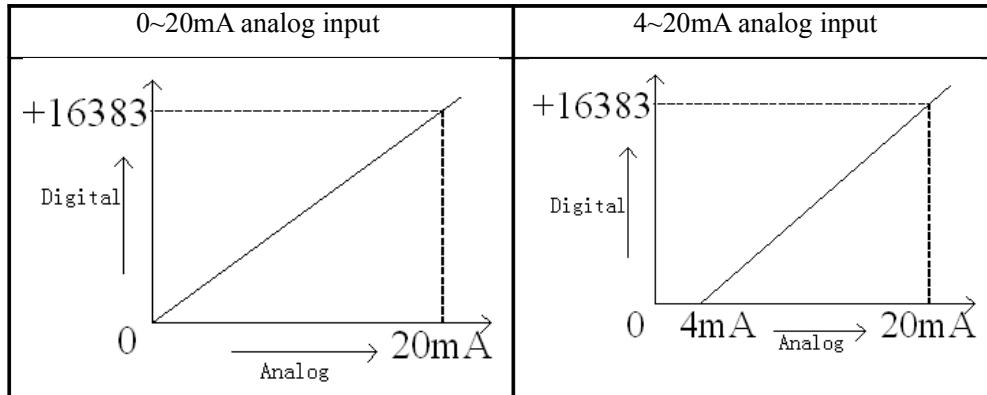
- When connect with external + 24V power supply, please use 24V power supply on PLC main unit to avoid interfere
- To avoid interfere, please use shield cable, and single-point grounding with the shield layer.

- Module's 0~20mA or 4~20mA output should be offered 24V power supply from outside. According to the QD value, adjust the circuit's current. The module itself doesn't generate current.

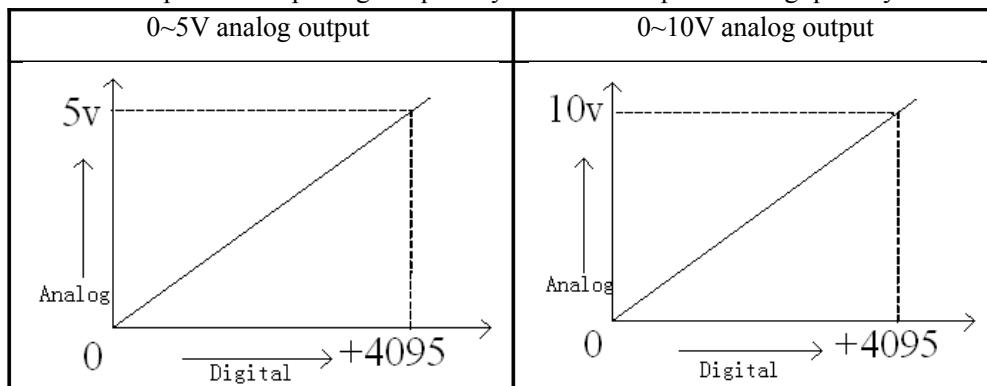


## 5 . Analog/Digital convert Diagram

The relationship of the input analog quantity and the converted digital quantity is shown below:

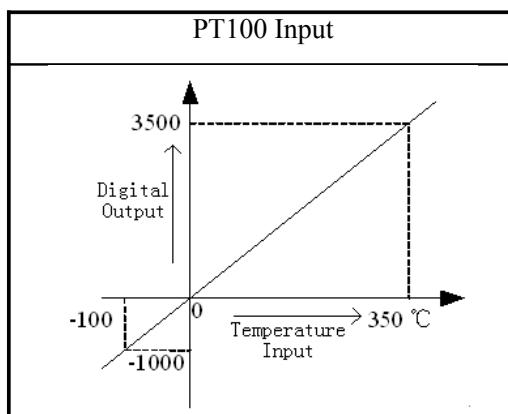


The relationship of the output digital quantity and its correspond analog quantity is shown below:



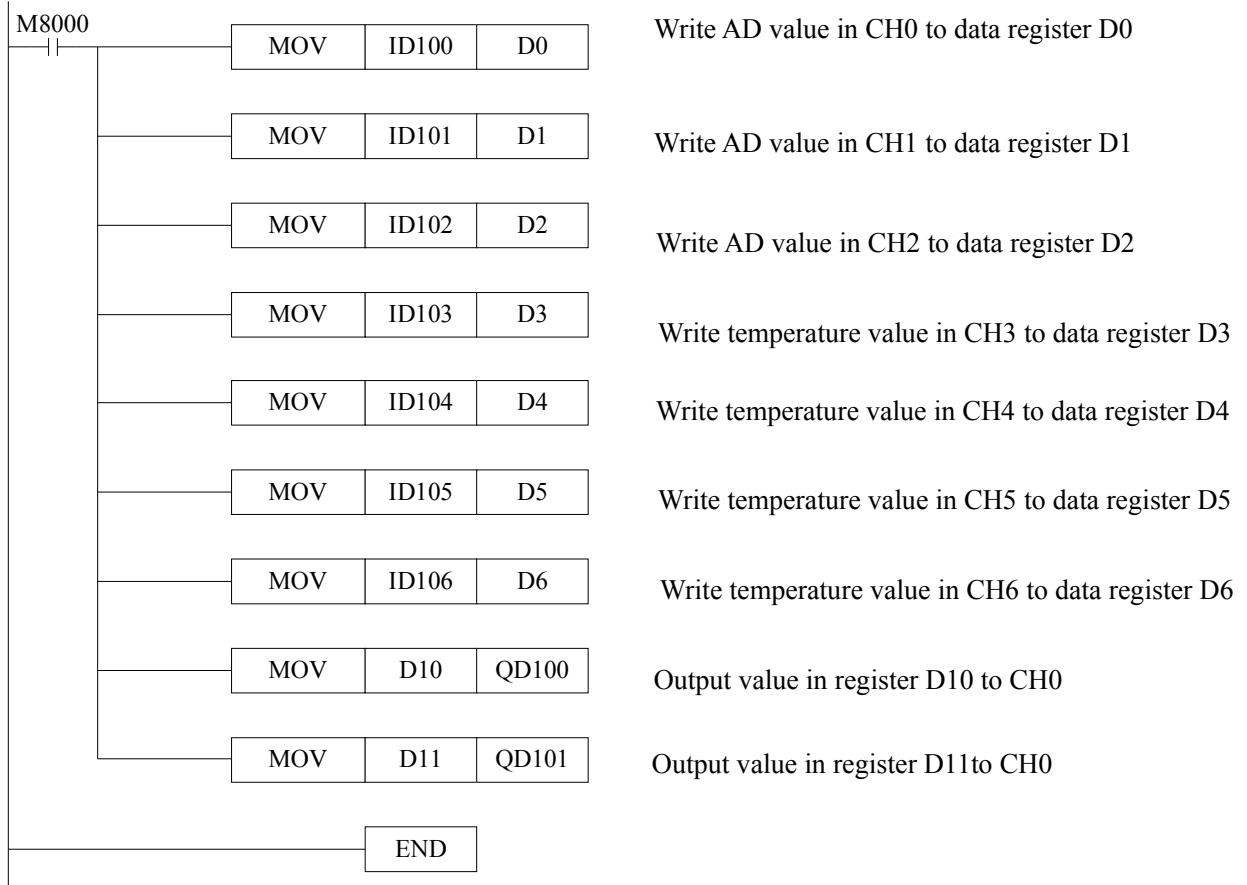
When the output value is larger than K4095, D/A converted analog value will remain 5V、 10V.

The output specialty of PT100 is shown below:

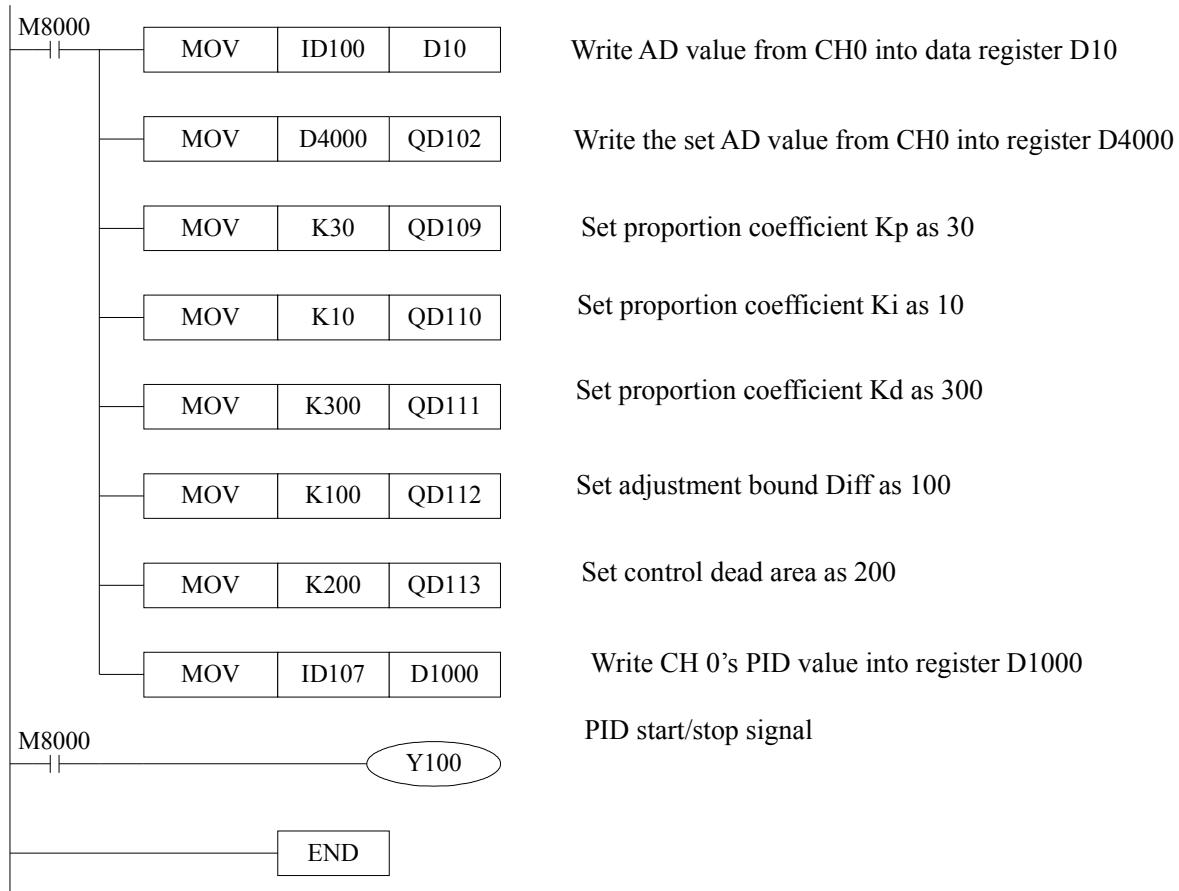


## 6 . Program

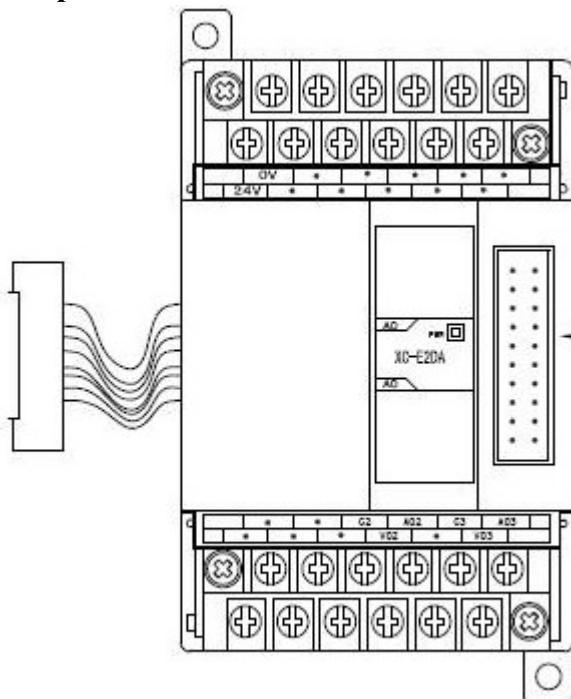
E.g. 1) Real time read data from 7 channels, write data to 2 channels (take module 1 as the example)



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



## 1. Specifications



### Characteristic:

- 12 bits high precision analog input.
- 2 channels selectable voltage 0 to 5V, 0 to 10V, currents are 0 to 20mA, 4 to 20 mA output (selectable)
- As special function module of XC series, 7 modules could be connected at most

Items	Voltage output	Current output
Analog input	DC 0 to 5V, 0 to 10V	DC0 to 20mA, 4 to 20mA
Digital output	12 bits 2H	
Distinguish	1/4096(12 bit); the cover data is stored into PLC in the form of Hex	
General precision	0.8%	
Convert 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]: via the connection of the extend cable and PLC's extend port, realize data transfer.

[extend port]: connect with other expansions.

## 2. The assignment of input/output ID

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

Register's ID of expansion 1:

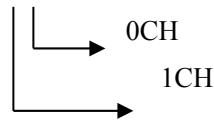
Channel	1 unit	2 unit	3 unit	4 unit	5 unit	6 unit	7 unit
0CH	QD100	QD200	QD300	QD400	QD500	QD600	QD700
1CH	QD101	QD201	QD301	QD401	QD501	QD601	QD701

3. Setting of working module

1) Expansion module input/output voltage is 0 to 5V, 0 to 10V, current is 0 to 20mA, 4 to 20mA module selectable, via PLC internal special FLASH registers FD setting. Such as follows:

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 a example:  
FD8250 H 0 0 0 0



Note: As show 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 2 channels' mode.

Take the first module as an example:

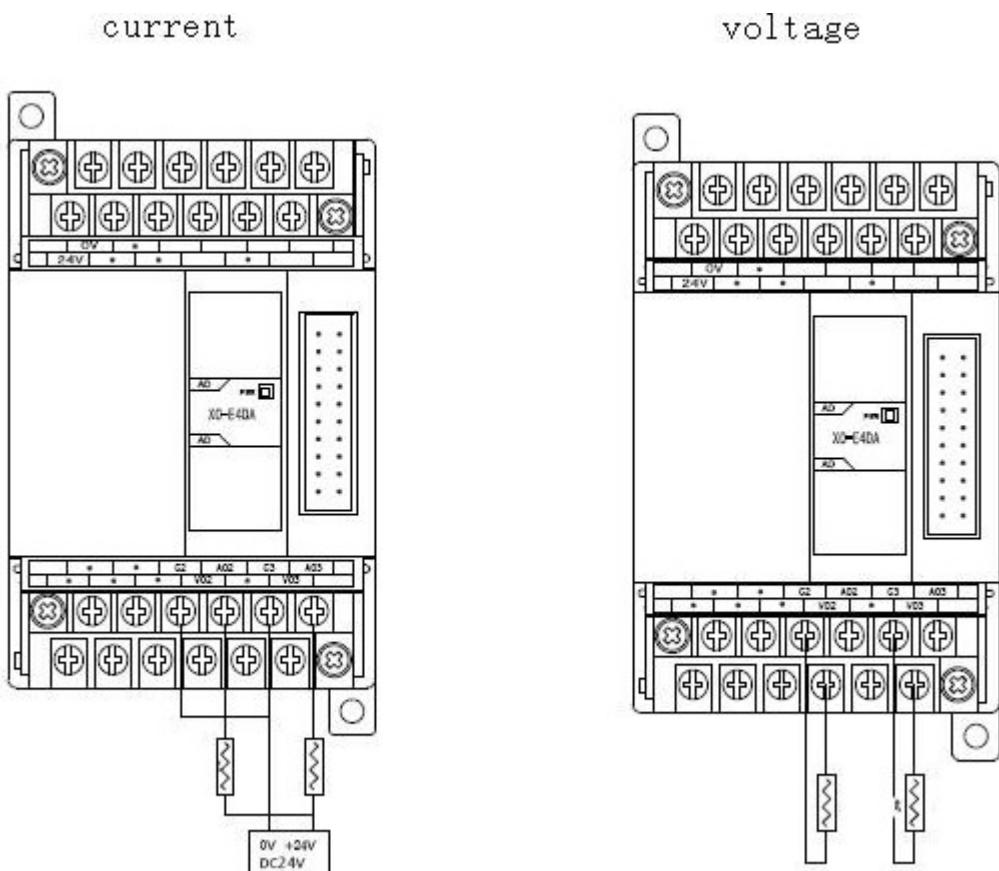
Register FD8250:

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

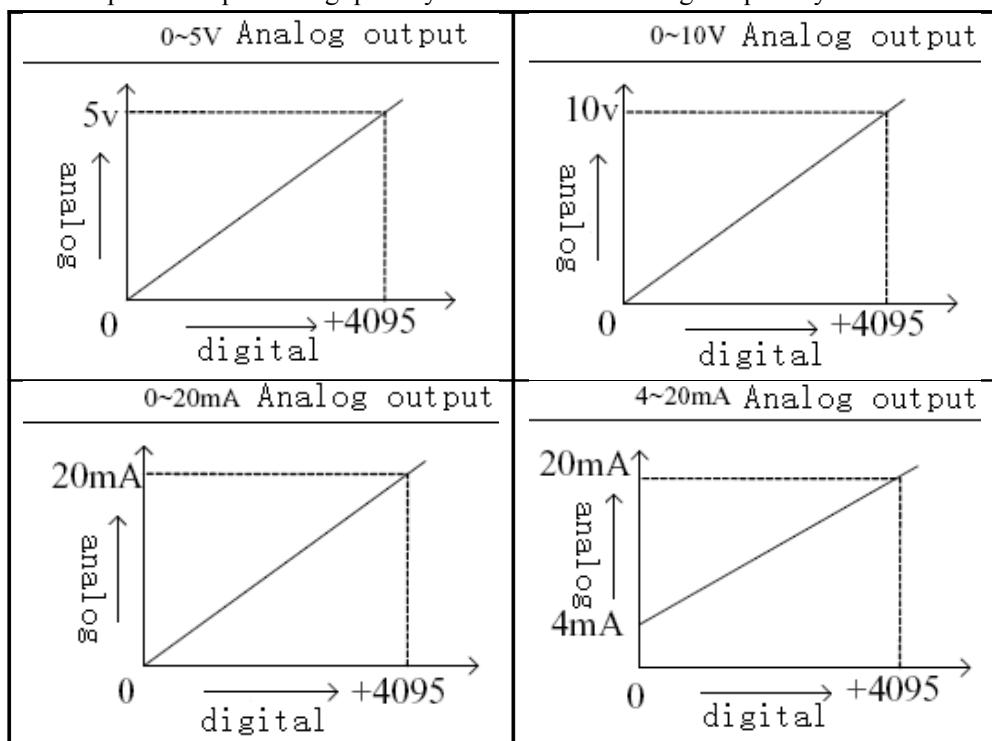
When carry on exterior connection, please note the following two items:

- When connect with external +24V power supply, please use 24V power supply on PLC main unit to avoid intefere.
- To avoid intefere, please use shield cable, and single-point grounding with the shield layer.
- Module's 0 to 20 mA or 4 to 20mA output should be offered 24V power supply from outside. According to the OD value. Adjust the circuit's current. The module itself doesn't generate current.



#### 4. Analog/Digital convert Diagram

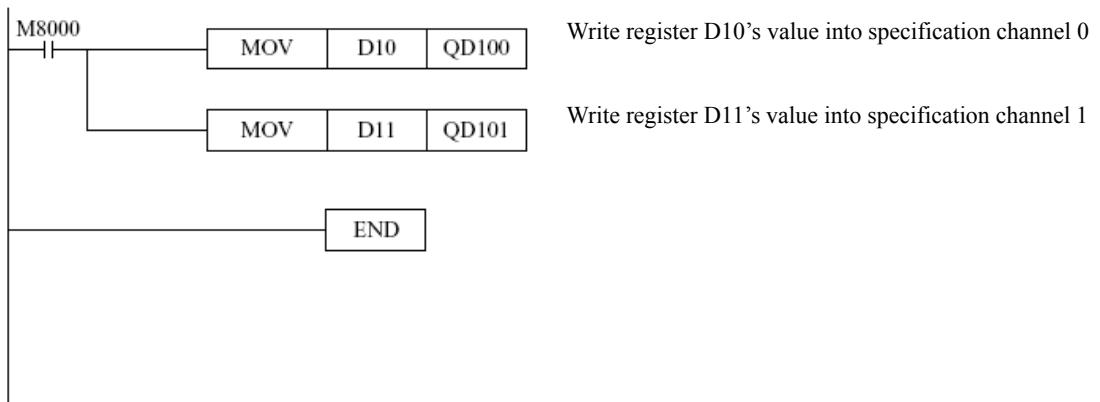
The relationship of the input analog quantity and the converted digital quantity is shown below.



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



**THINGET**

**Thinget Electronic Co., Ltd.**  
4th Floor Building 7, Originality Industry  
park, Liyuan Development Zone, Wuxi  
City, Jiangsu Province 214072  
Tel: (510)85134136  
Fax: (510)85111290