XC PLC series HARDWARE MANUAL

C3-60PR-E CPU, 36 in/24 out
XC3-60PT-C CPU, 36 in/24 out
XC3-48PR-E CPU, 28 in/20 out
XC3-48PT-C CPU, 28 in/20 out
XC3-32PR-E CPU, 18 in/14 out
XC3-32PT-C CPU, 18 in/14 out
XC3-24PR-E CPU, 14 in/10 out
XC3-24PT-C CPU, 14 in/10 out

XC3-14PR-E CPU, 8 in/6 out
XC3-14PT-C CPU, 8 in/6 out

XC3-19AR-E CPU, 9 NPN input

ECON Solutions Group
"Simple Solutions to Difficult Problems"

XC Series PLC Hardware Manual

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1 Summary of XC Series PLC

XC Series PLCs are designed to provide flexibility and power to industry and include a diversity of units to match budget and functionality. The CPUs and Expansion Units ensure flexibility of design. In addition, the Expansion Units facilitate easy expansion of I/O and communications. This chapter explains the main specifications, the complete product range, each part's description code and nomenclature.

The software provided to program the PLC units is Windows or MAC based and designed for easy of use following plug and play principle. Many functions are built-in and follow a tick-box selection protocol to enable settings and functionality; together with wireless capability, programming and setup could not have been made simpler.

1-1 XC Series Overview

1-1-1 XC Range - Models Available

The XC series range is designed with flexibility and cost in mind. The units are available with varying options:-

- I/O counts ranging from 14 point to 60 point
- Variable Power Sources such as AC240V and DC24 Volts
- Relay or Transistor Outputs or mixed outputs
- Input configuration is available in PNP or NPN

The Table 1 below provides a breakdown of the complete series and functionality; see section 2-1-2 for full series' performance and specification.

Series		Model	Description
XC1		Economic Type	Includes 10 I/O, 16 I/O, 24 I/O, 32 I/O Suitable for economic applications which have less of an I/O requirement and cannot be expanded. Does not support full range of control programming function, Expansion Modules or BD cards.
XC2		Basic Type	Includes 14 I/O, 16 I/O, 24 I/O, 32 I/O, 48 I/O, 60 I/O Equipped with XC Series PLCs' basic functions, supports BD Expansion Cards, Equipped with high speed operation ability, CPU does not support expansions modules.
XC3		Standard Type	Includes 14 I/O, 24 I/O, 32 I/O, 48 I/O, 60 I/O XC Series standard models, equipped with full functions.
XC5		Enhanced Type	Includes 24 I/O, 32 I/O, 48 I/O, 60 I/O XC3 Series functions, Additional functions – 24 I/O, 32 I/O models have 4CH pulse output, 48 I/O, 60 I/O support CAN-Bus and CAN-Bus network functions.
XCM		Motion Control Type	Includes 24 I/O, 32 I/O In addition to XC Series' basic functions, XCM models support powerful pulse output functions and advanced motion control instruction. The models are designed especially for motion control.

Special Combined PLC and HMI - XC3-19AR-E
(Combines analog I/O with digital I/O in one body) ※2

※1：For each subsidiary series' model list and functions, please refer to Appendix 4.

※2： XC3-19AR is not included in this manual.
For the users-manual, please refer to《XC3-19AR-E manual》。

1-1-2 XC Series Functions

XC series and models are designed with varying function blocks to provide the user with a cost effective unit depending on the application.

Table 2 below indicates the functions that apply to the complete range. Refer to Table 2 to identify which functions apply to each model.

- High Speed Operation:
  Basic operation instruction 0.2～0.5us, the scan time is 10,000 steps per 5ms, up to 160K program space available.

- Expansions:
  CPUs can support up to 7 different expansions and 1 BD card.

- Multiple Communication Ports:
  CPUs have 1～4 communication ports, can support RS232, RS485, CAN-Bus and can work with many peripheral devices such as inverters, instruments, printers etc.

- Richsoft device space:
  The five subsidiary series of XC Series PLCs are equipped with different internal resources to address specific requirements.
  The resource space reaches: 1024 points flow S, 8767 points middle relayM, 544 points input relay, 544 points output relay, 640 points Timer T, 640 points counter C, 9024 points data register D, 2048 points FD, 36864 points expansion register ED.

- 2 program forms:
  XC Series PLCs can utilize 2 types of program form, i.e. Instruction List and Ladder Chart. The two types are interchangeable.

- Extensive instructions:
  Extensive instructions available, besides the basic order control, are: data transfer and compare; arithmetic; data loop and shift; the PLC also supports pulse output; high speed counter; interruption; PID etc.

- Real time clock:
  XC Series PLCs are equipped with a real time clock, for time control.

- Compact size; straightforward installation:
  XC Series PLCs are compact and simple to install. The user can choose DIN rail or screw installation style.

Enhanced Special Functions

- High Speed Pulse Counter features 80KHz capacity:
  The CPUs of XC2/XC3/XC5 are equipped with 3 channels; 2 phases high speed counter and high speed counter comparator. Can realize single phase, pulse + direction, AB phase count, with up 80KHz frequency.

- Powerful communication & network ability:
  With multiple communication ports and diverse communication protocol, like Modbus protocol, Free Communication protocol etc., it's easy to build different networks.
  In Modbus network, PLC can be master or slave; XC5 Series is CAN-Bus compatible; Ethernet communication is achievable via the T-BOX and the G-BOX can work with GPRS network.

- High Speed Pulse Output can reach 400Hz:
  XC Series PLCs※1 are generally equipped with 2 pulse output terminals and are capable of 400KHz output; the special model※2 has 4 channels of pulse output functions.

- Interruption Function:
  XC Series PLCs have interruption functions; including external interruption, time interruption and high speed counter interruption; enabling them to meet different requirements.

- Switch I/O points freely:
  XC Series PLCs have a special switch I/O point function, this has been developed in case of terminals being damaged; there would be no need to change the program.

- C language function block:
  Enables the user to write the function block in C language. This can help improve program efficiency.

- PID function on CPUs:
  The CPUs of XC series PLCs※1 have PID control and auto tune function.

- Sequential Function Block (BLOCK):
  In the sequential function Block, users can easily control instructions in a sequential manner. This function is compatible with: ON pulse output; communication; motion control and inverter's read/write etc. This function greatly simplifies program editing.

- 24 segments high speed counter interruption:
  There are 24 segments of 32 bits initial value in high speed counter within XC Series PLCs※1 . Each segment can generate interruption with perfect real time ability, and realise electric cam function.

- PWM - Pulse Width Modulation:
  XC Series PLCs※1 have PWM pulse width modulation function; this function can apply to DC motor control.

- Frequency testing
  XC Series PLCs※1 are capable of frequency testing.

- Precise Time
  XC Series PLCs※1can realise precise time; the precise timer is a 32 bits timer of 1ms.

- Motion Control:
  XCM Series PLCs※1 are motion control models; they can realise circular interpolation, position control etc.

※1：Here XC Series PLCs refer to the PLC which can realise the mentioned functions. i.e. not all XC Series PLCs can realise the mentioned function. For details, please refer to Appendix 4.

※2：Here the special model refers to XC5-32T-E

Simple Programming

- Programming the PLC via XCPPro is easy and has the following user-friendly attributes:
- Switch between ladder and instruction list freely.
- Offers soft device comment, ladder comment, instruction hint functions etc.
- Offers many types of program interface for special instructions, straightforward instruction writing.
- Perfect monitor mode: ladder monitor, free monitor, soft devices monitor.
- Many windows in one interface, easy to manage.

※1：For the detailed XCPPro software application,
please refer to《XC series PLC user manual【software】》.

1-1-3 Expansion Options

Expansion Modules

To fulfil the field control requirements better, XC Series PLCs can work with expansions, each CPUs can link with up to 7 expansions.

- Diverse Types
- Digital I/O expansions, analog I/O modules, temperature control modules and mixed function modules etc.
- Compact Size
- DC24V power supply (32I/O modules are AC220V power supply).
- Analog, temperature modules all include PID tune function.

Digital I/O Modules	Analogue I/O Modules	Temperature Control Modules	Function Mixed Modules
Power Supply: DC24V AC220V **Input Points**: 8-32 **Output Points**: 8-32 **Output Type**: Relay Transistor	**Power Supply**: C24V **Type**: DA,AD AD/DA **DA channel** Nr.：2, 4 **AD channel Nr**.: 4, 8	**Power Supply**: DC24V **Temperature**: PT100 **Thermocouple Temp**. Channel Nr.: 6 **PID Control**: Included	**Power Supply**: DC24V **AD**: 3CH **Temperature**: 4CH PT100 **DA**: 2CH

BD Cards

Besides the expansion modules, XC Series PLCs can also accommodate additional BD Cards. The BD cards are small PCB cards which can insert into PLC from the BD port (on CPU), so this kind of expansion doesn't take extra space.

- Analog and temperature type: XC-2AD2PT-BD
- Communication: XC-COM-BD

※1: User should install and configure before using the BD cards.

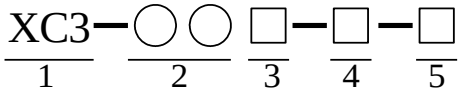
For details, please refer to:《XC series BD cards user manual》.

1-2 Product Code Nomenclature (Series Numbering Principle)

1-2-1 Naming Principle and Model List of CPUs

Naming Principle of CPUs

Naming principle of XC Series PLC CPUs:



1：Series Name		XC1, XC2, XC3, XC5, XCM
2：Input/ Output Point		10, 14, 16, 24, 32, 48, 60
3：If Input is NPN		R：Relay output
		T：Transistor output
		RT：Relay/Transistor mix output (Y0, Y1 are Transistor)
	If Input is PNP	PR：Relay output
		PT：Transistor output
		PRT：Relay/Transistor mix output (Y0, Y1 are Transistor)
4：Power Supply		E：AC Power Supply（220V）
		C：DC Power Supply（24V）

※1：Generally, clock and RS485 are standard configuration on communication port.
Some models are not included. Please refer to Appendix 4.

Expansion Modules

- **XC1 Series Model List**

Model					Input Points (DC24V)	Output Points (R, T)
AC Power Supply			DC Power Supply			
Relay output		Transistor output	Relay output	Transistor output		
NPN	XC1-10R-E	XC1-10T-E	XC1-10R-C	XC1-10T-C	5	5
	XC1-16R-E	XC1-16T-E	XC1-16R-C	XC1-16T-C	8	8
	XC1-24R-E	XC1-24T-E	XC1-24R-C	XC1-24T-C	12	12
	XC1-32R-E	XC1-32T-E	XC1-32R-C	XC1-32T-C	16	16
PNP	XC1-10PR-E	XC1-10PT-E	XC1-10PR-C	XC1-10PT-C	5	5
	XC1-16PR-E	XC1-16PT-E	XC1-16PR-C	XC1-16PT-C	8	8
	XC1-24PR-E	XC1-24PT-E	XC1-24PR-C	XC1-24PT-C	12	12
	XC1-32PR-E	XC1-32PT-E	XC1-32PR-C	XC1-32PT-C	16	16

- **XC2 Series Model List**

Model							Input Points (DC24V)	Output Points (R, T)
AC Power Supply				DC Power Supply				
Relay output				Relay output	Transistor output	R/T Type		
NPN	XC2-14R-E	XC2-14T-E	XC2-14RT-E	XC2-14R-C	XC2-14T-C	XC2-14RT-C	8	6
	XC2-16R-E	XC2-16T-E	XC2-16RT-E	XC2-16R-C	XC2-16T-C	XC2-16RT-C	8	8
	XC2-24R-E	XC2-24T-E	XC2-24RT-E	XC2-24R-C	XC2-24T-C	XC2-24RT-C	14	10
	XC2-32R-E	XC2-32T-E	XC2-32RT-E	XC2-32R-C	XC2-32T-C	XC2-32RT-C	18	14
	XC2-48R-E	XC2-48T-E	XC2-48RT-E	XC2-48R-C	XC2-48T-C	XC2-48RT-C	28	20
	XC2-60R-E	XC2-60T-E	XC2-60RT-E	XC2-60R-C	XC2-60T-C	XC2-60RT-C	36	24
PNP	XC2-14PR-E	XC2-14PT-E	XC2-14PRT-E	XC2-14PR-C	XC2-14PT-C	XC2-14PRT-C	8	6
	XC2-16PR-E	XC2-16PT-E	XC2-16PRT-E	XC2-16PR-C	XC2-16PT-C	XC2-16PRT-C	8	8
	XC2-24PR-E	XC2-24PT-E	XC2-24PRT-E	XC2-24PR-C	XC2-24PT-C	XC2-24PRT-C	14	10
	XC2-32PR-E	XC2-32PT-E	XC2-32PRT-E	XC2-32PR-C	XC2-32PT-C	XC2-32PRT-C	18	14
	XC2-48PR-E	XC2-48PT-E	XC2-48PRT-E	XC2-48PR-C	XC2-48PT-C	XC2-48PRT-C	28	20
	XC2-60PR-E	XC2-60PT-E	XC2-60PRT-E	XC2-60PR-C	XC2-60PT-C	XC2-60PRT-C	36	24

- **XC3 Series Model List**

Model							Input Points (DC24V)	Output Points (R, T)
AC Power Supply				DC Power Supply				
Relay output				Relay output	Transistor output	R/T Type		
NPN	XC3-14R-E	XC3-14T-E	XC3-14RT-E	XC3-14R-C	XC3-14T-C	XC3-14RT-C	8	6
	XC3-24R-E	XC3-24T-E	XC3-24RT-E	XC3-24R-C	XC3-24T-C	XC3-24RT-C	14	10
	XC3-32R-E	XC3-32T-E	XC3-32RT-E	XC3-32R-C	XC3-32T-C	XC3-32RT-C	18	14
	XC3-48R-E	XC3-48T-E	XC3-48RT-E	XC3-48R-C	XC3-48T-C	XC3-48RT-C	28	20
	XC3-60R-E	XC3-60T-E	XC3-60RT-E	XC3-60R-C	XC3-60T-C	XC3-60RT-C	36	24
PNP	XC3-14PR-E	XC3-14PT-E	XC3-14PRT-E	XC3-14PR-C	XC3-14PT-C	XC3-14PRT-C	8	6
	XC3-24PR-E	XC3-24PT-E	XC3-24PRT-E	XC3-24PR-C	XC3-24PT-C	XC3-24PRT-C	14	10
	XC3-32PR-E	XC3-32PT-E	XC3-32PRT-E	XC3-32PR-C	XC3-32PT-C	XC3-32PRT-C	18	14
	XC3-48PR-E	XC3-48PT-E	XC3-48PRT-E	XC3-48PR-C	XC3-48PT-C	XC3-48PRT-C	28	20
	XC3-60PR-E	XC3-60PT-E	XC3-60PRT-E	XC3-60PR-C	XC3-60PT-C	XC3-60PRT-C	36	24

- **XC5 Series Model List**

Model							Input Points (DC24V)	Output Points (R, T)
AC Power Supply				DC Power Supply				
Relay output				Relay output	Transistor output	R/T Type		
NPN	-	XC5-24T-E	-	-	XC5-24T-C	-	14	10
	-	XC5-32T-E	-	-	XC5-32T-C	-	18	14
	XC5-48R-E	XC5-48T-E	XC5-48RT-E	XC5-48R-C	XC5-48T-C	XC5-48RT-C	28	20
	XC5-60R-E	XC5-60T-E	XC5-60RT-E	XC5-60R-C	XC5-60T-C	XC5-60RT-C	36	24
PNP	-	XC5-24PT-E	-	-	XC5-24PT-C	-	14	10
	-	XC5-32PT-E	-	-	XC5-32PT-C	-	18	14
	XC5-48PR-E	XC5-48PT-E	XC5-48PRT-E	XC5-48PR-C	XC5-48PT-C	XC5-48PRT-C	28	20
	XC5-60PR-E	XC5-60PT-E	XC5-60PRT-E	XC5-60PR-C	XC5-60PT-C	XC5-60PRT-C	36	24

- **XCM Series Model List**

Model							Input Points (DC24V)	Output Points (R, T)
AC Power Supply				DC Power Supply				
Relay output				Relay output	Transistor output	R/T Type		
NPN	-	XCM-24T-E	-	-	XCM-24T-C	-	14	10
NPN	-	XCM-32T-E	-	-	XCM-32T-C	-	18	14
NPN	-	XCM-48T-E	-	-	XCM-48T-C	-	28	20
PNP	-	XCM-24PT-E	-	-	XCM-24PT-C	-	14	10
PNP	-	XCM-32PT-E	-	-	XCM-32PT-C	-	18	14
PNP	-	XCM-48PT-E	-	-	XCM-48PT-C	-	28	20

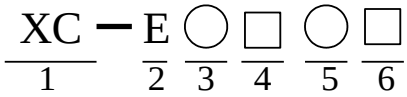
※1：XC1 has also a special 20I/O model available

※2：XCM-48 is in development

1-2-2 Expansion Units – Naming Principle and Module List

I/O Expansion Units

The I/O Expansion Unit's Model Naming Principle:



1：Series name XC
2：For Expansion E
3：Input points 8, 16, 32
4：For Input NPN Type: X
PNP Type: PX
5：Output points 8, 16, 32
6：For output YR：relay output
YT：transistor output

- **I/O Expansion Unit List:**

Model				I/O Points	Input Points (DC24V)	Output Points (R, T)
	Input	Output				
		Relay Output	Transistor Output			
NPN	XC-E8X	-	-	8	8	-
	-	XC-E8YR	XC-E8YT	8	-	8
	-	XC-E8X8YR	XC-E8X8YT	16	8	8
	XC-E16X	-	-	16	16	-
	-	XC-E16YR	XC-E16YT	16	-	16
	-	XC-E16X16YR	XC-E16X16YT	32	16	16
	XC-E32X	-	-	32	32	-
	-	XC-E32YR	-	32	-	32
PNP	XC-E8PX	-	-	8	8	-
	-	XC-E8YR	XC-E8YT	8	-	8
	-	XC-E8PX8YR	XC-E8PX8YT	16	8	8
	XC-E16PX	-	-	16	16	-
	-	XC-E16YR	XC-E16YT	16	-	16
	-	XC-E16PX16YR	XC-E16PX16YT	32	16	16
	XC-E32PX	-	-	32	32	-
	-	XC-E32YR	-	32	-	32

Analog & Temperature Expansion Units

Analog, Temperature Model Naming Principle:

XC－E 4AD 4DA 6PT 6TCA – P

① ② ③ ④ ⑤ ⑥

①	For Expansion	E
②	Analog Input	4AD：4CH analog input
		8AD：8CH analog input
③	Analog Output	2DA：2CH analog output
		4DA：4CH analog output
④	PT100 Temperature	6PT：6CH PT100
⑤	K type thermocouple	6TCA：6CH thermocouple input (V3.1or above)
⑥	P, I, D tune	P：with PID tune
		Blank：without PID tune

- **Analog Modules List**:

Model		**Description**
Analog Input	XC-E8AD	8CH analog input
	XC-E4AD	4CH analog input
	XC-E4AD2DA	4CH analog input, 2CH analog output
Analog Output	XC-E2DA	2CH analog output
	XC-E4DA	4CH analog output
Temperature Input	XC-E6PT-P	6CH PT100 testing with PID tune
	XC-E6TCA-P	6CH K type thermocouple testing, each channel's PID tune separately
	XC-E3AD4PT2DA	3CH analog input, 4CH PT100 testing, 2CH analog output
	XC-E2AD2PT2DA	2CH analog input, 2CH PT100 testing, 2CH analog output

BD Card

The BD Card Naming Principle:

XC－4AD 6PT 6TC– P– BD

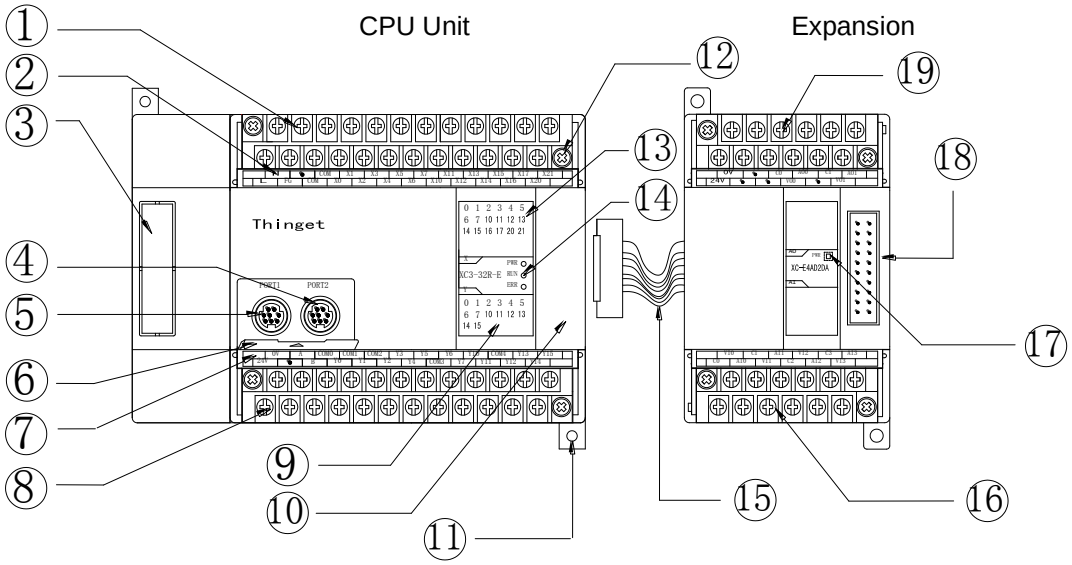
① ② ③ ④ ⑤

①	Analog Input	4AD：4CH analog input 8AD：8CH analog input
②	PT100 Temperature	6PT：6CH PT100 temperature Testing
③	K Type thermocouple	6TC：6CH thermocouple testing
④	P, I, D Tune	P：with PID tune Blank：without PID tune
⑤	For BD card	BD

- **BD Card List**

Model		**Description**
Temperature	XC-2AD2PT-BD	2CH analog input, 2CH PT100 temperature testing
Communication	XC-COM-BD	RS-485/232 communication

1-3 General Component Layout Diagram



Number	Name	Number	Name
1	Input power supply terminals	11	Installation holes (2)
2	Input terminal label	12	Screws to install/remove the terminals
3	Port to install BD card	13	Input LED
4	COM2	14	Action LED: PWR (power); RUN (RUN); ERR (Error)
5	COM1	15	Expansion cable
6	Cover plate for COM port	16	Output terminals
7	Output terminal label	17	Action LED: PWR (power);
8	Output& 24V power terminals	18	Port to connect with expansion
9	Output LED	19	Input & power supply terminals
10	Port to connect with expansion		

2 Specifications and Parameters of CPUs

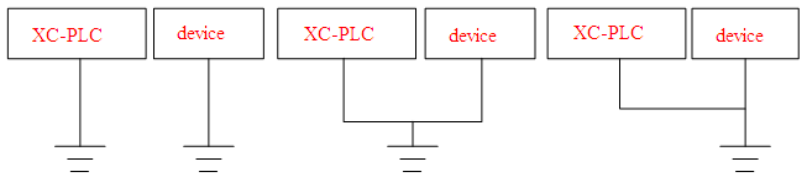
This chapter mainly tells the general specifications, performance, external dimensions, terminals arrangement and communication interface of the CPUs. For the expansions, please refer to chapter 8.

2-1 Specifications and Parameters

2-1-1 General Specifications

Items	Specifications
Isolate Voltage	Above DC 500V 2M ohm
Anti-noise	Noise voltage 1000Vp-p 1uS pulse per minute
Atmosphere	No erosive, flammable gas
Ambient Temperature	0°C~60℃
Ambient Humidity	5%~95% (no dew)
COM1※1	RS-232, connect with the host machine, HMI to program or debug
COM2※2	RS-232/RS-485, connect with net or intelligent instruments, inverters etc.
COM3※3	RS-232C/RS-485 expanded by BD card
COM4※4	CANBUS COM port
Installation	Use M3 screws or DIN to fix※5
Grounding	Ensure ground is provided separate from Motor circuits (Clean Earth)※6

※1：All the CPUs have COM1, for program and communication.
※2：10I/O, 14I/O, 16I/O CPUs don't have COM2.
※3：COM3 is the COM port from BD Card (XC-COM-BD).
※4：COM4 is only equipped on XC Series.
※5：The DIN rail should be DIN46277, width is 35mm.
※6：The grounding should be like type 1 and 2, not 3 (on diagram below).



Type 1 Type 2 Type 3

2-1-2 Individual Series' Performance and Specifications

XC1 Series

Items		Specifications			
Program Executing Form		Loop scan form			
Program Form		Instruction, Ladder			
Dispose Speed		0.5 us			
Power Off Retentive		Use FlashROM			
User's program space※1		32K			
I/O points※2	**Total I/O**	10	16	24	32
	Input	5 X0~X4	8 X0~X7	12 X0~X13	16 X0~X17
	Output	5 Y0~Y4	8 Y0~Y7	12 Y0~Y13	16 Y0~Y17
Internal Coils (X)※3		X0~X77 (64)			
Internal Coils (Y)※4		Y0~Y77 (64)			
Internal Coils (M)		448	M0~M199 【M200~M319】※5		
			For Special Use※6M8000~M8079		
			For Special Use※6M8120~M8139		
			For Special Use※6M8170~M8172		
			For Special Use※6M8238~M8242		
			For Special Use※6M8350~M8370		
Flow (S)		32	S0~S31		
Timer (T)	**Points**	80	T0~T23：100ms not accumulate		
			T100~T115：100ms accumulate		
			T200~T223：10ms not accumulate		
			T300~T307：10ms accumulate		
			T400~T403：1ms not accumulate		
			T500~T503：1ms accumulate		
	Spec.	100mS timer: set time 0.1~3276.7sec. 10mS timer: set time 0.01~327.67sec. 1mS timer: set time 0.001~32.767sec.			
Counter (C)	**Points**	48	C0~C23: 16 bits sequential counter		
			C300~C315: 32 bits sequential/inverse counter		
			C600~C603: single phase high speed counter		
			C620~C621		
			C630~C631		

	Spec.	16 bits counter: set value K0~32,767 32 bits counter: set value -2147483648~＋2147483647	
Data Register (D)		288 words	D0~D99 【D100~D149】※5
			For Special Use※6D8000~D8029
			For Special Use※6D8060~D8079
			For Special Use※6D8120~D8179
			For Special Use※6D8240~D8249
			For Special Use※6D8306~D8313
			For Special Use※6D8460~D8469
FlashROMRegister (FD)		510 words	FD0~FD411
			For Special Use※6FD8000~FD8011
			For Special Use※6FD8202~FD8229
			For Special Use※6FD8306~FD8315
			For Special Use※6 FD8323~FD8335
			For Special Use※6FD8350~FD8384
High Speed Disposability		No	
Password Protection		6 bits ASCII	
Self-diagnose Function		Power on self-check, monitor the timer, grammar check	

XC2 Series

Items		**Specifications**					
Program Executing Form		Loop scan form					
Program Form		Instruction, Ladder					
Dispose Speed		0.5 us					
Power Off Retentive		Use FlashROM					
User's program space※1		128K					
I/O points ※2	**Total I/O**	14	16	24	32	48	60
	Input	8 X0~X7	8 X0~X7	14 X0~X15	18 X0~X21	28 X0~X33	36 X0~X43
	Output	6 Y0~Y5	8 Y0~Y7	10 Y0~Y11	14 Y0~Y15	20 Y0~Y23	24 Y0~Y27
Internal Coils (X)※3		X0~X777 (512)					
Internal Coils (Y)※4		Y0~Y777 (512)					
Internal Coils (M)		8768 points	M0~M2999 【M3000~M7999】※5				
			For Special Use※6M8000~M8767				
Flow (S)		1024 points	S0~S511 【S512~S1023】				
Timer	**points**	640 points	T0~T99：100ms not accumulate				
			T100~T199：100ms accumulate				

			T200~T299：10ms not accumulate
			T300~T399：10ms accumulate
			T400~T499：1ms not accumulate
			T500~T599：1ms accumulate
			T600~T639：1ms precise time
	Spec.	100mS timer: set time 0.1~3276.7sec. 10mS timer: set time 0.01~327.67sec. 1mS timer: set time 0.001~32.767sec.	
Counter (C)	**points**	640 points	C0~C299: 16 bits sequential counter
			C300~C598: 32 bits sequential/inverse counter
			C600~C619: single phase high speed counter
			C620~C629: dual-phase high speed counter
			C630~C639：AB phase high speed counter
	Spec.	16 bits counter: set value K0~32,767 32 bits counter: set value -2147483648~＋2147483647	
Data Register (D)		2612 Words	D0~D999 【D4000~D4999】※5
			For Special Use※6D8000~D8511
			For Special Use※6D8630~D8729
FlashROM Register (FD)		512 words	FD0~FD255
			For Special Use※6 FD8000~FD8255
High Speed Dispose Ability		High speed counter, pulse output, external interruption	
Password Protection		6 bits ASCII	
Self-diagnose Function		Power on self-check, monitor the timer, grammar check	

XC3 Series

Items		Specifications				
Program Executing Form		Loop scan form				
Program Form		Instruction, Ladder				
Dispose Speed		0.5 us				
Power Off Retentive		Use FlashROM and Li battery				
User's program space※1		128K				
I/O points ※2	Total I/O	14	24	32	48	60
	Input	8 X0~X7	14 X0~X15	18 X0~X21	28 X0~X33	36 X0~X43
	Output	6 Y0~Y5	10 Y0~Y11	14 Y0~Y15	20 Y0~Y23	24 Y0~Y27
Internal Coils (X)※3		X0~X777 (512)				
Internal Coils (Y)※4		Y0~Y777 (512)				

Internal Coils (M)		8768 points	M0~M2999 【M3000~M7999】※5
			For Special Use※6M8000~M8767
Flow (S)		1024 points	S0~S511 【S512~S1023】
Timer	points	640 points	T0~T99：100ms not accumulate
			T100~T199：100ms accumulate
			T200~T299：10ms not accumulate
			T300~T399：10ms accumulate
			T400~T499：1ms not accumulate
			T500~T599：1ms accumulate
			T600~T639：1ms precise time
	Spec.	100mS timer: set time 0.1~3276.7sec. 10mS timer: set time 0.01~327.67sec. 1mS timer: set time 0.001~32.767sec.	
Counter (C)	points	640 points	C0~C299: 16 bits sequential counter
			C300~C598: 32 bits sequential/inverse counter
			C600~C619: single phase high speed counter
			C620~C629: dual-phase high speed counter
			C630~C639：AB phase high speed counter
	Spec.	16 bits counter: set value K0~32,767 32 bits counter: set value -2147483648~＋2147483647	
Data Register (D)		9024 words	D0~D3999 【D4000~D7999】※5
			For Special Use※6D8000~D9023
FlashROM Register (FD)		2048 words	FD0~FD1535
			For Special Use※6FD8000~FD8512
Expansion's Register (ED)※7		16384 words	ED0~ED16383
High Speed Dispose Ability		High speed counter, pulse output, external interruption	
Password Protection		6 bits ASCII	
Self-diagnose Function		Power on self-check, monitor the timer, grammar check	

XC5 Series

Items	Specifications
Program Executing Form	Loop scan form
Program Form	Instruction, Ladder
Dispose Speed	0.5 us
Power Off Retentive	Use FlashROM
User's program space※1	96K

I/O points ※2	Total I/O	24	32	48	60
	Input	14 X0~X15	18 X0~X21	28 X0~X33	36 X0~X43
	Output	10 Y0~Y11	14 Y0~Y15	20 Y0~Y23	24 Y0~Y27
Internal Coils (X)※3		512 points: X0~X777			
Internal Coils (Y)※4		512 points: Y0~Y777			
Internal Coils (M)		8768 points	M0~M3999 【M4000~M7999】※5		
			For Special Use※6M8000~M8767		
Flow (S)		1024 points	S0~S511 【S512~S1023】		
Timer	points	640 points	T0~T99：100ms not accumulate		
			T100~T199：100ms accumulate		
			T200~T299：10ms not accumulate		
			T300~T399：10ms accumulate		
			T400~T499：1ms not accumulate		
			T500~T599：1ms accumulate		
			T600~T639：1ms precise time		
	Spec.	100mS timer: set time 0.1~3276.7sec. 10mS timer: set time 0.01~327.67sec. 1mS timer: set time 0.001~32.767sec.			
Counter (C)	points	640 points	C0~C299: 16 bits sequential counter		
			C300~C598: 32 bits sequential/inverse counter		
			C600~C619: single phase high speed counter		
			C620~C629: dual-phase high speed counter		
			C630~C639：AB phase high speed counter		
	Spec.	16 bits counter: set value K0~32,767 32 bits counter: set value -2147483648~＋2147483647			
Data Register (D)		9024 words	D0~D999 【D4000~D4999】※5		
			For Special Use※6D8000~D8511		
			For Special Use※6D8630~D8729		
FlashROM Register (FD)		6144 words	FD0~FD5119		
			For Special Use※6FD8000~FD9023		
Expand the internal registers (ED)※7		36864 words	ED0~ED36863		
High Speed Dispose Ability		High speed counter, pulse output, external interruption			
Password Protection		6 bits ASCII			
Self-diagnose Function		Power on self-check, monitor the timer, grammar check			

XCM Series

Items		Specifications		
Program Executing Form		Loop scan form		
Program Form		Instruction, Ladder		
Dispose Speed		0.5 us		
Power Off Retentive		Use FlashROM and Li battery		
User's program space※1		160K		
I/O points ※2	Total I/O	24	32	48
	Input	14 X0~X015	18 X0~X021	28 X0~X33
	Output	10 Y0~Y011	14 Y0~Y015	20 Y0~Y23
Internal Coils (X)※3		X0~X1037 (Total 544)		
Internal Coils (Y)※4		Y0~Y1037 (Total 544)		
Internal Coils (M)		8768 points	M0~M2999 【M3000~M7999】※5	
			For Special Use※6M8000~M8768	
Flow (S)		1024 points	S0~S511 【S512~S1023】	
Timer	points	640 points	T0~T99：100ms not accumulate	
			T100~T199：100ms accumulate	
			T200~T299：10ms not accumulate	
			T300~T399：10ms accumulate	
			T400~T499：1ms not accumulate	
			T500~T599：1ms accumulate	
			T600~T639：1ms precise time	
	Spec.	100mS timer: set time 0.1~3276.7sec. 10mS timer: set time 0.01~327.67sec. 1mS timer: set time 0.001~32.767sec.		
Counter (C)	points	640 points	C0~C299: 16 bits sequential counter	
			C300~C598: 32 bits sequential/inverse counter	
			C600~C619: single phase high speed counter	
			C620~C629: dual-phase high speed counter	
			C630~C639：AB phase high speed counter	
	Spec.	16 bits counter: set value K0~32,767 32 bits counter: set value -2147483648~＋2147483647		
Data Register (D)		5024 words	D0~D2999 【D4000~D4999】※5	
			For Special Use※6D8000~D9023	

	524 words	FD0~FD63
		For Special Use※6FD8000~FD8349
		For Special Use※6FD8890~FD8999
Expand the internal registers (ED)※7	36864 words	ED0~ED36863
High Speed Dispose Ability	High speed counter, pulse output, external interruption	
Password Protection	6 bits ASCII	
Self-diagnose Function	Power on self-check, monitor the timer, grammar check	

※1：The user's program space: refers to the maximum program space when using ‘Secret Download’ function.

※2：I/O points: refer to the maximum external terminal connection points available.

※3：X: refers to the internal input relays, users can use middle relay when exceeding the Input points

※4：Y: refers to the internal output relays, users can use middle relay when exceeding the Output points.

※5：【】Sign: the default power off retentive area, this area can be changed.

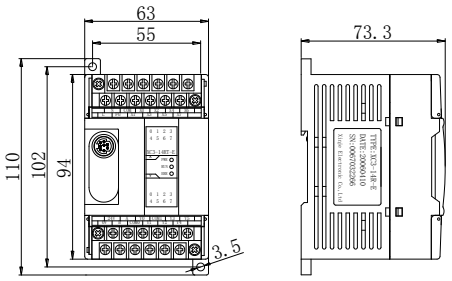
※6：For special use: refers to the special usage registers that are occupied by the system – this can't be applied for other usage. For details, please refer to Appendix 1;

※7：Only the hardware with 3.0 or above version of the CPUs have internal expansion register ED.

2-2 External Dimensions

Graph 1

(Unit: mm)

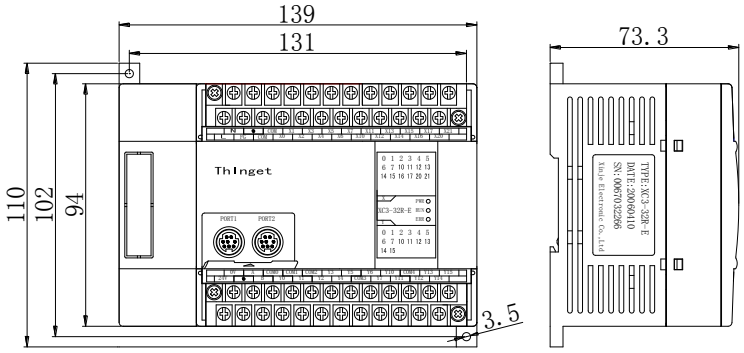


Applicable to Models

Series	I/O
XC1	10 and 16
XC2	14 and 16
XC3	14

Graph 2

(Unit: mm)

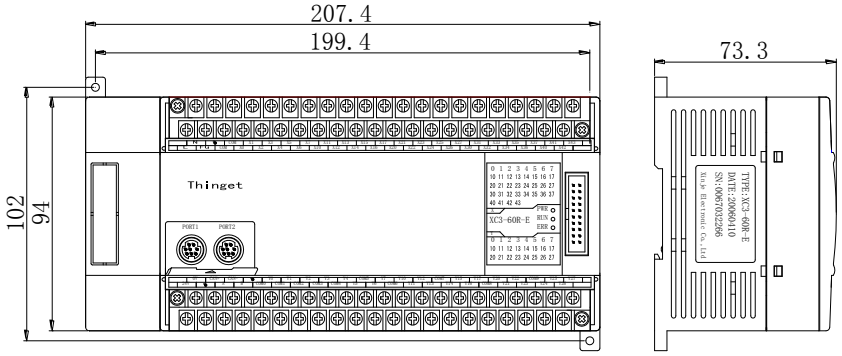


Applicable to Models

Series	I/O
XC1	24 and 32
XC2	24 and 32
XC3	24 and 32
XC5	24 and 32
XCM	24 and 32

Graph 3

(Unit: mm)

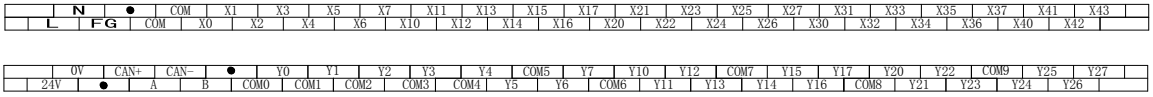


Applicable to Models

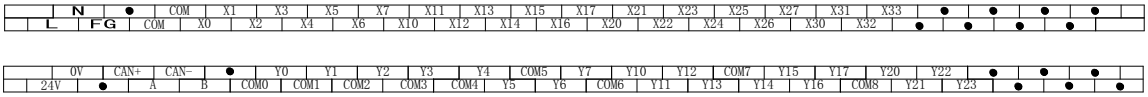
Series	I/O
XC2	48 and 60
XC3	48 and 60
XC5	48 and 60
XCM	48

2-3 Terminal Arrangements

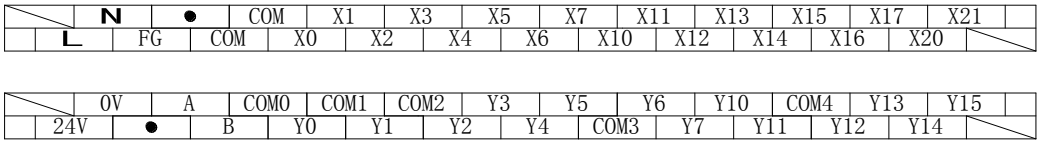
Graph A



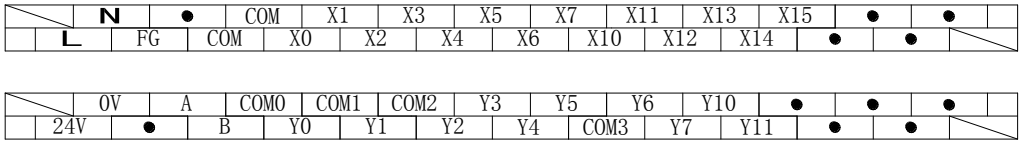
Graph B



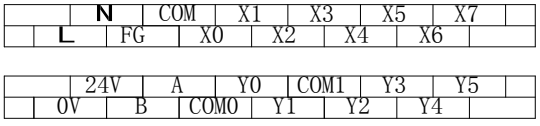
Graph C



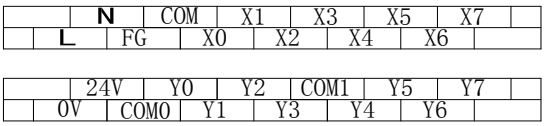
Graph D



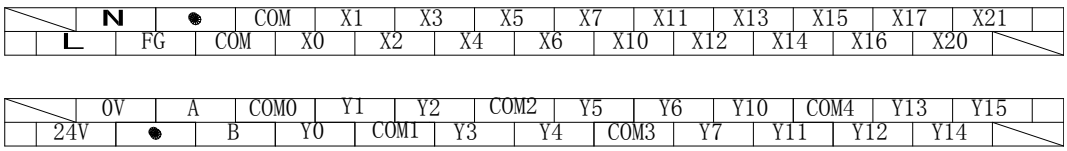
Graph E



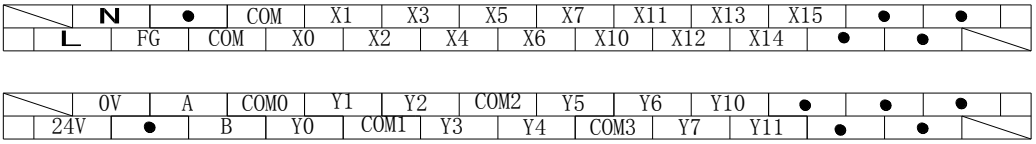
Graph F



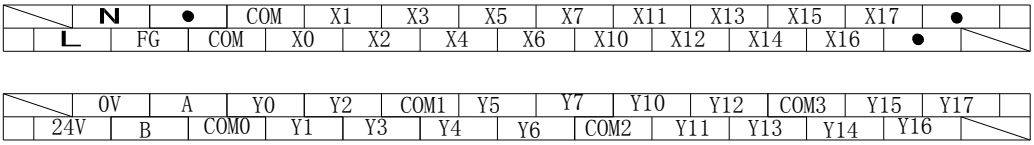
Graph G



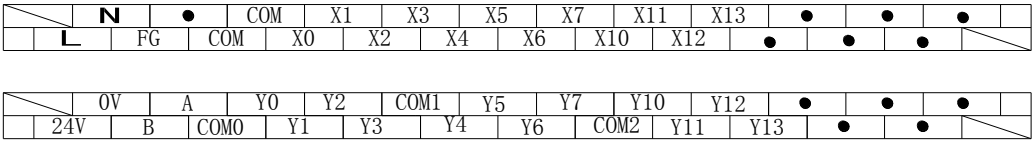
Graph H



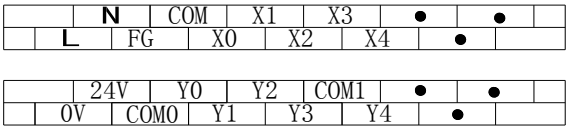
Graph I



Graph J



Graph K



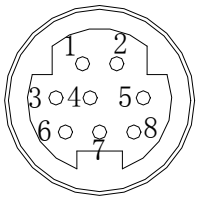
Graph to Model key:

Graph	Suitable Model	Comment
A	XC2-60, XC3- 60, XC5- 60	36 input/24 output
B	XC2-48, XC3- 48, XC5- 48	28 input/20 output
C	XC2-32, XC3- 32	18 input/14 output
D	XC2-24, XC3- 24	14 input/10 output
E	XC2-14, XC3- 14	8 input/6 output
F	XC1- 16, XC2-16	8 input/8 output
G	XC5- 32, XCM-32	18 input/14 output
H	XC5- 24, XCM-24	14 input/10 output
I	XC1- 32	16 input/16 output
J	XC1- 24	12 input/12 output
K	XC1-10	5 input/5 output

2-4 Communication Interface Ports – Pin Configuration

COM 1

Pins of COM1:

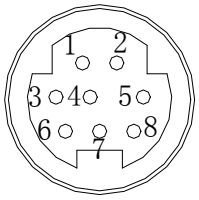


Mini Din 8 female

2：PRG
4：RxD
5：TxD
6：VCC
8：GND

COM 2

Pins of COM2※1:



Mini Din 8 female

4：RxD
5：TxD
8：GND

Program Cable

Mini Din 8 male　　DB9 female

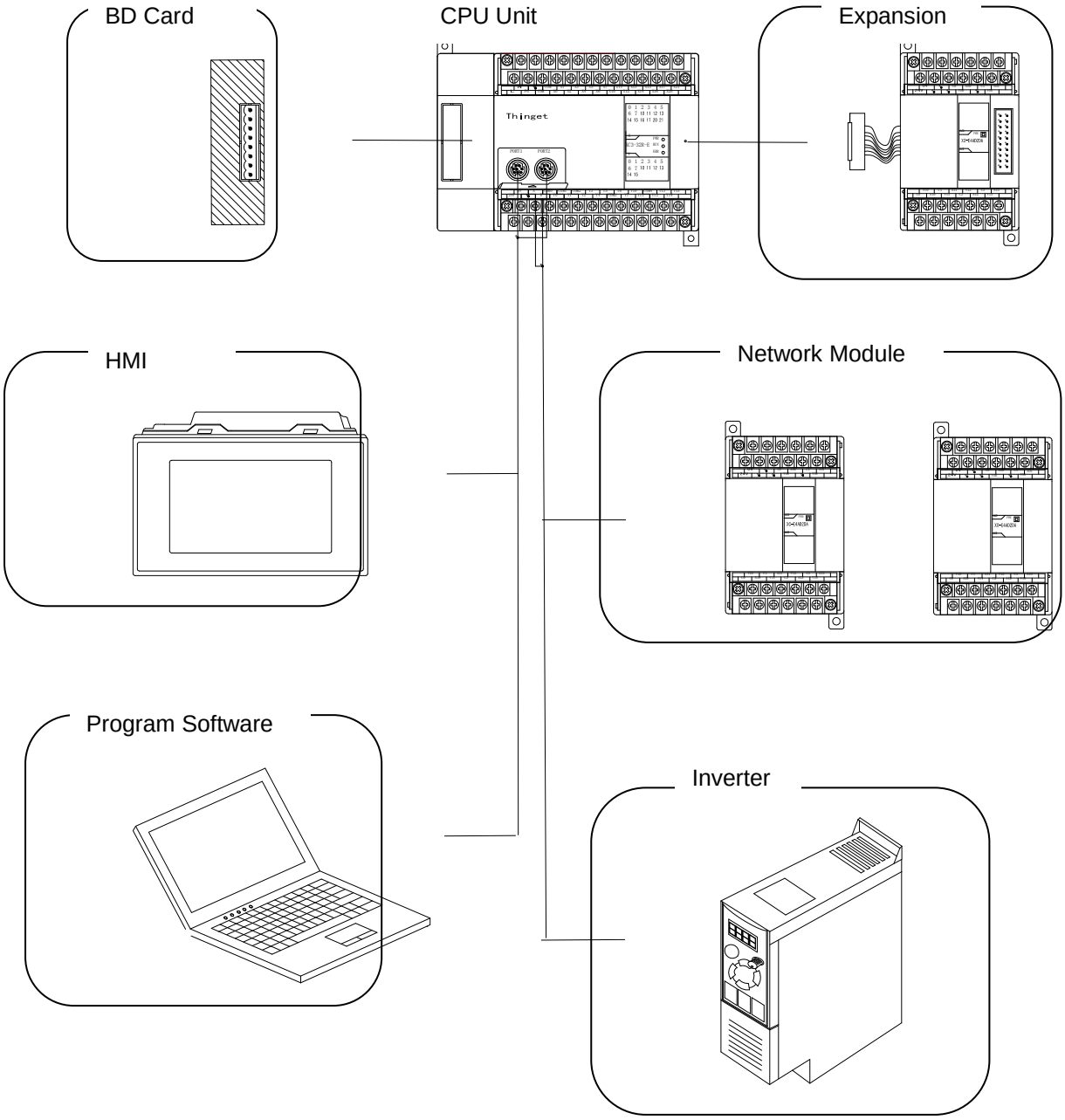
※1：in the graph we show only RS232 of COM2, we extend RS485 (A, B) to the terminals), therefore we have not listed them here.

3 System Structure

As the controller, the XC Series PLC can connect with many different types of expansion modules etc. In this chapter, we mainly cover the expansion devices; the connection principles of CPUs with expansion modules; installation; calculation of the I/O points and input/output ID etc. For the introduction of expansions, please refer to chapter 8.

3-1 System Structure

In the diagram below, we show the common system structure according to XC Series PLCs' basic configuration. It shows the basic connection between the PLC and peripheral equipment; also classic applications of the PLC's separate COM port, connection and expansion etc.



※1 : In the above graph, the communication devices connected to the COM port are only samples for your reference. Each COM port can connect with many devices in real applications.

3-2 Peripheral Equipment

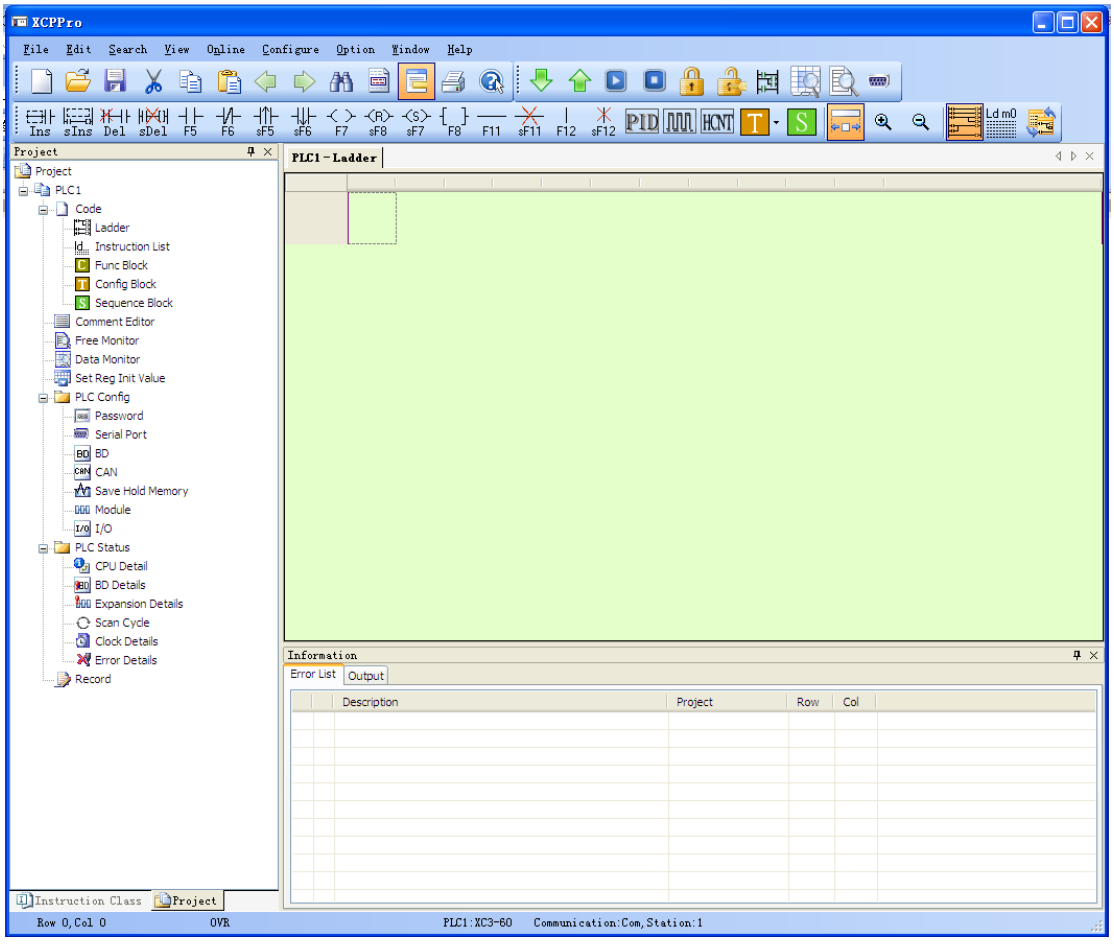
XC Series PLC basic units can work with many kinds of peripheral equipment.

3-2-1 Program Software

Via program software, users can write-to or upload program from PLCs, monitor PLCs in real time or configure PLCs etc.

After installing XCPPro on your PC, use the program cable, via COM1 or COM2 on PLCs (CPUs) to link PLC with XCPPro;

Program Interface



※1 : Communication Cables are available for Listo Limited, alternatively, specification and pin-outs are shown in Chapter 2-4

3-2-2 Human Machine Interface (HMI)

The HMI links PLCs to the operators. The HMI can send the commands from operators to PLCs, the PLC then executes the commands.
XC Series PLCs support diverse brands of HMI; the connection is based on the communication protocol. Generally, communication is via Modbus protocol, the detailed parameter settings depends on the HMI.
Listo HMIs can work with the PLC directly (the communication parameters are factory-set).
Listo currently offers four series of HMI: TH, TP, OP and MP.

TP / TH Series
Touch Panel Monitors

Size:	4.7", 5.7", 7", 10.4"
Display:	256 true color TFT
Operation:	Touch Screen
Interface:	RS232, RS422, RS485
Communication	Compatible with many PLC brands, inverters, instruments etc.
	Communicates with Listo Inverters
	Driver panel printer directly
	Dual COM ports, work with two different devices separately
	Supports free format protocol;

Recipe
Advanced Function
RTC: Real Time Clock
Password: nine-level setting

OP Series
Operation Panels

Size	3.7", 5.7"
Display	Blue LCD, 256 true color
Buttons Nr.	7, 20, 42
Interface	RS232, RS485
Communication	Compatible with many PLC brands.
	Communicates with Listo Inverters

RTC

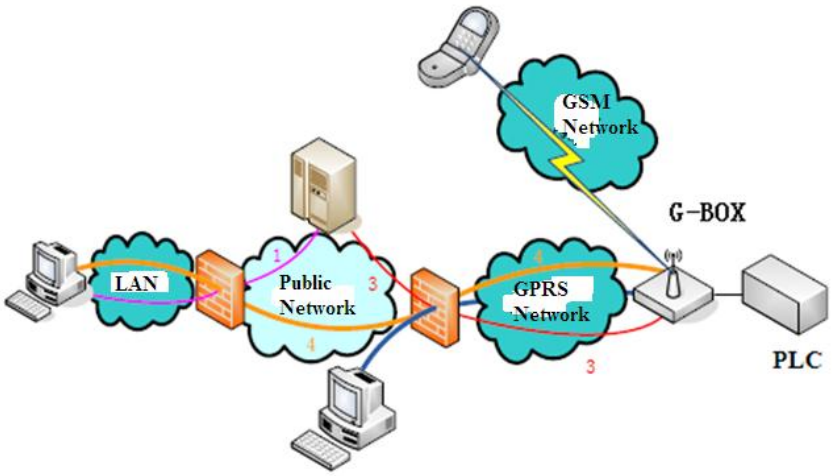
MP Series
Operation Panels with Touch Function

Size	3.7", 7"
Display	256 true color, blue LCD
Buttons Nr.:	26, 42, the LCD is a touch screen
Interface:	RS232, RS485
Communication	Compatible with many PLC brands. Communicates with Listo Inverters
RTC:	Real Time Clock

3-2-3 Network Modules

PLCs can build Modbus network, special models can build CAN-Bus network.
If the basic units are configured with the special network module, they can connect to GPRS network, Ethernet etc.

G-BOX

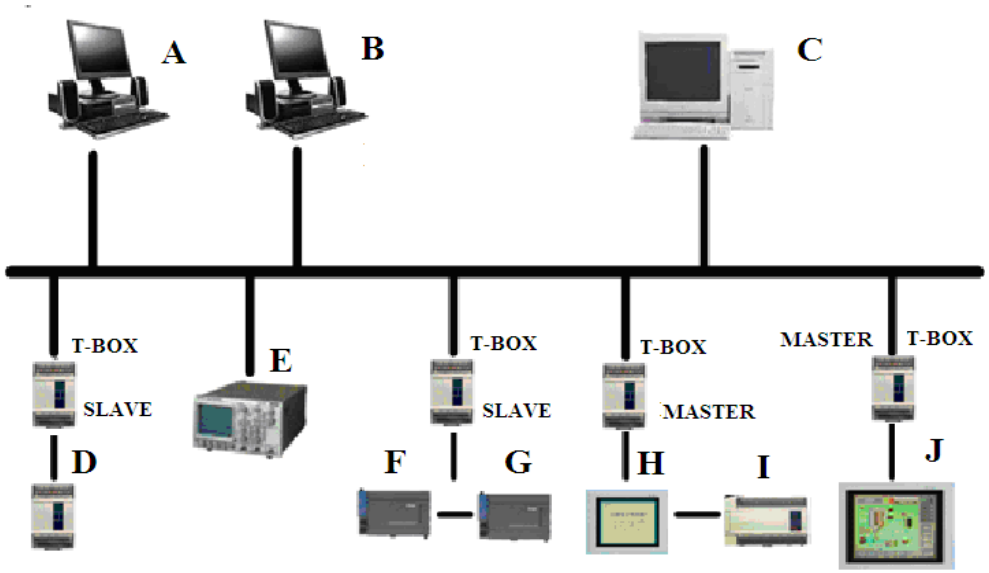


Data transfer wirelessly, open and transparent.
Remote program and debug PLC, realize upload/download PLC.
Integral data transfer terminal of TCP/IP protocol pallet, supports TCP, UDP, DNS, PPP etc.
Standard industrial interface (RS-232 or RS-485).
Supports long time online mode, equipped with re-dial and heart-beat functions.
Supports SMS to control PLC.
Supports local configuration.
Supports GPRS network and GSM network.
Suitable for distribution system and remote control applications.

T-BOX

As an industrial Ethernet module, T-BOX supports Modbus-RTU devices, the design is comparable to industrial Ethernet control systems.

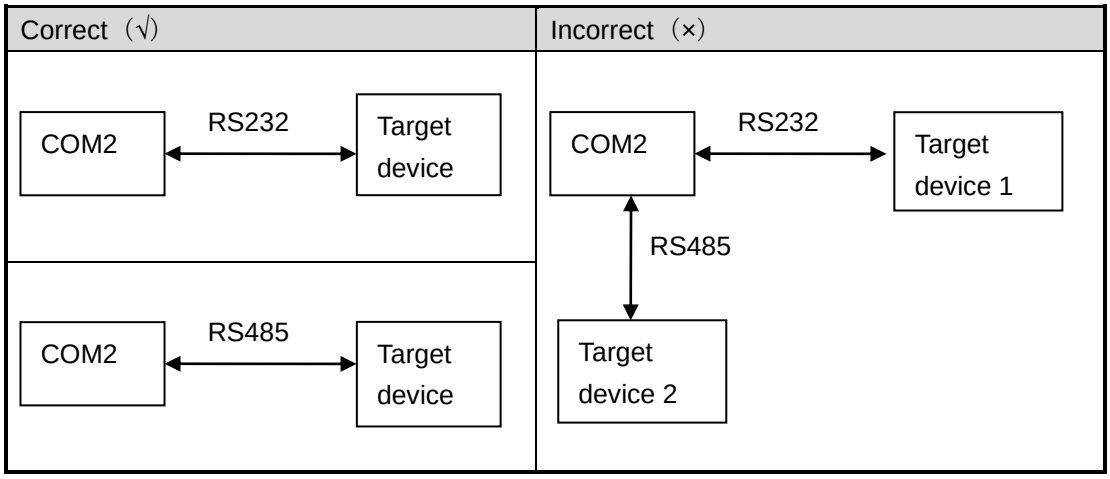
Remote integral maintenance and interrogation of PLC program on IP devices.
Remote integral monitor of PLC program on IP devices.
The traditional Modbus communication is ‘one master - multi-slave’ form. The communication speed is slow. Via the connection by T-Box, users can realize the data exchange among master PLC and each subsidiary PLC.



Realize flexible distributing automation structure, simplify system management.
Realize Ethernet communication via RJ45 interface; the communication is based on standard TCP/IP protocol.
Realize remote program, monitor, diagnosis via industrial Ethernet, therefore saving a lot of time and cost.
Store and operate data information via Ethernet, build-base to simplify the data disposal and file.
Enable the communication between Ethernet and automation equipment, enable these devices to be used in complicated systems.
High performance/price ratio, link the Ethernet to all the automation devices and levels in a simple form.
Easy to maintenance, supports simple diagnostic / interrogation function.

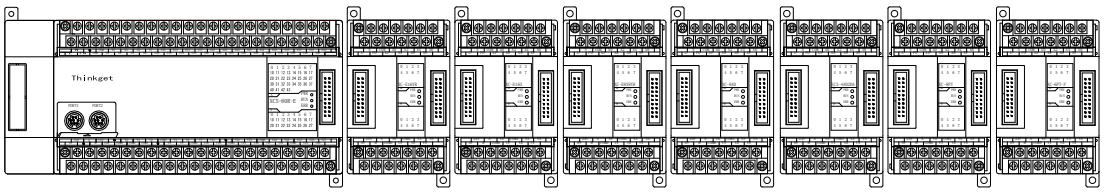
Communication Ports

XC Series PLC (CPUs) are usually equipped with COM1 and COM2.
Normally, both COM ports can be used to program, download, communication; however if the parameters on two COM ports are changed simultaneously this will cease to function.
COM2 is equipped with RS232 and RS485. But COM2 can't use these two modes at one time; i.e. COM2 can only be applied to one interface mode.



Expansion Devices

Generally, one CPU can work with different types of expansions, expanding digital I/O, analog I/O, temperature control etc.
One unit can work with up to 7 expansions and an extra BD card.



After connect the CPU with the expansion, if the "PWR" LED on expansion unit is ON, the expansion can work properly; after installing the BD card to CPU, both units require configuring before use.

How to Calculate the I/O

Once expanded, the total I/O points = I/O on basic unit + I/O on expansions.
Digital I/O is Octal
Analog I/O is Decimal
After expansion, the total I/O can reach 284 points

How to Calculate the I/O Points

Basic Unit XC3-32R-E (18I/14O) connected to 5 Expansion Units:

XC-E8X8Y, XC-E16X, XC-E32Y, XC-E2AD, XC-E4DA.

The total I/O points should be:

Input Points: 18 + 8 + 16 = 42

Output points: 14 + 8 +32 = 54

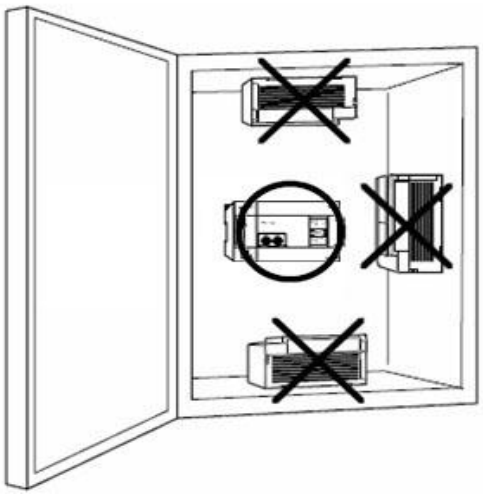
3-4 ID Assignment of Expansions

Expansion Position	Type	ID (As Register)	Maximum points/channels
Position 1#	Digital Input X	X100~X137	32 points
	Digital Output Y	Y100~Y137	32 points
	Analog Input ID	ID100~ID131	16 channels
	Analog Output QD	QD100~QD131	16 channels
	Module's Value D	D8250~D8259	-
Position 2#	Digital Input X	X200~X237	32 points
	Digital Output Y	Y200~Y237	32 points
	Analog Input ID	ID200~ID231	16 channels
	Analog Output QD	QD200~QD231	16 channels
	Module's Value D	D8260~D8269	-
Position 3#	Digital Input X	X300~X337	32 points
	Digital Output Y	Y300~Y337	32 points
	Analog Input ID	ID300~ID331	16 channels
	Analog Output QD	QD300~QD331	16 channels
	Module's Value D	D8270~D8279	-
Position 4#	Digital Input X	X400~X437	32 points
	Digital Output Y	Y400~Y437	32 points
	Analog Input ID	ID400~ID431	16 channels
	Analog Output QD	QD400~QD431	16 channels
	Module's Value D	D8280~D8289	-
Position 5#	Digital Input X	X500~X537	32 points
	Digital Output Y	Y500~Y537	32 points
	Analog Input ID	ID500~ID531	16 channels
	Analog Output QD	QD500~QD531	16 channels
	Module's Value D	D8290~D8299	-
Position 6#	Digital Input X	X600~X637	32 points
	Digital Output Y	Y600~Y637	32 points
	Analog Input ID	ID600~ID631	16 channels
	Analog Output QD	QD600~QD631	16 channels
	Module's Value D	D8300~D8309	-
Position 7#	Digital Input X	X700~X737	32 points
	Digital Output Y	Y700~Y737	32 points
	Analog Input ID	ID700~ID731	16 channels
	Analog Output QD	QD700~QD731	16 channels
	Module's Value D	D8310~D8319	-

Expansion Position	Type	ID (As Register)	Maximum points/channels
BD Card	Digital Input X	X1000~X1037	32 points
	Digital Output Y	Y1000~Y1037	32 points
	Analog Input ID	ID1000~ID1031	16 channels
	Analog Output QD	QD1000~QD1031	16 channels
	Module's Value D	D8320~D8329	-

3-5 General Installation Notes

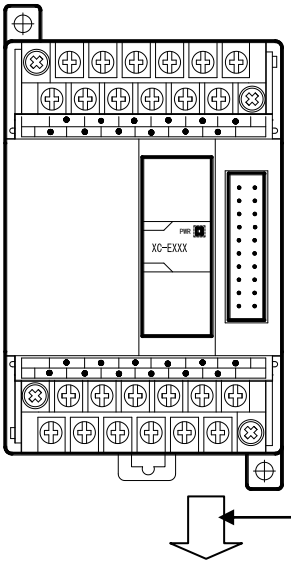
Installation Positions



Installation Method

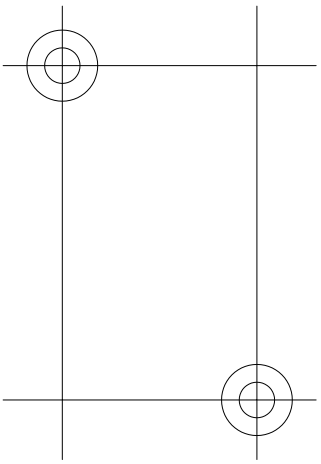
Use a DIN rail or screws to install the CPU units and expansions.

Use DIN46277



DIN installation

Directly install by screws



M3 Screw

Installation Environment

Please install the products according to chapter 2-1-1

4 Power Supply Specification and Wiring Method

In this chapter, we cover the structure, specification and external wiring of XC Series PLCs. The wiring methods differ from model to model, particularly in terms of wiring terminals. For each model's terminal arrangement, please refer to chapter 2-3.

4-1 Power Supply Specifications

The power supply specifications of XC series PLCs are listed below:

AC Power Supply Type

Items	Content
Rated Voltage	AC100V~240V
Allow Voltage Range	AC90V~265V
Rated Frequency	50/60Hz
Allow momentary power-off time	Interruption Time≤0.5 AC cycle, interval≥1sec
Impulse Current	Below 40A 5mS/AC100V below 60A 5mS/AC200V
Maximum Power Consumption	12W
Power Supply for Sensor	24VDC±10% maximum 400mA

time or voltage decreases abnormally, the PLC will stop working - Output will be OFF. When the power supply recovers, the PLC will run automatically.

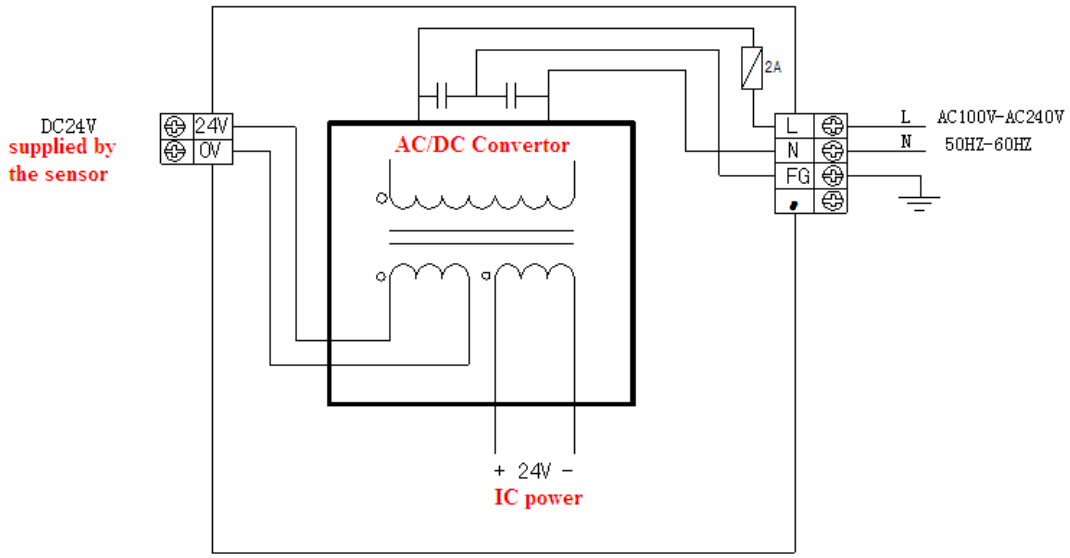
※3：The grounding terminals on basic units and expansions connect together and third type grounding should be followed.

DC Power Supply Type

Items	Content
Rated Voltage	DC24V
Allow Voltage Range	DC21.6V~26.4V
Input Current (Only for basic unit)	120mA DC24V
Allow momentary power off time	10mS DC24V
Impulse Current	10A DC26.4V
Maximum Power Consumption	12W
Power Supply for Sensor	24VDC±10% maximum 400mA

4-2 AC Power DC Input Type

Connection



※1：Connect the power supply to L, N terminals.

※2：24V, COM can supply 400mA/DC24V power supply. Do not give these two terminals power supply.

※3：[.] Terminals are blank terminals – not for connection, please do not wire them or use them as middle relays.

※4：Please connect the [COM] terminals on basic units and expansions together.

5 Input Specifications and Wiring Methods

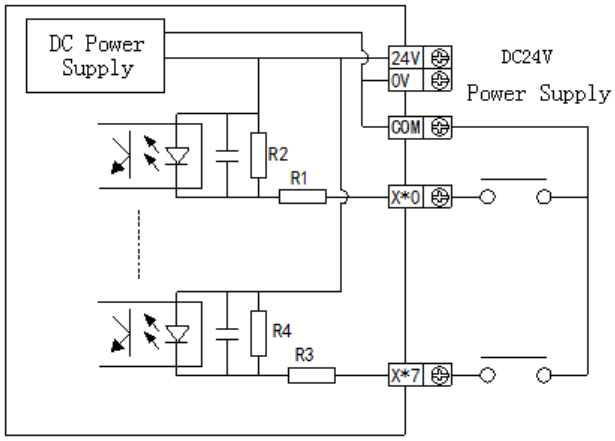
In this chapter we explain the input specifications and external wiring methods of XC

Series PLCs. The connection methods differ according to the different models; specifically in relation to the position of terminals. For each model's terminal arrangement, please refer to chapter 2-3.

5-1 Input Specification

Basic Units

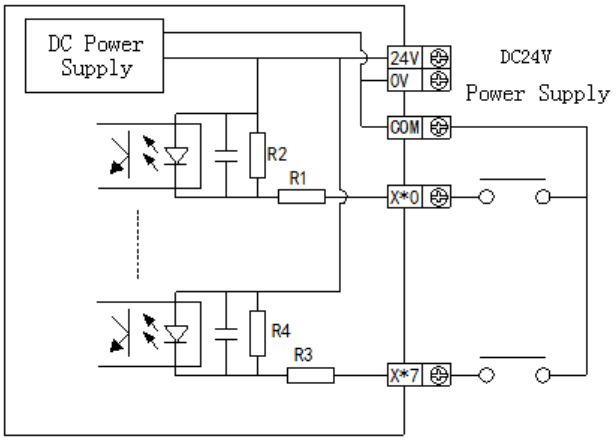
Input signal's voltage	DC24V±10%
Input signal's current	7mA/DC24V
Input ON current	Up to 4.5mA
Input OFF current	Low than 1.5mA
Input response time	About 10ms
Input signal's format	Contact input or NPN open collector transistor
Circuit insulation	Photo-electricity coupling insulation
Input action's display	LED light when input ON



Expansion Modules

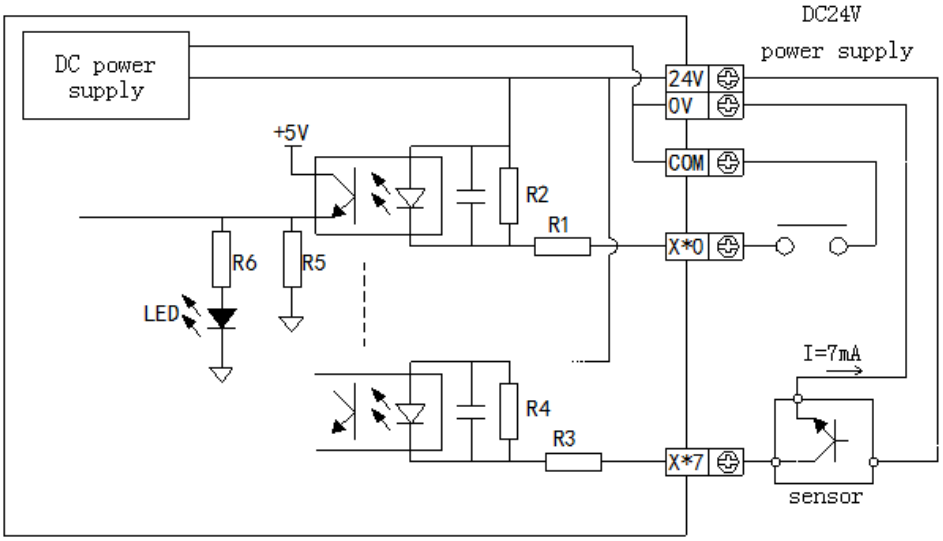
Input signal's voltage	DC24V±10%
Input signal's current	7mA/DC24V
Input ON current	Up to 4.5mA
Input OFF current	Low than 1.5mA
Input response time	About 10ms

Input signal's format	Contact input or NPN open collector transistor
Circuit insulation	Photo-electricity coupling insulation
Input action's display	LED light when input ON



5-2 DC Input Signal (AC Power Supply Type)

DC Input Signal



Input Terminal

When connecting input terminals and COM terminals, with volt-free contacts or NPN open collector transistors; if the input is ON，LED lamp lights, which indicates input. There are many COM terminals to connect in PLC.

Input Circuit

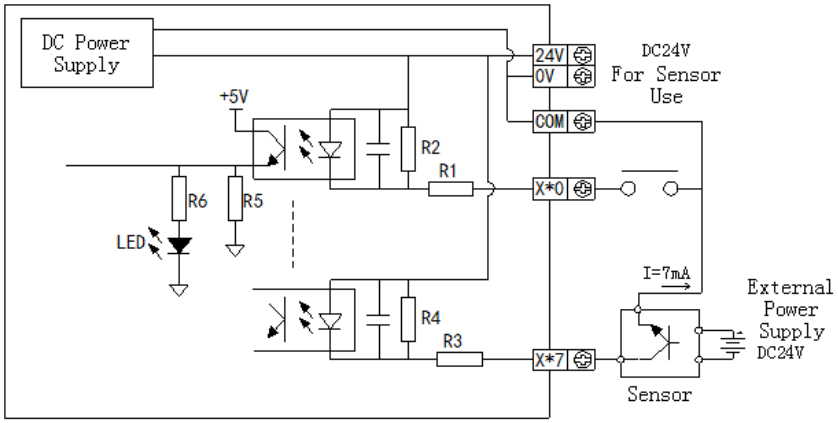
Use optical coupling instruments to insulate the input once circuit and twice circuit. There is a C-R filter in the twice circuit. It is set to avoid wrong operation caused by vibration of input contacts or noise along with input signal. As the preceding reason, for the changing of input ON→OFF，OFF→ON，in PLC, the response time delays about 10ms。There is a digital filter inside X000~X015.This kind of filter can vary from 0~15ms according to the special register (D8020).

Input sensitive

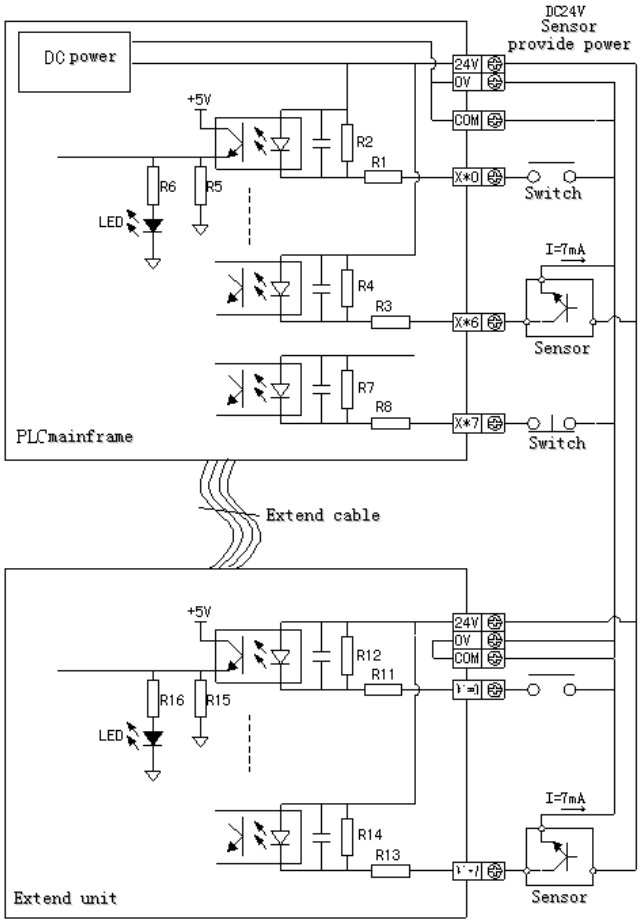
The PLC's input current is DC24V/7mA, but to be safe, it needs current up to 3.5mA when ON and lower than 1.5mA when OFF.

External Circuit Supply utilized by Sensors

XC Series PLCs' power input is supplied by its interior 24V power，if using exterior power to drive a photo-electric sensor etc., this exterior power should be DC24V±4V，please use NPN open collector type for sensor's output transistor.

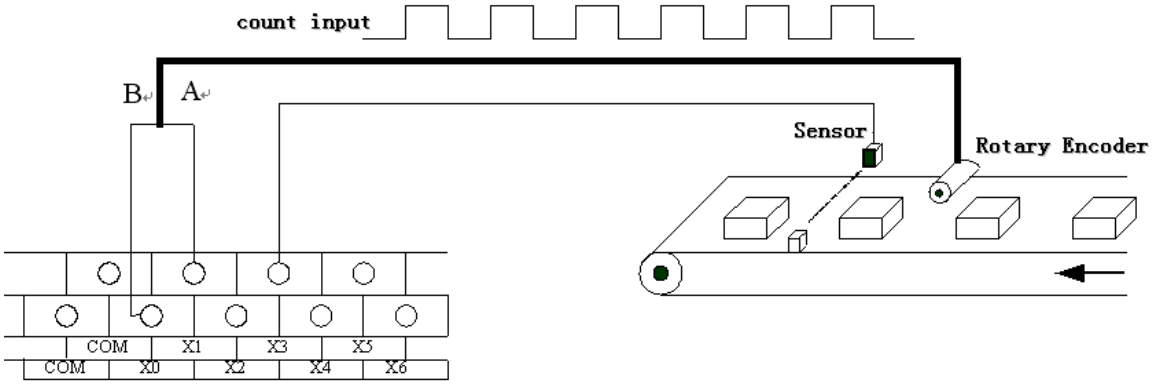


Input Wiring


DC24V
Sensor
provide power
DC power
24V
0V
COM
+5V
R2
R1
X*0
Switch
R6
R5
LED
I=7mA
R4
R3
X*6
Sensor
R7
R8
X*7
Switch
PLC mainframe
Extend cable
+5V
24V
0V
COM
R12
R11
R16
R15
LED
I=7mA
R14
R13
Sensor
Extend unit

5-3 High Speed Counter Input

XC Series PLCs support a high speed count function which is independent within the scan cycle. By using a different counter, testing the high speed input signal is achieved through the sensor and rotary encoder. The maximum testing frequency is 80KHz.

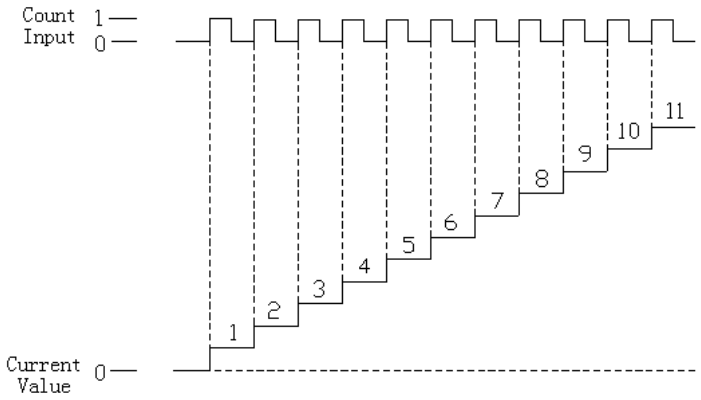


5-3-1 Count Mode

XC Series HSC function has three count modes: Increment mode, Pulse + Direction mode and AB-phase mode;

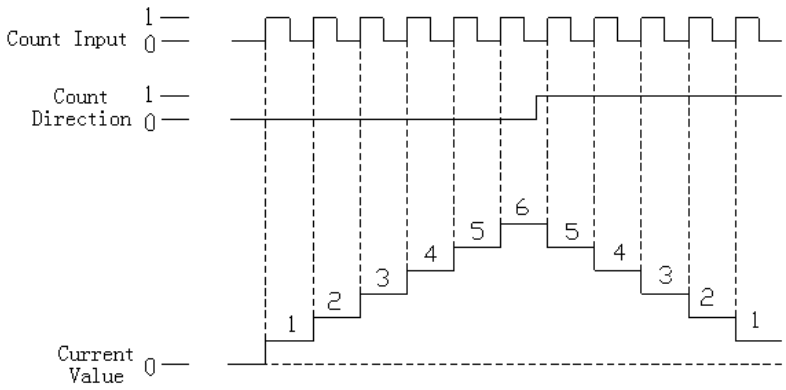
Increment Mode

Under this mode, input the pulse signal, the count value will increase with every rising edge of the pulse signal;



Pulse + Direction Mode

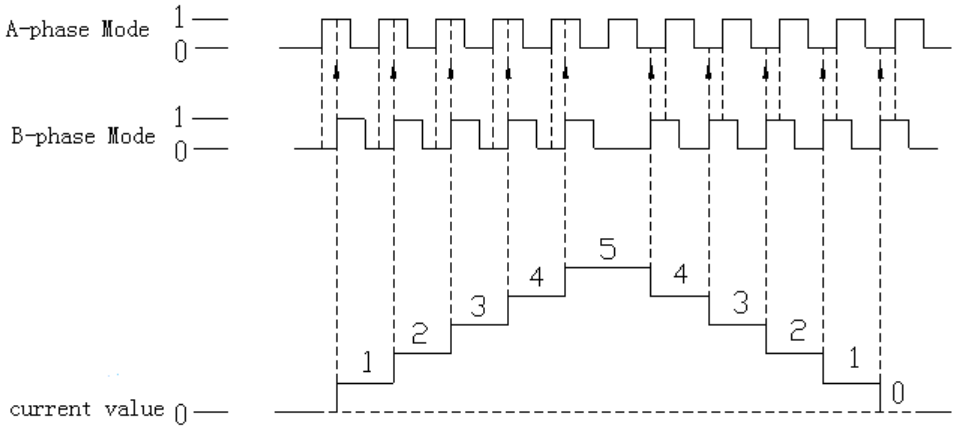
In this mode, pulses are counted in either Increments of Decrements. If count direction is set to ZERO then Pulse Counts are Increments; if count direction is set to ONE, Pulse Counts are decremented. The diagram below indicates this function.



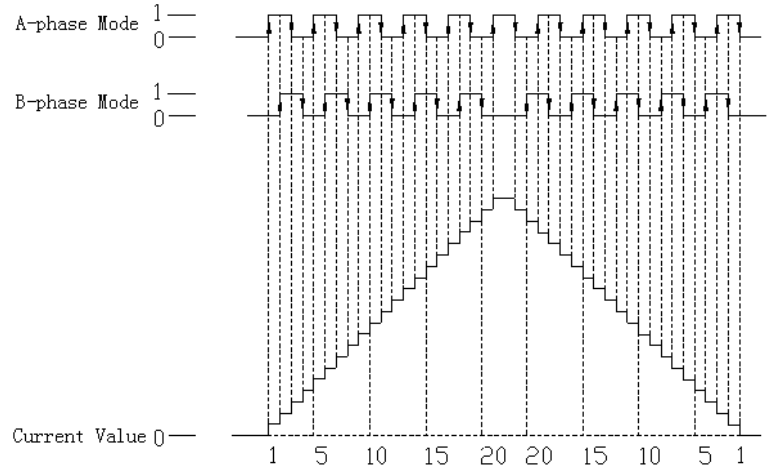
AB Phase Mode

Under this mode, the HSC value will increase or decrease according to the two different signals (A phase or B phase). According to the times number, we have also one-time frequency mode and four-time frequency mode. The default mode is four-time frequency mode.

One-time Frequency Mode



Four-time Frequency Mode



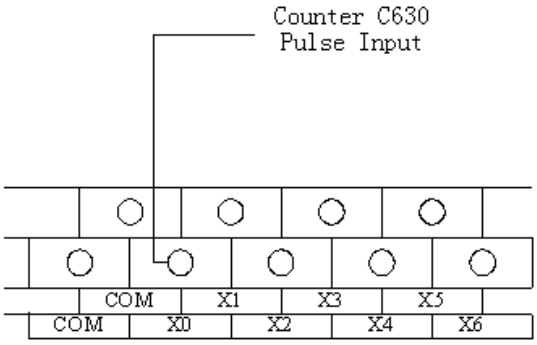
5-3-2 High Speed Count Range

The HSC's count range is: K-2,147,483,648 ~ K+2,147,483,647. If the count value exceeds this range, up-flow or down-flow appears;
The up-flow means: the count value jumps from K+2,147,483,647 to be K-2, 147, 483, 648, then continues to count; The up-flow means: the count value jumps from K-2,147,483,648 to be K+2,147,483,647, then continues to count.

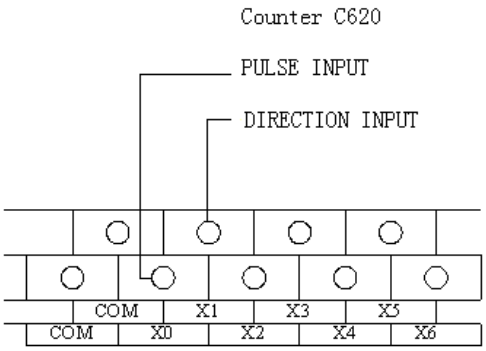
5-3-3 Input Wiring of HSC

The input wiring of pulse differs according to the PLC and counter's model. Below, we show several typical wiring methods (take XC3-48 PLC as the example):

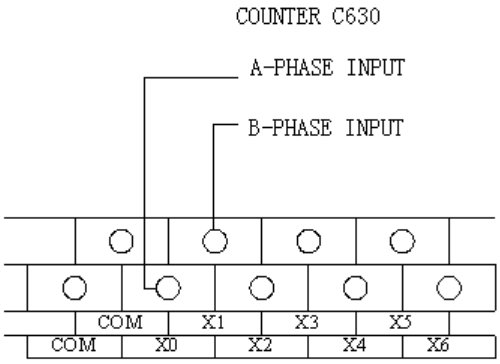
Increment Mode



Pulse + Direction Mode



AB Phase Mode



5-3-4 Input Terminals Assignment

1 - High Speed Counters Assignment of XC Series PLCs:

PLC Model		PLCs equipped high speed counters assignment		
		Increasing Mode	Pulse + Direction	AB Phase Mode
XC2 Whole Series		5	2	2
XC3 Series	14I/O	4	2	2
	24I/O, 32I/O	6	3	3
	48I/O, 60I/O	4	2	2
XC5 Series	24I/O, 32I/O	2	1	1
	4I/O, 60I/O	6	3	3
XCM Series	24I/O, 32I/O	2	1	1

2 - Input Terminals of HSC:

Letter key:

U	Dir	A	B
Counter's pulse input	Counter's direction judgment (OFF: increment counter, ON: decrement counter)	A phase input	B phase input

Normally, X0 and X1 terminal's input frequency can reach 80KHz under single-phase and AB phase mode; the other terminal's input frequency can reach 10KHz under single-phase mode and 5KHz under AB phase mode. If X input terminals are not used as high speed input ports, they can be used as common input terminals. The detailed port assignment is shown below:

XC2 PLCs – Whole Series																		
	Increment Mode										Pulse + direction mode					AB phase mode		
	C600	C602	C604	C606	C608	C610	C612	C614	C616	C618	C620	C622	C624	C626	C628	C630	C632	C634
Highest frequency	80K	80K	10K	10K	10K						80K	10K				80K	5K	
4 times frequency																√		
Counter interruption	√	√	√	√	√						√					√		
X000	U										U					A		
X001		U									Dir					B		
X002																		
X003			U									U					A	
X004												Dir					B	
X005																		
X006				U														
X007					U													
X010																		
X011																		
X012																		

XC3 -14 PLC																		
	Increment Mode										Pulse + direction mode					AB phase mode		
	C600	C602	C604	C606	C608	C610	C612	C614	C616	C618	C620	C622	C624	C626	C628	C630	C632	C634
*Max. Frequency	10K	10K	10K	10K							10K	10K				5K	5K	
4 times frequency																	√	
Counter's interruption	√	√	√	√								√					√	
X000	U										U					A		
X001											Dir					B		
X002		U																
X003			U															
X004												Dir					A	
X005				U								U					B	

* C600, C620, C630 can be 80KHz with customer's special requirements

XC3-19AR-E																		
	Increment Mode										Pulse + direction mode					AB phase mode		
	C600	C602	C604	C606	C608	C610	C612	C614	C616	C618	C620	C622	C624	C626	C628	C630	C632	C634
Max. Freq.	10K	10K	10K	10K							10K	10K				5K	5K	
4-time Freq.																	√	
Count Interrupt	√	√	√	√								√					√	
X000	U										U					A		
X001											Dir					B		
X002		U										U					A	
X003												Dir					B	
X004			U															
X005				U														

XC3-48, 60 PLC																		
	Increment Mode										Pulse + direction mode					AB phase mode		
	C600	C602	C604	C606	C608	C610	C612	C614	C616	C618	C620	C622	C624	C626	C628	C630	C632	C634
Max. Freq.	80K	80K	10K	10K							80K	80K				80K	80K	
4-time Freq.																	√	
Count Interrupt	√	√	√	√								√					√	
X000	U										U					A		
X001											Dir					B		
X002		U										U					A	
X003												Dir					B	
X004			U															
X005				U														

XC3-24/32 PLC and XC5-48/60 PLC																		
	Increment Mode										Pulse+Direction Mode					AB phase Mode		
	C600	C602	C604	C606	C608	C610	C612	C614	C616	C618	C620	C622	C624	C626	C628	C630	C632	C634
Max. Freq.	80K	80K	10K	10K	10K	10K					80K	10K	10K			80K	5K	5K
4-time Freq.																√		√
Count Interrupt	√	√	√	√	√	√					√					√		
X000	U										U					A		
X001		U									Dir					B		
X002																		
X003			U									U					A	
X004												Dir					B	
X005																		
X006				U									U					A
X007													Dir					B
X010																		
X011					U													
X012						U												

XC5-24/32 PLC, XCM-24/32 PLC																		
	Increment Mode										Pulse + direction mode					AB phase mode		
	C600	C602	C604	C606	C608	C610	C612	C614	C616	C618	C620	C622	C624	C626	C628	C630	C632	C634
Max. Freq.	80K	10K									80K					80K		
4-time Freq.																√		
Count Interrupt	√	√									√					√		
X000	U										U					A		
X001											Dir					B		
X002																		
X003		U																
X004																		
X005																		
X006																		

5-3-5 AB Phase Counter's Frequency Multiplication Setting

With the AB Phase Counter, the user can modify the value in FLASH data registers FD8241, FD8242, FD8243 to set the frequency multiplication value. When the value is 1, it is 1 time frequency; when the value is 4, it is 4 times frequency.

Register	Function	Setting Value	Content
FD8241	Frequency Multiplication of C630	1	1 time frequency
		4	4 time frequency
FD8242	Frequency Multiplication of C632	1	1 time frequency
		4	4 time frequency
FD8243	Frequency Multiplication of C634	1	1 time frequency
		4	4 time frequency

※1：In some special models, only one axis can be set as one time frequency or 4 times frequency, the left two axis are separately one time frequency and 4 times frequency.

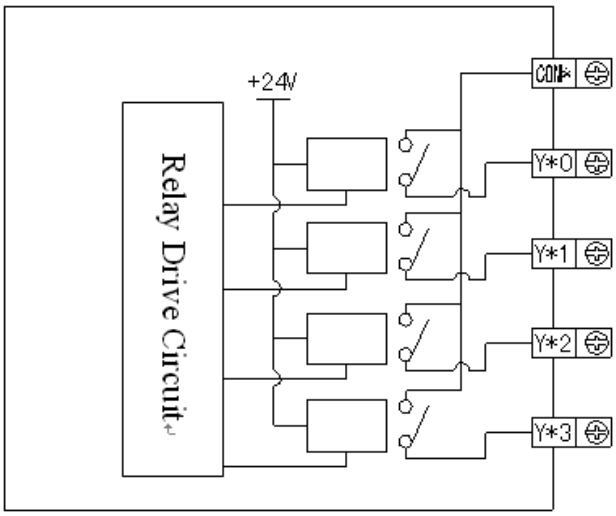
6 Output Specification and Wiring Methods

In this chapter we examine the output specifications and external wiring methods of XC series PLCs. The connection method differs from model to model; particularly in terms of terminal position. For each individual model's terminal arrangement, please refer to chapter 2-3.

6-1 Output Specifications

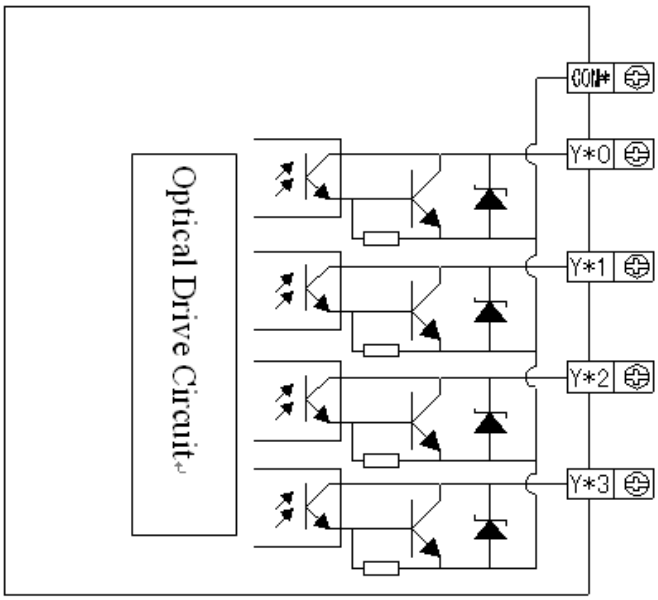
Relay Output

Interior power		Below AC250V, DC30V
Circuit insulation		Mechanism insulation
Action denote		LED indicate lamp
Max load	Resistant load	3A
	Induce load	80VA
	Lamp load	100W
Open circuit's leak current		-
Mini load		DC5V 2mA
Response time	OFF→ON	10ms
	ON→OFF	10ms



Normal Transistor Output

Interior power		Below DC5~30V
Circuit insulation		Optical coupling insulation
Action denote		Indicate lamp LED
Max load	Resistance load	0.8A
	Induce load	12W/DC24V
	Lamp load	1.5W/DC24V
Open circuit's leak current		-
Mini load		DC5V 2mA
Response time	OFF→ON	Below 0.2ms
	ON→OFF	Below 0.2ms

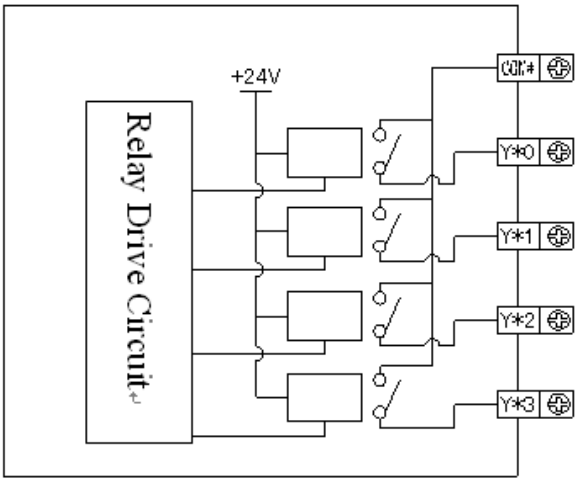


High Speed Pulse Output

Model	RT or T Type
High Speed Pulse Output Terminal	Common models are Y0, Y1；XC5-24/32 model is Y0~Y3
External Power Supply	Below DC5~30V
Action Indication	LED Lamp
Maximum Current	50mA
Max output frequency of pulse	400KHZ

6-2 Relay Output Type

Relay Output Circuit



- **Output Terminals**

  Relay output type includes 2~4 public terminals. So each public-end unit can drive different power-voltage systems (E.g.：AC200V，AC100V，DC24V etc.) loads.

- **Circuit Insulation**

  Between the relay output coils and contacts; PLC's interior circuits and exterior circuits and load circuits electrical insulation is given. Each public-end blocks are separate.

- **Action display**

  LED lamp lights when output relay's coils galvanize, output contacts are ON.

- **Response time**

  From the output relay galvanize (or cut) to the output contacts be ON (or OFF), the response time is about 10ms.

- **Output current**

  The current-voltage below AC250V can drive the load of pure resistance 2A/1 point, inductance load below 80VA（AC100V or AC200V） and lamp load below 100W（AC100V or AC200V）.

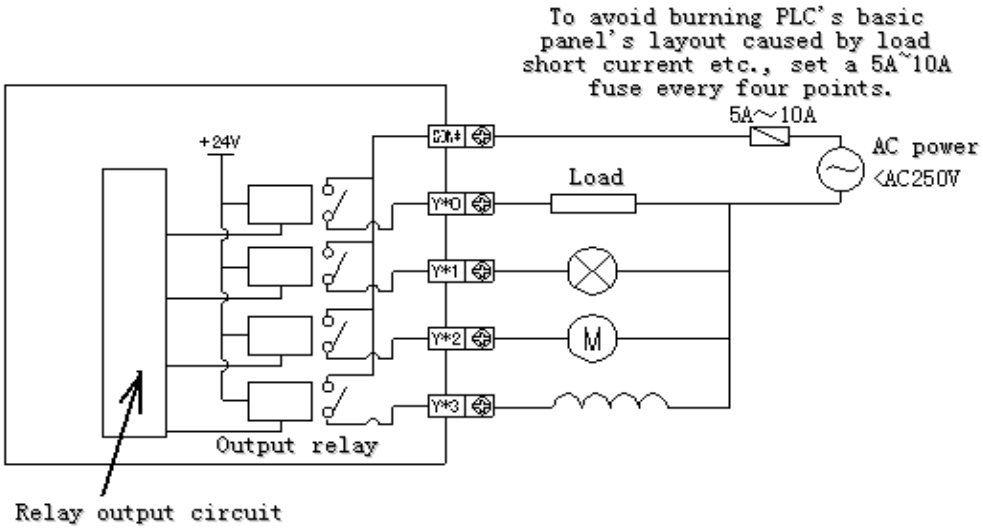
- **Open circuit's leak current**

  When the output contact is OFF and there's no leak current, can directly drive Ne lamp etc.

- **The life of relay output contacts**

  Standard life of inductive AC load such as a contactor, electromagnetism valve：5 million times for 20VA load. Cut power device's life according to the company's test: for 80VA load, the action life is up to 2 million times. But if the load parallel connection with surge absorber, the life will be greatly improved!

Output Connection Example

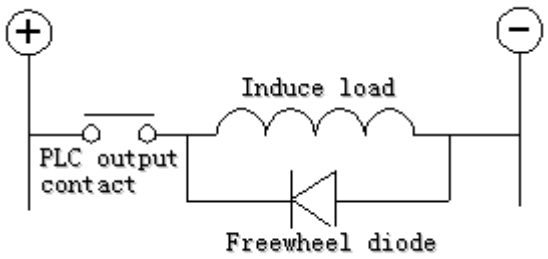


Constitution of Output Circuit

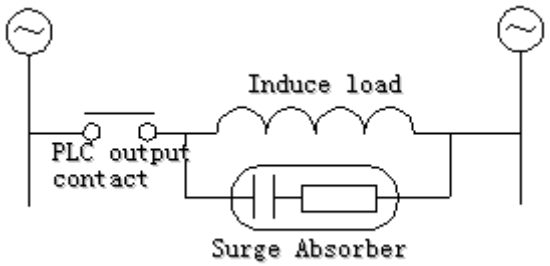
For DC induced loads, parallel connect with commutate diode. If it is not connected with a commutate diode, the contact's life will be decreased greatly. Choose a commutate diode which allows inverse voltage endurance up to 5~10 times of the load's voltage, ordinal current exceeds load current.

Parallel connecting AC induced load with a surge absorber can reduce noise.

DC Load



AC Load

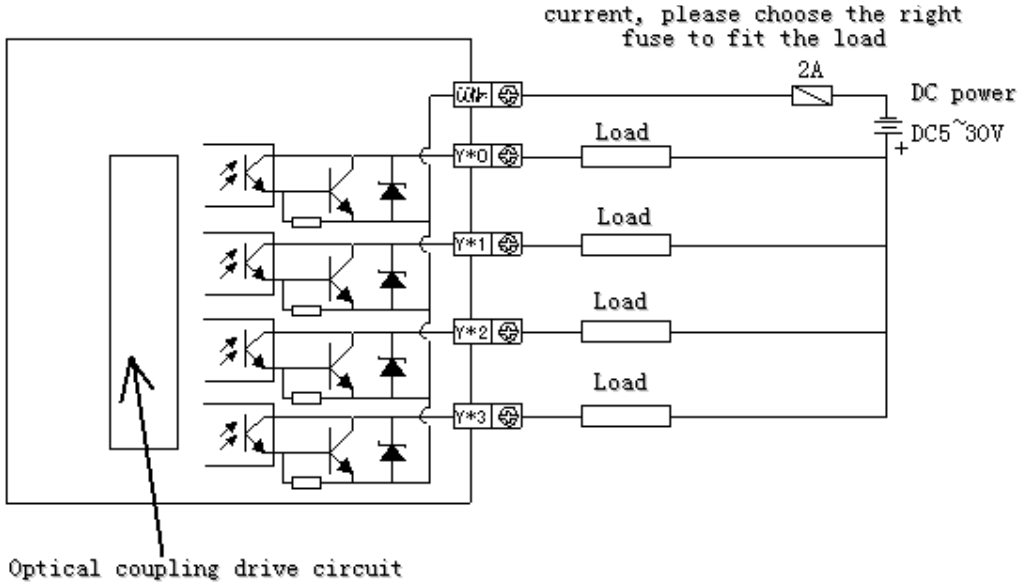


6-3 Transistor Output Type

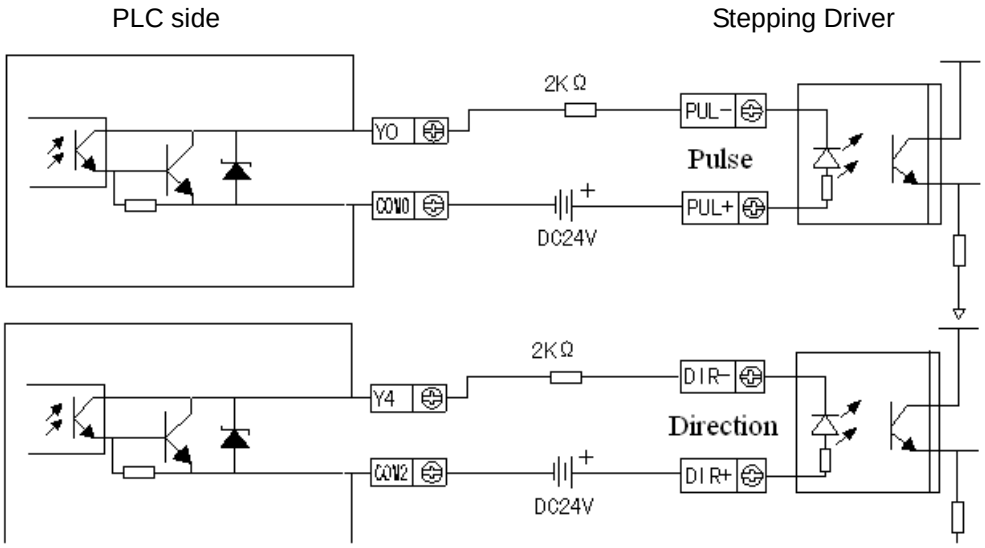
Transistor output models support high speed pulse output and normal transistor these two types:

Normal Transistor Output

- **Output Terminals**
  There are 1~4 COM outputs on transistor output type CPUs.
- **External Power Supply**
  DC5~30V stable power supply.
- **Circuit Isolation**
  PLCs have internal optical couples to isolate the internal circuit with the output transistors; public blocks isolate to each other.
- **Action Indication**
  When driving optical couples, LED will be ON, the output transistors will be ON;
- **Response Time**
  From optical couple being ON (or OFF) to transistor being ON (or OFF), PLC needs time below 0.2ms.
- **Output current**
  Each output's current is 0.5A. But limited by the temperature rising, every 4 points' total current should be below 0.8A.
- **Open circuit current**
  Below 0.1mA



E.g.: Below is the connection diagram of RT/T type PLC with stepping driver:



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

7 RUN, DEBUG, MAINTENANCE

In this chapter, we explain the whole process of using a PLV, from programming to function. Running, debugging and maintenance of PLCs is included.

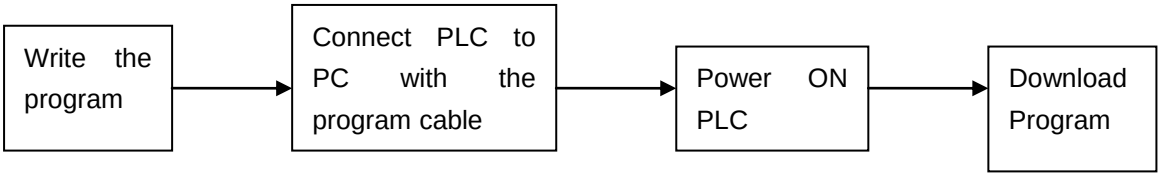
7-1 Run and Debug

Check the Products

On receipt of products, check if the input/output terminals are correct, or if there is any component missing. Generally, you can power on the PLC directly at this time. Check if PWR and RUN LED are ON.

Write and Download the Program

After confirming the products, please write the program for PLC. Write the program via computer then download the program to your PLC. The general operation steps are listed below:



※1: Please link the download cable before you power on the PLC. Or else the COM port will be easily damaged! The method to connect BD card and expansion is same.

Debug the Products

In Ideal conditions, the PLC is in running mode, however, if you find some mistakes in the program and you need to modify the program, you should write the new program to the running PLC:

Connect PLC to PC with the program cable

Upload the program in PLC

Modify the uploaded program [we suggest you to save the modified program]

Pause the running of PLC, download the modified program to PLC

Use ladder monitor, free monitor to monitor PLC

LED on PLC

When the PLC is running correctly, the **PWR** and **RUN** LED should be permanently ON;

If **ERR** LED keep is ON, it indicates that PLC is running in error, please correct the program;

If **PWR** LED is OFF, it indicates that there is no power supply, please check your wiring.

7-2 Daily Maintenance

Regular Equipment Checks

Even the PLC has certain anti-interfere ability and strong stability, you should check the PLC regularly.

The check items include:

Check if the input/output terminals, power supply terminals are loosen

Check if the COM ports are correct

Check if the PWR LED, I/O LED can be ON

Clear the dusts on PLC, to avoid the dusts fall into PLC

Manage to make PLC running, the storage environment fits the standard told in chapter 2-1-1

About the Battery

There are no components in general PLCs that decrease the life of the battery, so the battery can be used all the time, however, if your PLC supports clock function, you should change the battery regularly.

The battery's life is usually 3~5 years.

If utilizing relay output PLC type, and the relay needs to open/close frequently, or drive large capacity loads, the battery's life may be decreased.

If you find battery's power decreased, please change it as soon as possible.

After changing the battery, please power the system ON immediately, or else the battery will run out of power automatically.

Disposal

At the end of their useful life, the packaging and products should be treated as industrial waste and disposed of via a suitable recycling centre. Do not dispose of with normal household waste. Do not burn.

8 Expansion Devices

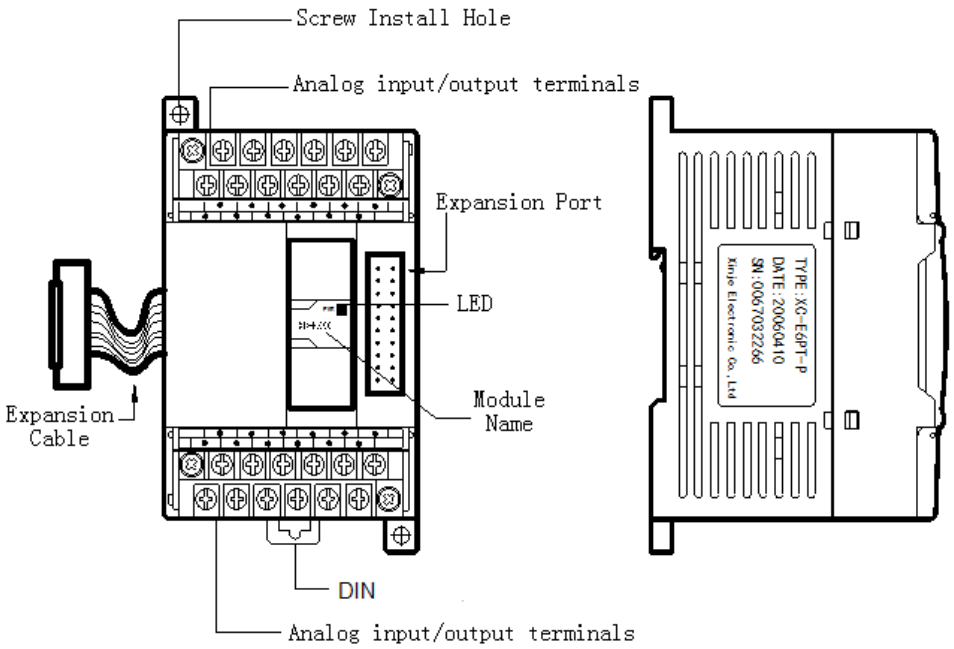
XC Series PLC expansions include Expansion Modules and Expansion BD cards. The Expansion Modules include Input/Output Expansion Modules, Analog and Temperature Expansion Modules; BD Cards include Analog, Temperature, communication applications etc. Via the expansion devices, XC Series PLCs are used widely in temperature, flow, liquid, pressure fields etc.

8-1 Modules Summary

General Specifications

Item	Content
Using environment	noncorrosive gas
Environmental Temperature	0℃~60℃
Stock temperature	-20~70℃
Environmental Humidity	5~95%
Stock Humidity	5~95%
Installation	Use M3 screws to fix or install on DIN46277 (width 35mm) DIN

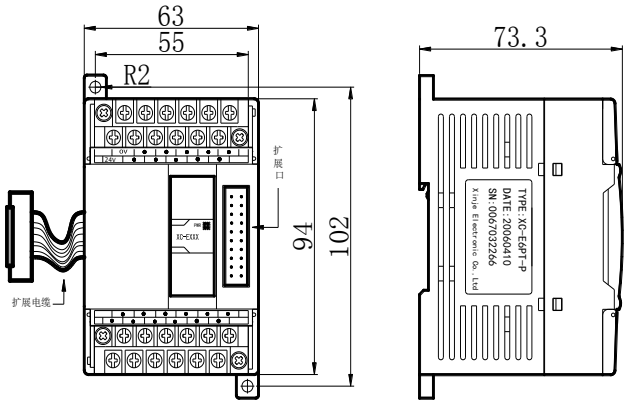
Module Structure



Name	Function
Power Supply Indication	The LED is ON when power on the module
Module Name	The model name of this special module
Expansion Port	Link with other expansion module
Analog input/output terminal	Used to connect with analog input/output and peripheral equipments, can be removed
DIN guild rail	Used to install the module directly
Screws install hole	Put M3 screw in the hole to finish installation
Expansion Cable	Realize data transfer by linking this cable to with PLC extension port

External Dimensions

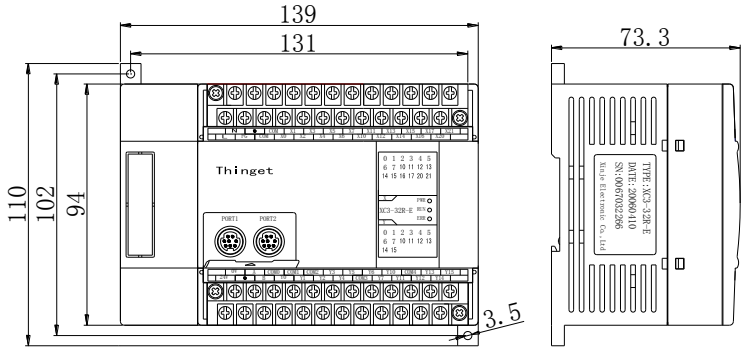
Graph 1 (Unit: mm)



Suitable Models

Module Type	Model
Digital Input/output	8I/O, 16I/O
Analog	All
Temperature	All
Mixture	All

Graph 2 (Unit: mm)

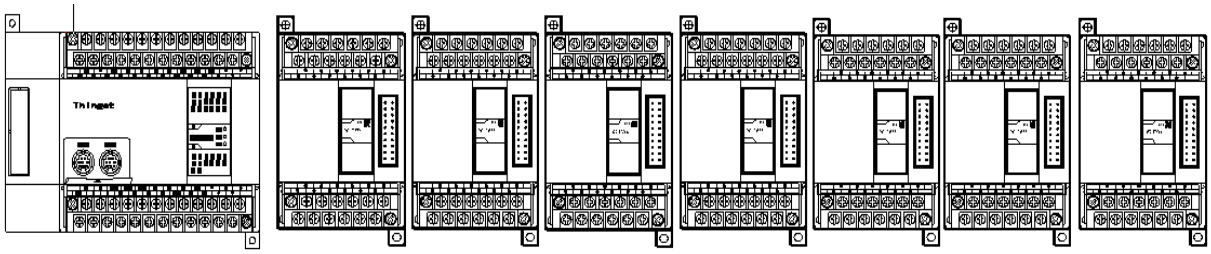


Suitable Models

Module Type	Model
Digital Input/output	32I/O
Analog	None
Temperature	None
Mixture	None

Module Configuration

XC series modules can be installed on the right of XC-PLC main units:



Digital input/output quantity is in octal form;
Input/output analog is in decimal form.

PLC main units can work with 7 expansions and one extra BD card. The expansion module can be any type (analog or digital, temperature).

8-2 Digital Input/Output Modules

Input/Output expansions, I/O ranges 8~32, Input type, Output type, Input/Output type, Transistor Output, Relay Output etc;

Model List

The detailed models are listed below:

Model				I/O Nr.	Input Nr. (DC24V)	Output Nr. (R,T)
	Input	Output				
		Relay Output	Transistor Output			
NPN	XC-E8X	-	-	8	8	-
	-	XC-E8YR	XC-E8YT	8	-	8
	-	XC-E8X8YR	XC-E8X8YT	16	8	8
	XC-E16X	-	-	16	16	-
	-	XC-E16YR	XC-E16YT	16	-	16
	-	XC-E16X16YR	XC-E16X16YT	32	16	16
	XC-E32X	-	-	32	32	-
	-	XC-E32YR	-	32	-	32
PNP	XC-E8PX	-	-	8	8	-
	-	XC-E8YR	XC-E8YT	8	-	8
	-	XC-E8PX8YR	XC-E8PX8YT	16	8	8
	XC-E16PX	-	-	16	16	-
	-	XC-E16YR	XC-E16YT	16	-	16
	-	XC-E16PX16YR	XC-E16PX16YT	32	16	16
	XC-E32PX	-	-	32	32	-
	-	XC-E32YR	-	32	-	32

Module Specification

Power Supply Specification - DC24V (32 I/O Expansion is AC220V)

Input Specification:

Input Items	Content
Input signal's voltage	DC24V±10%
Input signal's current	7mA/DC24V
Input ON current	Up to 4.5mA
Input OFF current	Low than 1.5mA
Input response time	About 10ms
Input signal's format	Contact input or NPN open collector transistor
Circuit insulation	Photo-electricity coupling insulation
Input action's display	LED light when input ON

Relay Output:

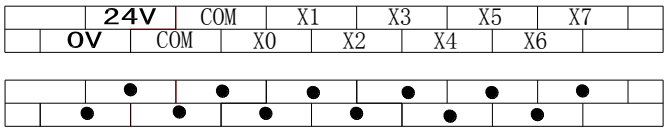
Input Items		Content
Internal power		Below AC250V, DC30V
Circuit insulation		Mechanism insulation
Action denote		LED indicate lamp
Max load	3A	3A
	80VA	80VA
	100W	100W
Open circuit's leak current		-
Mini load	DC5V 2mA	10ms
Response time	10ms	10ms

Transistor Output:

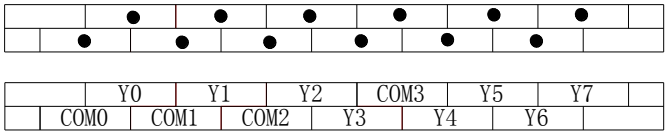
Input Items		Content
Internal power		Below DC5~30V
Circuit insulation		Optical coupling insulation
Action denote		Indicate lamp LED
Max load	0.8A	0.8A
	12W/DC24V	12W/DC24V
	1.5W/DC24V	1.5W/DC24V
Open circuit's leak current		-
Mini load	DC5V 2mA	DC5V 2mA
Response time	Below 0.2ms	Below 0.2ms

Terminal Arrangements

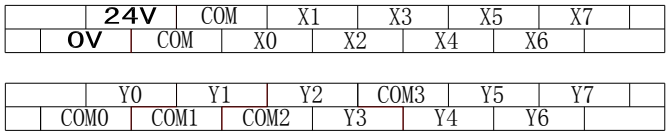
XC-E8X



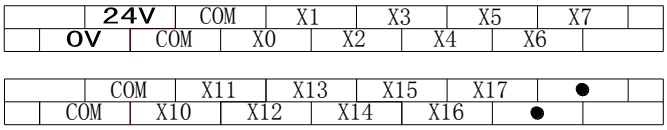
XC-E8YR, XC-E8YT



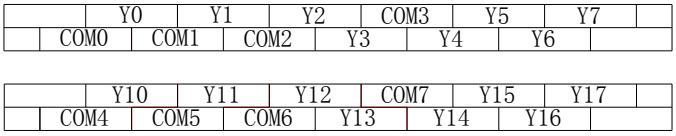
XC-E8X8YR, XC-E8X8YT



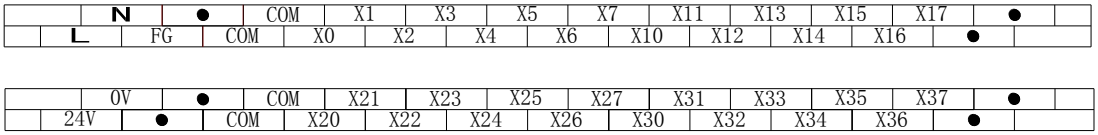
XC-E16X



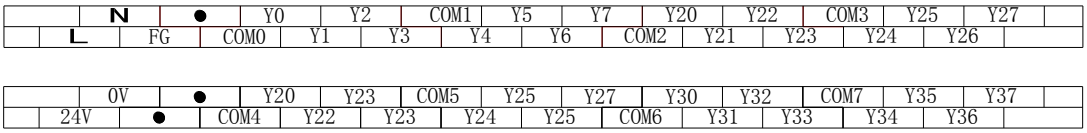
XC-E16YR, XC-E16YT



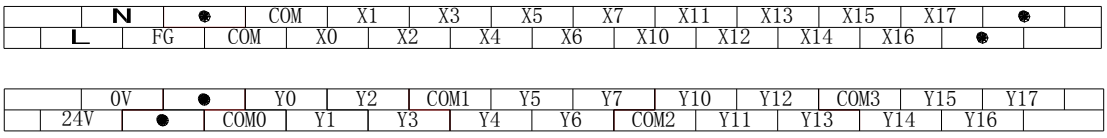
XC-E32X



XC-E32YR, XC-E32YT



XC-E16X16YR



8-3 Analog Temperature Modules

As the special modules of XC Series PLC, analog and temperature modules can work with other XC Series PLCs to achieve process controls like temperature, pressure, flow etc.
For details, please refer to《XC Series Analog/Temperature Expansions Manual》

The detailed modules are listed below:

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-E4AD	4 channels analog input (14bit)；current, voltage selectable
XC-E4DA	4 channels analog output (12bit)；current, voltage selectable
XC-E2DA	2 channels analog output (12bit)；current, voltage selectable
XC-E6PT-P	-100℃～350℃, 6 channels Pt100 temperature sampling, 0.1 degree precision, include PID operation
XC-E6TCA-P	0℃～1000℃, 6 channels K type thermocouple temperature sampling module, 0.1 degree precision, include PID operation
XC-E3AD4PT2DA	3 channels current input (14bit), 4 channels Pt100 temperature sampling and 2 channels 10 bits voltage output
XC-E2AD2PT2DA	2 channels current input (14bit), 2 channels Pt100 temperature sampling (16bit), and 2 channels 10 bits voltage output

8-3-1 XC-E8AD

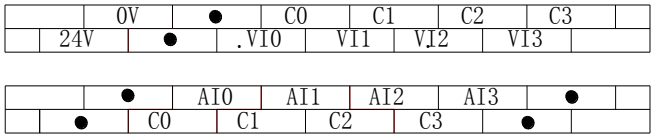
Product Overview

- 14 bits high precision analog input8 channels analog input
- The first four channels voltage input (0~5V, 0~10V two kinds)
- The left 4 channels current input (0~20mA, 4~20 mA two kinds)
- As special function module of XC Series, up to 7 modules can be connected together.

Specification

Items	Voltage input (0CH-3CH)	Current input (4CH-7CH)
Analog input bound	DC0～5V, 0～10V	DC0～20mA, 4～20mA
Max input bound	±18V	0～40mA
Digital output bound	14 bits binary data	
PID control value	0～K4095	
Distinguish Ratio	1/16383（14Bit）	
Integrate Precision	0.8%	
Convert speed	20ms/channel	
Power used by analog	DC24V±10%，100mA	

Terminal Arrangement
(XC-E8AD)



CH	NAME	SIGNAL	CH	NAME	SIGNAL
CH0	AI0	VI0+ voltage input	CH1	AI1	VI1+ voltage input
	C0	VI0- voltage input		C1	VI1- voltage input
CH2	AI2	VI2+ voltage input	CH3	AI3	VI3+ voltage input
	C2	VI2- voltage input		C3	VI3- voltage input
CH4	VI0	AI0+ current input	CH5	VI1	AI1+ current input
	C0	AI0- current input		C1	AI1- current input
CH6	VI2	AI2+ current input	CH7	VI3	AI3+ current input
	C2	AI2- current input		C3	AI3- current input
-	24V	+24V power supply			
	0V	COM of power supply			

8-3-2 XC-E4AD2DA

Product Overview

- 4CH analog input: voltage and current input selectable
- Voltage input range is 0～5V, 0～10V selectable
- Current input range is 0～20mA, 4～20mA selectable
- 2CH analog output: voltage and current input selectable
- Voltage input range is 0～5V, 0～10V selectable
- Current input range is 0～20mA, 4～20mA selectable
- 14 bits high precision analog input

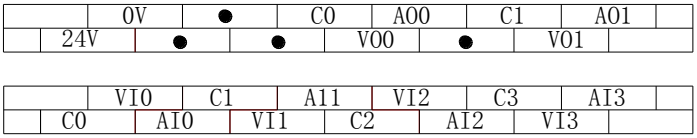
- As a special module, up to 7pcs XC-E4AD2DA can be connected to one XC Series PLC main unit.

Specification

XC-E4AD2DA module 4-channel A / D function with PID control

Items	Analog Input		Analog Output	
	Voltage Input	Current Input	Voltage output	Current Output
Analog Input Range	0~5V,0~10V	0~20mA,4~20mA	-	
Max Input Range	DC±18V	0~40mA	-	
Analog Output Range	-		0~5V, 0~10V, (external load resistor 2KΩ~1MΩ)	0~20mA,4~20mA (external load resistor 500Ω)
Digital Input Range	-		12bits binary (0~4095)	
Digital Output Range	14 bits binary (0~16383)		-	
Distinguish Ratio	1/16383(14Bit); the convert data is stored in PLC in form of Hex. (14Bit)		1/4095(12Bit); the convert data is stored in PLC in form of Hex. (14Bit)	
PID Output Value	0~K4095			
Integral precision	0.8%			
Convert Speed	20ms/CH	3ms/CH		
Power Supply	DC24V±10%, 100mA			

Terminal Arrangement
(XC-E4AD2DA)



CH	NAME	SIGNAL	CH	NAME	SIGNAL
CH0	AI0	Current analog input	CH1	AI1	Current analog input
	VI0	Voltage analog input		VI1	Voltage analog input
	C0	COM of CH0		C1	COM of CH1
CH2	AI2	Current analog input	CH3	AI3	Current analog input
	VI2	Voltage analog input		VI3	Voltage analog input
	C2	COM of CH2		C3	COM of CH3
CH0	AO0	Current analog output	CH1	AO1	Current analog output
	VO0	Voltage analog output		VO1	Voltage analog output
	C0	COM of CH0		C1	COM of CH1
-	24V	+24V power supply			
	0V	COM of power supply			

8-3-3 XC-E4AD

Product Overview

- 4CH analog input: voltage and current input selectable
- Voltage input range is 0～5V, 0～10V selectable
- Current input range is 0～20mA, 4～20mA selectable
- 14 bits high precision analog input

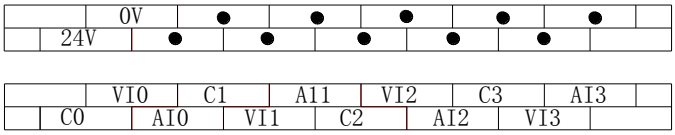
- As a special module, up to 7pcs XC-E4AD can be connected to one XC Series PLC main unit.

Specification

XC-E4AD module support PID auto tune function

Items	Analog Input (AD)	
	Voltage Input	Current Input
Analog Input Range	DC0～5V, 0～10V	DC0～20mA, 4～20mA
Max Input Range	DC±18V	DC0～40mA
Analog Output Range	-	
Digital Input Range	-	
Digital Output Range	14 bits binary (0～16383)	
Distinguish Ratio	1/16383(14Bit); the convert data is stored in PLC in form of Hex. (14Bit) (14Bit)	
PID Output Value	0～K4095	
Integral precision	0.8%	
Convert Speed	20ms/CH	
Power Supply	DC24V±10%，100mA	

Terminal Arrangement
(XC-E4AD)



CH	NAME	SIGNAL	CH	NAME	SIGNAL
CH0	AI0	Current analog input	CH1	AI1	Current analog input
	VI0	Voltage analog input		VI1	Voltage analog input
	C0	COM of CH0		C1	COM of CH1
CH2	AI2	Current analog input	CH3	AI3	Current analog input
	VI2	Voltage analog input		VI3	Voltage analog input
	C2	COM of CH2		C3	COM of CH3
-	24V	+24V power supply			
	0V	COM of power supply			

8-3-4 XC-E4DA

Product Overview

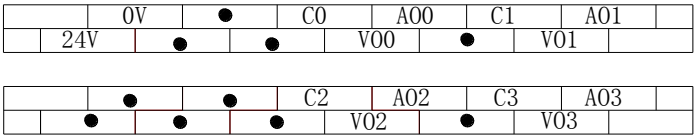
- 4CH analog output: voltage and current input selectable
- Voltage input range is 0～5V, 0～10V selectable
- Current input range is 0～20mA, 4～20mA selectable
- 10 bits high precision analog output;

- As a special module, up to 7pcs XC-E4DA can be connected to one XC Series PLC main unit.

Specification

Items	Voltage Output	Current Output
Analog Output Range	DC0～5V, 0～10V (external load resistor 2KΩ~1MΩ)	DC0～20mA, 4～20mA (external load resistor less than 500Ω)
Digital Input Range	12 bits binary	
Distinguish Ratio	1/1023(10Bit); the convert data is stored in PLC in form of Hex. (12Bit)	
Integral Precision	0.8%	
Convert Speed	3ms/CH	
Power Supply	DC24V±10%，100mA	

Terminal Arrangement
(XC-E4DA)



CH	NAME	SIGNAL	CH	NAME	SIGNAL
CH0	AO0	Current analog output	CH1	AO1	Current analog output
	VO0	Voltage analog output		VO1	Voltage analog output
	C0	COM of CH0		C1	COM of CH1
CH2	AO2	Current analog output	CH3	AO3	Current analog output
	VO2	Voltage analog output		VO3	Voltage analog output
	C2	COM of CH2		C3	COM of CH3
-	24V	+24V power supply			
	0V	COM of power supply			

8-3-5 XC-E2DA

Product Overview

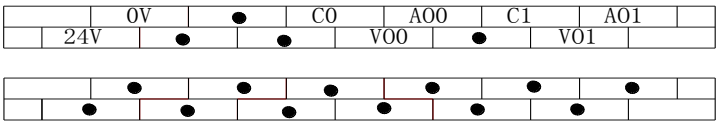
- 2CH analog output: voltage and current input selectable
- Voltage input range is 0～5V, 0～10V selectable
- Current input range is 0～20mA, 4～20mA selectable
- 12 bits high precision analog input

- As a special module, up to 7pcs XC-E2DA can be connected to one XC Series PLC main unit.

Specification

Items	Voltage Output	Current Output
Analog Output Range	DC0～5V, 0～10V	DC0～20mA, 4～20mA
	External Load Resistor (2KΩ~1MΩ)	External Load Resistor less than 500Ω
Digital Input Range	12 bits binary	
Distinguish Ratio	1/4096(12Bit); the convert data is stored in PLC in form of Hex. (12Bit)	
Integral Precision	0.8%	
Convert Speed	3ms/CH	
Power Supply	DC24V±10%，100mA	

Terminal Arrangement
(XC-E2DA)



CH	NAME	SIGNAL
CH0	AO0	Current analog output
	VO0	Voltage analog output
	C0	COM of CH0
CH1	AO1	Current analog output
	VO1	Voltage analog output
	C1	COM of CH1
-	24V	+24V power supply
	0V	COM of power supply

8-3-6 XC-E6PT-P

Product Overview

- Pt resistor input, the scale is Pt100
- 6CH input, 6CH output, 2 groups PID parameters (3CH/group)
- 1mA constant output, doesn't effected by the environment
- The distinguish precision is 0.1℃
- As a special module, up to 7pcs XC-E6PT-P can be connected to one XC Series PLC main unit.

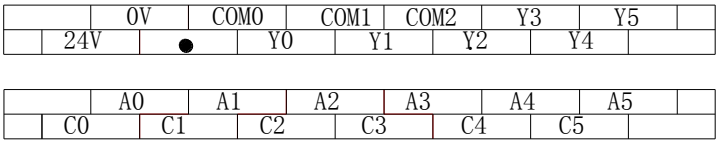
Specification

Items	Content
Analog Input Signal	Pt100 resistor
Temperature testing range	-100℃～350℃
Digital Output range	-1000～3500, 16bits with sign, binary
Control precision	±0.5℃
Distinguish Ratio	0.1℃
Integral Precision	0.8% (Relate to the max value)
Convert Speed	20ms/CH
Power Supply	DC24V±10%，50mA

※1: If no signal input, the value is 3500;

※2: According to the actual requirements, connect with Pt100 resistors

Terminal Arrangement
(XC-E6PT-P)



CH	NAME	SIGNAL	CH	NAME	SIGNAL
CH0	A0	0CH thermo-resistor input terminal	CH1	A1	1CH thermo-resistor input terminal
	C0	0CH COM of thermo-resistor input		C1	1CH COM of thermo-resistor input
CH2	A2	2CH thermo-resistor input terminal	CH3	A3	3CH thermo-resistor input terminal
	C2	2CH COM of thermo-resistor input		C3	3CH COM of thermo-resistor input
CH4	A4	4CH thermo-resistor input terminal	CH5	A5	5CH thermo-resistor input terminal
	C4	4CH COM of thermo-resistor input		C5	5CH COM of thermo-resistor input
	Y0	Output of CH0		Y1	Output of CH1
	Y2	Output of CH2		Y3	Output of CH3
	Y4	Output of CH4		Y5	Output of CH5
-	24V	+24V power supply			
	0V	COM for power supply			
COM0, COM1, COM2: COM for outputs					

8-3-7 XC-E6TCA-P

Product Overview

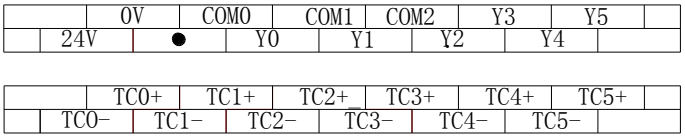
- Supports many thermocouple types (K, S, E, N, J, T, R types)
- Adopts DC-DC power supply isolate design, enhanced anti-interfere ability
- The temperature precision is 0.1℃
- Set each channel's PID parameters independently, equipped with separate register space
- Supports real time PID auto tune function; enable the device to PID auto tune under every status (cold status, heating status, transition status etc), get the best PID values
- Realize data exchange with FROM and TO instructions, enhances flexibility, reduces the data exchange quantity, expands the data memory space.

Specification

Items	Specifications
Analog Input Signal	K, S, E, N, J, T, R type thermocouples
Temperature testing range	0℃～1000℃
Digital Output range	0～4095, without sign 12 bits, decimal
Control precision	0.1℃
Distinguish Ratio	0.1℃
Integral Precision	0.1℃
Convert Speed	20ms/CH
Power Supply	DC24V±10%，50mA

※1: When no signal input, the channel's data is 4095;
※2: According to the actual requirements, connect with the thermo-resistors;

Terminal Arrangement
(XC-E6TCA-P)



CH	NAME	SIGNAL	CH	NAME	SIGNAL
CH0	TC0+	CH0 temperature input＋	CH1	TC1+	CH1 temperature input＋
	TC0-	CH0 temperature input－		TC1-	CH1 temperature input－
CH2	TC2+	CH2 temperature input＋	CH3	TC3+	CH3 temperature input＋
	TC2-	CH2 temperature input－		TC3-	CH3 temperature input－
CH4	TC4+	CH4 temperature input＋	CH5	TC5+	CH5 temperature input＋
	TC4-	CH4 temperature input－		TC5-	CH5 temperature input－
Y0~Y5		Output Channel Y0～Y5 Analog Output: in the form of digital type, the range is 0~4095 Digital Output: in the form of occupy ratio, Y output in the activate time			
－	24V	+24V power supply			
	0V	COM of power supply			

8-3-8 XC-E3AD4PT2DA

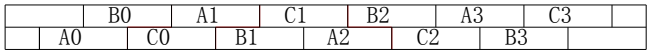
Product Overview

- 3CH 14bits current input, 4CH PT100 temperature input and 2CH 10bits voltage output
- 3CH AD is current (0~20mA, 4~20mA) selectable;
- 2Ch DA is voltage (0~5V, 0~10V) selectable, choose via the software
- Pt resistor input, the scale is PT100
- 3CH A/D and 4CH PT input are equipped with PID auto tune function
- As a special module, up to 7pcs XC-E3AD4PT2DA can be connected to one XC Series PLC main unit

Specification

Items	Analog Current Input (AD)	Temperature Input (PT)	Analog Voltage Output (DA)
Analog input	DC0～20mA, 4～20mA	PT100	-
Temperature testing range	-	-100~350℃	-
Max input range	DC0～40mA	-	-
Analog output range	-	-	DC0~5V, 0~10V(external load resistor 2KΩ~1MΩ)
Digital input range	-	-	10 bits Binary (0~1023)
Digital Output Range	14 bits Binary (0~16383)	-1000~3500	-
Distinguish Ratio	1/16383(14Bit): The converted data is stored in PLC in Hex. (14Bit)	0.1℃	1/1023(10Bit): The converted data is stored in PLC in Hex. (10Bit)
PID Output Value	0~K4095		-
Integral Precision	0.8%	±0.5℃	0.8%
Convert Speed	20ms/CH		3ms/CH
Power Supply	DC24V±10%，100mA		

Terminal Arrangement
(XC-E3AD4PT2DA)



CH	NAME	SIGNAL	CH	NAME	SIGNAL
0CH	AI0	0CH current Input	1CH	AI1	1CH current Input
	C0	0CH current Input COM		C1	1CH current Input COM
2CH	AI2	2CH current Input			
	C2	2CH current Input COM			
0CH	A0	0CH temperature input	1CH	A1	1CH temperature input
	B0	-		B1	-
	C0	0CH input COM		C1	1CH input COM
2CH	A2	2CH temperature input	3CH	A3	3CH temperature input
	B2	-		B3	-
	C2	2CH input COM		C3	3CH input COM
0CH	VO0	0CH voltage output	1CH	VO1	1CH voltage output
	C3	0CH voltage output COM		C4	1CH voltage output COM
-	24V	+24V power supply			
	0V	power supply COM			

8-3-9 XC- E2AD2PT2DA

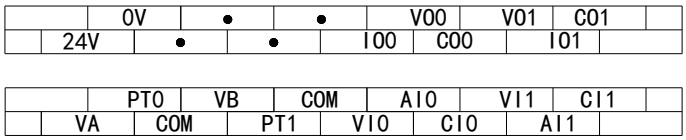
Product Overview

- 2CH 16bits analog input, 2CH PT100 temperature input and 2CH 10bits analog output
- 2CH input/output is current, voltage selectable (current: 0~20mA, 4~20mA; voltage: 0~5V, 0~10V), select via XCPPro;
- 2CH A/D and 2CH PT input has PID auto tune function
- Adopt DC-DC power supply isolation design, enhance the anti-interfere ability
- The display precision is 0.01℃
- Set each channel's PID value separately, equipped separate register space
- Supports real time PID auto tune function; enables the device to PID auto tune under every status (cold status, heating status, transition status etc), get the best PID values
- Realize data exchange with FROM and TO instructions, enhance the flexibility, reduce the data exchange quantity, expand the data memory space.

Specification
(XC-E2AD2PT2DA)

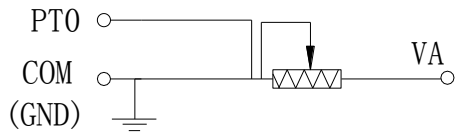
<table>
<tr><th>Items</th><th colspan="2">Analog Input (AD)</th><th>Temp. input（PT）</th><th colspan="2">Analog output (DA)</th></tr>
<tr><td rowspan="2">Analog Input</td><td>Current</td><td>0～20mA
4～20mA</td><td rowspan="2">PT100</td><td colspan="2" rowspan="2">-</td></tr>
<tr><td>Voltage</td><td>0～5V
0～10V</td></tr>
<tr><td>Temperature Range</td><td colspan="2">-</td><td>-100~350℃</td><td colspan="2">-</td></tr>
<tr><td>Max input range</td><td colspan="2">DC0～40mA</td><td>-</td><td colspan="2">-</td></tr>
<tr><td rowspan="2">Analog output range</td><td colspan="2" rowspan="2">-</td><td rowspan="2">-</td><td>Current</td><td>0～10V
0～5V</td></tr>
<tr><td>Voltage</td><td>0～20mA
4～20mA</td></tr>
<tr><td>Digital input range</td><td colspan="2">-</td><td>-</td><td colspan="2">10 bits binary (0~1023)</td></tr>
<tr><td>Digital Output range</td><td colspan="2">16 bits binary (0~65535)</td><td>-1000~3500</td><td colspan="2">-</td></tr>
<tr><td>Distinguish Ratio</td><td colspan="2">1/16383(16Bit)</td><td>0.01℃</td><td colspan="2">1/1023(10Bit)</td></tr>
<tr><td>PID Output value</td><td colspan="3">0~K4095</td><td colspan="2">-</td></tr>
<tr><td>Integral precision</td><td>0.8%</td><td colspan="2">±0.01℃</td><td colspan="2">0.8%</td></tr>
<tr><td>Convert speed</td><td colspan="3">20ms/CH</td><td colspan="2">3ms/CH</td></tr>
<tr><td>Power supply</td><td colspan="5">DC24V±10%，100mA</td></tr>
</table>

Terminal Arrangement
(XC-E2AD2PT2DA)



Name	Terminals	Comments		
Input terminals	PT0, PT1	Temperature Input	Analog input, PT100 temperature sensor (-100℃～350℃)	
	VI0, VI1	Analog Input	Voltage Input	0~10V or 0~5V
	AI0, AI1		Current input	0~20mA or 4~20mA
Output terminals	VO0,VO1	Analog Output	Voltage Input	in digital form, range: 0~1023
	IO0, IO1		Current input	in digital form, range: 0~1023

Three-line PT100 resistor's input wiring is shown below:

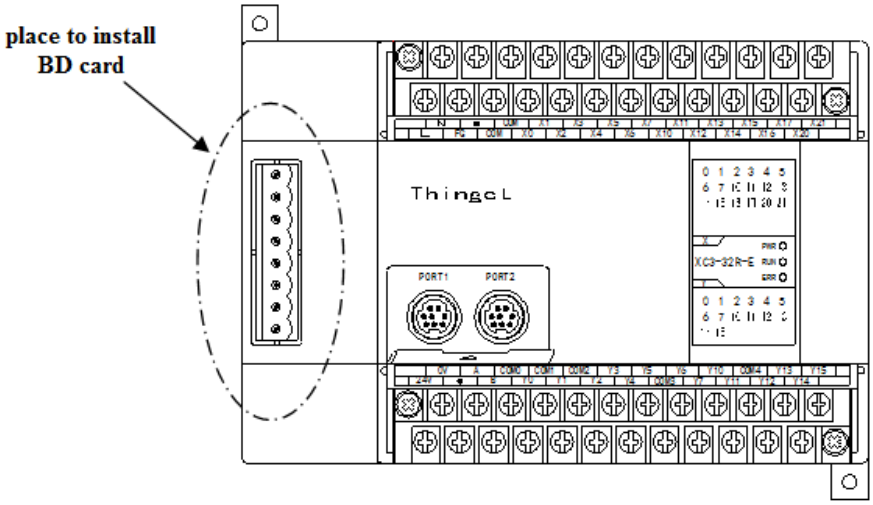


To normal PT100 resistors, wire according to the terminal's colour; the terminal with same colour can connect to PT1 and COM randomly, the other terminal connects to VA side;

8-4 Expansion BD Cards

Installation

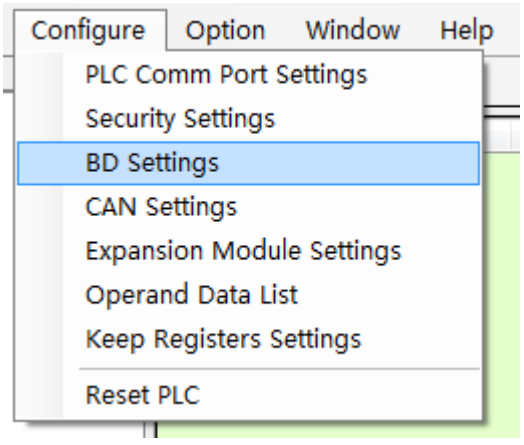
Open the cover on the left side (see the dotted line below), install the card according to the pin connectors and fix with screws; fix the protection cover to finish;



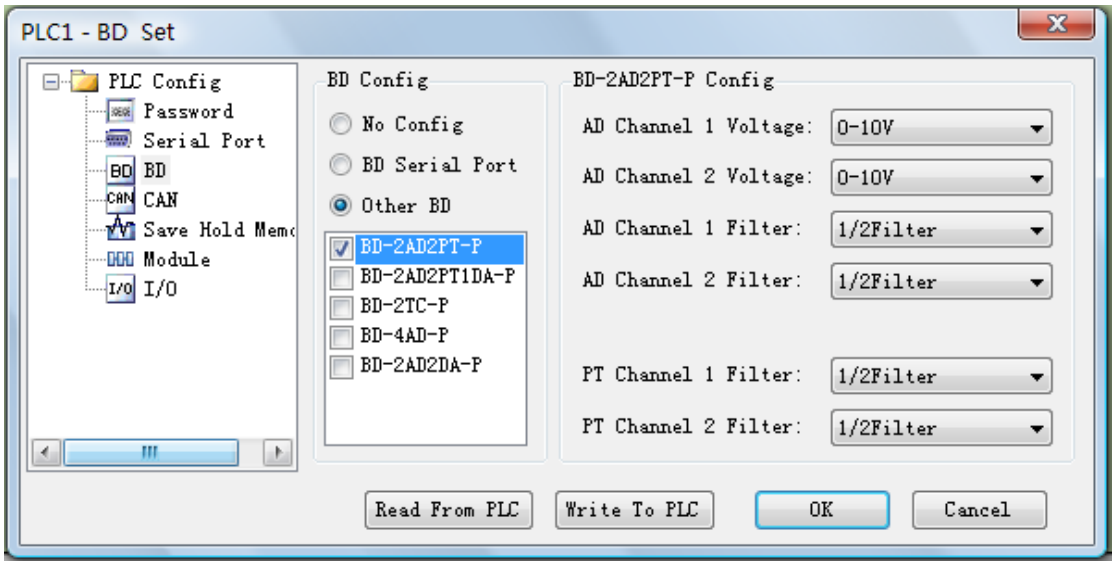
Configuration

Install the BD card on PLC correctly

Link PLC via XCPPro, in “Configure” menu, choose “BD settings ” (See graph below)



In “BD settings”, choose “Other BD”, then set BD from the right options; finally, download the user program;



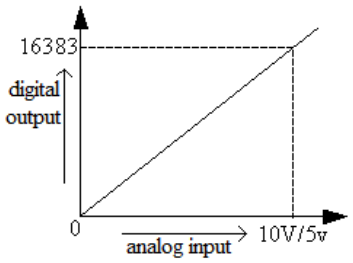
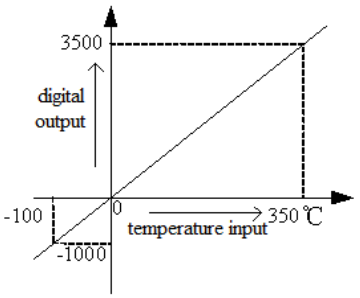
※1: If configure XC-COM-BD, then “BD config” option should choose “BD Serial Port”

8-4-1 XC-2AD2PT-BD

Product Overview

- 14 bits high precision analog input
- 2CH voltage 0~10V, 0~5V selectable
- 2CH temperature input

Specification

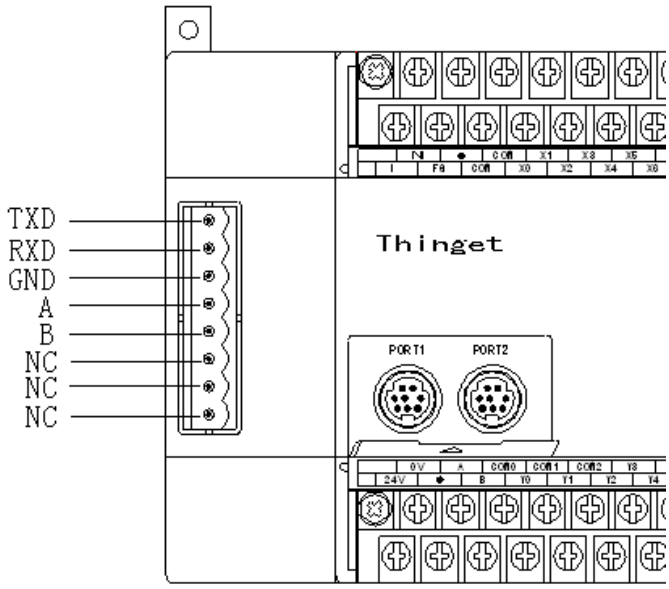
Items	Voltage Input	Temperature Input
Analog input signal	DC0~5V, 0~10V (the input resistor is 300kΩ)	Pt resistor Pt100 (2-line)
Temperature testing range	-	-100~350℃
Distinguish	0.15mV（10/16383）	0.1℃
Digital output range	0~16383	-1000~3500
Integral precision	±0.8% of the full scale	
Convert time	15ms×4CH	
PID output value	0~K4095	
Default value	0	3500
Input Specialty		
Isolation	No isolation among PLC's each channel	
I/O occupation	0 I/O (as operate via data register, so I/O is not limited by PLC's standard I/O limitation) （	

8-4-2 XC-COM-BD

Specification

- For RS-485 communication
- For RS-232 communication
- RS-232 and RS-485 can’t be used at the same time

Pin Configuration



※1: TXD, RXD, GND are RS-232 pins

※2: A, B are RS-485 pins

※3: RS-232 and RS-485 can’t be used at the same time

9 Relationships between Terminals and Soft Components

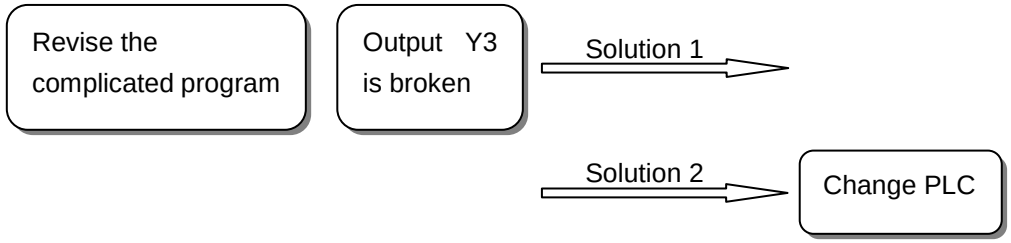
This chapter focuses on a special function of XC Series PLCs, mapping the relationship between terminals and soft components. With this special function, users can greatly reduce maintenance. To the local operation, they will not bother with the damaged terminals any more.

9-1 Function Summary

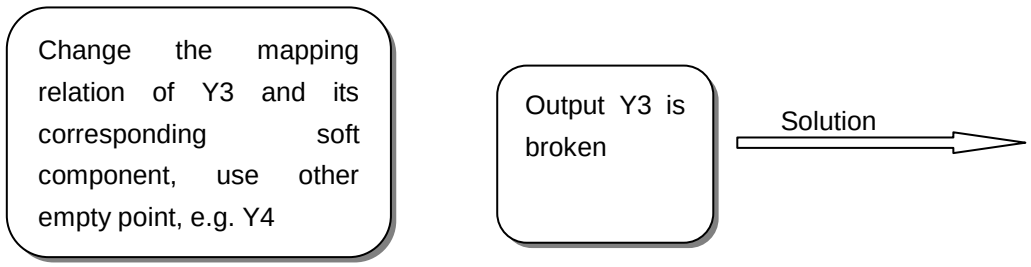
In normal practice when using PLCs, if the internal optical couples, relays or transistors are damaged, the corresponding input/output terminals will become faulty. The only solution is to revise the program. This is troublesome for the user and affects production greatly.

The new type PLC ended this one-to-one correspondence. Users need only change the soft component's value by HMI and the corresponding terminal will activate. To take advantage of this improvement, the user needn't replace the PLC or modify the original program if any of the PLC terminals become damaged.

Before (Complicated and not effective)



Now (Simple, fast and effective)



9-2 Operation Method

The mapping relationship for damaged inputs/outputs can be re-address to other useable points. This can be done without changes to the user program. In the PLC special register, we specify a certain address section for user to change the mapping relation. User just finds the mapping relation of the damaged input/output, replace the value in this special register with the value of changed input/output.

Below is the table to modify the input/output point's mapping ID:

Table 1: mapping relationship of the Input and soft component

ID.	FUNCTION	DESCRIPTION
FD8010	X00 corresponds to I**	X0 corresponds to the number of input mapping I**
FD8011	X01 corresponds to I**	
FD8012	X02 corresponds to I**	
……	……	
FD8073	X77 corresponds to I**	

Table 2: mapping relationship of the output and soft component

NO	FUNCTION	INSTRUCTION
FD8074	Y00 corresponds to O**	Y0 corresponds to the number of output mapping O**
FD8075	Y01 corresponds to O**	
FD8076	Y02 corresponds to O**	
……	……	
FD8137	Y77 corresponds to O**	

As shown in the table above, the original value is FD8010 is 0, if it is replaced by the value "7", then X7 will represent X0 in the program. At the same time the value in FD8170 should be changed to 0, to realize exchange. In this way, X0 will correspond with external input X7; X7 will correspond with external input X0.

※1: After changing the mapping relation, please restart the PLC.

※2: When change the mapping relation, please note: input/output is in octal, but the addressee ID is in decimal.

※3: When changes are made, the user should exchange the mapping relation. i.e. if modify X0 ID to be 5, make sure to change X5 ID to be 0.

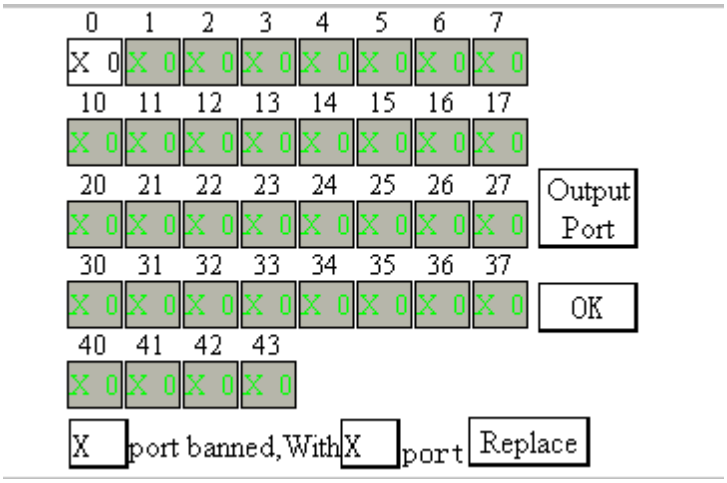
※4: Users can modify the FD value online, but this method is not recommended. We recommend the method in chapter 9-3.

9-3 I/O Reconfiguration via HMI

User can change the mapping relation by XCP Pro, but PLC must be online with PC. We suggest users change the mapping relation by HMI as per the example below:

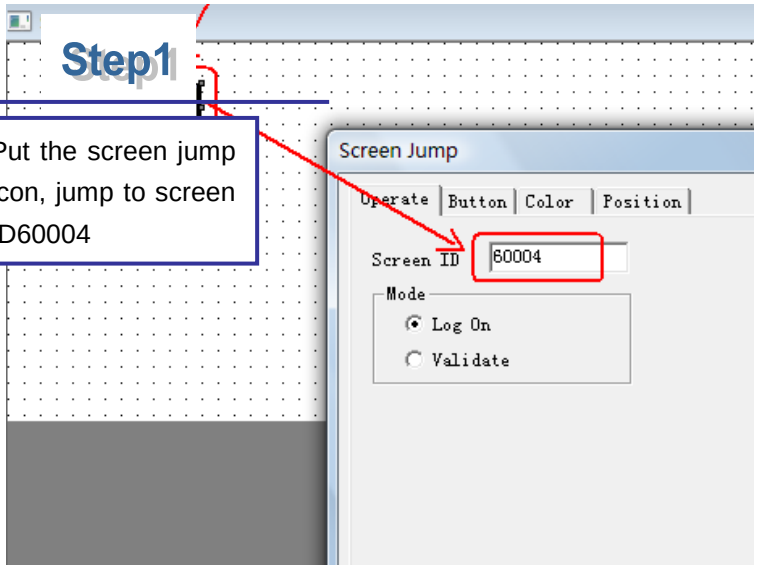
Below are two screen snap-shots based on ID60004 and ID60005 in TP Series HMI, they are used for changing the mapping relation of input and output. We just need to put the “Screen Jump” Button in the program interface, touch the Button, jump to the specified screen, change the mapping relation there.

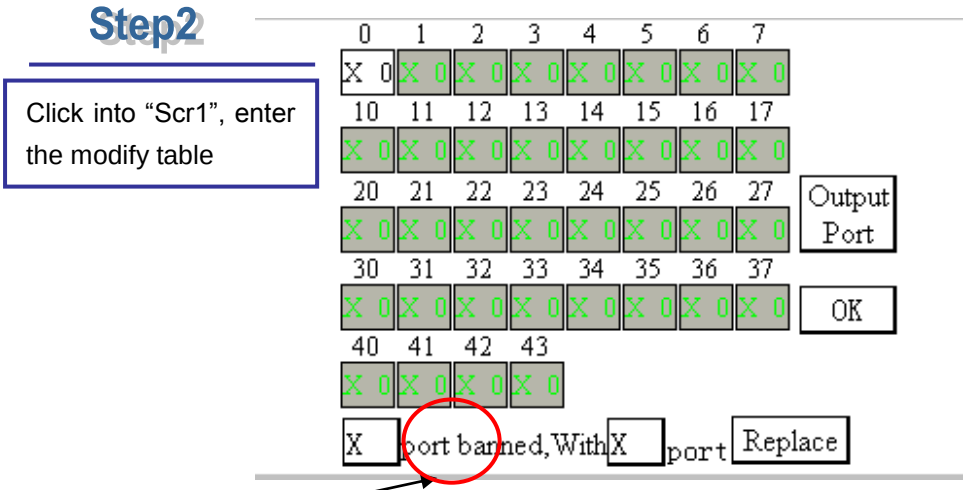
Modify the input point’s mapping screen (ID60004), see below:



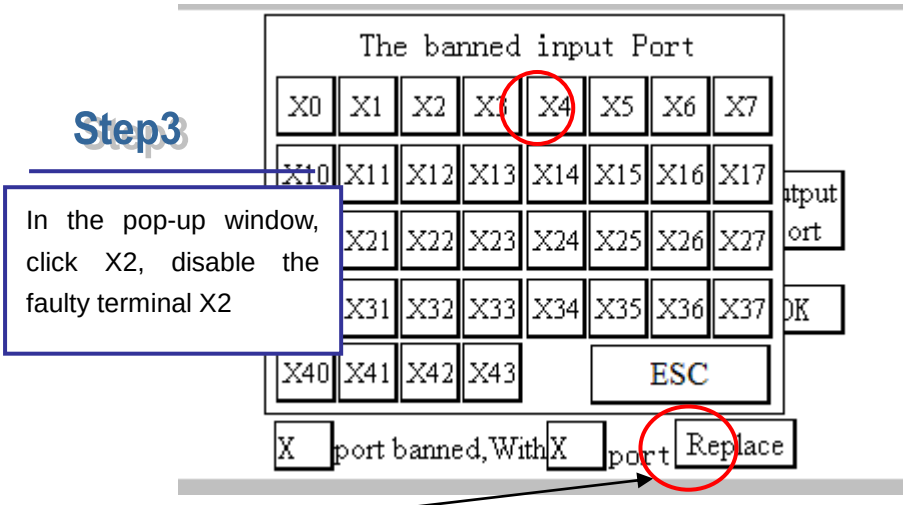
Modify the output point’s mapping screen (ID60005), see below:

From the image above, we can see that in the screen we list all the input/output terminals and it’s simple to modify. Follow the steps below:

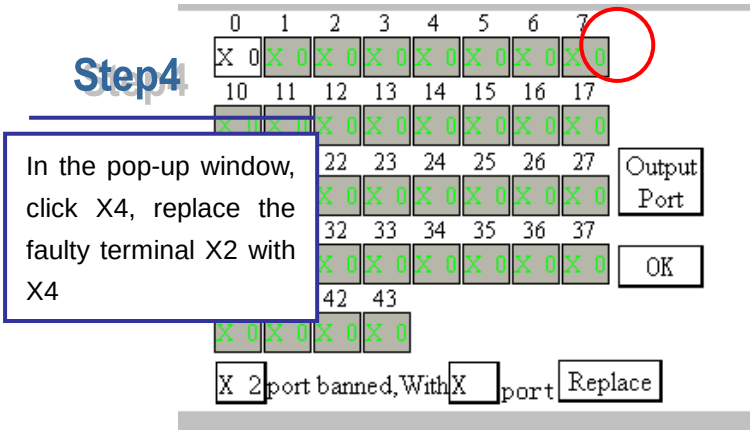


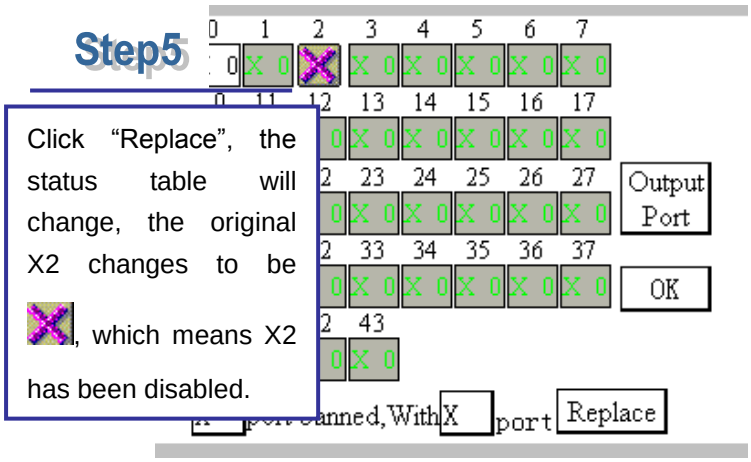


Click it, you will see the pop-up window:



Continue to click it, the replacement window will pop up:





As in the above graphs, we need only 5 minutes re-address I/O terminals. This method negates the need to modify the whole program or replace the PLC etc.

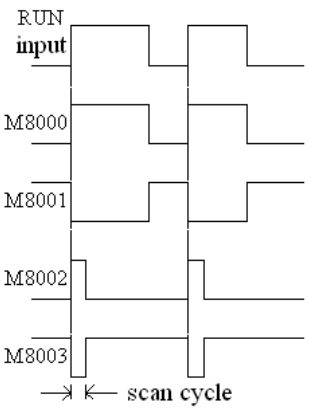
※1: after modification, make sure to restart PLC

Appendix 1 - Special Soft Device List

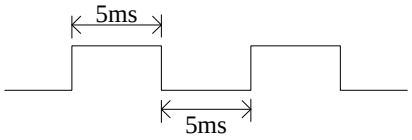
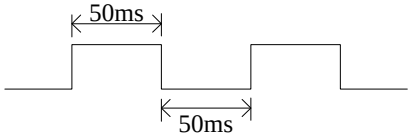
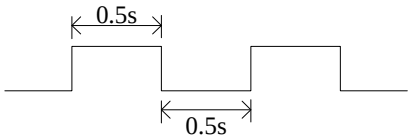
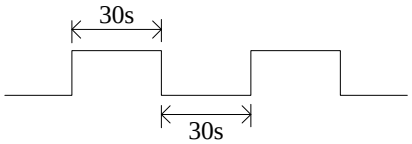
Here we introduce the main functions of special soft devices, data registers and FlashROM, and introduce expansion addresses.

Appendix 1-1 Special Auxiliary Relay List

PC Status (M8000-M8003)

ID	Function	Description	
M8000	Normally ON coil when running		M8000 keeps being ON status when PLC is running
M8001	Normally OFF coil when running		M8001 keeps being OFF status when PLC is running
M8002	Initial positive pulse coil		M8002 be ON in first scan cycle
M8003	Initial negative pulse coil		M8003 be OFF in first scan cycle

Clock (M8011-M8014)

ID	Function	Description
M8011	Shake with the cycle of 10ms	
M8012	Shake with the cycle of 100ms	
M8013	Shake with the cycle of 10sec	
M8014	Shake with the cycle of 1min	

Flag (M8020-M8029)

ID	Function	Description
M8020	Zero	The plus/minus operation result is 0
M8021	Borrow	“borrow” occurs in minus operation
M8022	Carry	When carry occurs in plus operation or overflow occurs in bit shift operation
M8023		
M8026	RAMP Mode	
M8029		

PC Mode (M8030-M8038)

ID	Function	Description
M8030	PLC initializing	
M8031	Non-retentive register reset	When driving this M, ON/OFF mapping memory of Y, M, S, TC and the current values of T, C, D are all reset to be 0
M8032	Retentive register reset	
M8033	Registers keep stopping	When PLC changes from RUN to STOP, leave all content in mapping registers and data registers
M8034	All output forbidden	Set PC’s all external contacts to be OFF status
M8038	Parameter setting	Set communication parameters flag

Stepping Ladder (M8041-M8046)

ID	Function	Description
M8041		
M8045	All output reset forbidden	When shifting the mode, all outputs reset functions are forbidden
M8046	STL status activate	When M8047 activating, act when any device of S0~S999 turns to be ON

Interruption (**M8050-M8059)**

ID	Function	Description
M8050 I000□	Forbid the input interruption 0	After executing EI instructions, even the interruption is allowed, but if M acts at this time, the correspond input interruption couldn't act separately E.g.：when M8050 is ON, interrupt I000□ is forbidden
M8051 I010□	Forbid the input interruption 1	
M8052 I020□	Forbid the input interruption 2	
M8053 I030□	Forbid the input interruption 3	
M8054 I040□	Forbid the input interruption 4	
M8055 I050□	Forbid the input interruption 5	
M8056 I40□□	Forbid the time interruption 0	After executing EI instruction, even the interruption is allowed, but if M acts at this time, the correspond time interruption couldn't act separately
M8057 I41□□	Forbid the time interruption 1	
M8058 I42□□	Forbid the time interruption 2	
M8059	Forbid the interruption	Forbid all interruption

Error Testing (M8067-M8072)

ID	Function	Description
M8067	Operation error	happen when calculating
M8070	Scan time out	
M8071	No user program	Internal codes parity error
M8072	User program error	execution codes or configure table parity error

Communication (M8120-M8148)

	ID	Function	Description
COM1	M8120		
	M8121	Waiting to send via RS232	
	M8122	“sending by RS232” flag	
	M8123	“RS232 receiving finish” flag	
	M8124	RS232 receiving flag	
	M8125	“Receive incomplete” flag	acceptance ends normally, but the accepted data number is less than the required number
	M8126	Global signal	
	M8127	“Accept error” flag	
	M8128	“ Accept correct” flag	
	M8129		
COM2	M8130		
	M8131	Waiting to send via RS232	
	M8132	“sending by RS232” flag	
	M8133	“RS232 receiving finish” flag	
	M8134	RS232 receiving flag	
	M8135	“Receive incomplete” flag	acceptance ends normally, but the accepted data number is less than the required number
	M8136	Global signal	
	M8137	“Accept error” flag	
	M8138	“ Accept correct” flag	
	M8139		
COM3	M8140		
	M8141	Waiting to send via RS232	
	M8142	“sending by RS232” flag	
	M8143	“RS232 receiving finish” flag	
	M8144	RS232 receiving flag	
	M8145	“Receive incomplete” flag	acceptance ends normally, but the accepted data number is less than the required number
	M8146	Global signal	
	M8147	“Accept error” flag	
	M8148	“ Accept correct” flag	
	M8149		

“High Speed Counter Interruption Finished” Flag (M8150-M 8169)

ID	Counter ID	Function	Description
M8150	C600	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8151	C602	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8152	C604	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8153	C606	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8154	C608	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8155	C610	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8156	C612	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8157	C614	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8158	C616	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8159	C618	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8160	C620	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8161	C622	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8162	C624	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8163	C626	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8164	C628	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8165	C630	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8166	C632	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8167	C634	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8168	C636	“Count Interruption Finished” Flag	Set flag ON when count interruption finish
M8169	C638	“Count Interruption Finished” Flag	Set flag ON when count interruption finish

Pulse output (M8170~M8238)

ID	Pulse ID	Function	specification
M8170	PULSE_1	“sending pulse” flag	Being ON when sending the pulse,
M8171		overflow flag of “32 bits pulse sending”	When overflow, Flag is on
M8172		Direction flag	1 is positive direction, the correspond direction port is on
M8173	PULSE_2	“sending pulse” flag	Being ON when sending the pulse,
M8174		overflow flag of “32 bits pulse sending”	When overflow, Flag is on
M8175		Direction flag	1 is positive direction, the correspond direction port is on
M8176	PULSE_3	“sending pulse” flag	Being ON when sending the pulse,
M8177		overflow flag of “32 bits pulse sending”	When overflow, Flag is on
M8178		Direction flag	1 is positive direction, the correspond direction port is on
M8179	PULSE_4	“sending pulse” flag	Being ON when sending the pulse,
M8180		overflow flag of “32 bits pulse sending”	When overflow, Flag is on
M8181		Direction flag	1 is positive direction, the correspond direction port is on

absolute, relative bit:

ID	function	specification	
M8190	C600 (24 segments)	**1** is absolute, **0** is relative	
M8191	C602 (24 segments)	**1** is absolute, **0** is relative	
M8192	C604 (24 segments)	**1** is absolute, **0** is relative	
M8193	C606 (24 segments)	**1** is absolute, **0** is relative	
M8194	C608 (24 segments)	**1** is absolute, **0** is relative	
M8195	C610 (24 segments)	……	
M8196	C612 (24 segments)		
M8197	C614 (24 segments)		
M8198	C616 (24 segments)		
M8199	C618 (24 segments)		
M8200	C620 (24 segments)		
M8201	C622 (24 segments)		
M8202	C624 (24 segments)		
M8203	C626 (24 segments)		
M8204	C628 (24 segments)		
M8205	C630 (24 segments)		
M8206	C632 (24 segments)		
M8207	C634 (24 segments)		
M8208	C636 (24 segments)		
M8209	C638 (24 segments)		
M8210	Pulse alarm flag (frequency change suddenly)	**1** is alarm, **0** is correct	PULSE_1
M8211	Neglect the alarm or not	When flag is 1, stop sending alarm	PULSE_1
M8212	Pulse alarm flag (frequency change suddenly)	**1** is alarm, **0** is correct	PULSE_2
M8213	Neglect the alarm or not	When flag is 1, stop sending alarm	PULSE_2
M8214	Pulse alarm flag (frequency change suddenly)	**1** is alarm, **0** is correct	PULSE_3
M8215	Neglect the alarm or not	When flag is 1, stop sending alarm	PULSE_3
M8216	Pulse alarm flag (frequency change suddenly)	**1** is alarm, **0** is correct	PULSE_4
M8217	Neglect the alarm or not	When flag is 1, stop sending alarm	PULSE_4
M8218	Pulse alarm flag (frequency change suddenly)	**1** is alarm, **0** is correct	PULSE_5
M8219	Neglect the alarm or not	When flag is 1, stop sending alarm	PULSE_5

Positive/negative count

ID	Counter Nr.	Function	Specification
M8238	C300~C498	Positive/negative counter control	**0** is increment counter, **1** is decrement counter, default is 0

24 segments HSC interruption loop (M8270~M8289)

ID	Counter ID	Specification	
M8270	24 segments HSC interruption loop (C600)	if set it to be 1, then loop executing the interruption; or else execute only one time interruption;	
M8271	24 segments HSC interruption loop (C602)		
M8272	24 segments HSC interruption loop (C604)		
M8273	24 segments HSC interruption loop (C606)		
M8274	24 segments HSC interruption loop (C608)		
M8275	24 segments HSC interruption loop (C610)		
M8276	24 segments HSC interruption loop (C612)		
M8277	24 segments HSC interruption loop (C614)		
……	……		
M8279	24 segments HSC interruption loop (C618)		
M8280	24 segments HSC interruption loop (C620)	if set it to be 1, then loop executing the interruption; or else execute only one time interruption;	
M8281	24 segments HSC interruption loop (C622)		
……	……		
M8284	24 segments HSC interruption loop (C628)		
M8285	24 segments HSC interruption loop (C630)	if set it to be 1, then loop executing the interruption; or else execute only one time interruption;	
……	……		
M8289	24 segments HSC interruption loop (C638)		

Read &Write the Expansions (M8340~M8341)

ID	Function	Specification
M8340	Read the expansion error flag (**read** instruction)	
M8341	Write the expansion error flag (**write** instruction)	

BLOCK Execution (M8630~M8730)

ID	Function	Specification
M8630		
M8631	BLOCK1 is running flag	
M8632	BLOCK2 is running flag	
……	……	……
……	……	……
……	……	……
M8730	BLOCK100 is running flag	

Appendix 1-2 List of Special Memory and Special Data Register

Clock (D8010-D8019)

ID	Function	Specification
D8010	The current scan cycle	Unit:0.1ms
D8011	The min. scan time	Unit:0.1ms
D8012	The max. scan time	Unit:0.1ms
D8013	Second (clock)	0~59 (BCD code)
D8014	minute (clock)	0~59 (BCD code)
D8015	hour (clock)	0~23 (BCD code)
D8016	day (clock)	0~31 (BCD code)
D8017	month (clock)	0~12 (BCD code)
D8018	year (clock)	2000~2099 (BCD code)
D8019	week (clock)	0 (Sunday)~6 (Saturday) (BCD code)

Flag (D8021-D8029)

ID	Function	Specification
D8021	Model	Low byte
	Series number	High byte
D8022	Compatible system's version number	Low byte
	System's version number	High byte
D8023	Compatible model's version number	Low byte
	Model's version number	High byte
D8024	Model's information	Max 5 characters +"\0"
D8025		
D8026		
D8027	Suitable program software version	
D8028		
D8029		

Error check（D8067-D8098）

ID	Function	Specification
D8067	Operation error code's Nr.	The error of divide zero
D8068	lock the Nr. of error code	
D8069		
D8070	exceeded scan time	Unit 1ms
D8074	Nr. of offset registers D	
D8097		
D8098		

Communication (D8120-D8149)

	ID	Function	specification
Com 1	D8120		
	D8121		
	D8122	the left data RS232 should send	
	D8123	Data number RS232 received	
	D8126		
	D8127	Communication error code	7: hardware error 8: CRC Parity error 9: station number error 10: no start code 11: no end code 12: communication time out
	D8128	Modbus communication error (the replied message from slaves when the master send errors)	0: correct 1: don't support function ID 2: address error (overrun address) 3: Data error (the number of data) 8: saving data error (rewrite Flash)
	D8129		

Com2	D8130		
	D8131		
	D8132	the left data RS232 should send	
	D8133	Data number RS232 received	
	D8136		
	D8137	Communication error code	7: hardware error 8: CRC check error 9: station number error 10: no start sign 11: no end sign 12: communication time out
	D8138	Modbus communication error (the replied message from slaves when the master send errors)	0：correct 1: don't support function ID 2: address error(overrun address) 3: Data error (the number of data) 8：saving data error (rewrite Flash）
	D8139		
Com 3	D8140		
	D8141		
	D8142	the left data RS232 should send	
	D8143	Data number RS232 received	
	D8146		
	D8147	Communication error code	7: hardware error 8: CRC check error 9: station number error 10: no start sign 11: no end sign 12: communication time out
	D8148	Modbus communication error (the replied message from slaves when the master send errors)	0：correct 1: don't support function ID 2: address error(overrun address) 3: Data error (the number of data) 8：saving data error (rewrite Flash）
	D8149		

HSC Interruption Station (D8150-D8169)

ID	Counter ID	function	specification
D8150	C600	The current segment (**No.n** segment)	

D8151	C602	The current segment	
D8152	C604	The current segment	
D8153	C606	The current segment	
D8154	C608	The current segment	
D8155	C610	The current segment	
D8156	C612	The current segment	
D8157	C614	The current segment	
D8158	C616	The current segment	
D8159	C618	The current segment	
D8160	C620	The current segment	
D8161	C622	The current segment	
D8162	C624	The current segment	
D8163	C626	The current segment	
D8164	C628	The current segment	
D8165	C630	The current segment	
D8166	C632	The current segment	
D8167	C634	The current segment	
D8168	C636	The current segment	
D8169	C638	The current segment	

Pulse output (D8170-D8220)

ID	Pulse ID	function	specification

D8170	PULSE_1	The low 16 bits of accumulated pulse number	
D8171		The high 16 bits of accumulated pulse number	
D8172		The current segment (means Nr.n segment)	
D8173	PULSE_2	The low 16 bits of accumulated pulse number	
D8174		The high 16 bits of accumulated pulse number	
D8175		The current segment (means Nr.n segment)	
D8176	PULSE_3	The low 16 bits of accumulated pulse number	Only XC5-32RT-E (4PLS) model has
D8177		The high 16 bits of accumulated pulse number	
D8178		The current segment (means Nr.n segment)	
D8179	PULSE_4	The low 16 bits of accumulated pulse number	
D8180		The high 16 bits of accumulated pulse number	
D8181		The current segment (means Nr.n segment)	
D8190	PULSE_1	The low 16 bits of the current accumulated current pulse number	
D8191		The high 16 bits of the current accumulated current pulse number	
D8192	PULSE_2	The low 16 bits of the current accumulated current pulse number	
D8193		The high 16 bits of the current accumulated current pulse number	
D8194	PULSE_3	The low 16 bits of the current accumulated current pulse number	Only XC5-32RT-E (4PLS) model has
D8195		The high 16 bits of the current accumulated current pulse number	
D8196	PULSE_4	The low 16 bits of the current accumulated current pulse number	
D8197		The high 16 bits of the current accumulated current pulse number	

ID	Pulse ID	Function	Description
D8210	PULSE_1	Error segment number	PULSE_1
D8212	PULSE_2	Error segment number	PULSE_2

D8214	PULSE_3	Error segment number	PULSE_3
D8216	PULSE_4	Error segment number	PULSE_4
D8218	PULSE_5	Error segment number	PULSE_5
D8220	Frequency Testing Precision	indicate the bit Nr. Behind the decimal dot, **1** means ***10**, **2** means ***100**	

Absolute Positioning/Relative Positioning/the Origin Return (D8230-D8239)

ID	Pulse	Function	Description
D8230	PULSE_1	Rising time of the absolute/relation position instruction (Y0)	
D8231		Falling time of the origin return instruction (Y0)	
D8232	PULSE_2	Rising time of the absolute/relation position instruction (Y1)	
D8233		Falling time of the origin return instruction (Y1)	
D8234	PULSE_3	Rising time of the absolute/relation position instruction (Y2)	
D8235		Falling time of the origin return instruction (Y2)	
D8236	PULSE_4	Rising time of the absolute/relation position instruction (Y3)	
D8237		Falling time of the origin return instruction (Y3)	
D8238	PULSE_5	Rising time of the absolute/relation position instruction	
D8239		Falling time of the origin return instruction	

Read/Write the Expansion (D8315-D8316)

ID	Function	Description
D8315	Read the expansion’s error type	
D8316	Write the expansion’s error type	

Sequential Function Block (D8630-D8730)

ID	Function	Description
D8630		
D8631	The current executing instruction of **BLOCK1**	The value is used when **BLOCK** is monitoring
D8632	The current executing instruction of **BLOCK2**	The value is used when **BLOCK** is monitoring
……	……	……
……	……	……
……	……	……
D8730	The current executing instruction of **BLOCK100**	The value is used when **BLOCK** is monitoring

Error information of the Expansions (D8600-D8627)

ID	Function	specification	Expansion ID
D8600	Read the expansion's error times		Expansion 1
D8601	Read the expansion's error	expansion's CRC parity error expansion's address error expansion's accepted data length error expansion's accept buffer zone overflow expansion's timeout error CRC parity error when PLC is accepting data unknown error	
D8602	write the expansion's error times		
D8603	write the expansion's error	……	
D8604	Read the expansion's times		Expansion 2
D8605	Read the expansion's error	……	
D8606	write the expansion's error times		
D8607	write the expansion's error	……	
D8608	Read the expansion's times		Expansion 3
D8609	Read the expansion's error	……	
D8610	write the expansion's error times		
D8611	write the expansion's error	……	
D8612	Read the expansion's times		Expansion 4
D8613	Read the expansion's error	……	

D8614	write the expansion's error times		
D8615	write the expansion's error	……	
……	……	……	……
……	……	……	……
D8624	Read the expansion's times		Expansion 7
D8625	Read the expansion's error	……	
D8626	write the expansion's error times		
D8627	write the expansion's error	……	

Take the first expansion module as the example:

Channel	AD signal	DA signal	PID Output value	PID run/stop bit	Set value	PID parameter: **Kp, Ki, Kd,** control range **Diff,** Death range **death**
XC-E8AD						
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	
XC-E4AD2DA						
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	
0CH	-	QD100	-	-	-	
1CH	-	QD101	-	-	-	

XC-E4DA

CH Nr.	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5	Exp. 6	Exp. 7
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

XC-E2DA

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

XC-E6PT-P/ XC-E6TC-P

CH Nr.	Current temp.	Set temp.	PID run/stop bit	The first 3CH PID value	The last 3CH PID value
0CH	ID100	QD100	Y100		
1CH	ID101	QD101	Y101	Kp：QD106	Kp：QD110
2CH	ID102	QD102	Y102	Ki：QD107	Ki：QD111
3CH	ID103	QD103	Y103	Kd：QD108	Kd：QD112
4CH	ID104	QD104	Y104	Diff：QD109	Diff：QD113
5CH	ID105	QD105	Y105		

XC-E6TCA-P

RELATIVE PARAMETERS	COMMENTS AND DESCRIPTIONS				
	CH	Ch0	Ch1	……	Ch5
Display temperature (unit: 0.1℃)	module 1	ID100	ID101	ID10×	ID105
PID output (X input which returns to main unit)	module 1	X100	X101	X10×	X105
Thermocouple's connecting status (0 is connect, 1 is disconnect)	module 1	X110	X111	X11×	X115
PID auto tune error bit (0 is normal, 1 is parameters error)	module 1	X120	X121	X12×	X125
Enable channel's signal	module 1	Y100	Y101	Y10×	Y105
Auto tune PID control bit	Auto tune activate signal, enter auto tune stage if being set to be 1; when auto turn finish, PID parameters and temperature control cycle value are refreshed, reset this bit automatically. Users can also read its status; 1 represents auto tune processing; 0 represents no atto tune or auto tune finished				
PID output value (operation value)	Digital output value range: 0～4095 If PID output is analogue control (like steam valve open scale or thyistor ON angle), transfer this value to the analogue output module to realize the control requirements				
PID parameters (P, I, D)	Via PID auto tune to get the best parameters; If the current PID control can't fulfill the control requirements, users can also write the PID parameters according to experience. Modules carry on PID control according to the set PID parameters.				
PID operation range (Diff) (unit: 0.1℃)	PID operation activates between ±Diff range. In real temperature control environments, if the temperature is lower than $T_{\text{set temp.}} - T_{Diff}$, PID output the max value; if the temperature is higher than $T_{\text{set temp.}} + T_{Diff}$, PID output the				

	mini value;
Temperature difference δ (unit: 0.1℃)	(sample temperature+ Temperature difference δ)/10=display temperature value. Then temperature display value can equal or close to the real temperature value. This parameter has sign (negative or positive). Unit is 0.1℃, the default value is 0.
The set temperature value(unit: 0.1℃)	Control system's target temperature value. The range is 0～1000℃, the precision is 0.1℃.
Temperature control cycle (unit: 0.1s)	Control cycle's range is 0.5s～200s, the minimum precision is 0.1s. the write value is the real temperature control cycle multiply 10. i.e. 0.5s control cycle should write 5, 200s control cycle should write 2000.
Adjust environment temperature value (unit: 0.1℃)	If users think the environment temperature is different with the display temperature, he can write in the known temperature value. At the moment of value written in, calculate the temperature difference δ and save. Calculate the temperature difference value δ=adjust environment temperature value－sample temperature value. Unit: 0.1℃. E.g.: under heat balance status, user test the environmental temperature as 60.0℃ with mercurial thermometer, the display temperature is 55.0℃ (correspond sample temperature is 550), temperature difference δ=0. at this time, users write this parameters with 600，temperature difference δ is re-calculated to be 50 (5℃), then the display temperature = (sample temperature＋temperature difference δ）/10 =60℃。 **Note: when users write the adjust temperature value, make sure that the temperature is same with the environment temperature value. This value is very important, once it's wrong, temperature difference δ will be wrong, then effect the display temperature
Auto tune output value	The output when auto tune, use % as the unit, 100 represents 100% of full scale output. 80 represents 80% of full scale output.

XC-E3AD4PT2DA

CH Nr.	AD signal	PID output value	PID run/stop bit	Set value	PID parameters: **Kp, Ki, Kd,** control range **Diff,** death range **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	
CH Nr.	PT signal	PID output value	PID run/stop bit	Set value	
3CH	ID103	ID110	Y103	QD105	
4CH	ID104	ID111	Y104	QD106	

5CH	ID105	ID112	Y105	QD107	
6CH	ID106	ID113	Y106	QD108	
CH Nr.	DA signal	-	-	-	-
0CH	QD100	-	-	-	
1CH	QD101	-	-	-	

XC-E2AD2PT2DA

RELATIVE PARAMETERS	COMMENTS AND DESCRIPTIONS				
	CH	PT0（0.01℃）	PT1（0.01℃）	AD0	AD1
Display temperature (unit: 0.1℃)	module 1	ID100	ID101	ID102	ID103
PID output (X input which returns to main unit)	module 1	X100	X101	X102	X103
Connecting status (0 is connect, 1 is disconnect)	module 1	X110	X111	X112	X113
PID auto tune error bit (0 is normal, 1 is parameters error)	module 1	X120	X121	X122	X123
Enable channel's signal	module 1	Y100	Y101	Y102	Y103
Auto tune PID control bit	Auto tune activate signal, enter auto tune stage if being set to be 1; when auto turn finish, PID parameters and temperature control cycle value are refreshed, reset this bit automatically. Users can also read its status; 1 represents auto tune processing; 0 represents no atto tune or auto tune finished				
PID output value (operation value)	Digital output value range: 0～4095 If PID output is analogue control (like steam valve open scale or thyistor ON angle), transfer this value to the analogue output module to realize the control requirements				
PID parameters (P, I, D)	Via PID auto tune to get the best parameters; If the current PID control can't fulfill the control requirements, users can also write the PID parameters according to experience. Modules carry on PID control according to the set PID parameters.				
PID operation range (Diff) (unit: 0.1℃)	PID operation activates between ±Diff range. In real temperature control environments, if the temperature is lower than $T_{\text{set temp.}} - T_{Diff}$, PID output the max value; if the temperature is higher than $T_{\text{set temp.}} + T_{Diff}$, PID output the mini value;				
Temperature difference δ	(sample temperature+ Temperature difference δ)/10=display temperature value. Then temperature display value can equal or close to the real temperature value. This				

(unit: 0.1℃)	parameter has sign (negative or positive). Unit is 0.1℃, the default value is 0.
The set temperature value(unit: 0.1℃)	Control system's target temperature value. The range is 0～1000℃, the precision is 0.1℃.
Temperature control cycle (unit: 0.1s)	Control cycle's range is 0.5s～200s, the minimum precision is 0.1s. the write value is the real temperature control cycle multiply 10. i.e. 0.5s control cycle should write 5, 200s control cycle should write 2000.
Real value (unit: 0.1℃)	If user thinks the environment temperature is different with the display temperature, he can write in the known temperature value. At the moment of value written in, calculate the temperature difference δ and save. Calculate the temperature difference value δ=adjust environment temperature valuesample temperature value. Unit: 0.1℃. E.g.: under heat balance status, user test the environmental temperature as 60.0℃ with mercurial thermometer, the display temperature is 55.0℃ (correspond sample temperature is 550), temperature difference δ=0. at this time, users write this parameters with 600，temperature difference δ is re-calculated to be 50 (5℃), then the display temperature = (sample temperature＋temperature difference δ）/10 =60℃。 **Note: when users write the adjust temperature value, make sure that the temperature is same with the environment temperature value. This value is very important, once it's wrong, temperature difference δ will be wrong, then effect the display temperature
Auto tune output value	The output when auto tune, use % as the unit, 100 represents 100% of full scale output. 80 represents 80% of full scale output.

Appendix 1-4 Special Flash Register List

I Filter

ID	Function	Initial Value	Description
FD8000	input filter time of **X** port	10	Unit: ms
FD8002		0	
FD8003		0	
……		0	
FD8009		0	

I Mapping

ID	Function	Initial value	Description
FD8010	**X00** corresponds with **I****	0	X0 corresponds with number of input image I**
FD8011	**X01** corresponds with **I****	1	Initial values are all decimal
FD8012	**X02** corresponds with **I****	2	
……	……		
FD8073	**X77** corresponds with **I****	63	

O Mapping

ID	Function	Initial value	Description
FD8074	**Y00** corresponds with **I****	0	Y0 corresponds with the number of output image O**
FD8075	**Y01** corresponds with **I****	1	Initial value are all decimal

FD8076	**Y02** corresponds with **I****	2	
……	……		
FD8137	**Y77** corresponds with **I****	63	

I Property

ID	function	Initial value	Description
FD8138	X00 property	all be 0	0: positive logic; others: negative logic
FD8139	X01 property		
FD8140	X02 property		
……	……		
FD8201	X77 property		

Power-off retentive area of soft components

ID	Function	Initial Value
FD8202	Start tag of **D** power off retentive area	4000
FD8203	Start tag of **M** power off retentive area	3000
FD8204	Start tag of **T** power off retentive area	640
FD8205	Start tag of **C** power off retentive area	320
FD8206	Start tag of **S** power off retentive area	512
FD8207	Start tag of E**D** power off retentive area	0
FD8209	Pulse director and pulse delay time setting	50ms

Communication

	ID	Function	Initial	Description
COM1	FD8210	Communicate Mode (station number)	1	255 (FF) is free mode， 1~254 is modbus station number
	FD8211	Communicate format	8710	Baud rate, Data bit, stop bit, parity
	FD8212	Judgment time of ASC timeout	3	Unit ms, if set to be 0, it means no timeout waiting
	FD8213	Judgment time of reply timeout	300	Unit ms, if set to be 0, it means no timeout waiting
	FD8214	Start ASC	0	High 8 bits invalid
	FD8215	End ASC	0	High 8 bits invalid
	FD8216	Free format setting	0	8/16 bits buffer; With/without start bit， With/without stop bit
COM2	FD8220	Communicate Mode (station number)	8710	255 (FF) is free mode， 1~254 is modbus station number
	FD8221	Communicate format	3	Baud rate, Data bit, stop bit, parity
	FD8222	Judgment time of ASC timeout	300	Unit ms, if set to be 0, it means no timeout waiting
	FD8223	Judgment time of reply timeout	0	Unit ms, if set to be 0, it means no timeout waiting
	FD8224	Start ASC	0	High 8 bits invalid
	FD8225	End ASC	0	High 8 bits invalid

	FD8226	Free format setting	8710	8/16 bits buffer; With/without start bit， With/without stop bit
COM3	FD8230	Communicate Mode (station number)	8710	255 (FF) is free mode， 1~254 is modbus station number
	FD8231	Communicate format	3	Baud rate, Data bit, stop bit, parity
	FD8232	Judgment time of ASC timeout	300	Unit ms, if set to be 0, it means no timeout waiting
	FD8233	Judgment time of reply timeout	0	Unit ms, if set to be 0, it means no timeout waiting
	FD8234	Start ASC	0	High 8 bits invalid
	FD8235	End ASC	0	High 8 bits invalid
	FD8236	Free format setting	8710	8/16 bits buffer; With/without start bit， With/without stop bit

Subsection Power-off Retentive Zone of Timer T

Nr.	Function	Initial Value
FD8323	Set the retentive zone's start tag of 100ms non-accumulation timer	
FD8324	Set the retentive zone's start tag of 100ms accumulation timer	
FD8325	Set the retentive zone's start tag of 10ms non-accumulation timer	
FD8326	Set the retentive zone's start tag of 10ms accumulation timer	
FD8327	Set the retentive zone's start tag of 1ms non-accumulation timer	
FD8328	Set the retentive zone's start tag of 1ms accumulation timer	
FD8329	Set the retentive zone's start tag of 1ms precise timer	

Subsection power-off retentive zone of counter C

Nr.	Function	Initial Value
FD8330	Set the retentive zone's start tag of 16 bits positive counter	
FD8331	Set the retentive zone's start tag of 32 bits positive/negative counter	
FD8332	Set the retentive zone's start tag of single-phase HSC	
FD8333	Set the retentive zone's start tag of dual-phase HSC	
FD8334	Set the retentive zone's start tag of AB-phase HSC	

※1：If you change special FLASH memory, it will take into effect after restart the PLC

Appendix 2 - Instructions List

This chapter lists all instructions supported by the XC Series PLC. These instructions include: basic instructions, application instructions, special function instructions and motion control instructions. It also shows each instruction's application range.
This enables the users to check the instruction's functions much faster. For detailed application, please refer to XC Series Programmable Controller [Instruction Part].

Appendix 2-1 Basic Instructions List

Mnemonic	Function
LD	Initial logical operation contact type NO (normally open)
LDI	Initial logical operation contact type NC (normally closed)
OUT	Final logic operation type coil drive
AND	Serial connection of NO
ANI	Serial connection of NC
OR	Parallel connection of NO
ORI	Parallel connection of NC
LDP	Rising edge pulse
LDF	Falling edge pulse
ANDP	Serial connection of rising edge pulse
ANDF	Serial connection of falling edge pulse
ORP	Parallel l connection of rising edge pulse
ORF	parallel connection of falling edge pulse
LDD	Read directly from the contact state
LDDI	NC contact directly read
ANDD	Read directly from the contact state, connected in series
ANDDI	Directly read normally closed contact, connected in series
ORD	Read directly from the contact state, parallel connection
ORDI	Directly read normally closed contact, parallel connection
OUTD	Direct output to the contact
ORB	Parallel connection of parallel multiply parallel circuit
ANB	Serial connection of parallel multiply parallel circuit
MCS	New bus line start
MCR	Bus line return
ALT	Alternate state
PLS	Rising edge pulse
PLF	Falling edge pulse
SET	Set a bit device permanently on
RST	Reset a bit device permanently off
OUT	Output counter coil
RST	Output reset, and current data reset to zero
END	Input and output processing, and return to Step 0
GROUP	Instruction block folding start
GROUPE	Fold the end of command block
TMR	Timer

Appendix 2-2 Applied Instruction List

Sort	Mnemonic	Function	Suit Model				
			XC1	XC2	XC3	XC5	XCM
Program flow	CJ	Condition Jump	√	√	√	√	√
	CALL	Call subroutine	√	√	√	√	√
	SRET	Subroutine return	√	√	√	√	√
	STL	Flow start	√	√	√	√	√
	STLE	Flow end	√	√	√	√	√
	SET	Open the assigned flow, close the current flow	√	√	√	√	√
	ST	Open the assigned flow, not close the current flow	√	√	√	√	√
	FOR	Start of a FOR-NEXT loop	√	√	√	√	√
	NEXT	END of a FOR-NEXT loop	√	√	√	√	√
	FEND	End of main program	√	√	√	√	√
Data compare	LD=※1	LD activate if (S1)= (S2)	√	√	√	√	√
	LD>※1	LD activate if (S1)> (S2)	√	√	√	√	√
	LD<※1	LD activate if (S1)< (S2)	√	√	√	√	√
	LD<>※1	LD activate if(S1)≠(S2)	√	√	√	√	√
	LD>=※1	LD activate if(S1) >= (S2)	√	√	√	√	√
	LD<=※1	LD activate if(S1) <= (S2)	√	√	√	√	√
	AND=※1	AND activate if (S1)= (S2)	√	√	√	√	√
	AND>※1	AND activate if (S1)> (S2)	√	√	√	√	√
	AND<※1	AND activate if (S1)< (S2)	√	√	√	√	√
	AND<>※1	AND activate if(S1)≠(S2)	√	√	√	√	√
	AND>=※1	AND activate if(S1) >= (S2)	√	√	√	√	√
	AND<=※1	AND activate if(S1) <= (S2)	√	√	√	√	√
	OR=※1	OR activate if (S1)= (S2)	√	√	√	√	√
	OR>※1	OR activate if (S1)> (S2)	√	√	√	√	√
	OR<※1	OR activate if (S1)< (S2)	√	√	√	√	√
	OR<>※1	OR activate if(S1)≠(S2)	√	√	√	√	√
	OR>=※1	OR activate if(S1) >= (S2)	√	√	√	√	√
	OR<=※1	OR activate if(S1) <= (S2)	√	√	√	√	√
Data move	CMP※1	Data compare	√	√	√	√	√
	ZCP※1	Data zone compare	√	√	√	√	√
	MOV※1	Move	√	√	√	√	√
	BMOV	Block move	√	√	√	√	√
	FMOV※1	Fill move	√	√	√	√	√
	FWRT※1	FlashROM Written	√	√	√	√	√

	MSET	Zone set	√	√	√	√	√
	ZRST	Zone reset	√	√	√	√	√
	SWAP	The high bytes and low bytes exchange	√	√	√	√	√
	XCH※1	Data exchange	√	√	√	√	√
Sort	Mnemonic	function	Suit model				
			XC1	XC2	XC3	XC5	XCM
Data Operation	ADD※1	addition	√	√	√	√	√
	SUB※1	subtraction	√	√	√	√	√
	MUL※1	multiplication	√	√	√	√	√
	DIV※1	division	√	√	√	√	√
	INC※1	Increment	√	√	√	√	√
	DEC※1	decrement	√	√	√	√	√
	MEAN※1	mean	√	√	√	√	√
	WAND※1	Word and	√	√	√	√	√
	WOR※1	Word or	√	√	√	√	√
	WXOR※1	Word exclusive or	√	√	√	√	√
	CML※1	Complement	√	√	√	√	√
	NEG※1	Negative	√	√	√	√	√
Data shift	SHL※1	Arithmetic shift left		√	√	√	√
	SHR※1	Arithmetic shift right		√	√	√	√
	LSL※1	Logic shift left		√	√	√	√
	LSR※1	Logic shift right		√	√	√	√
	ROL※1	Rotation shift lift		√	√	√	√
	ROR※1	Rotation shift right		√	√	√	√
	SFTL※1	Bit shift left		√	√	√	√
	SFTR※1	Bit shift right		√	√	√	√
	WSFL	Word shift left		√	√	√	√
	WSFR	Word shift right		√	√	√	√
Data convert	WTD	Single word integer convert to double word integer		√	√	√	√
	FLT※1	16 bits integer convert to float		√	√	√	√
	FLTD※1	64 bits integer convert to float		√	√	√	√
	INT※1	Float convert to integer		√	√	√	√
	BIN	BCD convert to binary		√	√	√	√
	BCD	Binary convert to BCD		√	√	√	√
	ASCI	Hex convert to ASCⅡ		√	√	√	√
	HEX	ASCⅡ convert to Hex		√	√	√	√
	DECO	Coding		√	√	√	√
	ENCO	High bit coding		√	√	√	√
	ENCOL	Low bit coding		√	√	√	√

Sort	Mnemonic	function	Suit Model				
			XC1	XC2	XC3	XC5	XCM
Float Operation	ECMP※2	Float compare		√	√	√	√
	EZCP※2	Float zone compare		√	√	√	√
	EADD※2	Float addition		√	√	√	√
	ESUB※2	Float subtraction		√	√	√	√
	EMUL※2	Float multiplication		√	√	√	√
	EDIV※2	Float division		√	√	√	√
	ESQR※2	Float square root		√	√	√	√
	SIN※2	Sine		√	√	√	√
	COS※2	Cosine		√	√	√	√
	TAN※2	tangent		√	√	√	√
	ASIN※2	Floating-point operations against SIN		√	√	√	√
	ACOS※2	Floating-point operations against COS		√	√	√	√
	ATAN※2	Floating-point operations against TAN		√	√	√	√
Clock	TRD	Read RTC data		√	√	√	√
	TWR	Set RTC data		√	√	√	√

※ 1 If no special instructions, general instruction is 16 bits, and does not have 32-bit instruction form.

※ 1 command to identify the form of a 32-bit instructions, the general expression of 32-bit instruction 16-bit instructions to their corresponding front "D", such as 32-bit ADD instruction DADD.

※ 2 marked with instructions for the 32-bit instructions, and does not have 16-bit instruction form.

"√" means where the family supports the instruction.

Appendix 2-3 Special Instructions List

sort	Mnemonic	Features	Applicable models				
			XC1	XC2	XC3	XC5	XCM
pulse	PLSY※1	Single-stage pulse output without acceleration and deceleration		√	√	√	√
	PLSR※1	Multi / single-stage, acceleration and deceleration, single / double pulse output		√	√	√	√
	PLSF※1	Variable frequency pulse output		√	√	√	√
	PLSA※1	Absolute position control of multi-stage pulse		√	√	√	√
	PLSNEXT/ PLSNT	Pulse switching section		√	√	√	√
	PLSMV※2	The number of pulses into the register		√	√	√	√
	STOP	Pulse Stop		√	√	√	√
High Speed Counter (HSC)	HSCR※2	Read 32-bit high-speed counter		√	√	√	√
	HSCW※2	Write 32 bit high-speed counter		√	√	√	√
MODBUS communication	COLR	Read MODBUS coil		√	√	√	√
	INPR	MODBUS read input coil		√	√	√	√
	COLW	MODBUS Write single coil		√	√	√	√
	MCLW	MODBUS Write multiple coils		√	√	√	√
	REGR	Read MODBUS register		√	√	√	√
	INRR	MODBUS write input register		√	√	√	√
	REGW	MODBUS write single register		√	√	√	√
	MRGW	MODBUS write multiple registers		√	√	√	√
Free format communication	SEND	Free format data transmission		√	√	√	√
	RCV	Free-form data reception		√	√	√	√
CANBUS communication	CCOLR	CANBUS coil Reading				√	
	CCOLW	Write coil CANBUS				√	
	CREGR	CANBUS register read				√	
	CREGW	CANBUS register write				√	
Precise timing	STR	Precise timing		√	√	√	√
	STRR	Reading of the precise timing register		√	√	√	√
	STRS	Stop the precise timing		√	√	√	√
interrupt	EI	Allow interrupt		√	√	√	√

	DI	Disable Interrupt		√	√	√	√
	IRET	Interrupt Return		√	√	√	√
BLOCK	BSTOP	Stop the operation of BLOCK		√	√	√	√
	BGOON	BLOCK continue to be uspended		√	√	√	√
	WAIT	Wait		√	√	√	√
Read/write expansion	FROM	Read module		√	√	√	√
	TO	Write		√	√	√	√
others	FRQM	Frequency Measurement		√	√	√	√
	PWM	PWM		√	√	√	√
	PID	PID control operation		√	√	√	√

※ 1: If no special instructions, generally referred to as 16-bit instructions, and do not have 32-bit instruction form.

※ 1 command to identify the form of a 32-bit instructions, the general expression of 32-bit instruction 16-bit instructions to their corresponding front "D", such as 32-bit ADD instruction DADD.

※ 2: marked with instructions for the 32-bit instructions, and does not have 16-bit instruction form.

※ 3: "√" indicates that the family supports the current instruction.

Appendix 2-4 Motion Control Instruction List

Mnemonic	FUNCTION	SUITABLE MODELS				
		XC1	XC2	XC3	XC5	XCM
ZRN※1	Origin return		√	√	√	√
DRVA※1	Absolute position		√	√	√	√
DRVI※1	Relative position		√	√	√	√
ABS	Absolute address					√
CCW※2	Circular anticlockwise interpolation					√
CHK	Servo end check					√
CW※2	Circular clockwise interpolation					√
DRV※2	High speed					√
DRVR	Electrical zero return					√
DRVZ	Machine zero return					√
FOLLOW※2	Follow movement instruction					√
INC	Incremental address					√
LIN※2	Linear interpolation positioning					√
PLAN※2	Plane selection					√
TIM※2	Delayed time					√
SETR	Set electrical zero					√
SETP※2	Set reference frame					√

※1: The instructions with ※1 sign have 32 bits form; generally 32 bits instructions are represented as adding D before 16 bits instructions, like this 32 bits ADD instructions is DADD;
※2: The instructions with ※2 sign are 32 bits form; they don't have 16 bits form;

Appendix 3 - Special Function Availability

Generally, the functions and instructions described in this manual don't have software and hardware requirements, however, to enable some special functions, minimum software and hardware versions are required.

Minimum requirements for the special functions are listed below:

function	Hardware version	Software version
Fill move 32 bits instruction DFMOV	V3.0 and above	V3.0 and above
Anti-trigonometric Operation	V3.0 and above	V3.0 and above
Read/write clock	V2.51 and above	V3.0 and above
Read/write high speed counter	V3.1c and above	V3.0 and above
Interrupt high speed counter	V3.1c and above	V3.0 and above
Read precise time	V3.0e and above	V3.0 and above
Stop precise time	V3.0e and above	V3.0 and above
C program block function	V3.0c and above	V3.0 and above
PID function	V3.0 and above	V3.0 and above
Block	V3.1i and above	V3.1h and above
Connect T-BOX	V3.0g and above	V3.0 and above
Connect G-BOX	V3.0i and above	V3.0 and above
Read/write XC-E6TCA-P, XC-E2AD2PT3DA, XC-E2AD2PT2DA	V3.1f and above	V3.1b and above
Expand register ED	V3.0 and above	V3.0 and above

Appendix 4 - PLC Configuration List

This part is used to check each model's configurations. Via this table, we can judge the model easily:

○ Selectable ×Not support √Support

Models	clock	communication			expansion	BD board	No. of high speed counters			No. of Pulse (T model / RT model)	External interrupt
		CAN	Modbus	Free			Increase	Pulse + direction	AB phase		
XC1 Series											
XC1-10	×	×	×	×	×	×	×	×	×	×	×
XC1-16	×	×	×	×	×	×	×	×	×	×	×
XC1-24	×	×	√※2	×	×	×	×	×	×	×	×
XC1-32	×	×	√※2	×	×	×	×	×	×	×	×
XC2 Series											
XC2-14	○	×	○	○	×	×	5	2	2	2	3
XC2-16	○	×	×	×	×	×	5	2	2	2	3
XC2-24	○	×	√	√	×	√	5	2	2	2※1	3
XC2-32	○	×	√	√	×	√	5	2	2	2※1	3
XC2-48	○	×	√	√	×	√	5	2	2	2※1	3
XC2-60	○	×	√	√	×	√	5	2	2	2※1	3
XC3 Series											
XC3-14	×	×	○	○	×	×	4	2	2	2	1
XC3-24	○	×	√	√	√	√	6	3	3	2※1	3
XC3-32	○	×	√	√	√	√	6	3	3	2※1	3
XC3-48	○	×	√	√	√	√	4	2	2	2	3
XC3-60	○	×	√	√	√	√	4	2	2	2	3
XC3-19AR-E	○	×	√	√	×	×	4	2	2	2	3
XC5 Series											
XC5-24	○	×	√	√	√	√	2	1	1	4※1	5
XC5-32	○	×	√	√	√	√	2	1	1	4※1	5
XC5-48	○	√	√	√	√	√	6	3	3	2※1	3
XC5-60	○	√	√	√	√	√	6	3	3	2※1	3
XCM Series											
XCM-24	○	×	√	√	√	√	2	1	1	4※1	5
XCM-32	○	×	√	√	√	√	2	1	1	4※1	5

~~※1：If using BD board , Y1 can't be used for pulse~~

※2：can only be used for Modbus slave

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