



1-1. Summary of XC series PLC and program format

Introduction

XC series programmable controller

- I/O 14~60 points
- FlashROM memory inside
- Real time clock: With clock inside, Li battery power drop memory
- Multi-COM ports can connect with inverters, instruments, printers etc.
- Rich instructions, convenient to program

**Program
Format**

Statement Program

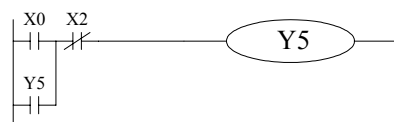
Statement program is the format which use “LD”, “AND”, “OUT” etc. These SFC instructions to input this format is the basic input form to compile the SFC program

E.g: Step	Instruction	ID
0	LD	X000
1	OR	Y005
2	ANI	X002
3	OUT	Y005

Ladder Program

Use sequential control signal and soft unit’s ID to draw the sequential circuit’s graph on the screen, which is called ladder program. As this method uses trigger point’s symbols and coil symbols to denote the sequential control circuit, so it is easy to understand the program’s contents. At the same time it’s also available to monitor the PLC’s action via the status displayed in the circuit.

E.g:



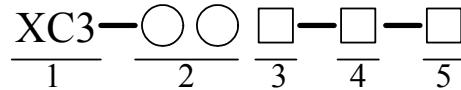
Alternation

The programs compiled with the preceding two methods are both stored in the PLC’s program memory in the format of instruction table. So, the denotation and edition of this two program format can convert to the other.

1-2. XC series PLC's Model and Type

XC Series

Main Units



- 1 Series Name XC1 series, XC3 series and XC5 series
- 2 I/O points
- 3 Input Format(NPN) R: Relay output
 T: Transistor output
 RT: Mix output of Transistor /Relay (Y0, Y1 are transistor)
- Output Format(PNP) PR: Relay output
 PT: Transistor output
 PRT: Mix output of Transistor /Relay(Y0, Y1 are transistor)
- 4 Supply Power E: AC Power(220V)
 C: DC Power(24V)
- 5 Clock S: With clock and RS485 COM port inside
 : Without clock and RS485 COM port inside

XC1 series models:

		Model				Input (DC24V)	Output (R, T)
		AC Power		DC Power			
		Relay Output	Transistor Output	Relay Output	Transistor Output		
N P N Type		XC3-16R-E	XC3-16T-E	XC3-16R-C	XC3-16T-C	8 points	8 points
		XC3-24R-E	XC3-24T-E	XC3-24R-C	XC3-24T-C	12 points	12 points
		XC3-32R-E	XC3-32T-E	XC3-32R-C	XC3-32T-C	16 points	16 points
P N P Type		XC3-16PR-E	XC3-16PT-E	XC3-16PR-C	XC3-16PT-C	8 points	8 points
		XC3-24PR-E	XC3-24PT-E	XC3-24PR-C	XC3-24PT-C	12 points	12 points
		XC3-32PR-E	XC3-32PT-E	XC3-32PR-C	XC3-32PT-C	16 points	16 points

XC3 series models:

Model							Input (DC24V)	Output (R, T)
AC Power			DC Power					
Relay Output	Transistor Output	Mix output (R&T)	Relay Output	Transistor Output	Mix output (R&T)			
N P N Type	XC3-14R-E	XC3-14T-E	XC3-14RT-E	XC3-14R-C	XC3-14T-C	XC3-14RT-C	8 points	6 points
	XC3-24R-E	XC3-24T-E	XC3-24RT-E	XC3-24R-C	XC3-24T-C	XC3-24RT-C	14 points	10 points
	XC3-32R-E	XC3-32T-E	XC3-32RT-E	XC3-32R-C	XC3-32T-C	XC3-32RT-C	18 points	14 points
	XC3-48R-E	XC3-48T-E	XC3-48RT-E	XC3-48R-C	XC3-48T-C	XC3-48RT-C	28 points	20 points
	XC3-60R-E	XC3-60T-E	XC3-60RT-E	XC3-60R-C	XC3-60T-C	XC3-60RT-C	36 points	24 points
P N P Type	XC3-14PR-E	XC3-14PT-E	XC3-14PRT-E	XC3-14PR-C	XC3-14PT-C	XC3-14PRT-C	8 points	6 points
	XC3-24PR-E	XC3-24PT-E	XC3-24PRT-E	XC3-24PR-C	XC3-24PT-C	XC3-24PRT-C	14 points	10 points
	XC3-32PR-E	XC3-32PT-E	XC3-32PRT-E	XC3-32PR-C	XC3-32PT-C	XC3-32PRT-C	18 points	14 points
	XC3-48PR-E	XC3-48PT-E	XC3-48PRT-E	XC3-48PR-C	XC3-48PT-C	XC3-48PRT-C	28 points	20 points
	XC3-60PR-E	XC3-60PT-E	XC3-60PRT-E	XC3-60PR-C	XC3-60PT-C	XC3-60PRT-C	36 points	24 points

XC5 series models:

Model							Input (DC24V)	Output (R, T)
AC Power			DC Power					
Relay Output	Transistor Output	Mix output (R&T)	Relay Output	Transistor Output	Mix output (R&T)			
N P N Type	-	XC5-32T-E	XC5-32RT-E	-	XC5-32T-C	XC5-32RT-C	18 points	14 points
	XC5-48R-E	XC5-48T-E	XC5-48RT-E	XC5-48R-C	XC5-48T-C	XC5-48RT-C	28 points	20 points
	XC5-60R-E	XC5-60T-E	XC5-60RT-E	XC5-60R-C	XC5-60T-C	XC5-60RT-C	36 points	24 points
P N P Type	-	XC5-32PT-E	XC5-32PRT-E	-	XC5-32PT-C	XC5-32PRT-C	18 points	14 points
	XC5-48PR-E	XC5-48PT-E	XC5-48PRT-E	XC5-48PR-C	XC5-48PT-C	XC5-48PRT-C	28 points	20 points
	XC5-60PR-E	XC5-60PT-E	XC5-60PRT-E	XC5-60PR-C	XC5-60PT-C	XC5-60PRT-C	36 points	24 points

**Digital I/O
Expansions**

$$\frac{\text{XC}}{1} - \frac{\text{E}}{2} \frac{\bigcirc}{3} \frac{\square}{4} \frac{\bigcirc}{5} \frac{\square}{6}$$

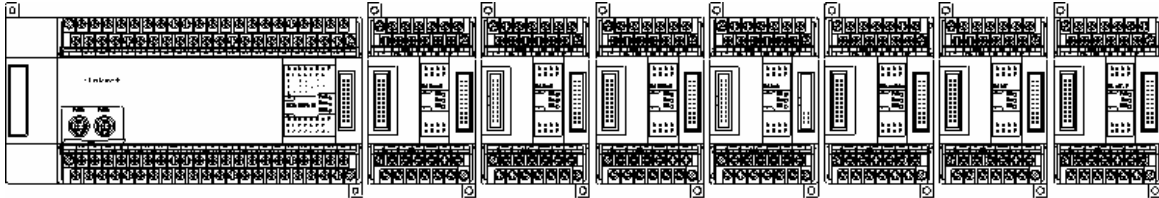
1. Series name
2. E: Expansion
3. Input points
4. X: Input
5. Output points
6. Output format YR: Relay output YT: Transistor output

Model			I/O points	Input (DC24V)	Output (R, T)
Input	Relay Output	Transistor Output			
-	XC-E8YR	XC-E8YT	8 points	-	8 points
XC-E16X	-	-	16 points	16 points	-
-	XC-E16YR	XC-E16YT	16 points	-	16 points
-	XC-E8X8YR	XC-E8X8YT	16 points	8 points	8 points
	XC-E16X16YR	XC-E16X16YT	32 points	16 points	16 points
XC-E32X	-	-	32 points	32 points	-
-	XC-E32YR	-	32 points	-	32 points

1-3. Expansion's constitution and ID assignment

Expansion

- XC series PLC can be used independently or used along with the expansions. The following is the chart of a basic unit with seven expansions.



Constitution Rules

- Digital Input/Output quantity is Octal
- Analogue Input/Output quantity is Decimal
- PLC main units can connect with 7 expansions and a BD module. The input/output type is not limited, both switch and analog quantity are available.

ID Assignment

Unit	Type	ID(As register)	Max points/ Channels
Expansion 1#	Input switch quantity X	X100~X137	32 points
	Output switch quantity Y	Y100~Y137	32 points
	Input analog quantity ID	ID100~ID131	16 channels
	Output analog quantity QD	QD100~QD131	16 channels
	Module's set value D	D8250~D8259	-
Expansion 2#	Input switch quantity X	X200~X237	32 points
	Output switch quantity Y	Y200~Y237	32 points
	Input analog quantity ID	ID200~ID231	16 channels
	Output analog quantity QD	QD200~QD231	16 channels
	Module's set value D	D8260~D8269	-
Expansion 3#	Input switch quantity X	X300~X337	32 points
	Output switch quantity Y	Y300~Y337	32 points
	Input analog quantity ID	ID300~ID331	16 channels
	Output analog quantity QD	QD300~QD331	16 channels
	Module's set value D	D8270~D8279	-
Expansion 4#	Input switch quantity X	X400~X437	32 points
	Output switch quantity Y	Y400~Y437	32 points
	Input analog quantity ID	ID400~ID431	16 channels
	Output analog quantity QD	QD400~QD431	16 channels
	Module's set value D	D8280~D8289	-
Expansion 5#	Input switch quantity X	X500~X537	32 points
	Output switch quantity Y	Y500~Y537	32 points
	Input analog quantity ID	ID500~ID531	16 channels
	Output analog quantity QD	QD500~QD531	16 channels
	Module's set value D	D8290~D8299	-
Expansion 6#	Input switch quantity X	X600~X637	32 points
	Output switch quantity Y	Y600~Y637	32 points
	Input analog quantity ID	ID600~ID631	16 channels
	Output analog quantity QD	QD600~QD631	16 channels
	Module's set value D	D8300~D8309	-
Expansion 7#	Input switch quantity X	X700~X737	32 points
	Output switch quantity Y	Y700~Y737	32 points
	Input analog quantity ID	ID700~ID731	16 channels
	Output analog quantity QD	QD700~QD731	16 channels
	Module's set value D	D8310~D8319	-
BD Board	Input switch quantity X	X1000~X1037	32 points
	Output switch quantity Y	Y1000~Y1037	32 points
	Input analog quantity ID	ID1000~ID1031	16 channels
	Output analog quantity QD	QD1000~QD1031	16 channels
	Module's set value D	D8320~D8329	-

1-4. General Specification

General Specification

Items	Specifications
Insulate voltage	Up to DC 500V 2MΩ
Anti-noise	1000V 1uS pulse per minute
Ambient temperature	0°C~60°C
Ambient humidity	5%~95%
COM 1	RS-232, connect with host machine, HMI program or debug
COM 2	RS-232/RS-485, connect with network or aptitude instrument, inverters etc.
COM 3	BD board COM port RS-232C/RS-485
COM 4	CANBUS COM port (XC5 series)
Installation	Can use M3 screw to fix or install directly on DIN46277 (Width 35mm) orbit
Grounding	The third type grounding (can't public ground with strong power system.)

Performance

XC3 series:

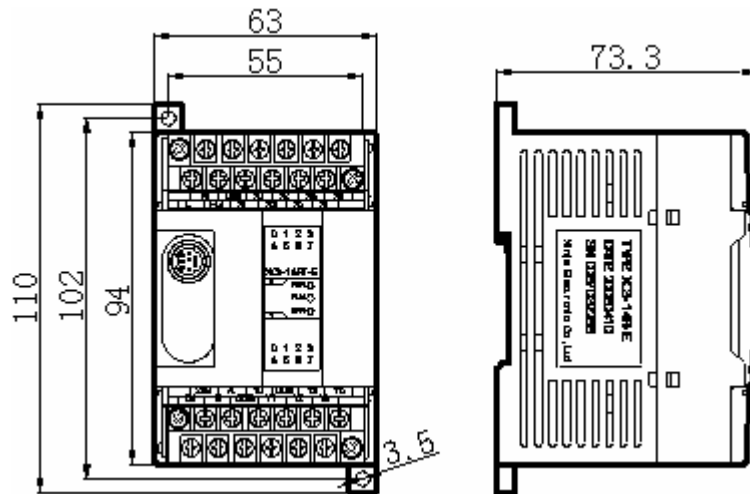
Item	Specification		
	14 points	24/32 points	48/60 points
Program executing format	Loop scan format, time scan format		
Program format	Both statement and ladder		
Dispose speed	0.5us		
Power cut retentive	Use FlashROM and Li battery		
User program's capacity	2500 steps	8000 steps	
I/O points	8 I / 6 O	Input 14/18 points Output 10/14 points	Input 28/36 points Output 20/24 points
Interior coil's points (M)	8512 points		
Timer (T)	Points	620 points	
	Spec.	100mS timer: Set time 0.1~3276.7 seconds 10mS timer: Set time 0.01~327.67 seconds 1mS timer: Set time 0.001~32.767 seconds	
Counter (C)	Points	635 points	
	Spec.	16 bits counter: set value K0~32767 32 bits counter: set value K0~2147483647	
Data Register(D)	8512 words		
FlashROM Register(FD)	2048 words		
High speed dispose function	High speed count, pulse output, external interrupt		
Setting of time scan space	0~99mS		
Password protection	6 bits ASCII		
Self diagnose function	Power on self-diagnose, Monitor timer, grammar check		

1-5. Shape and Size

Exterior Size

XC1 series 16 points main units

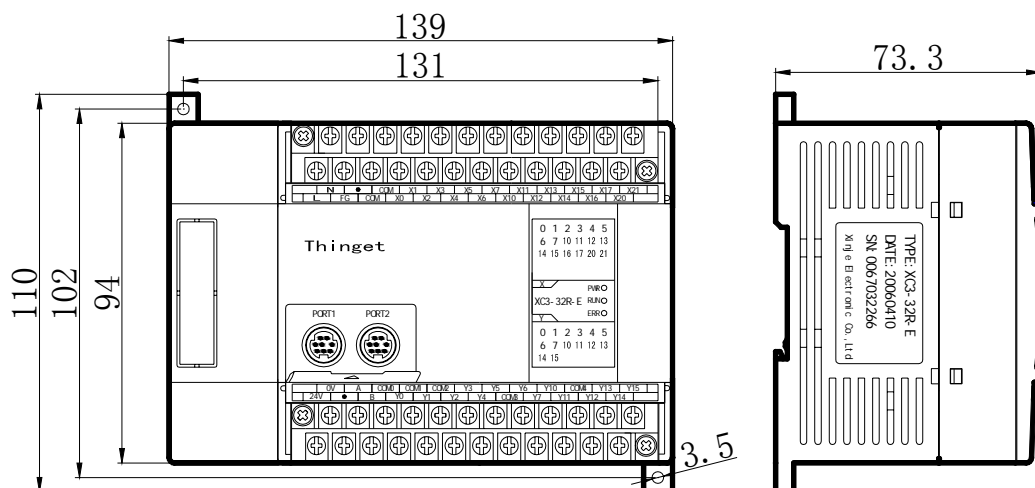
XC3 series 14 points main units (Including 16 points expansions)



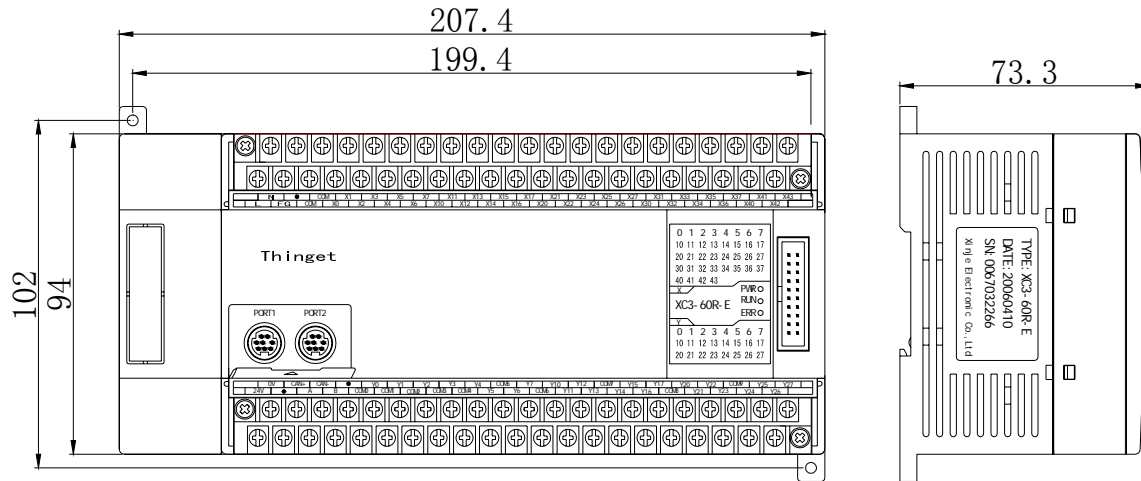
XC1 series 32 points main units (Including 24 points main units)

XC3 series 24 / 32 points main units (Including 32 points expansions)

XC5 series 32 points main units

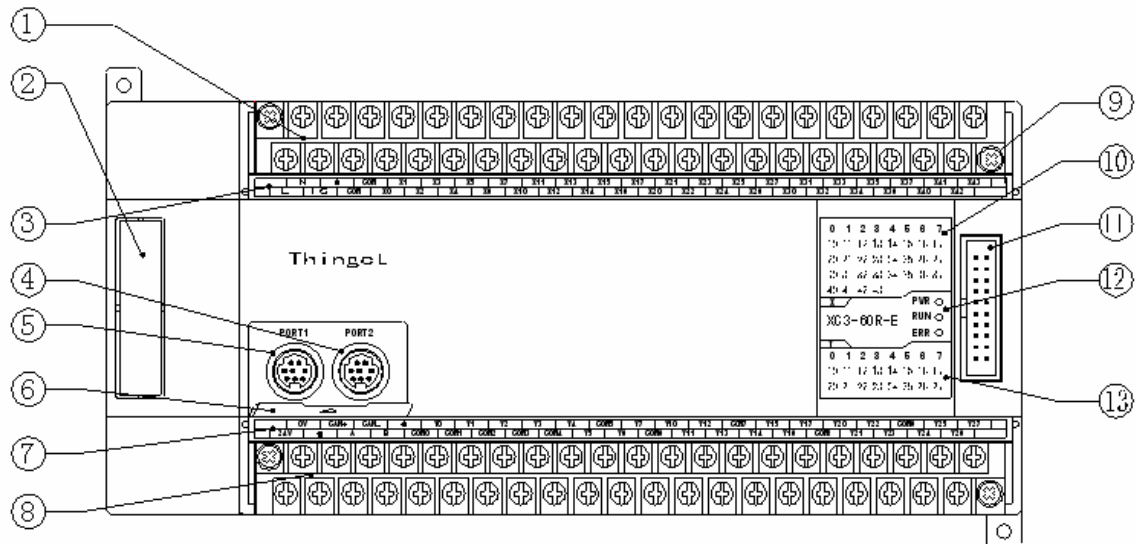


XC3 series 60 points main units (Including 48 points main units)
XC5 series 60 points main units (Including 48 points main units)



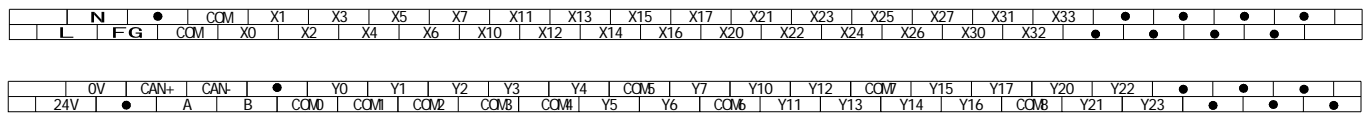
1-6. Terminal arrangement

Main Units

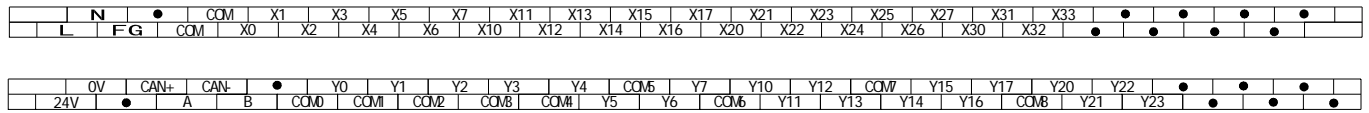


1. Input terminals
2. BD expansion
3. Input label
4. COM port
5. COM port
6. COM port's cover door
7. Output label
8. Output terminals
9. Screws
10. Input indicate LED
11. Extension port
12. Programming status indicate LED
13. Output indicate LED

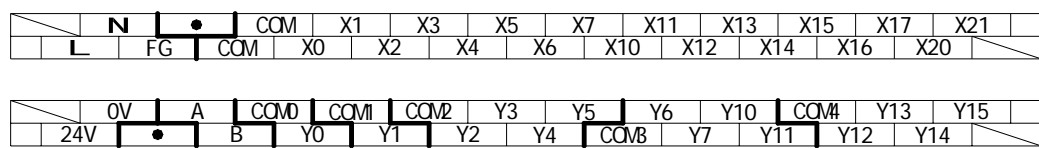
XC3- 60 main units, XC5- 60 main units: 36 Input/24 Output



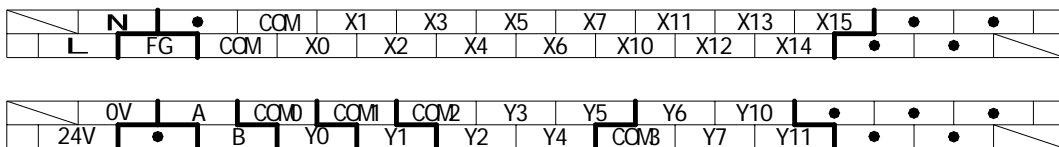
XC3- 48 main units, XC5- 48 main units: 28 Input /20 Output



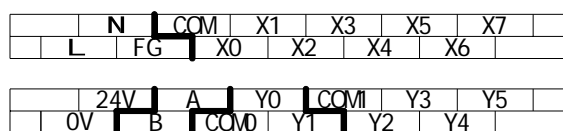
XC1- 32 main units, XC3- 32 main units, XC5- 32 main units: 18 Input /14 Output



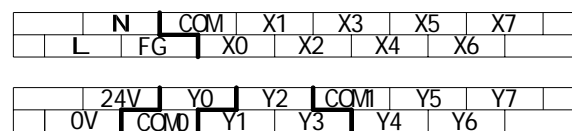
XC1- 24 main units, XC3- 24 main units: 14 Input /10 Output



XC3- 14 main units: 8 Input /6 Output



XC1- 16 main units: 8 Input /8 Output



Expansions

XC-E8X8YR

	24V	COM	X1	X3	X5	X7	
OV	COM	X0	X2	X4	X6		

	Y0	Y1	Y2	COMB	Y5	Y7	
COM0	COM1	COM2	Y3	Y4	Y6		

XC-E16X

	24V	COM	X1	X3	X5	X7	
OV	COM	X0	X2	X4	X6		

	COM	X11	X13	X15	X17	●	
COM	X10	X12	X14	X16	●		

XC-E16YR

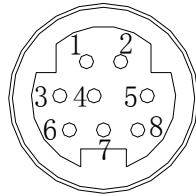
	Y0	Y1	Y2	COMB	Y5	Y7	
COM0	COM1	COM2	Y3	Y4	Y6		

	Y10	Y11	Y12	COM7	Y15	Y17	
COM4	COM5	COM6	Y13	Y14	Y16		

1-7. COM Port Definition

COM 1

Pin of COM 1

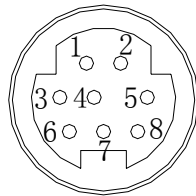


- 2: PRG
- 4: RxD
- 5: TxD
- 6: VCC
- 8: GND

Mini Din 88 core socket (hole)

COM 2

Pin of COM 2



- 4: RxD
- 5: TxD
- 8: GND

Mini Din 88 core socket (hole)

Connection of programmable cable is the following:



Mini Din 8 core socket (pin)

DB9 pin (hole)

2-1. Power Specification

For the power specification of XC series programmable controller's basic units, please see the following table:

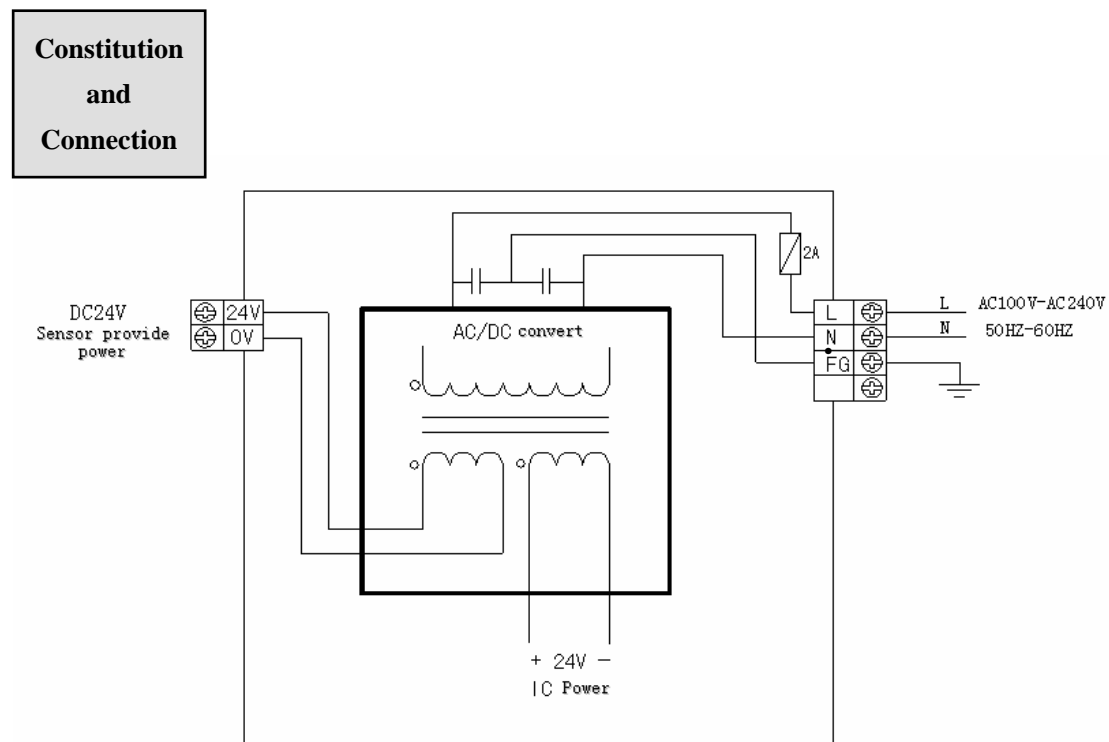
AC Power Type	Rated voltage	AC100V~240V
	Voltage allow bound	AC90V~265V
	Rated frequency	50/60Hz
	Allow momentary power-cut time	Interrupt time \leq 0.5 AC cycle, alternation \geq 1 sec
	Impact current	Max 40A 5mS below/AC100V max 60A 5mS below /AC200V
	Max power consumption	12W
	Power for sensor use	24VDC \pm 10% max 400mA



- To avoid voltage decrease, please use the power cable thicker than 2mm²
- Even appear power cut within 10ms; PLC can still go on working. But if long time power cut or abnormal power decrease, PLC will stop working, output will also appear OFF status, when recover power supply, the PLC will auto start to work.
- Connect the grounding terminals of basic units and extend modules together, then ground

DC power type	Rated voltage	DC24V
	Voltage allow bound	DC21.6V~26.4V
	Input current (Only basic unit)	120mA DC24V
	Allow momentary power-cut time	10mS DC24V
	Impact current	10A DC26.4V
	Max power consumption	12W
	Power for sensor use	24VDC \pm 10% Max 400mA

2-2. AC Power, DC Input Type

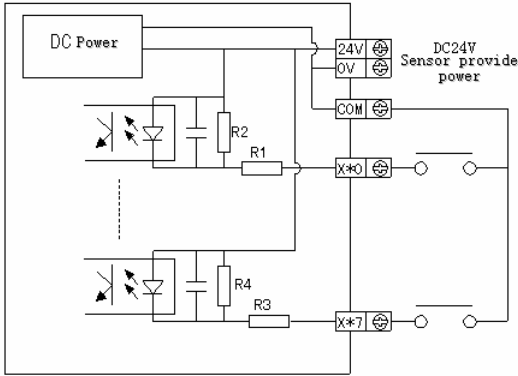


- The Input power is connected between L and N terminals.
- 24+, COM terminals can be used to power 400mA/DC24V for sensor supply. Besides, this terminal can't be connected to external power.
- Terminal is NC terminal, please don't go on exterior connection or use it as relay terminal.
- Connect the basic unit with all expansions module's **COM** terminal.

2-3. Input Specification

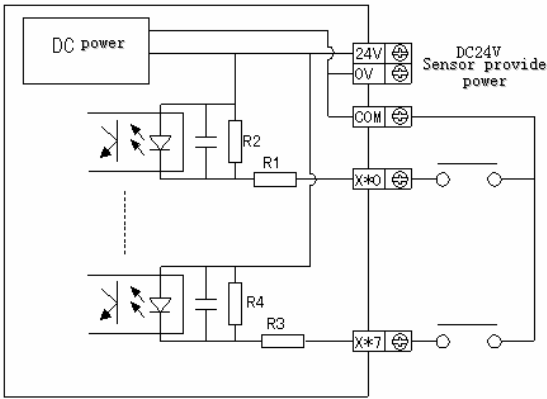
Basic Units

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



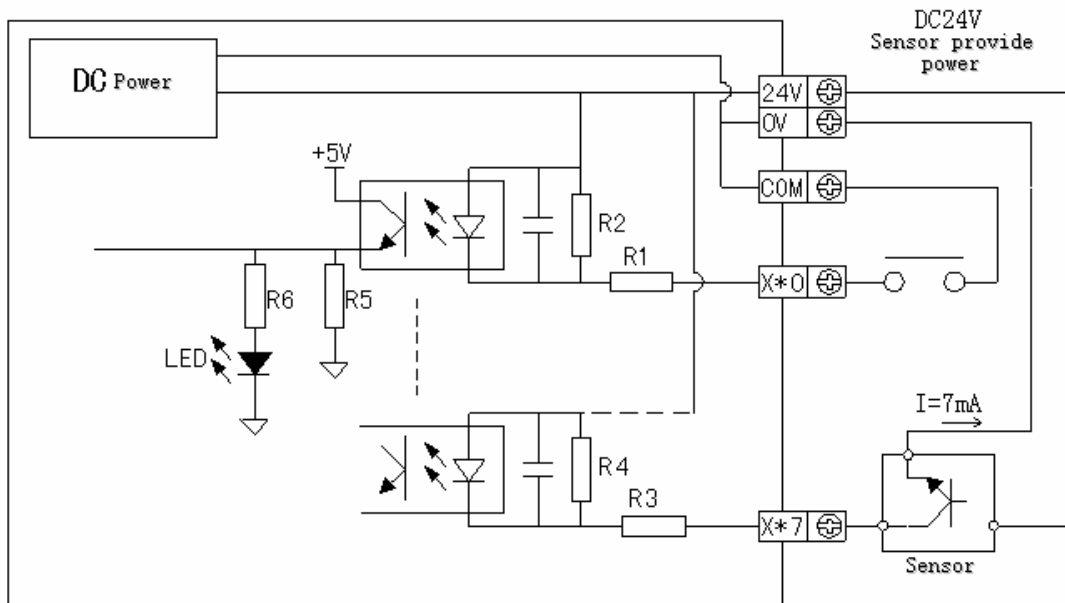
Expansions

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



2-4. DC Input Signal's Disposal(AC Power Type)

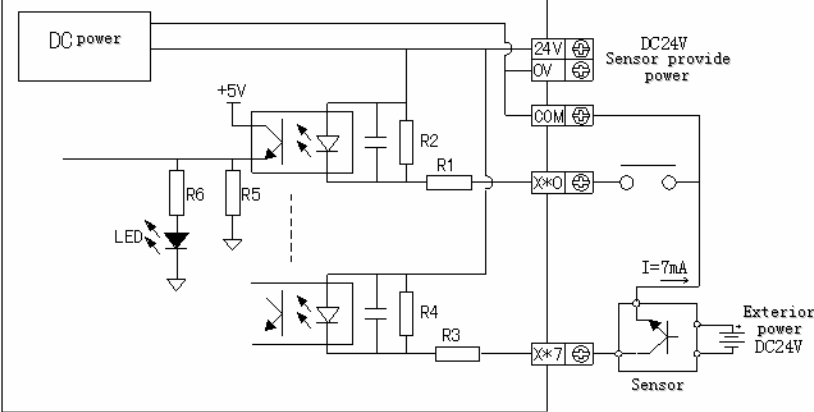
DC input signal



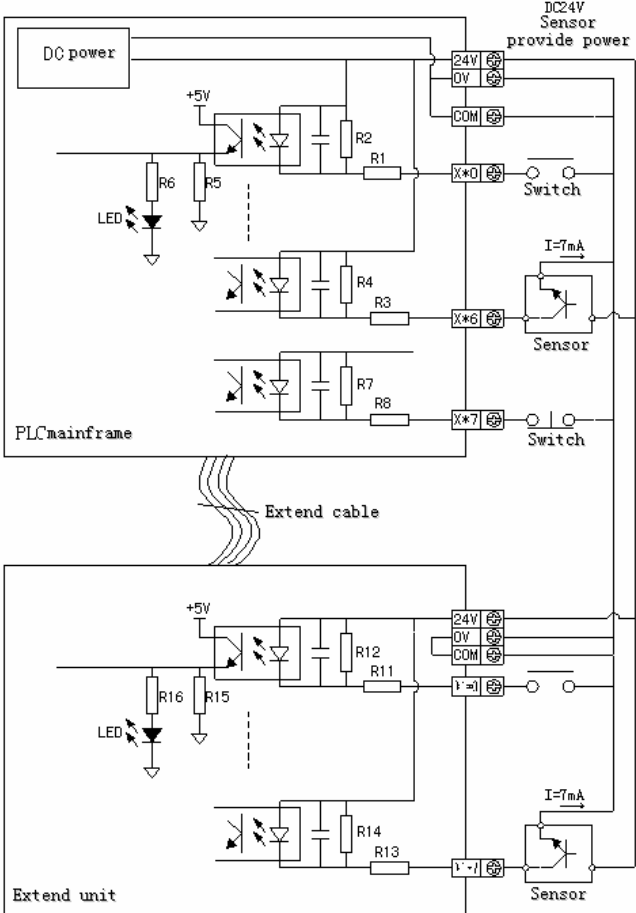
- Input terminal
When connect input terminal and **COM** terminal with contacts without voltage or NPN open collector transistor, if input is ON, LED lamp lights, which indicates input. There are many **COM** terminals to connect in PLC.
- Input circuit
Use optical coupling instrument to insulate the input once circuit and twice circuit, There's 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's 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 it's ON, lower than 1.5mA when it's OFF.

**Exterior
circuit used**

XC series PLC's input power is supplied by its interior 24V power, so if use exterior power to drive photoelectricity sensor etc., this exterior power should be DC24V±4V, please use NPN open collector type for sensor's output transistor



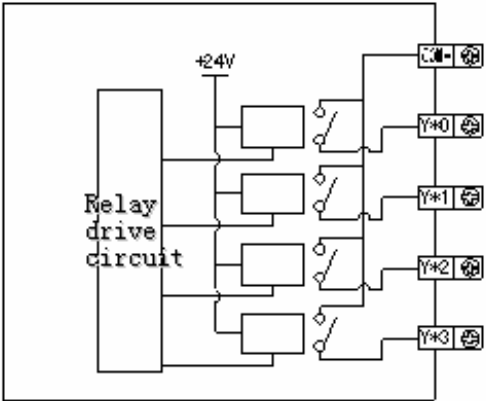
Input Connection



2-5. Output Specification

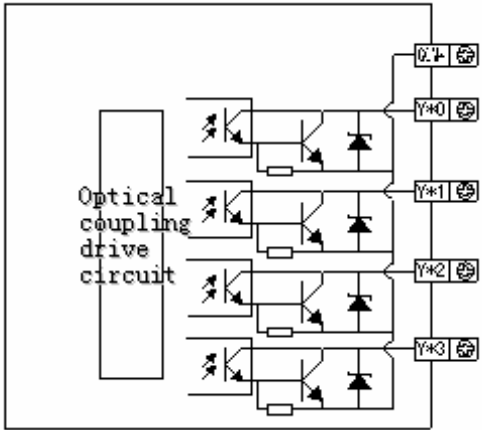
Relay output

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



Transistor Output

Interior power		Below DC5~30V
Circuit insulation		Optical coupling insulation
Action denote		Indicate lamp LED
Max load	Restance 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



2-6. Disposal of Relay Output Circuit

Relay output circuit

- **Output terminals**

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

- **Circuit's insulation**

Between the relay output coils and contacts, PLC's interior circuits and exterior circuits, load circuits are electric insulation. Besides, 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) .

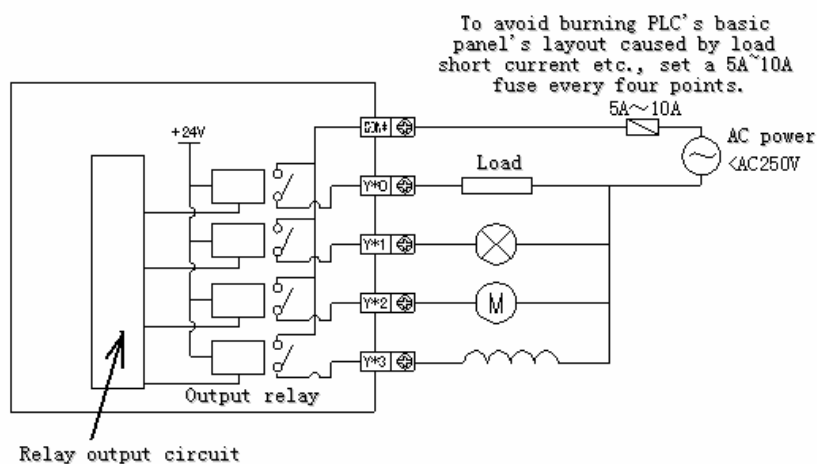
- **Open circuit's leak current**

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

- **The life of relay output contacts**

Standard life of induce AC load such as 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 connect with surge absorber, the life will be greatly improved!

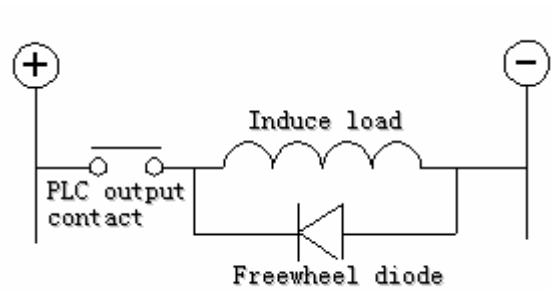
Output connection example



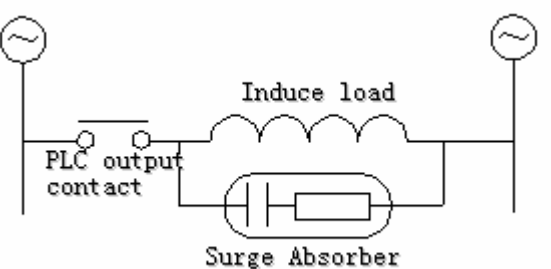
**Constitution
of output
circuit**

- For DC induce load, please parallel connect with commutate diode. If not connect with the commutate diode, the contact's life will be decreased greatly. Please choose the commutate diode which allow inverse voltage endurance up to 5~10 times of the load's voltage, ordinal current exceeds load current.
- Parallel connect AC induce load with surge absorber can reduce noise.

DC load



AC load



2-7. Disposal of Transistor Output Circuit

Transistor output circuit

- Output terminal
Basic unit's transistor output has 1~4 public-end output.
- Exterior power
Please use DC5~30V steady-voltage power for load drive,
- Circuit insulation
Use photoelectricity coupling device to insulate PLC's interior circuit and output transistor. Besides, each public block is separate.
- Action denote
When drive optical coupling, LED lights, output transistor is ON.
- Response time
From photoelectricity coupling device drive (or cut) to transistor ON (or OFF), the time PLC uses is below 0.2ms.
- Output current
The current is 0.5A per point. But as restrict by temperature goes up, the current is 0.8A every four points.
- Open circuit's current
Below 0.1mA

