# XINJE XL series PLC

Fast manual

Thanks to choose XINJE XL series PLC, this manual will introduce the specification, using method. For programming instruction, please refer to XD/XL series manual. XL series PLC use XD/Eppro software.

➡ **XL features**

➢ Faster processing speed (12 times of XC PLC)

➢ XL3 can extend 10 digital or analog I/O XL modules, XL5 can extend 16 modules, XL1 cannot extend modules

➢ Extend 1 XL ED card, XL1 cannot extend ED card

➢ Compatible with most functions of XC PLC

Safety notes

■ Control system design notes

⚠️⚠️ **Dangerous!**
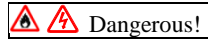
● Make sure to design safe circuit for application, ensure the control system can work safe when the external power outages or PLC has fault.

● It is important to set emergency brake circuit, protection circuit, interlock circuit for forward reverse rotation, position upper and lower limit interlock switch to prevent from machinery damage.

● For the safe operation of equipment, please design external protection circuit and safety mechanism for output signal related to major accident.

● All the output will be shut down when PLC found system error. The output maybe out of control when the controller circuit has error, please design suitable external control circuit to ensure the normal working of equipment.

● If the PLC output unit is broken, they cannot be controlled to be ON or OFF.

● PLC is designed for indoor electric environment, the power supply system should have lightning protection device, ensure that lightning overvoltage is not applied to the power input or signal input, output terminal of PLC, avoid equipment damage.

■ Installation and wiring notes

⚠️⚠️ **Dangerous!**
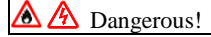
● Do not use the PLC in the following places: dust, lampblack, conductive dust, corrosive gas, flammable gas. Exposure to the environment of high temperature, dew, wind and rain. Electric shock, fire, vibration, malfunction, misoperation also can cause product damage.

● Do not make scrap metal and wire drop into the controller vent when wiring, it may cause fire, fault, wrong operation.

● After installing the PLC, make sure there is no foreign object covering the ventilation, otherwise the heat dissipation will be bad and cause fire, fault and wrong operation.

● The wiring of installation box must be solid and reliable, poor contact may result in wrong action.

⚠️ **Caution!**
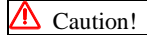
● Please use external power supply for extension module DC24V power.

● For serious interference occasions, please use shield cable for high frequency signal input and output to improve system anti-jamming capability.

■ Run and maintenance notes

⚠️⚠️ **Dangerous!**
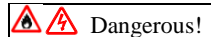
● Please connect and dismantle communication cable, extension card and control unit cable after the power supply is shut down, otherwise it may cause equipment damage or incorrect operation.

● It needs to understand the manual well and fully confirm the safety before operation for on-line modification, forced output, RUN, STOP and so on.

⚠️ **Caution!**
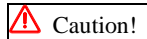
● Please process the old product as industrial waste.

● Ensure to cut off the power supply when installing and uninstalling the extension card.

● It needs to replace the battery when power is on (ensure the memory data is not lost), when the equipment is running, it must be operated by a professional electrical technician wearing an insulating glove.

Product information

■ Naming rule

$$ \underset{①}{XL}\ \underset{②}{5}\ \underset{③}{-32}\ \underset{④}{T}\ \underset{⑤}{4} $$

①	series	XL：XL ultrathin series PLC
②	type	1：XL1 economic type
		3：XL3 standard type
		5：XL5 enhanced type
③	I/O points	16：8 input /8 output
		32：16 input /16 output
④	Output type	Input is NPN R：relay output
		T：transistor output
		Input is PNP PR：relay output
⑤	Pulse channel	Without: T model has 2 channels of high speed pulse output (XL1 has no pulse output function)
		4: 4 channels of high speed pulse output

■ Basic parameters

Table 1: XL series general specifications

Item	Specification
Insulation voltage	Up DC500V 2MΩ
Anti-jamming	Noise voltage 1000Vp-p 1us pulse 1 minute
Air	No corrosive, flammable gas
Environment temperature	0℃~60℃
Environment humidity	5%RH~95%RH(no condensation)
Com 1	RS232, connect upper device, HMI, PLC
Com 2	RS485, connect meter, VFD
Installation	Install on the rail directly
Ground	The third ground(cannot ground together with high voltage system)

Table 2: XL series performance specifications

Item		Specification	
Program execution mode		Cyclic scanning mode	
Programming mode		Instruction, ladder chart	
Processing speed		0.05us	
Memory		FlashROM and lithium battery (3V button battery)	
User program capacity [1]		XL1/XL3: 256KB XL5: 384KB	
I/O numbers [2]	Total	16	32
	Input	8 X0~X7	16 X0~X17
	Output	8 Y0~Y7	16 Y0~Y17
Internal coil (X) [3]	896	XL1/XL3: X0~X77, X10000~X11177, X20000~X21177, X30000~X30077	
	1280	XL5: X0~X77, X10000~X11777, X20000~X20177, X30000~X30077	
Internal coil (Y) [4]	896	XL1/XL3: Y0~Y77, Y10000~Y11177, Y20000~Y20177, Y30000~Y30077	
	1280	XL5: Y0~Y77, Y10000~Y11777, Y20000~Y20177, Y30000~Y30077	
Internal coil(M, HM)	11008/ 92000	XL1/XL3: M0~M7999【HM0~HM959】[5] XL5: M0~M74999【HM0~HM11999】 Special [6] XL1/XL3: SM0~SM2047 XL5: SM0~SM4999	
Process (S)	1152/ 9000	XL1/XL3: S0~S1023【HS0~HS127】 XL5: S0~S7999【HS0~HS999】	
Timer (T)	Numbers	672/ 7000	XL1/XL3: T0~T575 【HT0~HT95】 XL5: T0~T4999 【HT0~HT1999】
	Specification	100ms timer: 0.1~3276.7s 10ms timer: 0.01~327.67s 1ms timer: 0.001~32.767s	
Counter (C)	Numbers	672/ 7000	XL1/XL3: C0~C575【HC0~HC95】 XL5: C0~C4999【HC0~HC1999】
	Specification	16-bit counter: K0~32,767 32-bit counter: -2147483648~＋2147483647	

Data register (D)	11048/ 90000 words	XL1/XL3: D0~D7999【HD0~HD999】[5] XL5: D0~D59999【HD0~HD24999】 Special [6] XL1/XL3: SD0~SD2047 XL5: SD0~SD4999
FlashROM register (FD)	7120/ 14192 words	XL1/XL3: FD0~FD5119 XL5: FD0~FD8191 Special [6] XL1/XL3: SFD0~SFD1999 XL5: SFD0~SFD5999
High speed processing ability		High speed counter, pulse output, external interruption
Password protection		6-bit ASCII
Self diagnostic function		Power on self-inspection, monitoring timer, syntax checking

[1]: user program capacity is the max capacity when secret downloading.

[2]: I/O numbers: the input and output terminal numbers user can connect from outside

[3]: X is internal input relay, the X exceeding I numbers can be used as intermediate relay.

[4]: Y is internal output relay, the Y exceeding O numbers can be used as intermediate relay.

[5]:【 】is latched memory area which cannot be changed.

[6]: special means the register is used by system, cannot be used for other way.

Table 3: XL series product list

	Model				Input numbers (I)	Output numbers (O)
	AC power supply/DC power supply					
		Relay output	Transistor output	Mixed output		
NPN		-	XL1-16T	-	8	8
		XL3-16R	XL3-16T	-	8	8
		-	-	XL5-32T4	16	16
PNP		XL3-16PR	-	-	8	8

Electrical design reference

Here lists XL series PLC I/O terminal configuration. The terminal configuration of relay output and transistor output terminal is same.

■ Product structure
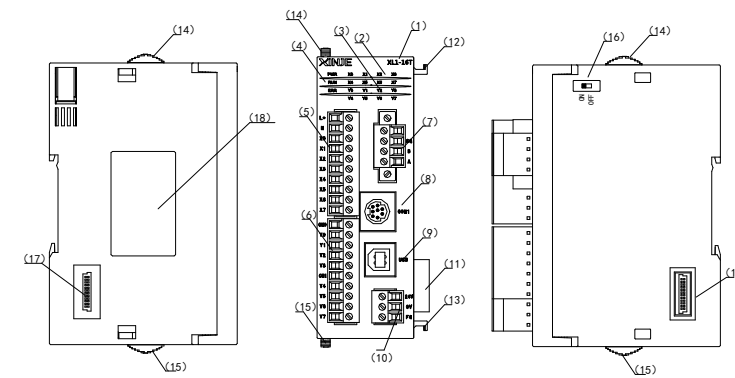
Each part name:

(1): PLC model
(2): input label and light
(3): output label and light
(4): system light
PWR: power supply light
RUN: run light
ERR: error light
(5): input terminal
(6): output terminal
(7): RS485 port (port2)

(8): RS232 port (port1)
(9): USB port
(10): power supply input
(11): right extension module access
(12): fixed module hook (up)
(13): fixed module hook (down)
(14): slide lock (up)
(15): slide lock (down)
(16): DIP switch
(17): left extension module access
(18): product label

Note:

(1): XL3/XL5 series USB port is only for program downloading, uploading and monitoring. (XL1 does not have USB port)

(2): the DIP switch is for RS485 X-NET communication, if the PLC is the first or last station of the fieldbus, please turn on the switch.

Communication port definition

■ Communication port definition

● XL series PLC has three com port, one USB port(XL1 does not have this port), one RS232 port (com1), one RS485 port (com2). It can extend one RS232 or RS485 port (com3) through the left extension ED card (XL-NES-ED).

● USB port used normal USB cable to connect PC and PLC, please install USB driver for the first time.

● RS232 port (com1) can connect PC and other device such as HMI, meter and VFD.

COM1 pin figure:
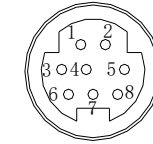
4: RXD
5: TXD
8: GND

Mini Din 8-pin socket
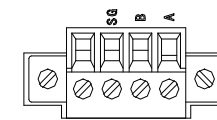
● Programming cable:

Mini Din 8-pin male socket   DB9 female socket

Note: the above diagram is for DVP cable, if it is XVP cable, please connect pin 1 of Mini Din8 and pin 7 of DB9.
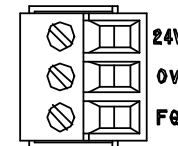
● RS485 port

Note: A is RS485+, B is RS485-. Please connect A to A, B to B when communicating. SG is ground terminal, please connect it to servo drive SG terminal. XL1 RS485 port has no isolation, cannot support X-NET fieldbus.

■ Power supply specification

● PLC power supply terminal

Note:

(1) PLC power supply terminal is 24V and 0V.

(2) FG is ground terminal which can shield the interference. Please connect to ground separately as needs.

● XL series power supply specification:

DC power supply

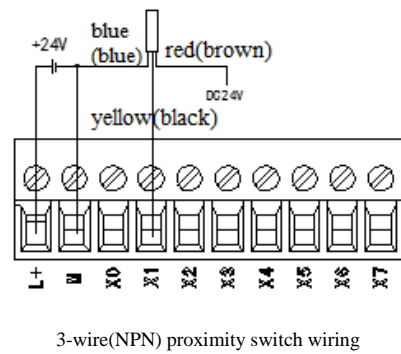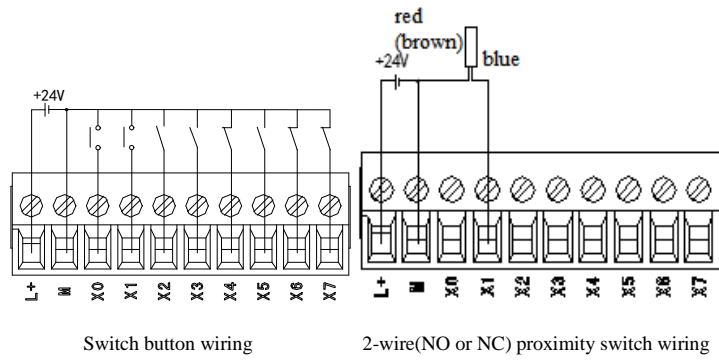| Item	Contents
Rated voltage	DC24V
Voltage allowable range	DC21.6V~26.4V
Input current (only for basic unit)	120mA DC24V
Allowable instant power outage time	10ms DC24V
Impact current	10A DC26.4V
Max consumption power	12W

■ Input specification and wiring

XL series PLC input is NPN or PNP mode, below will introduce the internal structure and wiring of this mode.

● **NPN mode specification**

Item	Contents
Input signal voltage	DC24V±10%
Input signal current	7mA/DC24V
Input ON current	Below 4.5mA
Input OFF current	Below 1.5mA
Input response time	About 10ms

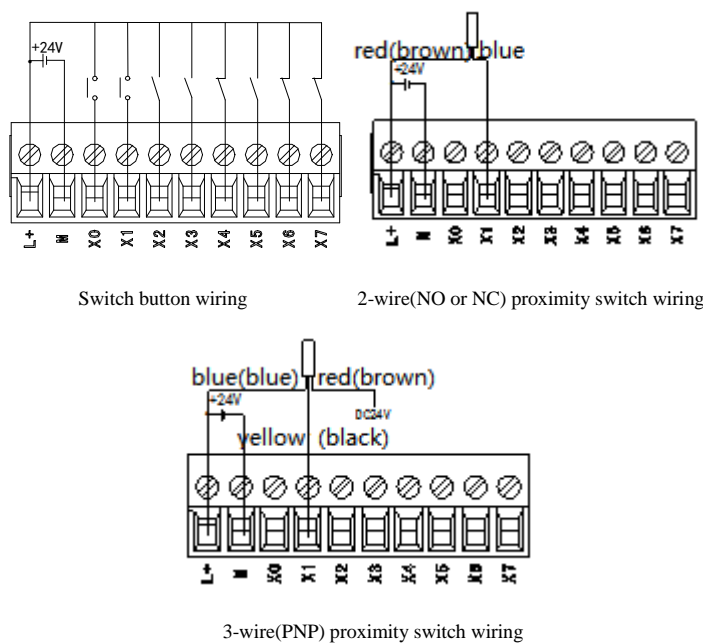| Input signal mode	Contactor input or NPN open collector transistor
Circuit insulation	Photocoupling insulation
Input action display	LED lights when the input is ON

- **NPN wiring example**

Switch button wiring   2-wire(NO or NC) proximity switch wiring

3-wire(NPN) proximity switch wiring

- **PNP mode specification**

Item	Contents
Input signal voltage	DC24V ±10%
Input signal current	7mA/DC24V
Input ON current	Below 4.5mA
Input OFF current	Below 1.5mA
Input response time	About 10ms
Input signal mode	Contactor input or PNP open collector transistor
Circuit insulation	Photocoupling insulation
Input action display	LED lights when the input is ON

- **PNP wiring example**

Switch button wiring   2-wire(NO or NC) proximity switch wiring


3-wire(PNP) proximity switch wiring

■ Output specification and wiring

The output specification includes transistor and relay. Below will introduce the internal structure and wiring method of the two modes.

◆ Output specification

Relay output

External power	Below AC250V, DC30V	
Circuit insulation	Mechanical insulation	
Action indicator	LED light	
Max load	Resistant load	3A
	Inductive load	80VA
	Lamp load	100W
Mini load	DC5V 2mA	
Response time	OFF→ON	10ms
	ON→OFF	10ms
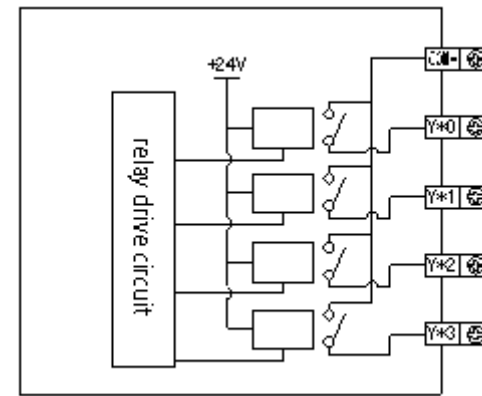
Transistor output

External power	Below DC5~30V	
Circuit insulation	Light coupling insulation	
Action indicator	LED	
Max load	Resistant load	0.3A
	Inductive load	8W/DC24V
	Lamp load	1.5W/DC24V
Mini load	DC5V 2mA	
Response time	OFF→ON	Below 0.2ms
	ON→OFF	Below 0.2ms
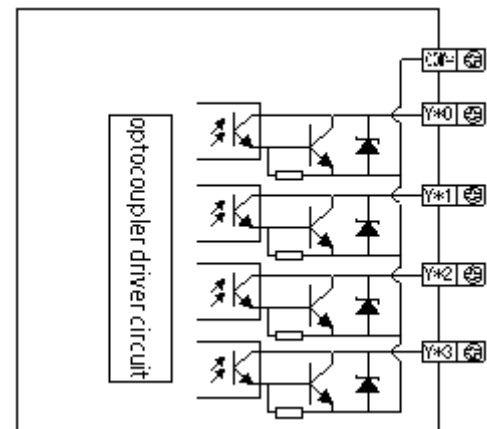
High speed pulse output

Model	T
Output terminal	Y0, Y1 (XL5-32T4 is Y0~Y3)
External power supply	Below DC5~30V
Action display	LED light
Max current	50mA
Max output pulse frequency	100KHz

Note: when the output pulse frequency is 100KHz to 200KHz, it cannot ensure all the servo can work well, please connect 500Ω resistor between output terminal and 24V power supply.

◆ Relay output

- Relay output type has 2 public terminals. So each public-terminal unit can drive power system with different voltages (E.g.: AC200V, AC100V, DC24V etc.) load.
- Between the relay output coils and contacts, PLC's interior circuits and exterior load circuits are electrical insulating. Besides, each public terminal and block are separate from each other.
- LED lamp lights when output relays' coils energize, output contacts are ON.
- From the output relay energize (or cut off) to output contact ON (or OFF), the response time is about 10ms.
- The output current below AC250V can drive the load made up of resistance is 3A per point, inductive load below 80VA (AC100V or AC200V) and lamp load below 100W (AC100V or AC200V).
- When output contact is OFF, there will be no leak current and can directly drive Ne lamp etc.
- Standard life of AC inductive load such as contactor, electromagnetic valve: according to company's useful life test, about 500 thousand times for 20VA load; about 300 thousand times for 35VA; about 100 thousand for 80VA. But if the load parallel connect with surge absorber, the useful life will greatly improve.

Relay output wiring:
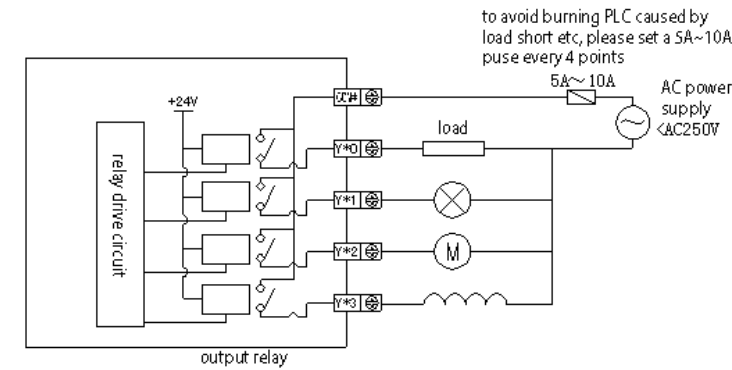
◆ Transistor output

- There are 2 com outputs of CPU unit transistor outputs.
- Please use DC5~30V power supply to drive the load.
- Inside PLC, it uses photoelectric couplers to isolate between internal circuits and output transistors; besides, the COM terminal is separated from each other.
- When photoelectric coupler is driven, LED will be ON and the output transistors will be ON.
- The time interval from PLC photoelectric couplers energizing (or cutting) to transistor ON (or OFF) is below 0.2ms.
- The current output is 0.3A per point. But limited by the temperature rising, every 4 points current is 0.8A.
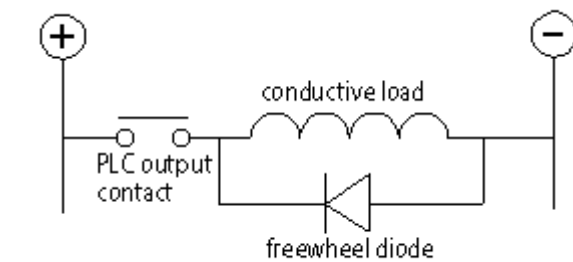- Open circuit current is below 0.1mA.

Transistor output wiring:
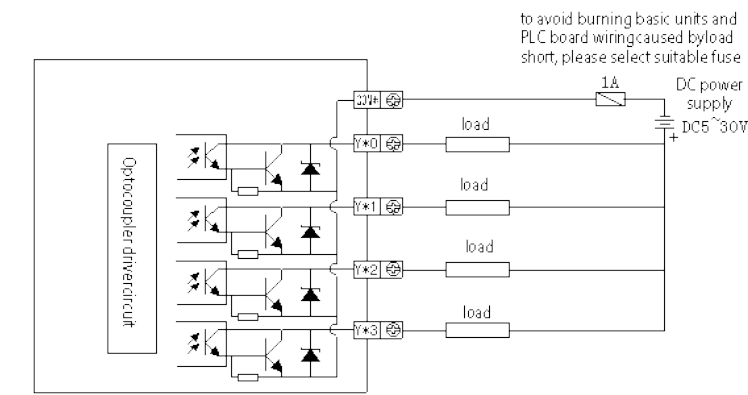
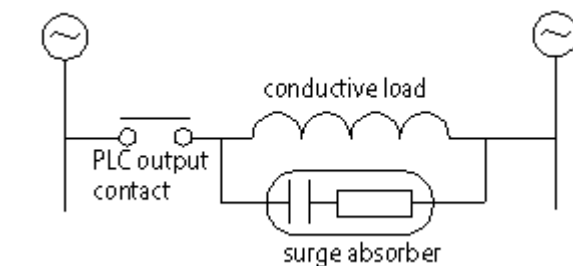
◆ Output circuit protection

For the inductive load of AC circuit, please use RC instantaneous voltage absorption circuit. For the inductive load of DC circuit, please use freewheeling diode

- **DC load**

Note: freewheeling diode IN4007.

- **AC load**

Note: surge absorber R=200Ω 2W, C=0.022uF 250V AC.

## ■ Connection head specification of terminal

When wiring XL series PLC, its wiring head should meet the following requirements:

(1) The stripping length is 9 mm;

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

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

Product dimensions and installation

■ Installation

The rail can be used to install the basic unit and extension module.
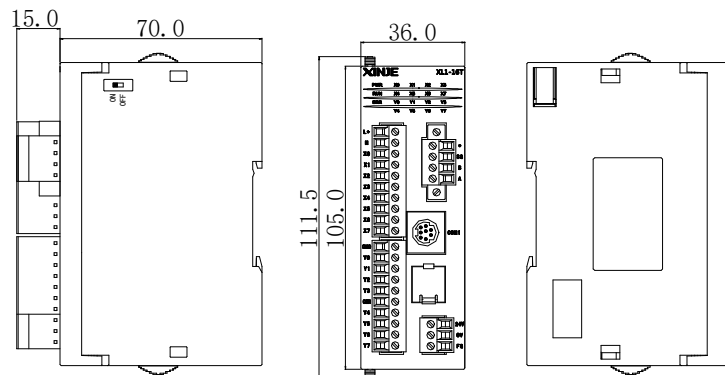Please use the rail DIN46277.

DIN rail hook
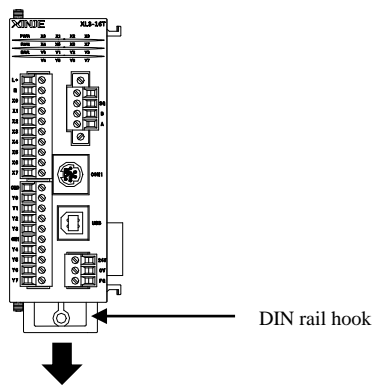
The main unit and extention module can be installed on the DIN46277 rail (width is 35mm). for removing the product, it needs to pull the hook then move right the product.
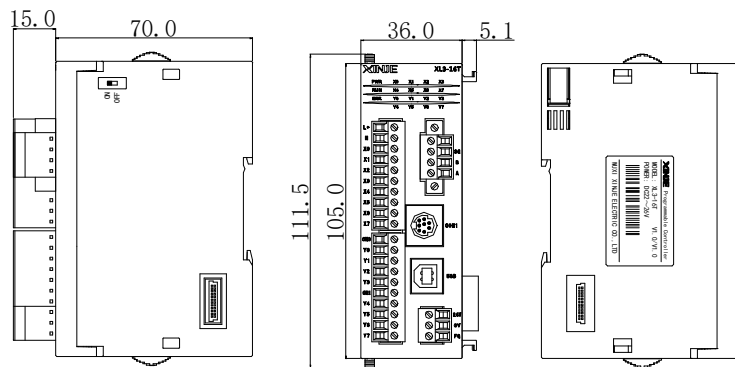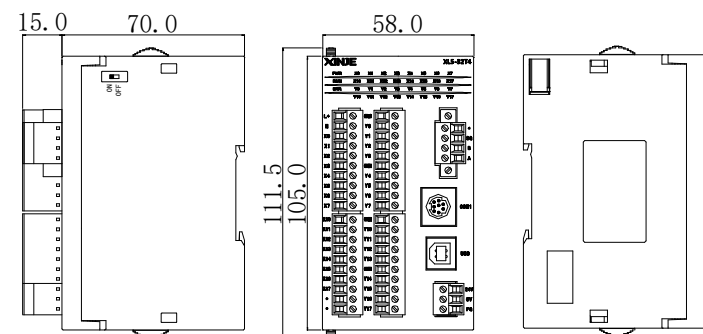
■ Dimensions   (unit: mm)

XL1-16T:


XL3-16R, XL3-16T, XL3-16PR:

XL5-32T4:

XL-P50-E power adapter

The power supply of XL series PLC can be external switching power supply or power module XL-P50-E.

■ Basic specification

Item	Specification
Power supply	AC85-265V
Output voltage	DC24V
Output current	2A
Air	No corrosive and flammable gas
Environment temperature	0℃~60℃
Environment humidity	5%RH~95%RH (no condensation)
Installation	Install on the rail directly
Ground	The third ground(cannot ground together with high voltage system)

■ Structure
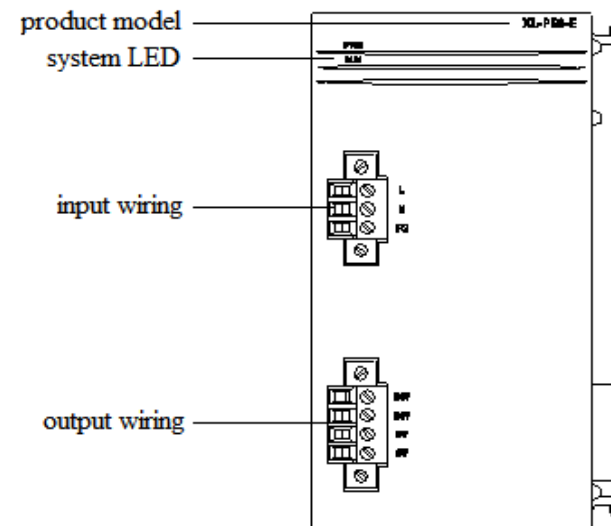
Structure name	Function
Product model	The detailed model of the product
System LED	PWR: power supply light, it is green and always ON when the power is on. RUN: run light, it is green and always ON when the module works well.
Input wiring	L, N: power supply input for the module FG: ground terminal
Output wiring	It can output two groups of DC24V, 0V power supply, and supply the power to the XL3 series PLC.

■ Dimension   (unit: mm)