



XG series PLC

User manual [Hardware]

Wuxi Xinje Electric Co., Ltd.

Data No. PG01 20210906EN 3.6

General description

- ◆ Thank you for purchasing Xinje XG series programmable controller.
- ◆ This manual mainly introduces the hardware characteristics of XG series programmable controllers.
- ◆ Before using the product, please read this manual carefully and conduct wiring on the premise of fully understanding the contents of the manual.
- ◆ For the introduction of software and programming, please refer to the relevant manuals.
- ◆ Please deliver this manual to the end user.

Notices for users

- ◆ Only operators with certain electrical knowledge can carry out wiring and other operations on the product. If there is any unknown place, please consult our technical department.
- ◆ The examples listed in the manual and other technical materials are only for users' understanding and reference, and do not guarantee certain actions.
- ◆ When using this product in combination with other products, please confirm whether it conforms to relevant specifications, principles, etc.
- ◆ When using this product, please confirm whether it meets the requirements and is safe.
- ◆ Please set up backup and safety functions by yourself to avoid machine failure or loss that may be caused by the failure of this product.

Responsibility statement

- ◆ Although the contents of the manual have been carefully checked, errors are inevitable, and we cannot guarantee complete consistency.
- ◆ We will often check the contents of the manual and make corrections in subsequent versions. We welcome your valuable comments.
- ◆ The contents described in the manual are subject to change without notice.

Contact information

If you have any problem about products, please contact the agent or Xinje company.

- ◆ Tel: 400-885-0136
- ◆ Fax: 0510-85111290
- ◆ Address: No.816, Jianzhu West Road, Binhu District, Wuxi City, Jiangsu Province, China
- ◆ Code: 214072
- ◆ Website: www.xinje.com

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Safety notes

Please read this part carefully before using and operate after understanding the usage, safety and notices. Pay attention to safety and wire correctly.

We have summarized possible problems that may happen and classify them by warning and caution. About other matters, please operate in basic working order.



Caution

Incorrect use may lead to danger, such as moderate and slight injury, property loss.



Warning

Critical miss may lead to serious danger, such as death or serious injury, serious loss of property.

- Confirmation when getting the product



Caution

Do not install the controller which is damaged, lack parts or type unfit. Otherwise, injury may occur.

- Product design



Warning

Please make safety circuit outside controller to make sure the system can run in safety when controller errors. Otherwise, incorrect action or fault may occur.



Caution

Do not put control wiring or power wiring together, separate them at least 10cm in principle. Otherwise, incorrect action or damage may occur.

- Product installation



Warning

Cut off all external power before installing controller. Otherwise, an electric shock may occur.



Caution

1. Please install and use this product under the environmental conditions specified in the general specifications of the manual.

Do not use in places with humidity, high temperature, dust, smoke, conductive dust, corrosive gas, combustible gas, vibration and impact.

It may cause electric shock, fire, misoperation, product damage, etc.

2. Do not directly touch the conductive part of the product.

It may cause malfunction and failure.

3. Please use Xinje XG-EB series special guide rail to fix this product, and please install it on a flat surface.

Incorrect installation may cause malfunction and product damage.

4. When processing the screw hole, please do not let the cutting powder and wire debris fall into the product shell.

It may cause malfunction and failure.

5. When connecting the expansion module with the expansion cable, please make sure that the connection is tight and the contact is good.

It may cause poor communication and malfunction.

6. When connecting peripheral devices, expansion devices, batteries and other devices, be sure to cut off power for operation.

It may cause malfunction and failure.

● Product wiring



Warning

1. Cut off external power before wiring. Otherwise, an electric shock may occur.

2. Connect AC or DC power to special power terminal correctly. Otherwise, may burn the controller.

3. Close the panel cover plate before controller powering on and running. Otherwise, an electric shock may occur.



Caution

1. Do not connect external 24V power to controllers' or expansion modules' 24V and 0V terminals, products damage may occur.

2. Use 2mm² cable to ground the ground terminals of expansion modules and controllers, never common ground to high voltage system. Otherwise, products fault or damage may occur.

3. Do not wiring between idle terminals. Otherwise, incorrect action or damage may occur.

4. Avoid ablation powder or clastic wires into product shell when processing screw holes. Otherwise, incorrect action or fault may occur.

5. Tighten up wiring terminals and separate conductive parts. Otherwise, incorrect action or product damage may occur.

● **Run and maintenance**



Warning

1. Do not touch terminals after power on.
Otherwise, an electric shock may occur.
2. Do not connect or move the wires when power on.
Otherwise, an electric shock may occur.
3. Make sure to stop the PLC before changing the controller program.
Otherwise, malfunction may occur.



Caution

1. Do not disassemble and assemble product arbitrarily.
Damage to product may occur.
2. Plug and connect cables on the condition of power off.
Otherwise, cable damage or malfunction may occur.
3. Do not wire the idle terminals.
Otherwise, malfunction or damage may occur.
4. Cut off the power when disassemble expansion modules, external devices and batteries.
Otherwise, malfunction and fault may occur.
5. Dispose them as industrial waste when out of use.

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Preface

The following will introduce the content composition of this manual, the scope of application of the manual, the conventions in the manual, the introduction of related manuals and the access to manual materials.

Application range of the manual

This manual is the hardware manual of XG series PLC products, which is applicable to XG1 and XG2 series PLC.

1. XG series PLC features

- ◆ **Faster instruction processing speed**

XG series PLC has faster instruction processing speed. XG1 series is equivalent to more than 2~3 times of XD3 series, and XG2 series is equivalent to 10 times of XDM series. The key performance is that the floating-point instruction operation speed is significantly improved, and the scanning cycle unit is us.

- ◆ **Greater program capacity**

XG series PLC has larger program capacity than XD series. XG1 series has 1MB program capacity, and XG2 series has 16MB program capacity.

- ◆ **Up to 16 XG series digital and analog value modules can be expanded**

XG series PLC supports the expansion of modules, including digital value, analog value, temperature module, etc., and the maximum number of extensions is 16.

- ◆ **Compatible with most common functions of XD series**

In addition to the above advantages, XG series also supports most common functions of XD series PLC.

- ◆ **Compatible with the original program of XC series**

Xinje PLC programming tool software can directly open the program of the original XC series PLC, but some instructions of XG series and XC series may be involved in the program, and errors will be reported in red font in Xinje PLC programming tool software. You only need to modify this part manually.

- ◆ **X-NET bus**

XG series PLC supports X-NET fieldbus communication, which can realize fast and stable communication between XG/XD/XL series PLC and TG/TN series HMI.

- ◆ **Ethernet communication**

The built-in Ethernet port LAN1 (RJ45 standard) can stably and quickly realize program upload and download, online monitoring and remote monitoring. After being connected to the LAN, it can communicate with other Modbus-TCP devices in the LAN.

- ◆ **EtherCAT bus**

XG2 series also has built-in Ethernet port LAN2 (RJ45 standard), which supports EtherCAT bus communication. V1 version supports 32 maximum stations. At present, it only supports slave stations with EEPROM, such as Xinje-DS5C, Panasonic EtherCAT servo, Kollmorgen servo, etc., but does not support Inovance servo.

2. XG series PLC unit

Series name	Product model
XG1	XG1-16T4
XG2	XG2-26T4

3. XG series PLC expansion modules

Module type	Product model
I/O	XG-E16X, XG-E32X, XG-E64X
	XG-E16YR, XG-E16YT, XG-E32YT, XG-E64YT
	XG-E8X8YR, XG-E8X8YT, XG-E16X16YT
AD/DA	AD type: XG-E8AD-A-S, XG-E8AD-V-S
	DA type: XG-E4DA-S
	AD/DA type: XG-E4AD2DA
Temperature	XG-E8PT3-P, XG-E8TC-P

4. Other accessories

Accessories type	Product model
Power supply module	XG-P75-E
Bus connector	XG-EUC-1, XG-EUCT-1
Installation rail	XG-EB-170, XG-EB-260, XG-EB-385, XG-EB-590, XG-EB-880, XG-EB-1500
External terminal block	JT-G26
Cables for external terminal block	JC-G26-NN05 (0.5m), JC-G26-NN10 (1.0m), JC-G26-NN15 (1.5m)

Conventions in the manual

Limited by space, some abbreviations may be used in the manual to replace the original names. These names that may be involved are listed in the table below for comparison.

Abbreviation	Explanation
XG series PLC	General name of the XG whole series of programmable controllers
XG1 series PLC	General name of the XG1 whole series of programmable controllers
XG2 series PLC	General name of the XG2 whole series of programmable controllers
XD series PLC	General name of the XD whole series of programmable controllers
Basic unit or body	The abbreviation of basic unit of XG full series programmable controller
Expansion module	General name of all expansion modules of XG series programmable controller
I/O expansion	Abbreviation of all input and output expansion modules of XG series programmable controller
Analog expansion	Abbreviation of all analog expansion modules of XG series programmable controller
Peripheral equipment	General term of programming software, human-machine interface and network module
Programming software	Abbreviation of Xinje PLC programming tool software
HMI	General name of TG, OP series products
TG series	General name of TG series touch screen
OP series	General term of OP series text display

Related manuals

This manual only covers the hardware of XG series PLC. For other applications, such as programming and instruction, please refer to the relevant manual materials. Relevant manuals are listed below for users' reference.

Manual name	Introduction
XG series PLC manual [instruction]	This paper introduces the basic instructions, application instructions, communication, PID, C language, block and other applications of XG series programmable controllers
XG series PLC manual [positioning control]	This paper introduces the application of pulse output, motion control and other instructions of XG series programmable controllers
X-NET bus manual	This paper introduces the usage of Xinje X-NET fieldbus, X-NET motion bus and Ethernet communication
TCPIP communication based on Ethernet	This paper introduces the TCP IP communication of Xinje based on Ethernet, including the usage of Modbus and free format communication
EtherCAT motion control manual	This paper introduces the communication method between Xinje PLC and the corresponding slave station
Manual name	Introduction
XG series expansion module manual	This paper introduces the characteristics, parameters, addresses, overall dimensions, terminals and wiring of XG series analog quantity, input and output expansion module

1. XG series product overview

1-1. Product features

1-1-1. Basic unit

(1) Rich models

The basic unit of XG series medium-sized PLC has 2 subseries product lines, and various combinations can be freely selected.

- I/O points 16, 26
- Output type transistor
- Input type PNP, NPN, differential
- Power type DC24V

Series	Description
XG1	Including 16 points specifications. Compatible with most functions of XD series, it has larger internal resource space, faster processing speed, supports bus motion control, two-axis linkage, interpolation, follow-up and other motion control functions, supports Ethernet communication, X-NET fieldbus, and supports 16 expansion modules, which can meet the basic use needs of users.
XG2	Including 26 points specifications. Compatible with most functions of XD series, it has larger internal resource space and faster processing speed. It supports motion control functions such as two-axis linkage, interpolation and follow-up, Ethernet communication and EtherCAT bus functions, 16 expansion modules and oscilloscope functions, which can meet most of the user's needs.

Note: Please refer to Appendix 3 of this book for the corresponding non basic functions of specific models of products.

(2) Powerful functions

XG series PLC has substantial basic functions and a variety of special functions. Each subseries has different functions due to different applications.

Substantial basic functions

- ◆ **High speed operation**
The basic processing instruction is 0.005 ~ 0.03us, the scanning time is 10000 steps 1ms, and the program capacity is up to 16MB.
- ◆ **Rich expansion modules**
XG series PLC^{**1} support 16 expansion modules of different types and models.
- ◆ **Multiple communication ports**
The basic unit has 4-5 communication ports, supports USB Download (XG2 has no USB port), supports RS485 port to connect a variety of external devices, supports LAN interface to access LAN, and synchronously controls 32-axis motors.
- ◆ **Abundant soft component capacity**
The maximum amount of resources can reach 80000 points of non power down holding process S,

4000 points of power down holding process HS, 700000 points of non power down holding intermediate relay M, 48000 points of power down holding intermediate relay HM, 1280 points of input relay X, 1280 points of output relay Y, 50000 points of non power down holding timer T, 8000 points of power down holding timer HT, 50000 points of non power down holding counter C, 8000 points of power down holding counter HC, 700000 points of non power down holding data register D 100000 points power down hold data registers HD, 65536 points FD.

- ◆ **Two programming modes**

XG series PLC supports two programming modes, namely command language programming and ladder diagram programming. These two kinds of programming can be edited by switching with each other.

- ◆ **Rich instruction set**

Rich instructions. In addition to basic sequence control, data transmission and comparison, arithmetic operations, data circulation and shift, it also supports special instructions such as pulse output, high-speed counting, interrupt, PID, etc.

- ◆ **Real-time clock**

XG series PLC has a built-in clock for time control.

- ◆ **Easy to install**

XG series PLC is easy to install and installed directly on the guide rail.

Enhanced special features

- ◆ **X-NET bus**

XG series PLC supports X-NET fieldbus communication, which can realize fast and stable communication between XG series PLC and TG/TN series touch screen. XG1 supports X-NET motion bus function and can realize synchronous motion control of 20-axis motor.

- ◆ **Ethernet communication**

XG series PLC supports Ethernet communication, which can realize faster and more stable program/data download and better real-time performance. It supports PLC access to the Internet, and realizes remote search, online monitoring, uploading and downloading of PLC.

- ◆ **EtherCAT communication**

XG2 series also has built-in Ethernet port LAN2 (RJ45 standard), which supports EtherCAT bus communication. V1 version supports 32 maximum stations. At present, it only supports slave stations with EEPROM, such as Xinje-DS5C, Panasonic EtherCAT servo, Kollmorgen servo, etc., but does not support Inovance servo.

- ◆ **High speed counting, up to 80KHz/200KHz**

The basic unit of XG series PLC is equipped with 4-channel, 2-phase high-speed counter and high-speed counting comparator, which can count in single-phase and AB phase modes, and the frequency can reach 80kHz/200kHz.

- ◆ **High speed pulse output, up to 100KHz^{*1}**

XG series PLC generally has 4 pulse output terminals, which can output pulses up to 100kHz^{*1}

- ◆ **Interrupt function**

XG series PLC has interrupt function, which is divided into external interrupt, timing interrupt and

high-speed counting interrupt, which can meet different interrupt requirements.

- ◆ **Free switching of I/O points**

XG series PLC has unique special functions. The technology developed for terminal damage treatment can realize normal operation without changing the program.

- ◆ **C language editing function block**

Using C language to write function blocks has better program confidentiality. At the same time, due to the introduction of C language rich operation functions, it can realize various functions. It saves internal space and improves programming efficiency.

- ◆ **PID function**

The basic unit of XG series PLC also has PID control function, and can also carry out self-tuning control.

- ◆ **Sequence BLOCK**

In the sequential function block, the sequential execution of instructions can be realized, which is especially suitable for pulse output, motion control, module reading and writing, and simplifies the programming.

- ◆ **100 segments high speed counter interrupt**

The high-speed counter of XG series PLC has 100 segments of 32-bit preset values, and each segment can produce interruption. It has good real-time performance, high reliability and low cost.

- ◆ **PWM**

XG1 series PLC has PWM pulse width modulation function, which can be used to control DC motor.

- ◆ **Frequency measurement**

XG1 series PLC can measure the frequency.

- ◆ **Precise timing**

XG1 series PLC can carry out precise timing, and the precise timer is a 1ms 32-bit timer.

Note: PLC can output high-speed pulses up to 200kHz, but it cannot guarantee the normal operation of all servo systems. Please connect a resistance of about 500Ω between the output end and 24V power supply.

(3) Easy to programming

The programming of XG series PLC in Xinje PLC programming tool software^{*1} can obviously feel the humanization of the software and its easy application.

- ◆ Ladder diagram programming and instruction table programming can be switched and edited at any time.
- ◆ It has the functions of software component annotation, ladder diagram annotation, instruction prompt, etc.
- ◆ It provides a variety of editing panels for special instructions, which makes it more convenient to write instructions.
- ◆ Perfect monitoring mode: ladder diagram monitoring, free monitoring, soft component monitoring.
- ◆ Multiple window display makes management more convenient.

1-1-2. Expansion unit

(1) Expansion module

In order to better meet the on-site control needs, XG series PLC can be externally expanded 16 expansion modules.

- Rich types: input and output expansion module, analog quantity processing module and temperature control module.
- Small size
- DC24V power supply

I/O module	Analog module	Temperature module
Power supply: DC24V Input: 8~32 points Output: 8~32 points Output type: transistor relay	Power supply: DC24V Type DA, AD AD/DA DA channels: 2~4 AD channels: 4~8	Power supply: DC24V Temperature input: PT100 Thermocouple Channels: 8 PID control: built-in transistor

1-2. Model composition and model table

1-2-1. Basic unit model composition and model table

(1) Model composition of basic unit

The basic unit model composition of XG series PLC is generally as follows:

$\text{XG} \square - \bigcirc \bigcirc \square \bigcirc$
 $\text{①} \quad \text{②} \quad \text{③} \quad \text{④} \quad \text{⑤}$

- | | |
|-------------------|---|
| ①: Product series | XG: XG series medium programmable controller |
| ②: Product type | 1: XG1 series
2: XG2 series |
| ③: I/O points | 16: 8 inputs/8 outputs
26: 18 inputs/8 outputs |
| ④: Output type | T: transistor output |
| ⑤: Pulse channels | 4: 4 channels pulse output |

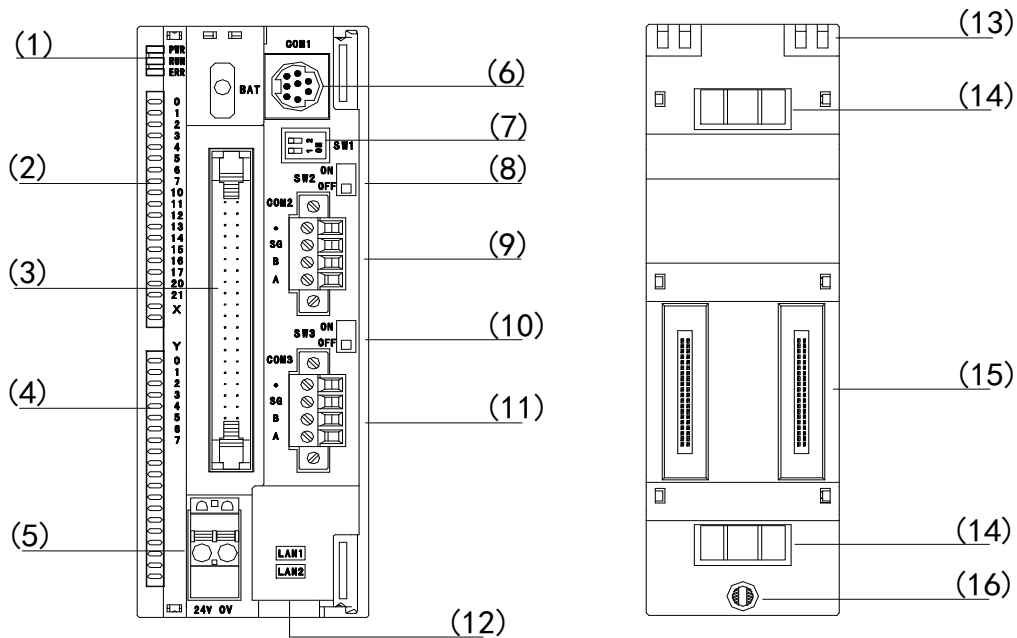
(2) List of basic unit models

- ◆ XG series model list

Model							Input points (DC24V)	Output points (R, T)
AC power supply			DC power supply					
Relay output	Transistor output	Transistor relay mixed output	Relay output	Transistor output	Transistor relay mixed output			

Note: When the dial switches SW1 and SW2 are used for RS485 communication, whether the PLC is the terminal. When the PLC is at the beginning or end of the bus, please turn the dial switch to on.

1-3-2. XG2 series structural composition



(1): System indicator

PWR: power LED

RUN: run LED

ERR: error LED

(2): Input labels and indicator

(3): I/O terminals

(4): Output labels and indicator

(5): Power supply input

(6): RS232 port (COM1)

(7): PLC updating dial switch

(8): RS485 port (COM2) dial switch

(9): RS485 port (COM2)

(10): RS485 port (COM3) dial switch

(11): RS485 port (COM3)

(12): RJ45 port (LAN1, LAN2)

(13): Mounting hook

(14): Grounding metal sheet

(15): Expansion module interface

(16): Mounting hole

Note:

※1: when the dial switches SW2 and SW3 are used for RS485 communication, whether the PLC is the terminal. When the PLC is at the beginning or end of the bus, please turn the dial switch to on.

※2: input and output wiring needs to be used with external terminal blocks and adaptive connecting cables. See section 5-1 for details.

2. Specification parameters of main body

2-1. Specification parameters

2-1-1. General specifications

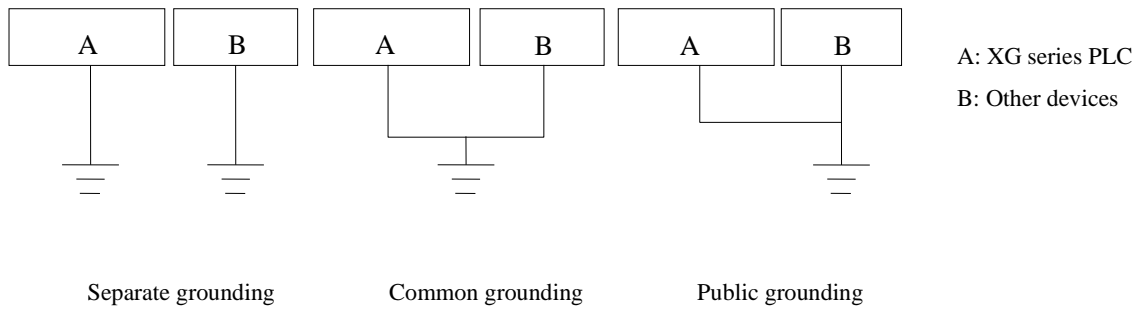
(1) XG1 series PLC

Item	Specification
Insulation voltage	Above DC 500V 2MΩ
Anti-noise	Noise voltage 1000Vp-p 1us pulse 1 minute
Air	No corrosive and combustible gas
Ambient temperature	0°C~60°C
Ambient humidity	5%~95% (no condensation)
Altitude	Within 2000m
USB port	Download / upload programs and data, online monitoring
COM1 port	RS485, MODBUS/X-ENT fieldbus. Connect HMI, external equipment, etc
COM2 port	RS485, MODBUS/X-ENT fieldbus/X-ENT motion bus, connect intelligent instruments, frequency converters, etc
LAN port	RJ45 Ethernet port, support Ethernet, connect the upper computer, remote monitoring, and connect the PLC to the LAN
Installation	Directly installed on Xinje XG-EB guide rail
Grounding	The third kind of grounding (not common grounding with strong current system) ^{**2}

(2) XG2 series PLC

Item	Specification
Insulation voltage	Above DC 500V 2MΩ
Anti-noise	Noise voltage 1000Vp-p 1us pulse 1 minute
Air	No corrosive and combustible gas
Ambient temperature	0°C~60°C
Ambient humidity	5%~95% (no condensation)
COM1 port	RS232, MODBUS, download / upload programs and data, online monitoring
COM2 port	RS485, MODBUS, connect to the HMI, communication devices, etc.
COM3 port	RS485, MODBUS, connect to the HMI, communication devices, etc.
LAN 1	RJ45, X-ENT fieldbus /Ethernet communication, support the connection of upper computer, remote monitoring, and communication with other devices in LAN or Internet
LAN 2	RJ45 Ethernet port, support EtherCAT bus control up to 32-axis
Installation	Directly installed on Xinje XG-EB guide rail
Grounding	The third kind of grounding (not common grounding with strong current system) ^{**2}

Note: Separate grounding or common grounding should be adopted for grounding, and public grounding is not allowed.



2-1-2. Performance specifications

(1) XG1 series PLC

Item		Specification	
Program execution mode		Cyclic scanning mode	
Programming method		Command, ladder diagram	
Processing speed		0.03us	
Power-off holding		FlashROM and lithium battery	
User program capacity ^{*1}		1MB	
I/O points ^{*2}	Total points	16 points	
	Input points	8 points X0~X7	
	Output points	8 points Y0~Y7	
Internal coil (X) ^{*3}		1280 points: X0~X77, X10000~X30077	
Internal coil (Y) ^{*4}		1280 points: Y0~Y77, Y10000~Y30077	
Internal coil (M, HM)		87000 points	M0~M69999 【HM0~HM11999】 ^{*5}
			Special use ^{*6} SM0~SM4999
Process (S)		9000 points	S0~S7999 【HS0~HS999】 ^{*5}
Timer (T)	Points	7000 points	T0~T4999 【HT0~HT1999】 ^{*5}
	Specification	100ms timer: 0.1~3276.7s 10ms timer: 0.01~327.67s 1ms timer: 0.001~32.767s	
Counter (C)	Points	7000 points	C0~C4999 【HC0~HC1999】 ^{*5}
	Specification	16-bit counter: K0~32,767 32-bit counter: -2147483648~+2147483647	
Data register (D)		100000 words	D0~D69999 【HD0~HD24999】 ^{*5}
			Special use ^{*6} SD0~SD4999
FlashROM register (FD)		14192 words	FD0~FD8191
			Special use ^{*6} SFD0~SFD5999
High speed processing function		High speed counting, pulse output, external interrupt	
Password		6-bit ASCII	
Self diagnosis function		Power on self-test, monitoring timer, syntax check	

(2) XG2 series PLC

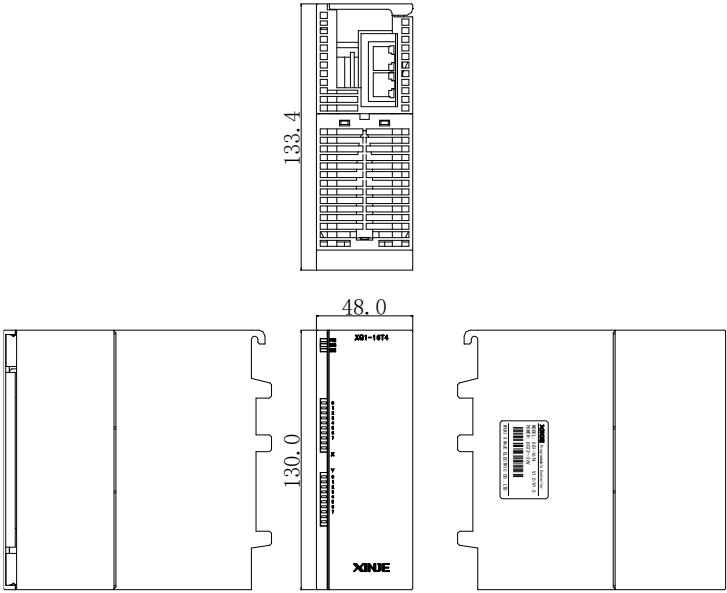
Item		Specification	
Program execution mode		Cyclic scanning mode	
Programming method		Command, ladder diagram	
Processing speed		0.005~0.01us	
Power-off holding		FlashROM and lithium battery	
User program capacity ^{※1}		16MB	
I/O Points ^{※2}	Total points	26 points	
	Input points	18 points X0~X21	
	Output points	8 points Y0~Y7	
Internal coil (X) ^{※3}		1280 points: X0~X77, X10000~X30077	
Internal coil (Y) ^{※4}		1280 points: Y0~Y77, Y10000~Y30077	
Internal coil (M, HM)		798000 points	M0~M699999 【HM0~HM47999】 ^{※5}
			Special use ^{※6} SM0~SM49999
Process (S)		84000 points	S0~S79999 【HS0~HS3999】 ^{※5}
Timer (T)	Points	58000 points	T0~T49999 【HT0~HT7999】 ^{※5}
	Specification	100ms timer: 0.1~3276.7s	
		10ms timer: 0.01~327.67s	
		1ms timer: 0.001~32.767s	
Counter (C)	Points	58000 points	C0~C49999 【HC0~HC7999】 ^{※5}
	Specification	16-bit counter: K0~32,767 32-bit counter: -2147483648~+2147483647	
Data register (D)		810000 words	D0~D699999 【HD0~HD99999】 ^{※5}
			Special use ^{※6} SD0~SD9999
FlashROM register (FD)		75536 words	FD0~FD65535
			Special use ^{※6} SFD0~SFD9999
High speed processing function		High speed counting, pulse output, external interrupt	
Password		6-bit ASCII	
Self diagnosis function		Power on self-test, monitoring timer, syntax check	

Note:

- ※ 1: User program capacity refers to the maximum program capacity during secret download.
- ※ 2: I/O points refers to the number of terminals that users can access and output signals from the outside.
- ※ 3: X refers to the internal input relay, and X beyond I points can be used as an intermediate relay.
- ※ 4: Y refers to the internal output relay, and Y exceeding O points can be used as an intermediate relay.
- ※ 5: [] flag, which is the default power-off holding area and cannot be changed.
- ※ 6: Special use, refers to the register occupied by the system for special purposes, which cannot be used for other purposes. For details, see Appendix 1.
- ※ 7: The numbers of input coils and output relays/transistors are octal numbers, and the numbers of other memories are decimal numbers.
- ※ 8: I/O without real connection with peripherals can be used as a fast internal relay.
- ※ 9: The above range of software components is the effective range of PLC in X-NET communication mode or Ethernet communication mode. In Modbus communication mode, some soft components cannot be read and written. See section 6-2-3 of XG series programmable controller user manual [basic instructions] for the specific available range.

2-2. XG series dimension

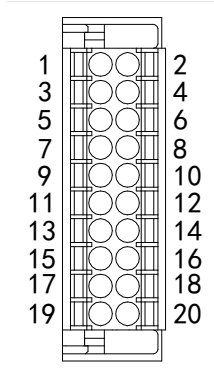
(unit: mm)



2-3. Terminal arrangement

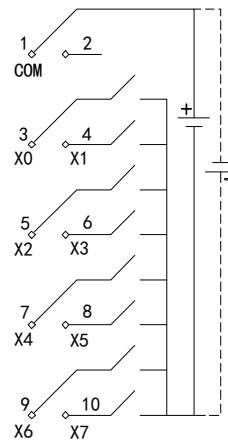
2-3-1. XG1 series terminal arrangement

(1) Input / output terminal pin definition



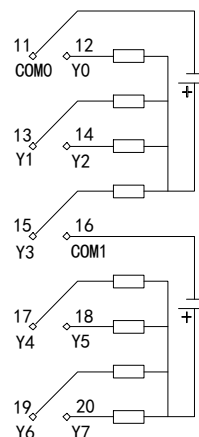
(2) Input terminal

Pin	Name	Pin	Name
1	COM	2	-
3	X0	4	X1
5	X2	6	X3
7	X4	8	X5
9	X6	10	X7



(3) Output terminal

Pin	Name	Pin	Name
11	COM0	12	Y0
13	Y1	14	Y2
15	Y3	16	COM1
17	Y4	18	Y5
19	Y6	20	Y7



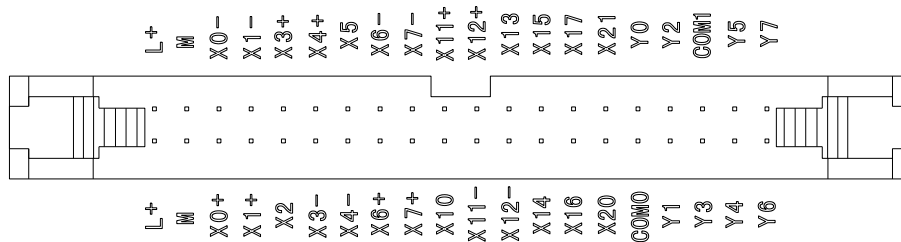
Note:

- ※ 1: In the input part, the solid line is NPN connection, and the dotted line is PNP connection.
- ※ 2: The common terminal com of the input terminal block corresponds to all input points. Com on the output terminal block corresponds to different Y output points. Please refer to the above figure for wiring. It is compatible

with NPN and PNP input modes.

2-3-2. XG2 series terminal arrangement

(1) Main body terminals



(2) External terminal block terminal

L+	X0+	X1+	X2	X3-	X4-	X6+	X7+	X10	X11-	X12-	X14	X16	X20	COM0	Y1	Y3	COM1	Y5	Y7
M	X0-	X1-	X3+	X4+	X5	X6-	X7-	X11+	X12+	X13	X15	X17	X21	Y0	Y2	•	Y4	Y6	•

Note:

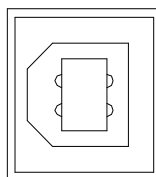
- ※ 1: COM0 at the output corresponds to Y0~Y3, and COM1 corresponds to Y4~Y7.
- ※ 2: See section 5-1 for specific wiring.

2-4. Communication port

XG series generally has USB port (XG2 does not have this port), COM1 (RS485), COM2 (RS485), COM3 (RS485), LAN port (RJ45). USB port can be used to download programs and data at high speed. COM1 and COM2 are mainly used for communication, and can also be used to download programs. Ethernet port can connect PLC to local area network.

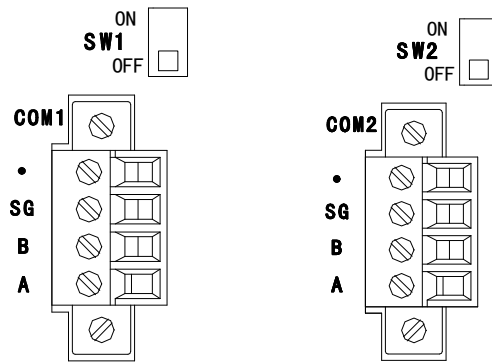
(1) USB port

The USB port can only be used to download PLC programs and data, and cannot be used for other communications. When downloading, please use the USB cable of the printer or the USB Download Cable JC-UA-15 of Xinje.



(2) RS485 port

There are two RS485 ports on PLC, A is RS485+, B is RS485-, and SG is signal ground.



XG1 series PLC: COM1 port supports MODBUS and X-NET fieldbus functions. COM2 port supports Modbus, X-NET fieldbus and X-NET motion bus functions.

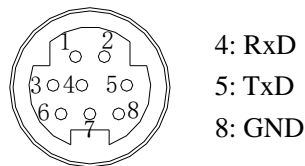
XG2 series PLC: COM2 port and COM3 port support Modbus communication.

When the dial switch is used for RS485 communication, whether the PLC is the terminal. When the PLC is at the beginning or end of the bus, please turn the dial switch to on. SW1 corresponds to COM1, SW2 corresponds to COM2, and SW3 corresponds to COM3.

Note: SW1 of XG2 series PLC is updating dial switch.

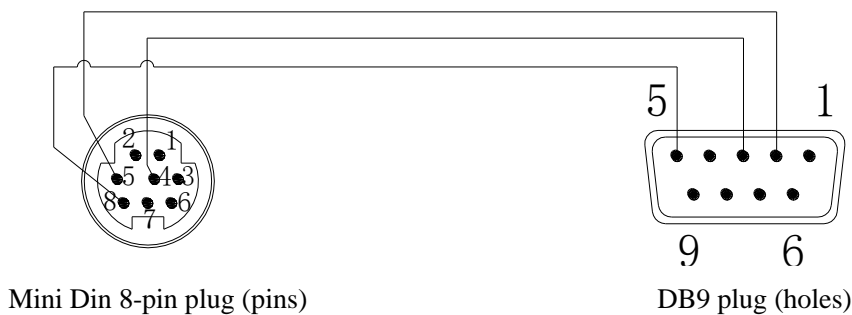
(3) RS232 port

XG2 series PLC has a RS232 port (COM1), supports MODBUS communication.



Mini Din 8-pin plug (hole)

If you want to use COM1 port to download the program, you can connect with PC through DVP or XVP cable of Xinje. If not, you can also make your own cable. The connection mode of DVP cable is shown in the following figure:



Mini Din 8-pin plug (pins)

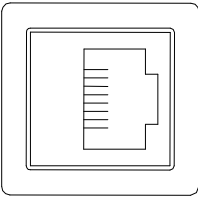
DB9 plug (holes)

Note: The above figure is the wiring diagram of DVP cable. On this basis, XVP cable needs to be connected with terminal 1 (Mini DIN8) and terminal 7 (DB9).

(4) LAN port

Ethernet communication is supported through the LAN port (RJ45 standard), which can download programs, online monitoring and remote monitoring for the PLC, connect the PLC to the LAN, and communicate with other TCP IP devices in the LAN.

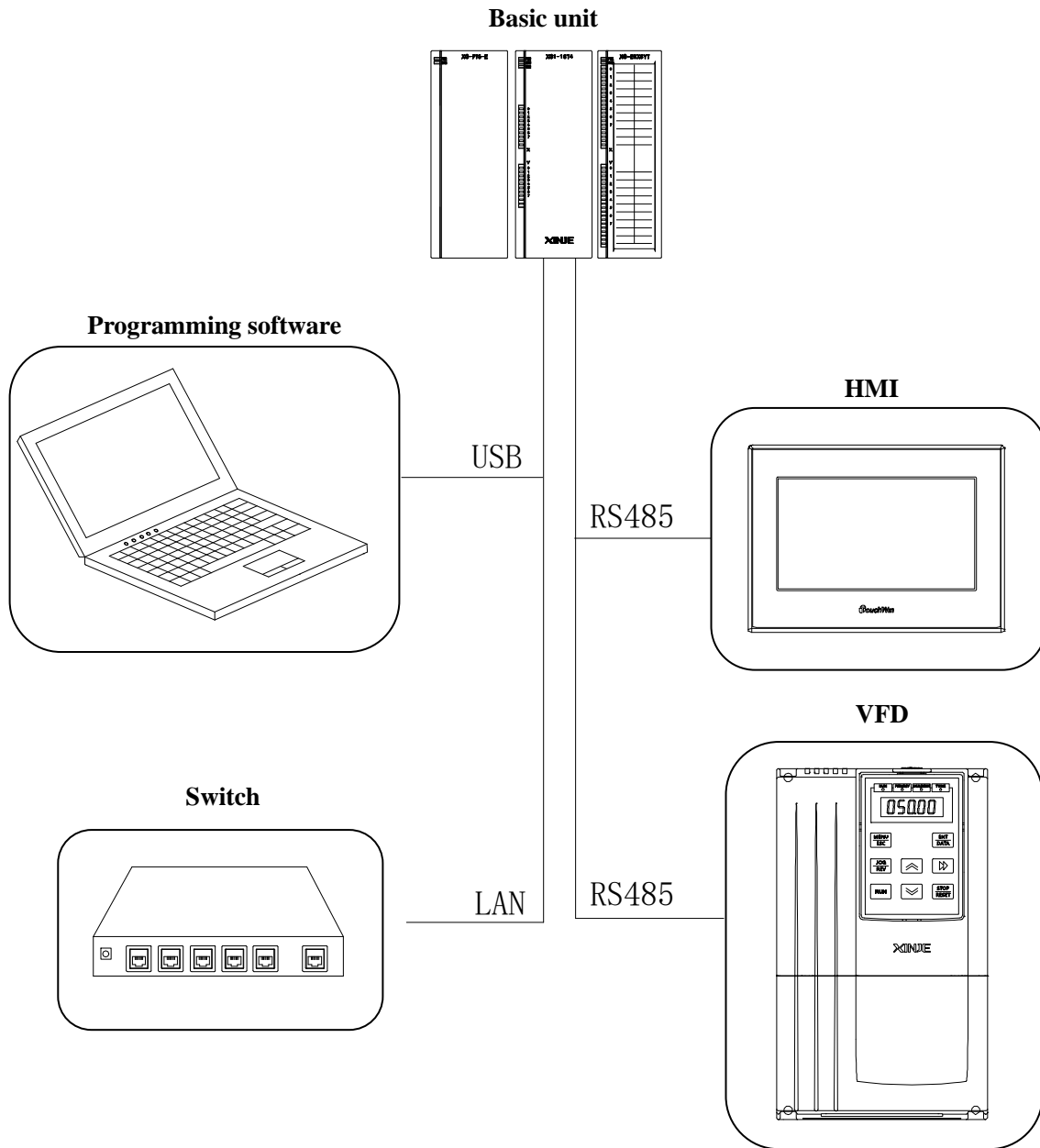
The LAN2 port of XG2 series is used for EtherCAT bus synchronous control of 32-axis motor.



3. System composition

3-1. System composition

The following figure is the system structure diagram based on the basic configuration of XG series PLC. Through this diagram, we can roughly understand the connection between PLC and peripheral equipment, expansion equipment, etc., as well as the typical applications of PLC communication, connection and expansion ports.



Note: The connecting devices of the above communication ports are only for example, and the actual communication ports can connect a variety of devices.

3-2. Peripheral equipment

The use of the basic unit of XG series PLC involves a variety of peripheral devices.

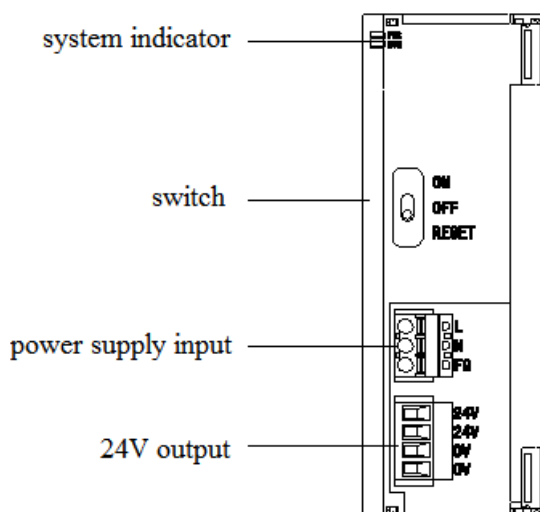
3-2-1. Power supply module

(1) Basic specification

XG series medium-sized PLC is equipped with a special power module, the model is XG-P75-E, and its basic specifications are as follows:

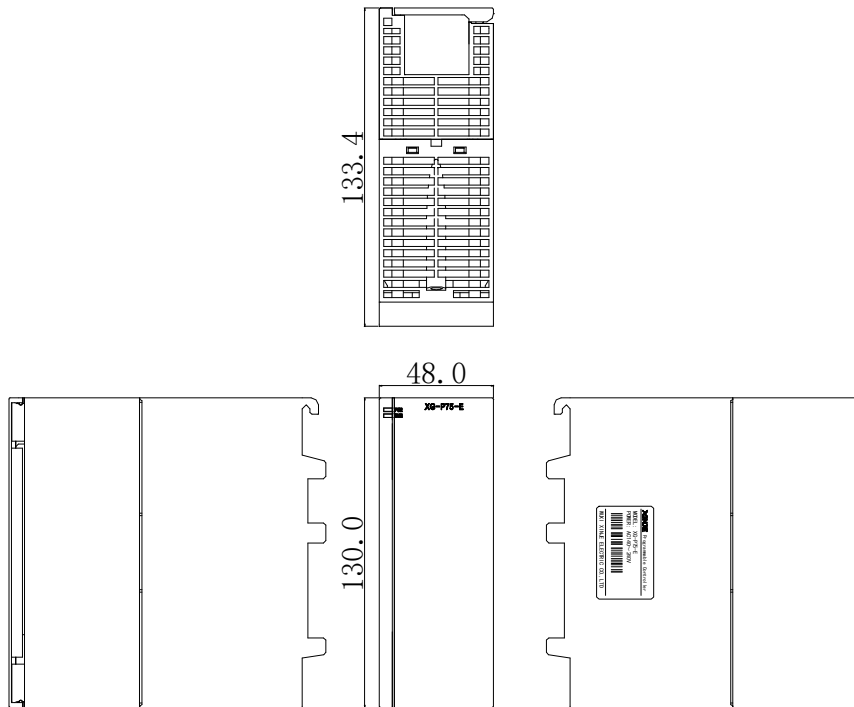
Item	Specification
Power supply	AC100~240V
Output voltage	24VDC
Output power	75W
Ambient temperature	0°C~60°C
Ambient humidity	5%RH~95%RH (no condensation)
Installation	Directly installed on Xinje XG-EB series guide rail

(2) Structure



Name	Explanation
System indicator	PWR: power indicator, green is always on after AC220V power is connected Run: operation indicator light. Green is always on when the power module is in normal operation
Switch	ON: normally output 24V OFF: stop outputting 24V RESET: undefined
Power supply input	L, N: power supply input FG: grounding terminal
24V output	24V,0V: It can output a group of 24VDC power supply to supply power to XG body

(3) Dimension (unit: mm)



3-2-2. Mounting rail

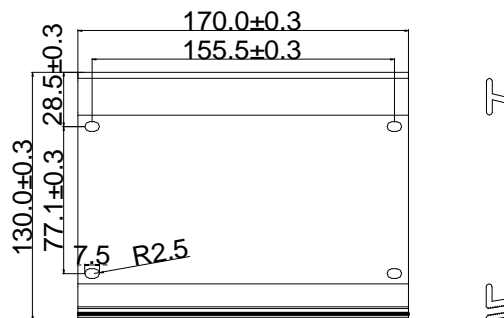
The installation of basic unit, expansion module and power module needs to be installed through guide rail. Xinje provides XG-EB series guide rails of various sizes for users to choose.

(1) Guide rail models

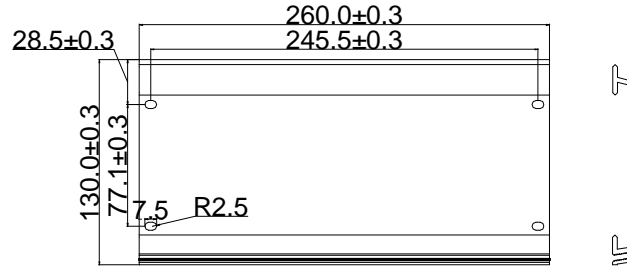
Models	Length (mm)
XG-EB-170	170
XG-EB-260	260
XG-EB-385	385
XG-EB-590	590
XG-EB-880	880
XG-EB-1500	1500

(2) Guide rail size (unit: mm)

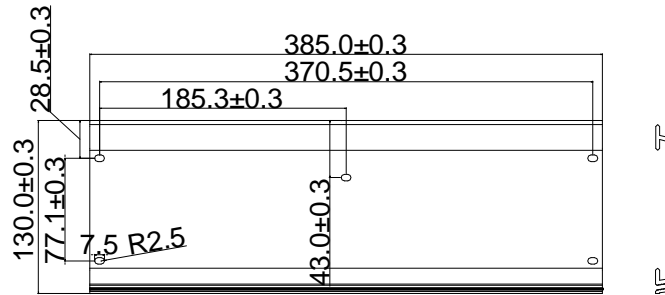
◆ XG-EB-170



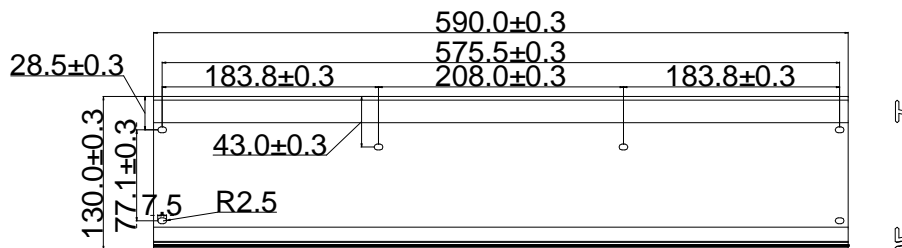
◆ XG-EB-260



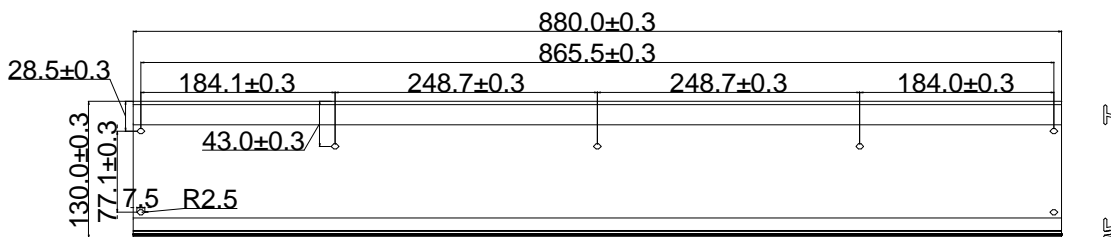
◆ XG-EB-385



◆ XG-EB-590



◆ XG-EB-880



3-2-3. U connector

(1) Basic function

XG-EUC-1: the U-shaped connector for XG series medium-sized PLC is used for the connection between XG series PLC body and expansion module, or the connection between modules.

XG-EUCT-1: on the basis of XG-EUC-1, it has built-in terminal resistance. The connector is inserted into the expansion port of the last expansion module to improve the signal quality.

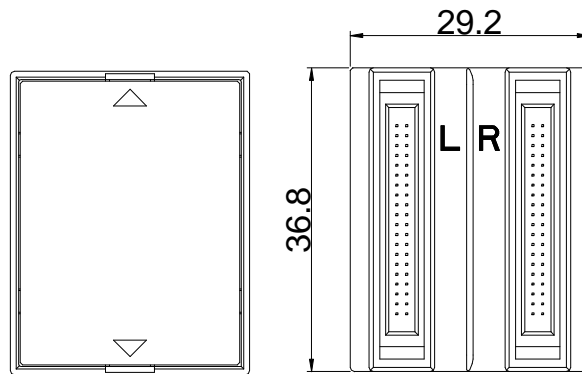
Note:

※ 1: when connecting more than 10 expansion modules, XG-EUCT-1 is required. It is also recommended for occasions with strong electromagnetic interference.

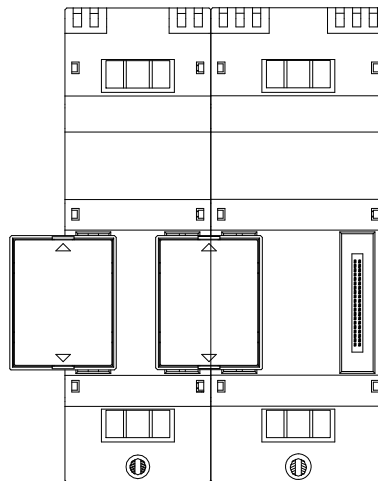
※ 2: when connecting multiple expansion modules, XG-EUCT-1 can only be used in the last expansion position,

and XG-EUC-1 can still be used in other positions.

(2) Dimension (unit: mm)



(3) Installation position



3-2-4. Terminal block and connecting cable

External terminal blocks can be selected for XG2 wiring. Xinje provides terminal blocks and connecting cables required by XG2 for users to choose.

Model list of terminal block and connecting cable:

PLC	Terminal block	Connecting cable
XG2-26T4	JT-G26	JC-TG26-NN05 (0.5m) JC-TG26-NN10 (1.0m) JC-TG26-NN15 (1.5m)

(1) Terminal block

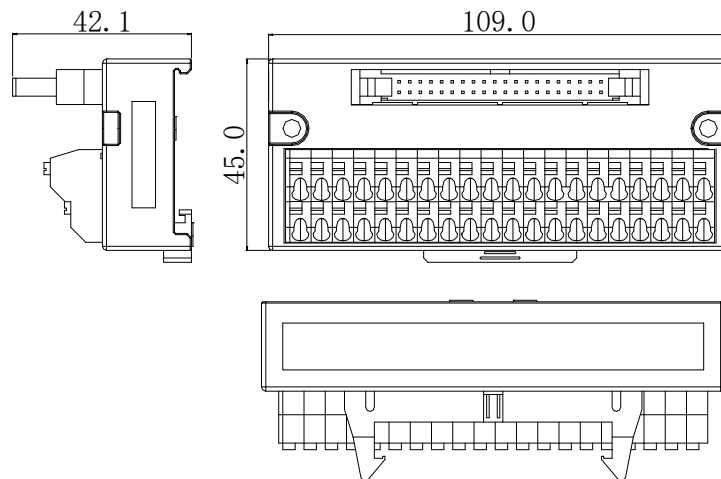
■ Terminal arrangement on terminal block

L+	X0+	X1+	X2	X3-	X4-	X6+	X7+	X10	X11-	X12-	X14	X16	X20	COM0	Y1	Y3	COM1	Y5	Y7
M	X0-	X1-	X3+	X4+	X5	X6-	X7-	X11+	X12+	X13	X15	X17	X21	Y0	Y2	•	Y4	Y6	•

Note: COM0 at the output end corresponds to Y0~Y3, and COM1 corresponds to Y4~Y7

■ Terminal block dimension

(Unit: mm)



■ Wiring method

When wiring, press the spring switch with a small screwdriver, insert the wire into the corresponding jack, and release the spring switch. The terminal block requires that the length of wire stripped is 1.5cm.

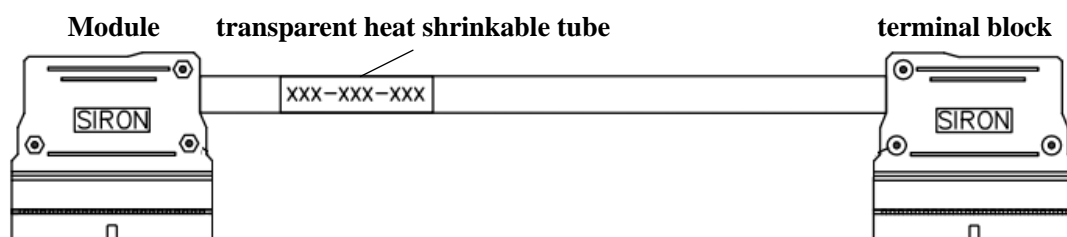
■ Installation

Please install the terminal block on a 35mm wide guide rail.

(2) Connecting cable

When connecting the terminal block externally, connecting cables need to be used together. Xinje provides JC-G26-NN05, JC-G26-NN10, JC-G26-NN15 cables with different lengths and specifications for users to choose and buy. Please note that when connecting, one end which the transparent heat shrinkable tube wrapped the model is connected to XG2, and the other end is connected to the terminal block, which cannot be reversed!!!

The connection diagram is as follows

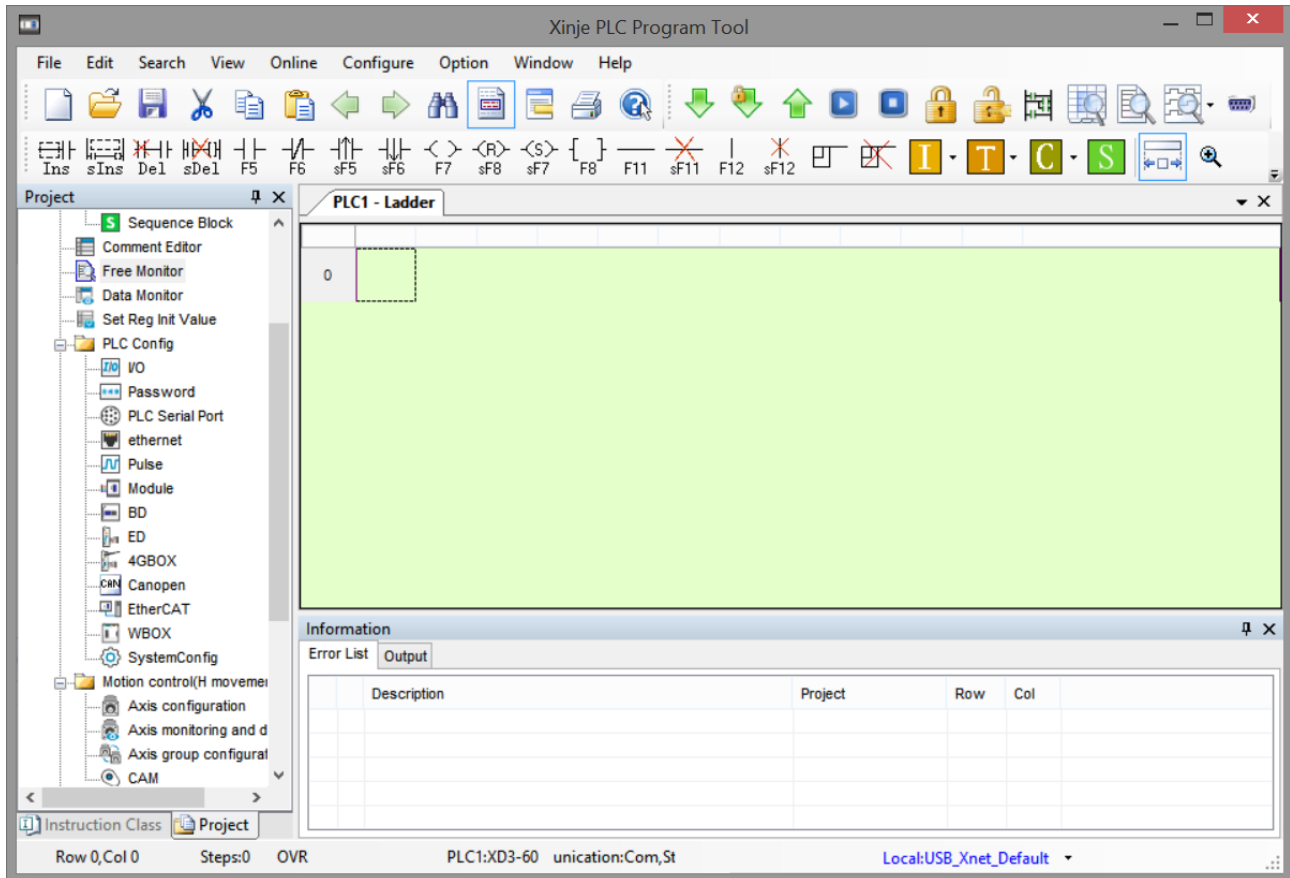


Note: When connecting with the terminal block, please pay attention to the position of the card slot of the terminal block, and do not connect it upside down

3-2-5. Programming software

In the programming software, the functions of writing or uploading programs to PLC, monitoring the operation of PLC in real time, configuring PLC and so on can be realized. After the "Xinje PLC programming tool software" is installed on the personal PC, the connection between PLC and programming software can be realized through the USB port of the basic unit using the USB download cable.

- ◆ Software interface



Note: Please try to use the USB download cable JC-UA-15 provided by Xinje company, or use the printer cable.

3-2-6. HMI

HMI is the interface to realize the interaction between PLC and operators. The HMI can easily and quickly send the action of the operator to the PLC, and then the PLC executes the action.

The basic unit of XG series PLC supports the connection of various HMIs. The connection is based on the consistent communication protocol, which can generally be through Modbus protocol. The specific parameters are determined according to the specific HMI.

The HMI of Xinje company can be directly connected with the basic unit for communication (the communication parameters have been consistent). At present, Xinje HMI products are divided into touch screen TG series and text display OP series.

(1) TG series

- ◆ Size 4.3", 7", 8", 10.1", 15.6"
- ◆ Display 16.77 million colors, 65536 colors
- ◆ Operation Display area touch operation
- ◆ Port RS232, RS422, RS485, USB, Ethernet port
- ◆ Communication It can directly communicate with VFD, various PLCs and instruments
Direct drive panel printer, supporting a variety of printers
Equipped with two ports, it can connect two different devices at the same time
Support free format protocol, and users can write drivers freely

- ◆ Recipe Search the recipe by index
- ◆ Screen Rich 3D image library, text effects, data collection, data backup, etc
- ◆ Password Nine level permission setting
- ◆ Advanced Open advanced functions, animation track design, etc

(2) OP series

- ◆ Size 3.7"
- ◆ Display STN-LCD
- ◆ Button 7, 20, the screen cannot be touched
- ◆ Interface RS232, RS485, RS422
- ◆ Communication Direct communication with various PLCs
Directly communicate with Xinje frequency converter
- ◆ Clock built-in

3-3. Constitution principle

(1) Communication port

- ◆ The basic units of XG series are generally equipped with multiple communication ports, including COM1, COM2, COM3, etc.
- ◆ Most communication ports can be used for programming download and communication.
- ◆ Each port is independent of each other.

(2) Expansion devices

- ◆ Generally speaking, the basic unit can be expanded with different types of expansion modules or mixed expansion, including input and output expansion, analog quantity and temperature expansion.
- ◆ XG series can be expanded by up to 16 modules.
- ◆ After connecting the basic unit and the expansion module with the bus connector, the PWR indicator of the expansion module is on, and the expansion module can be used normally.

(3) Calculation of points

- ◆ Points are the actual input and output points.
- ◆ When the expansion module is connected, the total number of points = points of the basic unit + points of the expansion module.
- ◆ The serial number of input and output digital value is octal.
- ◆ The serial number of input and output analog quantity is decimal.
- ◆ After expansion, the total number of points can reach 538 at most.

Point calculation example

Basic unit XG1-16T4 (8I/8O) connects 5 expansion modules XG-E8X8YR.

I points: $8 + 8 * 5 = 48$

O points: $8 + 8 * 5 = 48$

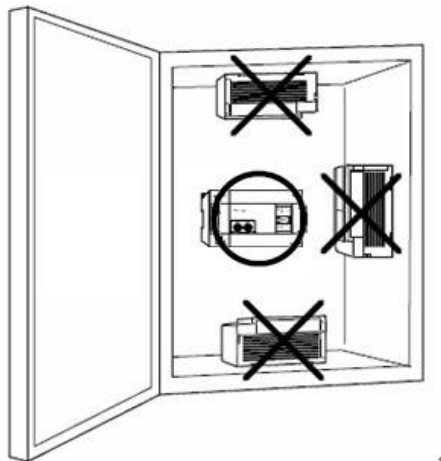
Total points: $I + O = 48 + 48 = 96$

3-4. Allocation of extension module definition number

Code	Name	Range	Points
X	Input points	X10000~X10077 (expansion module 1) X11700~X11777 (expansion module 16)	1024
Y	Output points	Y10000~Y10077 (expansion module 1) Y11700~Y11777 (expansion module 16)	1024
ID	Expansion module	ID10000~10099 (expansion module 1) ID11500~11599 (expansion module 16)	1600
QD	Expansion module	QD10000~10099 (expansion module 1) QD11500~11599 (expansion module 16)	1600

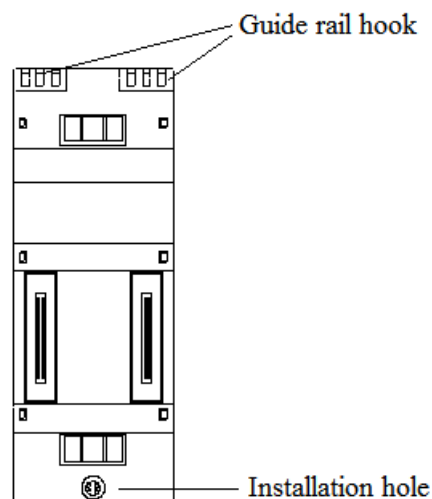
3-5. Product installation

(1) Installation position

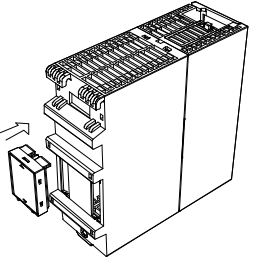
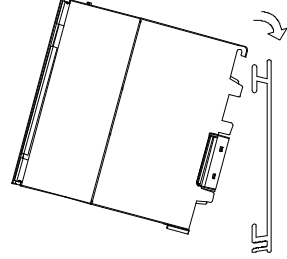
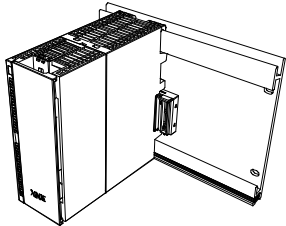
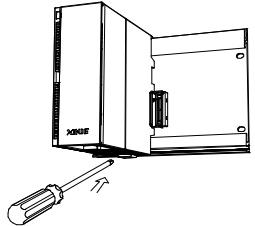
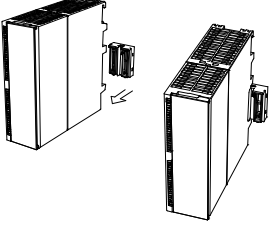
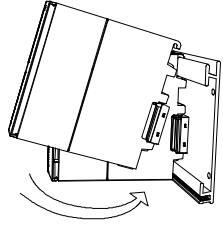
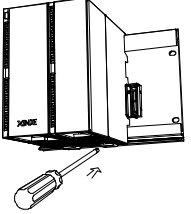
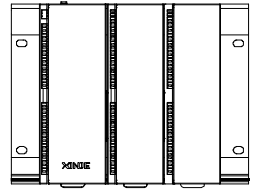


(2) Installation method

XG-EB series guide rails are selected for the installation of basic units and expansion modules.



Connect the power module, XG main body and XG expansion module to the guide rail through U-connector, and fix them with bottom screws. The installation steps are as follows:

<p>① Insert the L Port of the U-shaped connector into the left interface on the back of the PLC body (right side in front view)</p>	<p>② Hang the installation hook on the upper side of the PLC body to the upper side of the installation guide rail according to the direction shown in the figure</p>
	
<p>③ Fix the PLC to the mounting rail as shown in the figure below</p>	<p>④ Please fix the screw hole below the PLC with screws</p>
	
<p>⑤ Plug the L Port of the U-connector into the left interface on the back of the expansion module 1 (right side in front view)</p>	<p>⑥ Hang the installation hook on the upper side of the #1 module to the upper side of the installation guide rail according to the direction shown in the figure. The expansion port on the left side of the module is connected to the R port of the U-connector on the main body</p>
	
<p>⑦ Please fix the screw hole under the module 1 with screws</p>	<p>⑧ Continue to install the following modules in the same way, and the effect is shown in the following figure.</p>
	

Note:

※ 1: if the power module XG-P75-E is selected, please install the power module on the left side of the PLC body according to the installation steps ①~④.

※ 2: the R port on the back of the last expansion module does not need to be installed with a U-connector.

(3) Installation environment

Please install the product under the environmental conditions specified in section 2-1-1.

4. Power supply specification

4-1. Power supply specification

The power specifications of the basic unit of XG series PLC are shown in the following table:

(1) DC power supply

Item	Content
Rated voltage	DC24V
Allowable voltage range	DC21.6V~26.4V
Input current (only for basic unit)	120mA DC24V
Allowable instantaneous power-off time	10ms DC24V
Impact current	10A DC26.4V
Maximum power consumption	12W

Note: It is an empty terminal, please do not connect it externally or use it as a relay terminal

5. Input specification and wiring

5-1. Input specification

XG series PLC supports three input modes: NPN, PNP (XG1 only) and differential (XG2 only). The specifications and wiring methods are introduced below:

5-1-1. Input specification

(1) NPN input specification

Item	Content
Input signal voltage	DC24V±10%
Input signal current	7mA/DC24V
Input ON current	Above 4.5mA
Input OFF current	Below 1.5mA
Input response time	About 10ms
Input signal mode	Contact input or NPN open collector transistor
Circuit insulation	Photoelectric coupling insulation
Input action display	LED light is on when input on

(2) PNP input specification

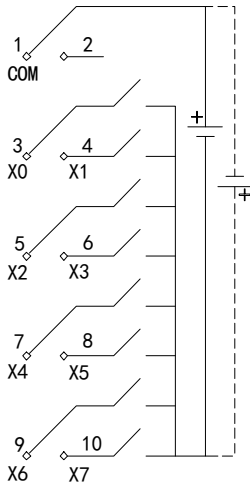
Item	Content
Input signal voltage	DC24V±10%
Input signal current	7mA/DC24V
Input ON current	Above 4.5mA
Input OFF current	Below 1.5mA
Input response time	About 10ms
Input signal mode	Contact input or PNP open collector transistor
Circuit insulation	Photoelectric coupling insulation
Input action display	LED light is on when input on

(3) Differential input specification

Item	Content
Input signal voltage	DC5V±10%
Input signal current	12mA/DC5V
Input ON current	Above 4.5mA
Input OFF current	Below 1.5mA
Input response time	Max 200KHz
Input signal mode	Differential input
Circuit insulation	Photoelectric coupling insulation
Input action display	LED light is on when input on

5-1-2. Wiring example

(1) XG1 input wiring example



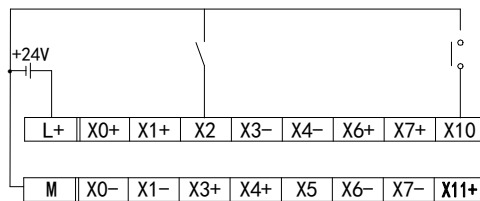
Note:

(1) In the left figure, the solid line part is NPN connection, and the dotted line part is PNP connection.

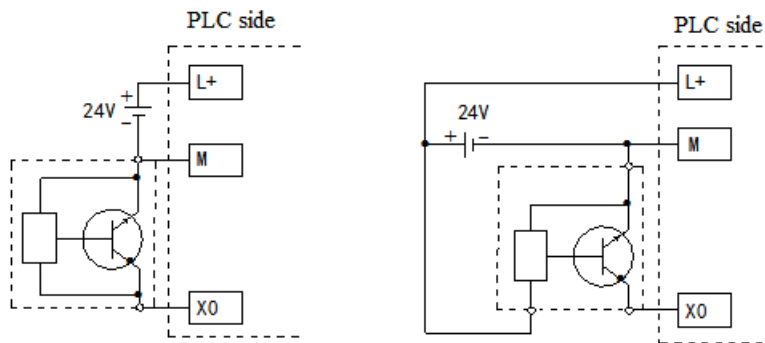
(2) The PLC is generally equipped with a plug-in spring connector to facilitate wiring when it leaves the factory. The length of the stripped wire of this connector is required to be 1.5cm. When wiring, press the yellow spring switch with a small screwdriver, insert the wire into the corresponding jack, and release the spring switch.

(2) XG2 input wiring example

■ NPN wiring

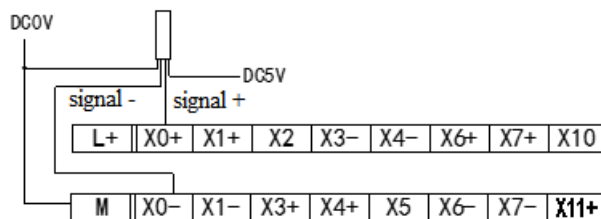


Switch button wiring example



2-wire (NO or NC) proximity switch wiring example 3-wire (NPN) proximity switch wiring example

■ Differential mode



Differential wiring example

5-2. DC input signal

(1) NPN mode

➤ Input terminal

When the input terminal and com terminal is connected through the voltage free contact or NPN open collector transistor, the input is on, and the LED light corresponding to the input is on. There are multiple input com terminals in the programmable controller that can be connected.

➤ Input circuit

The input primary circuit and secondary circuit are insulated by optical coupler, and the secondary circuit is equipped with C-R filter. This is set to prevent misoperation caused by vibration of input contact or noise mixed with input line. Due to the above reasons, the response time of input ON→OFF and OFF→ON changes lags about 6ms in the programmable controller. Digital filter is built in the input terminal.

➤ Input sensitivity

The input current of the programmable controller is DC24V 7mA, but for the sake of reliable action, when it needs to be on, it is more than 4.5mA, and when it is off, it is less than 1.5mA.

(2) PNP mode

➤ Input terminal

When the input terminal and com terminal is connected through the DC24V contact or PNP open collector transistor, the input is on, and the LED light corresponding to the input is on. There are multiple input com terminals in the programmable controller that can be connected.

➤ Input circuit

The input primary circuit and secondary circuit are insulated by optical coupler, and the secondary circuit is equipped with C-R filter. This is set to prevent misoperation caused by vibration of input contact or noise mixed with input line. Due to the above reasons, the response time of input ON→OFF and OFF→ON changes lags about 10ms in the programmable controller. Digital filter is built in the input terminal.

➤ Input sensitivity

The input current of the programmable controller is DC24V 7mA, but for the sake of reliable action, when it needs to be on, it is more than 4.5mA, and when it is off, it is less than 1.5mA.

(3) Differential mode

➤ Input terminal

When the DC5V voltage contact is used between the input terminal and the M terminal, the input is on, and the LED light corresponding to the input is on.

➤ Input circuit

The input primary circuit and secondary circuit are insulated by optical coupler, and the secondary circuit is equipped with C-R filter. This is set to prevent misoperation caused by vibration of input contact or noise mixed with input line. Due to the above reasons, the response time of input ON→OFF and OFF→ON changes lags about 10ms in the programmable controller. Digital filter is built in the input terminal.

➤ Input sensitivity

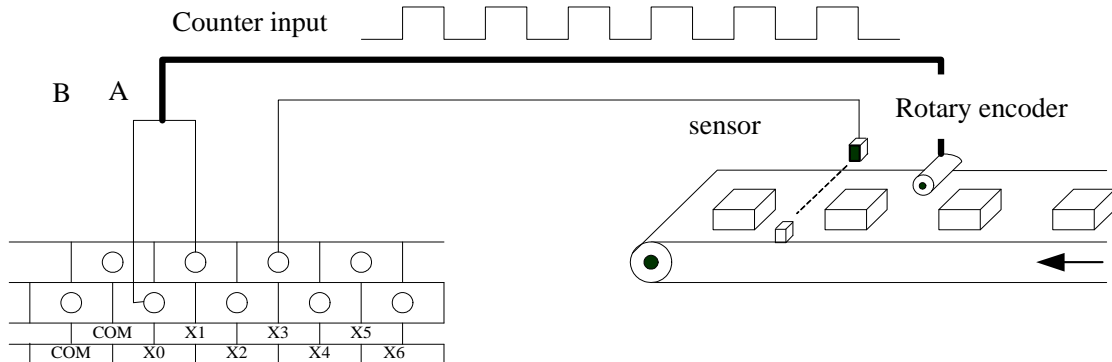
The input current of the programmable controller is DC5V 12mA, but for the sake of reliable action, when it needs to be on, it is more than 4.5mA, and when it is off, it is less than 1.5mA.

5-3. High speed counting input

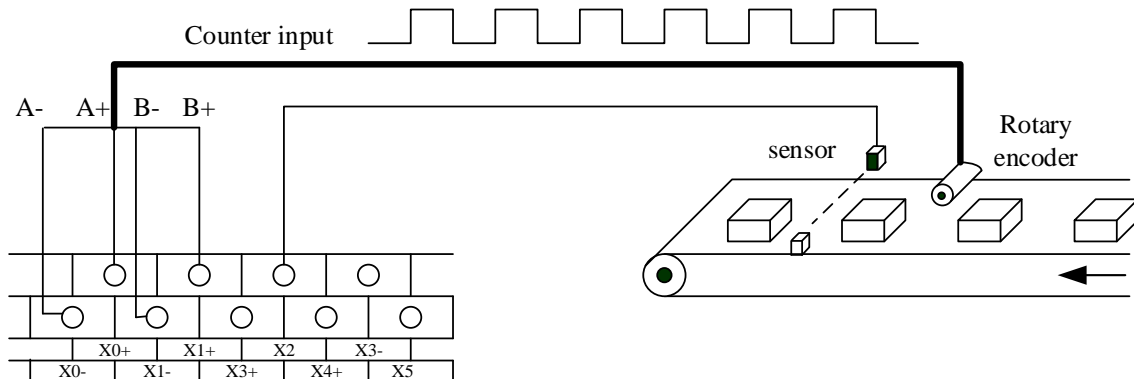
XG series PLC has a high-speed counting function independent of the scanning cycle of the programmable controller. By selecting different counters, the measurement of high-speed input signals such as measurement sensors and rotary encoders can be achieved. The maximum measurement frequency of XG1 can reach 80kHz, and the maximum measurement frequency of XG2 can reach 200kHz.

Note:

- (1) The high-speed counting input of XG1 series PLC can only receive the open collector signal (OC), not the differential signal. Please be sure to choose the encoder of the open collector signal (OC).



- (2) The high-speed counting input of XG2 series PLC can only receive differential signal (DIFF) and cannot receive open collector signal. Please be sure to select the encoder of differential signal (DIFF).



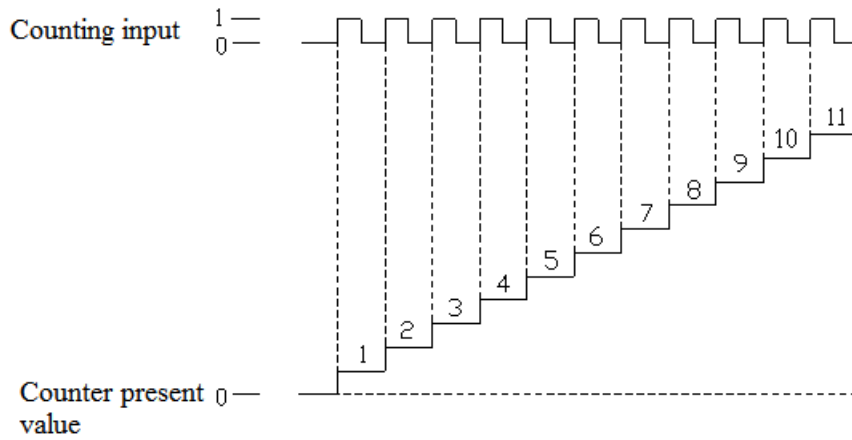
- (3) When the counting frequency is higher than 25Hz, please choose a high-speed counter.

5-3-1. Counting mode

XG series high-speed counting function has two counting modes: incremental mode and AB phase mode.

(1) Incremental mode

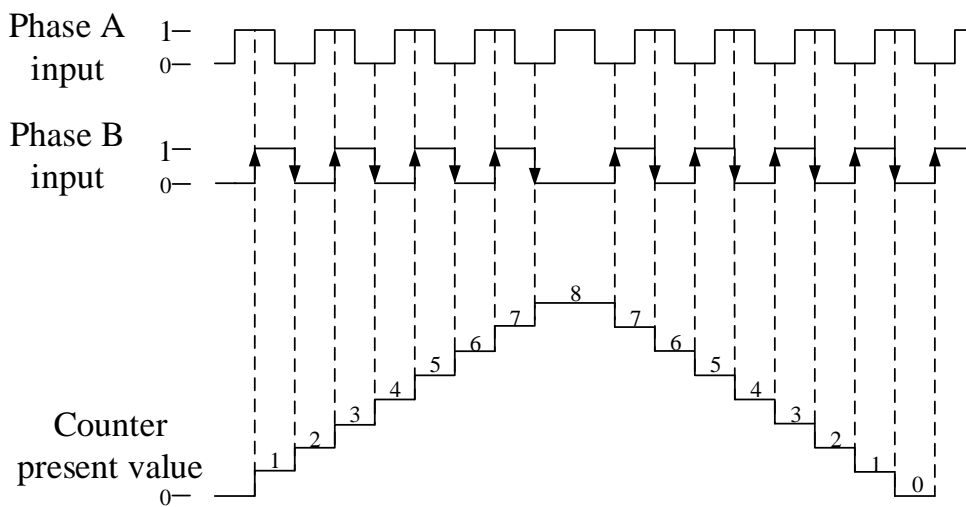
In this mode, the input pulse signal is counted, and the count value increases with the rising edge of each pulse signal.



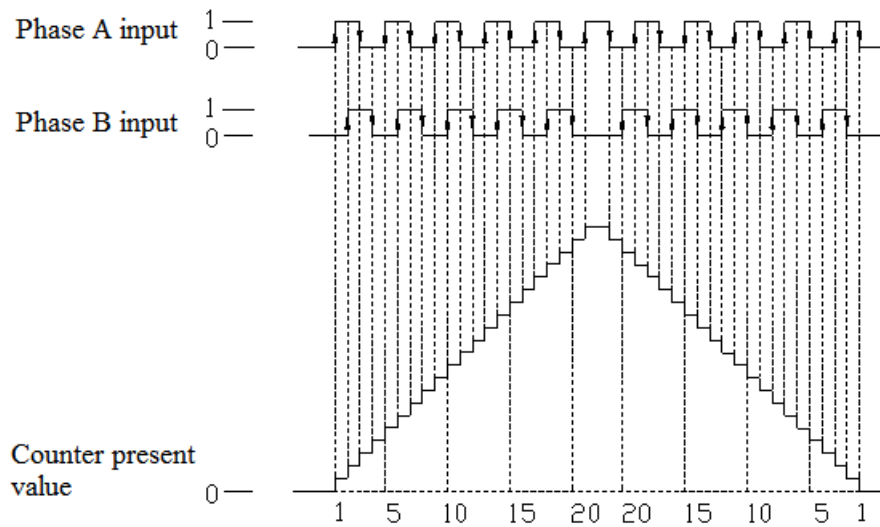
(2) AB phase mode

In this mode, the high-speed count value is incremented or decremented according to two differential signals (phase A and phase B). According to the frequency multiplication number, it can be divided into two modes: double frequency and quadruple frequency, but its default counting mode is quadruple frequency mode.

Double frequency mode



Quadruple frequency mode



5-3-2. High speed counting range

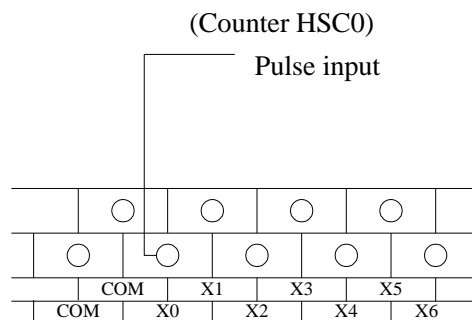
The counting range of high-speed counter is: $K-2,147,483,648 \sim K+2,147,483,647$. When the count value exceeds this range, overflow or underflow occurs.

The so-called overflow is to jump the count value from $K+2147483647$ to $K-2147483648$ and continue counting. When underflow occurs, the count value jumps from $K-2147483648$ to $K+2147483647$ and continues to count.

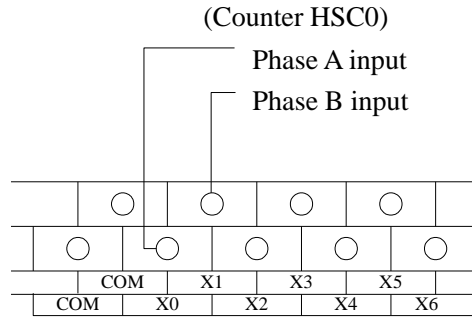
5-3-3. High speed counter input wiring

The wiring of counting pulse input terminal is slightly different according to the type of programmable controller and the model of counter. The typical wiring methods are shown in the following figure (taking HSC0 of XG1 series 16 points PLC as an example):

(1) Incremental mode



(2) AB phase mode



5-3-4. Input terminal assignment

1. The number of high-speed counting channels of XG series PLC is shown in the following table:

PLC model		High speed counter channels	
		Incremental mode	AB phase mode
XG1	16 points	4	4
XG2	26 points	4	4

2. Definition of high-speed counting input terminal:

The meaning of each letter is:

U	A	B	Z
Counting pulse input	Phase A input	Phase B input	Z-phase pulse capture

Note: The Z-phase function is still under development.

Under normal circumstances, the input frequency of XG1 series high-speed counting terminal can reach 80kHz and 50KHz in single-phase and AB phase modes respectively. The highest frequency of XG2 series high-speed counting terminal can reach 200kHz in single-phase and AB phase modes. When the X input is not used as a high-speed input port, it can be used as a common input terminal. In the frequency doubling item in the table, "2" means fixed double frequency, "4" means fixed quadruple frequency, "2/4" means adjustable. The specific port allocation and functions are shown in the following table:

XG1-16T4												
	Single phase incremental mode							AB phase mode				
	HSC0	HSC2	HSC4	HSC6	HSC8	HSC10	HSC12	HSC0	HSC2	HSC4	HSC6	HSC8
Max frequency	80K	80K	80K	80K				50K	50K	50K	50K	
Quadruple frequency								2/4	2/4	2/4	2/4	
Counting interrupt	√	√	√	√				√	√	√	√	
X000	U							A				
X001								B				
X002		U							A			
X003									B			
X004			U							A		
X005										B		

X006				U							A	
X007											B	

XG2-26T4												
	Single phase incremental mode							AB phase mode				
	HSC0	HSC2	HSC4	HSC6	HSC8	HSC10	HSC12	HSC0	HSC2	HSC4	HSC6	HSC8
Max frequency	200K	200K	200K	200K				200K	200K	200K	200K	
Quadruple frequency								2/4	2/4	2/4	2/4	
Counting interrupt	√	√	√	√				√	√	√	√	
X000+	U+							A+				
X000-	U-							A-				
X001+								B+				
X001-								B-				
X002												
X003+		U+							A+			
X003-		U-							A-			
X004+									B+			
X004-									B-			
X005												
X006+			U+							A+		
X006-			U-							A-		
X007+										B+		
X007-										B-		
X010												
X011+				U+							A+	
X011-				U-							A-	
X012+											B+	
X012-											B-	

5-3-5. AB phase counting frequency doubling setting mode

For ab phase counting, the frequency doubling value can be set by modifying the data in the special flash data registers SFD321, SFD322, SFD323.....SFD330. When the value is 2, it is 2 times the frequency, and when the value is 4, it is 4 times the frequency.

Register	Function	Setting value	Meaning
SFD320	HSC0 frequency doubling	2	Double frequency
		4	Quadruple frequency
SFD321	HSC2 frequency doubling	2	Double frequency
		2	Quadruple frequency
SFD322	HSC4 frequency doubling	2	Double frequency
		2	Quadruple frequency
SFD323	HSC6 frequency	2	Double frequency

	doubling	4	Quadruple frequency
SFD324	HSC8 frequency doubling	2	Double frequency
		4	Quadruple frequency
SFD325	HSC10 frequency doubling	2	Double frequency
		4	Quadruple frequency
SFD326	HSC12 frequency doubling	2	Double frequency
		4	Quadruple frequency
SFD327	HSC14 frequency doubling	2	Double frequency
		4	Quadruple frequency
SFD328	HSC16 frequency doubling	2	Double frequency
		4	Quadruple frequency
SFD329	HSC18 frequency doubling	2	Double frequency
		4	Quadruple frequency

Note:

※ 1: For more applications on high-speed counting, please refer to the user manual of XG series programmable controller [basic instructions].

※ 2: For a specific model, only one axis can be set to double frequency or quadruple frequency, and the other two are double frequency and quadruple frequency respectively.

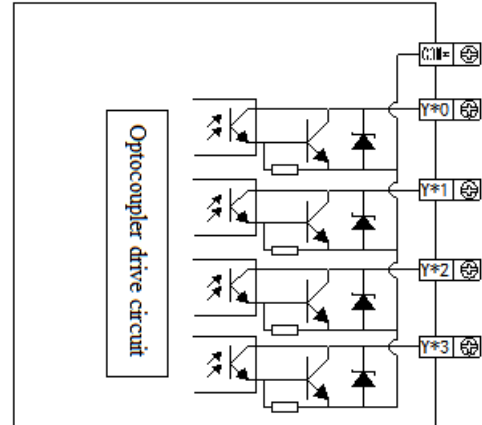
※ 3: After the SFD register is modified, it is necessary to restart the high-speed counter (that is, disconnect and reconnect the triggering conditions) to make the new configuration take effect!

6. Output specification and wiring

6-1. Output specification

(1) transistor output

External power supply		Below DC5~30V
Circuit insulation		Optocoupler insulation
Action indicator		LED light
Max load	Resistive load	0.3A
	inductive load	7.2W/DC24V
	Light load	1.5W/DC24V
Min load		DC5V 2mA
Open circuit leakage current		< 0.1mA
Response time	OFF→ON	< 0.2ms
	ON→OFF	< 0.2ms



(2) High speed pulse output

Model	T4
High speed pulse output terminal	Y0~Y3
External power supply	Below DC5~30V
Action indicator	LED light
Max current	50mA
Pulse max output frequency	100KHz

Note:

(1) When the high-speed pulse output function is used, the PLC can output pulses up to 200kHz, but it can not ensure that all servos operate normally. Please connect a resistance of about 500 ohms between the output and the 24V power supply.

(2) The PLC is generally equipped with a plug-in spring connector to facilitate wiring when it leaves the factory. The connector requires that the stripped length of the wire shall be at least 1.5cm. When wiring, press the yellow spring switch with a small screw drive, insert the wire into the corresponding socket, and release the spring switch.

6-2. Transistor output

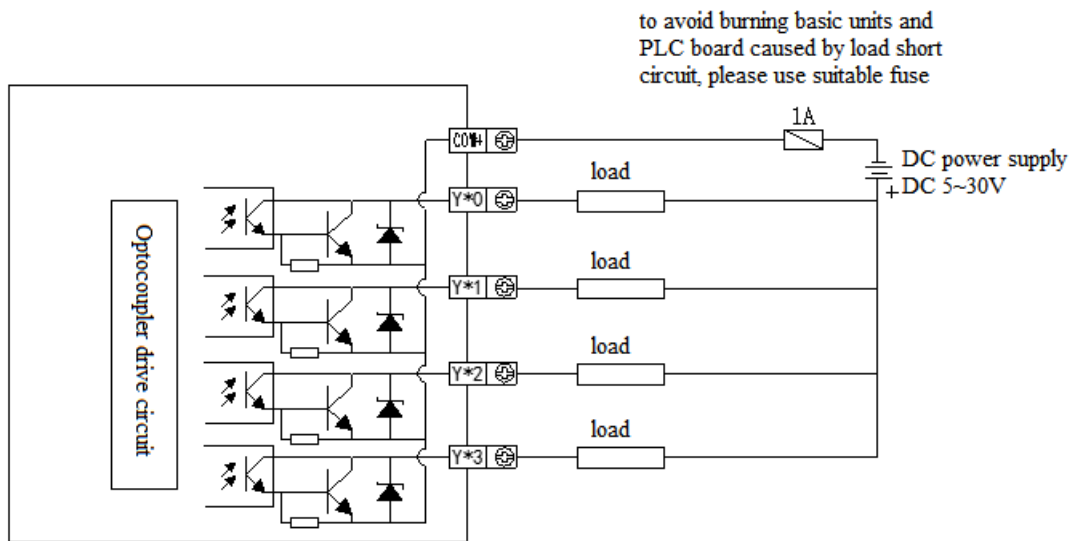
Transistor (NPN) output types can be divided into high-speed pulse output and ordinary transistor

(1) Normal transistor output

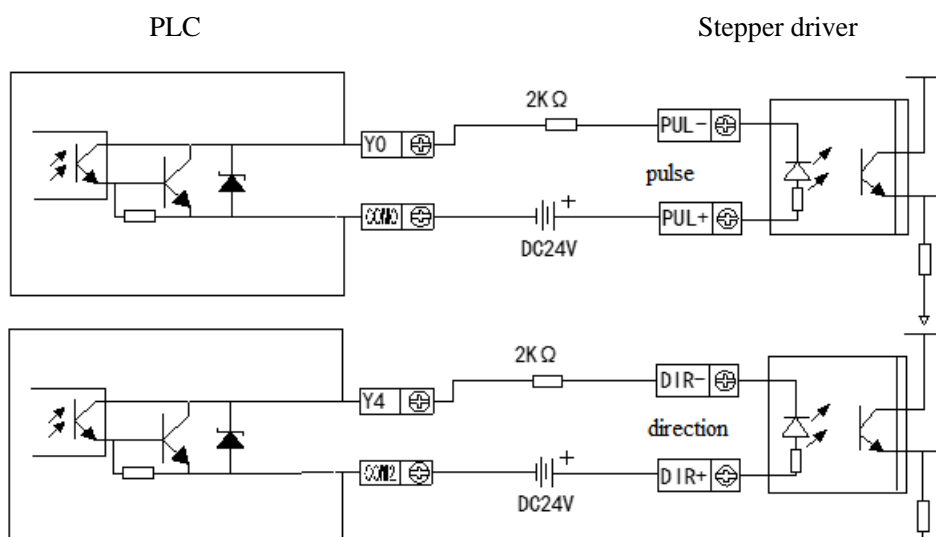
- ◆ External Power Supply
Please use DC5~30V power supply to drive the load.
- ◆ Circuit Isolation

Inside PLC, we use photoelectric couplers to isolate between internal circuits and output transistors

- ◆ Action Display
When photoelectric couplers drive, LED will be ON and the output transistors will be ON.
- ◆ Response Time
The time interval that PLC from photoelectric couplers energizing (or cutting) to transistor ON (or OFF) is below 0.2ms.
- ◆ Output current
The current it outputs is 0.3A per point. But limited by the temperature rising, every 4 points current add up to 0.5A.
- ◆ Open circuit current
Below 0.1mA.



Example: the following is the wiring diagram of T-type PLC and stepper motor driver.

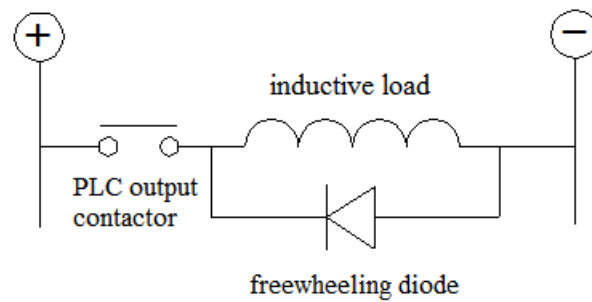


(Make sure the driver's photoelectric coupling input terminal has 8~15mA reliable current)

(2) Output circuit protection

For inductive load of DC circuit, freewheeling diode shall be added, as shown in the following figure:

- ◆ DC load



Note: freewheeling diode is 1N4007.

7. Operation, commissioning and maintenance

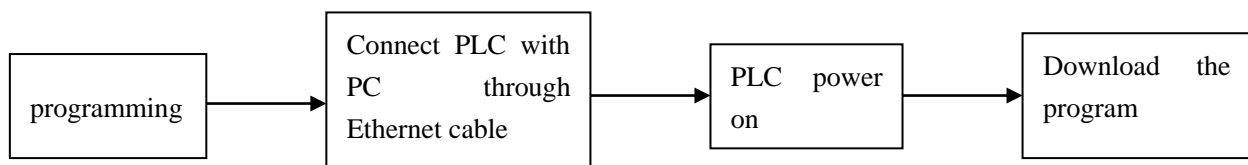
7-1. Operation and commissioning

(1) Product inspection

After receiving the product, please first check whether the input and output terminal blocks of the product are intact and whether there are missing parts. Generally speaking, the PLC at this time can be directly connected to the power cable for power on inspection, and the PWR and RUN indicators should be always on.

(2) Programming and downloading

After confirming that the product is in good condition, the PLC can be programmed. The programming is carried out in the personal computer. The completed program can be downloaded to PLC. The general operation steps are as follows:



Note: Please connect the programming cable before the PLC is powered on, so as to effectively prevent the serial port from being burnt out! The same is true for connecting expansion modules.

(3) Debugging

Ideally, the PLC is in normal operation, but if the program in the PLC is found to be wrong and needs to be modified, it is necessary to rewrite the program to the running PLC.

- ◆ Use Ethernet cable to connect PLC and computer
- ◆ Upload the program in the PLC
- ◆ Modify the uploaded program, and save the modified program
- ◆ Pause the operation of PLC and download the modified program to PLC
- ◆ Monitor PLC through software debugging function
- ◆ If the requirements are still not met, continue to modify the program and download it to PLC until the requirements are met.

(4) PLC indicator light

- ◆ When the PLC is in normal operation, the indicator lights PWR and RUN should always be on.
- ◆ When the indicator ERR is always on, it indicates that there is a problem with the PLC operation. Please correct the program in time.
- ◆ If the indicator PWR is not on, there is a problem with the power supply. Check the power wiring.

7-2. Routine maintenance

(1) Regular inspection of products

Although the programmable controller has certain anti-interference and strong stability, it should also form the habit of regular inspection and maintenance of the controller. The inspection items include:

- ◆ Whether the input and output terminals and power supply terminals of PLC are loose
- ◆ Whether the communication port is intact
- ◆ Whether the power indicator and input / output indicator can be lit
- ◆ Remove the accumulated dust outside the PLC to avoid dust and conductive dust falling inside the PLC
- ◆ Try to make the PLC operation and storage environment conform to the standards described in section 2-1-1 of this manual.

(2) About the battery

There are no components inside the programmable controller that can seriously shorten its service life, so it can be used all the time. However, if it is a PLC with clock function, the battery shall be replaced regularly.

- ◆ The service life of the battery is generally 3-5 years.
- ◆ Please replace the battery as soon as possible after the battery power drops.
- ◆ After replacing the battery, please power on the PLC immediately, otherwise the battery may be exhausted.

(3) Discard

If you decide to discard this product, please treat it as industrial waste.

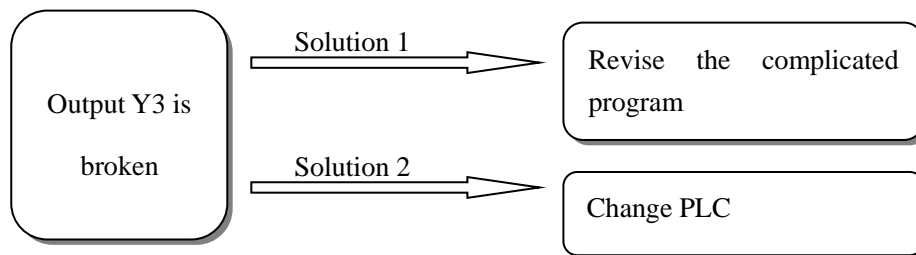
8. Switch between soft components

8-1. Function overview

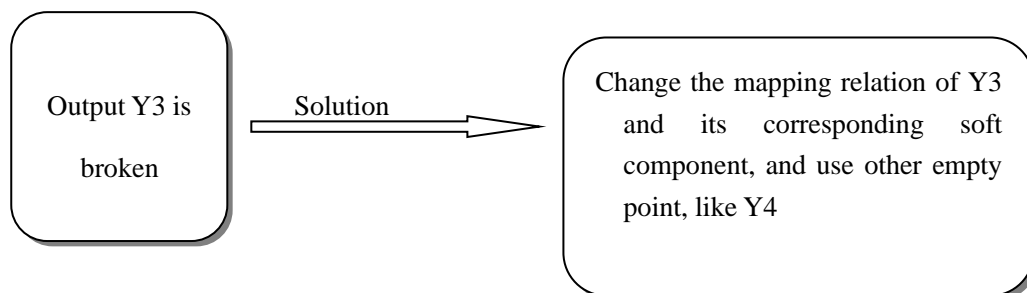
When the internal lighting coupling, relays or transistor are damaged, the corresponding input/output terminals will be out of use. Users either revise the program or ask the manufactures for help, which is very troublesome and affects the users' normal work schedule.

The new type PLC developed independently by Xinje can break the one-to-one correspondence, users only need to change the soft component's value by HMI, then the corresponding terminal will activate.

Before(Complicated and not effective)



Now (Simple, fast and effective)



8-2. Operation method

It no needs to revise the program when we change the damaged input/output point mapping relation and replace the damaged point. In PLC special registers, we allocate certain address section for users to change the mapping relation. Users just need to find and revise the damaged input/output mapping register, and replace the value in this special register with value of replaced input/output.

Method 1: modify the FD register, below is the table for modifying the input/output points' mapping ID:

Table1 Mapping relation of the input and soft component

ID	Function	Description
SFD10	I00 correspond to X**	0 of input corresponds to the number of X**
SFD11	I01 correspond to X**	
SFD12	I02 correspond to X**	
.....	
SFD87	I77 correspond to X**	Default is 77 (octal number)

Table2 mapping relation of the output and soft component

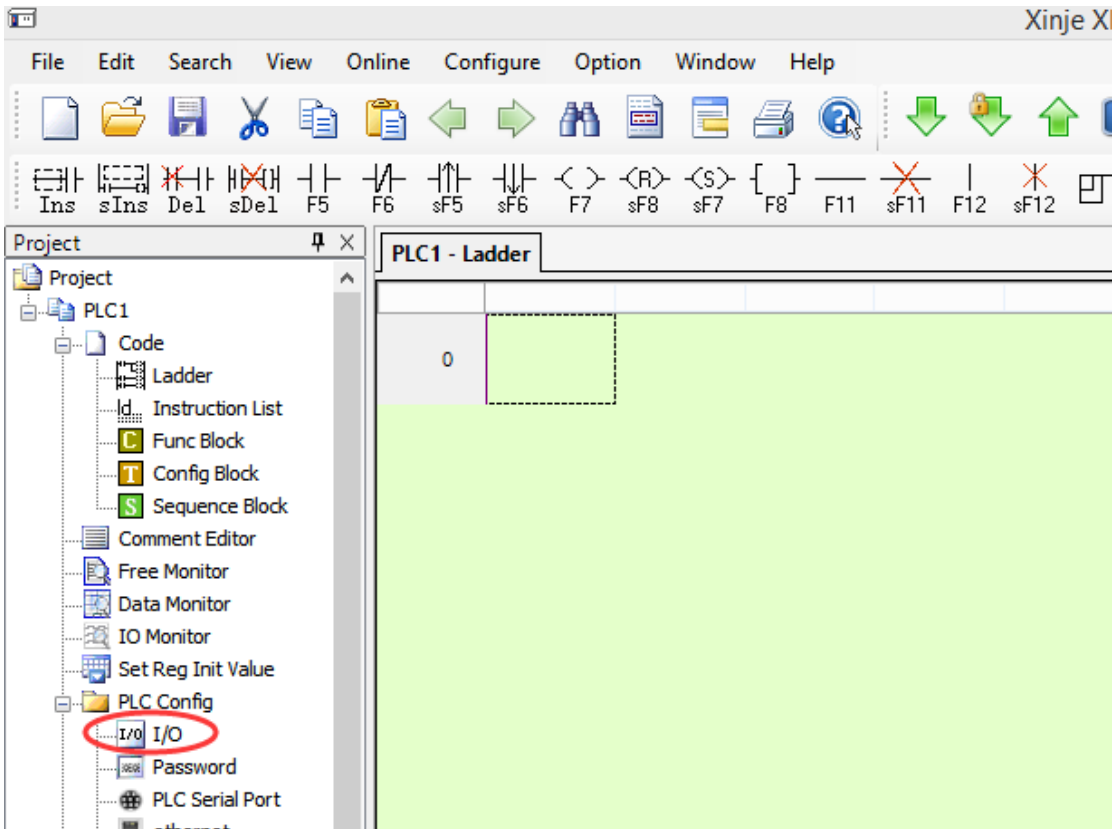
ID	Function	Description
SFD110	O00 correspond to Y**	0 of output corresponds to the number of Y**
SFD111	O01 correspond to Y**	
SFD112	O02 correspond to Y**	
.....	
SFD187*	O77 correspond to Y**	Default is 77 (octal number)

As show in the table above, the default value in SFD10 is 0. If we replace it with value '7', then all X0 in the program will correspond to external input X7. But meantime you should replace the value in SFD17 with 0, to realize exchange. Then original X0 will correspond to X7, and original X7 will correspond to external input X0.

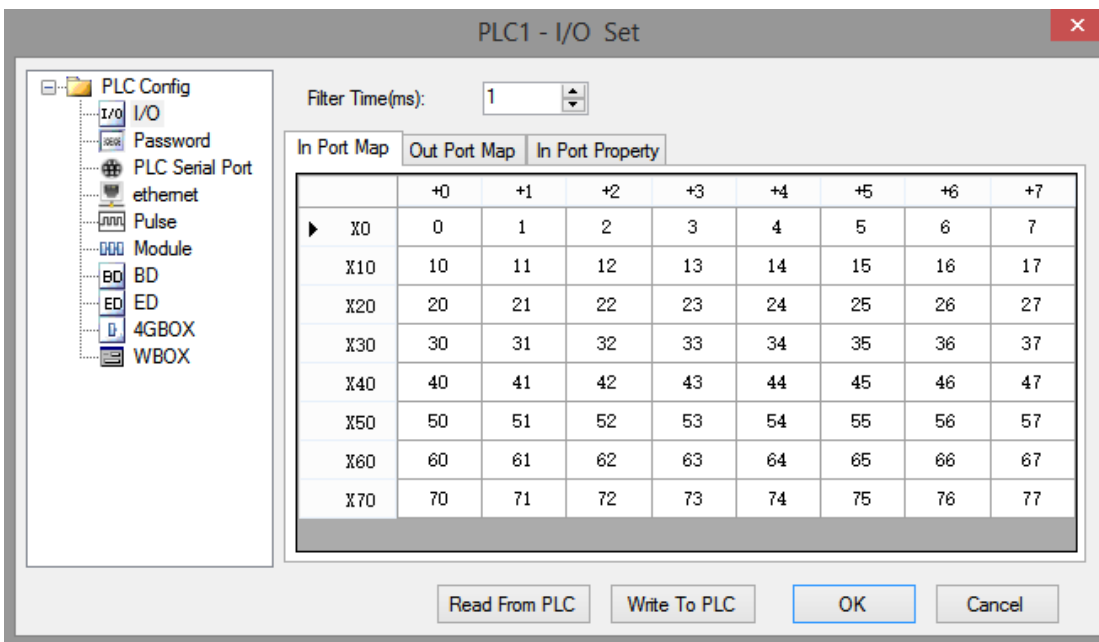
Note:

- ※1: After changing the mapping relation, please power on PLC again.
- ※2: When change the mapping relation, please pay attention, input/output data is octal number while ID is decimal number.
- ※3: Exchange the mapping relation when change. i.e. if modify X0 ID to be 5, make sure to change X5 ID to be 0;
- ※4: Mapping relation, one terminal corresponds to one soft component.
- ※5: Users can modify the SFD value in the software, please see method 2.

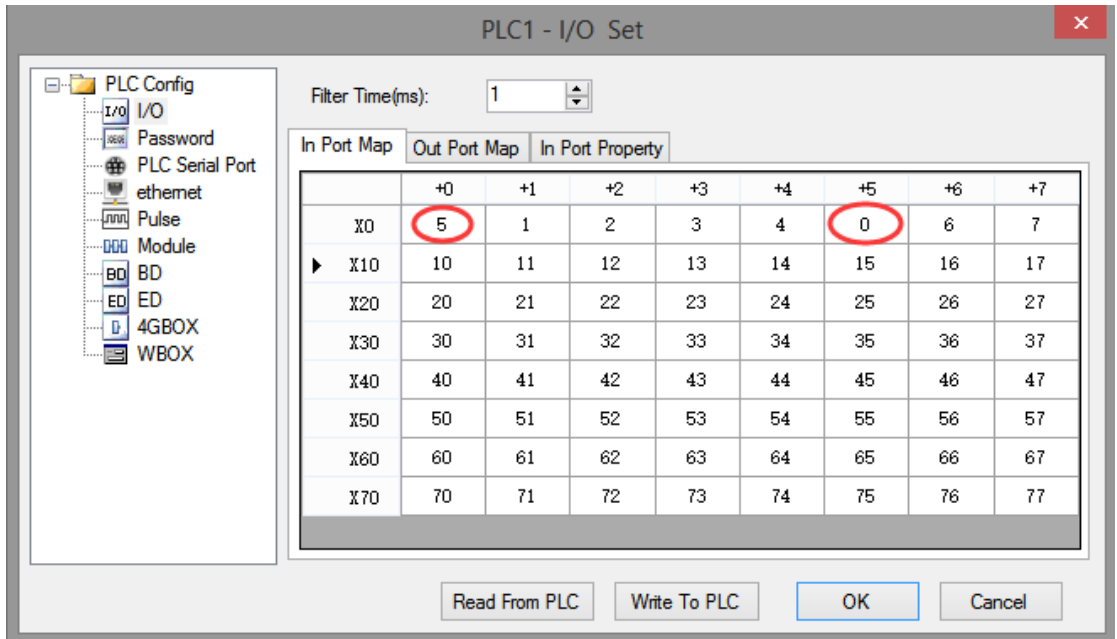
Method 2: modify in the software directly. Click the project bar/PLC config/I/O.



Change it in below window:



For example, it needs to switch X0 and X5, please change the mapping value of X0 to 5, X5 to 0.



Appendix

Appendix 1. Special soft component list

Appendix 1 mainly introduces the functions of XG series PLC special soft element, data register, FlashROM and the address distribution of expansions for users to search.

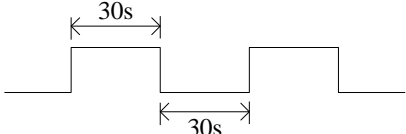
Appendix 1-1. Special auxiliary relay list

Initial status (SM0-SM7)

ID	Function	Description
SM000	Normally ON coil when operation	
SM001	Normally OFF coil when operation	
SM002	Initial positive pulse coil	
SM003	Initial negative pulse coil	
SM004	PLC running error	When SM4 sets ON, it indicates that there is an error in the operation of PLC. (Firmware version V3.4.5 and above supports this function by PLC)
SM005	Battery low alarm coil	When the battery voltage is less than 2.5V, SM5 will put ON (at this time, please replace the battery as soon as possible, otherwise the data will not be maintained)
SM007	Power down hold data error	

Clock (SM11-SM14)

ID	Function	Description
SM011	10ms frequency cycle	
SM012	100ms frequency cycle	
SM013	1s frequency cycle	

SM014	1min frequency cycle	
-------	----------------------	--

Mark (SM20-SM22)

ID	Function	Description
SM020	Zero bit	SM020 is ON when plus/minus operation result is 0
SM021	Borrow bit	SM021 is ON when minus operation overflows
SM022	Carry bit	SM022 is ON when plus operation overflows

PC mode (SM30-SM34)

ID	Function	Description
SM030	PLC initialization	Restore PLC to factory settings
SM032	Retentive register reset	When SM032 is ON, ON/OFF mapping memory of HM, HS and current values of HT, HC, HD will be reset.
SM033		
SM034	All output forbidden	The output indicators of PLC are all off, but the output state of Y terminal remains. If it is used for pulse output, the software will also monitor the pulse change, but there is no output. The pulse stop sending method is emergency stop, and the output of expansion module is also prohibited.

Stepping ladder (SM40)

ID	Function	Description
SM040	The process is running	Set ON when the process is running

Interruption ban (SM50-SM90)

ID	Interrupt no.	Function	Description
SM050	I0000/I0001	Forbid input interruption 0	After executing EI instruction, the input interruption couldn't act independently when M acts, even if the interruption is allowed. E.g.: when SM050 is ON, I0000/I0001 is forbidden.
SM051	I0100/I0101	Forbid input interruption 1	
SM052	I0200/I0201	Forbid input interruption 2	
SM053	I0300/I0301	Forbid input interruption 3	
SM054	I0400/I0401	Forbid input interruption 4	
.....	
SM069	I1900/I1901	Forbid input interruption 19	After executing the EI instruction, even if the interrupt is allowed, when this SM acts, the corresponding timer interrupt cannot act alone
SM070	I40**	Forbid timing interruption 0	
SM071	I41**	Forbid timing interruption 1	
SM072	I42**	Forbid timing interruption 2	
SM073	I43**	Forbid timing interruption 3	
SM074	I44**	Forbid timing interruption 4	
.....	
SM089	I59**	Forbid timing interruption 19	
SM090		Forbid all interruptions	Forbid all interruptions

High speed ring counter (SM99)

address	Function	Note
SM099	High Speed Ring Counting enable	SM99 set ON, SD99 add one per 0.1ms, cycle between 0 and 32767

High speed counter complete flag (SM100-SM103)

Address	Function	Note
SM100	HSC0 count complete flag (100 segments)	
SM101	HSC2 count complete flag (100 segments)	
SM102	HSC4 count complete flag (100 segments)	
SM103	HSC6 count complete flag (100 segments)	

High speed counting direction flag (SM110-SM113)

Address	Function	Note
SM110	HSC0 direction flag	
SM111	HSC2 direction flag	
SM112	HSC4 direction flag	
SM113	HSC6 direction flag	

High speed counting error flag (SM120-SM123)

Address	Function	Note
SM120	HSC0 error flag	
SM121	HSC2 error flag	
SM122	HSC4 error flag	
SM123	HSC6 error flag	

Communication (SM150-SM179)

	Address	Function	Note
Serial port 1	SM150	Modbus instruction execution flag	Set on when the instruction starts to execute Set off when the execution is completed
	SM151		
	SM152	Free format communication sending flag	Set on when the instruction starts to execute Set off when the execution is completed
	SM153	Free format communication receive complete flag	Set on when receiving a frame of data or receiving data timeout. User program is required to be set to off
	SM154		
	SM159		
Serial port 2	SM160	Modbus instruction execution flag	Set on when the instruction starts to execute Set off when the execution is completed
	SM161		
	SM162	Free format communication sending flag	Set on when the instruction starts to execute Set off when the execution is completed
	SM163	Free format communication receive	Set on when receiving a frame of data or

		complete flag	receiving data timeout. User program is required to be set to off
	SM164		
		
	SM169		
Serial port 3	SM170	Modbus instruction execution flag	Set on when the instruction starts to execute Set off when the execution is completed
	SM171		
	SM172	Free format communication sending flag	Set on when the instruction starts to execute Set off when the execution is completed
	SM173	Free format communication receive complete flag	Set on when receiving a frame of data or receiving data timeout. User program is required to be set to off
	SM174		
		
	SM179		

Sequence BLOCK (SM300-SM399)

ID	Function	Description
SM300	BLOCK1 running flag	ON during execution
SM301	BLOCK2 running flag	ON during execution
SM302	BLOCK3 running flag	ON during execution
SM303	BLOCK4 running flag	ON during execution
SM304	BLOCK5 running flag	ON during execution
SM305	BLOCK6 running flag	ON during execution
.....	
SM396	BLOCK97 running flag	ON during execution
SM397	BLOCK98 running flag	ON during execution
SM398	BLOCK99 running flag	ON during execution
SM399	BLOCK100 running flag	ON during execution

Error detection (SM400-SM412)

ID	Function	Description
SM400	I/O error	
SM401	Expansion module communication error	
SM402	BD/ED communication error	
SM403	FROM/TO error	
.....		
SM405	No user program	Internal code check wrong
SM406	User program error	Implement code or configuration table check wrong
SM407	SSFD check error	
SM408	Memory error	Can not erase or write Flash
SM409	Calculation error	

SM410	Offset overflow	Offset exceeds soft element range
SM411	FOR-NEXT overflow	
SM412	Invalid data fill	

Error message (SM450-SM463)

ID	Function	Description
SM450	System error check	
SM451	Hardfault interrupt flag	
SM452		
SM453	SD card error	
SM454	Power supply is cut off	
.....		
SM460	Extension module ID not match	
SM461	BD/ED module ID not match	
SM462	Extension module communication overtime	
SM463	BD/ED module communication overtime	

Expansion module, BD status (SM500)

ID	Function	Description
SM500	Module status read is finished	

Appendix 1-2. Special data register list

Battery (SD005~SD007)

ID	Function	Description
SD005	Battery register	It will display 100 when the battery voltage is 3.1V, if the battery voltage is lower than 2.5V, it will display 0, it means please change new battery at once, otherwise the data will lose when PLC power off.
SD007	Power down hold data error type	

Clock (SD010-SD019)

ID	Function	Description
SD010	Current scan cycle	100us, us is the unit
SD011	Min scan time	100us, us is the unit
SD012	Max scan time	100us, us is the unit
SD013	Second (clock)	0~59 (BCD code)
SD014	Minute (clock)	0~59 (BCD code)
SD015	Hour (clock)	0~23 (BCD code)
SD016	Day (clock)	0~31 (BCD code)
SD017	Month (clock)	0~12 (BCD code)
SD018	Year (clock)	2000~2099 (BCD code)
SD019	Week (clock)	0(Sunday)~6(Saturday) (BCD code)

Flag (SD020-SD031)

ID	Function	Note
SD020	Model type	
SD021	model (low-8) series (high-8)	
SD022	Compatible system version (low) system version (high)	
SD023	Compatible model version (low) model version (high)	
SD024	Model info	
SD025	Model info	
SD026	Model info	
SD027	Model info	
SD028	Suitable software version	
SD029	Suitable software version	
SD030	Suitable software version	
SD031	Suitable software version	

Stepper ladder (SD040)

ID	Function	Description
SD40	Flag of the executing process S	

High speed counting (SD100-SD103)

ID	Function	Description	Note
SD100	Current segment (No. n segment)		HSC00
SD101	Current segment (No. n segment)		HSC02
SD102	Current segment (No. n segment)		HSC04
SD103	Current segment (No. n segment)		HSC06

High speed counting error (SD120-SD129)

ID	Function	Note
SD120	HSC0 error info	
SD121	HSC2 error info	
SD122	HSC4 error info	
SD123	HSC6 error info	
SD124	HSC8 error info	
SD125	HSC10 error info	
SD126	HSC12 error info	
SD127	HSC14 error info	
SD128	HSC16 error info	
SD129	HSC18 error info	

Communication (SD150-SD179)

	Address	Function	Explanation
Serial port 1	SD150	Modbus read write instruction execution result	0: correct 100: receive error 101: receive overtime 180: CRC error 181: LRC error 182: station error 183: send buffer overflow 400: function code error 401: address error 402: length error 403: data error 404: slave station busy 405: memory error (erase FLASH)
	SD151	X-Net communication result	0: correct 1: communication overtime 2: memory error 3: receive CRC error 420: X-NET read write error
	SD152	Free format communication send result	0: correct 410: free format send buffer overflow

	Address	Function	Explanation
Serial port 1	SD153	Free format communication receive result	0: correct 410: send data length overflow 411: receive data short 412: receive data long 413: receive error 414: receive overtime 415: no start character 416: no end character
	SD154	Free format communication receive data numbers	In bytes, not include start and stop characters
		
	SD159		
Serial port 2	SD160	Modbus read write instruction execution result	0: correct 100: receive error 101: receive overtime 180: CRC error 181: LRC error 182: station error 183: send buffer overflow 400: function code error 401: address error 402: length error 403: data error 404: slave station busy 405: memory error (erase FLASH)
	SD161	X-Net communication result	0: correct 1: communication overtime 2: memory error 3: receive CRC error 420: X-NET read write error
	SD162	Free format communication send result	0: correct 410: free format send buffer overflow
	SD163	Free format communication receive result	0: correct 410: send data length overflow 411: receive data short 412: receive data long 413: receive error 414: receive overtime 415: no start character 416: no end character
	SD164	Free format communication receive data numbers	In bytes, not include start and stop characters
		
	SD169		

	地址号	功能	说明
Serial port 3	SD170	Modbus read write instruction execution result	0: correct 100: receive error 101: receive overtime 180: CRC error 181: LRC error 182: station error 183: send buffer overflow 400: function code error 401: address error 402: length error 403: data error 404: slave station busy 405: memory error (erase FLASH)
	SD171	X-Net communication result	0: correct 1: communication overtime 2: memory error 3: receive CRC error 420: X-NET read write error
	SD172	Free format communication send result	0: correct 410: free format send buffer overflow
	SD173	Free format communication receive result	0: correct 410: send data length overflow 411: receive data short 412: receive data long 413: receive error 414: receive overtime 415: no start character 416: no end character
	SD174	Free format communication receive data numbers	In bytes, not include start and stop characters
		
	SD179		

Sequence block (SD300-SD399)

ID	Function	Description	Note
SD300	Executing instruction of BLOCK1	The value will be used when BLOCK monitors	
SD301	Executing instruction of BLOCK2	The value will be used when BLOCK monitors	
SD302	Executing instruction of BLOCK3	The value will be used when BLOCK monitors	
SD303	Executing instruction of BLOCK4	The value will be used when BLOCK monitors	

SD304	Executing instruction of BLOCK5	The value will be used when BLOCK monitors	
SD305	Executing instruction of BLOCK6	The value will be used when BLOCK monitors	
.....	
SD396	Executing instruction of BLOCK97	The value will be used when BLOCK monitors	
SD397	Executing instruction of BLOCK98	The value will be used when BLOCK monitors	
SD398	Executing instruction of BLOCK99	The value will be used when BLOCK monitors	
SD399	Executing instruction of BLOCK100	The value will be used when BLOCK monitors	

Error detection (SD400-SD413)

ID	Function	Note
SD400		
SD401	Extension module no. of communication error	Means module no.n is error
SD402	BD/ED module no. of communication error	
SD403	FROM/TO error type	
SD404	PID error type	
.....		
SD409	Calculation error code	1: divide by 0 error 2: MRST, MSET front operand address less than back operand 3: ENCO, DECO data bits of encoding and decoding instructions exceed the limit. 4: BDC code error 7: Radical sign error
SD410	The number of offset register D when offset crosses the boundary	
SD411		
SD412	Invalid data fill value (low 16 bits)	
SD413	Invalid data fill value (high 16 bits)	

Error detection (SD450-SD463)

ID	Function	Description
SD450	1: Watchdog act (Default 200ms) 2: Control block application fail 3: Visit illegal address	
SD451	Firmware error type: 1: Register error 2: Bus error	

	3: Usage error	
SD452	Hardware error	
SD453	SD card error	
SD454	Power-off time	
SD460	Extension module ID not match	
SD461	BD/ED module ID not match	
SD462	Extension module communication overtime	
SD463	BD/ED module communication overtime	

Expansion module, BD status (SD500-SD516)

ID	Function	Description	Note
SD500	Module number Expansion modules: #10000 ~ 10015 BD: #20000~20001 ED: #30000		
SD501~516	Expansion module, BD /ED status		16 registers

Module information (SD520-SD775)

ID	Function	Explanation	Note
SD520		Extension module 1	Each extension module occupies 16 registers
.....			
SD535		Extension module 16	
.....		
SD760			
.....			
SD775			

Expansion module error information (SD860-SD923)

ID	Function	Description	Note
SD860	Error times of module read		Expansion module 1
SD861	Error types of module read	Module address error. Module accepted data length error. Module CRC parity error when PLC is accepting data. Module ID error. Module overtime error.	
SD862	Error times of module write		
SD863	Error types of module write		
SD864	Error times of module read		Expansion module 2
SD865	Error types of module read	1. Module address error. 2. Module accepted data length error. 3. Module CRC parity error	

		4. Module ID error. 5. Module overtime error.	
SD866	Error times of module write		
SD867	Error types of module write		
.....			
SD920	Error times of module read		Expansion module 16
SD921	Error types of module read	1. Module address error. 2. Module accepted data length error. 3. Module CRC parity error 4. Module ID error. 5. Module overtime error.	
SD922	Error times of module write		
SD923	Error types of module write		

Version information (SD990~SD993)

ID	Function	Explanation	Note
SD990	Firmware version date	Low 16-bit	
SD991	Firmware version compilation date	High 16-bit	
SD992	FPGA version compilation date	Low 16-bit	
SD993	FPGA version compilation date	High 16-bit	

Appendix 1-3. Special Flash register list

* means it works only after repower on the PLC

I filtering

ID	Function	Description	Note
SFD0*	Input the filtering timing value, 10ms by default		
SFD2*	Watchdog run-up time, default value is 200ms		

I mapping

ID	Function	Description	Note
SFD10*	I00 corresponds to X**	Input terminal 0 corresponds to X** number	0xFF means terminal bad, 0xFE means terminal idle
SFD11*	I01 corresponds to X**		
SFD12*	I02 corresponds to X**		
.....		
SFD73*	I77 corresponds to X**	Default value is 77 (Octonary)	

O mapping

ID	Function	Description	Note
SFD74*	O00 corresponds to Y**	Output terminal 0 correspond to Y** number	0xFF means terminal bad, 0xFE means terminal idle
		Default value is 0	
.....		
SFD134*	O77 corresponds to Y**	Default value is 77 (Octonary)	

I properties

ID	Function	Description	Note
SFD138*	I00 properties	Properties of input terminal 0	0: positive logic others: negative logic
SFD139*	I01 properties		
.....		
SFD201*	I77 properties		

High speed counter

ID	Function	Description
SFD320	HSC0 frequency doubling	2: double frequency 4: quadruple frequency (effective at AB phase counting mode)
SFD321	HSC2 frequency doubling	Ditto
SFD322	HSC4 frequency doubling	Ditto
SFD323	HSC6 frequency doubling	Ditto
SFD324	HSC8 frequency doubling	Ditto
SFD325	HSC10 frequency doubling	Ditto

SFD326	HSC12 frequency doubling	Ditto
SFD327	HSC14 frequency doubling	Ditto
SFD328	HSC16 frequency doubling	Ditto
SFD329	HSC18 frequency doubling	Ditto
SFD330	HSC absolute relative selection (24 segments)	bit0 corresponds to HSC0, bit1 corresponds to HSC2, and so on, bit9 corresponds to HSC18 0: relative 1: absolute
SFD331	Interrupt circulating of 24 segments high speed counting	bit0 corresponds to HSC0, bit1 corresponds to HSC2, and so on, bit9 corresponds to HSC18 0: single 1: loop
SFD332	CAM function	bit0 corresponds to HSC0, bit1 corresponds to HSC2, and so on, bit9 corresponds to HSC18 0: do not support CAM function 1: support CAM function

Expansion module configuration

ID	Function	Description	Note
SFD350			Configuration of the first expansion module
:			
SFD359			
SFD360			Configuration of the second expansion module
:			
SFD369			
:	:	:	
SFD500			16th expansion module configuration
:			
SFD509			

Communication

ID	Function	Description	Note
SFD600	COM1 buffer bit setting	0: 8-bit buffer bit 1: 16-bit buffer bit	
SFD610	COM2 buffer bit setting	0: 8-bit buffer bit 1: 16-bit buffer bit	
SFD620	COM3 buffer bit setting	0: 8-bit buffer bit 1: 16-bit buffer bit	
SFD630	COM4 buffer bit setting	0: 8-bit buffer bit 1: 16-bit buffer bit	
SFD640	COM5 buffer bit setting	0: 8-bit buffer bit 1: 16-bit buffer bit	

Appendix 2. Instruction list

All instructions supported by XG series PLC, including basic instructions, application instructions, special function instructions and motion control instructions, will be listed in Appendix 2, and the range of series corresponding to these instructions will also be described.

This part is only for the function that users can quickly view instructions. For more detailed application of instructions, please refer to the user manual of XG series PLC [basic instructions] and [motion control].

Appendix 2-1. Basic instruction list

Mnemonic	Function	Mnemonic	Function
LD	Initial logical operation contact type: NO (normally open)	ORDI	Read NC and parallel connection
LDI	Initial logical operation contact type: NC (normally closed)	OUTD	Output the point directly
OUT	Final logic operation type: coil drive	ORB	Parallel connection of serial circuit
AND	Serial connection of NO	ANB	Serial connection of parallel circuit
ANI	Serial connection of NC	MCS	New bus line start
OR	Parallel connection of NO	MCR	Bus line return
ORI	Parallel connection of NC	ALT	Alternate coil state
LDP	Operation start of pulse rising edge	PLS	Connect on a scan cycle of pulse rising edge
LDF	Operation start of pulse falling edge	PLF	Connect on a scan cycle of pulse falling edge
ANDP	Serial connection of pulse rising edge	SET	Set coil on
ANDF	Serial connection of pulse falling edge	RST	Set coil off
ORP	Parallel connection of pulse rising edge	OUT	Drive counting coil
ORF	Parallel connection of pulse rising edge	RST	Set coil off and current value rest to zero
LDD	Read directly from the contact state	END	I/O process and return to step 0
LDDI	Read directly NC	GROUP	Instruction block fold start
ANDD	Read directly from the contact state and connect serially	GROUPE	Instruction block fold end
ANDDI	Read NC and connect serially	TMR	Timing
ORD	Read directly from the contact state and parallel connection		

Appendix 2-2. Application instruction list

Mnemonic	Function	Mnemonic	Function
Program flow			
CJ	Condition jump	SET	Open the assigned flow and close the current flow
CALL	Call subroutine	ST	Open the assigned flow and do not close the current flow
SRET	Subroutine return	FOR	Start of a FOR-NEXT loop
STL	Flow start	NEXT	END of a FOR-NEXT loop
STLE	Flow end	FEND	End of main program
Data compare			
LD= ^{*1}	LD activate if (S1) = (S2)	AND<> ^{*1}	AND activate if (S1) ≠ (S2)
LD> ^{*1}	LD activate if (S1) > (S2)	AND>= ^{*1}	AND activate if (S1) ≥ (S2)
LD< ^{*1}	LD activate if (S1) < (S2)	AND<= ^{*1}	AND activate if (S1) ≤ (S2)
LD<> ^{*1}	LD activate if (S1) ≠ (S2)	OR= ^{*1}	OR activate if (S1) = (S2)
LD>= ^{*1}	LD activate if (S1) ≥ (S2)	OR> ^{*1}	OR activate if (S1) > (S2)
Mnemonic	Function	Mnemonic	Function
Data compare			
LD<= ^{*1}	LD activate if (S1) ≤ (S2)	OR< ^{*1}	OR activate if (S1) < (S2)
AND= ^{*1}	AND activate if (S1) = (S2)	OR<> ^{*1}	OR activate if (S1) ≠ (S2)
AND> ^{*1}	AND activate if (S1) > (S2)	OR>= ^{*1}	OR activate if (S1) ≥ (S2)
AND< ^{*1}	AND activate if (S1) < (S2)	OR<= ^{*1}	OR activate if (S1) ≤ (S2)
Data move			
CMP ^{*1}	Data compare	EMOV	Float move
ZCP ^{*1}	Data zone compare	FWRT ^{*1}	FlashROM written
MOV ^{*1}	Move	MSET	Multi data set
BMOV	Block move	ZRST	Zone reset
PMOV	Block move	SWAP	Switch high bytes and low bytes
FMOV ^{*1}	Multi-bit data move	XCH ^{*1}	Exchange data
Data operation			
ADD ^{*1}	Addition	MEAN ^{*1}	Mean
SUB ^{*1}	Subtraction	WAND ^{*1}	Logic and
MUL ^{*1}	Multiplication	WOR ^{*1}	Logic or
DIV ^{*1}	Division	WXOR ^{*1}	Logic exclusive or
INC ^{*1}	Increase 1	CML ^{*1}	Complement
DEC ^{*1}	Decrease 1	NEG ^{*1}	Negative
Data shift			
SHL ^{*1}	Arithmetic shift left	ROR ^{*1}	Rotation shift right
SHR ^{*1}	Arithmetic shift right	SFTL ^{*1}	Bit shift left
LSL ^{*1}	Logic shift left	SFTR ^{*1}	Bit shift right
LSR ^{*1}	Logic shift right	WSFL	Word shift left
ROL ^{*1}	Rotation shift left	WSFR	Word shift right
Data transformation			
WTD	Single word integer convert to double	ASCI	Hex convert to ASC II

	word integer		
FLT ^{*1}	16 bits integer convert to float	HEX	ASC II convert to Hex
FLTD ^{*1}	64 bits integer convert to float	DECO	Coding
INT ^{*1}	Float convert to integer	ENCO	High bit coding
BIN	BCD convert to binary	ENCOL	Low bit coding
BCD	Binary convert to BCD		
Floating number operation			
ECMP ^{*2}	Float compare	SIN ^{*2}	Float Sine
EZCP ^{*2}	Float zone compare	COS ^{*2}	Float Cosine
EADD ^{*2}	Float addition	TAN ^{*2}	Float tangent
ESUB ^{*2}	Float subtraction	ASIN ^{*2}	Float arcsin
EMUL ^{*2}	Float multiplication	ACOS ^{*2}	Float arccos
EDIV ^{*2}	Float division	ATAN ^{*2}	Float arctan
ESQR ^{*2}	Float square root		

Mnemonic	Function	Mnemonic	Function
Clock operation			
TRD	Read RTC data	TSUB	Clock data subtraction
TWR	Write RTC data	HTOS	Hour, minute, second convert to second
MOV	Precise RTC BD board data reading	STOH	Second convert to hour, minute, second
TO	Precise RTC BD board data writing	TCMP	Time (hour, minute, second) comparison
TADD	Clock data add	DACMP	Date (year, month, day) comparison

Note:

※1: All the instructions are 16 bits and no 32 bits format in general. ※1 has 32 bits. 32 bits instructions are added D in front of its 16 bits instruction. Such as ADD (16 bits) / DADD (32 bits).

※2: These instructions are 32 bits, and have no 16 bits format.

Appendix 2-3. Special instruction list

Mnemonic	Function	Mnemonic	Function
Positioning control			
PLSR ^{*2}	multi-segment pulse output	STOP	Pulse stop
PLSF ^{*2}	variable frequency pulse output	GOON	Pulse continue
DRVI ^{*2}	Relative single segment pulse output	ZRN ^{*2}	Mechanical origin return
DRVA ^{*2}	Absolute single segment pulse output		
Motion control			
DRV	Fast positioning	DRVR	Quick positioning (polar coordinates)
LIN	Linear interpolation	CW	Circular arc (center coordinate)
CCW	Inverse arc (center coordinate)	CW_R	Circular arc (circle radius)
CCW_R	Inverse arc (circle radius)	ARC	Three point arc
FOLLOW	Follow up (single-phase incremental mode)	FOLLOW_AB	Follow up (AB phase mode)
High speed count			

CNT ^{※2}	Single phase high speed counting	RST	Reset high speed counter
CNT_AB ^{※2}	AB phase high speed counting	DMOV ^{※2}	Read write high speed counter
High speed counter interrupt			
CNT ^{※2}	Single-phase 100 segments high speed counter(with interruption)	CNT_AB ^{※2}	AB-phase 100 segments high speed counter(with interruption)
Communication			
COLR	MODBUS coil read	REGR	MODBUS register read
INPR	MODBUS input coil read	INRR	MODBUS input register read
COLW	MODBUS single coil write	REGW	MODBUS single register write
MCLW	MODBUS multi coil write	MRGW	MODBUS multi register write
SEND	Free format communication sending data	RCV	Free format communication receiving data
CFGCR	Reading of serial port parameters	CFGCW	Writing serial port parameters
Precise timing			
STR ^{※2}	Precise timing	STOP	Stop precise timing
DMOV ^{※1}	Read precise timing register		
Interrupt			
EI	Enable interrupt	IRET	Interrupt return
DI	Disable interrupt		
BLOCK			
SBSTOP	BLOCK stop	WAIT	Wait
SBGOON	Carry on the suspensive BLOCK	FROM	Read module /BD data
TO	Write module /BD data		
Other			
PWM ^{※1}	Pulse width modulation	FRQM	Frequency measurement
PID	PID operation control	NAME_C	C function block

Note:

※1: the instruction marked with ※1 is a 32-bit instruction, and does not have a 16-bit instruction form. Other instructions are 16 bits.

※2: the table does not contain X-NET and Ethernet communication instructions. Please refer to the user manual of X-NET bus and the user manual of TCP IP communication based on Ethernet.

Appendix 3. PLC configuration list

This part is mainly for the convenience of users to check the function configuration of various series models. Through this table, it is easy to judge the selection of product models.

For a detailed description of the following functions, please refer to the user manual of XG series PLC [basic instructions] and [positioning control].

○ user selection × not supported √ supported

Model	Clock	USB	RS232	RS485	RJ45	Communication		Expansion module	HSC channel		Pulse output (T model)	External interrupt
						Ethernet	EtherCAT		Incremental	AB phase		
XG1 series												
XG1-16T4	√	1	×	2	2	√	×	16	4	4	4	6
XG2 series												
XG2-26T4	√	×	1	2	2	√	√	16	4	4	4	12

Appendix 4. Q&A

When running or debugging PLC, users may encounter some difficult problems due to lack of experience. This part mainly aims at the problems that users are most likely to encounter, and puts forward solutions for users' reference.

Q1: Why the coil is not set when the condition is satisfied?

A1: The possible reasons:

- (1) Users may use one coil for many times, which leads to double coils output. And at this time, the later coil has priority.
- (2) Coil may be reset, users can find the reset point by monitor function and modify the program.

Q2: Why PLC can not communicate with other devices?

A2: The possible reasons:

- (1) communication parameters: PLC com port and device parameters must be the same.
- (2) communication cable: Confirm connection correct and good and change cable to try again.
- (3) communication serial port: Check the port by downloading PLC program. Rule out this problem if download successfully.
- (4) contact manufacturer if all the above are ruled out.

Q3: How long can the PLC battery be used?

A3: Normally for 2~3 years.

XINJE



WUXI XINJE ELECTRIC CO., LTD.

No.816, Jianzhu West Road, Binhu District,

Wuxi City, Jiangsu Province, China

214072

Tel: 400-885-0136

Fax: (510) 85111290

www.xinje.com