



# **ZP series integral controller**

**User manual**

WUXI XINJE ELECTRIC CO., LTD

NO. ZC01 20161213 3.4



**ZP series**

**Integral Controller**

**User manual**

Catalog

Preface

Safety notes

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ZP series introduction

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I/O and wiring specification

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Programming instructions

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HMI screen engineering

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Appendix

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This manual includes some basic precautions to be followed for the safety of your devices and yourself of cause. All mentioned precautions are warned with a triangle logo ahead. Referring to the other unmentioned notes, please follow the basic electrical procedures.

**Precautions**



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Please follow the precautions. If not, your control system may be out of order, or a fortune loss caused in a severe situation.

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**Correct  
Application**



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This product and its components should only be used in situations mentioned in the catalog and technical specifications, and also be used with other devices produced by other manufactures which are admitted or recommended by our company.

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All behaviors without clear written permission, including copying, translation and using this file, should be prohibited, or you will take the responsibility of our loss. We reserve all the rights of our expansive products and their design patent license and registration.

Duty declaration

We have checked the contents of this manual in conformity with the hardware and software described in, but we still can't guarantee completely consistent because of some unavoidable mistakes. Even so, we will check data in this manual and update it frequently. Finally, welcome to put forward your valuable opinions.



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# PREFACE

## SIMPLIFIED INTRODUCTION ABOUT THIS MANUAL

Firstly, thank you for purchasing our ZP series product. Please read this manual carefully before related operations.

### Manual purpose

- Users can operate and maintain ZP series products according to the related guidance and instructions, referring to characteristics, specifications and methods etc.
- This manual includes four parts, involving introduction, outside wiring, PLC programming and HMI screen editing.
- Product overview: introductions of characteristics, specification and installation on ZP series product.
- External wiring: introductions of power specifications and I/O wiring on ZP series product.
- PLC programming: introductions of PLC programming on ZP series product.
- HMI screen: introductions of HMI screen editing on ZP series product.

### Relevant person

This manual is suitable for persons below:

- Terminal users
- Debugging person
- Technical support staff

These persons mentioned above need to read the safety notes carefully before operating ZP series integrated controller.

### Access

Electronic manual: Visit the official website of XINJE <https://www.xinje.com> to download.

### Statement of responsibility

- Although the contents in the manual have been carefully checked, errors are inevitable and we cannot guarantee complete agreement.
- We will often review the contents of the manual and make corrections in subsequent versions. Your valuable comments are welcome.
- Please understand that the contents of the manual are subject to change without prior notice.

### Contact information

If you have any questions about our products, please contact the agent, office of the product purchase, or directly contact with XINJE.

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## SAFETY NOTES

The problems that may be caused during the use of the product are basically included in the safety precautions, and all are indicated by the two levels of attention and danger, and other unfinished matters, please comply with the basic electrical operating procedures.



### NOTICE

When used incorrectly, it can be dangerous, there is a possibility of moderate injury or minor injury, and there is a possibility of property damage.

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### DANGER

When used incorrectly, it may be dangerous, cause personal injury or serious injury, and may cause serious property damage.

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- Confirmation when you get the product



### NOTICE

Don't install damaged controllers, integrated controllers that lack components, or integrated controllers that do not meet requirements, this may cause injury.

- Product system design



### DANGER

Design a safety loop outside the integrated controller to ensure that the entire system can run safely when the integrated controller is abnormal, this may cause the risk of misoperation and failure.



### NOTICE

Don't bundle the control wiring and power wiring together, in principle to separate 10cm, this may cause the risk of misoperation and failure.

- Product installation



### DANGER



Before installing the integrated controller, disconnect all external power supplies, this may cause electric shock.



#### NOTICE

1. Please install and use this product under the environmental conditions specified in the general specifications of the manual.  
Don't use in damp, high temperature, dust, smoke, conductive dust, corrosive gas, flammable gas, and vibration, impact places.  
This may cause electric shock, fire, misoperation, product damage, etc.
2. Don't directly touch the conductive part of the product.  
This may cause the risk of misoperation and failure.
3. When machining screw holes, please don't let cutting powder and wire debris fall into the product housing. This may cause the risk of misoperation and failure.
4. When connecting peripheral devices, expansion devices, and batteries, power off the device. This may cause the risk of misoperation and failure.

#### ● Product wiring



#### DANGER

1. Before connecting cables to the integrated controller, disconnect all external power supplies.  
This may cause electric shock.
2. Connect the DC power supply to the dedicated power terminal of the fusioncube.  
The wrong power supply could burn the controller.



#### NOTICE

1. Don't connect external cables to empty terminals.  
This may cause misoperation, product damage.
2. When machining screw holes, please do not let cutting powder and wire debris fall into the product housing.  
This may cause the risk of misoperation and failure.
3. When connecting terminals with wires, ensure that the conductive part does not touch other wires or terminals.  
This may cause the risk of misoperation and failure.

#### ● Product operation and maintenance



#### DANGER

1. After powering on the integrated controller, do not touch the terminals.  
This may cause electric shock.
2. Don't connect or disassemble terminals while the power is on.  
This may cause electric shock.

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3. Please don't open the rear panel.

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#### NOTICE

1. Don't disassemble or assemble this product without authorization. This may cause damage to the product.
2. Remove and reinsert the cable when the power is off.  
The cable may be damaged or misoperated.
3. Don't connect external cables to empty terminals.  
This may cause misoperation, product damage.
4. Power off expansion devices, peripherals, and batteries before removing them.  
This may cause misoperation, failure, etc.
5. When the product is discarded, please treat it as industrial waste.
6. When the product emits odor or abnormal sound, turn off the power switch immediately.  
(The buzzer's short sound is normal after the product is powered on)
7. Don't press the screen with a sharp object, such as a pen or screwdriver. Otherwise, the screen may be damaged or faulty.

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# 1 ZP SERIES INTRODUCTION

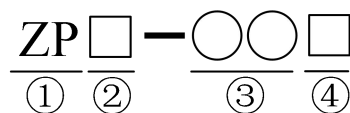
## 1-1. Introduction

ZP series is the perfect integration of OP series and XD series in function, under the premise of meeting the control requirements, ZP series can completely replace the OP and PLC in the control system, the compact form factor greatly saves installation space, and makes maintenance easier.

### 1-1-1. Characteristics

- It makes logic control, analog input/output and HMI integrated in one set  
Digital input: 10 points, optical isolation  
Digital output: 8 points, transistor output/relay output/transistor relay output  
I/O extension: Z-4X4YT-BD, Z-8X-BD, Z-8YT-BD  
Analog extension: Z-3AD3PT-BD, Z-4AD2DA-A-BD, Z-1WT-BD, Z-2WT-BD  
Communication extension: Z-NES-BD  
Temperature control extension: Z-4TC-BD, Z-4PT3-BD
- The HMI screen with rich functions is easy and simple to edit
- LCD: 192\*64 pixels (3.7 inches); LCD service life can be 20000 hours
- Up to 26 function keys, the functions can be freely specified
- The key sensitive and accurate
- Programming port Multi-function design: HMI and PLC programming use the same programming cable
- Waterproof rating meets IP20
- Compact structure, greatly save electric control cabinet space
- The appearance is simple and elegant and full of fashion

### 1-1-2. Name rule



1: Series name	ZP: the display area does not have touch functionality
2: PLC type	1: XD1 series PLC 2: XD2 series PLC 3: XD3 series PLC
3: I/O points	18: 10 input 8 output
4: Output type	R: relay output T: transistor output RT: transistor relay output

## 1-1-3. Model list

Model				Input points (DC24V)	Output points (R, T)
DC resource					
Input type	Relay output	Transistor output	Transistor relay output		
NPN type	ZP1-18R	ZP1-18T	-	10 points	8 points
	ZP2-18R	-	ZP2-18RT	10 points	8 points
	ZP3-18R	ZP3-18T	ZP3-18RT	10 points	8 points

### Extended BD:

Model	Instructions
Z-4X4YT-BD, Z-8X-BD, Z-8YT-BD	Z-nXmYT-BD, n DC input(NPN input), m transistor output
Z-4TC-BD	4 thermocouple, supports multiple types thermocouple temperature sensors, resolution 0.1 °C
Z-4PT3-BD	4 PT100(three-wire system) temperature acquisition temperature range -100°C~500°C, resolution 0.1 °C
Z-4AD2DA-A-BD	4 analog current input, 2 analog current output
Z-3AD3PT-BD	3 analog voltage input, 3 PT100 temperature inputs
Z-1WT-BD, Z-2WT-BD	1/2 pressure sensor analog voltage input
Z-NES-BD	1 RS232 or 1 RS485

## 1-2. General specification

### 1-2-1. Product specification

#### 1) Electrical spec.

Item		Specification		
		ZP1-18R/T	ZP2-18R/T	ZP2-18R/T/RT
Electrical Char.	Input voltage	DC24V		
	Power dissipation	Less than 10W (TYP2.0W)		
	Allow instantaneous outage	10ms DC24V		Less than 20ms
	Withstand voltage	AC1000V-10mA 1 minute (between signal and ground)		
	Insulation impedance	About 10MΩ, DC500V (between signal and ground)		
Environment	Operation temperature	0~50°C		
	Storage temperature	-10~60°C		
	Ambient humidity	20~85% (no condensation)		
	Vibration resistance	10~25Hz (X, Y, Z each direction is 30 minutes 2G)		
	Interference immunity	Voltage noisy: 1000Vp-p		
	Ambient air	No corrosive gas		

	Protective structure	Meet IP20	
Structure	Cooling mode	Natural air cooling	
	External dimension	172.0*121.0*56.5	
	Panel openings dimensions	164.0*113.0	
Interface	Download port	RS-232	
	Communication port	RS-232/ RS-485 (PLC)	RS-485

## 2) HMI specification

Item		Specification
Screen	Type	Yellow-green color LCD
	LCD size	3.7 inches
	Service life	More than 20000 hours, 24 hours run under the ambient temperature 25°C
	Display area	192*64
	Contrast	Potentiometer adjustable
	Language	Simplified/traditional Chinese; English
	Character size	Dot font and vector font
	Touch mode	Untouchable
Memory	Screen	64KB FlashROM
	Data	4KB SRAM

## 3) PLC specification

Item		Specification		
		ZP1-18R/T	ZP2-18R/T	ZP2-18R/T/RT
Ontology IO	Total points	18		
	Input points	10		
	Output points	8		
Max IO points		26		
High speed positioning <sup>*6</sup>	Ordinary pulse output	/	2	2
High speed input	Single-phase /AB mode	/	3	3
	Input mode	/	OC	OC
Expansion capability	BD board	/	1	2
Frequency measurement		Nonsupport	Support	
Program execution mode		Cyclic scanning mode		
Programming mode		Order, ladder diagram		
Processing speed		0.02~0.05us		
Blackout hold		Use FlashROM and lithium battery		
User program capacity <sup>*1</sup>		256KB		
I/O points <sup>*2</sup>		Input 10, output 8		

Internal coil (M, HM)		11008 points	M0~M7999 [HM0~HM959] ※3
			Special use ※4 SM0~SM2047
Flow (S)		1152 points	S0~S1023 [HS0~HS127] ※3
Timer (T)	Points	704 points	T0~T575 [HT0~HT95] ※3
	Spec		100ms timer: 0.1~3276.7s 10ms timer: 0.01~327.67s 1ms timer: 0.001~32.767s
Counter (C)	Points	704 points	C0~C575 [HC0~HC95] ※3
	Spec		High-speed counter HSC0~HSC31 16-bit counter: K0~32,767 32-bit counter: -2147483648~+2147483647
Data register (D)		11548 words	D0~D7999 [HD0~HD999] ※3
			Special use ※4 SD0~SD2047
			Special use ※4 HSD0~HSD499
FlashROM register (FD)		7120 words	FD0~FD5119
Confidentiality register (FS)		48 words	FS0~FS47
Sequential function block WAIT order special coil		32	SEM0~SEM127
High-speed processing function		High-speed count, pulse output, external interruption	
Password protection		6-bit ASCII	
Self-diagnostic function		Power-on self-test, monitor timer, grammar checking	

**Notes:**

- ※1: the max capacity of secret download mode
- ※2: I/O numbers means the input and output terminal numbers
- ※3: register area in [] is the power-off retentive area, not for other uses
- ※4: special use: special register, not for other uses. Refer to the appendix to know in detail.
- ※5: serial number of input coil, output relay/transistor is octal number, and other registers are decimal number.
- ※6: the PLC with only transistor output has high-speed positioning function.

## 1-2-2. Special function

### 1) High-speed count

ZP2-18, ZP3-18												
	Incremental mode							AB phase mode				
	HSC0	HSC2	HSC4	HSC6	HSC8	HSC10	HSC12	HSC0	HSC2	HSC4	HSC6	HSC8
Max frequency	80K	10K	10K					50K	5K	5K		

4-time frequency								2/4	2/4	2/4		
Count interruption	√	√	√					√	√	√		
X000	U							A				
X001								B				
X002								Z				
X003		U							A			
X004									B			
X005									Z			
X006			U							A		
X007										B		
X010										Z		
X011												

**Notes:** Counting function of Z phase signal is still in research.

## 2) High-speed pulse

- T type: Y0, Y1, max speed 100KHz

## 3) External interrupt

Input terminal	Pointer		Suppress interruption
	Rising interruption	Falling interruption	
X2	I0000	I0001	SM050
X3	I0100	I0101	SM051
X4	I0200	I0201	SM053
X5	I0300	I0301	SM054
X6	I0400	I0401	SM055
X7	I0500	I0501	SM056
X10	I0600	I0601	SM056
X11	I0700	I0701	SM057

**Notes:**

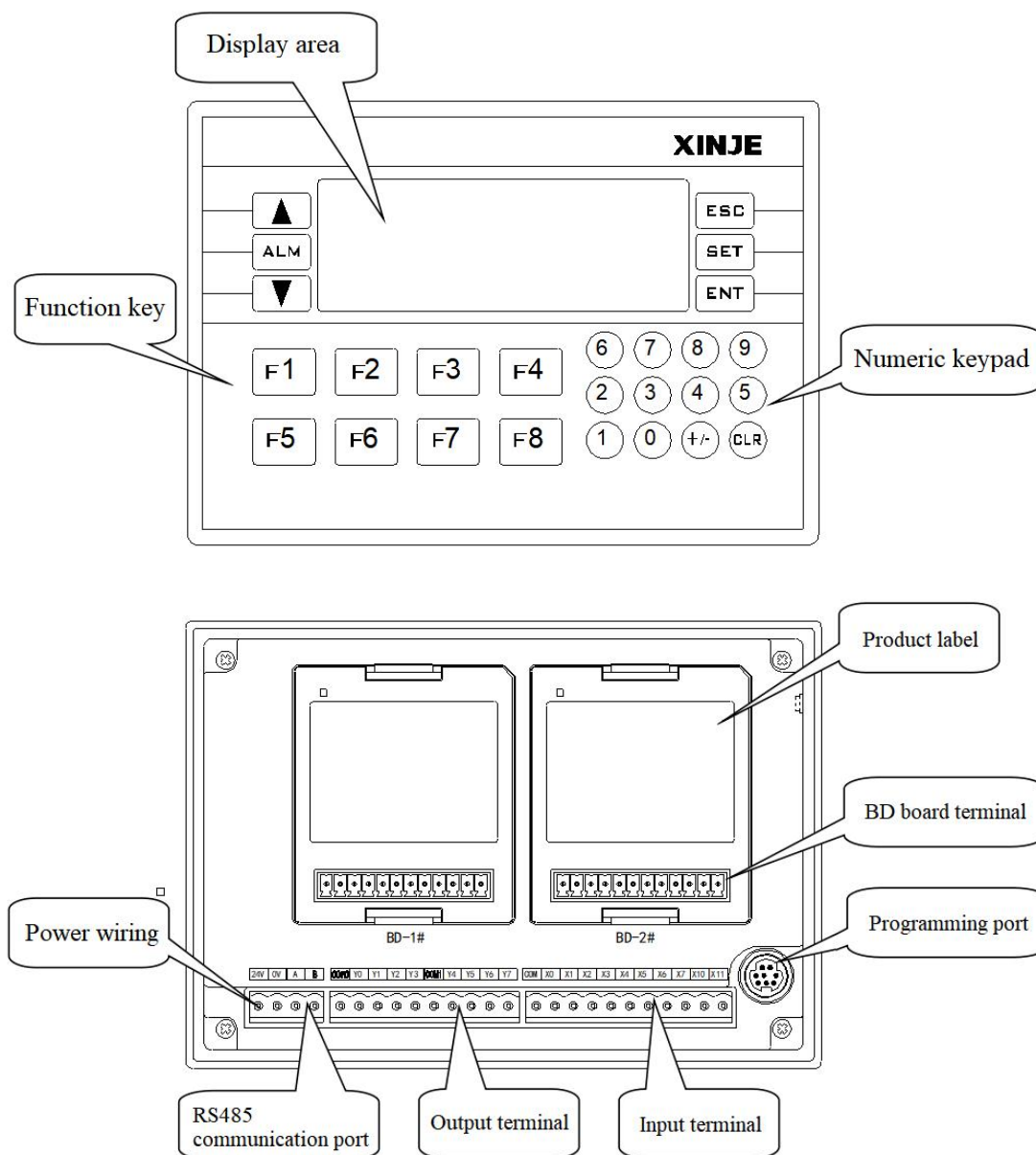
- (1) The above lists only the specifications. For details about the parameters and usage guide, please refer to XD/XL series PLC manual [basic instruction].
- (2) External interruption will not be executed after suppress interruption coil is ON.

## 4) Frequency measurement

Model		X ID	Max frequency
ZP2, ZP3 series	18 points	X0	80 KHz
		X3	10 KHz
		X6	10 KHz

## 1-3. Part introduction










### 1-3-1. Structure



### 1-3-2. Key function

Key	Basic function
ESC	No matter what state the monitor is in, when this key is pressed, it returns to the initial screen of the system. The initial screen of the system is specified by the user when designing the screen, and the initial screen of the system is generally set as the main menu or the screen with the highest frequency of use



	Flip the screen to the previous page
	Flip the screen to the next page
	<p>Press this key to modify the register value. The register area being modified is displayed in reverse color, and the modified bits are displayed blinking.</p> <p>If the current screen does not have a register setting window component, an empty operation is performed.</p> <p>Press the [SET] key again before pressing the [ENT] key to cancel the current modification operation and continue to modify the next data register.</p>
	Write the modified data into the register, and continue to modify the next data register, the last register of the current screen is modified, exit the modified register state
	Alarm list key, after setting the alarm list function, press this key to quickly switch to the alarm list screen
	When modifying register data, clear the selected region
	When modifying register data, set the data positive or negative
	Number key (0-9), in the number setting state, the modified number bits into the corresponding key value
	Normal function key (F1-F8)

**Notes:** In addition to the common functions in the above table, each key in the panel can be defined by the user as any of the functions of "ON", "OFF", "reverse" and "instantaneous ON".

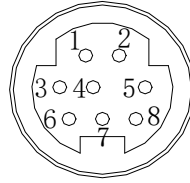
### 1-3-3. Terminal arrangement

24V	0V	A	B	COM0	Y0	Y1	Y2	Y3	COM1	Y4	Y5	Y6	Y7	COM	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11
-----	----	---	---	------	----	----	----	----	------	----	----	----	----	-----	----	----	----	----	----	----	----	----	-----	-----

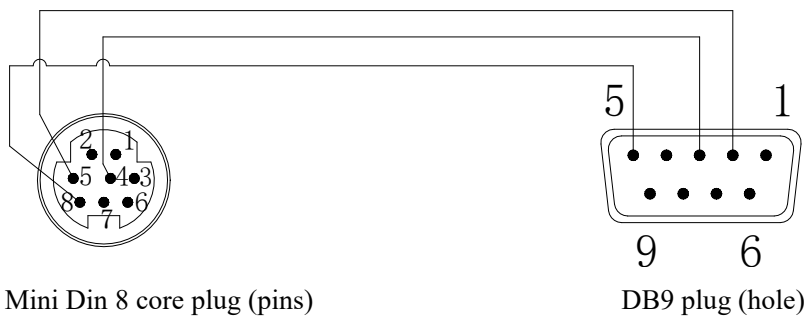
### 1-3-4. Programming port

Download port is RS232. The programming port has dual download function, both PLC program and HMI screen data can be downloaded. The port supports MODBUS and X-NET protocols, the appearance and main pins are as below:

Pin NO.	function
Pin4	RxD
Pin6	TxD
Pin8	GND



Please use the special programming cable of our company for downloading. If you have none, you can also make it by yourself. The connection of programming port and 9 pins of PC is as follows.



**NOTICE:**

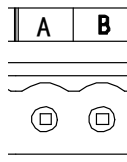
- (1) Please use the dedicated programming cable provided by XINJE for PLC to download the PLC program and HMI screen.
- (2) Please don't modify the communication parameters of the download port, otherwise the PLC cannot connect to the PC.

### 1-3-5. Communication port

Communication port of ZP series integrated machine is the communication port of the PLC part, accords to RS485 (serial port 2).

When PLC is in the state of factory settings, you can also use this port for downing or uploading, it is mainly used for communicating with external sensors, instrument, equipment and other devices.

AB port appearance and main pins:



- 1) Communication parameters

Station number	Modbus station 1~254, 255 (FF) is free format communication
Baud rate	300bps~115.2Kbps
Data bit	7, 8
Stop bit	1, 2
checking	None, Odd, Even, Empty, Mask

2) Parameter setting

**When RS485 is used to communicate with peripheral devices, you cannot modify the communication parameters. You can only use the default parameters.**

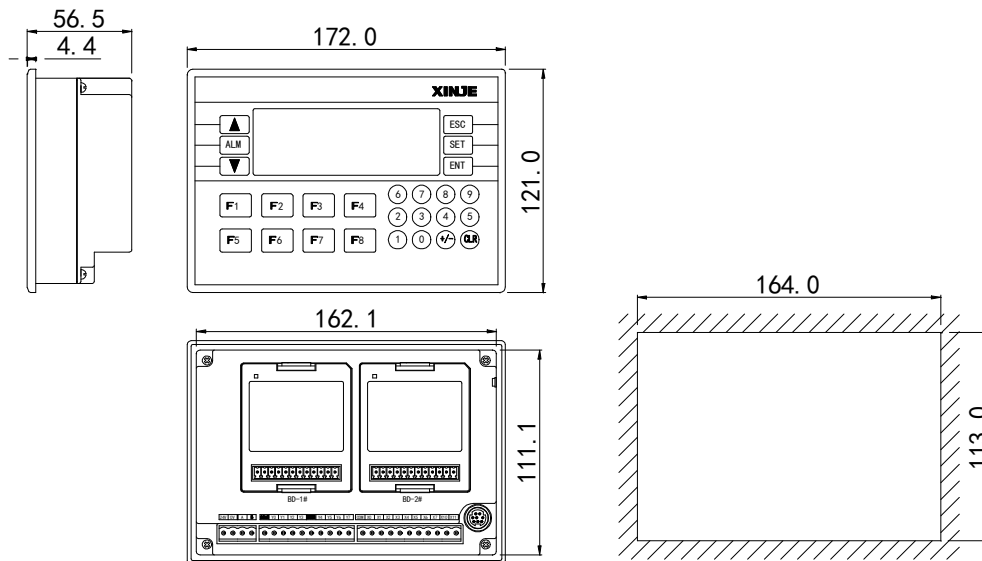
Communication default parameters: station number is 1, baud rate 19200bps, 8 data bits, 1 stop bit, even parity.

**NOTICE:**

RS485 port support MODBUS, free format and X-NET Bus communication. Serial port parameters can be set through the RS232 download port. X-NET communication mode can be modified by XINJEConfig tool. Refer to [X-NET manual].

## 1-4. Dimension

Appearance and hole dimension (unit: mm)



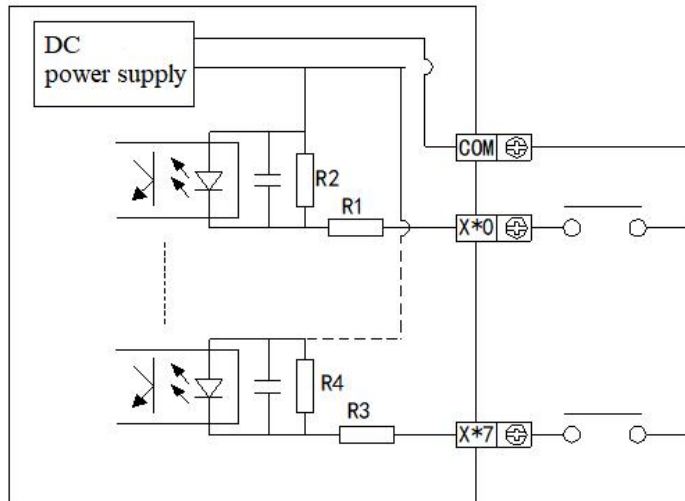
## 2 I/O and wiring

This chapter explains the I/O specification and wiring method of ZP series

### 2-1. Input specification

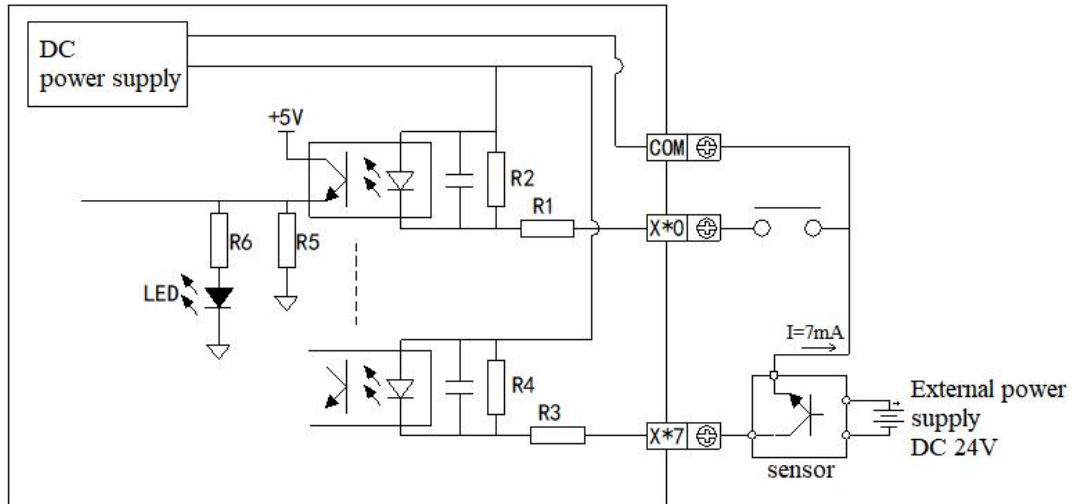
#### 1) Basic unit

Input signal voltage	DC24V $\pm$ 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 format	Point input/ open collector NPN transistor
Circuit insulation	Optical coupling insulation
Input action display	LED light is ON when inputting ON



#### 2) Input wiring

The ZP3 series don't provide 24V power supply internally, so when using an external power supply to drive sensors such as photoelectric switches, the external power supply voltage should be DC24V  $\pm$  4V, and the output transistor of the sensor should use NPN open-collector type.



- Input points

If using the no voltage contact or NPN open collector transistor between input points and COM, the input need to be ON.

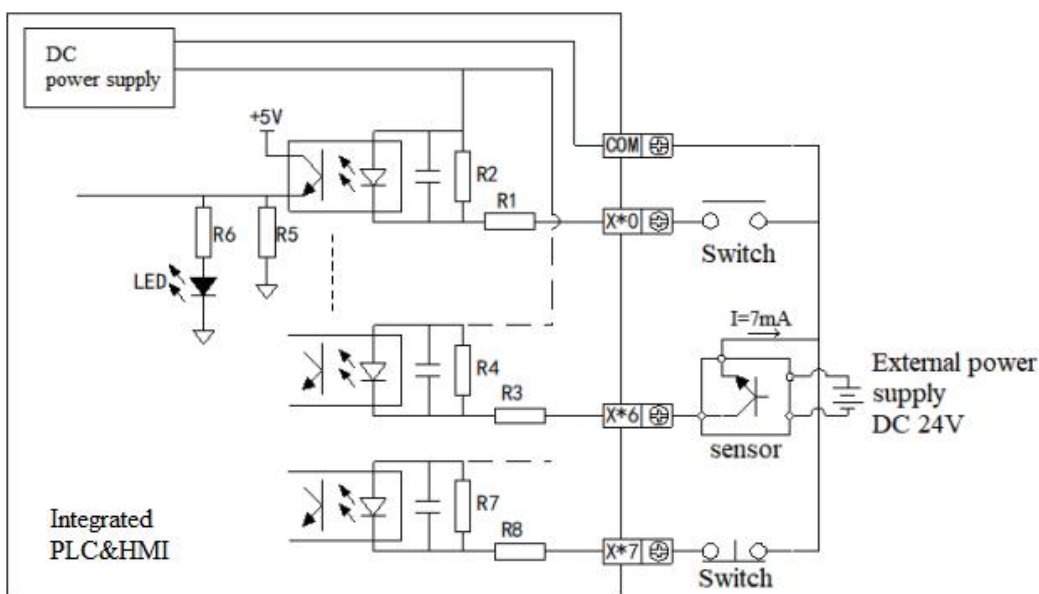
- Input circuit

Use the optical coupler to make insulation isolation between the first loop and the secondary loop of inputting, and set C-R filter in the secondary loop to avoid the noise produced by vibration of input points, mixture of input line or wrong operation. So for the transformation of ON→OFF, OFF→ON, the response delay time is about 10ms in the product. Input terminal has a built-in digital filter.

- Input sensitivity

The input current of integrated controller is DC24V 7mA, but for the reliable action, the current is above 3.5mA if ON, and it is below 1.5mA if OFF.

### 3) Typical connection

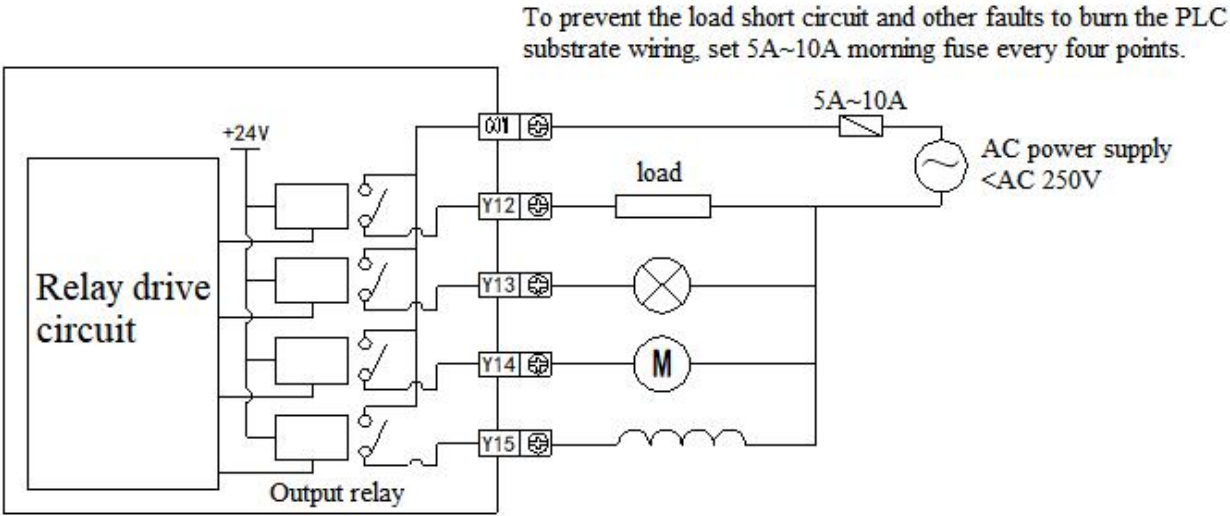


## 2-2. Relay output specification and circuit

### 2-2-1. Relay output spec

Model		R output	RT output
Relay output bit		Y0~Y7	Y4~Y7
External power		Below AC250V, DC30V	
Circuit insulation		Machinery insulation	
Action command		Make a “close” sound	
Max loader	Resistance load	3A	
	Inductance load	80VA	
	Lamp load	100W	
Min loader		DC5V 2mA	
Response time	OFF→ON	10ms	
	ON→OFF	10ms	

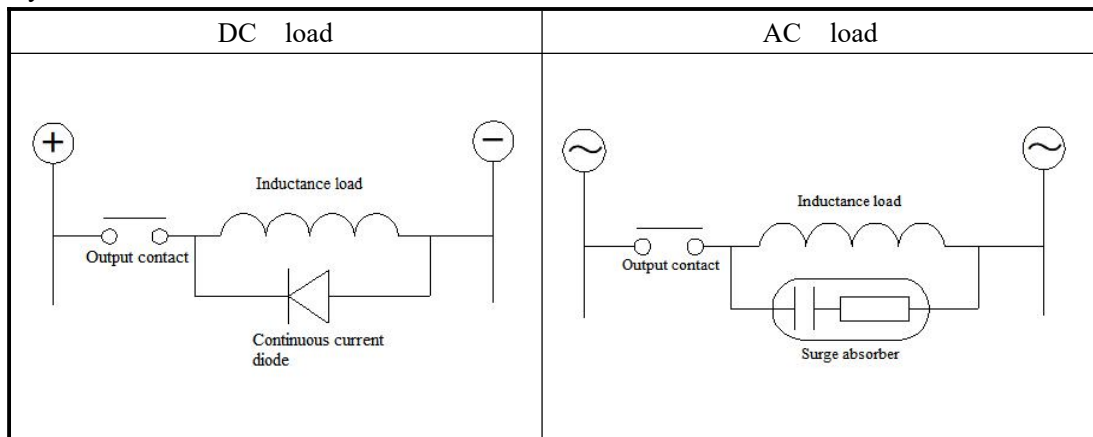
### 2-2-2. Output wiring example



Notes: T type has no relay output, don't access 220V, otherwise it will cause product damage

## 2-2-3. Output circuit composition

- DC inductive load, fly-wheel diode need to be in parallel. If not, the service life of junction will be low. Please select the diode whose forward current is higher than the load current, allowing reverse pressure over load voltage 5 ~ 10 times.
- AC inductive load, surge absorber need to be in parallel. It will reduce noise and extend the service life of relay.



## 2-3. Transistor output specifications and circuits

Transistor output has two types, including high-speed pulse output and ordinary transistor.

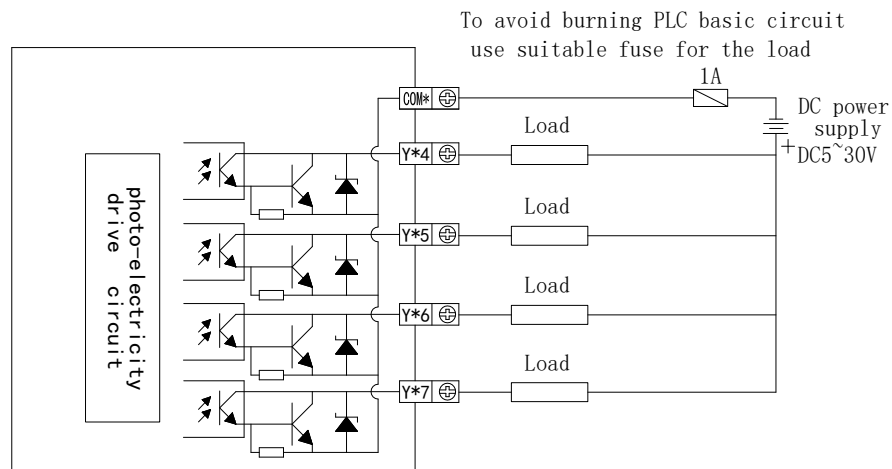
### 2-3-1. Ordinary transistor output

Model		T
Output bit		Y2~Y7
External power supply		Below DC 5~30V
Circuit insulation		Coupling light insulation
Max load	Resistance load	0.3A
	Inductance load	7.2W/DC24V
	Lamp load	1.5W/DC24V
Min load		DC 5V 2mA
Open circuit current		Below 0.1mA
Response time	OFF→ON	Below 0.2ms
	ON→OFF	Below 0.2ms

Ordinary transistor output circuit :

- Output points  
Transistor output of integrated controller has a common point output
- External power supply  
The power to drive load is DC5~30V regulated power supply

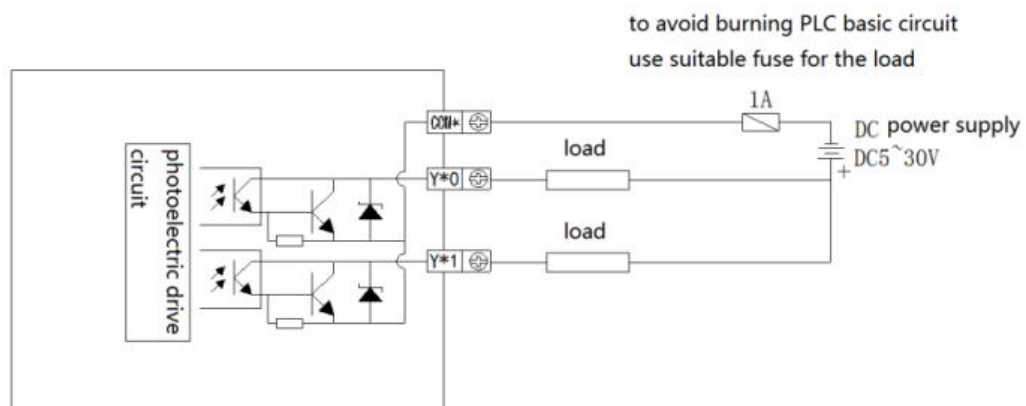
- **Circuit insulation**  
It is insulated isolation by photoelectric coupler between its internal loop and output transistor.
- **Action instruction**  
While driving the optical coupling, output transistor is ON.
- **Response time**  
The time is below 0.2ms from photoelectric coupler driving (cut down) to transistor ON(OFF).
- **Output current**  
The output current is 0.3A each 1 point. However, due to the temperature rise limit, the total current is 0.5A each output 4 points.
- **Open circuit current**  
Below 0.1mA.



## 2-3-2. High-speed pulse output

Model	T
High-speed pulse output bit	Y0~Y1
External power supply	Below DC5~30V
Max current	50 mA
Pulse output max frequency	200KHz

High-speed pulse output circuit:

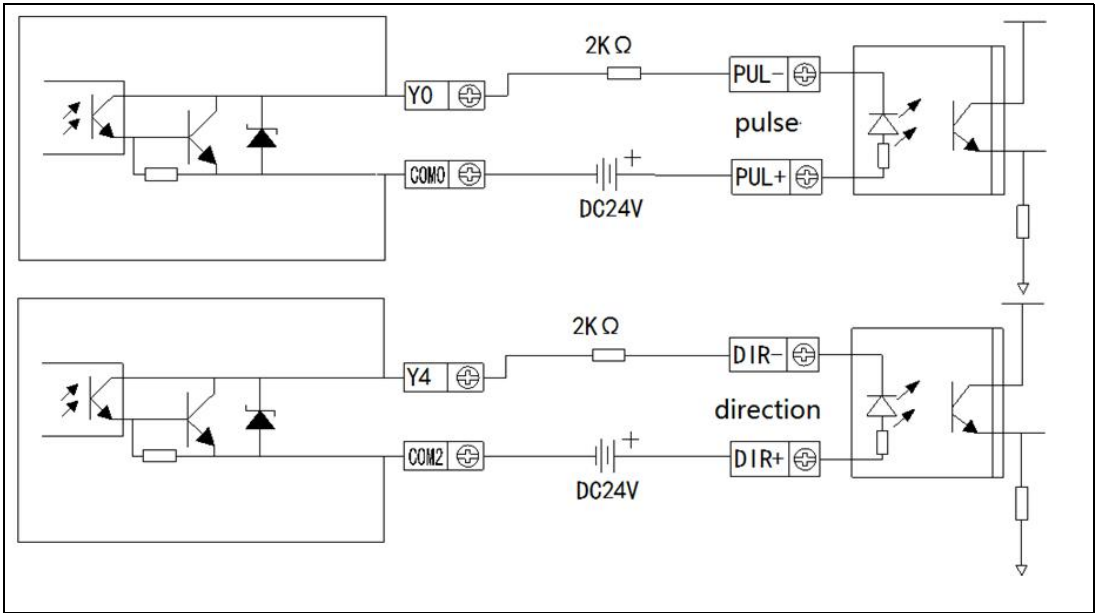




Below is wiring of T type integrated controller and servo drive

Integrated controller

Servo drive



(make sure the current of servo driver optical coupling input is 8~15mA)

# 3 PLC programming

This chapter describes the specific operations of the ZP3 series PLC programming, includes internal software component allocation, instruction list, software related introduction, and how to create projects, and communicate content.

## 3-1. List of software component numbers

ZP1/ZP2/ZP3 series assignment of software component number are as follows:

In addition, when expanding the BD board for special features, correlation definition number, please refer to [ Z Series Extended BD Board User Manual].

Identification mark	Name	Radius	Points
		18 points	18 points
X	Input points	X0~X11	10
Y	Output points	Y0~Y7	8
X	Input points <sup>*3</sup>	X20000~X20077 (#1 extend BD)	64
		X20100~X20177 (#2 extend BD)	64
Y	Output points <sup>*3</sup>	Y20000~Y20077 (#1 extend BD)	64
		Y20100~Y20177 (#2 extend BD)	64
M	Internal relay	M0~M7999	8000
HM		HM0~HM959 <sup>*1</sup>	960
SM		Special use SM0~SM2047 <sup>*2</sup>	2048
S	Flow	S0~S1023	1024
HS		HS0~HS127 <sup>*1</sup>	128
T	Timer	T0~T575	576
HT		HT0~HT95 <sup>*1</sup>	96
ET		Precise timing ET0~ET31	32
C	Counter	C0~C575	576
HC		HC0~HC95 <sup>*1</sup>	96
HSC		High-speed counter HSC0~HSC31	32
D	Data register	D0~D7999	8000
HD		HD0~HD999 <sup>*1</sup>	1000
SD		Special use SD0~SD2047	2048
HSD		Special use HSD0~HSD499 <sup>*2</sup>	500
FD	FlashROM register	FD0~FD6143	6144
SFD		Special use SFD0~SFD1999 <sup>*2</sup>	2000
FS	Special secret register	FS0~FS47	48
ID <sup>*4</sup>	Noumenon	ID0~ID99	100
	Extend BD	ID20000~ID20099 (#1 extend BD)	100
		ID20100~ID20199 (#2 extend BD)	100
QD <sup>*5</sup>	Noumenon	QD0~QD99	100

	Extend BD	QD20000~QD20099 (#1 extend BD)	100
		QD20100~QD20199 (#2 extend BD)	100
SEM	Sequential function block WAIT instruction specific coil	SEM0~SEM31	32

**Notes:**

- 1) The memory area is the default blackout hold area(The PLC power off hold area cannot be modified).
- 2) Special use(Hold without power failure), a special purpose register occupied by the system, don't use it for other purposes. Please refer to the section [List of Special Software Components] in the appendix of this manual.
- 3) Extended I/O address allocation for BD(Oct), maximum of two can be extended simultaneously.
- 4) Analog input software component address.
- 5) Analog output software component address.

## 3-2. Instruction list

### 3-2-1. Basic instructions

Instruction	Function	Usable software component
LD	Initial logic normally open contactor	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
LDD	Directly from the contact read state	X
LDI	Initial logic normally close contactor	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
LDDI	Direct read normally closed contact	X
LDP	Rising edge detection algorithm	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
LDF	Falling edge detection operation began	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
AND	Serial connection normally open contactor	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
ANDD	Directly from the contact read state	X
ANI	Serial connection normally close contactor	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
ANDDI	Direct read normally closed contact	X
ANDP	Rising edge detection in series connection	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
ANDF	Falling edge detection in series connection	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
OR	Parallel connection normally open contactor	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
ORD	Directly from the contact read state	X
ORI	Parallel connection normally close contactor	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
ORDI	Direct read normally closed contact	X
ORP	Pulse rising edge detection parallel connection	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
ORF	Parallel connection of pulse falling edge detection	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
ANB	Series connection of parallel circuit block	none
ORB	Parallel connection of series circuit block	none
OUT	Coil drive	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
OUTD	Output to the contactor	Y
SET	Keep the coil ON	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
RST	Clear the coil-ON state	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m

PLS	Rising edge detection instruction	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
PLF	Falling edge detection instruction	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
MCS	Connecting coil instruction for common serial points	none
MCR	Removal of common serial points	none
ALT	Negate the coil	X,Y,M,HM,SM,S,HS,T,HT,C,HC,Dn.m
RST	Reset the contactor, clear the current value	Y、C、HC、HSC
CNT	No power down keep counting up, count coil drive	K、D
CNT_D	Power down keep counting up, count coil drive	K、D
TMR	No power down keep the timer coil drive	K、D
TMR_A	Power down keep the timer coil drive	K、D
END	Operate output/input and return to step 0	none
GROUP	Block folding start	none
GROUPE	Block folding end	none

### 3-2-2. Application instructions

type	Instruction	Function
Data shift	SHL	Arithmetic shift left
	SHR	Arithmetic shift right
	LSL	Logic shift left
	LSR	Logic shift right
	ROL	Rotate left
	ROR	Rotate right
	SFTL	Bit shift left
	SFTR	Bit shift right
	WSFL	Word shift left
	WSFR	Word shift right
Data conversion	WTD	Word convert to double word
	FLT	16-bit integer convert to float
	FLTD	64-bit integer convert to float
	INT	Float convert to integer
	BIN	BCD convert to binary
	BCD	Binary convert to BCD
	ASCI	Hex convert to ASCII
	HEX	ASCII convert to hex
	DECO	Decoding
	ENCO	High-bit encoding
	ENCOL	Low-bit encoding
Float calculation	ECMP	Float comparison
	EZCP	Float zone comparison
	EADD	Float addition
	ESUB	Float subtraction

	EMUL	Float multiplication
	EDIV	Float division
	ESQR	Float square
	SIN	Float sine
	COS	Float cosine
	TAN	Float tangent
	ASIN	Float arcsine
	ACOS	Float arccosine
	ATAN	Float arctangent
Clock	TRD	Read clock data
	TWR	Write clock data
	TCMP	Clock comparison

### 3-2-3. Special instructions

Type	Instruction	Function
Pulse output	PLSR	Multiple pulse output
	PLSF	Variable frequency pulse output
	STOP	Pulse stop
	GOON	continue to pulse
	ZRN	Mechanical origin regression
	DRVA	Absolute location
	DRVI	Relative location
High-speed count	CNT	Single phase high speed counting/Single phase high speed counting interrupt
	CNT_AB	AB phase high speed counting/AB phase high speed counting interrupt
	DMOV	32 bit high-speed count read
	DMOV	32 bit high speed count write
	RST	High-speed count reset
Modbus communication	COLR	MODBUS read coil
	INPR	MODBUS read input coil
	COLW	MODBUS write single coil
	MCLW	MODBUS write multi-coil
	REGR	MODBUS read register
	INRR	MODBUS read input register
	REGW	MODBUS write single register
MRGW	MODBUS write multi-register	
Free format communication	SEND	Free format data sending
	RCV	Free format data reception

X-NET communication	BIT_READ	Read instruction
	BIT_WRITE	Write instruction
	REG_READ	Read register instruction
	REG_WRITE	Write register instruction
Precise timing	STR	Precise timing
	DMOV	Read precise timing register
	STOP	Stop precise timing
Interruption	EI	Enable the interruption
	DI	Disable the interruption
	IRET	Interruption return
Others	FRQM	Frequency measurement
	PWM	Pulse width modulation
	PID	PID control

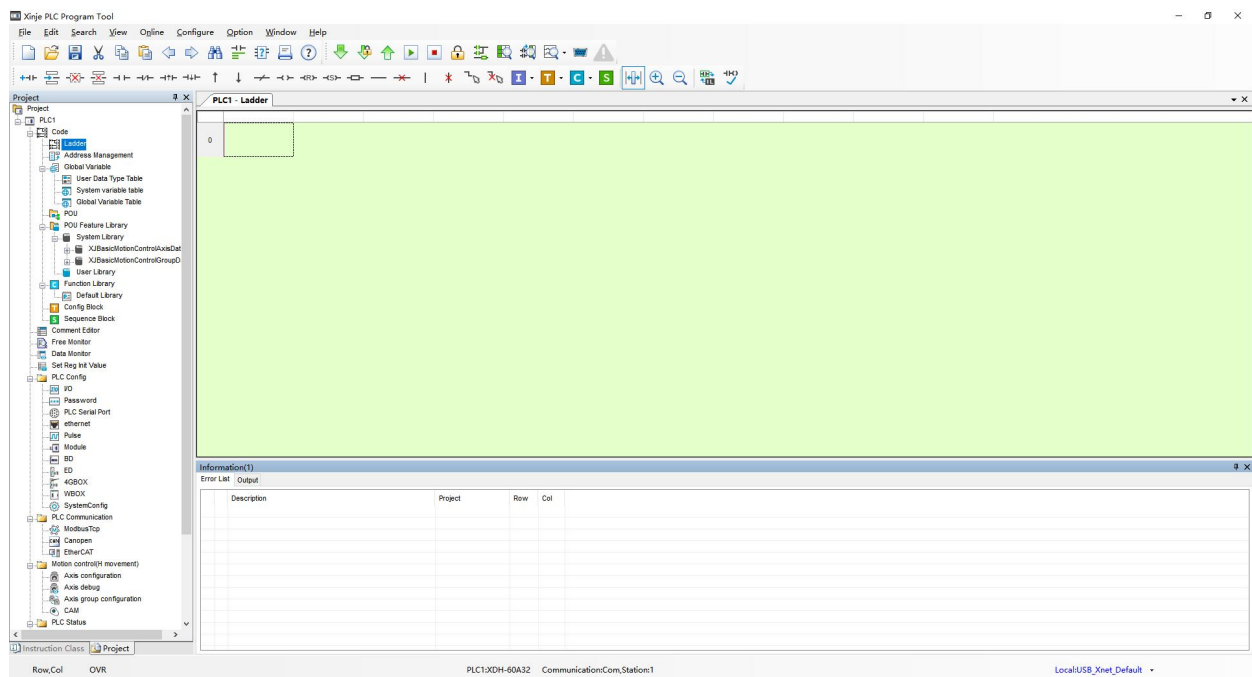
**Notes:** This manual simply lists all supported instructions. Detailed instructions on the use of the directive, please refer to XD/XL series PLC manual [basic instructions] and XD/XL series PLC manual [position control].

## 3-3. Create a project

### 3-3-1. About Software

ZP series is the organic integration of XD series PLC and OP in function. Therefore, when writing the control program, the software used is the same as the XD series PLC, which uses XDPPro software.


The interface of XDPPro software is shown in the figure below :



## 3-3-2. Creation of project

Let's take ZP3-18T as an example, specify the steps to create a PLC program project.

1) Open the software

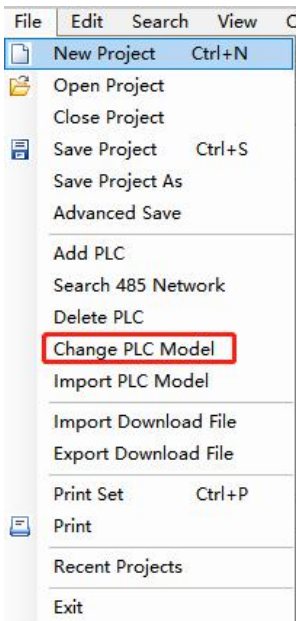
Double click the XDPPro software icon  , open the software, the screen shown above will display.

The PLC object of the software defaults to XDH-60A32 (look at the status bar at the bottom, as shown in the image below), not the PLC type of ZP, so it needs to be modified.

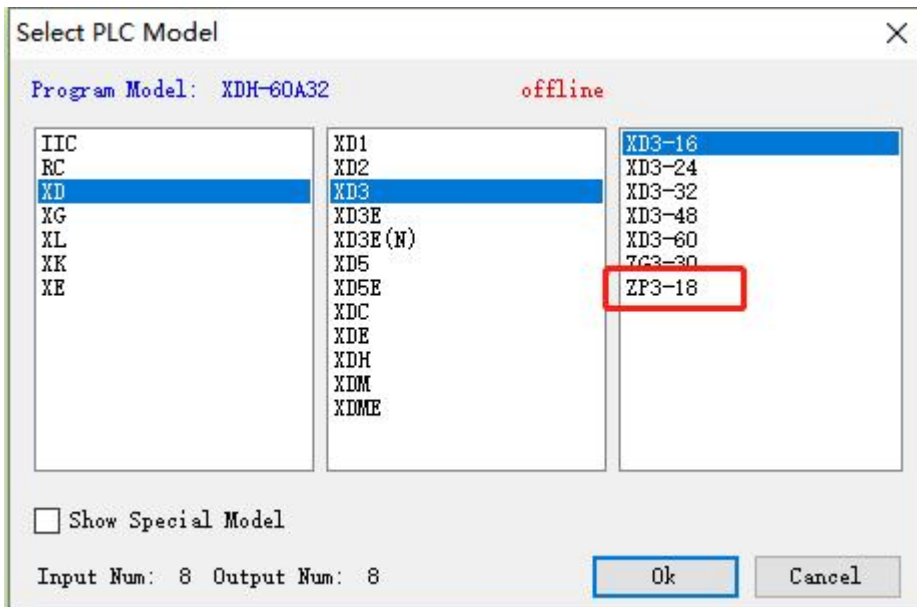
PLC: **XDH-60A32** Communication:Com,Station:1

2) Modify the model

Click "File" in the menu bar, then click "Change PLC type", as shown in the following picture:

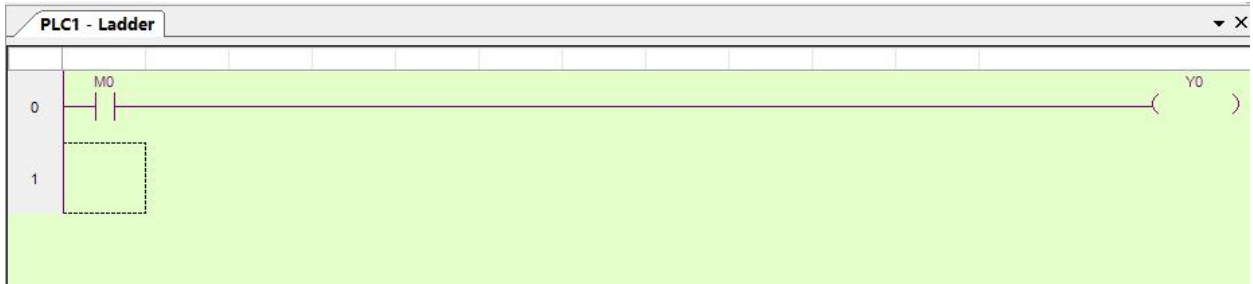


Select the appropriate PLC type in the pop-up window, the example is ZP3-18T, so here select "XD3" and then click "ZP3-18T", as shown in the following picture:



### 3) Write program


After the above two steps, you can start writing programs in the software. The programming specification and the specific operation of the software, please refer to [ XD series PLC manual ].

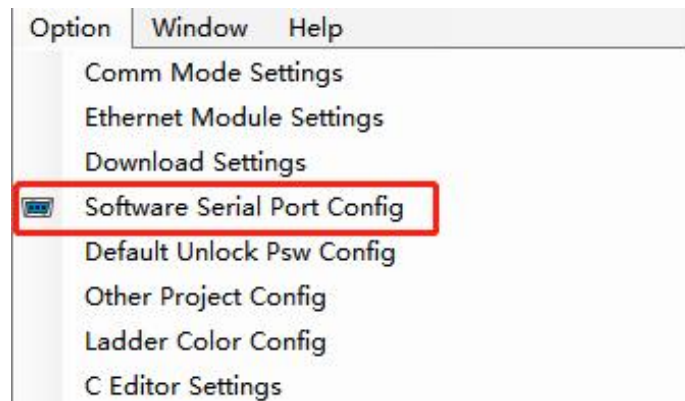


## 3-3-3. Upload/download of program

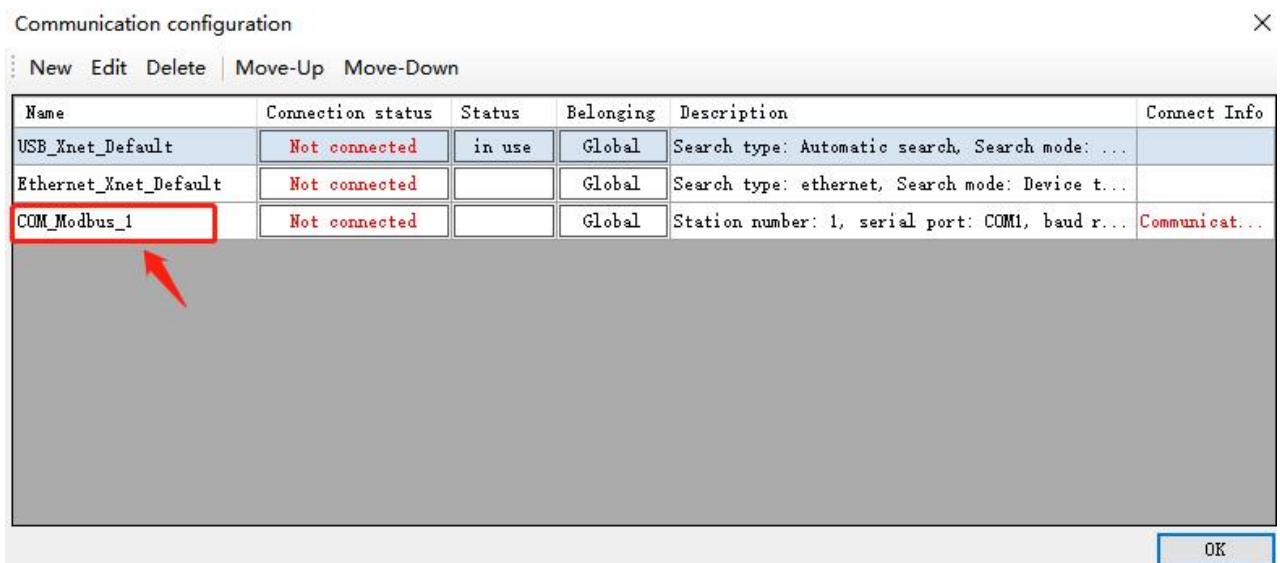
### 1) On-line

Before downloading the program, please verify that the ZP is successfully connected to the computer (For cable connections, refer to section 1-3-5). Click on Menu bar [Options], then click [Software Serial Port

Settings], or click on the icon "".

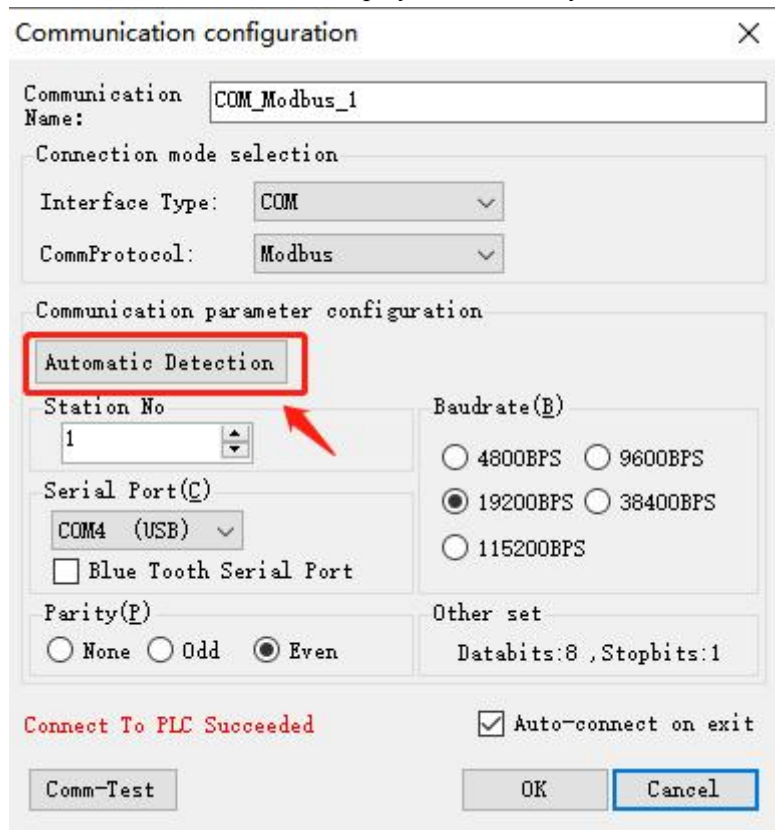


Operation as shown below:

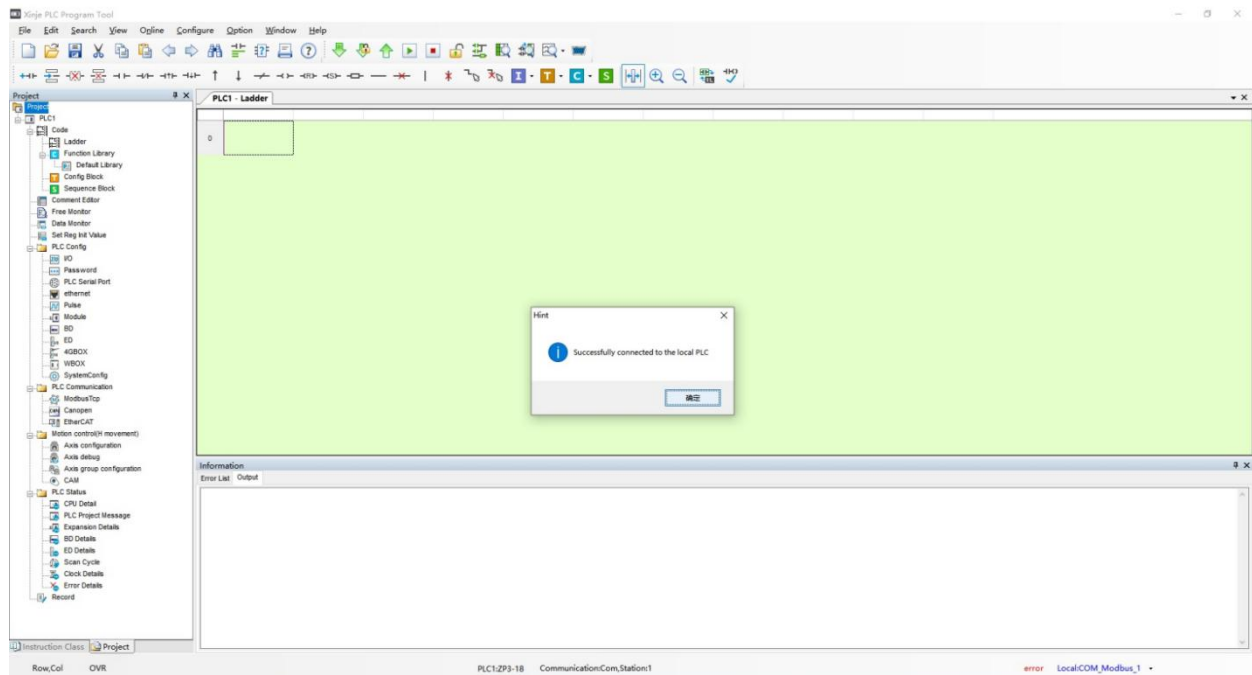




Click automatic detection, the PLC connection is displayed successfully, click OK.

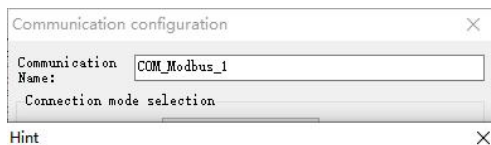


Change the usage status to "in use" and click OK.

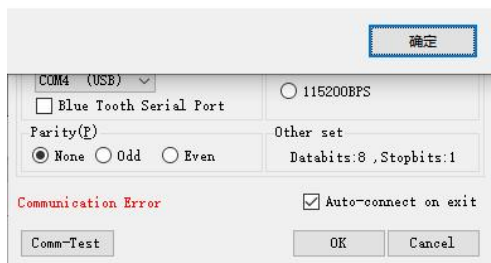


"Connect To PLC Succeeded" is displayed, so you have successfully connected your PLC to your PC!


If the automatic detection fails and the following message is displayed, the serial port parameters may be modified, you can use "Stop PLC When Reboot".




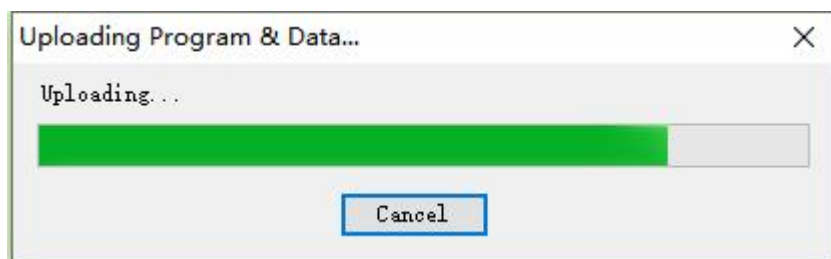
Automatic detection serial port failure, please try to use the function "Stop PLC When Reboot"



## 2) Upload/download of program

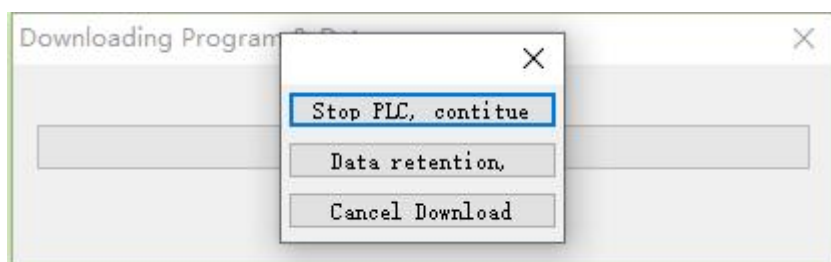
After successful connection, click the toolbar icon "", the program in the PLC can be uploaded.

Click the icon "", and save the program.

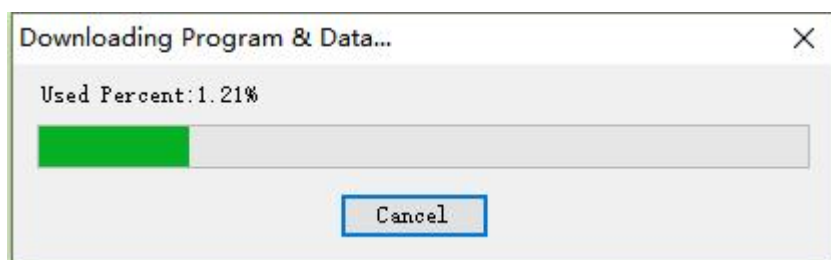


After successful connection, click the toolbar icon "", the program in the PLC can be downloaded.

If the PLC is running, the following information window is displayed.

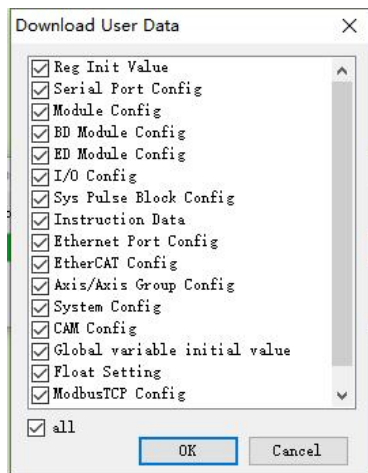



The program download process will automatically calculate the current program percentage, as shown in the following picture:



At the end of the program download, the "Download User Data" window will be displayed.

User can select the type of data to download as required, by default select all, as shown in the following picture:



After downloading the program, click the toolbar icon "", operating PLC.

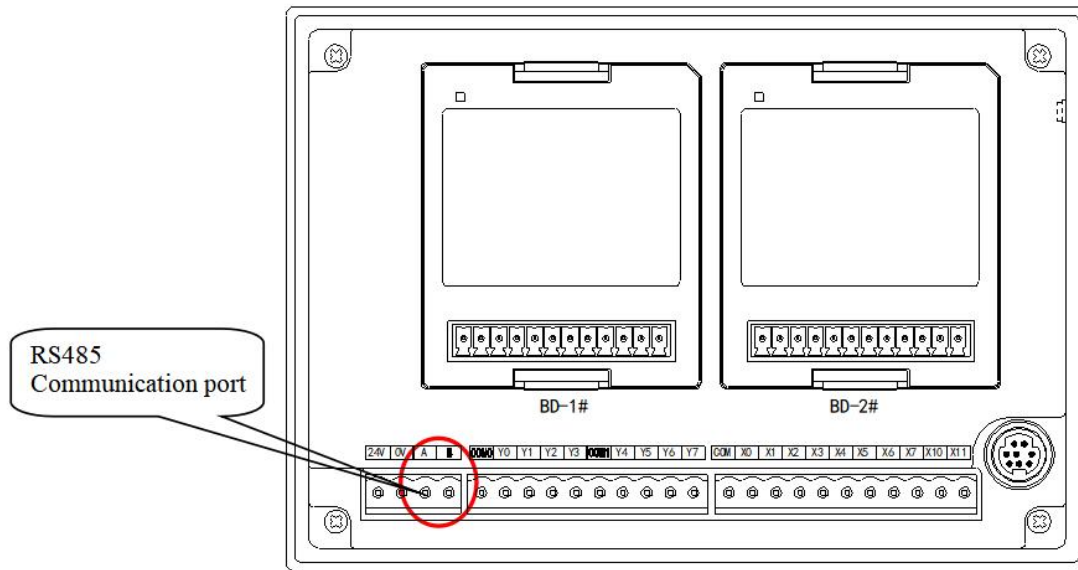
#### Notes:

- 1) If the program has a password set, or is a private download, six red dots will appear on the right side of the interface.
- 2) More detailed usage of XDPPro software, please refer to XD/XL series PLC manual.

## 3-4. Communication

### 3-4-1. Communication port

ZP series with programming port (RS232) and RS485 communication port (A,B port). Among them, the programming port can only be used for PLC program and HMI screen download. The RS485 communication port can be used to communicate with other devices, the communication parameters of this port can be reset by software.



RS485 communication port pin A is the "+" signal, and B is the "-" signal.

### 3-4-2. Communication parameters

<b>Station number</b>	Modbus station 1-254, 255 (FF) is free format communication
<b>Baud rate</b>	300bps~115.2Kbps
<b>Data bit</b>	8 data bits, 7 data bits
<b>Stop bit</b>	1, 2
<b>Checking</b>	None, Odd, Even

Communication port default parameter: station NO.1, baud rate 19200bps, 8 data bits, 1 stop bits, even check

### 3-4-3. Parameter setting

Users can use RS485 port for Modbus communication, free-form communication and X-NET communication.

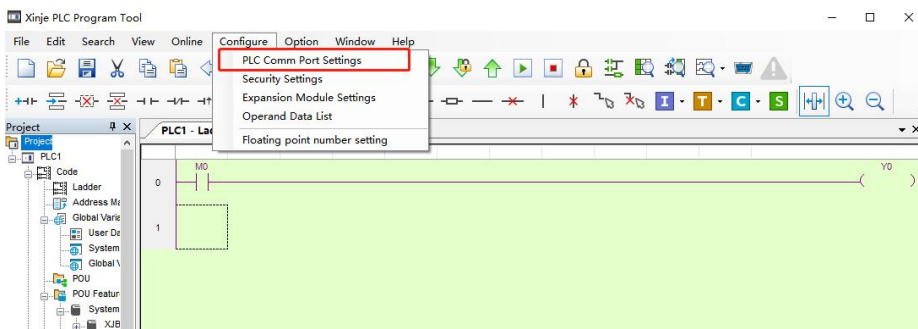
There are two ways to set Modbus communication parameters:

- 1) Parameters are set by programming software;
- 2) Configure the XINJEConfig tool to set parameters.

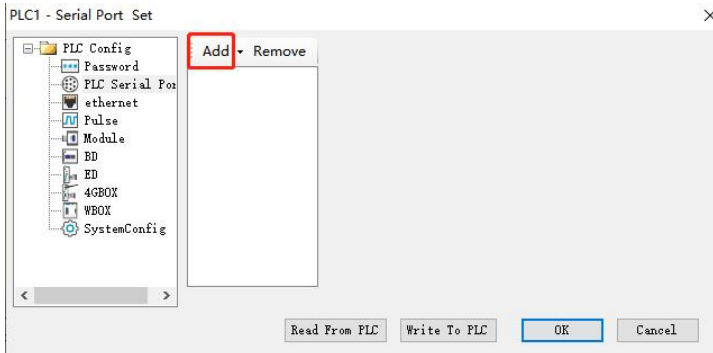
Free format communication parameter settings can be set by programming software. Specific introduction please refer to XD/XL series PLC manual [basic instruction].

X-NET communication parameter settings can be set by XINJEConfig tool. X-NET communication feature can refer to [X-NET manual].

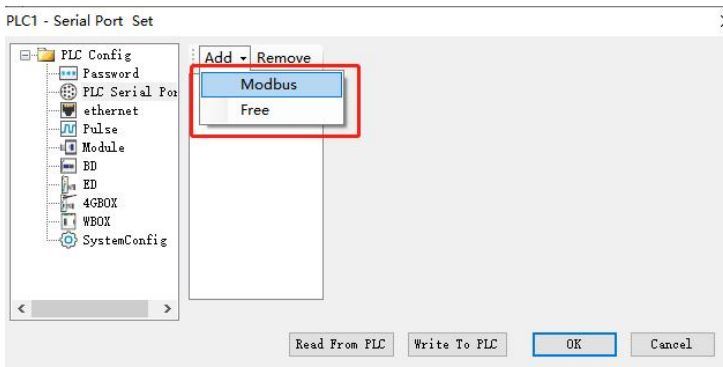
1. Parameters are set by programming software.
  - 1) The PLC will be connected to the PC using the download cable.
  - 2) Open the Xinje PLC Program Tool, find the "Configure" in the menu bar, and click the "PLC Comm Port settings ". As shown in the following picture:



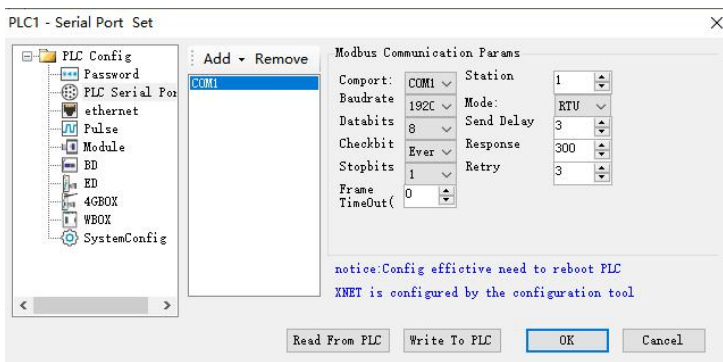
3) After clicking, the page shown below will appear:



4) Click "add", there are two modes of communication, Modbus and Free.



After selecting Modbus communication, the serial port configuration screen is displayed on the right, as shown in the following figure:



**Port No.:** It refers to Port of PLC, COM1 refer to port1(RS232), COM2 refer to port2(RS485).

**The baud rate, data bit, parity bit, stop bit** should be same to the communication device.

**Station number:** If the PLC is master, the station no. is defaulted 1. If the PLC is slave, it needs to set different station no.

**Two modes of communication:** RTU and ASCII.

**Delay before sending(ms):** Waiting time before PLC sends data. In the original XC series PLC, if the master PLC communicates with the slave PLC, the master PLC sends data to the slave PLC. If the master PLC sends data to the slave PLC after the first time, and the slave PLC has not yet had time to receive the data, then the master PLC sends data to the slave PLC again, which easily leads to the error of the slave PLC; In XD series PLC, it has send delay to solve the problem. That is, after receiving data from the slave station, it must delay a certain time to receive the next communication data, so as not to cause the above problems.

**Reply overtime(ms):** It refers to the time when the PLC can not receive the response after sending the request and wait for sending again.

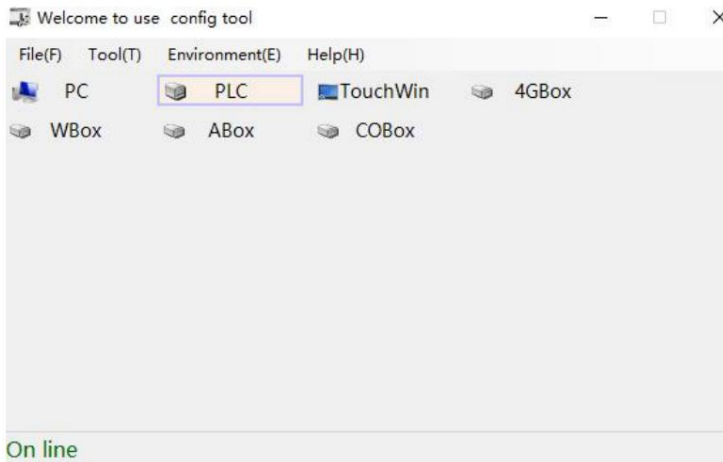
**Retry times:** It refers to the number of times that the PLC can not receive the reply, and each reply needs a reply timeout time.

5) After setting, click write to PLC, then cut off the PLC power supply and power on again to make the settings effective.

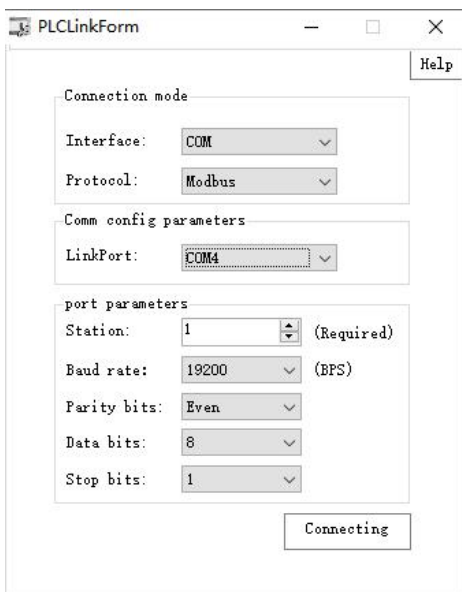
2. Set the parameters by using XINJEConfig tool.

1) Use the OP download cable to connect the PLC to the PC.

2) Open the XINJEConfig software, the following window appears:

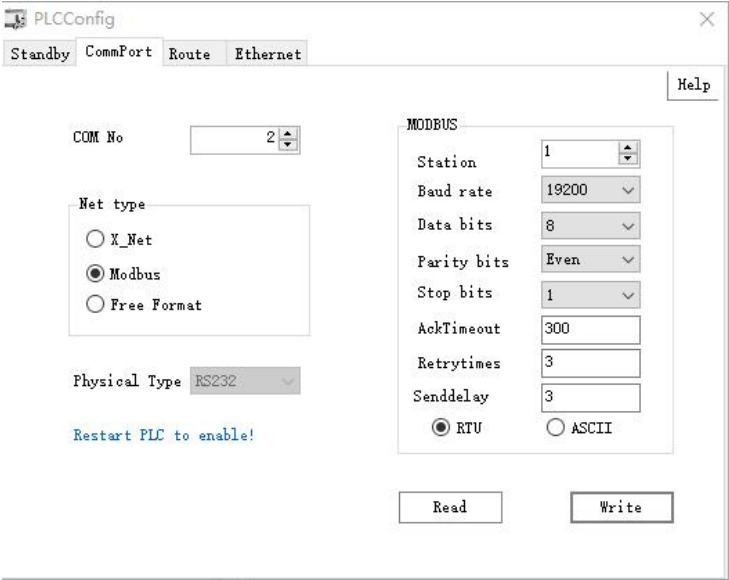


3) Click "PLC", the following window appears:



The Link Port must be the COM port that connects the computer to the PLC, which can be viewed in the Device Manager. Serial port parameters are the parameters of the PLC serial port connected to the computer.

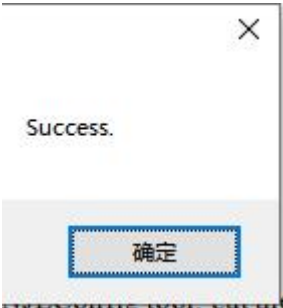
4) In the "Link Port", select the connection port for the PC and PLC. The "Protocol" select Modbus, click to "Find Device", the following window appears:



Comport NO.: K1~K5, port1(RS232), port2(RS485).

Here, we can set the communication mode and parameters of each communication port.

5) When the com port parameters setting is completed, click writeconfig. It will show "write configuration success" message.



6) Close XINJEConfig tool, cut the PLC power and power on again to make the settings effective.

### 3-4-4. Modbus communication and address

ZP1/ZP2/ZP3 series support both Modbus master and Modbus slave.

Master mode: When PLC is set to be master, it can communicate with other slave devices which have MODBUS-RTU or MODBUS-ASCII protocol via Modbus instructions; it also can change data with other devices.

For example: Xinje ZP3 series can control inverter by Modbus.

Slave mode: When PLC is set to be slave, it can only response with other master devices.

#### Communication address

ZP3 series Modbus address and internal soft component table:

Type	Component symbol	Component ID	Number	Modbus address (Hex)	Modbus address (decimal)
Coil, bit	M	M0~M7999	8000	0~1F3F	0~7999
	X	X0~X77(main unit)	64	5000~503F	20480~20543
		X10000~X10077(#1 module)	64	5100~513F	20736~20799
		X10100~X10177(#2 module)	64	5140~517F	20800~20863
		X10200~X10277(#3 module)	64	5180~51BF	20864~20927
		X10300~X10377(#4 module)	64	51C0~51FF	20928~20991
		X10400~X10477(#5 module)	64	5200~523F	20992~21055
		X10500~X10577(#6 module)	64	5240~527F	21056~21119
		X10600~X10677(#7 module)	64	5280~52BF	21120~21183
		X10700~X10777(#8 module)	64	52C0~52FF	21184~21247
		X11000~X11077(#9 module)	64	5300~533F	21248~21311
		X11100~X11177(#10 module)	64	5340~537F	21312~21375
		X20000~X20077(#1 BD)	64	58D0~590F	22736~22799
		Y	Y0~77(main unit)	64	6000~603F
	Y10000~Y10077(#1 module)		64	6100~613F	24832~24895
	Y10100~Y10177(#2 module)		64	6140~617F	24896~24959
	Y10200~Y10277(#3 module)		64	6180~61BF	24960~25023
	Y10300~Y10377(#4 module)		64	61C0~61FF	25024~25087
	Y10400~Y10477(#5 module)		64	6200~623F	25088~25151
	Y10500~Y10577(#6 module)		64	6240~627F	25152~25215
	Y10600~Y10677(#7 module)		64	6280~62BF	25216~25279
	Y10700~Y10777(#8 module)		64	62C0~62FF	25280~25343
	Y11000~Y11077(#9 module)		64	6300~633F	25344~25407
	Y11100~Y11177(#10 module)		64	6340~637F	25408~25471
	Y20000~Y20077(#1 BD)		64	68D0~690F	26832~26895
	S	S0~S1023	1024	7000~73FF	28672~29695
	SM	SM0~SM2047	2048	9000~97FF	36864~38911
	T	T0~T575	576	A000~A23F	40960~41535
	C	C0~C575	576	B000~B23F	45056~45631
	ET	ET0~ET31	32	C000~C01F	49152~49183
	SEM	SEM0~SEM31	32	C080~C09F	49280~49311
	HM <sup>*1</sup>	HM0~HM959	960	C100~C4BF	49408~50367
HS <sup>*1</sup>	HS0~HS127	128	D900~D97F	55552~55679	
HT <sup>*1</sup>	HT0~HT95	96	E100~E15F	57600~57695	
HC <sup>*1</sup>	HC0~HC95	96	E500~E55F	58624~58719	
HSC <sup>*1</sup>	HSC0~HSC31	32	E900~E91F	59648~59679	
Register, word	D	D0~D7999	8000	0~1F3F	0~7999
	ID	ID0~ID99(main unit)	100	5000~5063	20480~20579
		ID10000~ID10099(#1 module)	100	5100~5163	20736~20835
		ID10100~ID10199(#2 module)	100	5164~51C7	20836~20935



		ID10200~ID10299(#3 module)	100	51C8~522B	20936~21035
		ID10300~ID10399(#4 module)	100	522C~528F	21036~21135
		ID10400~ID10499(#5 module)	100	5290~52F3	21136~21235
		ID10500~ID10599(#6 module)	100	52F4~5357	21236~21335
		ID10600~ID10699(#7 module)	100	5358~53BB	21336~21435
		ID10700~ID10799(#8 module)	100	53BC~541F	21436~21535
		ID10800~ID10899(#9 module)	100	5420~5483	21536~21635
		ID10900~ID10999(#10 module)	100	5484~54E7	21636~21735
		ID20000~ID20099(#1 BD)	100	58D0~5933	22736~22835
	QD	QD0~QD99(main unit)	100	6000~6063	24576~24675
		QD10000~QD10099(#1 module)	100	6100~6163	24832~24931
		QD10100~QD10199(#2 module)	100	6164~61C7	24932~25031
		QD10200~QD10299(#3 module)	100	61C8~622B	25032~25131
		QD10300~QD10399(#4 module)	100	622C~628F	25132~25231
		QD10400~QD10499(#5 module)	100	6290~62F3	25232~25331
		QD10500~QD10599(#6 module)	100	62F4~6357	25332~25431
		QD10600~QD10699(#7 module)	100	6358~63BB	25432~25531
		QD10700~QD10799(#8 module)	100	63BC~641F	25532~25631
		QD10800~QD10899(#9 module)	100	6420~6483	25632~25731
		QD10900~QD10999(#10 module)	100	6484~64E7	25732~25831
		QD20000~QD20099(#1 BD)	100	68D0~6933	26832~26931
		SD	SD0~SD2047	2048	7000~77FF
	TD	TD0~TD575	576	8000~823F	32768~33343
	CD	CD0~CD575	576	9000~923F	36864~37439
	ETD	ETD0~ETD31	32	A000~A01F	40960~40991
	HD <sup>※1</sup>	HD0~HD999	1000	A080~A467	41088~42087
	HSD <sup>※1</sup>	HSD0~HSD499	500	B880~BA73	47232~47731
	HTD <sup>※1</sup>	HTD0~HTD95	96	BC80~BCDF	48256~48351
	HCD <sup>※1</sup>	HCD0~HCD95	96	C080~C0DF	49280~49375
	HSCD <sup>※1</sup>	HSCD0~HSCD31	32	C480~C49F	50304~50335
	FD <sup>※2</sup>	FD0~FD6143	6144	C4C0~DCBF	50368~56511
	SFD <sup>※2</sup>	SFD0~SFD1999	2000	E4C0~EC8F	58560~60559
	FS <sup>※2</sup>	FS0~FS47	48	F4C0~F4EF	62656~62703

**Notes:**

- 1) The power down holding area is marked with ※1, and the flash area is marked with ※2.
- 2) The bit software components X and Y are addressed in base 8 and the rest in base 10.
- 3) Specific usage of Modbus communication instructions, please refer to XD series PLC manual [basic instruction].

# 4 HMI screen programming

This chapter describes the specific operations of the ZP3 series HMI programming, includes brief description of the software, how to create HMI screen project in software, and basic components and main functions of tools.

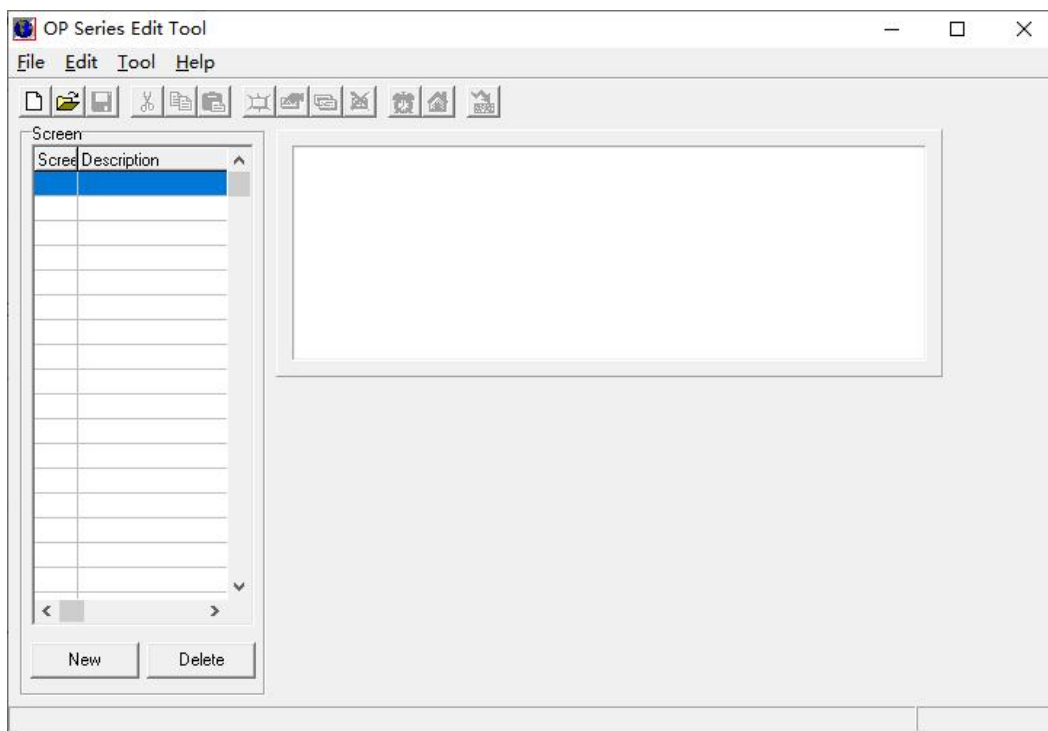
## 4-1. OP 20 software

### 4-1-1. About software

HMI screen of ZP3 series need to be programmed in HMI software. The HMI of the ZP3 series belongs to the OP series, therefore the software used is OP 20 software.


OP 20 software runs under Windows98/XP/NT. As a secondary development tool, the software is easy to learn, easy to use, and can directly set Chinese and English characters. The user project consists of images, and set the screen to accomplish some specific functions. Realize the free jump between different screens.

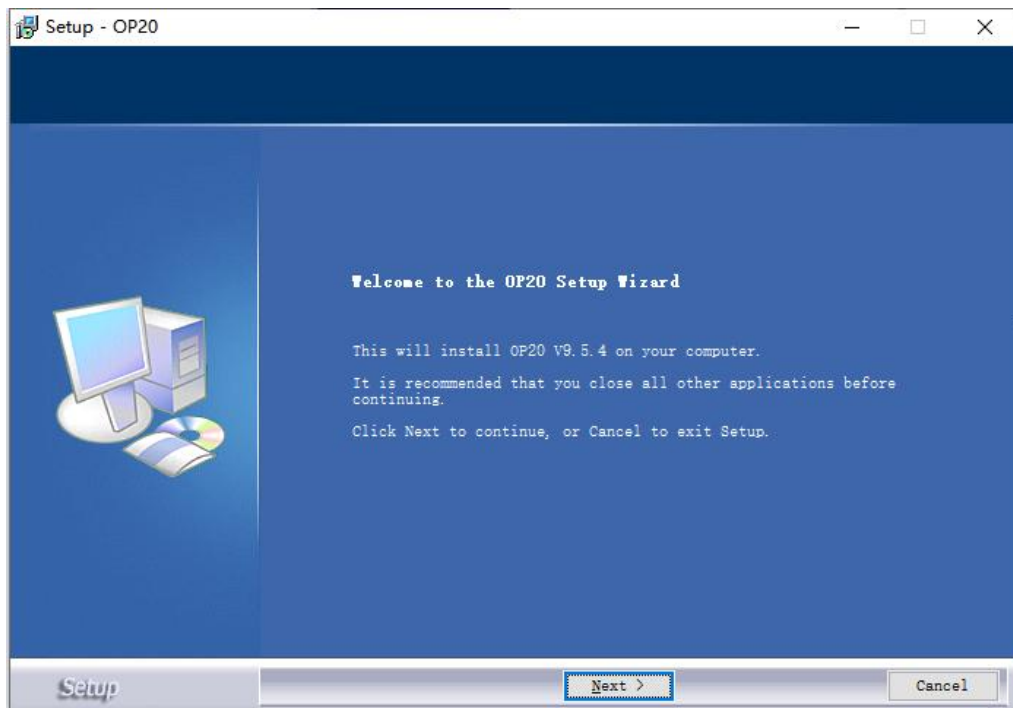
The interface of OP20 software is shown as follows:



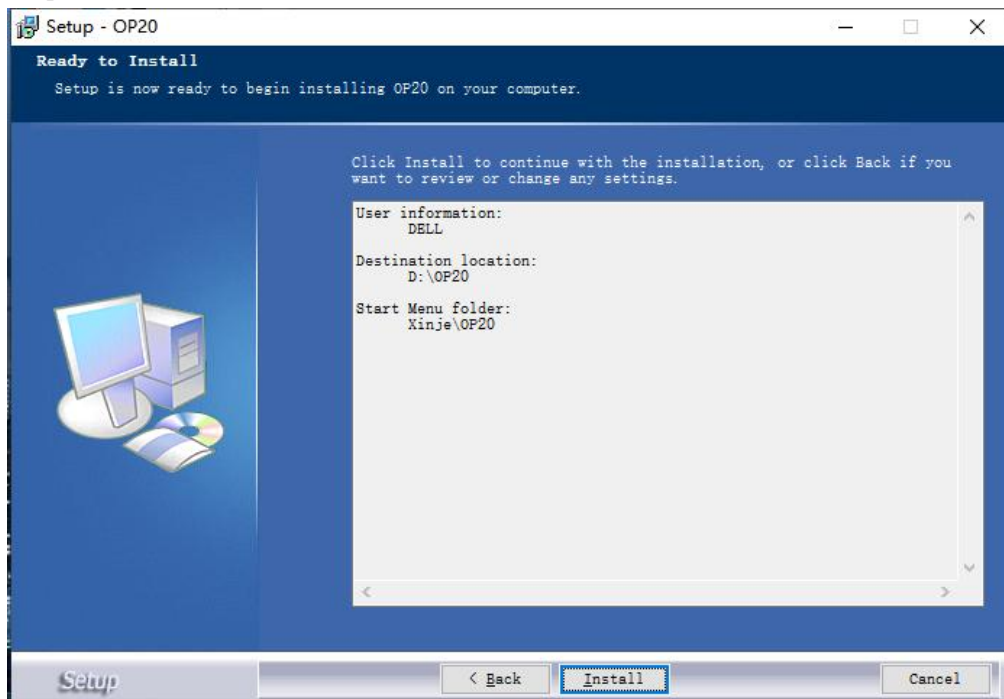
### 4-1-2. Installation and uninstallation

OP20 software V9.3.2 and later adopts the registry installation mode, therefore before using the software, the user must first install the software correctly on the computer. The following uses the OP20 V6.5K as an example, this section describes how to install and uninstall the software.

- 1) Find the "  " under the installation folder and double click the icon, enter the software installation procedure, the installation interface is shown as follows:



- 2) Click the "Next" button, select "I accept the Deal". Click the "Next" continuously. When the following page appears, click the "Install". (When the page for selecting an installation location is displayed, you can select the default setting. If another version of the OP software has been installed before and has not been uninstalled, you must select another installation location. If the software is installed in the same path, it may run incorrectly. In general, it is not recommended to install two or more versions of OP20 software on a computer.)



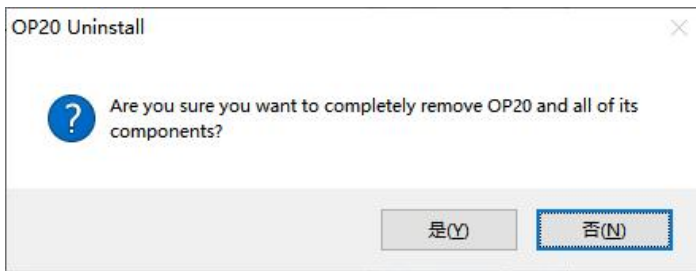
3) Finally, the installation is complete. At this point, you can start to use the software to edit the screen.

**Notes:**

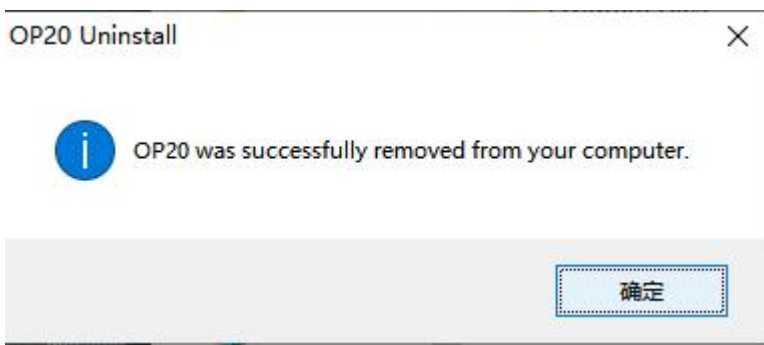
OP 20 software adopts backward compatibility processing, that is, using a later version of the software can open a lower version of the project file.

4) Unload

Find "unins000" in the installation directory and double click the icon. The following window is displayed, ask if you want to uninstall the software. As shown in the following picture:



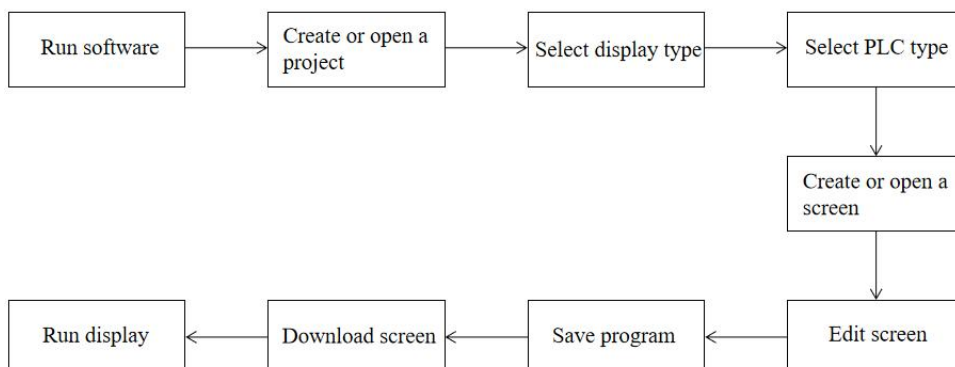
Click the "Yes" to start the uninstallation process. Finally, a window indicating that the software has been successfully uninstalled will appear, as shown in the following figure:



### 4-1-3. Use process

After the OP20 software is correctly installed through the previous steps, the editing of the project screen can be officially started.. The following is the basic process for editing project images using software.

The basic use process of OP20 is as follows:




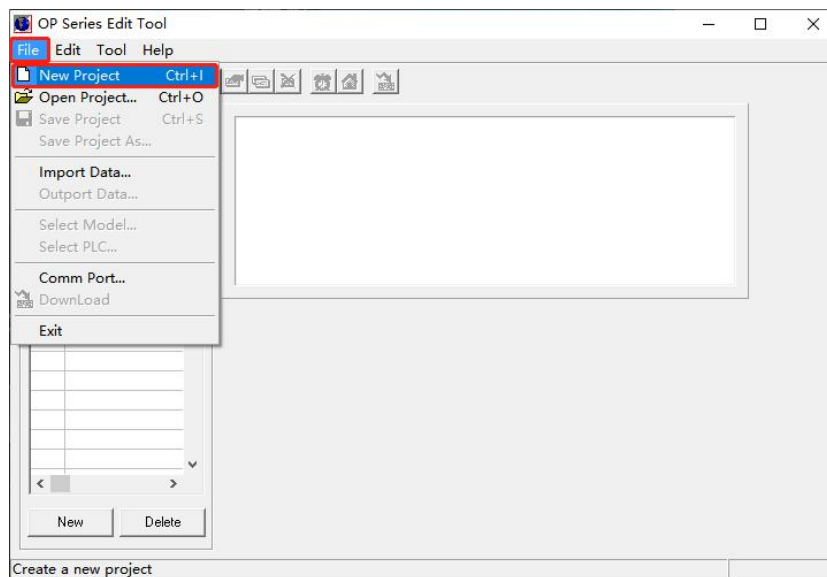
## 4-2. Create a project

The HMI engineering screen of the ZP3 series is edited in OP20 software. OP software is easy to understand and easy to use. The following will take ZP3-18T as an example to explain the process of making a specific project screen.

### 4-2-1. Creation of project

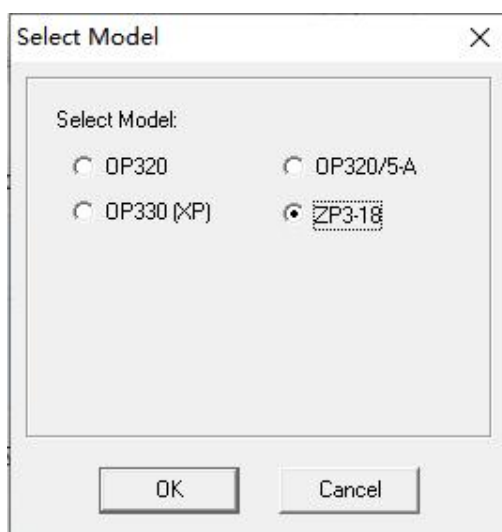
#### 1) New construction

Double click the icon "" of to open the software, there is no picture at this time. Click "File" in the menu bar and then click "New Project" to create a new project.



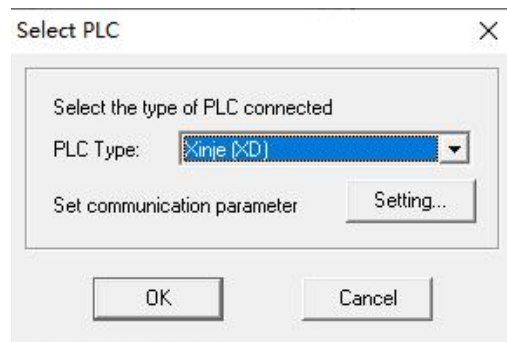
#### 2) Display selection

After the new project is created, an "Select Model" window will appear, in which you can select the model of you want. The object model in this example is ZP3-18T, so the display should select "ZP3-18", as shown below:



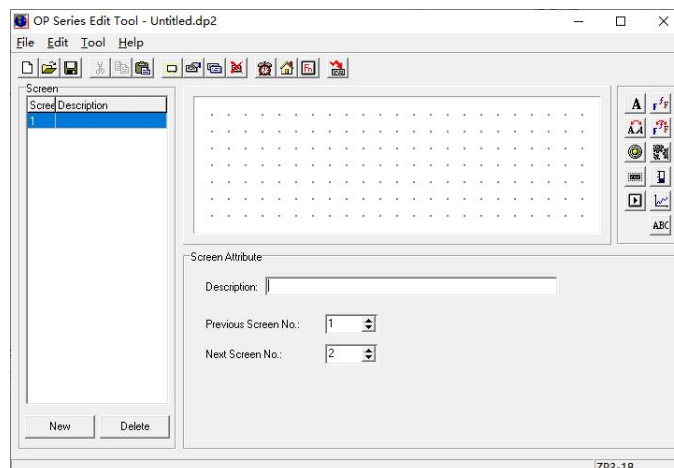
### 3) PLC selection

Since the ZP series is a combination of HMI and XD series PLC functions, for OP displays, the object it communicates with should be XD series PLC, of course, the communication between the two is built-in, and the communication parameters can be set by default.



### 4) Screen editing

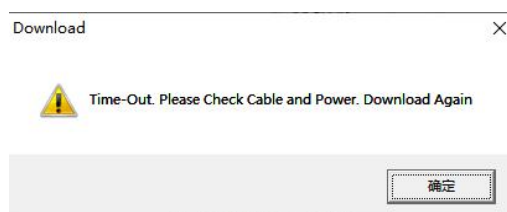
After setting the display and selecting the PLC type, the editing mode of the project screen will be officially entered. Below is the environment for editing screen 1. For specific instructions on screen production, please refer to [OP20 programming manual].



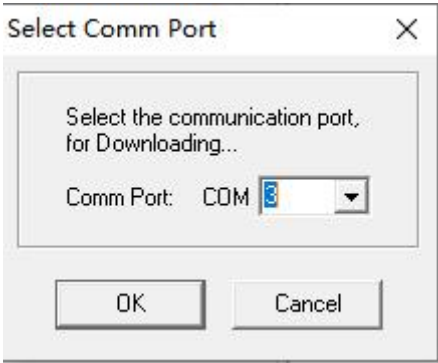
## 4-2-2. Screen download

### 1) Communication port selection


Before downloading the screen, you must correctly select the connected communication port. This communication port is the 9-pin serial port of the computer itself, and the computer will automatically number it, so long as the user knows the number of the connected communication port. If you cannot confirm, you can make connection attempts in sequence. If the selected COM port is incorrect, a message will be displayed indicating that it cannot be opened, as shown in the following figure:



Click the menu bar "File", select "Comm port", select the correct serial port number. In this example, the communication port is COM3, as follows:



2) Download








Connect the ZP3 download port to the computer using the download cable. At the same time, the ZP3 must be powered on. Click " " on the toolbar to start the download process, and the download progress window is displayed. After all screen data is downloaded, a window indicating that the download is complete will pop up.





**Notes:**

- 1) Please don't power off the machine during the process of downloading the screen, otherwise please power on again and download again.
- 2) The cable for downloading the screen and the cable for downloading the PLC program can be the same.
- 3) Don't download images when the XDPPro software and the OP software are open at the same time.












### 4-3. Function list of tools and components

#### 4-3-1. Tool button list

Button	Main function
	Create a new project
	Open a saved project
	Save the project you are editing
	New screen
	Displays the properties of the current screen
	Copy one picture to another
	Delete current screen

	Log in the alarm list information, each alarm information corresponds to an intermediate relay
	Specify the initial screen of the system, when the display is working, the key is directly returned to this screen. Generally, this screen is the main menu or the most frequently used screen, and the system password is set; Sets the interactive control register definition number.
	Set the global function key
	Through the computer RS232 port, the edited project file is downloaded to ZP

### 4-3-2. Partial function list

Button	Main function
	Enter text, including Chinese characters or English letters.
	Place variable text to display the current machine status through dynamic text, making it easier for operators to operate and improve production efficiency. Variable text is ideal for you.
	Vector text, you can size the input text, you can set the font.
	Dynamic vector text, the display content varies according to the different values, can be set 0 ~ 254 state display content.
	Place an indicator to show the switching status of the intermediate relay inside the PLC.
	Place a data monitoring window or a data setting window(The object is a PLC data register).
	Place the function key, the function of the function key includes screen jump and switch control.
	Touch key, allows the user to touch the display screen(Only XMP series all-in-one machines support this feature).
	Insert the bitmap file, can display the graphics of the machine, so that the operator can easily understand, but also can display the factory logo, factory emblem, enhance the product image.
	Place bar charts that visually display analog parameters such as flow, pressure, level, etc. Its height, width and direction can be specified arbitrarily.
	Place the line chart. In the process of industrial control, some parameters change slowly, and operators want to understand the change process of these parameters in a certain period of time, and line charts should be the most ideal way.



