MA series module

Application Manual

Xinje Electronic Co., Ltd

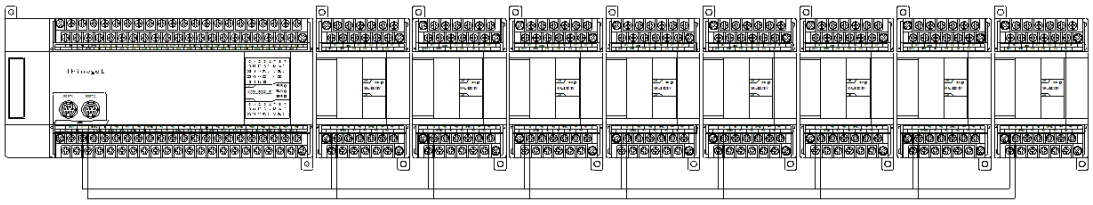
Catalog

1. Communicate with integrated controller

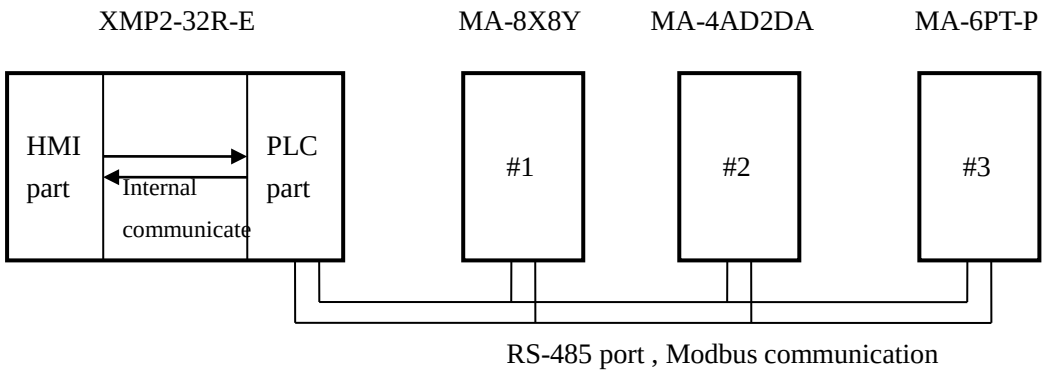
MA series modules are new products developed by Xinje with analog control function. MA module has strong communication ability. It supports Modbus-RTU protocol, can communicate with any devices support of Modbus protocol such as PLC, HMI, and integrated controller.
MA series have various types of products:

Type	Function
MA-8X8YR	8 channels digital input, 8 channels digital output
MA-16X	16 channels digital input
MA-16YR/T	16 channels digital output
MA-4DA	4 channels analog output
MA-4AD	4 channels analog input
MA-8AD-A/V	8 channels analog input
MA-4AD2DA	4 channels analog input, 2 channels analog output
MA-6TC-P	6 channels type K thermocouple temperature control
MA-6PT-P	6 channels PT100 temperature control

MA modules have strong extension capability, it can connect 16 different types of MA modules with PLC and HMI.



This chapter will tell you how to communicate 3 MA modules with Xinje integrated controller. The communication figure is shown as below:



About the using method of each module, please refer to MA series module user manual. This application manual is aimed to introduce how to communicate MA with other devices.

1.1 Requirement and preparation

1. Purpose

To command the skill of communicate several MA modules with integrated controller.

2. Devices

(1) XMP2-32R-E 1 piece

(2) MA-8X8Y, MA-4AD2DA, MA-6PT-P 1 piece

(3) RS-485 cable 3 pieces, TP cable 1 pieces, XC cable 1 piece, 24V power supply wire 3 pieces, 220V power supply wire 1 piece

(4) Computer with Touchwin and XCPpro software inside

3. Communication requirements

Integrated controller XMP2-32R-E communicates with 3 MA modules which are MA-8X8Y, MA-4AD2DA and MA-6PT-P.

Detailed requirements:

(1) Real-time read the I/O signal of MA-8X8Y, and display them on screen;

(2) Real-time read the signal of MA-4AD2DA channel 0, control the PID signal of this channel, set the target value, PID parameters; write data into MA-4AD2DA 2 channels.

(3) Control the temperature of MA-6PT-P channel 0, PID control and self-study PID parameters, set target temperature on the screen, display the temperature as tendency chart.

4. Reference data

(1) XMP2-32 integrated controller manual

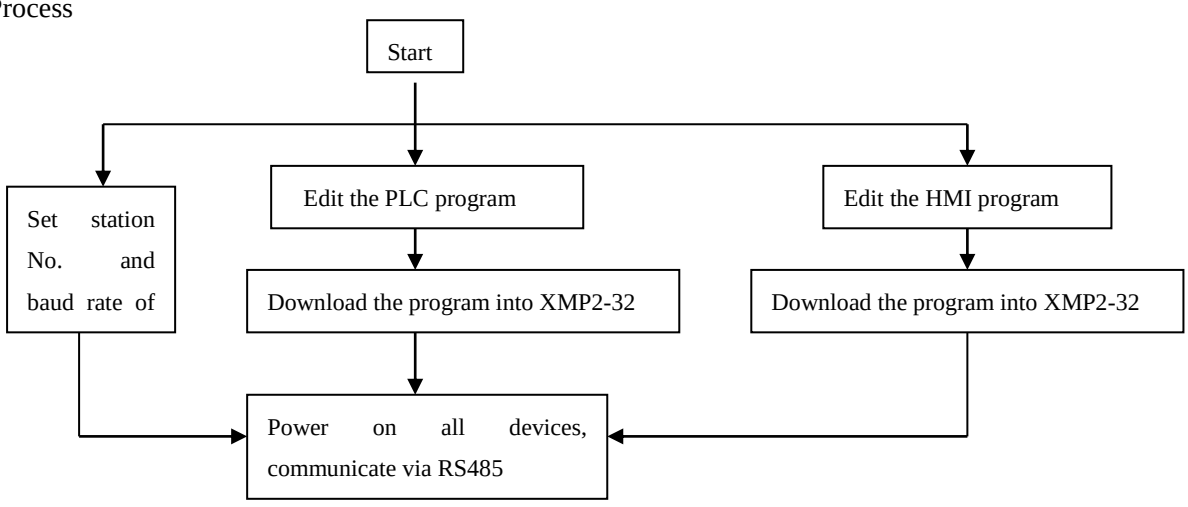
(2) XC series edit tool XCPpro manual

(3) XC series PLC manual

(4) MA series module manual

(5) TP series touch screen manual

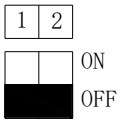
5. Process



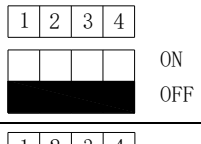
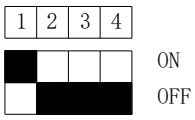
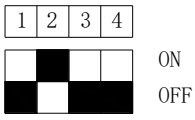
1.2 Communication setting

Because the use of Modbus-RTU communication protocol, each device should have Modbus station number. The 3 MA modules station No. are 1~3.
3 MA modules are based on Modbus-RTU protocol, they are slave stations in the Modbus network, they can not visit the master station but only can response the master station. The master station XMP2-32R-E can visit all the slave stations.
Make sure the communication is successful, it should set the correct communication parameters including baud rate and station No. The baud rate of master device should be the same as slave devices. To make it easy, we set all devices' baud rate to be 19200 bps; the station No. is the ID for master to distinguish each slave station.
Don't have to set the communication parameters of XMP2-32R-E, use the default parameters.

3 MA modules baud rate setting:

Baud rate	DIP switch
19200bps	

The station No. setting:

Module type	Station No.	DIP switch
MA-8X8Y	1	
MA-4AD2DA	2	
MA-6PT-P	3	

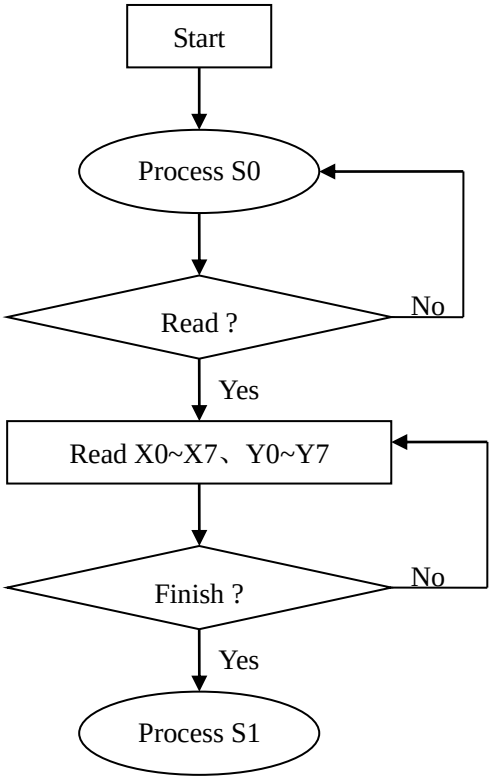
1.3 PLC program

1.3.1 Design concept

According to the control requirements, the MA modules should communicate with PLC, PLC should communicate with HMI. XMP2-32R-E should read and write the data of 3 MA modules, we can use process instruction to realize the function. 3 MA modules need 3 processes.
Next, we will analyze the program method of each module.

1.3.2 MA-8X8Y

XMP2-32R-E should read the I/O signal of MA-8X8Y, it can use Modbus instruction "COLR—read coil" to read the data of X0~X7 and Y0~Y7 in process S0.

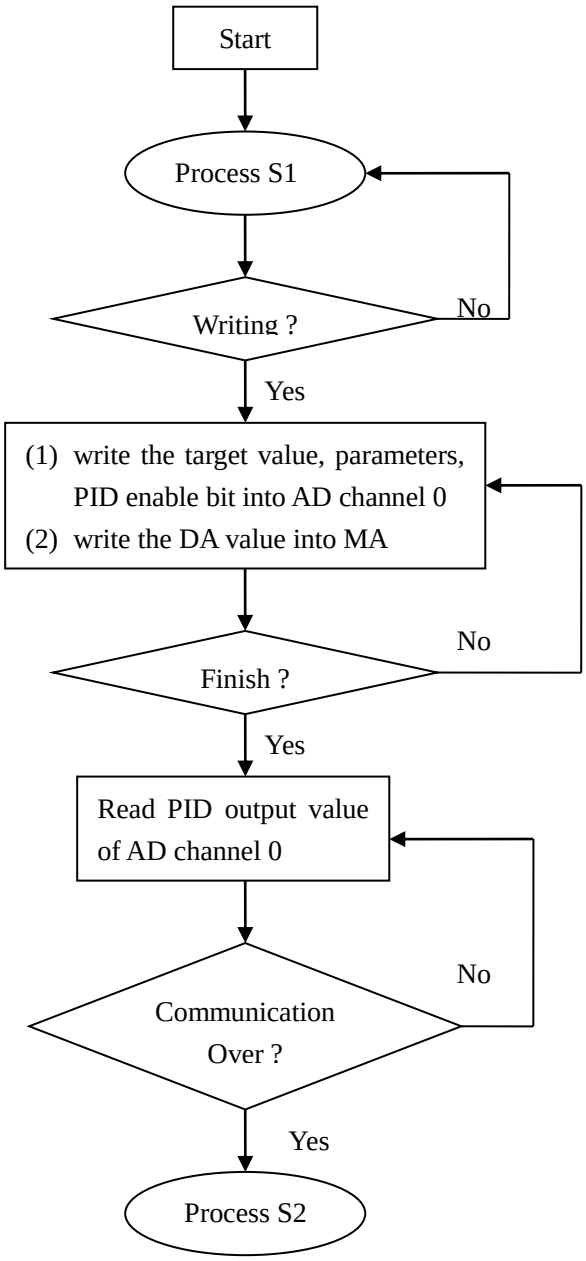


The coil and register used in the program:

Type	Address type	Address	Function
XMP2-32R-E	Auxiliary coil	M100~M107	Save the value of X0~X7 and display on the screen
XMP2-32R-E	Auxiliary coil	M110~M117	Save the value of Y0~Y7 and display on the screen
MA-8X8Y	Bit	K0~K7	X0~X7 channel input signal
MA-8X8Y	Bit	K128~K135	Y0~Y7 channel output signal

1.3.3 MA-4AD2DA

As the requirements, AD is used to write target value into MA-4AD2DA channel 0, read PID output, control PID enable bit manually, modify the PID parameters any time. DA is used to control the analog output. All the contents will be completed in process S1. It will use these instructions: REGW---write one register, MRGW---write many registers, COLW---write one coil, COLR----read coil.



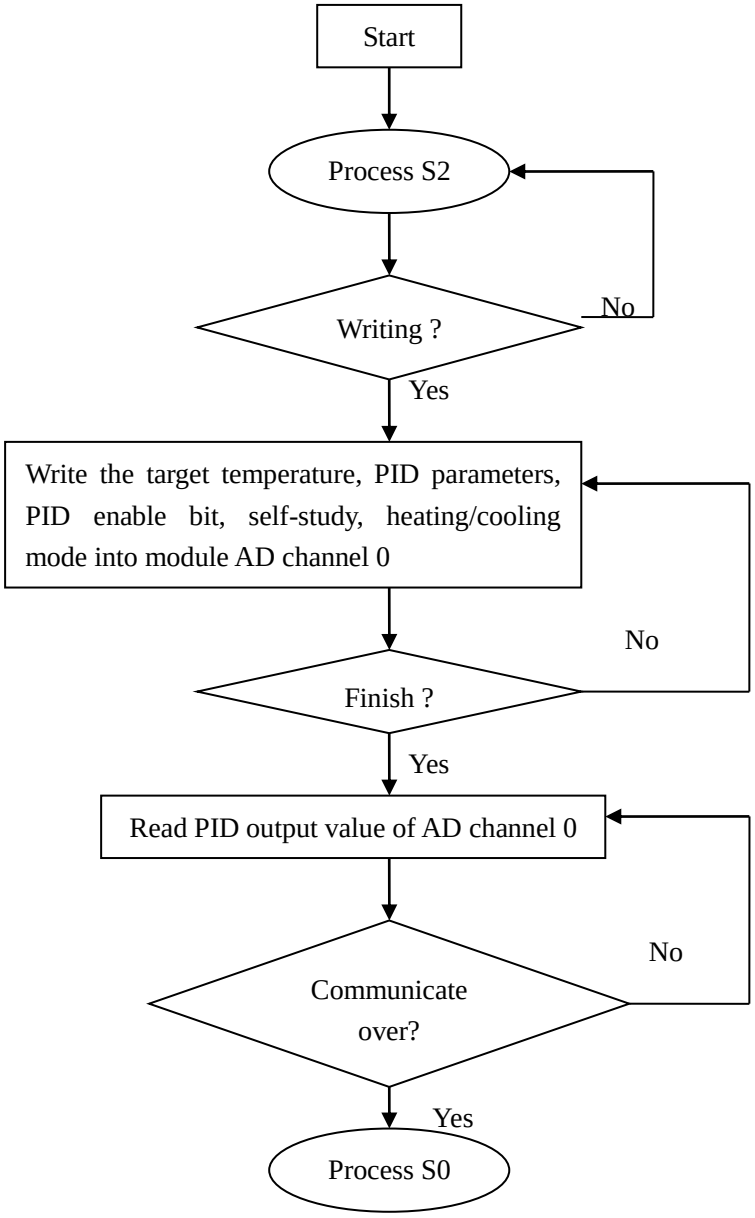
The registers and coils used in the program:

Product type	Address type	Address	Function
XMP2-32R-E	Auxiliary coil	M200	Control the PID enable bit of the module
XMP2-32R-E	Register	D200	Write the target value into AD channel 0
XMP2-32R-E	Register	D201	Read the PID output value of AD channel 0
XMP2-32R-E	Register	D210~D213	Write P, I, D, Diff into the module
XMP2-32R-E	Register	D214	Write PID control period value
XMP2-32R-E	Register	D220	Write the value into DA channel 0
XMP2-32R-E	Register	D221	Write the value into DA channel 1
MA-4AD2DA	Bit	K160	PID enable bit address
MA-4AD2DA	Register	K8	AD channel 0 PID output address
MA-4AD2DA	Register	K130	AD channel 0 target value address

MA-4AD2DA	Register	K134~K137	AD channel 0 P, I, D, Diff parameters address
MA-4AD2DA	Register	K150	PID control period address
MA-4AD2DA	Register	K128	DA channel 0 address
MA-4AD2DA	Register	K129	DA channel 1 address

1.3.4 MA-6PT-P

As the requirements, write the target temperature into module channel 0, read the PID output value and self-study enable bit, control the heating or cooling mode manually, modify the PID parameters anytime. It will use these instructions: REGR, REGW, MRGW, COLW. Besides, in order to monitor the temperature, it can use real-time tendency chart to show the changing of temperature, this function will be introduced in HMI screen part.



The registers and coils used in the program:

Product type	Address type	Address	Function
XMP2-32R-E	Auxiliary coil	M300	Control the PID enable bit
XMP2-32R-E	Auxiliary coil	M301	Control the self-study enable bit
XMP2-32R-E	Auxiliary coil	M302	Control the heating/cooling mode
XMP2-32R-E	Register	D300	target value of module channel 0
XMP2-32R-E	Register	D301	Read PID output value
XMP2-32R-E	Register	D310~D313	P, I, D, Diff parameters
XMP2-32R-E	Register	D314	PID control period
MA-6PT-P	Bit	K128	PID enable bit address
MA-6PT-P	Bit	K136	Self-study enable bit address
MA-6PT-P	Bit	K144	Heating/cooling mode address
MA-6PT-P	Register	K128	Target temperature address of channel 0
MA-6PT-P	Register	K6	PID output address of channel 0
MA-6PT-P	Register	K134~K137	P, I, D, Diff parameters address
MA-6PT-P	Register	K158	PID control period address

1.3.5 Control program

The control program will include three processes S0, S1, S2. Three processes are responsible for communicate with 3 MA modules.

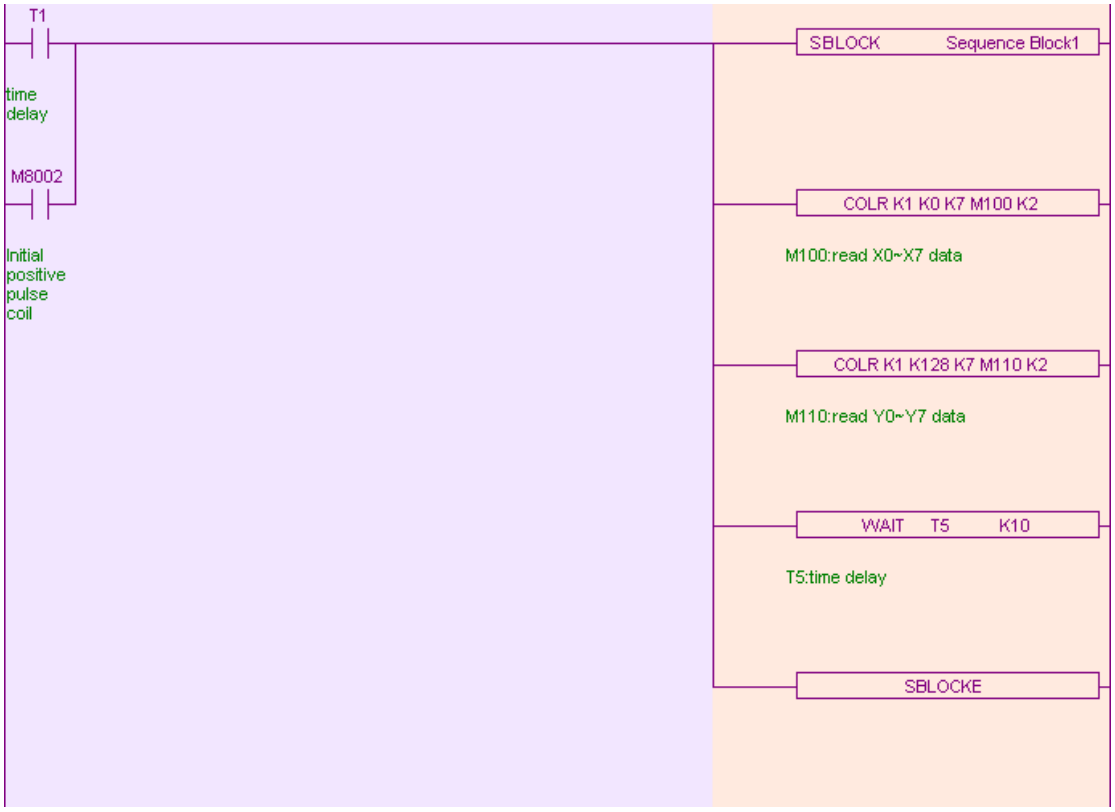
Time delay is added in the beginning of each process, in order to prevent from communication error and fall into endless loop. When the communication is successful or the time delay is over, the program will go to next process. Time delay should not be too long, or the communication time will be long and delayed.

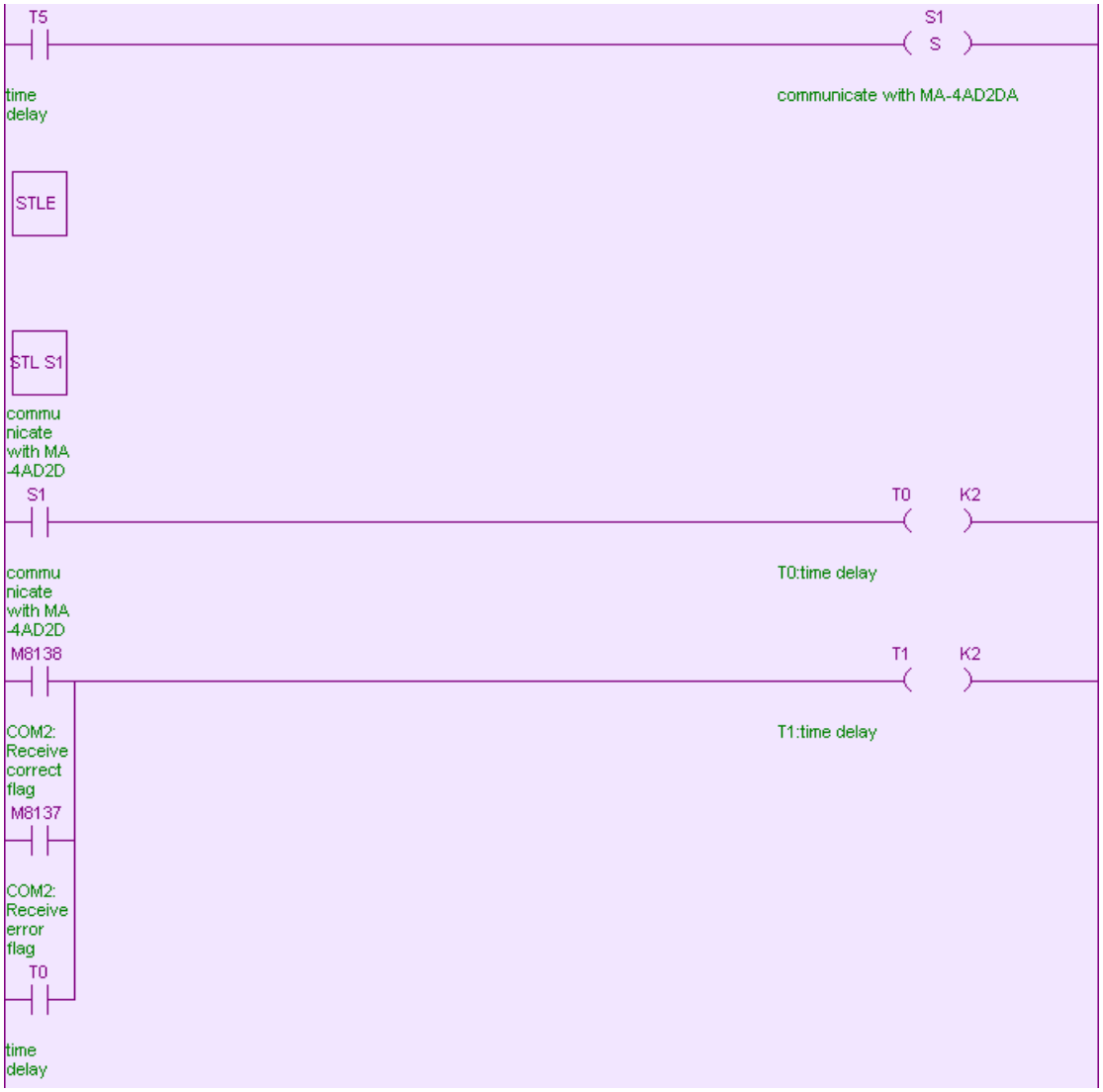
Please note that, there are some parameters in MA modules which are set as default value, such as I/O mode (voltage/ current), measure range. If user wants to modify these parameters, it is needed to add write instruction.

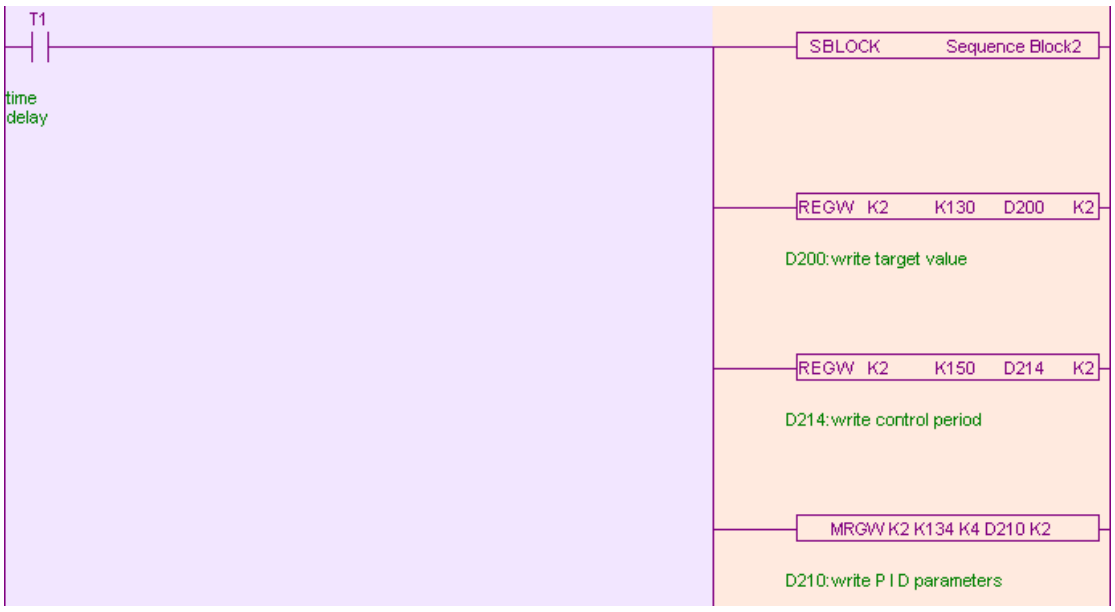
At last, make sure all the slave station No. are right when writing the instructions.

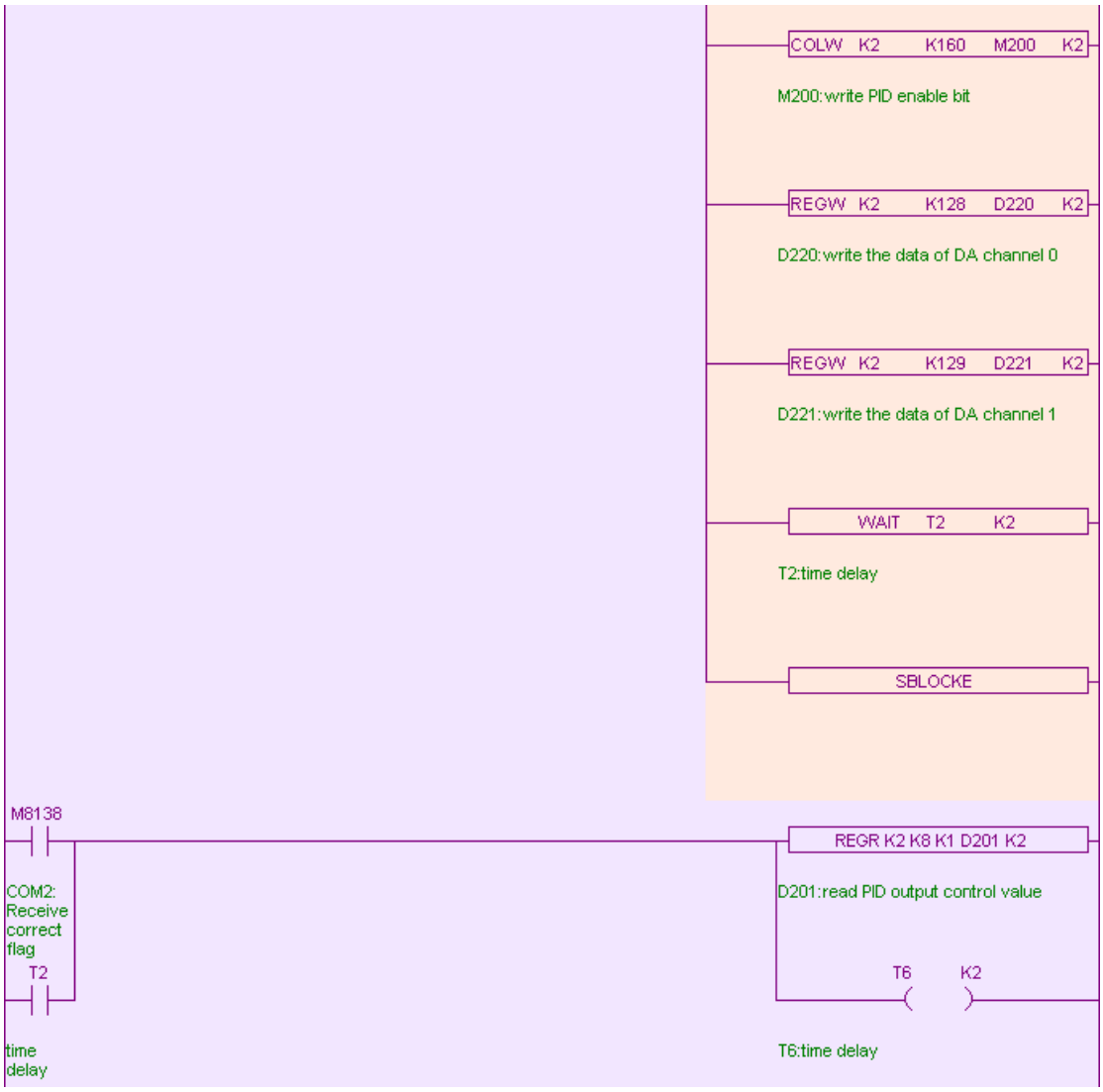
The whole program is as below:

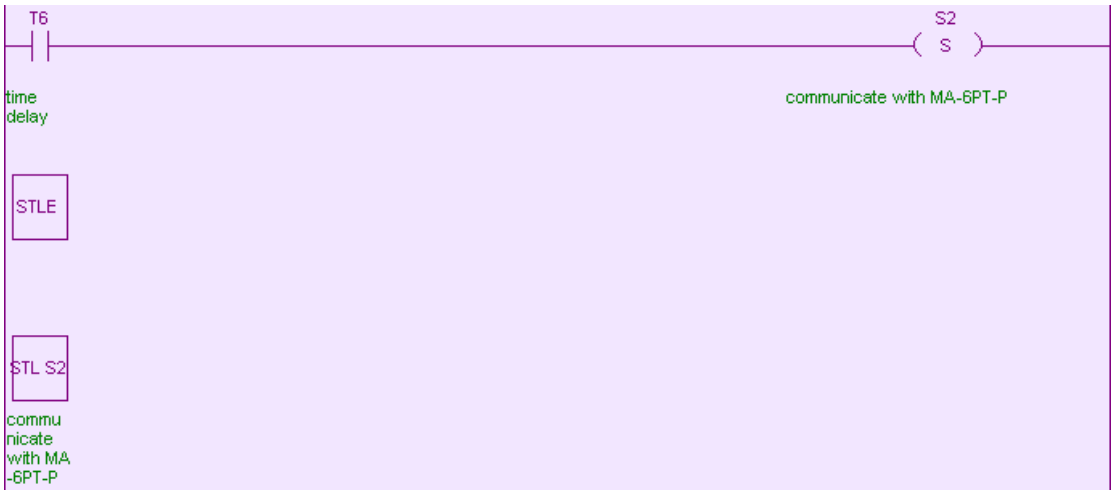

M8002
S0
S
Initial positive pulse coil
communicate with MA-8X8Y
STL S0
commu nicate with MA -8X8Y
S0
T0
K10
commu nicate with MA -8X8Y
T0:time delay
M8138
T1
K2
COM2: Receive correct flag
T1:time delay
M8137
COM2: Receive error flag
T0
time delay

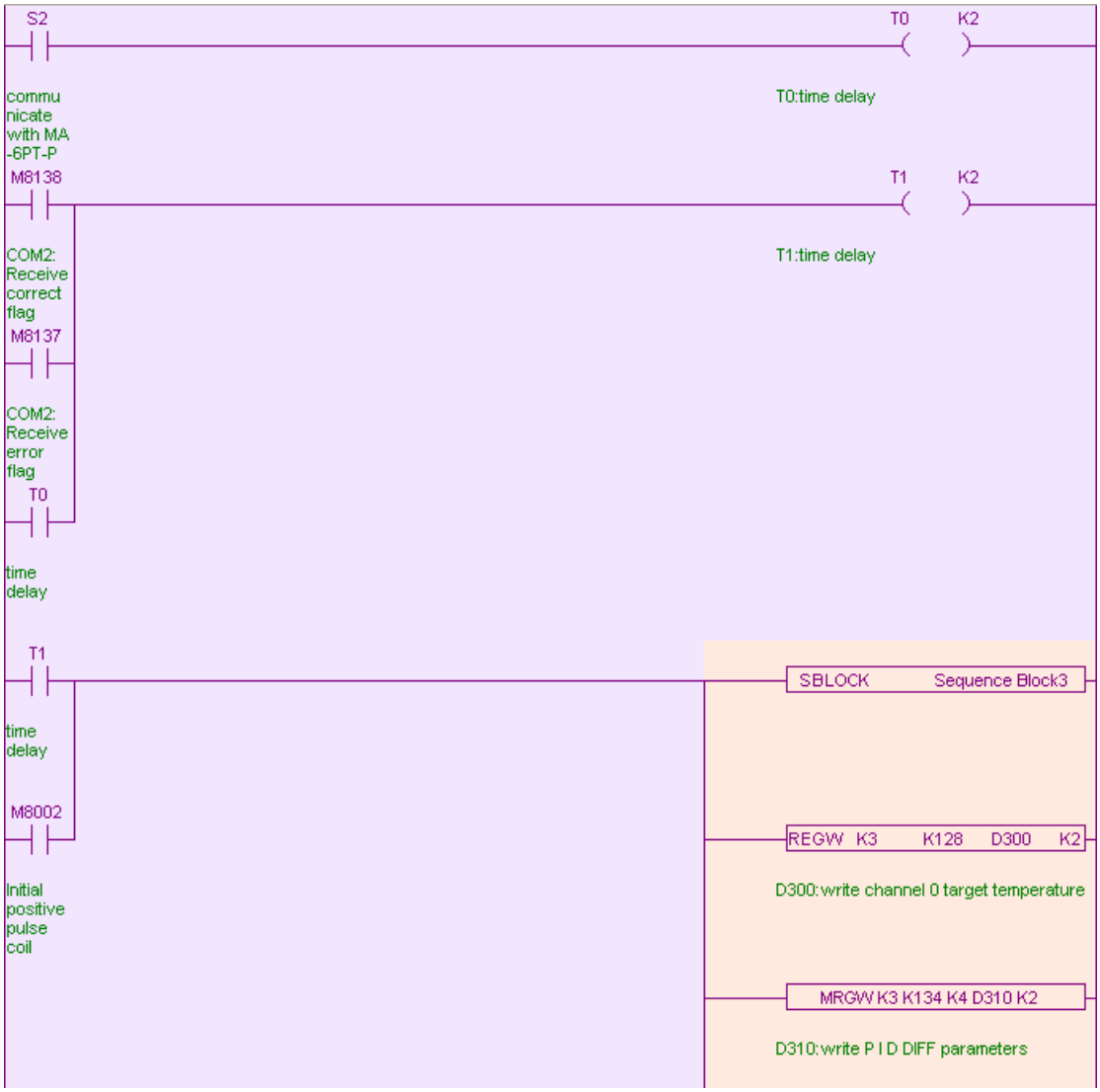

T1
time delay
SBLOCK Sequence Block1
M8002
COLR K1 K0 K7 M100 K2
Initial positive pulse coil
M100:read X0~X7 data
COLR K1 K128 K7 M110 K2
M110:read Y0~Y7 data
WAIT T5 K10
T5:time delay
SBLOCKE

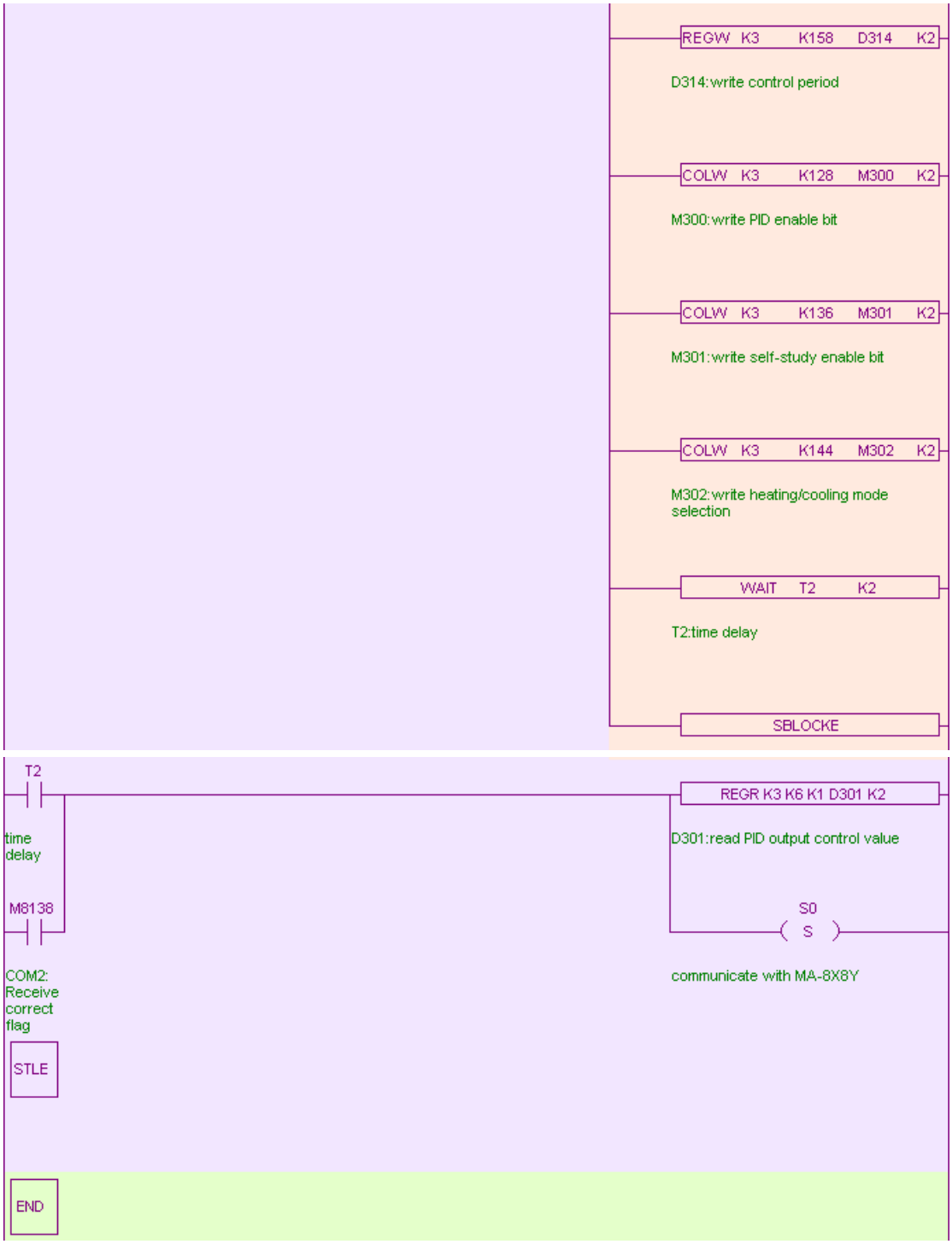

T5
S1
S
time
delay
communicate with MA-4AD2DA
STLE
STL S1
commu
nicate
with MA
-4AD2D
S1
T0
K2
commu
nicate
with MA
-4AD2D
T0:time delay
M8138
T1
K2
COM2:
Receive
correct
flag
T1:time delay
M8137
COM2:
Receive
error
flag
T0
time
delay


T1
time
delay
SBLOCK Sequence Block2
REGW K2 K130 D200 K2
D200:write target value
REGW K2 K150 D214 K2
D214:write control period
MRGW K2 K134 K4 D210 K2
D210:write P I D parameters


COLW K2 K160 M200 K2
M200:write PID enable bit
REGW K2 K128 D220 K2
D220:write the data of DA channel 0
REGW K2 K129 D221 K2
D221:write the data of DA channel 1
WAIT T2 K2
T2:time delay
SBLOCKE
M8138
REGR K2 K8 K1 D201 K2
D201:read PID output control value
COM2:
Receive
correct
flag
T2
T6 K2
time
delay
T6:time delay


T6
S2
S
time
delay
communicate with MA-6PT-P
STLE
STL S2
commu
nicate
with MA
-6PT-P


S2
T0
K2
commu
nicate
with MA
-6PT-P
T0:time delay
M8138
T1
K2
COM2:
Receive
correct
flag
T1:time delay
M8137
COM2:
Receive
error
flag
T0
time
delay
T1
SBLOCK
Sequence Block3
time
delay
M8002
REGW K3
K128
D300
K2
Initial
positive
pulse
coil
D300:write channel 0 target temperature
MRGW K3 K134 K4 D310 K2
D310:write P I D DIFF parameters


REGW K3 K158 D314 K2
D314:write control period
COLW K3 K128 M300 K2
M300:write PID enable bit
COLW K3 K136 M301 K2
M301:write self-study enable bit
COLW K3 K144 M302 K2
M302:write heating/cooling mode selection
WAIT T2 K2
T2:time delay
SBLOCKE
T2
time delay
M8138
COM2: Receive correct flag
STLE
REGR K3 K6 K1 D301 K2
D301:read PID output control value
S0
S
communicate with MA-8X8Y
END

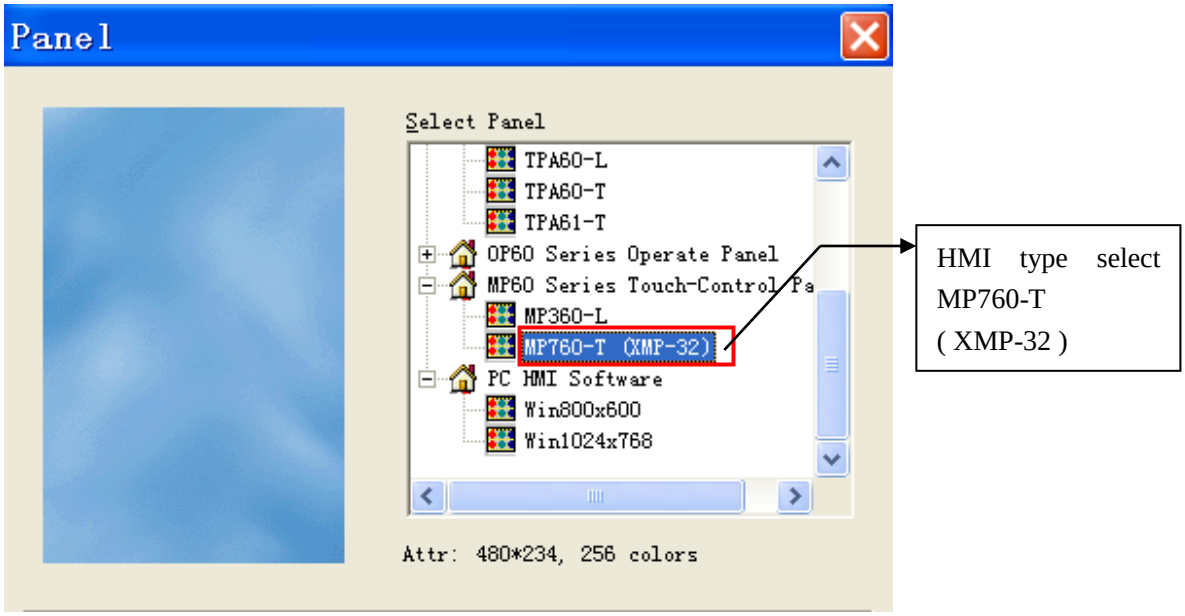
1.4 HMI program

XMP2-32R-E is integrated controller with HMI and PLC in one device. After completing the PLC program, the next is to edit the HMI screen to monitor the data of the modules. HMI communicates with PLC directly, PLC is responsible to receive and process the data.

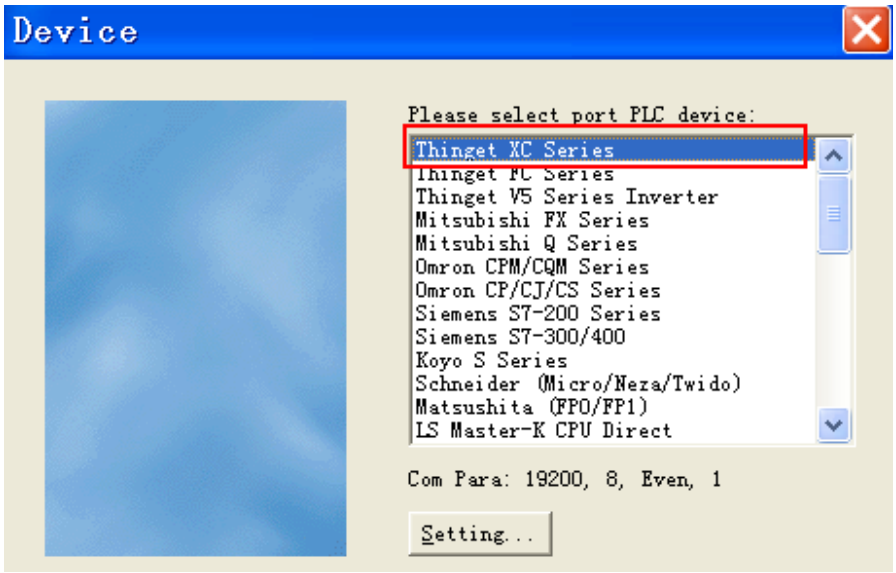
1.4.1 Build a new project

XMP2-32R-E is integrated with HMI and PLC, so the HMI screen will be edited in Touchwin software.

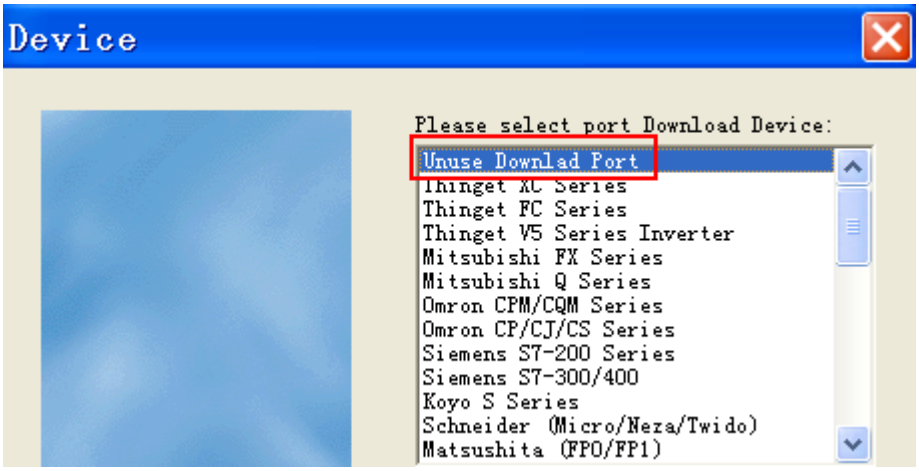
1. Open Touchwin software, build a new project, show below window:



2. PLC type select Thinget XC series



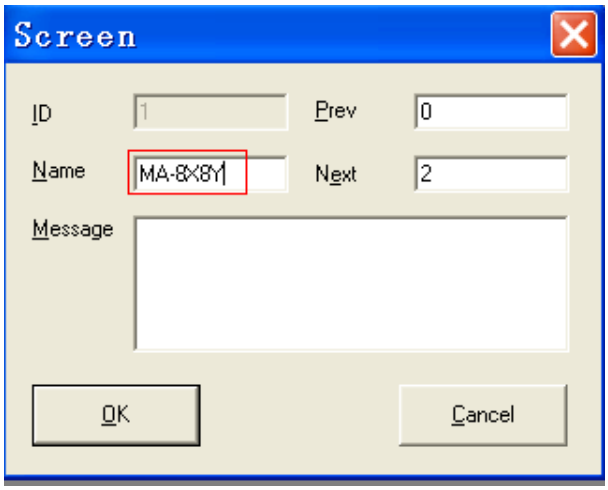
3. Download port device select unuse:



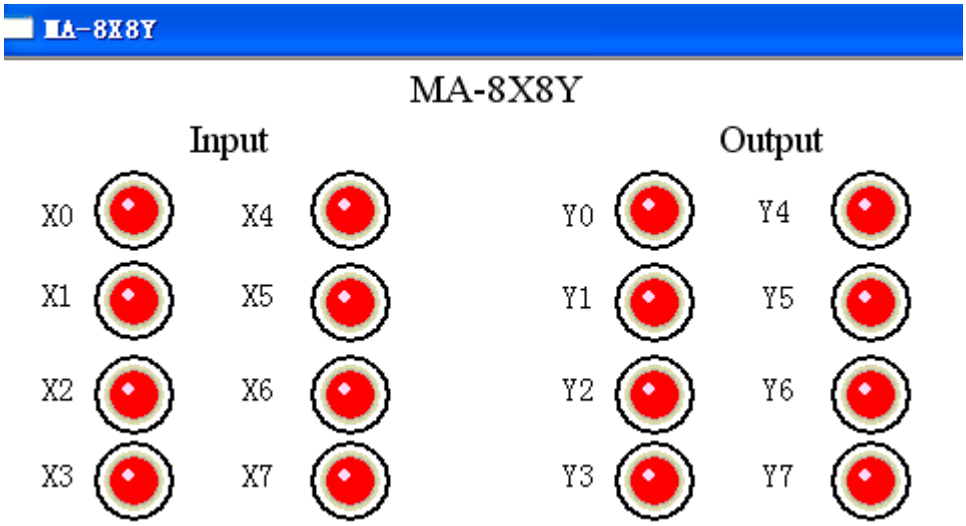
4. Click next until finish.

1.4.2 Screen 1 MA-8X8Y

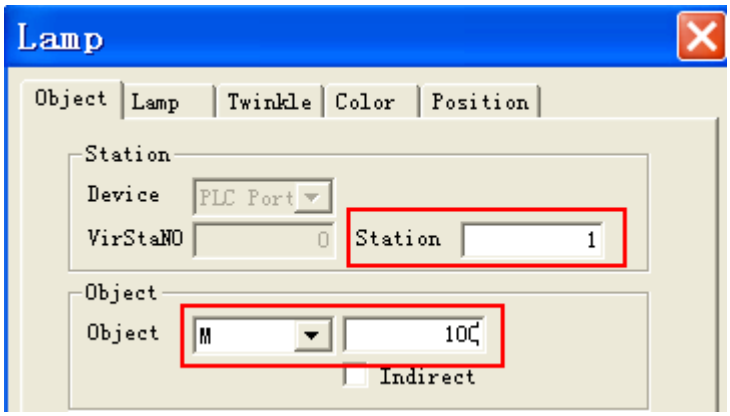
First, name screen 1 to be MA-8X8Y:



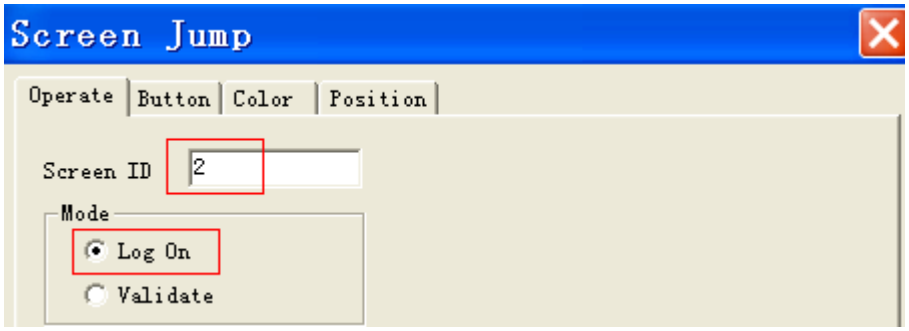
According to the requirements, PLC reads the module data, and HMI displays the data on the screen. Put 16 lamps and 16 texts on the screen. Texts content are: X0~X7, Y0~Y7. The lamps addresses are: M100~M107, M110~M117. Besides, it can add some suggestive words on the screen, please see the following picture:



Take X0 lamp as an example, set the station No. to be 1, address is M100:

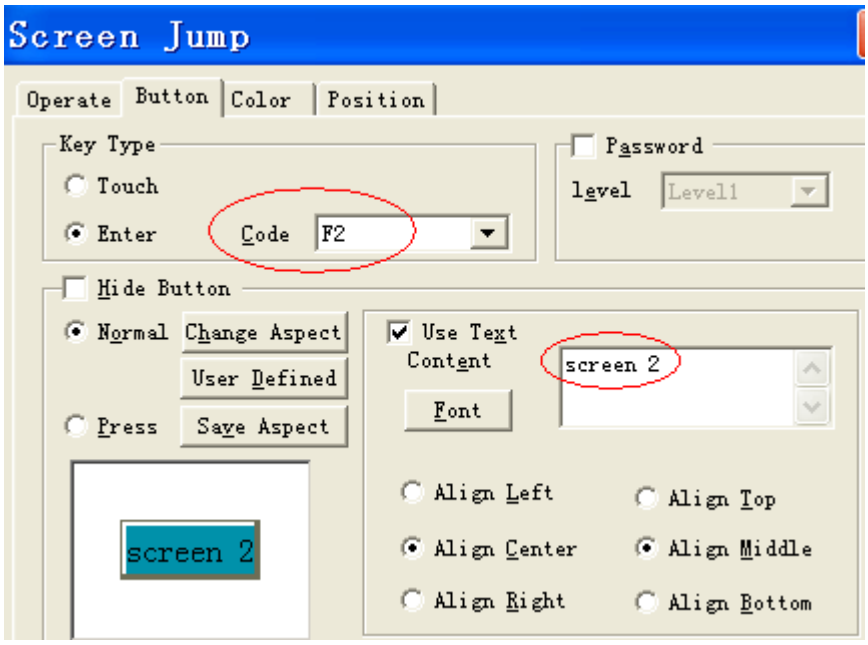


In order to go to screen 2, put a screen jump button on the screen:

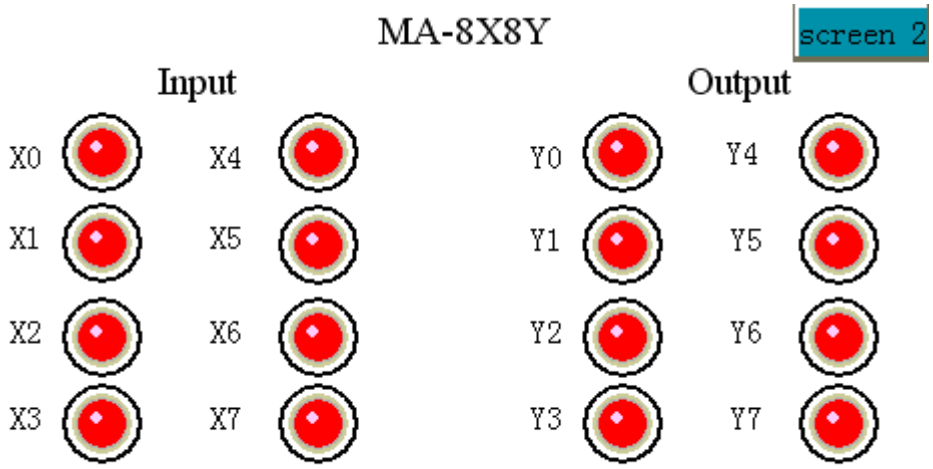


Set the screen ID to 2, do not need to set password, so the mode is log on.

In “button” tab, set the enter code to be F2, content to be screen 2. As XMP2-32R-E has panel buttons, the jump screen function can use the F2 button on the panel.



The finished screen is as below:

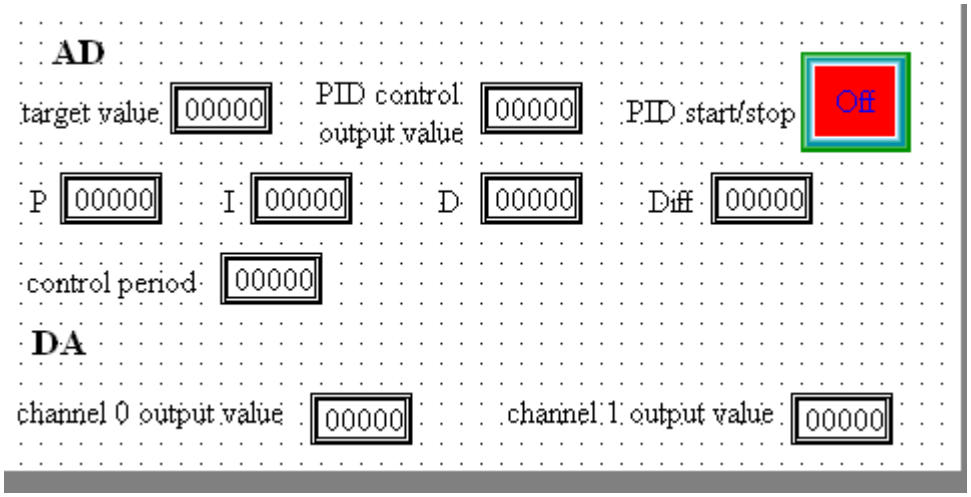


1.4.3 Screen 2 MA-4AD2DA

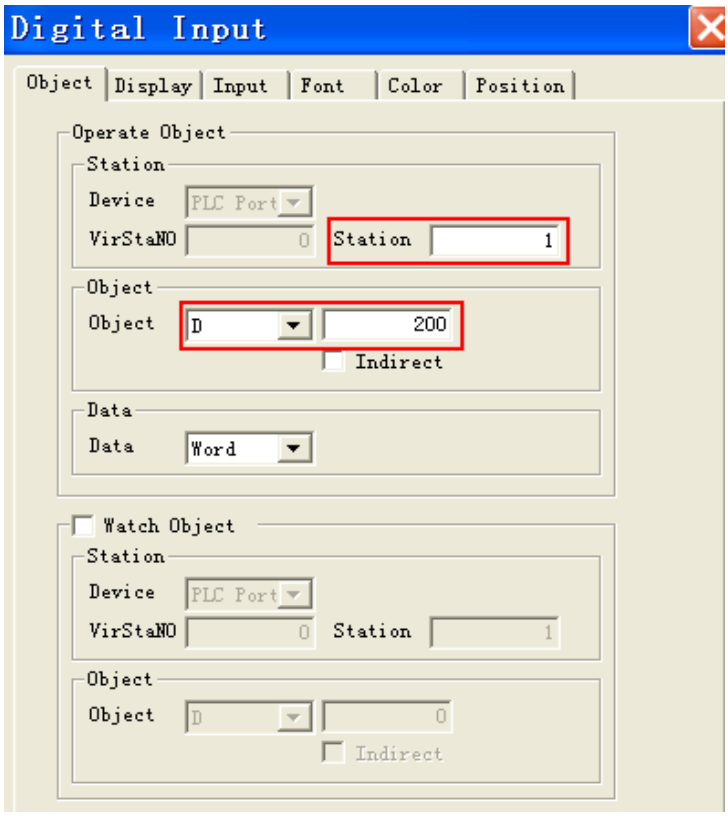
Similar to screen 1, build a new screen 2 named " MA-4AD2DA".

Screen 2 includes the control and display of AD and DA. AD needs 6 data input buttons, 1 lamp. DA needs 2 data input buttons.

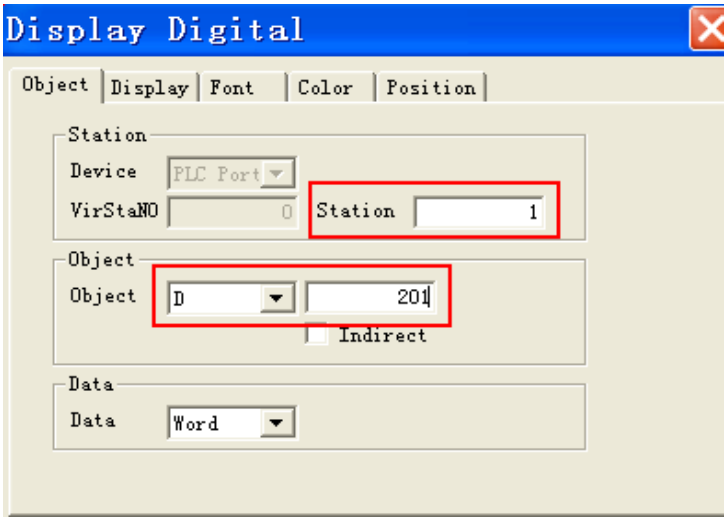
Please see below picture:



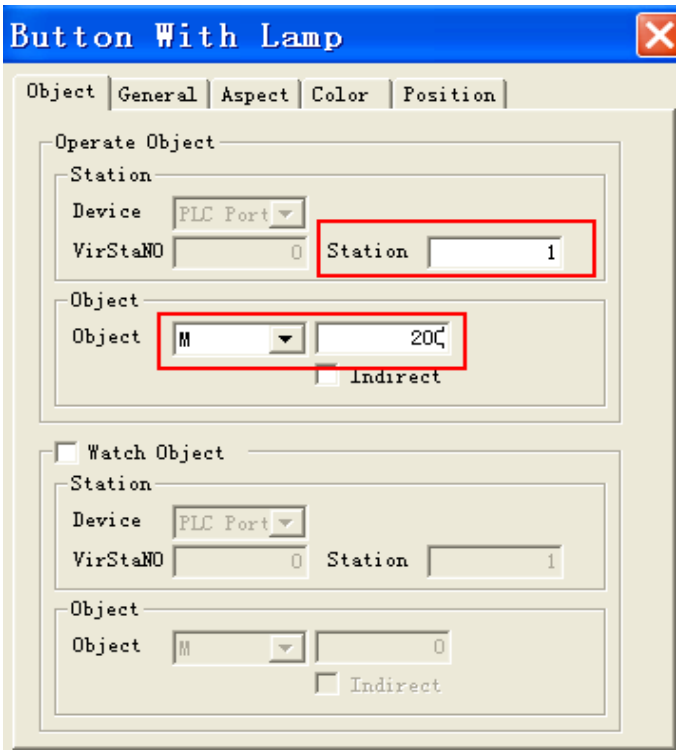
AD: data input button addresses are: D200 (target value), D210 (P), D211(I), D212 (D), D213 (Diff), D214 (control period). Take target value for example, set the address to be D200, station No. 1.



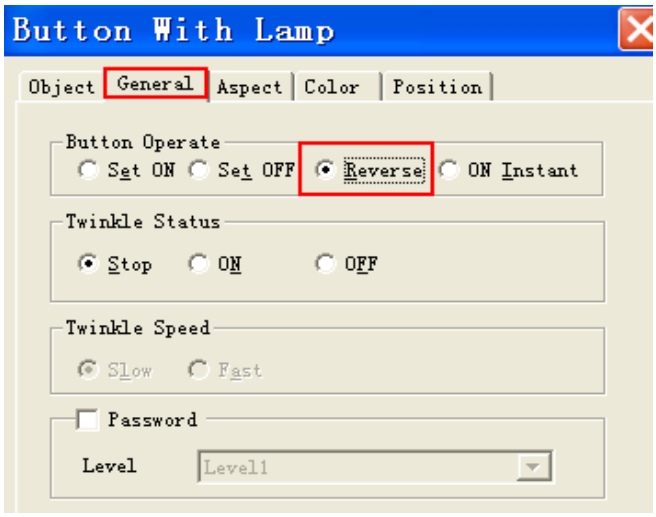
Data display button address is D201(PID control output value), set as below:



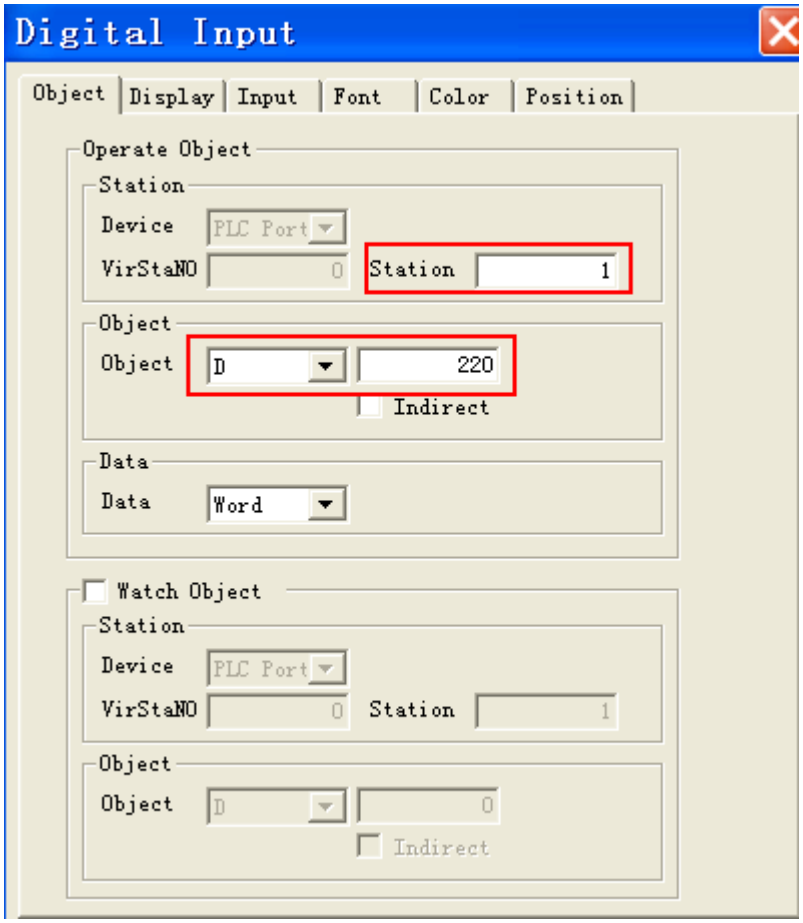
Lamp button is used to display the PID enable bit of channel 0, set the address to be M200, station No.1:



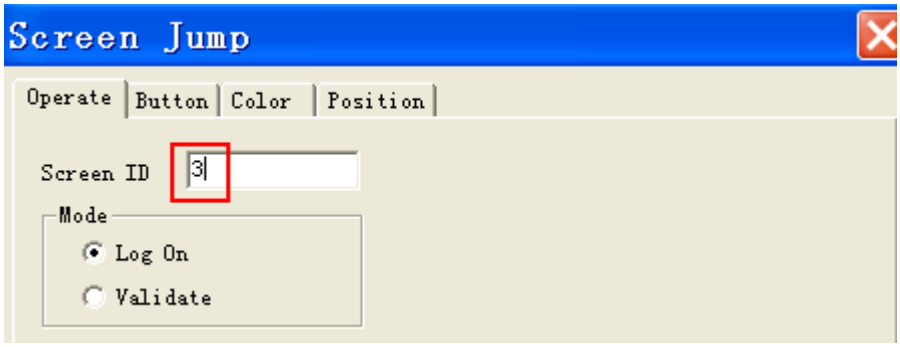
The operation of lamp button set to be reverse, other choices set as default:



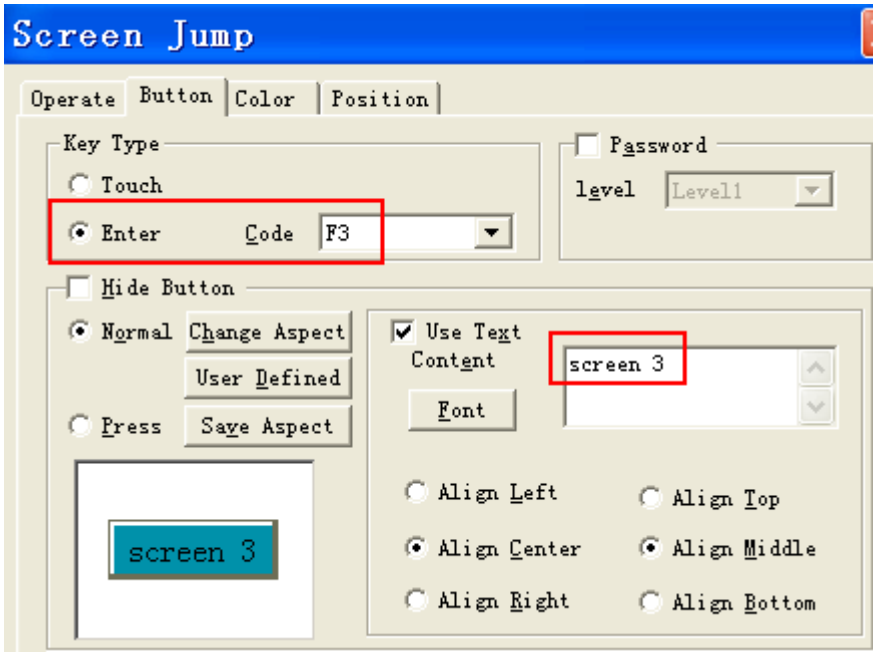
DA: the addresses of data input button are: D220 (channel 0 output value) , D221 (channel 1 output value). Take channel 0 for example: set the address to be D220, station No.1, other choices set as default:



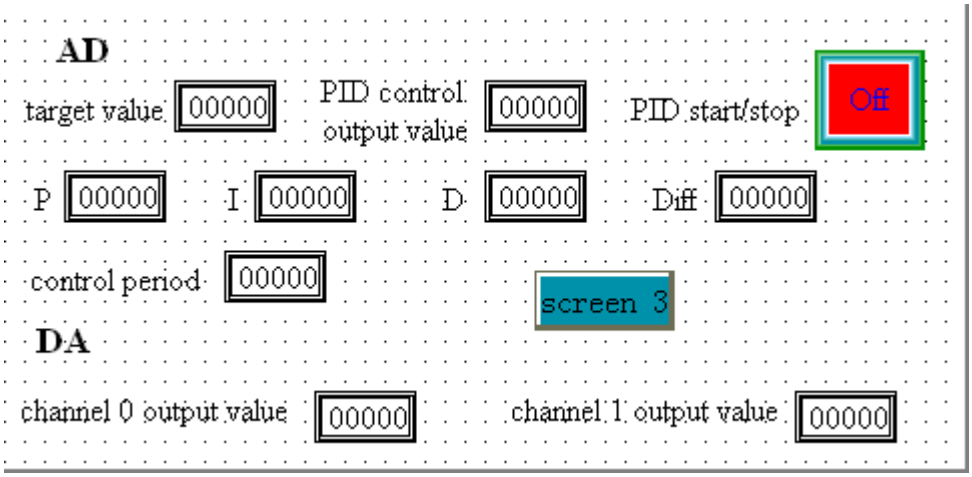
At last, put a screen jump button on the screen, jump to screen 3:



Use panel button F3 to realize the jump function.



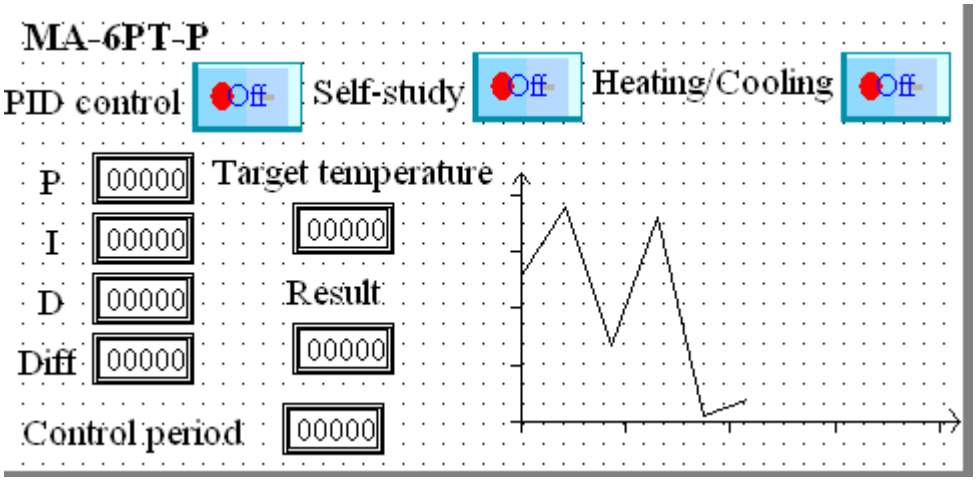
The final screen is as below:



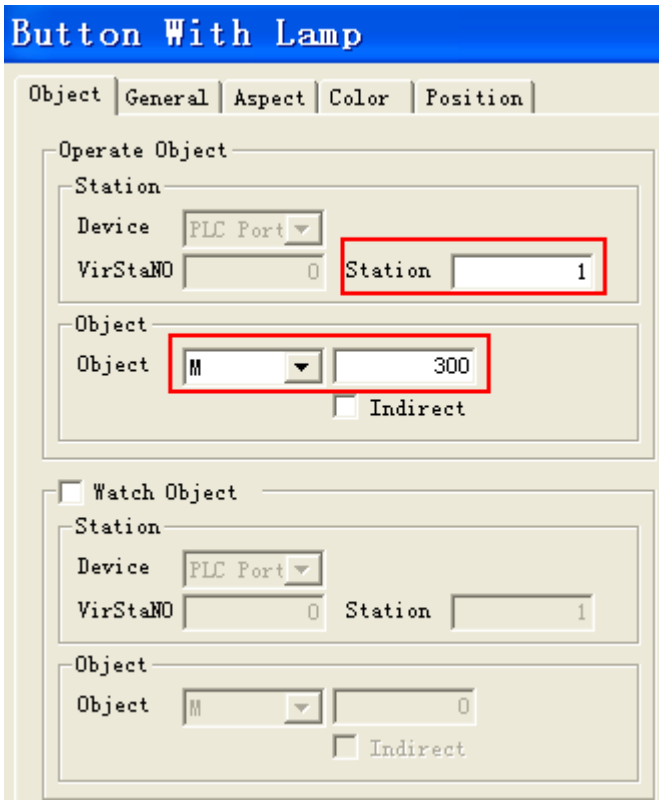
1.4.4 Screen 3 MA-6PT-P

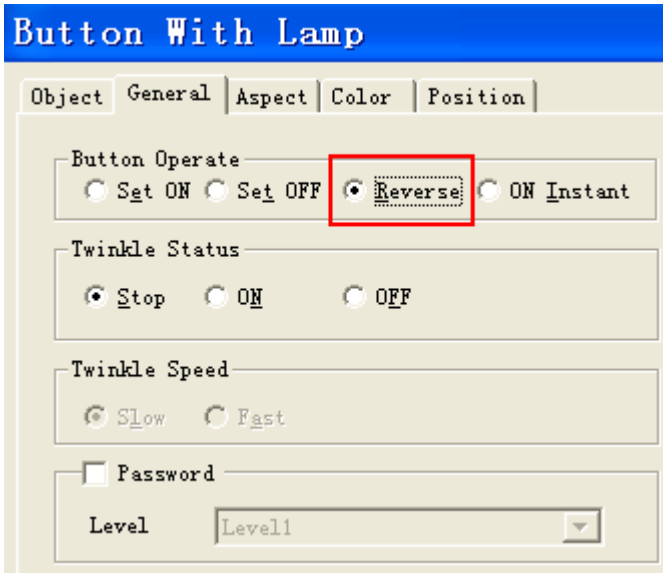
Build a new screen, named as “ MA-6PT-P ”.

According to the requirements, it needs 3 lamp buttons, 6 data input buttons, 1 data display button and 1 real time tendency chart. Data input button is used to input target value and PID parameters, data display is used to display PID control result, button is used to control the ON/OFF. Real time tendency chart can reflect the changing of temperature.

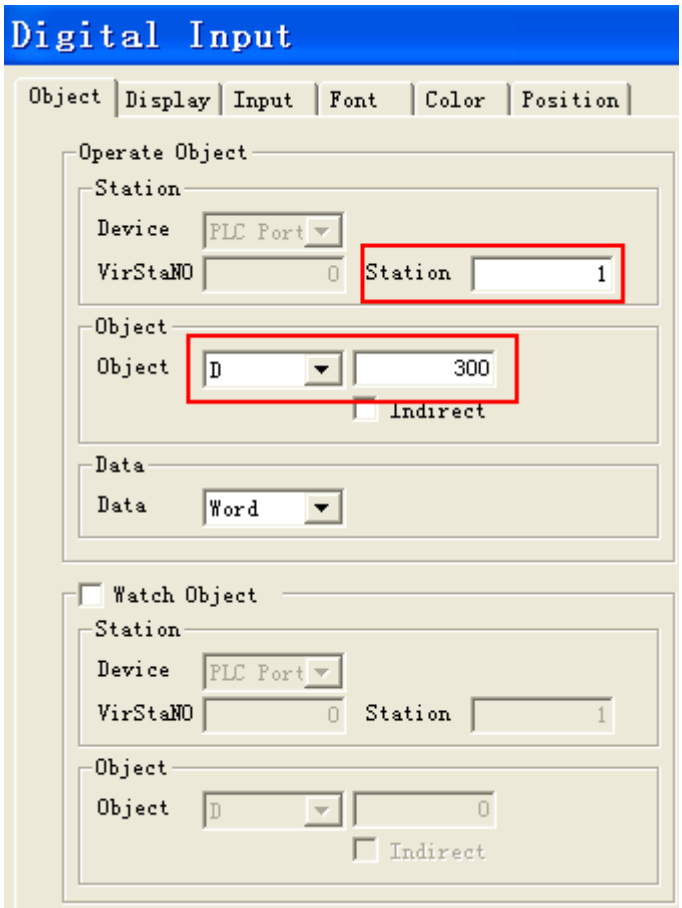


The lamp button addresses are: M300 (PID control), M301 (self-study), M302 (Heating/cooling). Take PID control lamp button for example, set the address to be M300, station No.1, button operation is reverse, other choices set as default:



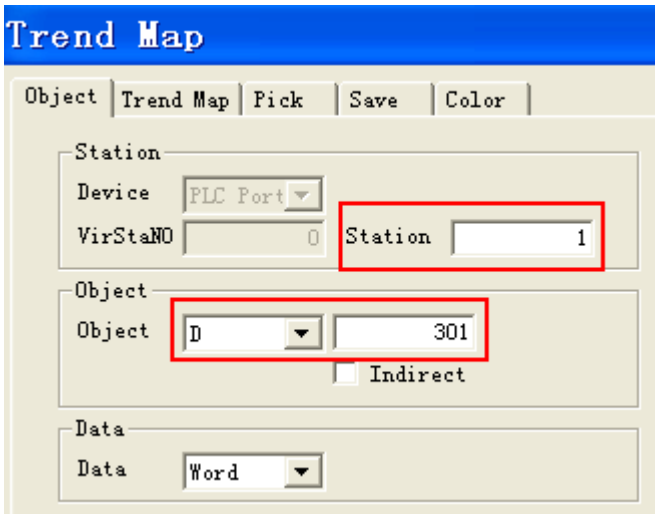


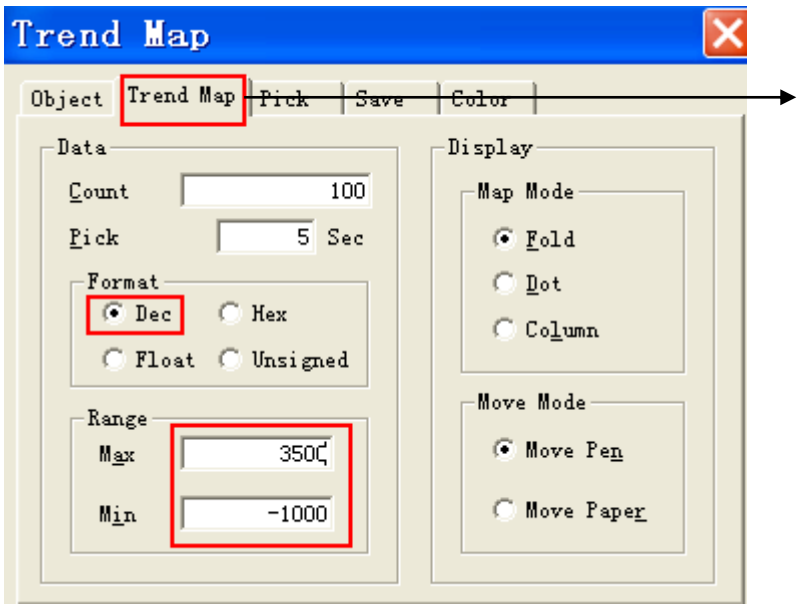
Data input button addresses are: D300 (target temperature), D310 (P), D311 (I), D312 (D), D313 (Diff), D314 (control period). Take target temperature as an example, set the address to be D300, station No.1, other choices set as default:



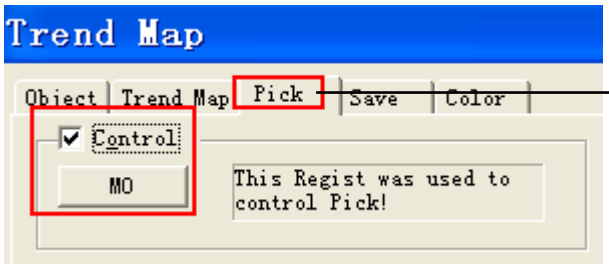
Real time tendency chart is used to display the temperature changing, the address is D301:

Click Modify, set the address to be D301, station NO.1

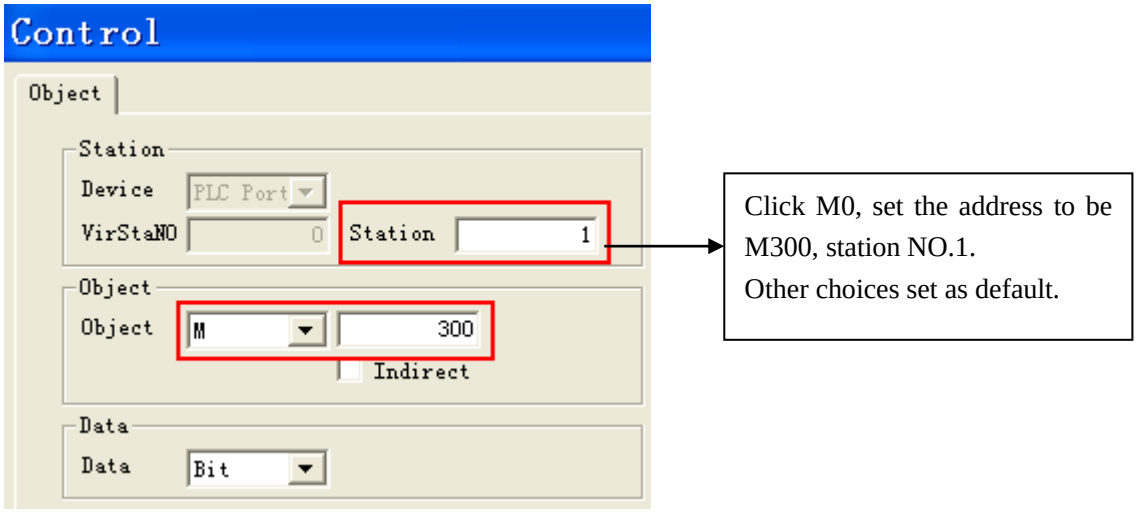




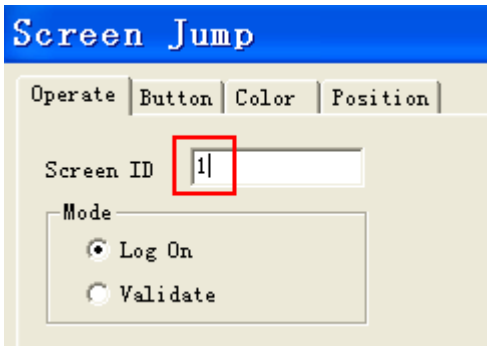
Switch to trend map, modify the temperature range to be -1000~3500, which means the temperature range is -100 ℃ ～ 350 ℃ as the precision is 0.1℃.

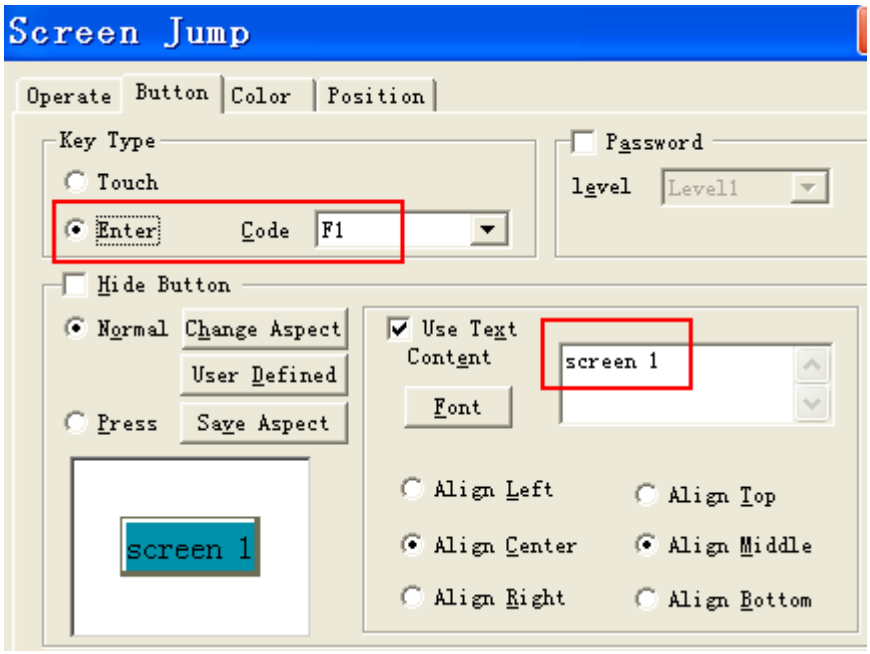


Switch to Pick, this item is used to display the temperature changing after PID control started.

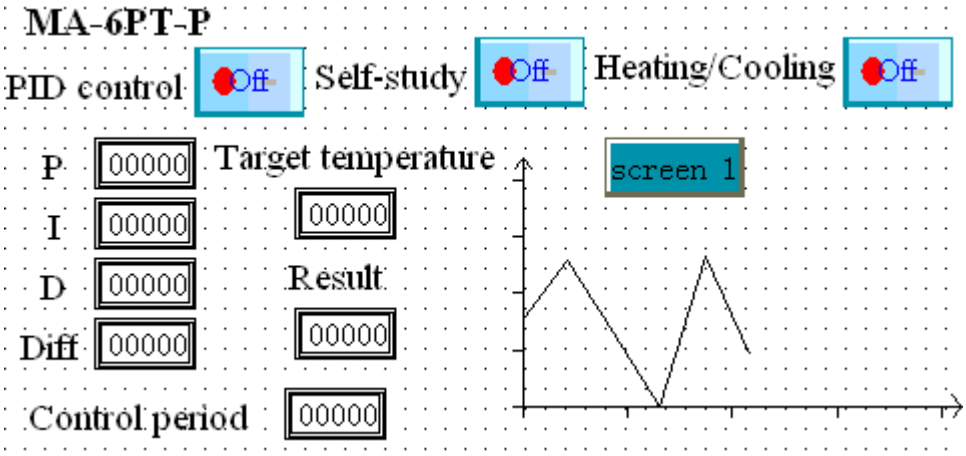


At last, put a screen jump button on the screen in order to jump to screen 1.





The final Screen 3 is shown as below:



By now, the screen design has been finished. The processing method for multi-module communication is similar to single module. Within this example, the module communicates with PLC directly, touch screen only gets information and controls the action of module by reading PLC. Thus, the station number of buttons and elements mentioned above are all PLC station numbers. It should be noticed that if touch screen communicates with module directly, the station number is different for each module.

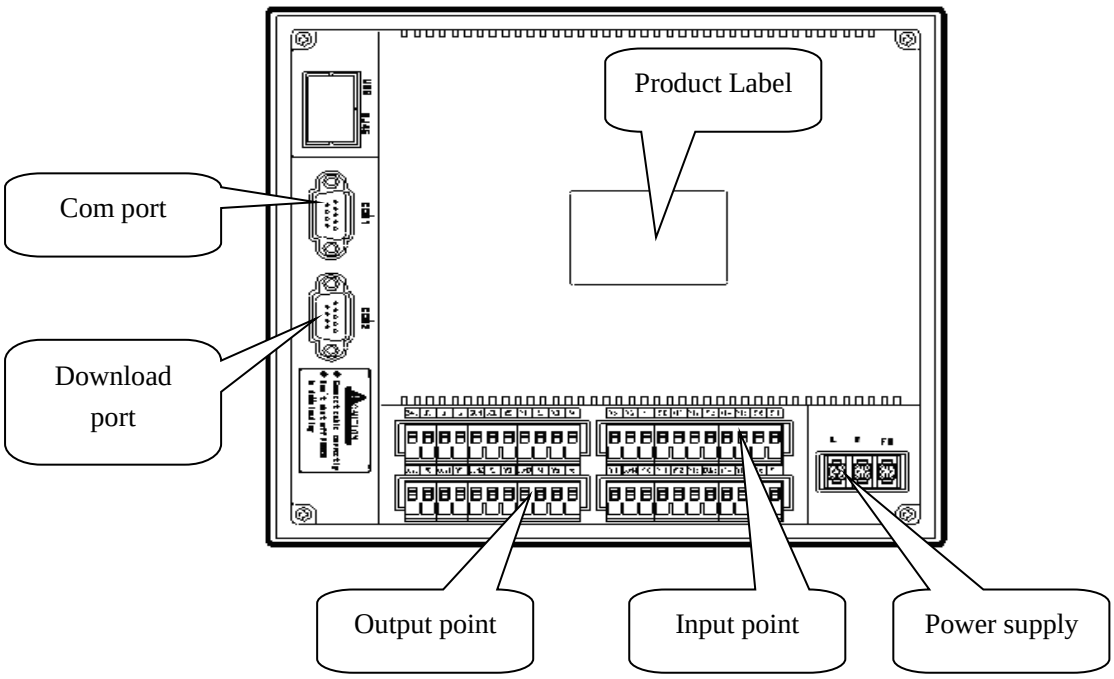
Besides, please note that whatever the registers are from MA-4AD2DA or MA-6PT-P, the register value is an intermediate quantity. For example, when register value is 800 when reading the temperature, it means the actual temperature is 80℃ (precision is 0.1℃).

1.5 Hardware connection

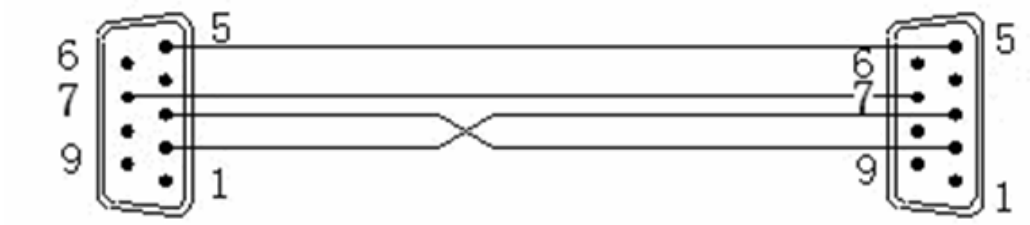
1.5.1 Download connection

After completing the design of PLC and HMI programs, download these programs into integrated controller XMP2-32R-E.

The interface and I/O points of XMP2-32R-E are shown as below:



The connection between download port and serial port of PC



XMP2-32R-E download port PC serial port

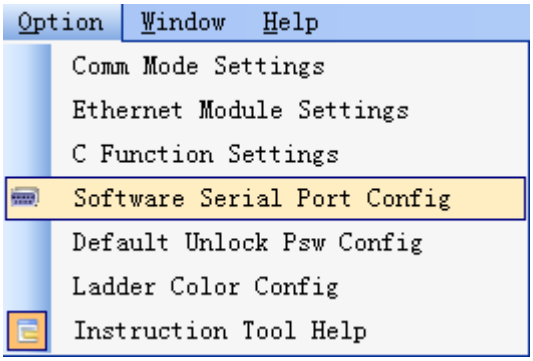
NOTICE:

(1) The power supply of XMP2-32R-E is AC 220V.
(2) The power supply of MA module is DC 24V (connect with 24V DC output on XMP2-32R-E).
(3) Whatever downloading PLC or HMI program, it should proceed via download port.
(4) We recommend to use the special PLC and HMI cables made by Xinje. You also can make the cable by yourself refer to the diagram shown above. If the PC doesn't has serial port, you can use USB-RS232 converter.

1.5.2 Download PLC program

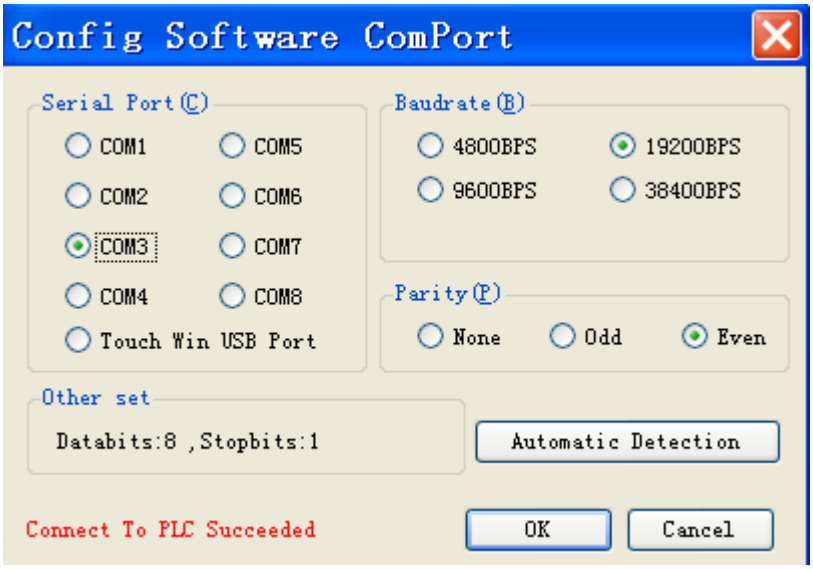
1. Online

Before downloading the program into PLC, make sure XMP2-32R-E is connected to PC successfully. Click  to set serial port, please see the picture shown below:

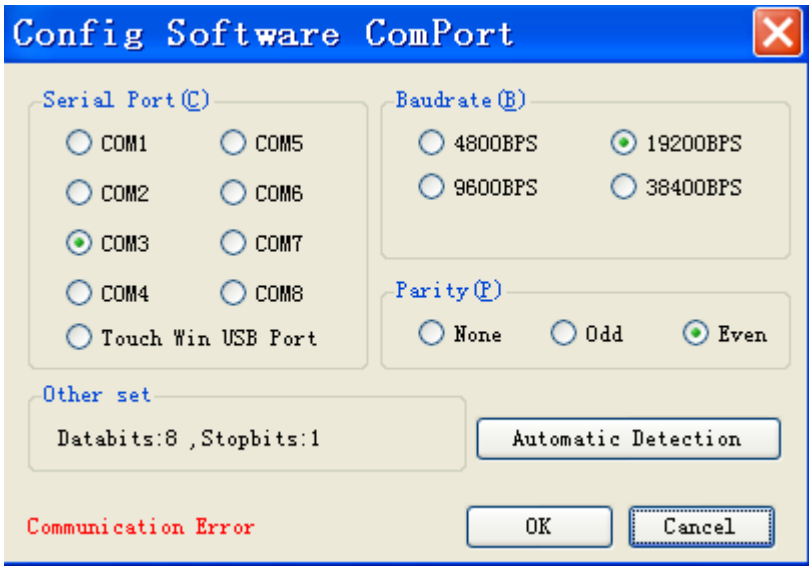


In “Config software comport” window, select the correct serial port, baud rate, parity or click “automatic detection” to auto-check these parameters.

When you see the red words “ Connect to PLC succeeded ”, it means PLC is connected with PC successfully. Click “OK” which is shown as below:

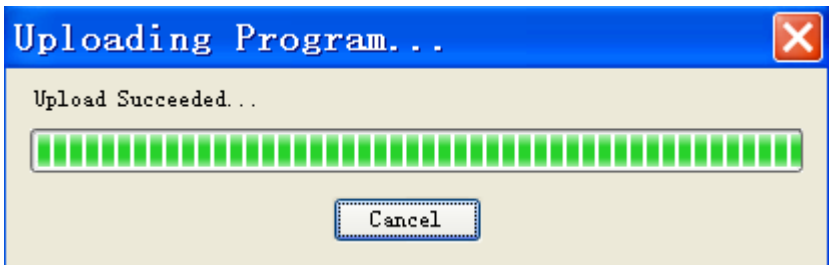


If the connection is failed, “Config software comport” window will show “communication error”. At this time, please check the PLC port, PC serial port and communication cable.

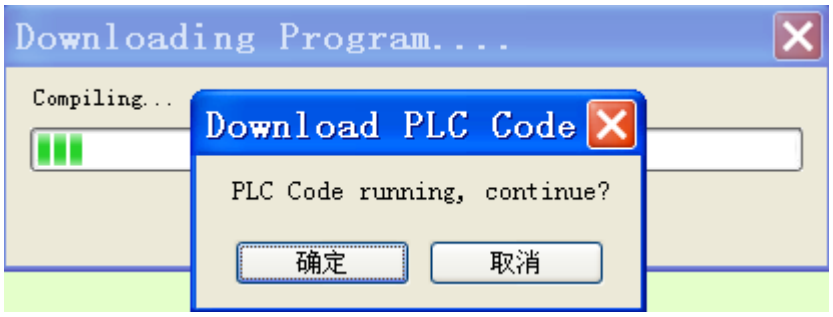


2. Download the program

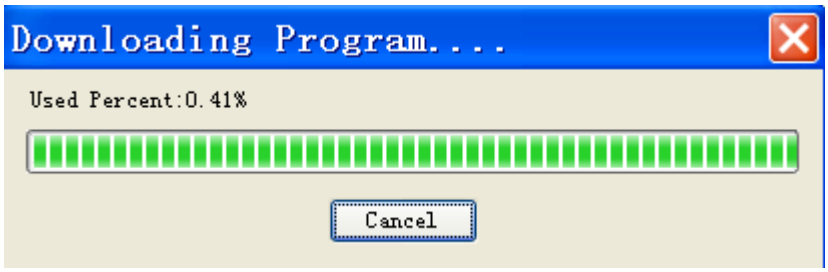
After the connection is successful, click icon to upload the PLC program. Click to save the program.



Click icon to download the program. If PLC is running, it will show the following message:



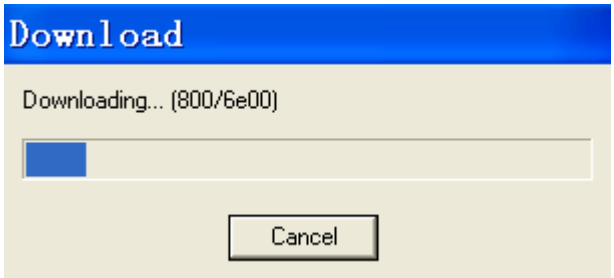
Click "OK" to stop the PLC running and download the program. It will show the downloading progress window:



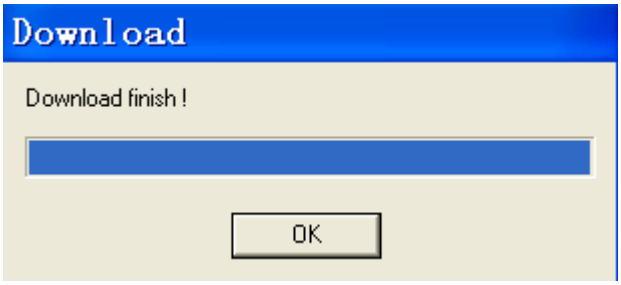
When download process has been finished, click icon to run the PLC.

1.5.3 Download the screen

Connect the XMP2-32R-E download port with PC serial port, turn on the 220V power, click icon of Touchwin software to download the data. If it shows "connection timeout, please check the cable", you have to download the program again.



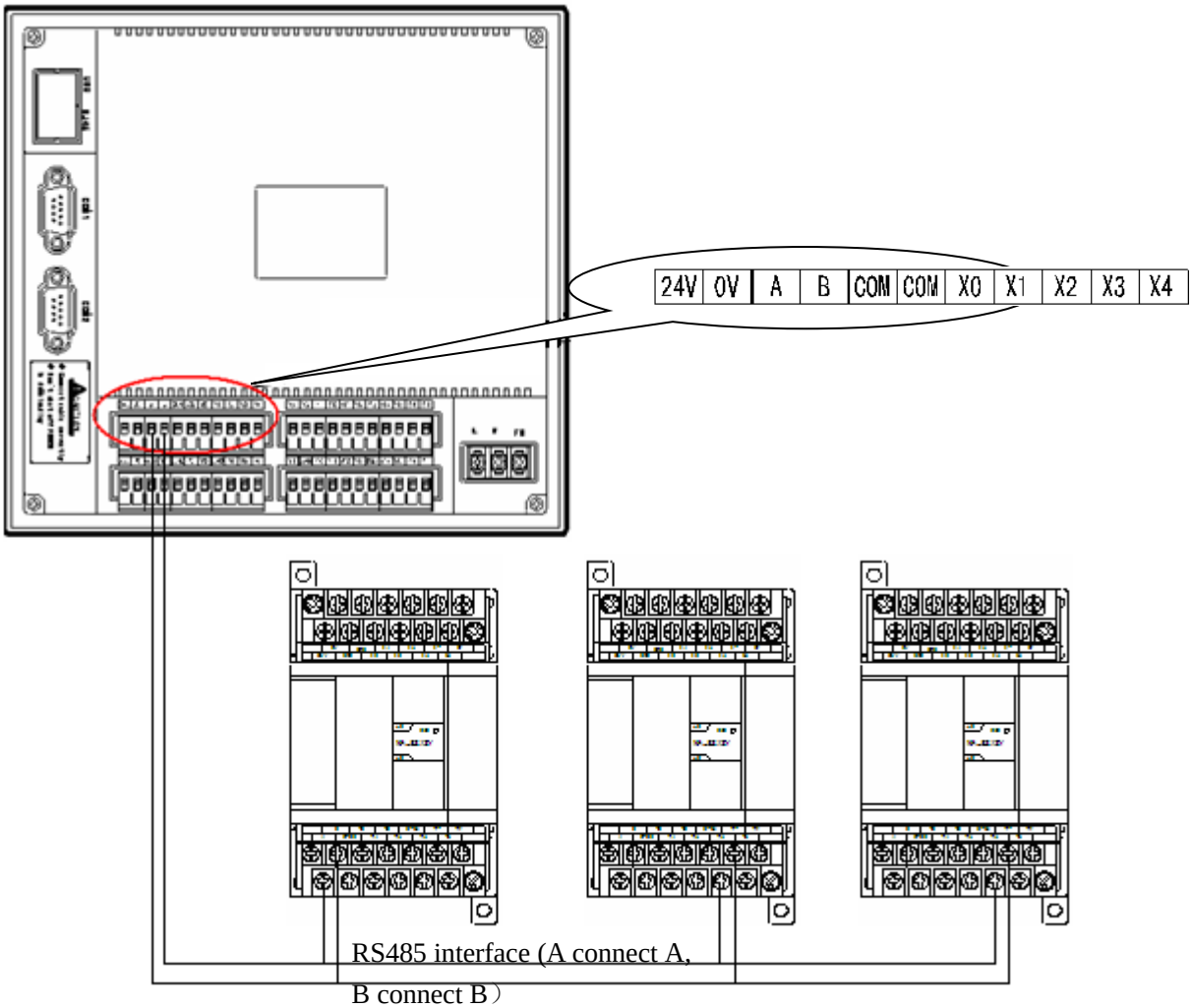
After finished the data transfer, it will show the following window. It means the transfer is successful.



NOTICE During the downloading process, make sure the XMP2-32R-E controller won't power off.

1.5.4 Communication

XMP2-32R-E has two kinds of interface which are RS232 and RS485. However these two interfaces can not be used at the same time. In this example, we use RS485 (point A and B) interface to connect MA module.



1.5.5 Indication LED

Connect all the devices according to the above drawing, make sure MA module and XMP2-32R-E are all connected to power supply. After the baud rate and station number of MA modules have been configured, the module power LED is lighted up and communication LED is ON/OFF alternated which means the communicating is normal.(LED lighting up means communicating, LED twinkling means communicating error).

If X0 of MA-8X8Y is turned on, the related lamp on screen 1 will light up. However, this process will have some delay time caused by communication delay, scan period and reading PLC by HMI. For some cases which need high effectiveness, it can communicate HMI with module directly.

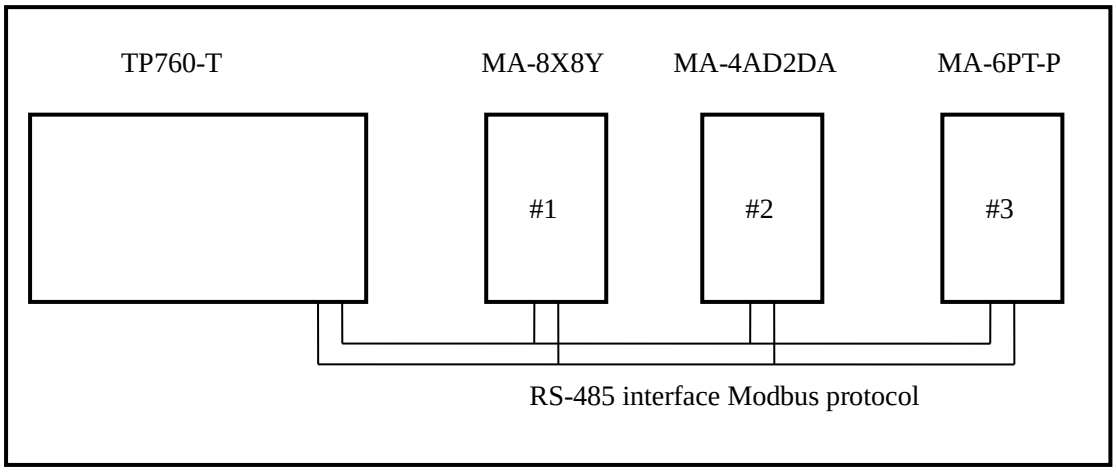
2. Communicate HMI with multi-modules

In the first chapter, we have introduced how to communicate integrated controller with three MA modules. In fact, it is still the communication between PLC and MA module. In this chapter, we will introduce how to communicate HMI with MA module.

There are many advantages to use HMI to communicate with MA modules It doesn't need complicated program to deal with individual communication process. You also don't worry about the communication will get into endless loop and has error. You only need to use simple elements of HMI such as buttons, data input buttons to communicate with modules.

In a word, using HMI to communicate with modules makes the operation easier and improves the effectiveness.

We will use the same requirements to realize the communication between MA modules and HMI. Please see the following connection drawing:



2.1 Preparation and requirements

1. Purpose

To command the method of communicate multi-MA modules with HMI.

2. Device

(1) TP760-T 1 unit

(2) MA-8X8Y, MA-4AD2DA, MA-6PT-P 1 unit

(3) RS485 cables, DVP cables, wires

(4) PC installed with Touchwin software

3. Communication requirements

TP760-T communicates with 3 three MA modules:

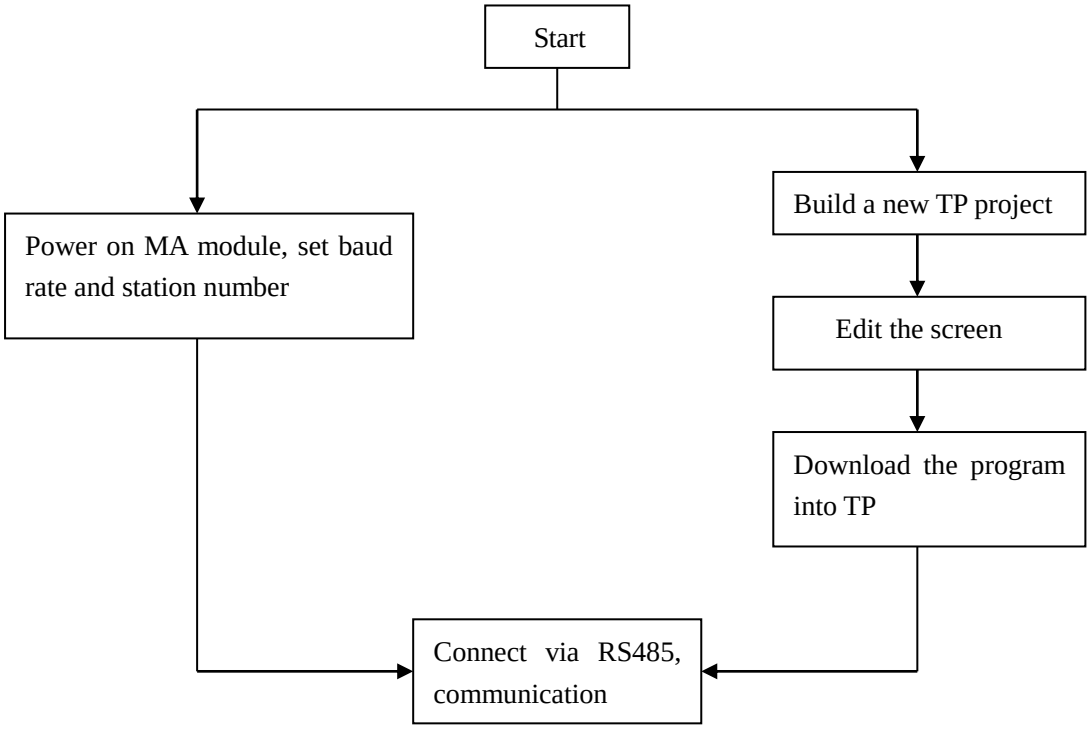
(1) real time read the I/O signal of MA-8X8Y, then display them on the screen

(2) real time read the value of MA-4AD2DA channel 0, control the start and stop of PID, set the target value and PID parameters; write value into MA-4AD2DA DA channel 0 and 1.
(3) PID control and auto-tune the temperature of MA-6PT-P channel 0, display the target/current temperature on the screen, modify the PID parameters. Display the temperature in real time tendency chart.

4. Reference data

(1) MA series module manual
(2) TP series HMI manual

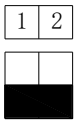
5. Process

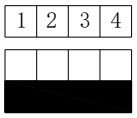
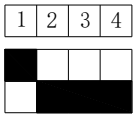
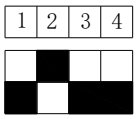


2.2 Communication setting

The communication is based on MODBUS protocol, set the station number to 1~3 for three MA modules.
These MA modules are slave stations which can not visit the master station TP760-T. However, TP760-T can visit all the modules.
Next, set the correct baud rate and station number of each device. The baud rate of master station should be the same as the slave station. We set as the default baud rate of TP760-T 19200bps.
Three MA modules station numbers are 1,2,3.

MA module setting:

Baud rate	DIP switch
19200bps	

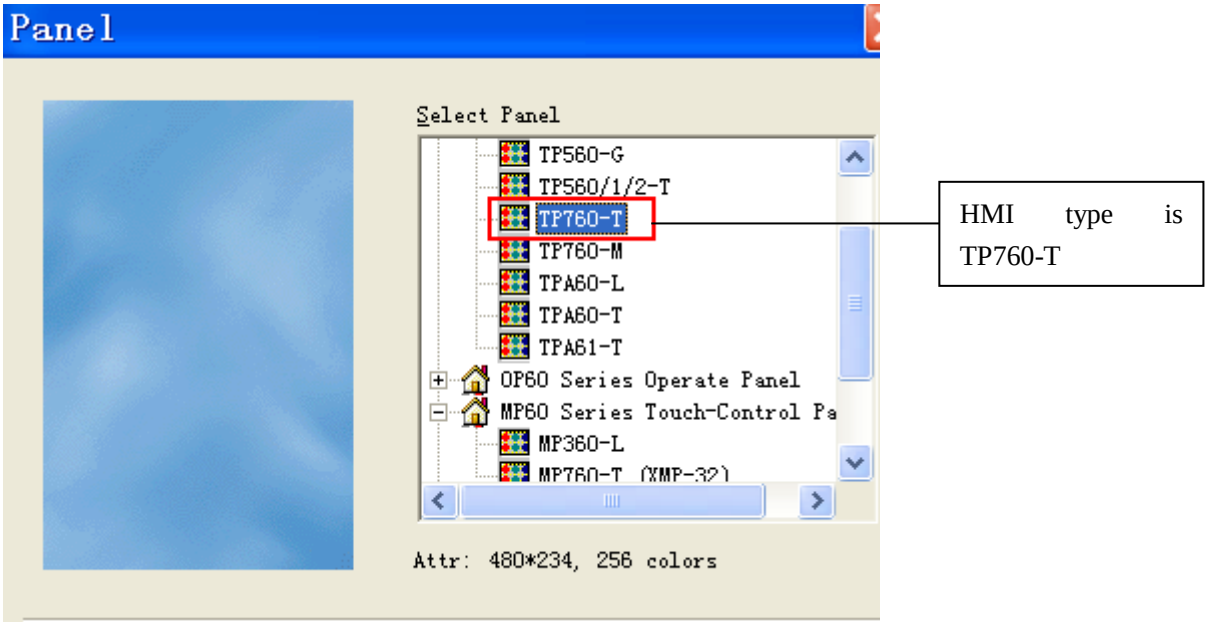
Module type	Station No.	DIP switch
MA-8X8Y	1	
MA-4AD2DA	2	
MA-6PT-P	3	

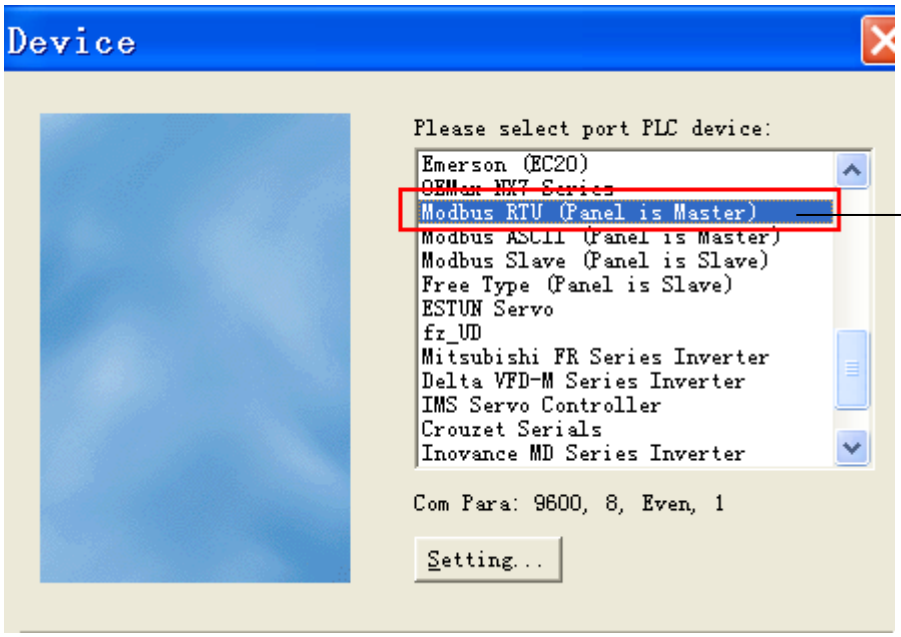
2.3 HMI screen

The program is simple for communicating between HMI and MA modules. Next we will introduce the method of making HMI project.

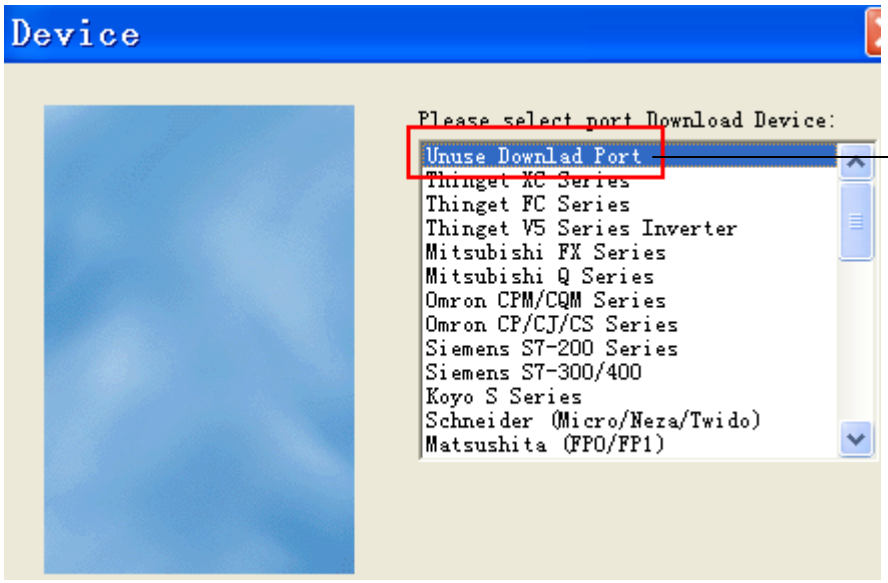
2.3.1 Build a new TP project

Open Touchwin software, build a new project:





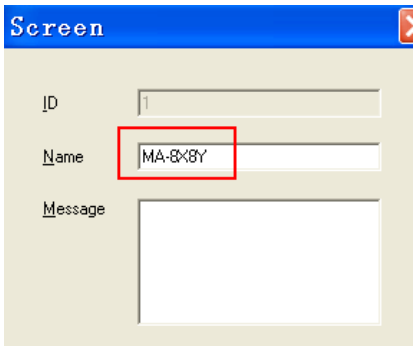
PLC port device select Modbus RTU (panel is master)



select unuse download port, then click next until finish building.

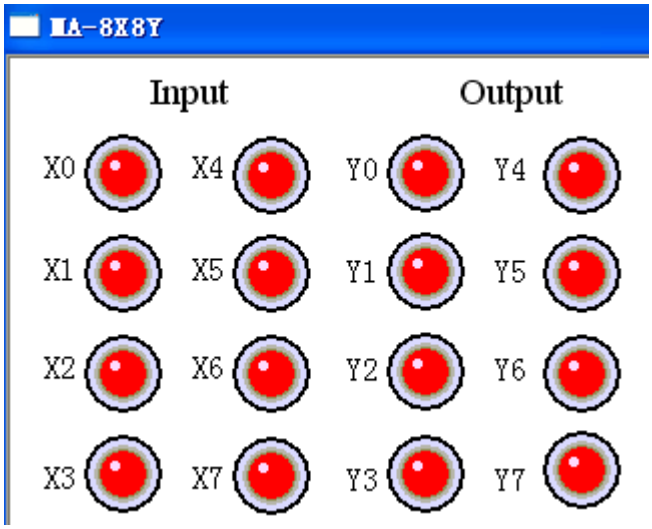
2.3.2 Screen 1 MA-8X8Y

First, change the name of screen 1 to MA-8X8Y.

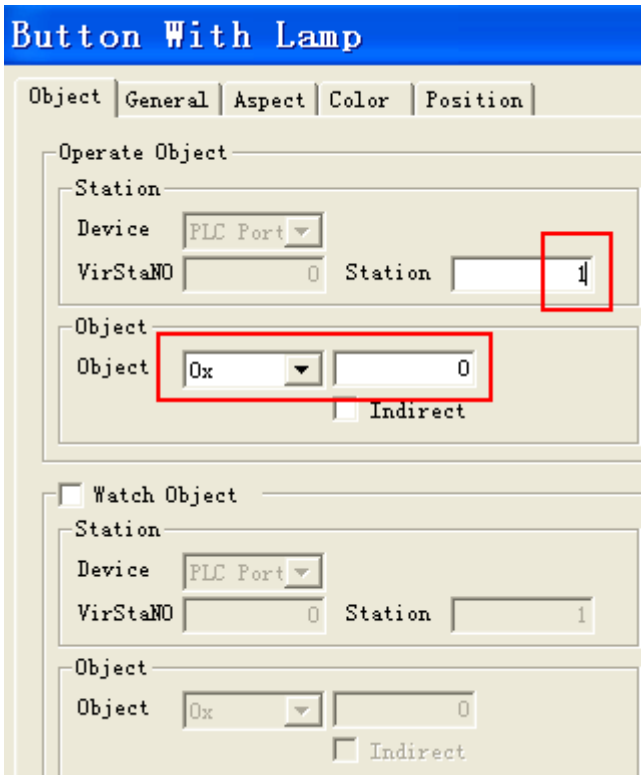


According to the requirements, display the MA-8X8Y data on the screen. Put 16 lamp buttons on the screen.

Set the lamp buttons addressed to 0x0~0x7 (X0~X7) and 0x128~0x135 (Y0~Y7).



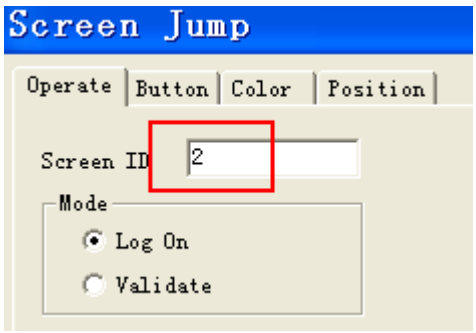
Take X0 for example. Set the station number to 1, address to 0x0:

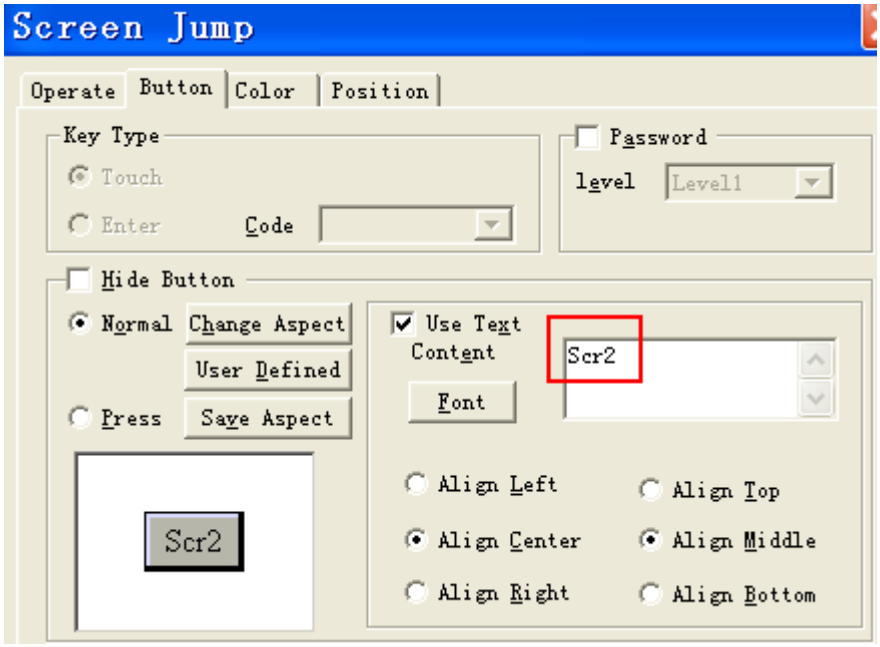


Set other I/O points at the same method.

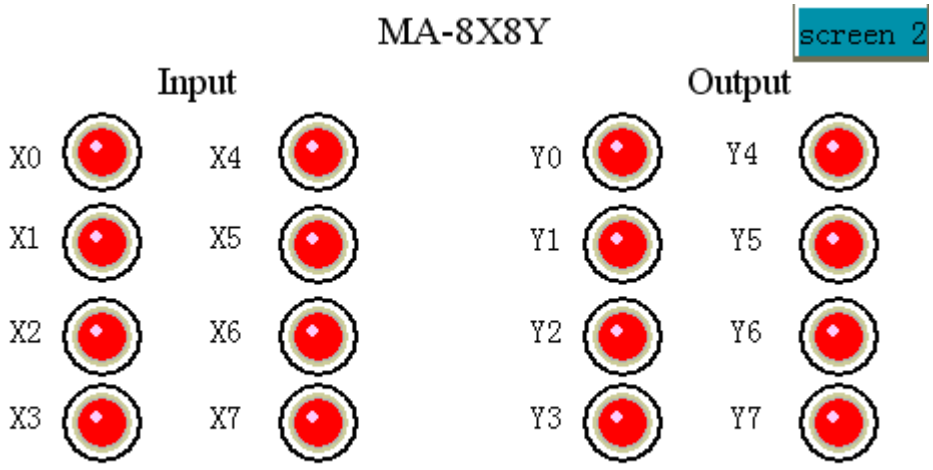
ATTENTION: 0x is Modbus address of MA module. HMI reads data from MA Modbus address directly but don't need PLC. This is the advantage of TP series HMI.

Put a screen jump button on the screen, set the jump screen ID to screen 2. Change the button content to screen 2.





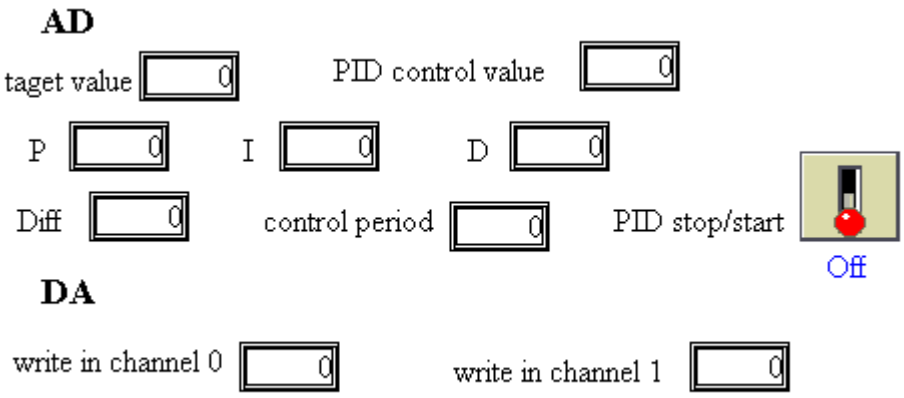
The final screen 1 is shown as below:



2.3.3 Screen 2 MA-4AD2DA

Set the name of screen 2 to MA-4AD2DA.

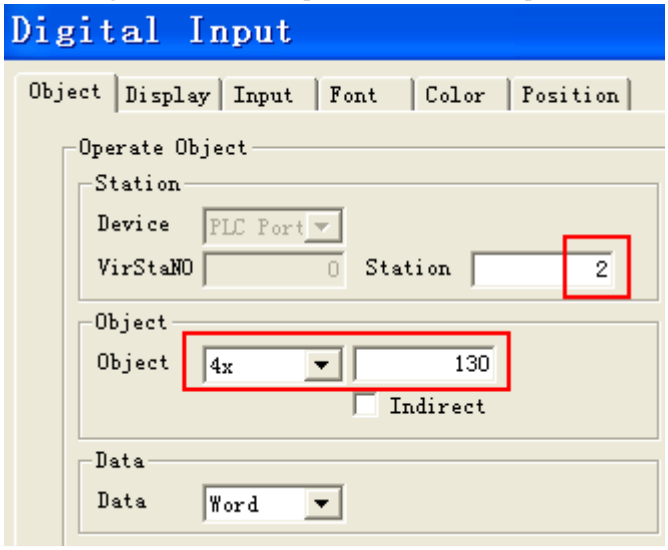
Screen 2 includes AD and DA. AD needs 6 data inputs, 1 data display, 1 lamp button. DA needs 2 data inputs.



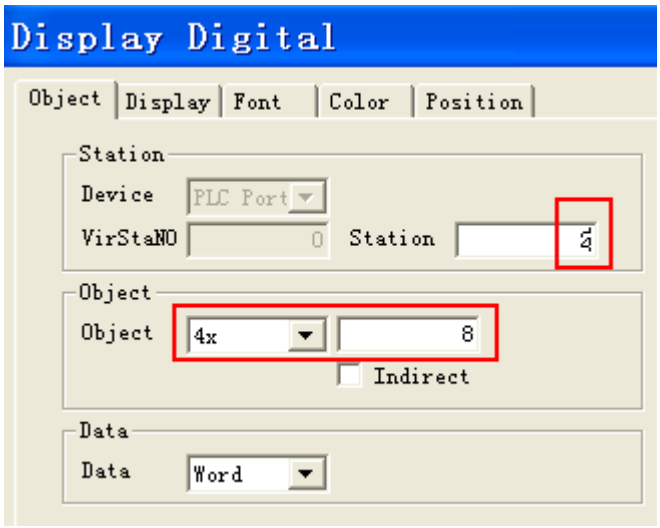
The Modbus address of MA module is shown as below:

Content	Modbus address
Target value	4x130
PID control value	4x8
P	4x134
I	4x135
D	4x136
Diff	4x137
Control period	4x150
PID stop/start	0x160
Write data in DA channel 0	4x128
Write data in DA channel 1	4x129

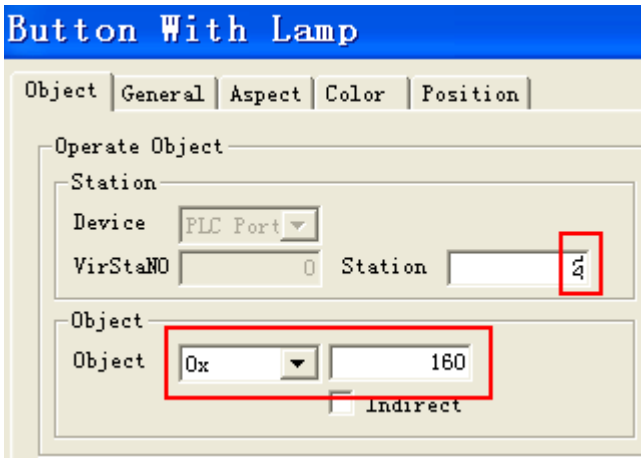
Take “target value” data input button for example. Set the address to 0x130, station number 2.



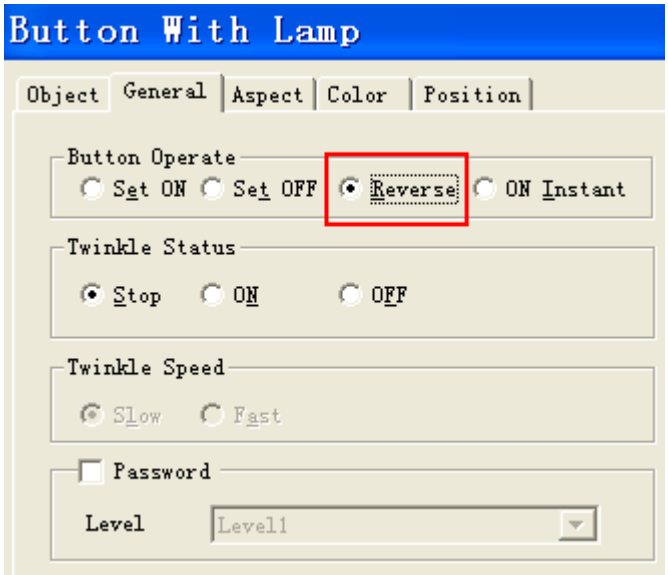
Data display button is used to display current PID control value, set the address to 4x8, station number 2:



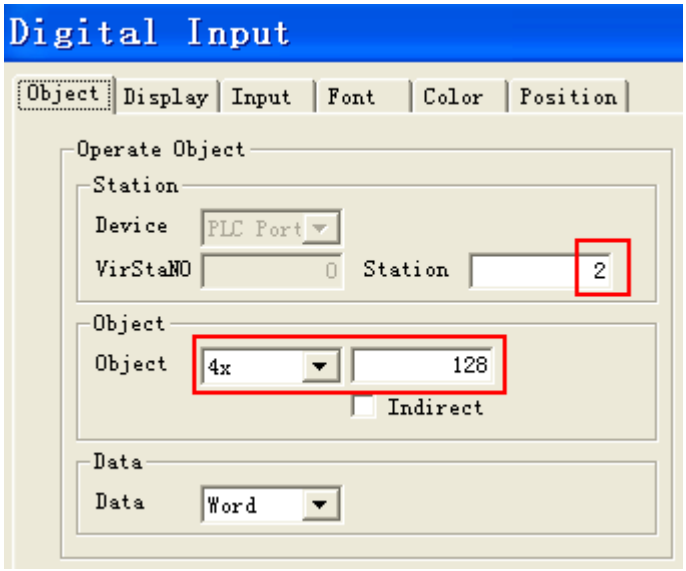
Lamp button is used to control and display the PID enable bit of channel 0, set the address to 0x160, station number 2:



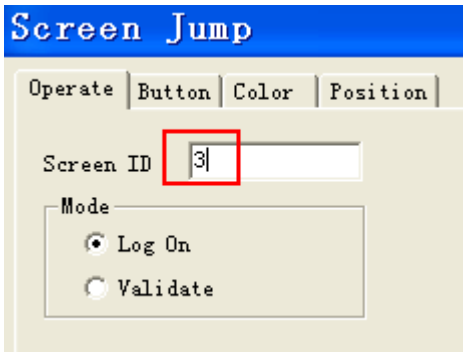
The operation of lamp button set to “reverse”.



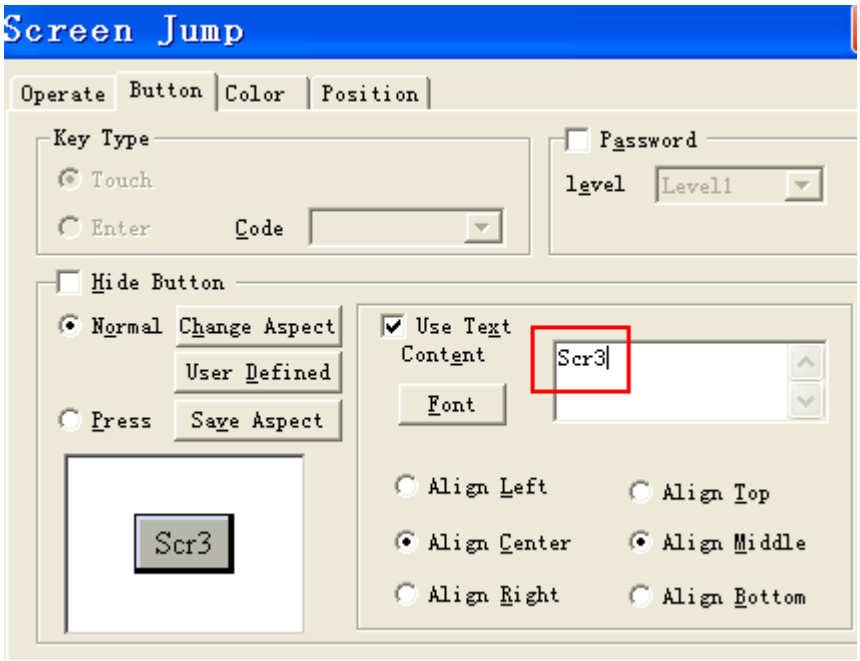
In DA part, take channel 0 for example. Set the data input button address to 4x128, station number 2:



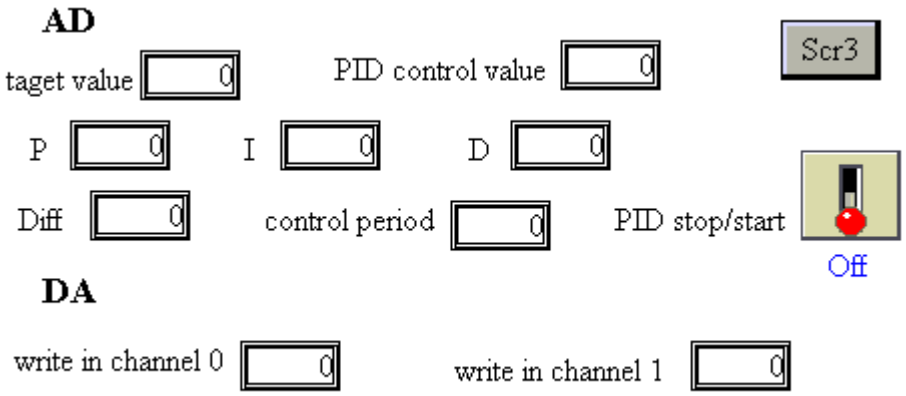
At last, use a jump screen to jump to screen 3.



Change the jump screen button content to “screen 3”:

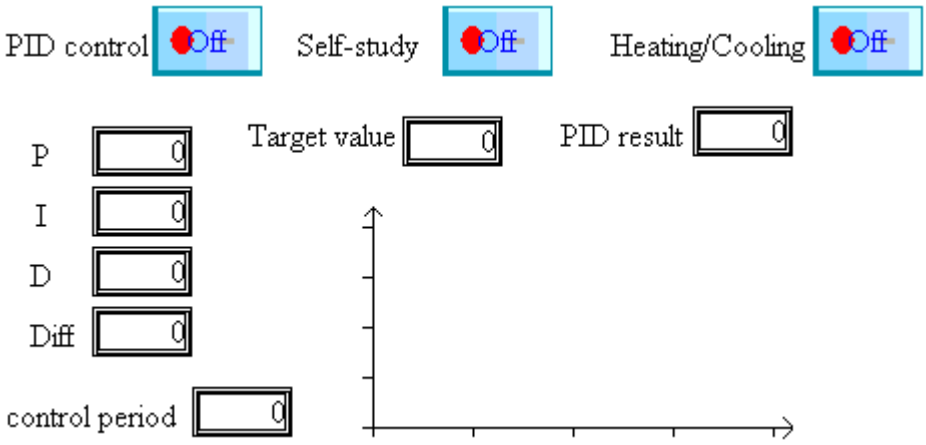


The final screen is show as below:

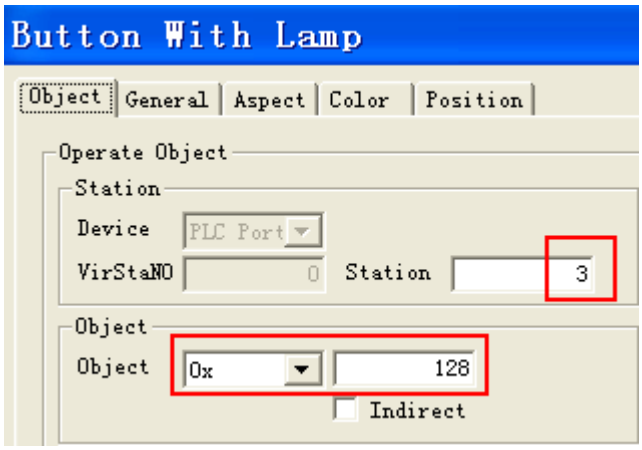


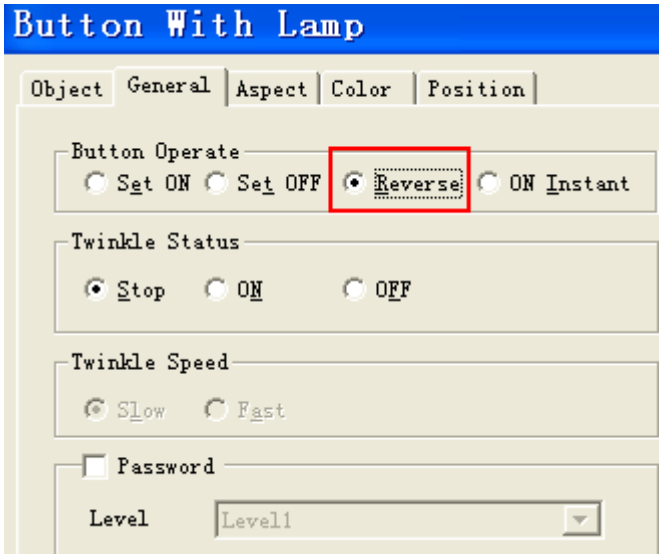
2.3.4 Screen 3 MA-6PT-P

Build a new screen, change the screen name to MA-6PT-P.
According to the requirement, we need 3 lamp buttons, 6 data input buttons, 1 data display button and 1 real time trend map. Data input button is used to set target value, PID parameters, etc. Data display button is used to display PID control result, lamp button is used to control the start and stop of each process. Real time trend map can reflect the temperature variable trend.

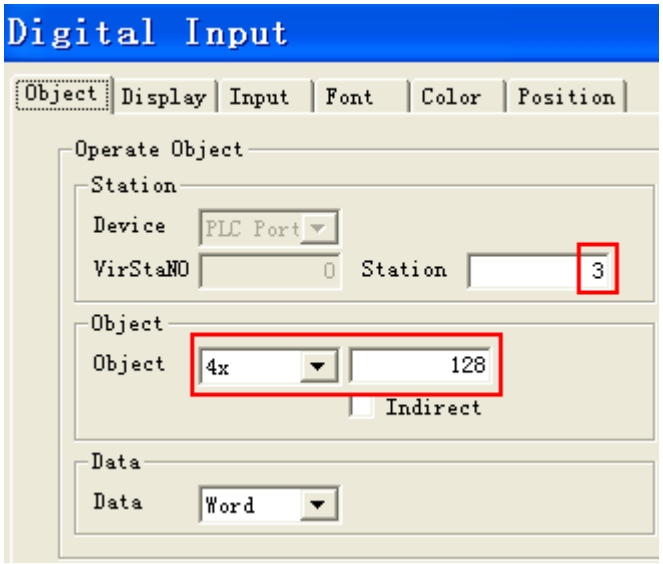


Lamp button Modbus addresses are 0x128(PID control), 0x136(self-study), 0x144(Heating/Cooling). Take PID control for example, set Modbus address to 0x128, station number 3, button operate reverse.



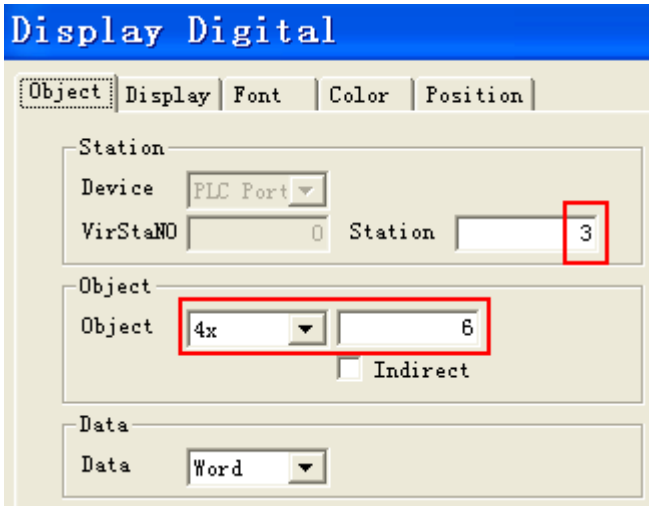


Target value is used to input target temperature, the Modbus address is 4x128, station number is 3.

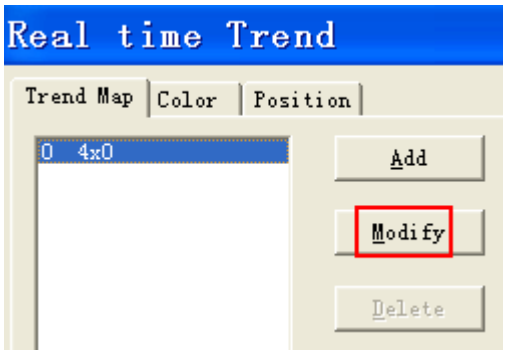


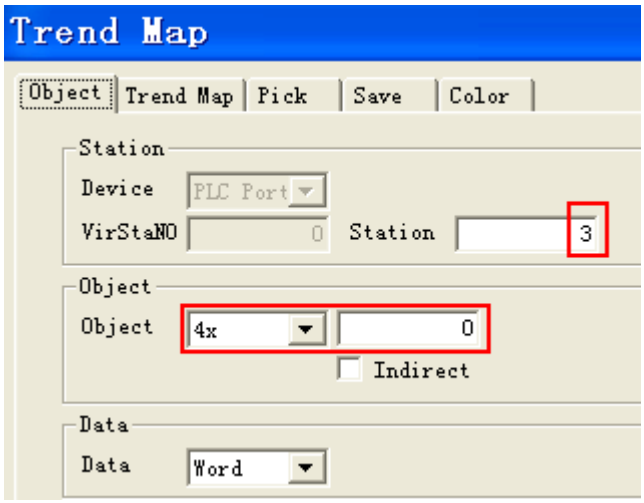
Other data input button Modbus addresses are 4x134(P),4x135(I),4x136(D),4x137(Diff),4x158(Control period).

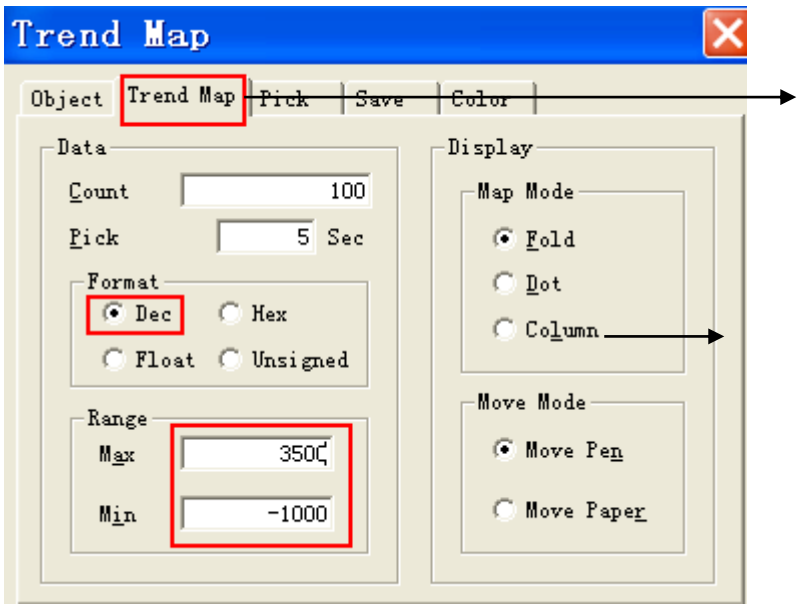
Data display button address is 4x6 (PID output result), station number 3.



Real time trend map is used to display the current temperature, the address is 4x0, station number 3. Click Modify icon to change the address and station number.

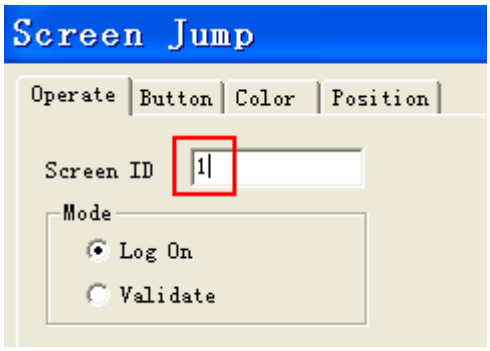




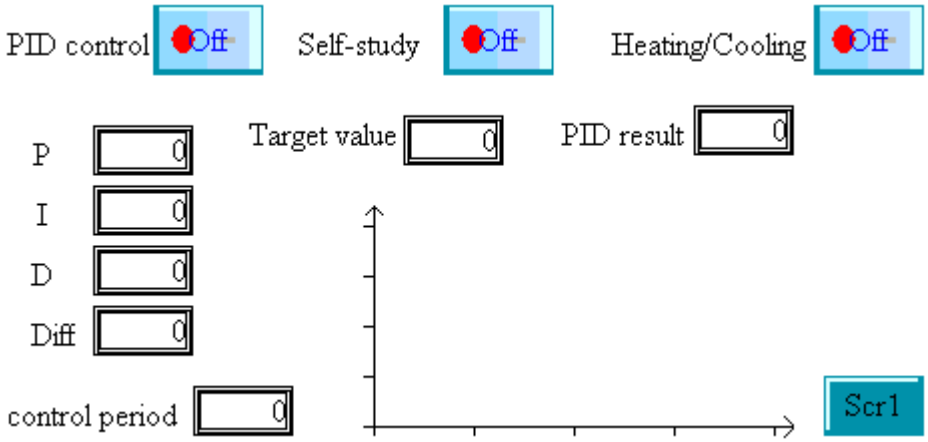


Switch to trend map, modify the temperature range to be -1000~3500, which means the temperature range is -100 ℃ ～ 350 ℃ as the precision is 0.1℃.

At last, put a screen jump button on the screen in order to jump to screen 1.



The final Screen 3 is shown as below:



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