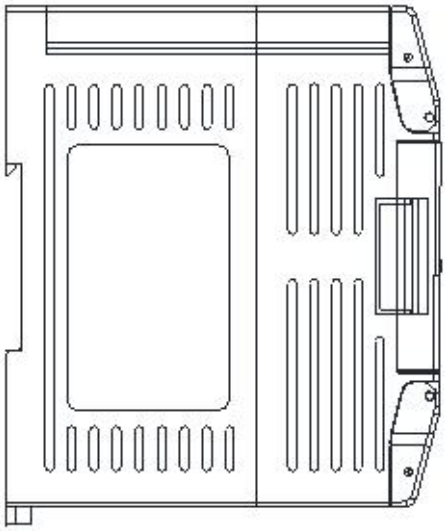
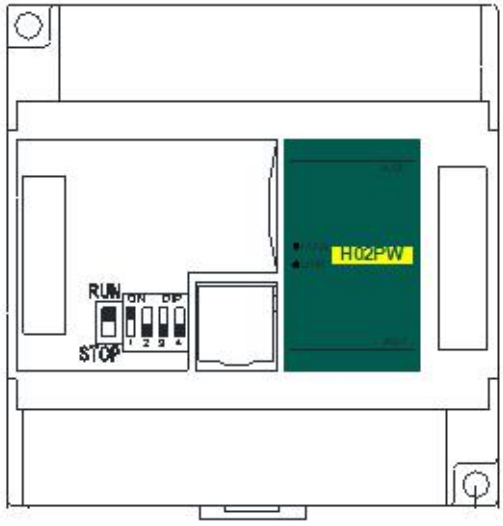
Haiwell 海为®

Haiwell PLC User Manual

Programmable Logic Controller

Programmable Power Module User Manual & Application Case





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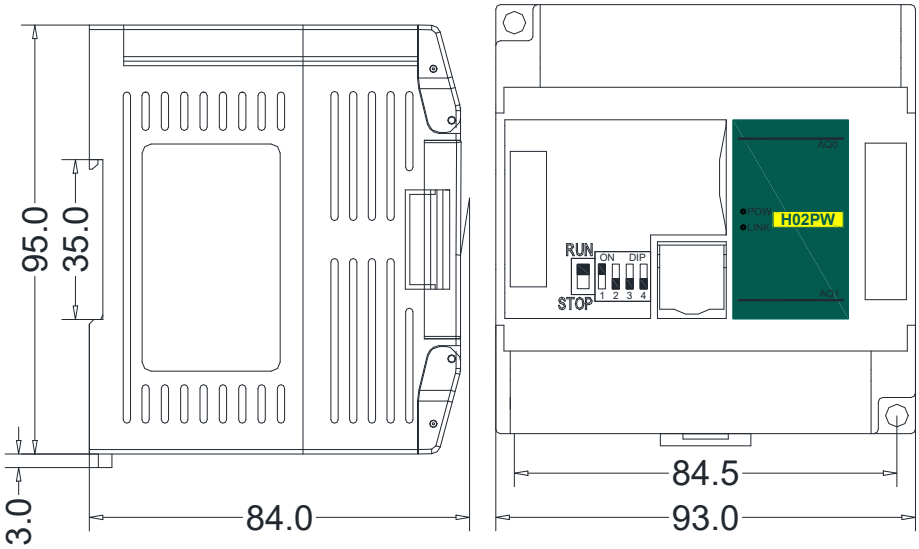
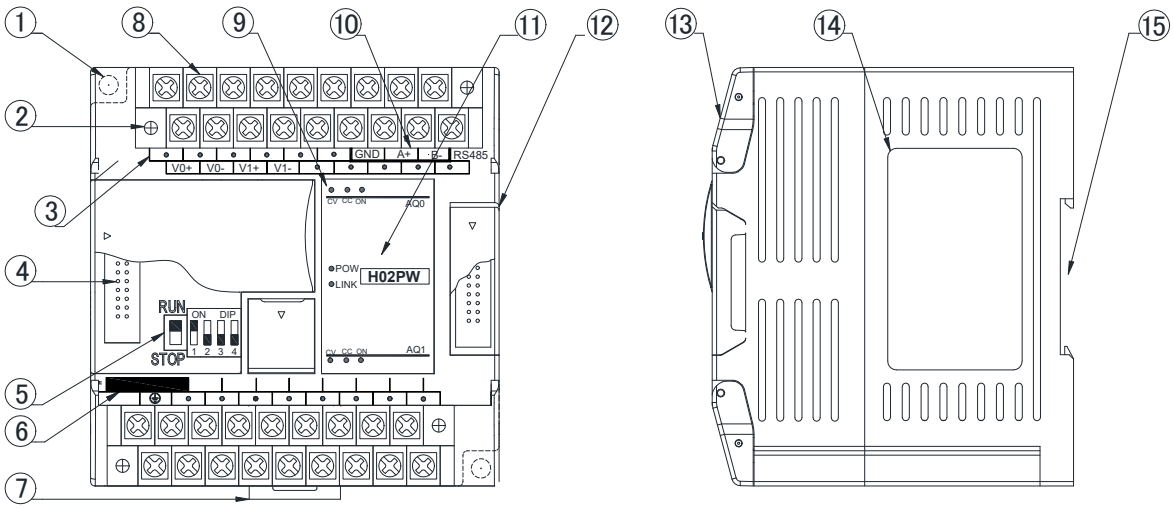
Programmable Power Module User Manual

1. Product Model List and Dimension

Type	Power	Dimension
H02PW	0.07A	93×95×82mm
H02PW-e	0.1A	





1. Fixed hole	8. Removable terminal
2. Removable terminal screw	9. Channel indicator
3. Terminal definition	10. RS485 communication port
4. Module expansion port	11. PWR power indicator、LINK module communication indicator
5. DIP switch（4-channel module without DIP switch）	12. Module expansion port
6. External power supply terminal	13. Transparent cover of module terminal
7. Guide rail buckle	14. Module nameplate
	15. 35mm DIN guide rail

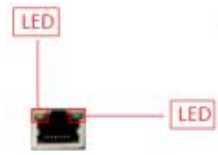
2. Indicator Description

① **PWR:** Power indicator. green,constant light -Power normal;not light - Power abnormal.
② **CV / CC / ON:** Constant voltage / constant current / PWM indicator, red. Constant on - Corresponding constant voltage / constant current / PWM output; Off - Not output.
③ **LINK:** Communication indicator. Divided into four colors according to the severity of the error, from normal to serious: green, yellow flashing, red flashing, red constant-on.
Users need to make corresponding treatment according to the different status of the indicator light, as shown in the following table:

LINK indicator state		Indication information classification	Reference processing mode
Green	no light	MPU didn't identify the module and no communication	Normal
	constant light	MPU has identified the module but no communication	
	jitter quickly	Serial or parallel port in communication	
Yellow	light-dark flicker	Without serial or parallel port in communication	Lack of external power supply
	darkened and jitter alternately	With serial or parallel port in communication	
Red	light-dark flicker	Without serial or parallel port in communication	Incomplete firmware
	darkened and jitter alternately	With serial or parallel port in communication	
	constant light	Without serial or parallel port in communication	Return to factory maintenance
	jitter quickly	With serial or parallel port in communication	
Note: Jitter: indicator on 30ms and off 30ms; Flicker: indicator on 0.5s and off 0.5s; Alternately: indicator off 0.5s and jitter 0.5s			

④ **RJ45 Ethernet indicator:** there are two Ethernet LEDs, green and yellow, as shown on the picture:

Color	Status description
Green light is long bright	Physical connection of TCP module and external device is normal;
Green light goes out	TCP module fails to connect with external device or the module itself is abnormal
Yellow light blinks	TCP module is connected to an external device normally, and blinking frequency indicates the data transmission speed. When speed is fast, human eye is not easy to distinguish, at this time, yellow light is long bright.
Yellow light goes out	No data transmission communication of TCP module and external device



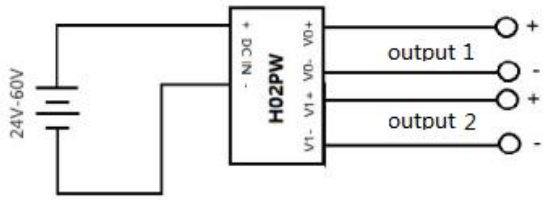
3. Environmental Specifications for Product

Item	Environment Specification
Temperature/Humidity	Operating temperature:0~+55℃ Storage temperature:-25~+70℃ Humidity: 5~95%RH, No condensation
Interference immunity	DC EFT:±3000V Surge:±500V
Over voltage resistance	500VAC/1min between DC terminal and PE terminal
Insulation impedance	Between DC terminal and PE terminal @500VDC,>=5MΩ ,all input/output points to PE terminal @500VDC
Operating environment	Avoid dust, moisture, corrosion, electric shock and external shocks

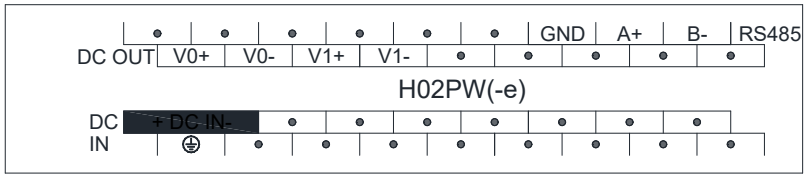
4. Technical Specification

Item	Parameter
Input voltage range	24V～62V
Output voltage adjustment range	3V~50V
Output current adjustment range	Single-channel：0~5A double-channel：0~3A
Output Power	Single-channel：60W double-channel：90W（each 45W）
Output voltage resolution	10mV
Output current resolution	5mA
Voltage / current accuracy	CV：0.5%+5mV CC：0.5%+5mA
Power regulation	CV：0.5%+5mV CC：0.5%+1mA
Load Regulation	CV：4%+20mV CC：0.5%+1mA
Output ripple	Max.300mV（Specified output indicator range）
Typical efficiency	86%（input 65V，output 30V，2A）
Voltage / current display accuracy	CV：1%+5mV CC：1%+2mA
Protection type	OVP、OCP、OPP（Overvoltage, overcurrent, overload protection）
Heat-dissipating method	Heat sink

5. Wiring Diagram



6. Terminal Wiring

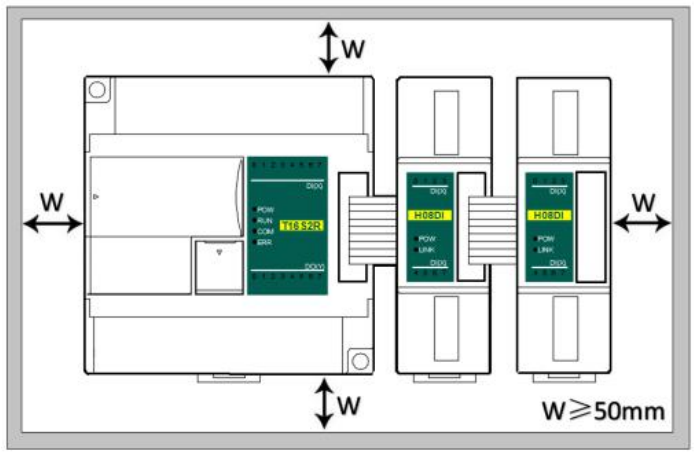


7. Module Parameter Table (CR code is corresponding to the Modbus register address)

CR code	Function description
00H	Low byte for module code, and high byte for module version number.
01H	Communication address
02H	Communication protocol: The low 4-bit of the low byte: 0 - N,8,2 For RTU，1 - E,8,1 For RTU，2 - O,8,1 For RTU，3 - N,7,2 For ASCII，4 - E,7,1 For ASCII，5 - O,7,1 For ASCII，6 - N,8, 1 For RTU The high 4-bit of the low byte: 0 – 2400，1 – 4800，2 – 9600，3 – 19200，4 – 38400，5 – 57600，6 - 115200
03H~06H	Module name
07H~08H	Default IP address: 192.168.1.111
09~0AH	Reserve
0BH	High byte subnet mask（b3~b0,1indicates 255, 0 indicates0, for example, subnet mask 255.255.255.0，b3~b0=1110）, low byte reserved
0CH~0EH	Reserve
0FH	Error code: 0-Normal, 1-Illegal firmware identity, 2-Incomplete firmware, 3-System data access exception, 4-No external 24V power supply
10H	Channel 1 voltage measurement, unit: 0.01V
11H	Channel 1 current measurement, unit: mA
12H	Channel 2 voltage measurement, unit: 0.01V
13H	Channel 2 current measurement, unit: mA
14H	Channel 1 voltage output value, unit: 0.01V
15H	Channel 1 current output value, unit: mA
16H	Channel 2 voltage output value, unit: 0.01V
17H	Channel 2 current output value, unit: mA
18H	Channel 1 PWM output period, unit: ms
19H	Channel 2 PWM output period, unit: ms
1AH	Channel 1 PWM output duty cycle, range: 0 ~ 1000
1BH	Channel 2 PWM output duty cycle, range: 0 ~ 1000
1CH~3FH	Reserve

8. Mounting and Installation

The PLC should be secured to an enclosed cabinet while mounting. For heat dissipation, make sure to provide a minimum clearance of 50mm between the unit and all sides of the cabinet.



Rail mounting: Use standard 35 mm rail.

Screw mounting: Each MPU or extension module has two positioning screw holes, the diameter of the hole is 4.5mm. Please refer to the dimension figure for the location of the positioning holes and their spacing.

To avoid over temperature and for a better heat dissipation, do not mount PLC to a position near to the bottom/top of the cabinet. Do not mount PLC in vertical direction.

Extension module wiring: Connections between extension modules and connections between module and MPU are achieved through bus.A extension cable will be configured to every extension module, for the connection between two different modules.Connection methods: turn the right side of extended interface(the last MPU or extension module) over, plug the extension cable in the extended interface, then press down the cover of the extended interface to reset the interface, the extended interface at the right side of the module will be reserved for extension of the next module. Connect all extension modules in turn in the same way.

Programmable Power Module Application Case

1. Expand Module Through the Host PLC Parallel Port

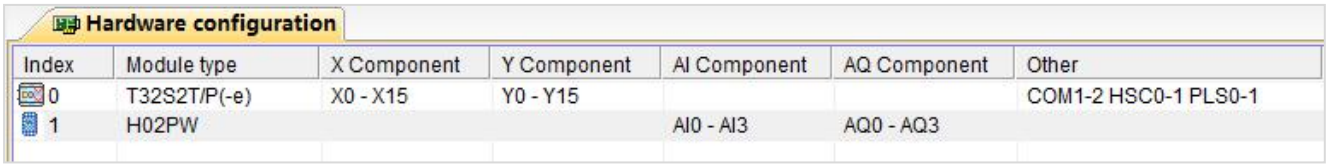
1.1. Module power supply

H02PW module is a programmable power module, the module itself can not be used as a power supply, it is used to control the external power supply voltage or current constant output, so regardless of H02PW is extended through the parallel port of host PLC or used as a remote module, it needs to supply DC24V ~ 62V power to the H02PW through the power input end of the module.

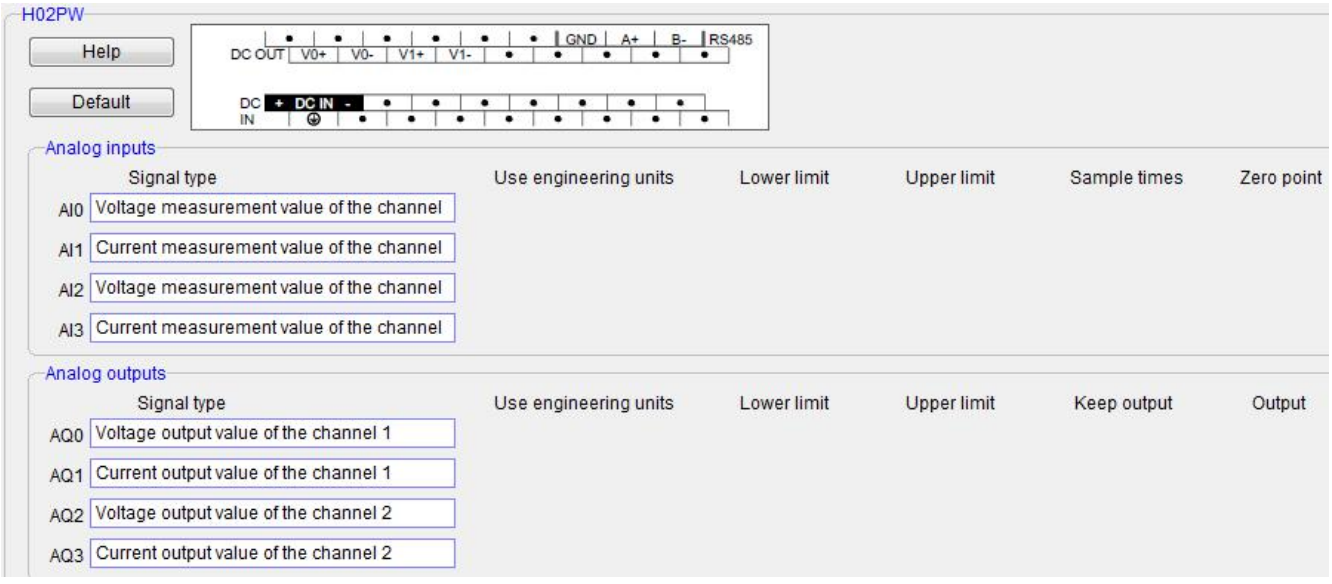
1.2. The analog need't be written any conversion program, read the analog register value directly

For example, the host PLC T32S2T is expanded with one module H02PW through the parallel port

First enter the PLC programming software menu bar - view - hardware configuration, in accordance with the external order of actual modules to add the module models, after added, the analog address will be automatically arranged, as shown below:

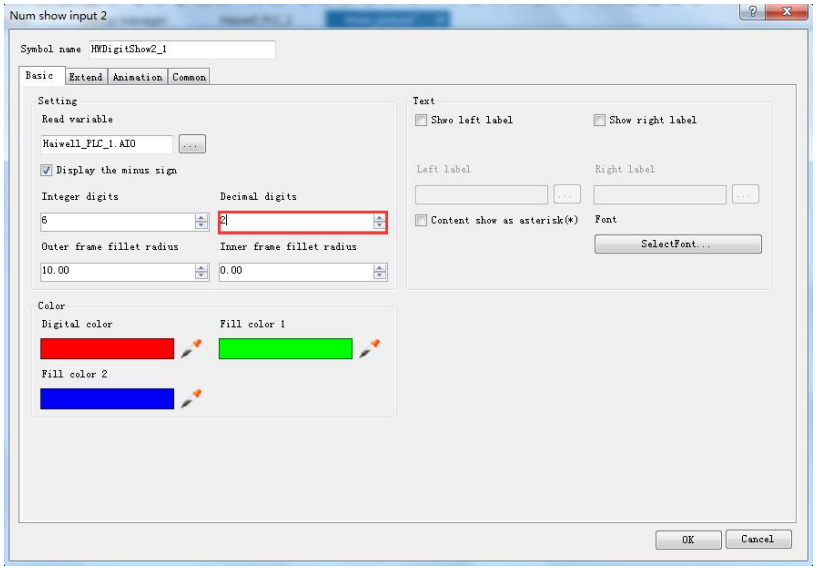


One channel of the programmable power module H02PW occupies two AI registers (one AI register feedback voltage measurement, unit: 0.01V and the other AI register feedback current measurement, unit: mA) and two AQ registers (one AQ register control voltage output value, unit: 0.01V, the other AQ register control current output value, unit:mA)



1.3. Display analog values on SCADA and HMI

To display or set the measurement / output voltage of H02PW module on configuration, touch screen, text and other PC softwares, you only need to set 2 decimal places on the numerical display primitive, because the measurement / output voltage unit of the H02PW module is 0.01V. Then the values read in this way will be automatically reduced 100 times on the configuration, that is the display converted to unit V, for example, you only need to set the decimal place to 2 on Haiwell Cloud configuration settings:



So the PLC reads the voltage measurement value AI0 of H02PW, AI0 = 1000, that is, the actual 10.00V, and there is no need to do any data processing in the PLC and configuration, you can set 2 decimal places on display primitive, then it will be automatically reduced by 100 times, displaying 10.00, which is the actual 10.00V.

1.4. Application example of module CR code: read and write PWM output period and output duty cycle from H02PW module

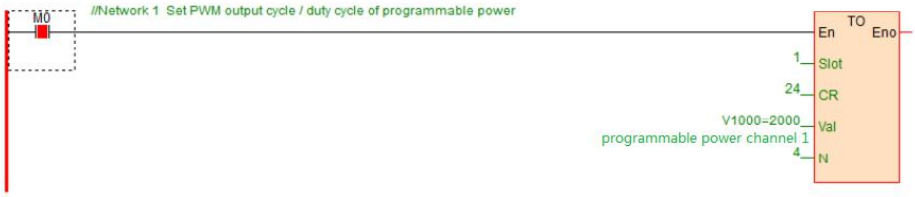
In this example, the H02PW PWM control is achieved by setting the PWM output period and output duty cycle of the H02PW module. The PWM output period CR code of H02PW module is 18H ~ 19H (hexadecimal), PWM output duty cycle CR code is 1AH ~ 1BH (hexadecimal) (more CR content can be found in the software online help - Hardware Manual - Expansion module parameters within the corresponding model).This program is as follows:

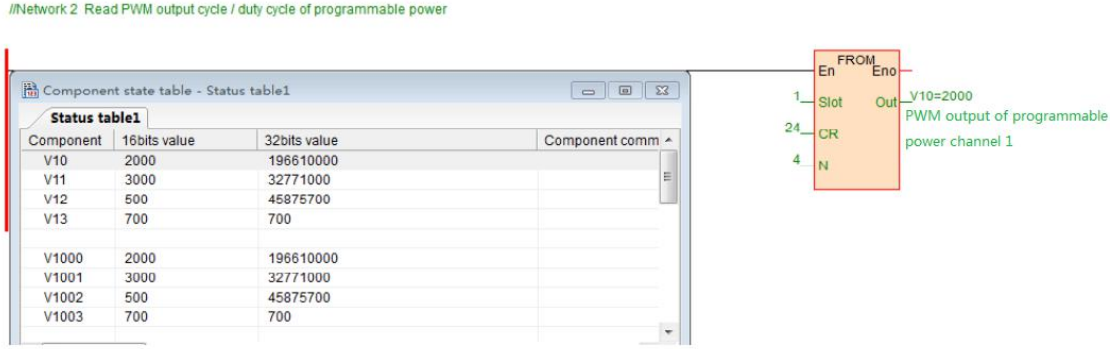
Slot: Position number, H02PW is the first expansion module, so fill in 1;

CR: The PWM output period and duty cycle start CR code of the module is 18H, that is, 18H(hexadecimal)= 24(decimal), you can directly input 24 or 0x18 to the instruction CR terminal;

N: Set the number, in this case, set 4 CR number.

Val: The data start component to be written into, in this case, the register of the power-down preserve area is used. When PLC is powered on again, the setting value before power-off can be maintained.





2. Module Used as Remote IO

Haiwell PLC expansion module is built-in one RS485 communication port(Some models with Ethernet communication port), which not only supports parallel bus(Use the expansion bus to connect with the parallel port of host PLC), but also supports serial bus(Use the RS485 communication port of module networking with communication port of host PLC, and host PLC controls the remote module by communication instructions), when using the serial bus to expand (that is, remote IO module), it doesn't have expansion limit of system points and can be distributed installation.

Distributed installation is very important for the system which needs to collect and monitor a large number of decentralized digital or analog signals(temperature, humidity, differential pressure, blowing rate, flow, fan speed, valve opening, etc.), it can easily achieve distributed installation control and unlimited points of expansion, greatly improving the control system configuration flexibility and future control expansion capabilities, reducing the number of signal wiring, also reducing the interference problem of too long analog signal line, saving the project investment costs.

The following will introduce the operation key points and techniques.

2.1. Module power supply

When the module is used for remote IO, it is necessary to supply power DC24V ~ DC62 to the power input end of the module. If the module is powered normally, the PWR indicator will light.

2.2. Communication port introduction

① Modules are built-in RS485 port.
② Optional Ethernet port.
③ RS485 communication port and Ethernet port can be used at the same time, for example, the RS485 of module communicates with PLC, Ethernet port can also communicates with multiple host computers (up to 7).

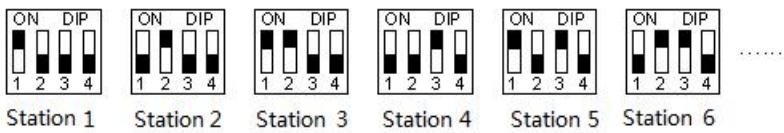
2.3. Communication protocols and default parameters

RS485: Support standard Modbus RTU / ASCII protocol, it can communicate with the configuration, touch screen, text display, PLC and other third-party host computer, which must support Modbus protocol. Among them:

Address: 1 ~ 254 can be set; module address is divided into soft address and hard address, hard address has the highest priority.

Soft address: The address set through programming software - remote tool, address range 1-254;

Hard address: The address set through the 4-bit DIP switch of module hardware, address range 1-15. Hardware address setting example:



Baud rate：2400、4800、9600、19200、38400、57600、115200 optional;

Data format : N, 8, 2 RTU、 E, 8, 1 RTU、 O, 8, 1 RTU、 N, 8, 1 RTU、E, 7, 1 ASCII、 O, 7, 1 ASCII、 N，7，2 ASCII optional.

RS485 default parameter：19200，N 8 2 RTU，station number is 1.

Ethernet +: Support the standard Modbus TCP protocol, it can communicate with the configuration, touch screen, PLC and other third-party host computers, which must support Modbus TCP protocol. Among them:

Ethernet default parameters:

IP：192.168.1.111

Subnet mask: 255.255.255.0

Gateway: 192.168.1.1

2.4. Module parameter configuration method introduction, when the module is used as remote IO

There are three ways to configure remote IO parameters:

There are three ways to configure remote IO parameters:

- It can be configured via programming software - tools - remote modules (recommended);
- It can be configured via the hardware configuration and TO instructions, when the module is hung behind the host PLC through the parallel port;
- It can be configured via MODW instructions through the serial communication.

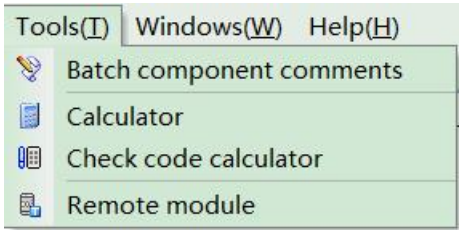
2.5. Parameter configuration example: The module is configured by programming software remote module tool

Hardware connection

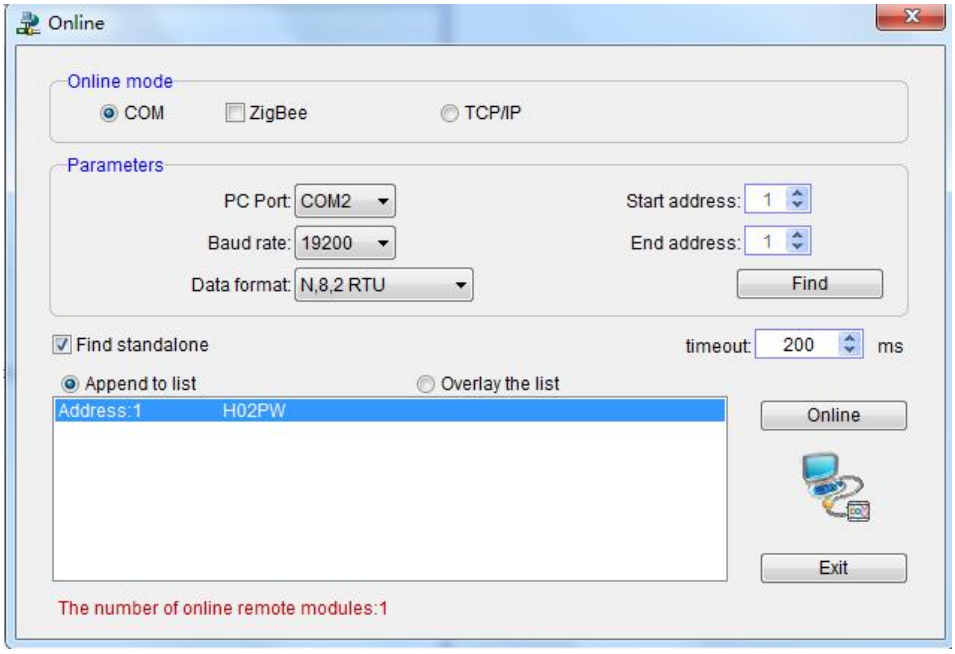
Through the RS485 communication port (the terminals of A +,B- on the module) connection: If the computer has a serial port, you can use the converter of 232 to 485 connecting with the module; if it has one USB interface, you can use the converter of USB to 485 connecting with the module.

Software operation steps

Click on the the menu bar tool of programming software- "remote module":

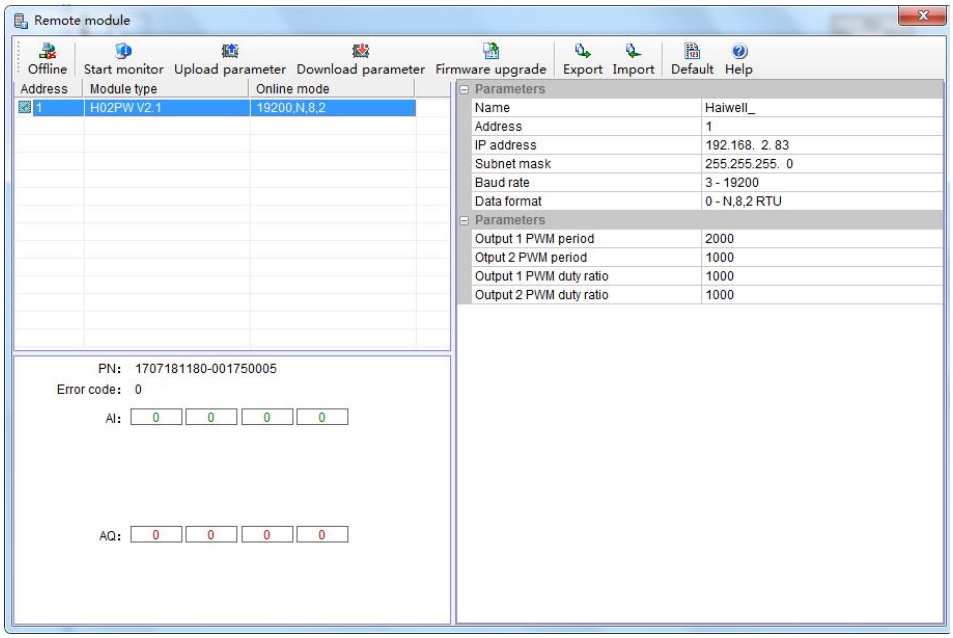


Click the button in the pop-up window to open the "Online" window. The module default address is 1,19200, N 8 2 RTU, the online success is as follows:

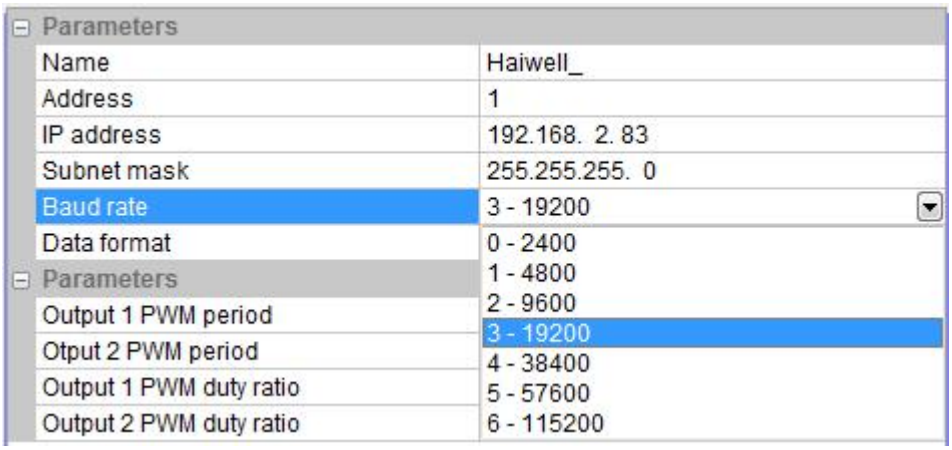


If there is only one machine connected with 485 line, then check "Find standalone"; if there are more than one, then remove the button of "Find standalone", and set the start address and end address, so that all the machines connected with 485 line can be found and achieve parameter configuration.

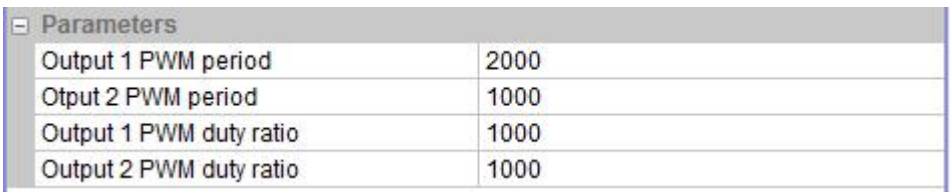
Click to exit, enter the configuration interface, as shown below:



We can change the module name, address, IP, subnet mask, baud rate, data format and other communication parameters in the communication parameter area.



In the parameter column, you can set the PWM output period and duty cycle of the two channels respectively.



After setting, select the "Download parameter" to download the parameter into the module.

In addition, we can do the following operations through the remote module tool:

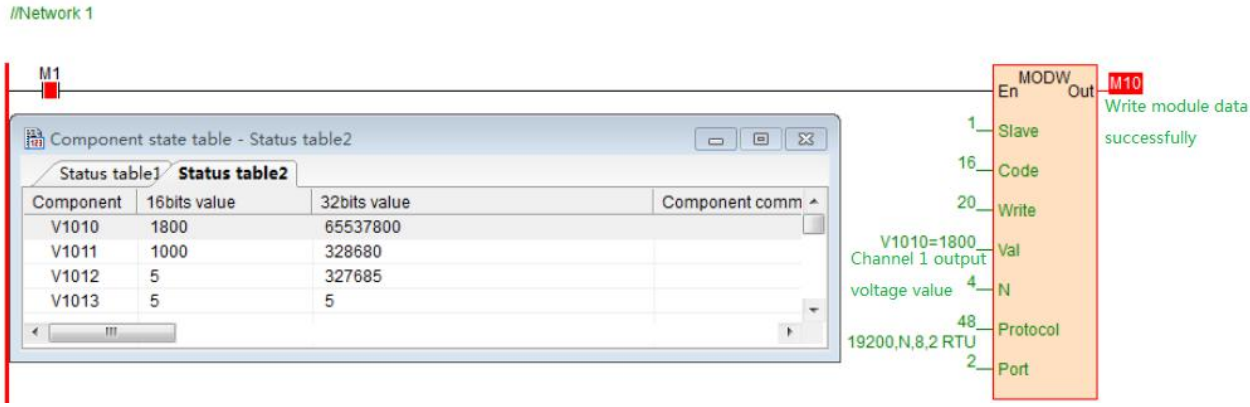
- Online monitoring the channel value of module, error code.
- Upload the module paramater, upgrade the module firmware, then make the module support new features.
- It can export the module configuration to save or import and restore the default value.

2.6. Remote IO application example(RS485 mode): The PLC writes the channel output voltage and current values of H02PW module

① Hardware wiring: PLC connects to 485 port of module by shielded twisted pair, A + connects to A +, B- connects to B-, if the PLC connects to multiple remote IO modules, it needs to use hand in hand way to connect.

② Modbus address: It can be seen from the H02PW CR parameter list that the corresponding CR code of H02PW module channel output voltage and current value is 14H～17H.

③ PLC program: The host PLC wants to write the 2-channel output voltage and current value of remote IO module H02PW, the voltage unit is 0.01V and the current unit is mA, therefore, if it wants to output 10V voltage, only need to write into 1000 in the corresponding register. In this example, H02PW communication is the default parameter: Station number address is 1, baud rate is 19200, data format is N 8 2 RTU. The PLC program is shown as below:

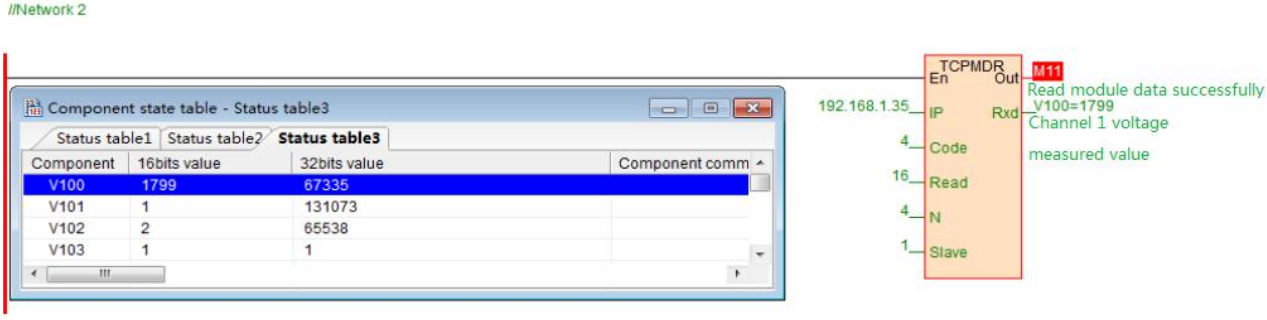


2.7. Remote IO application example(Ethernet mode): The PLC reads the measured voltage and current of the H02PW module channel

① Hardware wiring: PLC and module Ethernet port connected with a shielded network cable, they can be connected directly or through the switch.

② Modbus address: From the above H02PW module CR parameter list shows that the module channel measurement voltage and current are stored in 10H ~ 13H.

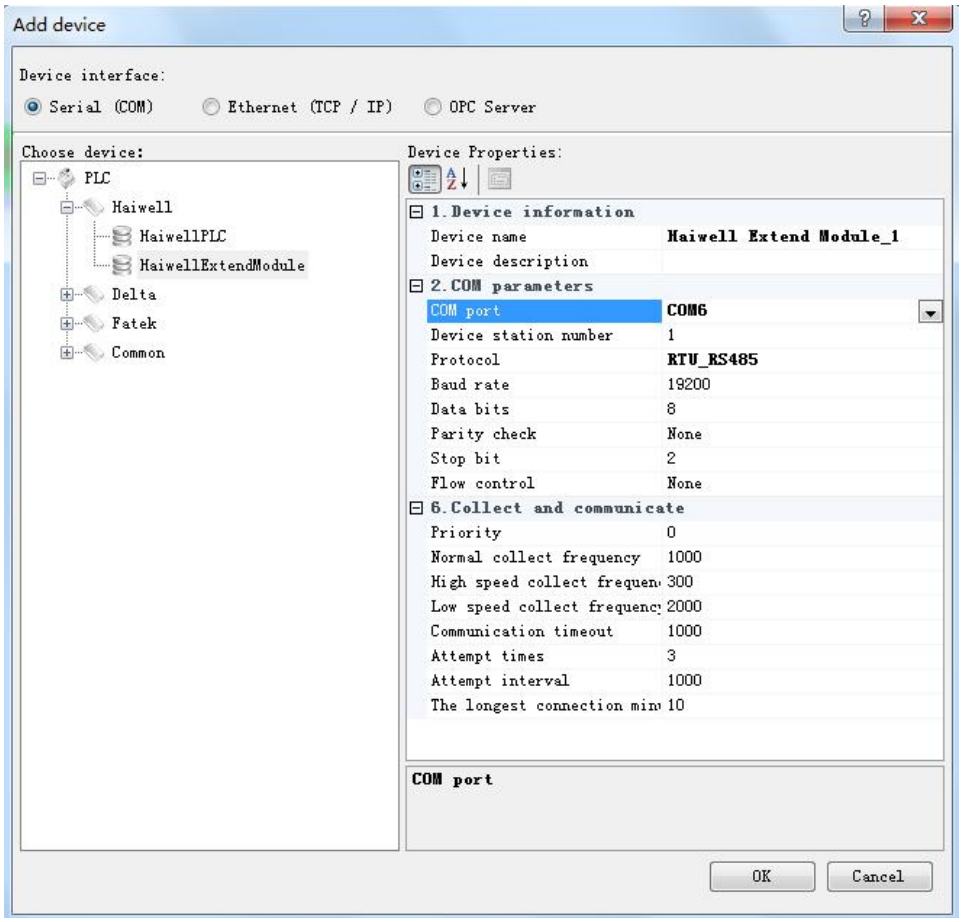
③ PLC program: Read the measurement voltage and current of remote Ethernet module H02PW channel, if the module IP address is 192.168.1.35, station address is 1, the read result is stored in V100-V103.



2.8. The example of Haiwell cloud configuration directly communicates with the H02PW module

Open Haiwell SCADA software, select "new project", then select "add device" at the "device", according to the module you choose supports Ethernet or RS485, select the serial or Ethernet, in this case for serial port, the generated serial port number of USB to 485 is COM6, as shown below:

The default parameter for the module is 19200 N 8 2 RTU, and station number address is 1. As for serial port, it directly selects Haiwell remote module driver:

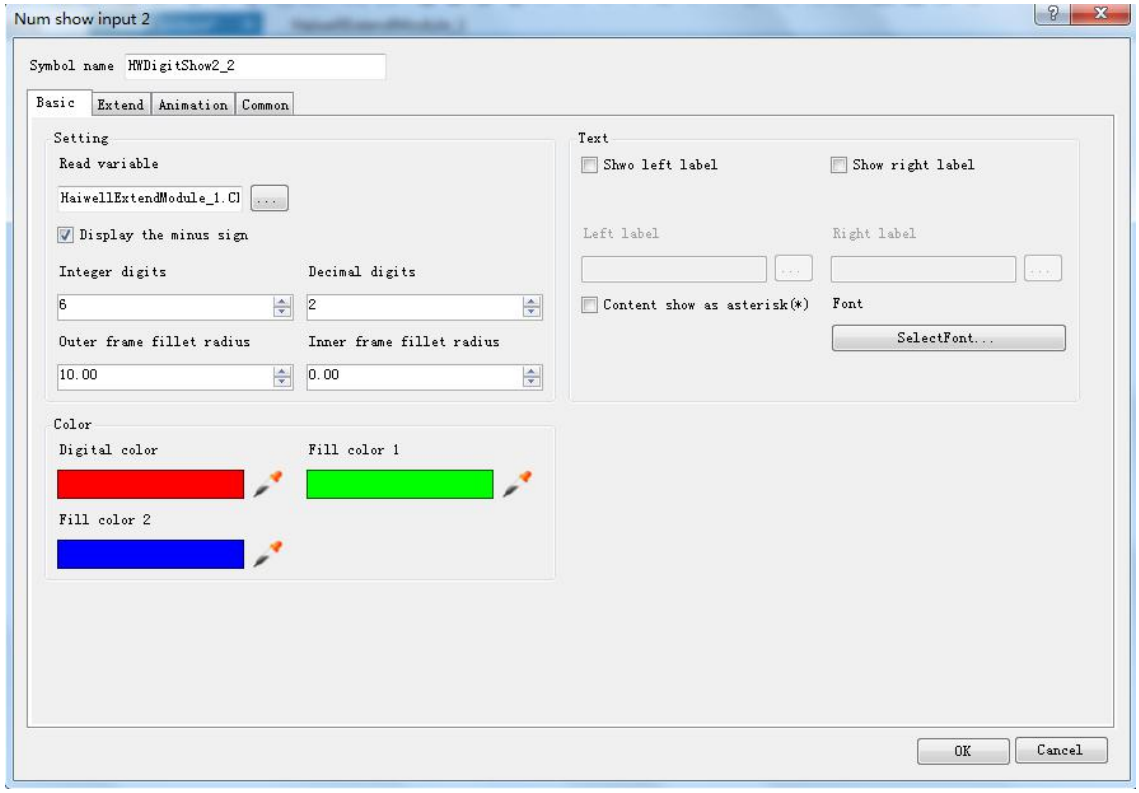


Click OK, then it will prompt us to start setting up variables. We create the H02PW module 2-channel corresponding CR code variables of the voltage / current measurements、voltage / current output values、PWM output period and duty cycle:

Device properties | Add | Batch add | Delete | Online | Off

	Variable name	Register type	Register address	Address length	Data type	Read-write mode	Acquisition frequency
1	CR16	CR	16	1	Integer	Read and write	Normal
2	CR17	CR	17	1	Integer	Read and write	Normal
3	CR18	CR	18	1	Integer	Read and write	Normal
4	CR19	CR	19	1	Integer	Read and write	Normal
5	CR20	CR	20	1	Integer	Read and write	Normal
6	CR21	CR	21	1	Integer	Read and write	Normal
7	CR22	CR	22	1	Integer	Read and write	Normal
8	CR23	CR	23	1	Integer	Read and write	Normal
9	CR24	CR	24	1	Integer	Read and write	Normal
10	CR25	CR	25	1	Integer	Read and write	Normal
11	CR26	CR	26	1	Integer	Read and write	Normal
12	CR27	CR	27	1	Integer	Read and write	Normal

Next set up the screen, then it will be OK to use the display primitive binding the corresponding channel variable value. If you need to display the number of decimal places, you can set the corresponding number of decimal places on the display primitive. As shown below:



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