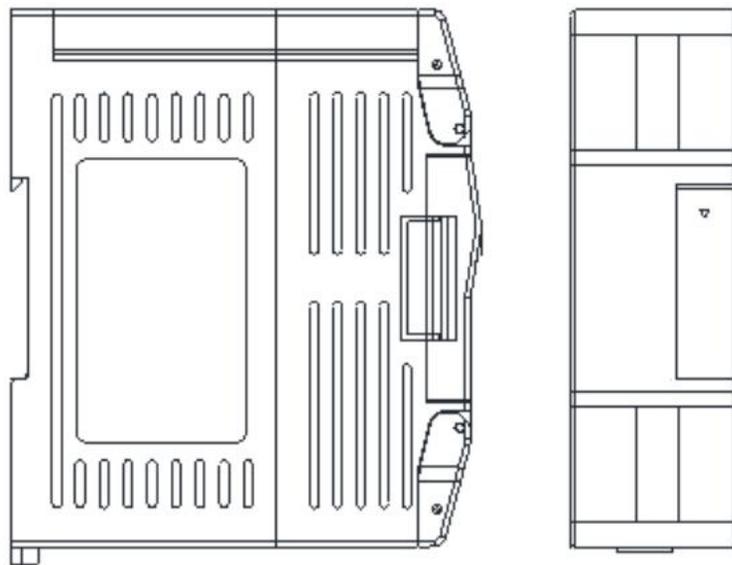# HNC PLC User Manual

Classic Programmable Logic Controller

Load Cell Module User Manual & Application Case

Contents

Load Cell Module User Manual

Load Cell Module Application Examples

Load Cell Module User Manual

1. Product Model List and Dimension

Model	Power (24VDC)	Dimension
TE-1WG	0.2A	30×95×82mm
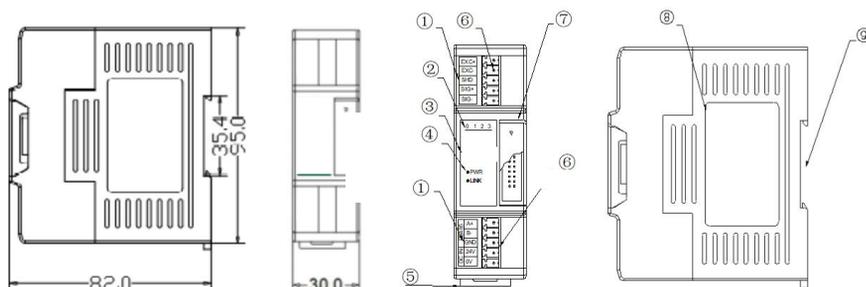
1. Terminal definition	6. Pluggable terminal
2. Weighing status indicator	7. Module expansion port
3. Model	8. Transparent cover of Module terminal
4. PWR:power indicator、LINK:Module communication indicator	9. Module nameplate
5. DIN rail mounting slot	10. 35mm DIN rail

2. Indicator Description

(1) PWR：Power indicator. Green, power is normal; No light - power is abnormal.
(2) LINK: Multi-status indicator .three colors(Red. Yellow. Green).
(3) 0: ON:gross weight; 1: ON: net weight; 2: ON: tare weight; 3: ON: calibration. As follows:

Reference processing mode	Module bus state	LINK indicator state
Normal	No communication of Module	No light
	MPU has identified the Module but no communication	Constant light in green
	Serial or parallel port in communication	Green jitter: indicator on 30ms and off 30ms
Parallel power supply insufficient, must connect to external power supply	Without serial or parallel port in communication	Yellow flicker: indicator on 0.5s and off 0.5s
	With serial or parallel port in communication	Yellow indicator off and jitter alternates: indicator off 0.5s and jitter 0.5s
Firmware upgrade failed, re-upgrade the Module firmware	Without serial or parallel port in communication	Red flicker: indicator on 0.5s and off 0.5s
	With serial or parallel port in communication	Red indicator off and jitter alternates: indicator off 0.5s and jitter 0.5s
Hardware failure	Without serial or parallel port in communication	Always on in red
	With serial or parallel port in communication	Red jitter quickly: indicator on 30ms and off 30ms

3.Power Supply Specification

Item	DC Power Supply
Power supply voltage	24VDC -15%~+20%
Power supply frequency	——
Instantaneous surge	MAX 20A 1.5ms @24VDC
Permit Power supply loss	10ms or less
Isolation Model	No Electrical isolation
Power Protection	DC input power polarity reverse, over voltage protection

4. Environmental Specification

Item	Environment Specification
Temperature/humidity	Operating temperature:0~+55℃　Storage temperature:-25~+70℃　Humidity: 5~95%RH, No condensation
Anti Vibration	10~57 HZ, amplitude=0.075mm, 57HZ~150HZ acceleration=1G, 10 times each for X-axis, Y-axis and Z-axis
Anti Shock	15G, duration=11ms, 6 times each for X-axis, Y-axis and Z-axis
Anti jamming	DC EFT:±2500V　　Surge:±1000V
Operating environment	Avoid dust, moisture, corrosion, electric shock and external shocks

5. Module Parameter Table

Item	Specification
Power supply	24VDC±20%，0.2A
A/D conversion method	24Bits △ Σ
A/D conversion speed	6.25/12.5/25/50/100/200/500Hz
Internal resolution	24bits
linearity error	Static weighing≤ 0.02% FS
Excitation Voltage	5VDC ±5% , 125mA (it can connect with 4 load Cells each 350 Ω)
Sensor sensitivity	1mV/V~5 mV/V
Measurement pulse	0~2000Hz　24VDC
Load Cell form	4- line connection or 6-line connection load Cells
Maximum distance to connect the sensor	100 meters

6. Load Cell Connections

Wiring Diagram (Second generation load cell module)
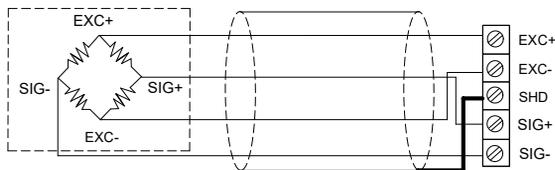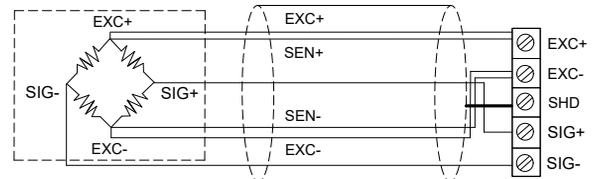
4-wire sensor and instrument connection　　　6-wire sensor and instrument connection

7. Multiple-load-Cell Parallel Connections

8. Terminal connection diagram


```
EXC+
EXC-
SHD
SIG+
SIG-
```
TE-1WG
```
RS485  A+
       B-
       GND
DC IN  24V
       0V
```

9. Module parameter table (CR code means the corresponding Modbus register address)

Note: CR code is corresponding to the Modbus register address.

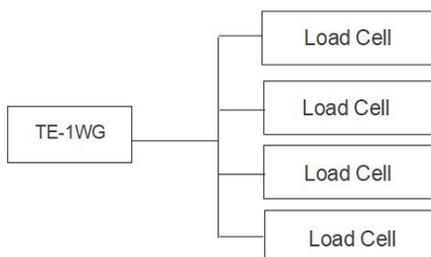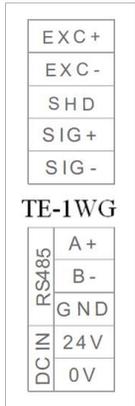| CR code(Hex) communication address	Function description	Property	Factory default	Remarks
00H	Low byte for Module code, Higher 3-bit of the High-Byte is　ID number. Lower 5-bit of High-Byte is version number.	R	xxxx	
01H	Communication Address	R/W	1	Range：1~247
02H	Communication Protocol Low byte lower 4-bit：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 Low byte higher 4-bit：0 – 2400 　　　　　　　　1 - 4800 　　　　　　　　2 - 9600 　　　　　　　　3 - 19200 　　　　　　　　4 - 38400 　　　　　　　　5 – 57600 　　　　　　　　6 - 115200	R/W	48 (19200, N,8, 2　RTU）	
03H	Module name	R/W		
04H	Module name	R/W		
05H	Module name	R/W		
06H	Module name	R/W		
07H	IP Address: default 192.168.1.111	R/W	0x016F	
08H	IP Address: default 192.168.1.111	R/W	0xC0A8	
09H	Month/date	R		
0AH	Year batch number	R		
0BH	High byte subnet mask(b3~b0,"1" means 255, "0" means 0, for example subnet mask 255.255.255.0 b3~b0=1110), low byte manufacturer code HW	R/W		Low byte code cannot be modified
0CH	Verification code	R		
0DH	Serial number low byte	R		
0EH	Serial number high byte	R		
0FH	Error Code 0:normal 1: illegal firmware identity 2: firmware incomplete 3:system data access exception 4: No external 24V power supply	R		
10H	Channel 1 average weight	R		
11H	Channel 1 status code bit0：No-load(zero point weight) bit1：exceed the upper limit of weight bit2：measurement value stable bit3~15：reserve	R		
12H	Channel 1 real-time weight	R		
13H	Channel 1 uses 32-bit display flags: 0: 16-bit weight display 1: 32-bit weight display	R/W32	0	

14H~15H	Channel 1 Real-time Weight 32 Bit Value: 14H: 32-bit low byte 15H: 32-bit high byte	R	0	
16H~17H	The average weight of channel 1 is 32 bits: 16H: 32-bit low byte 17H: 32-bit high byte	R	0	
18H	Channel 1 Skin Weight Low Bytes	R/W	0	16 bits to 18H, 32 bits to 18H19H
19H	Channel 1 Skin Weight High Bytes	R/W	0	
1AH	Channel 1 Control Setting Bit 0: Reservation Bit 1: Gross/Net Weight Display, 0-Gross Weight, 1-Net Weight Bit2-15: Reservation	R/W	0	Switch the current display weight to rough weight or net weight, us the value of 19H to work as tare weight
1BH	Channel 1 sampling frequency 0-7.5Hz，1-15Hz，2-30Hz，3-60Hz，4-120Hz,5-240Hz，6-480Hz，7-960Hz	R/W	3	range：0~7
1CH~1DH	Reserve	R		
1EH	Channel 1 average number of times	R/W	10	range：1~100
1FH	Channel 1 filter ratio	R/W	2	range：0~5
20H	Channel 1 stability examination times	R/W	5	range：0~500
21H	Channel 1 stability examination range	R/W	10	range：0~10000
22H	Channel 1 zero point tracking intensity 0 :close zero point tracking function Others: zero-point tracking intensity (absolute value)	R/W	0	Absolute value, range：0~200
23H	Channel 1 zero point detection range	R/W	10	Absolute value, range：0~10000
24H	Channel 1 upper limit of weight Set the upper limit value of weight, when measurement value is over the set value will record error code	R/W	32767	
25H	Channel 1 Skin Weight Read (Settings) At 16-bit display, the current weight value (10H) is read as the weight value of the leather weight and stored at 18H. When 32-bit display, read CR16H and CR17H as skin weight Z value, and store them at 18H and 19H.	R/W	0	0: no operation 1: Read the weight value as the tare weight and store it at 18H and 19H. Others: Invalid
26H	Channel 1 Calibration Weighing Instruction Supports Maximum 3-segment Calibration Write value 1: Enter calibration mode and zero current average weight Write value 2: End the calibration process -- User proofreading steps (16 bits): Step1: No weights on the weighing unit Step2: CR26H write value 1, enter calibration mode Step3: Paragraph 1. Calibration. Add a standard weight to the weighing unit and write the weight of the current chassis into CR27H. Step4: If you need to calibrate the second paragraph, add another standard weight to the weighing unit and write the weight on the current chassis to CR29H. If you don't need it, go to Step6. Step5: If you need to calibrate paragraph 3, add another standard weight to the weighing unit and write the weight on the current chassis into CR2BH. If you don't need it, go to Step6. Step 6: CR26H Writes value 2 to end the calibration process -- User calibration step (32 bits): Step1: No weights on the weighing unit Step2: CR26H write value 1, enter calibration mode Step3: Paragraph 1. Calibration. Add a standard weight to the weighing unit and write the weight on the current chassis into CR27H 28H. Step4: If the second calibration is needed, add another standard weight to the weighing unit and write the weight on the current chassis into CR29H 2AH. If not, go to Step6. Step5: If you need to calibrate paragraph 3, add another standard weight to the weighing unit and write the weight on the current chassis into CR2BH 2CH. If you don't need it, go to	R/W	0	Before use, the weight adjustment should be completed step by step.

	Step6. Step 6: CR26H Writes value 2 to end the calibration process			
27H	Low bytes of base weight of weights in channel 1, paragraph 1	R/W	2000	
28H	High bytes of base weight of weights in channel 1, paragraph 1	R/W	0	
29H	Low bytes of base weight of weights in channel 1, paragraph 2	R/W	0	
2AH	High bytes of base weight of weights in channel 1, paragraph 2	R/W	0	
2BH	Low bytes of base weight of weights in channel 1, paragraph 3	R/W	0	
2CH	High bytes of base weight of weights in channel 1, paragraph 3	R/W	0	
2DH	Automatic peeling range of channel 1	R/W	0	
2EH	Channel 1 Weight Upper Limit Low Bytes (32 Bit Display)	R/W	32767	
2FH	Channel 1 Weight Upper Limit High Bytes (32Bit Display)	R/W	32767	
30H~4FH	Reserve	R	0	
50H	Channel 2 average weight	R		
51H	Channel 2 status code: bit0：no-load（zero point weight） bit1：exceed the weight upper limit bit2：stability of measurement value bit3~15：reserved	R		
52H	Channel 2 Real-time weight	R		
53H	Channel 2 uses 32-bit display flags: 0: 16-bit weight display 1: 32-bit weight display	R/W32		
54H~55H	Channel 2 Real-time Weight 32 Bit Value: 54H: 32-bit low byte 55H: 32-bit high byte	R		
56H~57H	The average weight of channel 2 is 32 bits: 56H: 32-bit low byte 57H:32-bit high byte			
58H	Channel 2 Skin Weight Low Bytes	R/W	0	16 bits only use 58H, 32 bits use 58H 59H.
59H	Channel 2 Skin Weight High Bytes	R/W	0	
5AH	Channel 2 Control Setting Bit 0: Reservation Bit 1: Gross/Net Weight Display, 0-Gross Weight, 1-Net Weight Bit2-15: Reservation	R/W	0	Switch the current display weight to wool Weight or net weight, used in calculation the value of 58H and 59H as tare weight
5BH	Channel 2 sampling frequency 0-7.5Hz，1-15Hz，2-30Hz，3-60Hz，4-120Hz,5-240Hz，6-480Hz，7-960Hz	R/W	3	range：0~7
5CH-5DH	Reserved	R		
5EH	Channel 2 average number of times	R/W	10	range：1~100
5FH	Channel 2 filter ratio	R/W	2	range：0~5
60H	Channel 2 standstill checking times	R/W	5	range：0~500
61H	Channel 2 standtill checking range	R/W	2	range：0~10000
62H	Channel 2 zero tracking intensity 0 :close zero tracking function others: show zero tracking intensity(absolute value)	R/W	0	Absolute vaule,range：0~200
63H	Channel 2 zero-point detection range	R/W	10	Absolute vaule,range：0~10000
64H	Channel 2 weight upper limit Set the upper limit value of weight, when measurement value is over the set value will record error code	R/W	32767	
65H	Channel 2 Skin Weight Read (Settings) When 16-bit display, read the current weight value (50H) as the weight value of the leather weight and store it at 58H. When 32-bit display, read CR56H and CR57H as skin weight Z value and store them at 58H and 59H.	R/W	0	0: no operation 1: Read the weight value as the tare weight and store it at 58H 59H. Others: Invalid

66H	Channel 1 Calibration Weighing Instruction Supports Maximum 3-segment Calibration Write value 1: Enter calibration mode and zero current average weight Write value 2: End the calibration process --- User proofreading steps (16 bits): Step1: No weights on the weighing unit Step2: CR66H write value 1, enter calibration mode Step3: Paragraph 1. Calibration. Add a standard weight to the weighing unit and write the weight on the current chassis into CR67H. Step4: If you need to calibrate the second paragraph, add another standard weight to the weighing unit and write the weight on the current chassis to CR69H. If you don't need it, go to Step6. Step5: If you need to calibrate paragraph 3, add another standard weight to the weighing unit and write the weight on the current chassis into CR6BH. If you don't need it, go to Step6. Step 6: CR66H write value 2, end calibration process --- User calibration step (32 bits): Step1: No weights on the weighing unit Step2: CR66H write value 1, enter calibration mode Step3: Paragraph 1: Calibration. Add a standard weight to the weighing unit and write the weight on the current chassis into CR67H 68H. Step4: If the second calibration is needed, add another standard weight to the weighing unit and write the weight on the current chassis into CR69H 6AH. If not, go to Step6. Step5: If the calibration of paragraph 3 is required, add another standard weight to the weighing unit and write the weight on the current chassis into CR6BH 6CH. If not, go to Step6. Step 6: CR66H write value 2, end calibration process	R/W	0	Before use, the weight adjustment should be completed step by step.
67H	Low bytes of base weight of weights in channel 2, paragraph 1	R/W	2000	
68H	High bytes of base weight of weights in channel 2, paragraph 1	R/W	0	
69H	Low bytes of base weight of weights in channel 2, paragraph 2	R/W	0	
6AH	High bytes of base weight of weights in channel 2, paragraph 2	RW	0	
6BH	Low bytes of base weight of weights in channel 2, paragraph 3	RW	0	
6CH	High bytes of base weight of channel 2, paragraph 3	RW	0	
6DH	Automatic peeling range of channel 2	RW	0	
6EH	Channel 2 Weight Upper Limit Low Bytes (32Bit Display)	RW	32767	
6FH	Channel 2 Weight Upper Limit High Bytes (32Bit Display)	RW	32767	
70H-9EH	Reserved	R	0	
9FH	Restoring factory parameters of configurable CR	RW	1	The default value is 1 and 0 is written to the CR to restore the factory parameters of the configurable CR.

Application example of load Cell Module

Load Cell Module for remote IO function

The extension Module has a RS485 communication port (part models with additional Ethernet communication interface), which supports parallel bus (the parallel interface with PLC host (HCC series) by extending the extension bus) and the serial bus (using the RS485 communication port with the communication port of the PLC, the host plc using the communication instruction to control the remote Module). When you use the serial connection, then the remote IO Module is not limited by system IO points, and can be distributively installed.

It is very important for Distributed installation to collect or monitor a large number of discrete DI/DO or analog signals (temperature, humidity, pressure, air volume, flow, fan speed, valve opening and so on). The Distributed installation control and unrestricted expansion are easily realized, which greatly improves the control system. It reduces the wiring cost of all kinds of signals, and reduces the interference caused by the over-length of the analog signal line.

Next, we will introduce remote IO usage.

1. Load Cell Module power supply

When load Cell Module is used for remote IO，24VDC external switch power supply， PWR indicator light is on．

2. Communication interface introduction

TE-1WG has the RS485 interface.

3. Communication protocol and default parameters

RS485：

It supports standard Modbus RTU/ASCII protocol, and it can communicate with any third-party devices, such as PC scada, touch screen, text display and PLC, which support Modbus protocol.

Soft address: by programming software, the address set by remote tool, the address range 1-254, the default value is 1;

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

RS485 default parameters: 19200, N 82 RTU, station number 1.

4.When Module is used for remote IO, Module communication parameter configuration method is introduced as folllows：

There are three methods for remote IO parameter configuration:

①It can be configured by programming software tool remote Module (recommended).

②The Module can be connected to the host plc by parallel port and configured by hardware configuration and TO instruction.

③The Module can be configured by MODW instruction through serial communication

5.Parameter configuration example: configuring the Module through programming software "remote Module tool".

Hardware connection

①.through the RS485 (A+ B- terminal) connection: the computer with the serial port, can use 232 to 485 converter, if the PC with USB interface, you can use USB to 485 converter.

②.connect via Ethernet + communication interface: the Module can connect directly to the computer network port with standard network cable, or the computer and Module will be connected to the Ethernet switch.

Software operation steps

Click on the software menu bar - "remote Module":
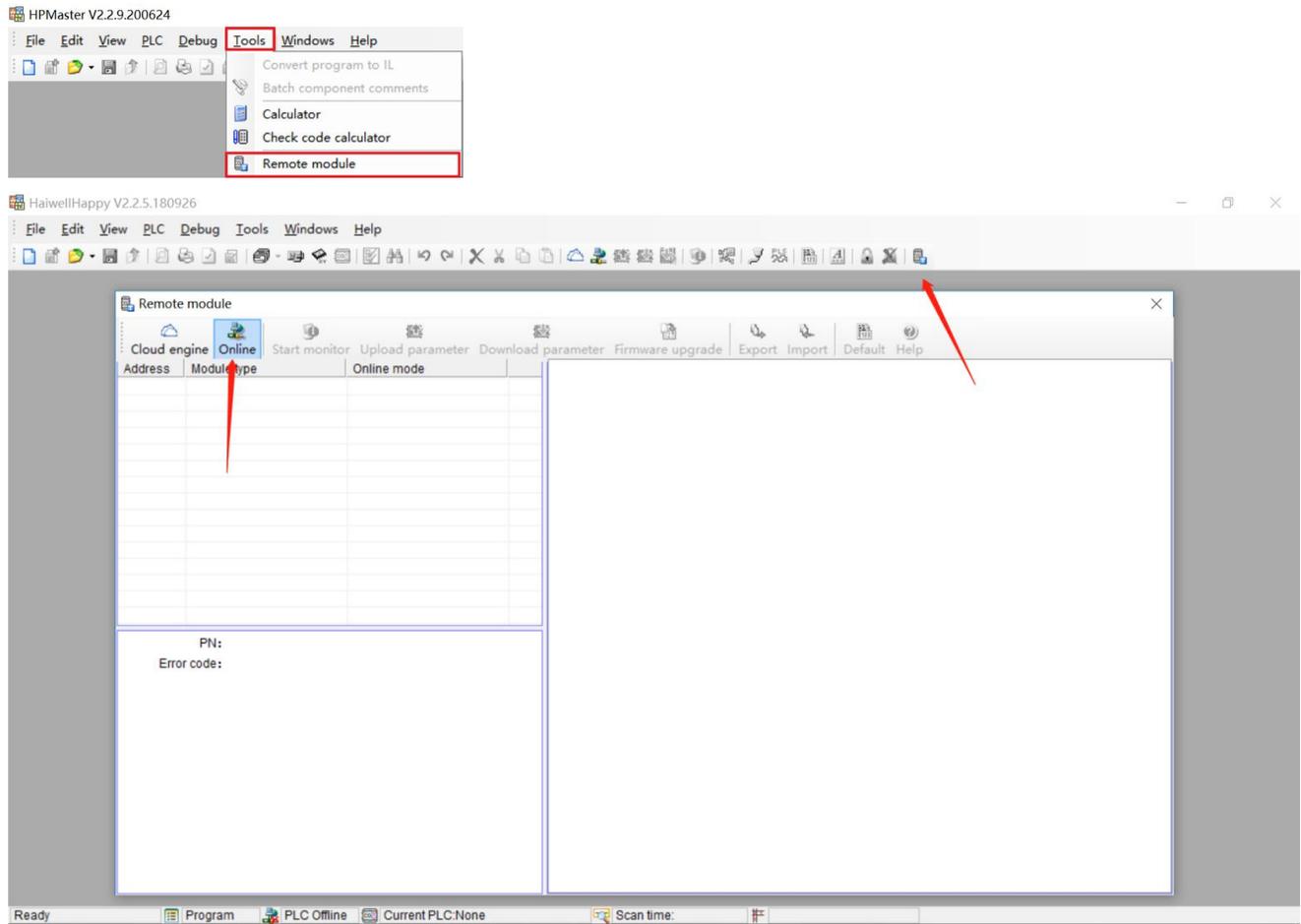
The default address of the Module is 1 with format 19200, N 82 RTU, and the online success is as follows:
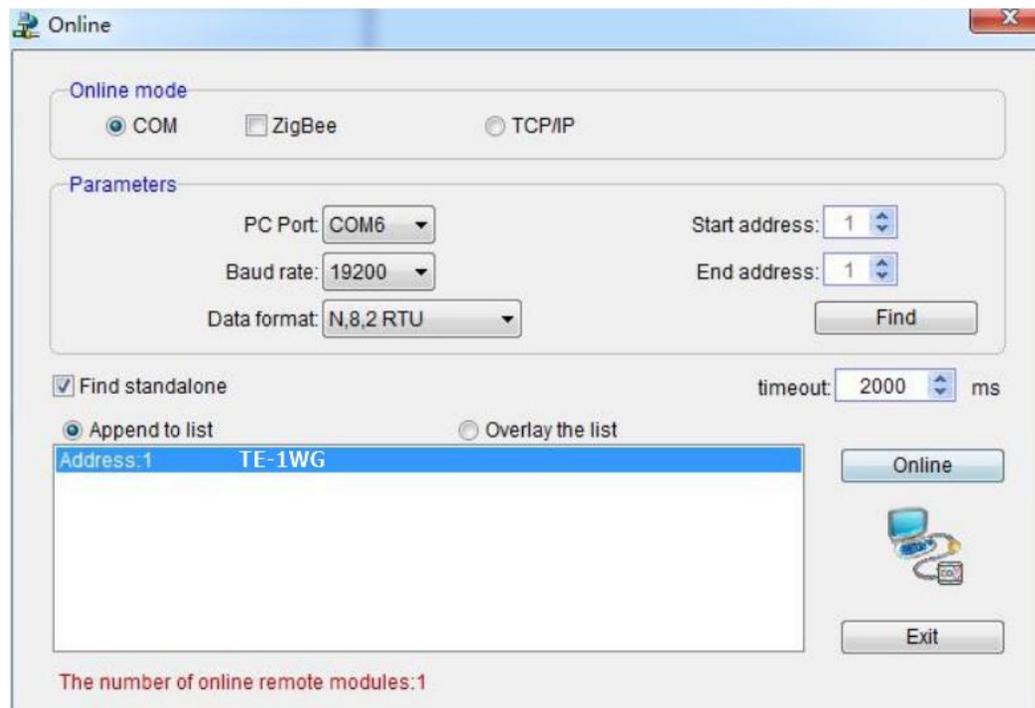
If there is only one plc on the 485 port, then you can use "find standalone". If there are many, set the start address and stop address, so that all the machines on the 485 port can be found and the parameters are configured. Click exit to enter the configuration interface.

In the communication parameter area, we can change the Module's name, address, baud rate and data format and other communication parameters, and then download it after modification.
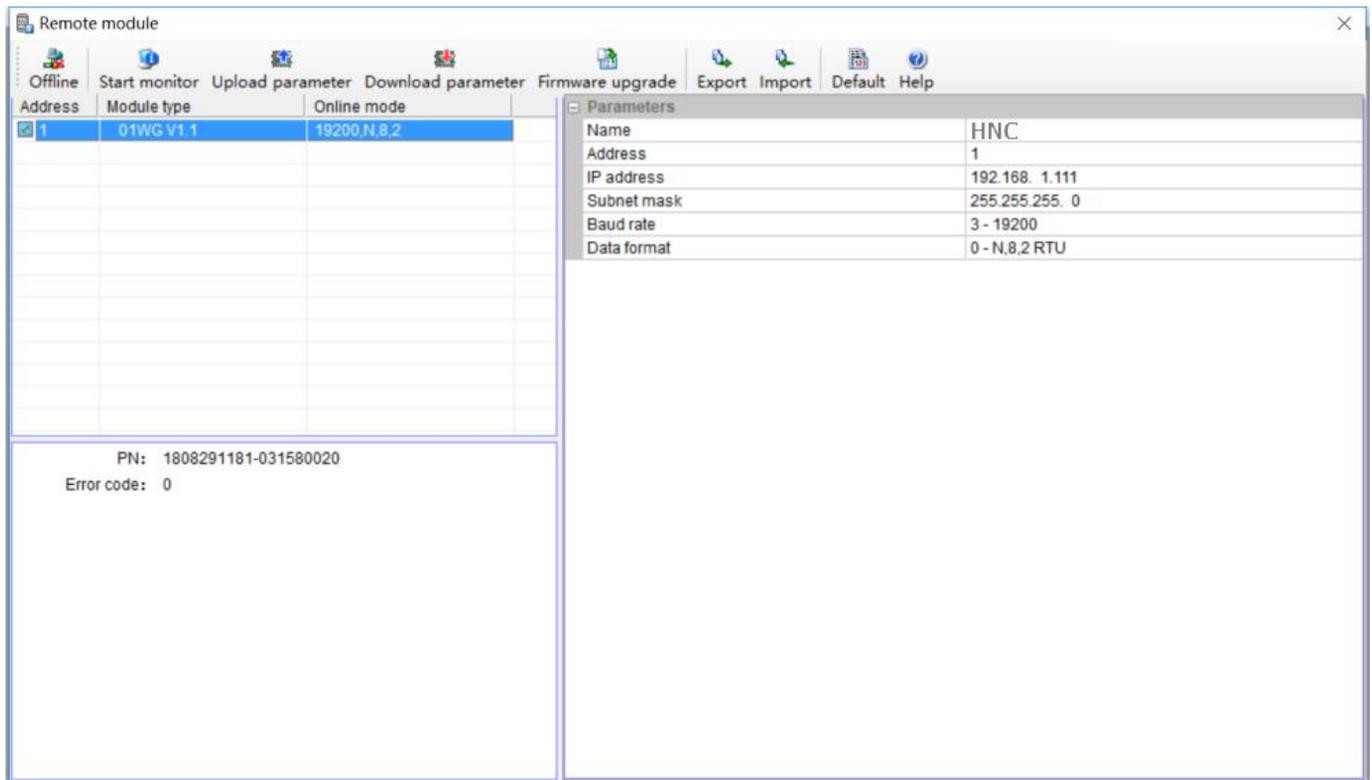
6.Examples of remote IO applications: reading Module real-time weight

①:hardware wiring: the RS485 ports of the host PLC and the load Cell Module are connected by the shielded twisted cable and the A+ is connected by A+ and B- to B-. If PLC connects to multiple weighing Modules, it is necessary to connect by mode of "hand by hand".

②: Modbus address: from the CR parameter table above, we can see that the TE-1WG Module CR 12H means the real-time weight.

③PLC program: this example TE-1WG communication is the default parameter: station number 1, baud rate 19200, data format N 82 RTU. PLC reads the 4 Channels values as follows:
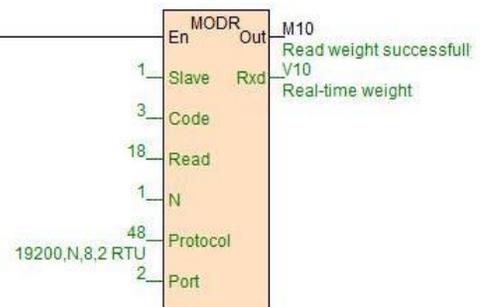
7.Examples of remote IO applications: calibration

The weighing Module supports three segments of calibration, and can realize multi-scale calibration. Take Channel 1 as an example, the tutorial steps are as follows:

Step1: No weight is put on the weighing unit.

Step2: CR26H write value 1, enter the calibration mode;

Step3: Paragraph 1 is calibrated by adding a standard weight to the weighing unit and writing the weight on the current chassis into CR27H.

Step4: If the second calibration is needed, add another standard weight to the weighing unit, and write the weight on the current chassis into CR29H, otherwise Step6 will be executed.

Step5: If the calibration of paragraph 3 is required, add another standard weight to the weighing unit, and write the weight on the current chassis into CR2AH, otherwise Step6 will be executed.

Step6: CR26H writes value 2 to end the calibration process.

Examples of multi-segment calibration procedures are as follows:

//Network 2 ******** Calibration ********。 Step1: No standard weights on the load cell； Step2: Write "1" into CR26H to start calibration；

//Network 3 Step3：In the first segment of calibration, put a standard weight on the pan connected to the load cell module. The weight of the counterweight should be written into CR27H(16 bits) You could continue to step 6 if multiple segments of calibration are unnecessary.

```
M61
─┤ ├─────────────────────────────────────────────────────────┤En   MODW  Out├─M403
1st                                                             1─┤Slave
segment                                                         6─┤Code
                                                               39─┤Write
                                                          V1002 ─┤Val
                                                    Low byte of 1st
                                                                1─┤N
                                                               48─┤Protocol
                                                    19200,N,8,2 RTU
                                                                2─┤Port

M403                                                              M61
─┤ ├───────────────────────────────────────────────────────────( RST )─
                                                                 1st
                                                                 segment
```

//Network 4 Step4: Add one more standard counterweight on the pan if second segment of calibration is needed. The current weight should be written into CR29H(16 bits) Or you could continue to step 6.

```
M62
─┤ ├─────────────────────────────────────────────────────────┤En   MODW  Out├─M404
2nd                                                            1─┤Slave
segment                                                        6─┤Code
                                                              41─┤Write
                                                         V1004 ─┤Val
                                                   Low byte of 2nd
                                                               1─┤N
                                                              48─┤Protocol
                                                   19200,N,8,2 RTU
                                                               2─┤Port

M404                                                             M62
─┤ ├───────────────────────────────────────────────────────────( RST )─
                                                                2nd
                                                                segment
```
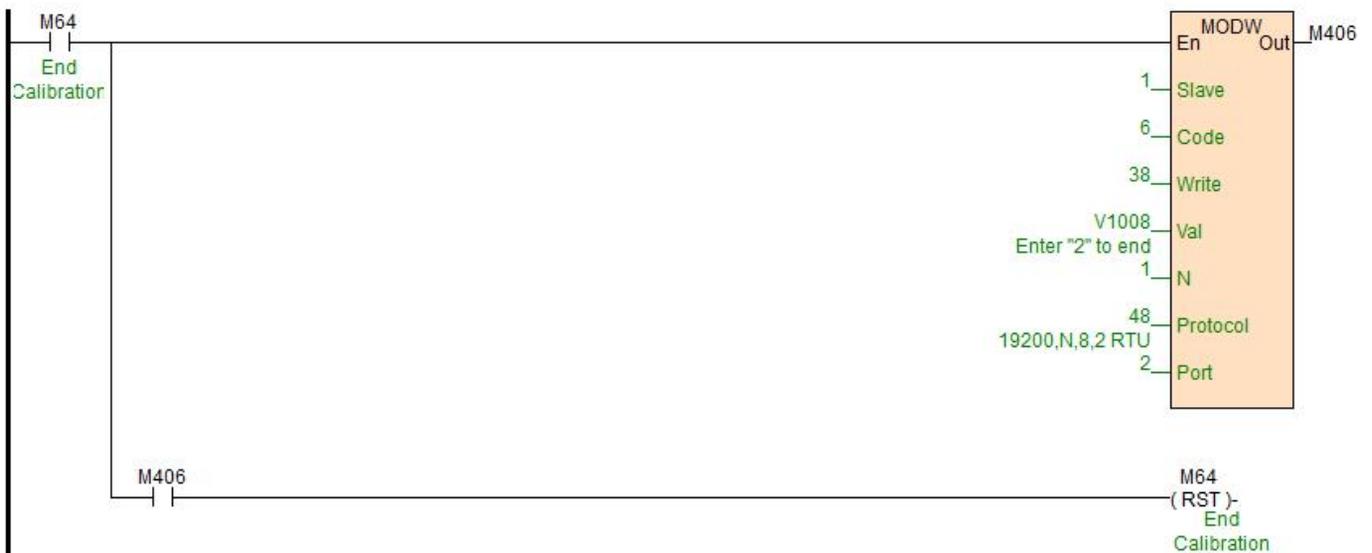
//Network 5 Step5: Add another standard counterweight on the pan if third segment of calibration is needed. The current weight should be written into CR2BH(16 bits) /. Or you could continue to step 6.; Step6: Write "2" into CR26H to end calibration.

```
  M63                                                           MODW
──┤├──┬─────────────────────────────────────────────────┐ En       Out├─ M405
 3rd   │                                                  │
segment│                                              1 ──┤ Slave
       │                                                  │
       │                                              6 ──┤ Code
       │                                                  │
       │                                             43 ──┤ Write
       │                                                  │
       │                                          V1006 ──┤ Val
       │                                    Low byte of 3rd │
       │                                              1 ──┤ N
       │                                                  │
       │                                             48 ──┤ Protocol
       │                                    19200,N,8,2 RTU │
       │                                              2 ──┤ Port
       │
  M405 │                                              M63
──┤├──┴────────────────────────────────────────────( RST )─
                                                     3rd
                                                    segment
```

//Network 6 Step6: Write "2" into CR26H to end calibration.

```
  M64                                                          MODW
──┤├──┬─────────────────────────────────────────────────┐ En       Out├─ M406
 End   │                                                  │
Calibration                                           1 ──┤ Slave
       │                                                  │
       │                                              6 ──┤ Code
       │                                                  │
       │                                             38 ──┤ Write
       │                                                  │
       │                                          V1008 ──┤ Val
       │                                     Enter "2" to end │
       │                                              1 ──┤ N
       │                                                  │
       │                                             48 ──┤ Protocol
       │                                    19200,N,8,2 RTU │
       │                                              2 ──┤ Port
       │
  M406 │                                              M64
──┤├──┴────────────────────────────────────────────( RST )─
                                                     End
                                                  Calibration
```

Other parameters configuration and read are also read with MODR and MODW instructions.