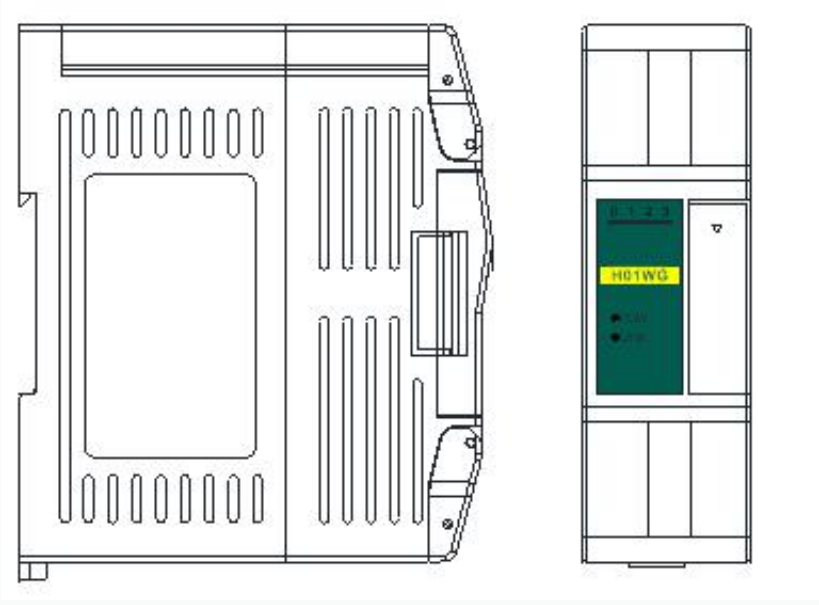
Haiwell 海为®

Haiwell Programmable Logic Controller User Manual

H01WG load cell module user manual and programming examples



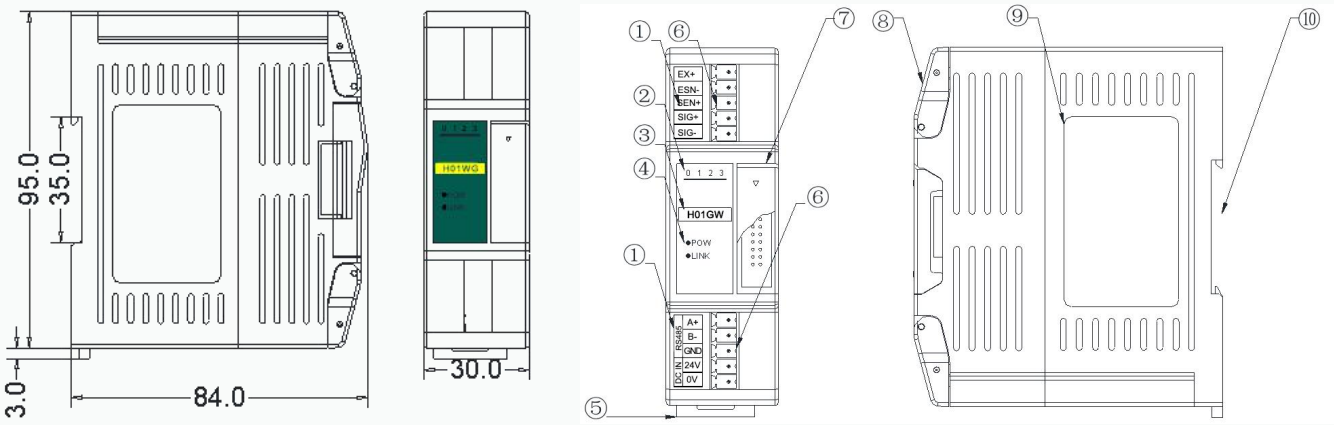
Xiamen haiwell technology Co., Ltd. en.haiwell.com

Catalogue

H01WG Load cell module user manual

1. Product model list and dimension

Model with ethernet	Power supply(24 VDC)	Model with ethernet	Power supply(22 0VAC)	Model	Power supply(24VD C)	Model	Power supply(220 VAC)	Dimension
				H01WG	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

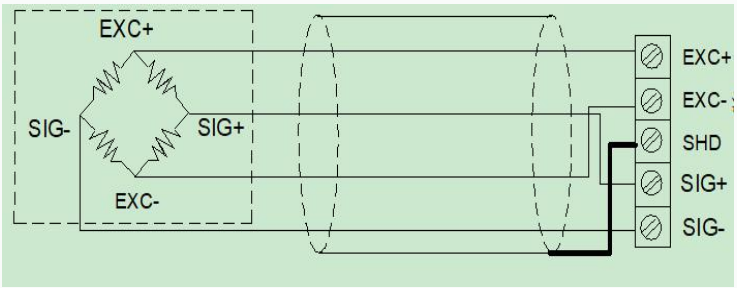
Item	Environment Specification
Temperature/humidity	Operating temperature:0~+55℃ Storage temperature:-25~+70℃ Humidity: 5~95%RH, No condensation
Anti Vibration	10~57 HZ, amplitude=0.075mm, 57HZ~150HZ acceleration=1G, 10 times each for X-axis, Y-axis and Z-axis
Anti Shock	15G, duration=11ms, 6 times each 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

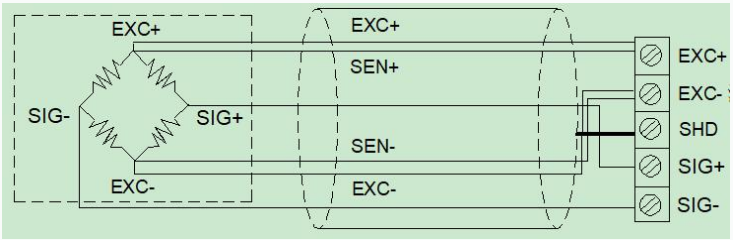
Item	Specification
Power supply	24VDC±20%，0.2A
A/D conversion method	24Bits △ Σ
A/D conversion speed	6.25/12.5/25/50/100/200/500Hz
Internal resolution	24bits
linearity error	Static weighing≤ 0.02% FS
Excitation Voltage	5VDC ±5% , 125mA (it can connect with 4 load cells each 350 Ω)
Sensor sensitivity	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

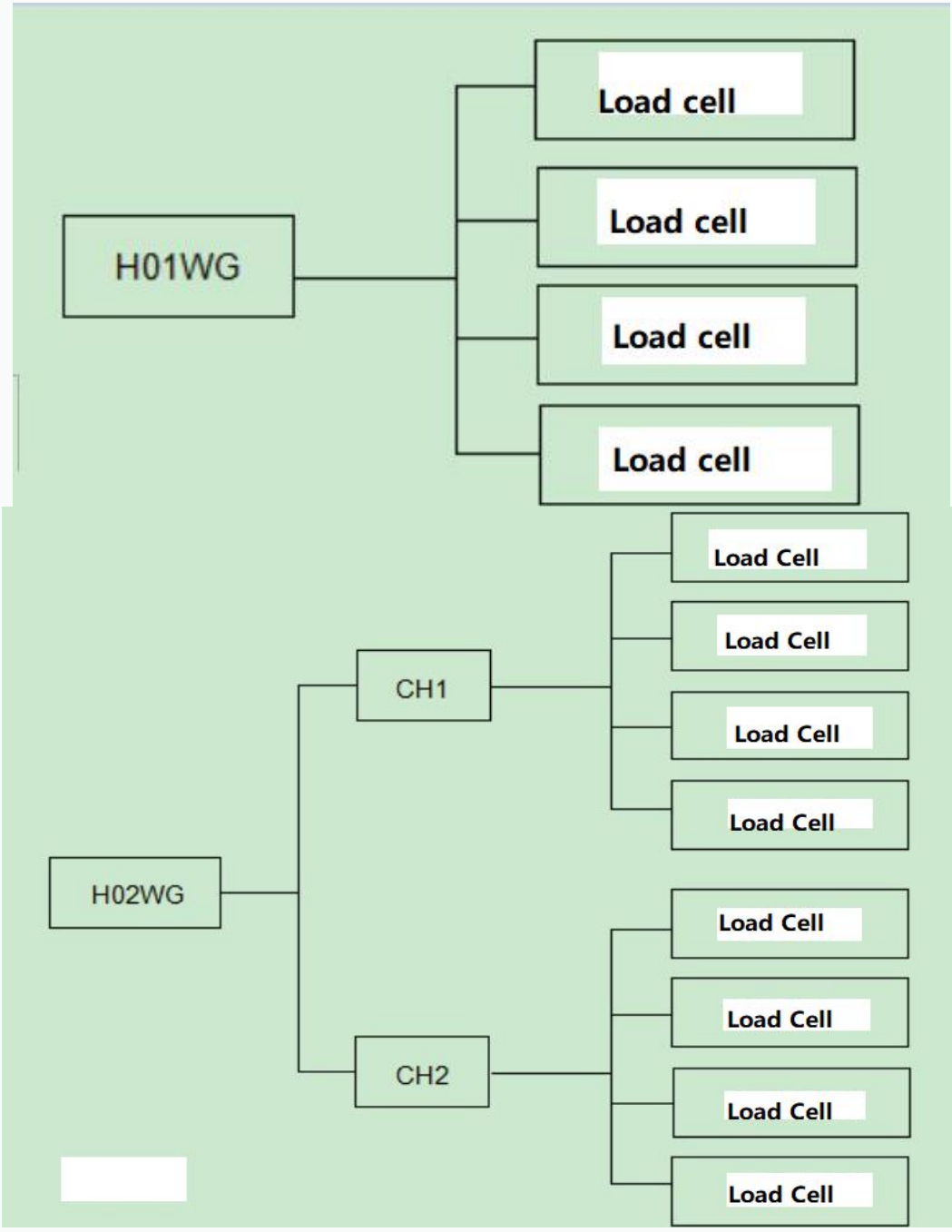
4-wire sensor and instrument connection:



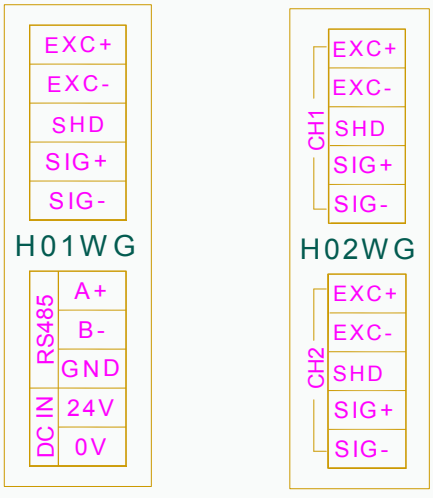
6-wire sensor and instrument connection:



7. Multiple-load-cell parallel connections



8. Terminal connection diagram



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	10AD	
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		
1H	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~18H	reserve	R		
19H	channel 1 tare weight	R/W	0	
1AH	channel 1 control setting bit0：reserve bit1:rough weight/ net weight display, 0-rough weight, 1- net weight bit2~15：reserve	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 frequency0 - 6.25Hz，1 – 12.5 Hz，2 - 25 Hz，3 - 50 Hz，4 - 100 Hz，5 - 200 Hz，6 – 500Hz	R/W	2	range：0~6
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 tare weight read(set) Read the current weight value(12H) as the tare weight value	R/W	0	0：no operation 1：Read the weight value as tare weight, stored to 19H others: invalid
26H	channel 1 weight calibration instruction, support up to three segments calibration 1：zeroing instruction 2：counterweight base point instruction Calibration steps: Step1：No counterweight on the load cell Step2： give “1” to CR26H register to start Calibration Step3：first segment calibration, add standard counterweight to the load cell and write current value to the CR27H reighster, Step4：If you need second segment calibration, add another standard counterweight to the load cell and write current value to CR28H register, if no need then jump to step 6 Step 5: If you need third segment calibration, add another standard counterweight to the load cell and write current value to CR29H register, if no need then jump to step 6 Step5：give value “2” to CR26H register to finish the weight calibration	R/W	0	Before using this module, the user should finish weight calibration step by step
27H	channel 1 first segment counterweight base point weight	R/W	1000	
28H	channel 1 second segment counterweight base point weight	R/W	0	
29H	channel 1 thirdsegment counterweight base point weight	R/W	0	
2AH	channel 1 automatic deduct the tare weight range	R/W	0	
2BH~4FH	reserved	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		
53H-58H	reserved	R		
59H	channel 2 tare weight	R/W	0	
5AH	channel 2 control settings bit0：reserved bit1：gross weight/net weight，0-gross weight，1-net weight bit2~15：reserved	R/W	0	Switch the current display weight to rough weight or net weight, us the value of 59H to work as tare weight
5BH	Channel 2 sampling frequency, 0 - 6.25Hz，1 – 12.5 Hz，2 - 25 Hz，3 - 50 Hz， 4 - 100 Hz，5 - 200 Hz，6 – 500Hz	R/W	2	range：0~6
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	Abolute vaule,range： 0~200
63H	Channel 2 zero-point detection range	R/W	10	Abolute 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 tare weight read(set) Read the current weight value(12H) as the tare weight value	R/W	0	0：no operation 1：Read the weight value as tare weight, stored to 19H others: invalid
66H	6channel 2 weight calibration instruction, support up to three segments calibration 1：zeroing instruction 2：counterweight base point instruction Calibration steps: Step1：No counterweight on the load cell Step2： give “1” to CR66H register to start Calibration Step3：first segment calibration, add standard counterweight to the load cell and write current value to the CR67H reighster, Step4：If you need second segment calibration, add another standard counterweight to the load cell and write current value to CR68H register, if no need then jump to step 6 Step 5: If you need third segment calibration, add another standard counterweight to the load cell and write current value to CR69H register, if no need then jump to step 6 Step5：give value “2” to CR66H register to finish the weight calibration	R/W	0	Before using this module, the user should finish weight calibration step by step
67H	channel 2 first segment counterweight base point weight	R/W	1000	
68H	channel 2 second segment counterweight base point weight	R/W	0	
69H	channel 2 thirdsegment counterweight base point weight	R/W	0	
6AH	channel 2 automatic deduct the tare weight range	R/W	0	
6BH-8FH	reserved	R		

Ten, installation of extension module

Installation should be in the closed distribution electric cabinet. keep a certain space(As shown on the right), to make sure PLC can have a good heat dissipation

Din rail installation method: use standard 35mm din rail

Screw installation method: all host plc and extension module have two screw positioning holes. The aperture is 4.5mm. the distance of positioning,please refer to the product shape size diagram. Whatever the installation way you use, please do not place the PLC in the bottom of the cabinet near the wall or install vertical, to make sure PLC can give out heat well.

Between different load cell modules and host plc, always use parallel-bus connection. Each module comes with an ribbon cable for parallel connection. Connection method: open the extension interface on the right side of one of its modules (host or extension module), insert the extended ribbon cable into the extension interface,and the extension interface on the right side of the module is used as the next extension. In turn, all extension modules are connected in turn.

Application example of load cell module

One. The module is extended through the parallel port of the host

1. Load cell module power supply

All expansion modules of Haiwell do not require external power supply, can be directly powered by the parallel port of the host.

If the PLC is 24VDC power supply, the external switching power supply is supplied to the host, and the extensions are powered by the parallel port from the host plc. The module power supply is essentially from the external switch power supply, so the module needs no additional external power supply. If the expansion module has insufficient power supply (the PWR light on the module is not bright), the external switching power supply capacity is not enough. The correct approach is to enlarge the power supply of the external switch power.

If the host PLC is 220VAC power supply, the extension modules are powered by the parallel port from the host plc, the expansion module does not need to connect the external power supply; if the expansion module is in insufficient power supply (the PWR lamp on the module is not bright), the correct approach is to supply the power supply module only by a single switch power supply. (This case happens when the number of expansion modules is too big and external loads are too much).

Haiwell extension module can be used as remote IO, so it will not be restricted by the number of system I/O points, and can be installed distributively, reducing cable wiring and solving the problem of interference caused by the long distance of traditional wiring. When modules are used as remote IO, they need power to be supplied externally The external power supply of the module is optional with 24VDC and 220VAC.

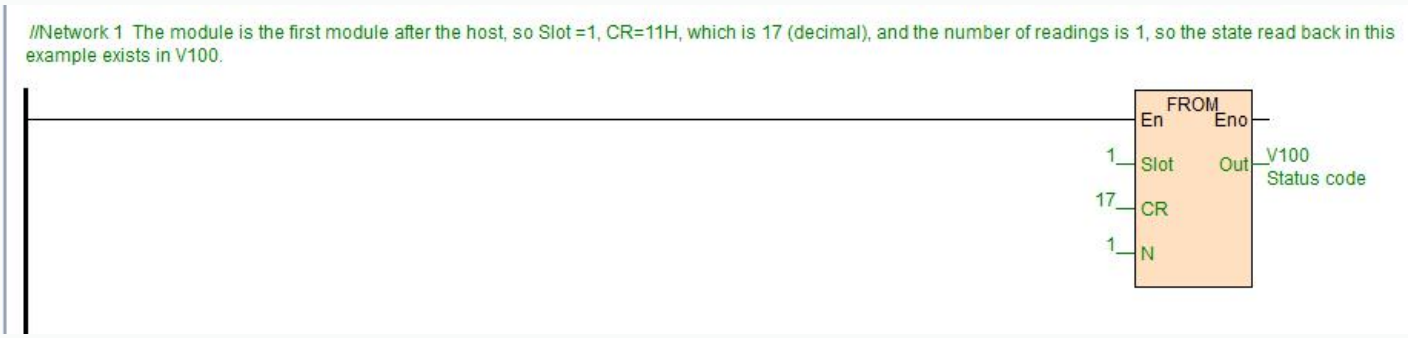
2. Hardware configuration

In this case, the host is N40S2T, with a load cell module, so the hardware configuration is as follows:

Index	Module type	X Component	Y Component	AI Component	AQ Component	Other	Description
0	N16S2T/P(-e)	X0 - X7	Y0 - Y7			COM1-2 HSC0-3 PLS0-3	CPU module 8*DI 8*DO transistor AC220V pow
1	H01WG						1 channel weighing module. built-in RS485 con

3. read the current weighing state

Here the load cell module is the first extension module of the host plc, so Slot =1, CR=11H (17-decimal), here read only one data, so the state read value back to V100:



11H： State code indication

Bit0: When here this bit is 1, it means that

there is no load on the load cell. The detection of no-load range is set by CR23H register.

When the bit is 1, it means that the weighing unit is no load state, and the no-load judgement range is set at CR 23H.

Bit1: When the bit is 1,it means exceed the upper limit. The upper limit of weight can be set by CR24H register,

When the bit is 1, it means that the load on the weighing unit exceeds the upper limit of the set weight, and the upper limit of

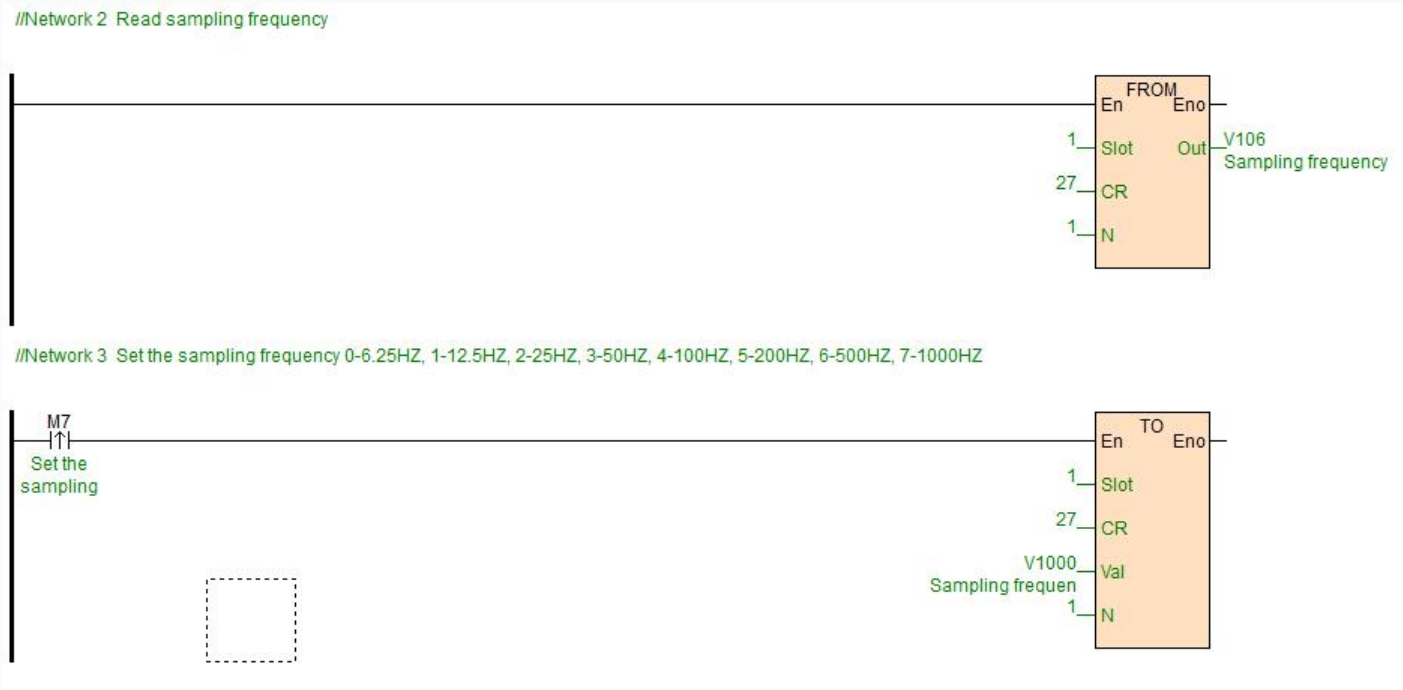
weight is CR 24H.

Bit2: When this bit is 1, the measurement of the load cell is stable, and the range of the stability detection and checking times is in CR20H register and CR21H register.

The registers status can be converted to bit component by the WTOB instruction for quick checking.

1BH：Sampling frequency

This register determines the number of sampling times within the cycle. The lower the value, the more stable the value is, the higher the accuracy.



1FH： Filter ratio

The larger this register value and the larger the filter proportion, the more stability the average weight value (in register CR10H). However, the delay will increase and the sensitivity will decrease.

22H：Zero point tracking intensity

The function of this register is to track zero point when the weight value is in the relevant range, which is used to reduce the temperature drift effect.

25H：Tare Weight reading (setting)

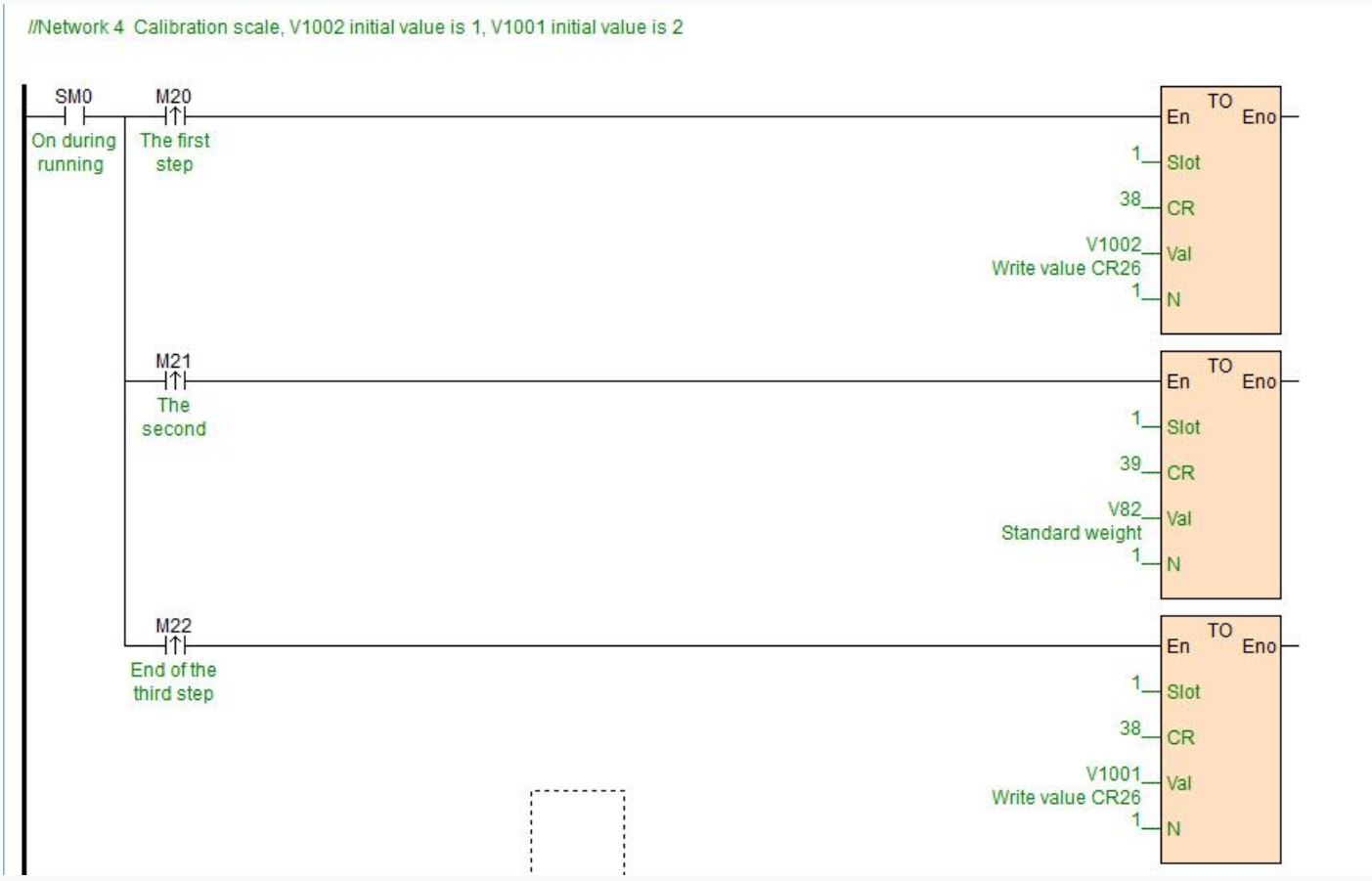
When make this register value as 1, the read value(from register CR12H) is taken as tare weight and will be stored in the tare weight register (CR19H).

For example, the current weight is 100, and when the tare weight reading function is set, the current weight is still 100 if the value of the control setting register (CR1AH) is 0, and the current weight will be 0 if the control setting register value (CR1AH) is 2.

4. calibration

Weight calibration is necessary before using the load cell module. First remove all the items on the load cell, write 0x0001 to the CR register 26H, calibrate the zero point, then add the standard counterweight on the load cell module, write the current value the CR register 27H, then write to the CR register 26H with 0x0002, and calibrate the base point.

Related control registers: CR 26H channel 1 weight calibration instruction, CR 27H channel 1 counterweight base point weight.



5. net weight measurement function

The user can choose the measured weight to be gross weight or net weight through the control setting (CR1AH) . The net weight is the actual weight of the goods after deducting the weight of the outer packing. The weight of the outer packing is called tare weight, and the gross weight is the total weight, that is, the gross weight is equal to the tare weight plus the net weight.

Tare Weight: outer packing weight

Net weight: actual weight of goods

Gross weight: total weight, gross weight = tare weight + net weight

example: use channel 1 to measure the net weight of display

① Read tare weight value

i、Write 0x0000 to CR1AH

ii、Put the outer packing on the weighing platform

iii、Write to CR25H with 0x0001, and the read value is tare weight.

② Display the net weight of the goods

0x0002 write 0x0002 to CR1AH

Relevant control registers

25H Channel 1 Tare weight read (set)

1AH Channel 1 control setting

19H Channel 1 tare weight

6. standstill check function

When the item is placed on the load cell to measure weight, the standstill check function can be used to know whether the current measurement is stable.

if the amplitude of the measured value is within the checking range set by CR 21H, the relevant Bit of CR11H will be set to 1.

If the measured value exceeds the set range of standstill, the relevant stable-Bit of the CR 11H will be set to 0, until the standstill check number 20H is within the checking range, and the relvant stable-Bit of the CR 11H will be then set to 1.

For example, the measurement time is 10ms, the standstill check times is set to 10 times, the checking range is 1000, when the variation range exceeds 1000, the measurement value is unstable, that is, the relevant stable-Bit of CR 11H will be set to 0, when the 100ms (10*10ms) variation range is within the checking range 1000, the relevant stability-Bit will be reset to 1 again. It is recommended to judge the stability before controlling it.

Related control registers: 20H channel 1 standstill checking times

21H channel 1 checking range

7. zero point detection function

The zero point detection function can be used to determine whether the item is removed from the weighing module, and if the zero point weight relevant Bit is 1, indicating that the item has been removed from the weighing module, and then we can move to next step.

Related control register: 23H zero point detection range

8. filter function

The average value is to get a average data from all the data, but the actual environment will have the inevitable external force factors, causing the read value to change sharply, the change of the average value also becomes larger, filtering function is to remove the mutation value . The filtered average value will not be affected by the abrupt change of the value. The filter ratio range is 10% ~ 50%.

Related control register: 1FH channel 1 filter ratio

Two. Load cell module for remote IO

Haiwell extension module has a RS485 communication port (part models with additional Ethernet communication interface), which supports parallel bus (the parallel interface with PLC host 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

H01WG 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”.

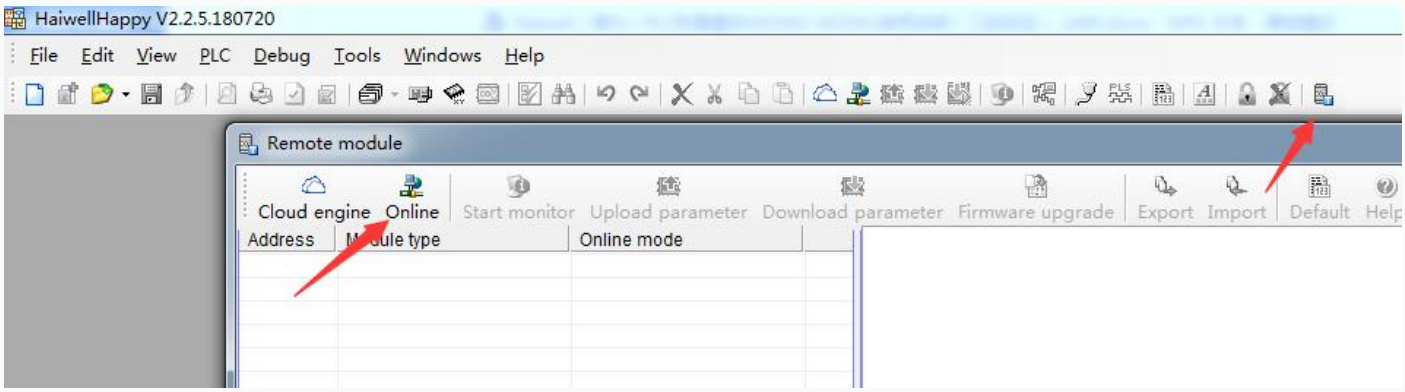
Hardware connection

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.

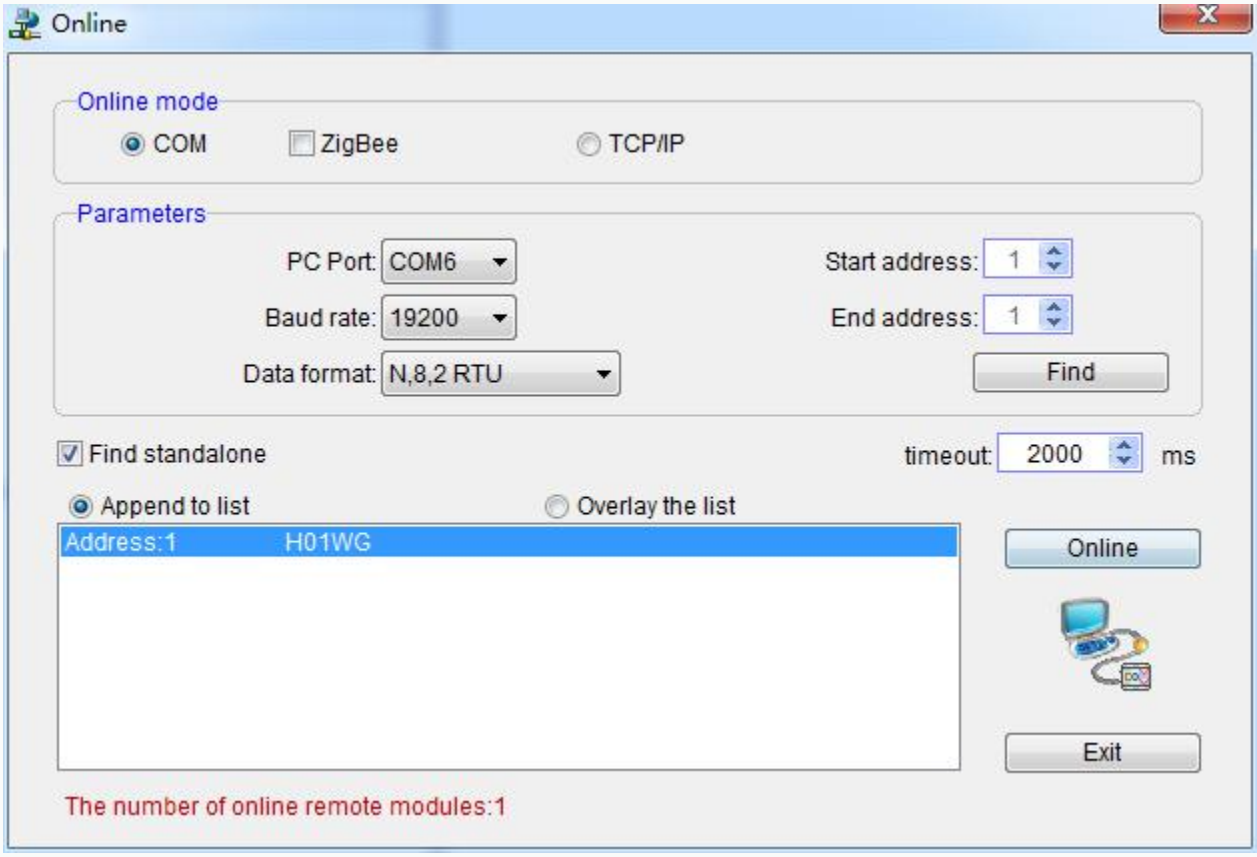
②.connect via Ethernet + communication interface: the module can connect directly to the computer network port with standard network cable, or the computer and module will be connected to the Ethernet switch.

Software operation steps

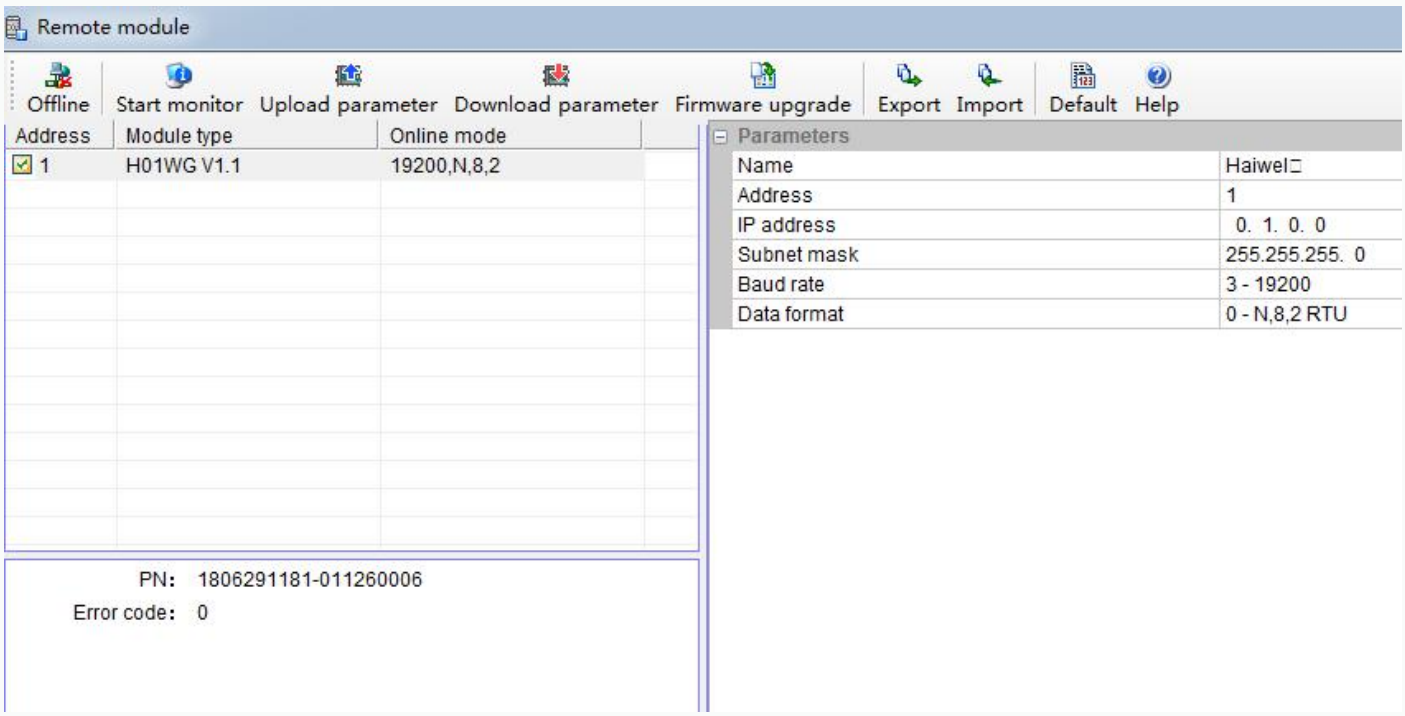
Click on the software menu bar - "remote module":



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.

5. examples of remote IO applications: reading module real-time weight

①:hardware wiring: the 485 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 H01WG module CR 12H means the real-time weight.

③PLC program: this example H01WG communication is the default parameter: station number 1, baud rate 19200, data format N 82 RTU. PLC reads the 4 channels values as follows:

6. examples of remote IO applications: calibration

User calibration steps:

Step1： No counterweight is placed on the weighing unit

Step2：write value 1 to CR26H

Step3：Add the standard counterweight on the load cell

Step4：Write the weight of the counterweight to CR27H

Step5：Writes the value 2 to CR26H to finish the calibration