H960 Operation Manual

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I. H960 Product Structure Description

1.1 Appearance

The shell is marked with device SN, device PN, product name，Model and other information.

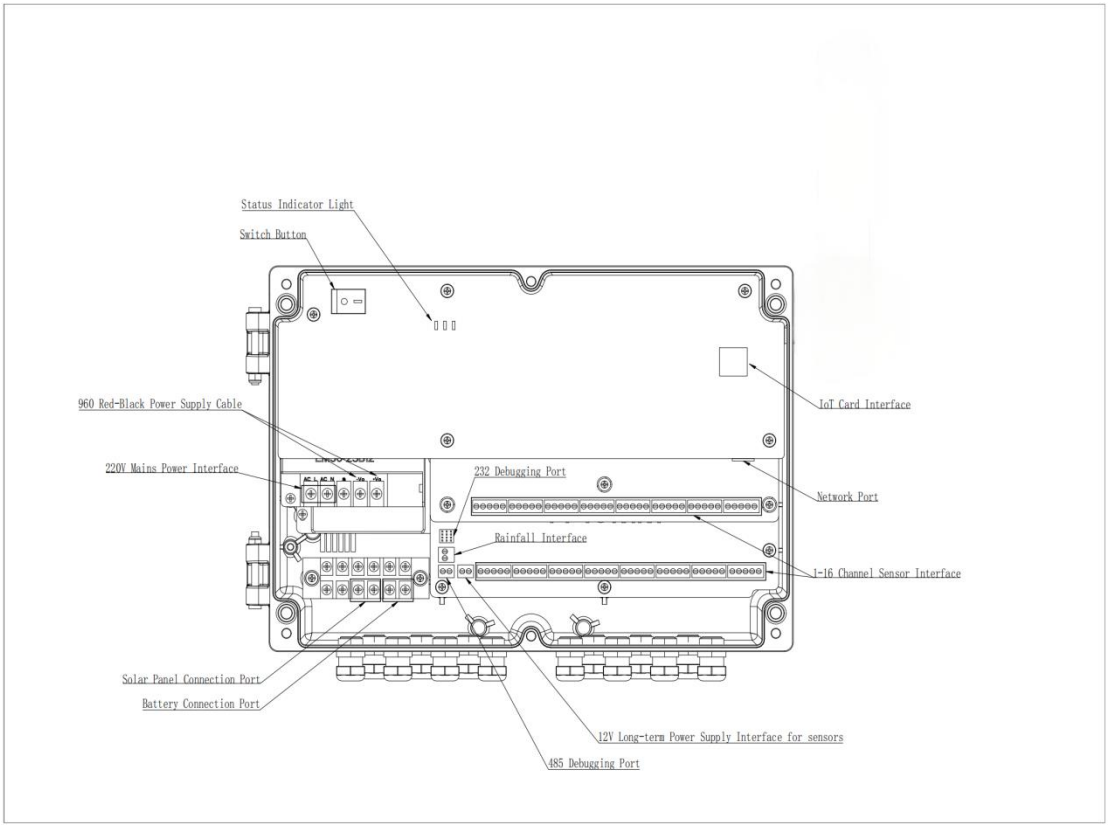
1.2 Internal

(1) H960 supports 3 power supply schemes:

① Vac input: 100-240Vac, 50-60Hz;

② External battery and solar panel;

No matter which power supply method is used, the red and black power supply wires of 960 should be connected.



(2) H960 is equipped with a built-in network port and RS485 port (the RS485 port can be debugged and expanded for output, and no sensor is connected) and a 12V long-term power supply port (providing 12V long-term power supply for sensors).

(3) H960 sensor access supports vibrating string, RS485, switching quantity, current/voltage, differential resistance, resistance, etc. Sensor wiring is carried out in the sensor channel. The channel names are CH01-CH08, representing channels 1-8 in turn.

(4) Status light: normally green on; when there is no external power supply, the built-in battery voltage is lower than 5.5V or the data collection of a connected sensor is abnormal, the indicator light flashes slowly within 1s; when the device is upgraded or the channel status is modified, the channel sensor data is erased and the indicator light flashes quickly within 0.25s.

Network light: orange on when successfully connected to any one of the

servers (3 network channels in total).

Power light: when the built-in lithium battery is fully charged, the red light is always on when powered on; when the battery is charging, it flashes at 1s interval.

(5) The RS232 debug port requires CHCNAV's special 7-core cable, which needs to be ordered by the company and is not a universal interface at present;

The RS485 debug port can be connected with a USB to RS485 serial port cable.

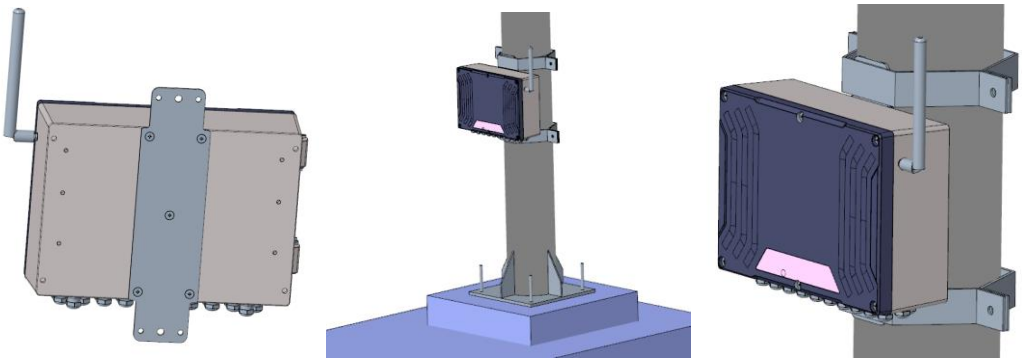
II. H960 Installation Scheme

No matter which installation scheme is adopted, the device must be protected against lightning and grounded after installation. The diameter of the grounding wire is not less than 2.5mm².

Strong and weak electricity should be routed separately. For example, The wiring of sensors and power supply lines should not be routed together, and network cables and power supply lines should not be routed together.

2.1 Pole Installation

2.1.1 Hoop Fixing



First, fix the backplane to the H960 host with 5 M5×10 countersunk head

screws, and then fix the upper and lower sides of the backplane with 2 stainless steel hoops or hose clamps to fix it on the pole.

2.1.2 Screw Fixing

The opening diameter of the 6 holes on the upper and lower sides of H960 is 8mm, and it is fixed on the pole with M8 screws.

2.2 Wall Installation

The backplane is fixed to the 960 host with 5 M5×10 countersunk head screws. When installing on the wall, it is fixed to the wall with 4-6 M8 screws.

2.3 Cabinet Installation

It is directly installed inside the CHCNAV cabinet. If it is installed inside the cabinet, a suction cup antenna must be used to place the antenna outside the cabinet.

III. H960 Power Supply Scheme

3.1 Solar Panel + Built-in Lithium Battery Wiring

Wiring method: The positive pole of the solar panel + is connected to the red positive pole of the H960 power supply wire, and the negative pole of the solar panel - is directly connected to the black negative pole of the H960 power supply wire.

The device is default connected to the H960 power supply wire and the solar controller load wire. It needs to be cut first and then wired according to the above wiring method.

Note:

1. Solar panel input should be DC 9-21V and recommended solar panel specifications is 50W.

2. When using this power supply method, the positive and negative poles of the H960 power supply must not borrow the two rightmost terminals of the mains module, which may burn the ACDC.

3.2 Solar Panel + External Battery Wiring

The device is default that the controller's load is connected to the H960 power supply wire. In this case, the battery is connected first and the solar panel is connected last.

When using this power supply method, the positive and negative poles of the H960 power supply must not borrow the two rightmost terminals of the mains module, which may burn the ACDC.

3.3 AC Power Supply Wiring

When accessing AC (100-240Vac,50-60Hz), pay attention to electrical safety, and ensure that the cable is not powered when accessing. The 1-3 terminals in the first red frame are the live wire, neutral wire, and ground wire interfaces respectively, and the mains can be accessed to. The second red frame is the place to access the negative and positive poles of the load, and directly connect the black and red wires of H960.

The device is default connected to the H960 power supply wire and the solar controller load wire. It needs to be cut first and then wired according to the above wiring method.

IV. H960 Universal Debugging

This chapter mainly describes the universal debugging method of the H960 upper computer. After H960 is powered, inserted with a card, and inserted with an antenna, it can be debugged according to the upper computer. The specific wiring of the sensor and the filling of the sensor parameters are described in Chapter 5.

4.1 Upper Computer Universal Debugging

4.1.1 H960 Serial Port Connection to Computer

H960 is connected to the computer through a debug cable. The debug cable includes two types.

The first is RS232 debugging, which consists of a power supplyable three-generation data cable (5 meters), a TWG0034 seven-core data cable, and a USB to RS232.

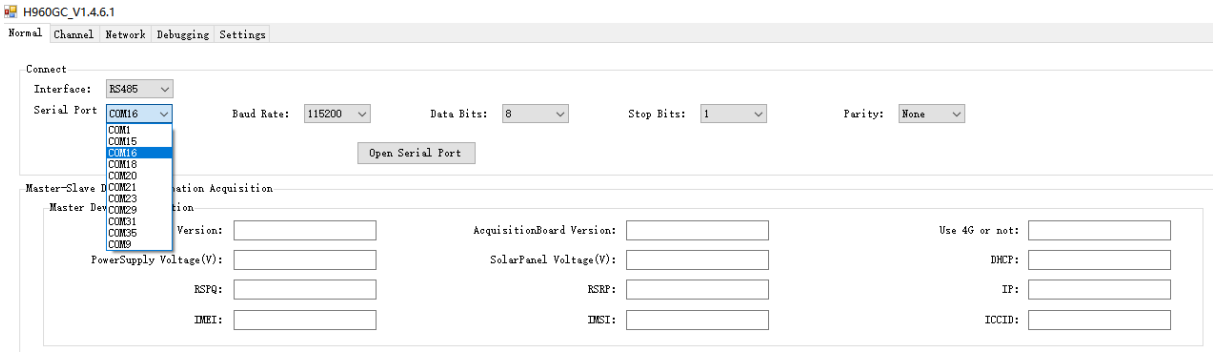
The second is RS485 debugging, which can be directly purchased with a USB to RS485. (RS485 debugging cannot print device logs)

The third is network port debugging, which is supported by firmware versions v1.3.7.4YNSX and V1.4 (expected to be released by the end of 24). (Network port debugging can print device logs, but you need to turn on the network port debugging function first, and ensure that the IP of the computer and 960 are in the same network segment)

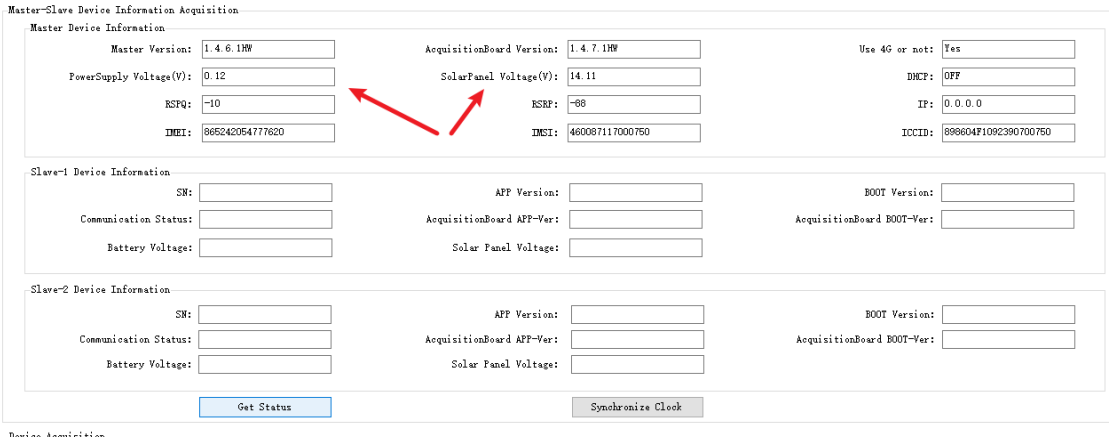
4.1.2 H960 Routine Parameter Query and Configuration

Double-click H960tool.exe to open the upper computer.

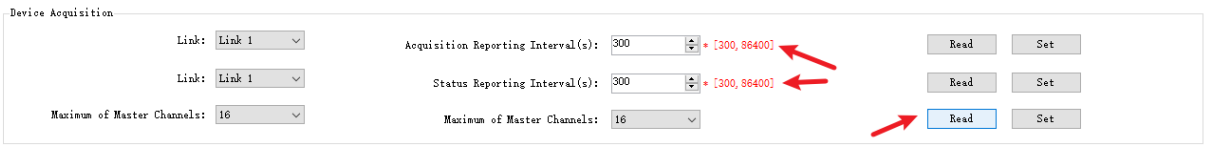
(1) Open the upper computer software, select the COM port on the routine page (if you don't know which serial port it is, open the device manager of the computer, and you can view it in the port (COM and LPT)), the baud rate is 115200, select the interface according to the RS232 or RS485 port accessed on site, and click "Open Serial Port". If the serial port is accessed after the upper computer is opened, the serial port will not be displayed, and the upper computer needs to be closed and then opened. When the serial port is connected normally, the upper right log box will prompt that the serial port is opened successfully, and the lower right log box will print basic information such as the supply voltage and temperature of H960.



(2) Click the "Get Status" button to check whether the supply voltage is normal (5.5V-8.4V) and the solar panel voltage (that is, the external supply voltage, generally ≥12V). If the solar panel voltage is near 0, it means that the device is not powered normally. This step is mainly to check whether the basic information of the device is normal, and no configuration is required.



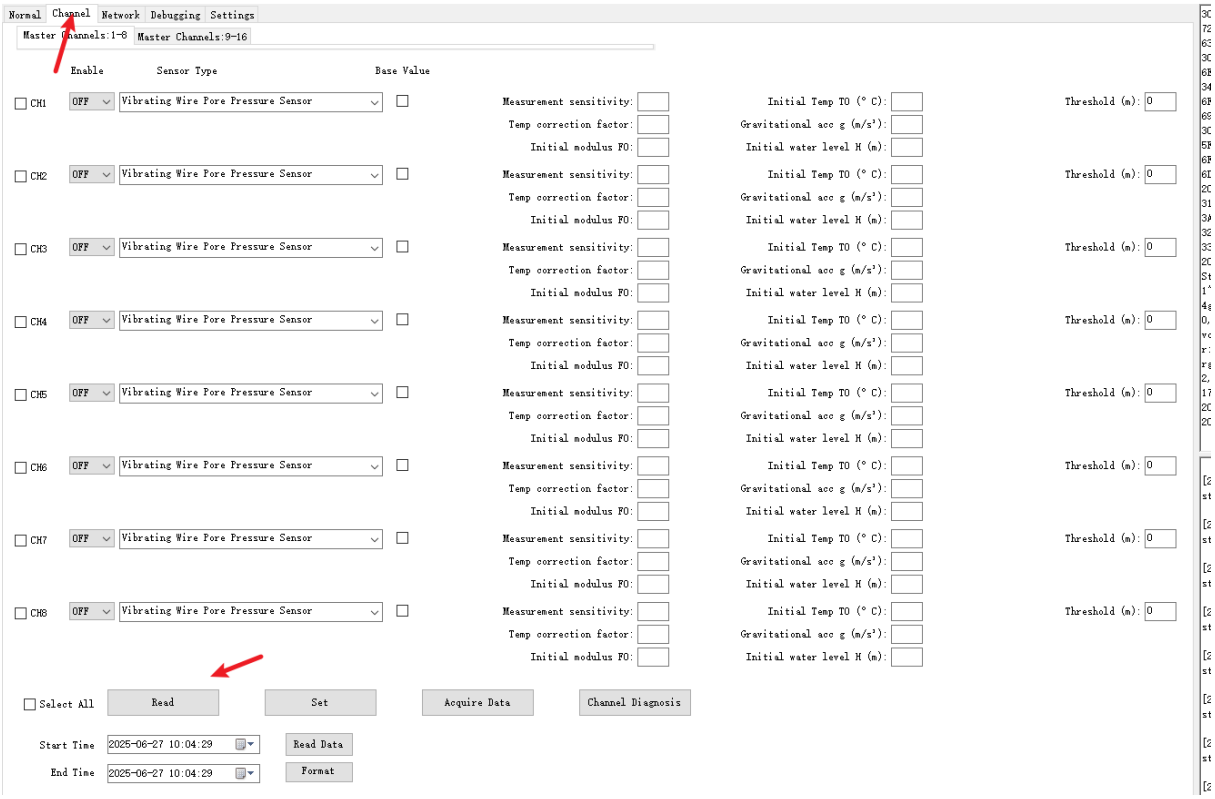
(3) In the device collection column, first read the collection and status intervals and the maximum number of channels, and then set the collection and reporting interval and status reporting interval according to the project requirements. The maximum number of channels defaults to 16.



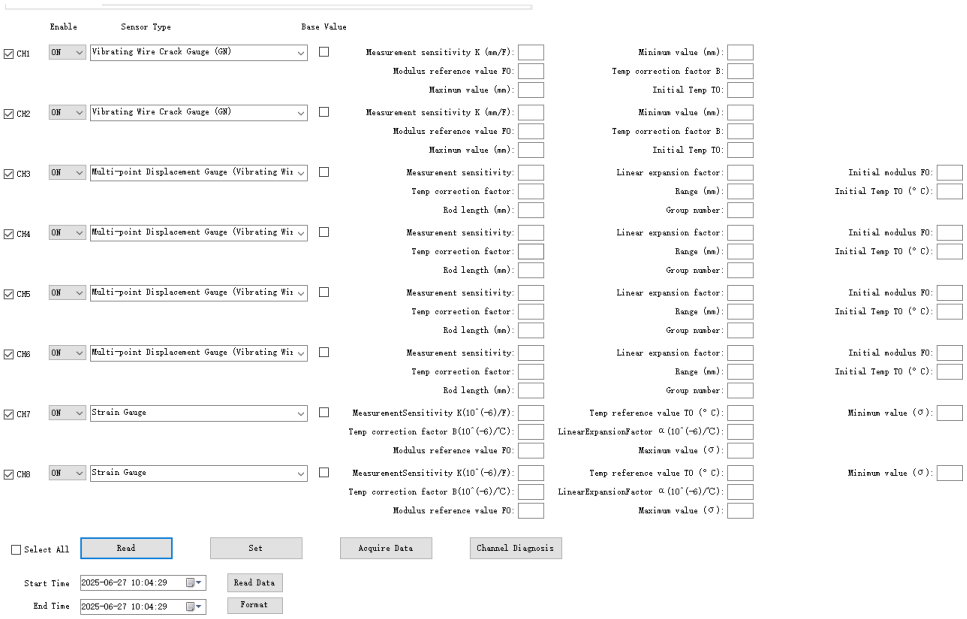
4.1.3 H960 Channel Setting

This paragraph only describes the general channel configuration logic, and how to fill in the channel parameters of specific different sensors is shown in Chapter 5.

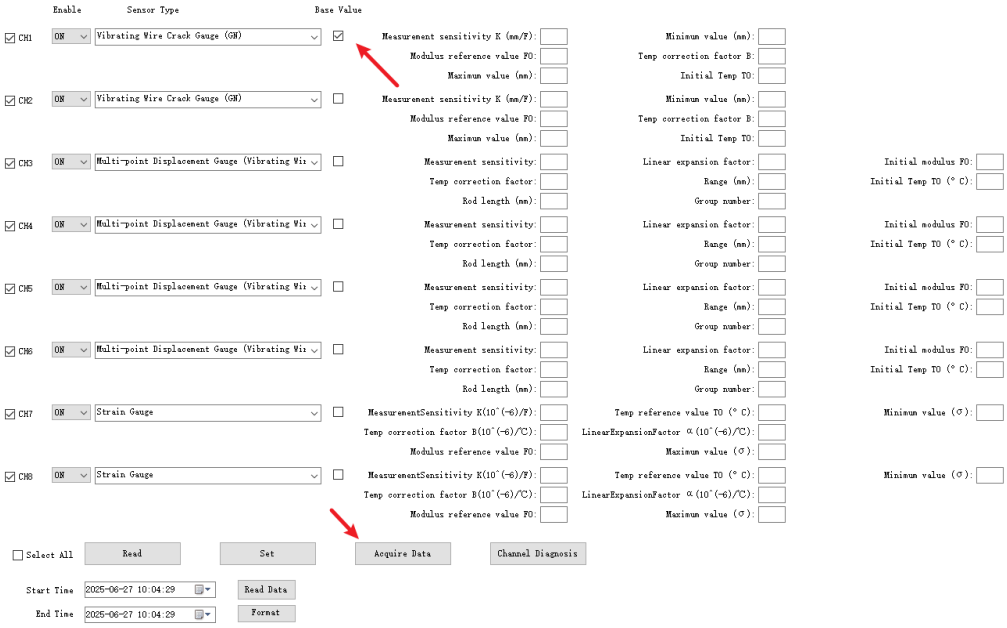
(1) Click the channel in the menu bar, first click read to read the default parameters of each channel, and get into the good habit of reading channels.



(2) Check the channels that need to be configured, modify the enable to on, and set according to the type of sensor to be connected to each channel (see Chapter 5 below for how to fill in the channel parameters of specific different sensors). Configure as many channels as connected at one time, do not configure one channel and click set once. After all channel parameters are configured, click the set button below.



(3) After setting the channel parameters of the vibrating wire device, the base value calibration is basically required. Check the base value calibration and click collect data, and H960 will collect a set of data as the reference value.



Note: If you need to modify the parameters of a certain channel or add a configuration of a certain sensor after the configuration is completed, you must read the channel parameters first! All previously configured channels must be checked, and then modified or added, otherwise the previous channel information will be lost and need to be reconfigured!

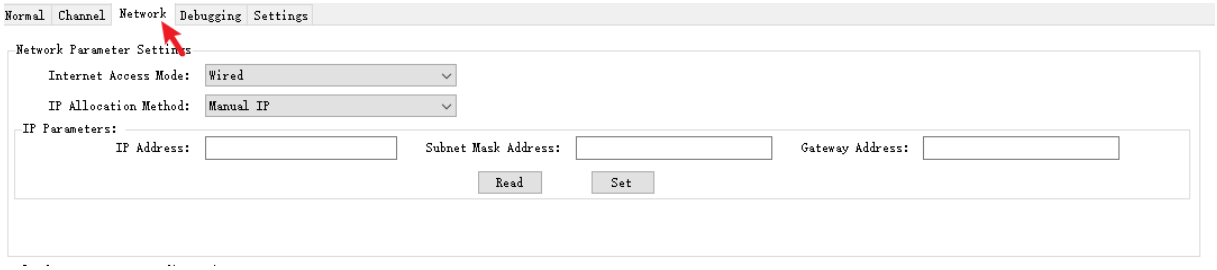
4.1.4 H960 Network Setting

(1) Network parameter setting - wireless transmission

Default wireless transmission does not need to be configured.

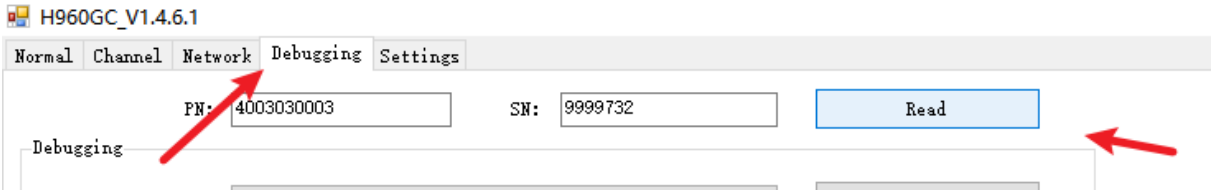
(2) Network parameter setting - wired transmission

If wired is used, the IP allocation method can be manual IP or DHCP (automatic IP acquisition). If wired transmission is used, it is recommended to set it as a manual IP, and then fill in the IP parameters. The IP address and the server IP are in the same network segment. The device itself is a tcp client, and the internal network IP of the server and the pre-allocated port need to be written in the platform parameter configuration.



4.1.5 H960 Other Parameter Query and Configuration (Generally Not Required)

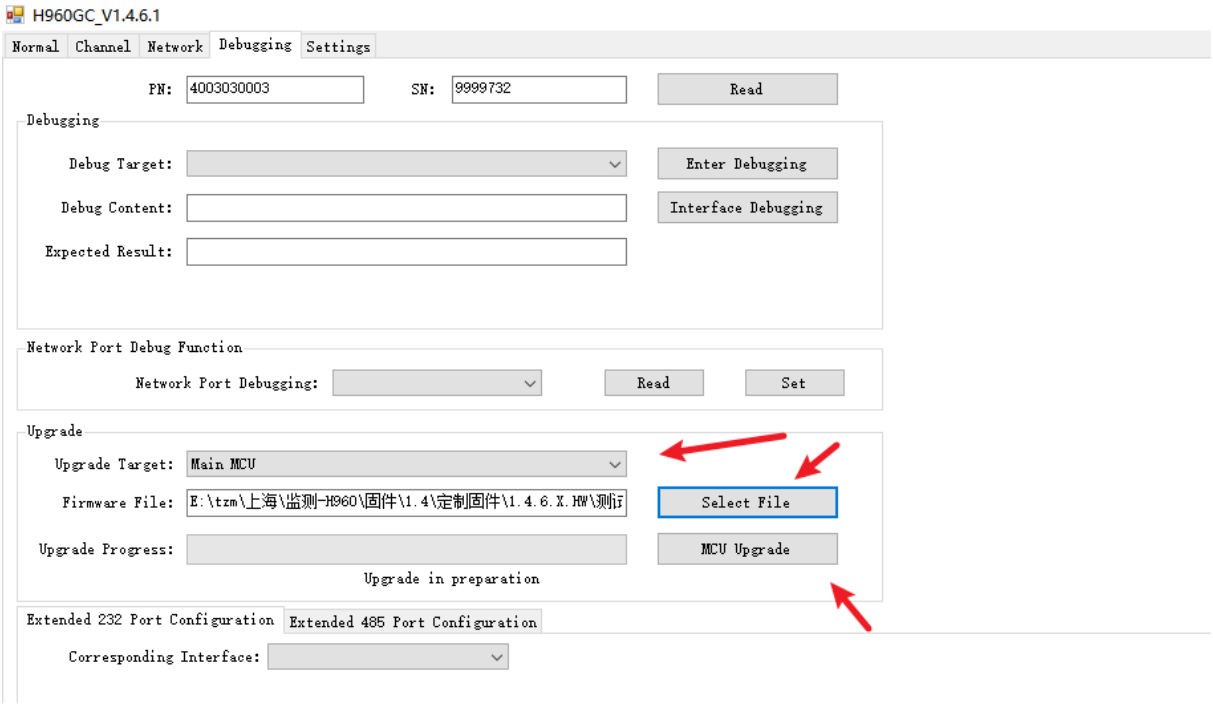
① Read SN and PN



② Motherboard firmware upgrade

Select the upgrade object as the main MCU in the upgrade column, select the path where the firmware exists locally in the firmware file column, and the name of the motherboard firmware has the English MB. Do not select the wrong firmware.

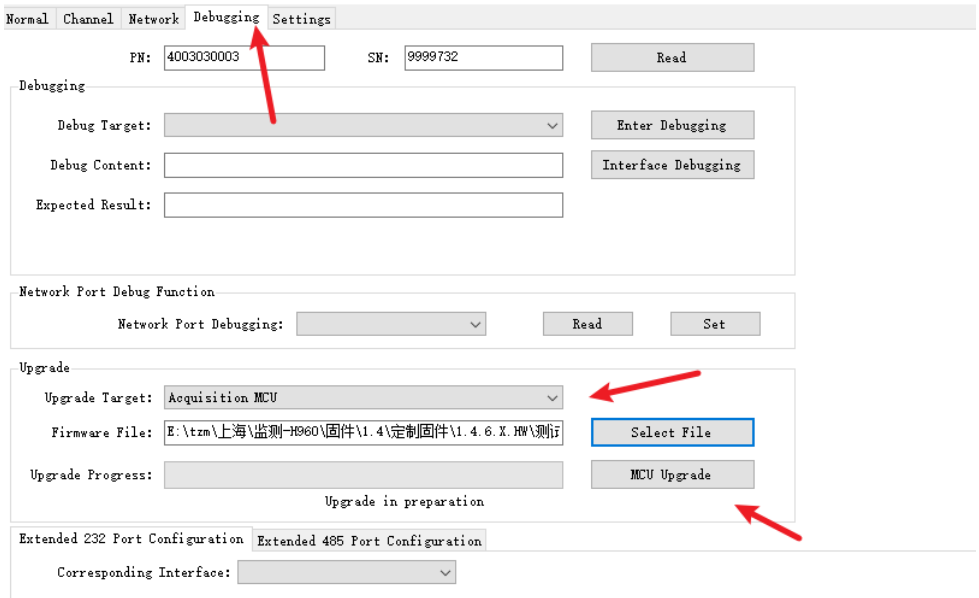
Click the "MCU Upgrade" button. Wait for the upgrade progress to complete, and the device will automatically restart after the upgrade is complete.



③ Acquisition board firmware upgrade

Select the upgrade object as the acquisition MCU in the upgrade column, select the path where the firmware exists locally in the firmware file column, and the name of the motherboard firmware has the English SB. Do not select the wrong firmware.

Click the "MCU Upgrade" button. Wait for the upgrade progress to complete.



④ Channel configuration - read data (debugging is ignored)

In addition, there are two buttons, read data and format disk, in the channel

setting interface. Check a channel, select the time period, and click read data to generate a table of the data of this channel during this period and store it in the Data directory of the upper computer software. (This function is only explained, and there is no need to click during debugging)

Click the "Format Disk" button to complete the format operation of the device Flash storage unit. Flash mainly stores the sensor data stored in each acquisition channel. (This function is only explained, and there is no need to click during debugging)

V. Sensor Debugging and Data Access

Chapter 5 mainly introduces how to fill in the sensor parameters when the sensor is wired and the channel is configured. The overall configuration logic is shown in Chapter 4.

5.1 Debugging and Access of Vibrating String Sensors

The wiring of the vibrating wire device refers to the vibrating string wiring method, and the terminals 1-5 are connected to temperature -, temperature +, shield, frequency -, and frequency + respectively.

For vibrating wire devices, the sensitivity coefficient K and temperature correction coefficient B must be filled in during configuration. These two parameters are in the accompanying rating table, and the on-site rating table must be kept. And the vibrating wire device must be calibrated with a base value, that is, the measured value in a certain state is used as the reference value. Therefore, when installing the vibrating wire device on site, the rating table must be kept and the reference value must be recorded.

5.1.1 Vibrating String Piezometer

(1) Wiring

The vibrating string piezometer is a vibrating wire device, so the wiring method

is according to the vibrating string.

The 1-5 terminals of H960 are connected to temperature - (green), temperature + (white), shield, frequency - (black), and frequency + (red) from left to right.

(2) Upper computer debugging

① Channel configuration

As shown in the figure below, it is assumed that the first channel is connected to a vibrating string piezometer, then check channel 1, modify the enable to on, and modify the sensor category to vibrating string piezometer.

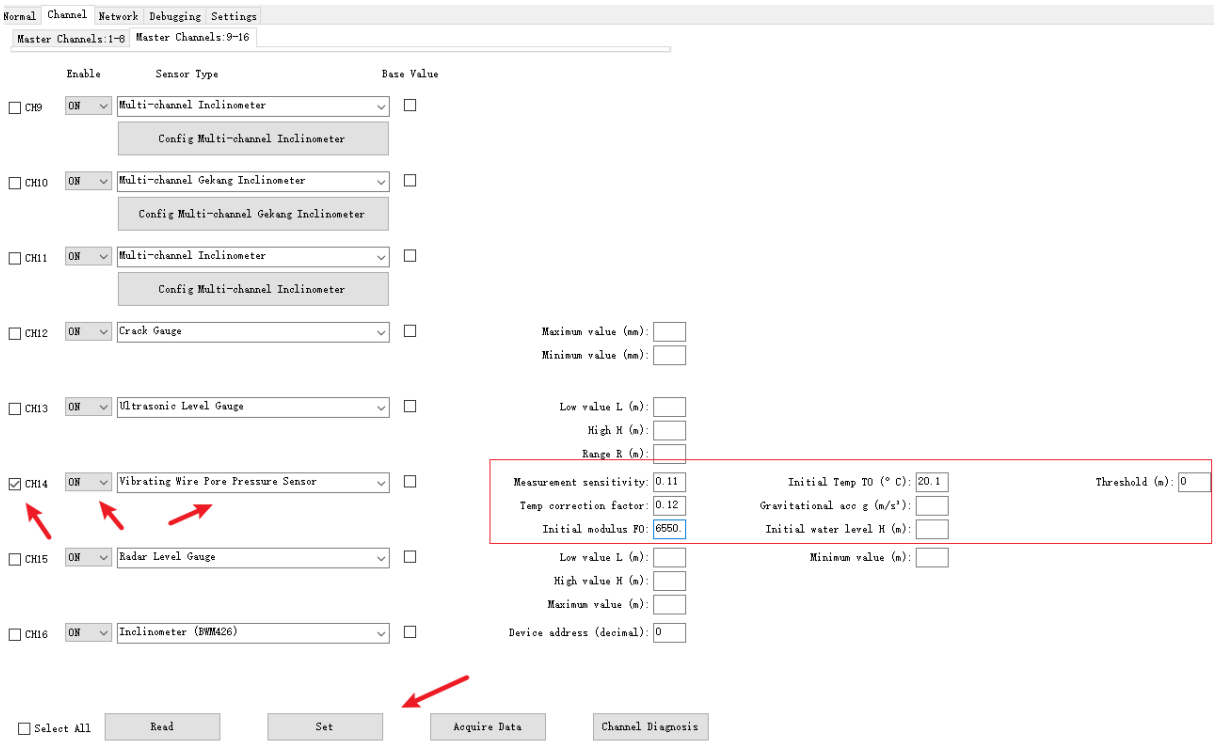
Sensitivity coefficient K/temperature correction coefficient B: obtained from the accompanying rating table.

Gravitational acceleration: default 9.8 (default is left blank), if some provinces require 9.81, it can be manually written;

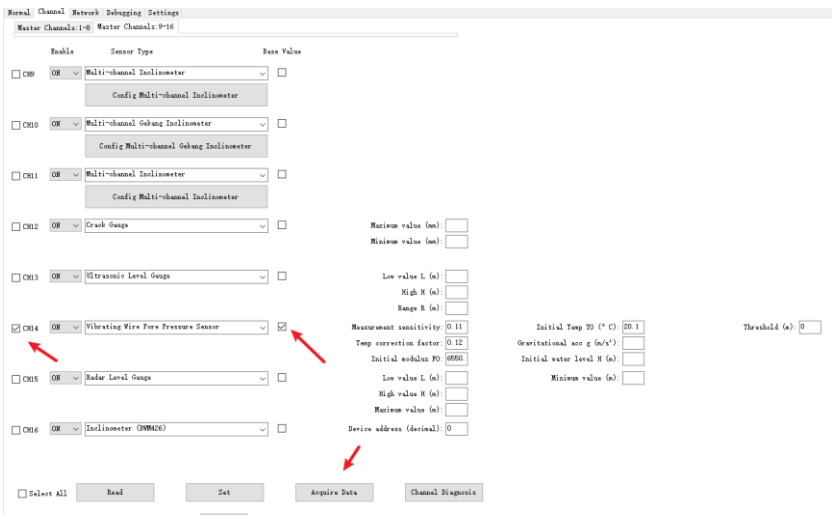
Initial temperature/initial modulus: default is left blank, and it will be automatically written after the base value is calibrated, or it can be manually written;

Initial water level: default is left blank.

After filling in the parameters, click set.



After setting the channel type, the vibrating string piezometer needs to be calibrated with a base value (the piezometer needs to be in a state of being soaked in water and not in the water in the hole). Check the channel that has just been set, check the base value calibration, and click collect data. H960 will use the collected set of data as the initial modulus and initial temperature of the piezometer. After completing the above operations, H960 will record and write the initial modulus F0, initial temperature T0, sensitivity coefficient K, and temperature correction coefficient B of the piezometer connected to the first channel.



5.1.2 Joint Gauge

(1) Wiring

The joint gauge is a vibrating wire device, so the wiring method is according to the vibrating string.

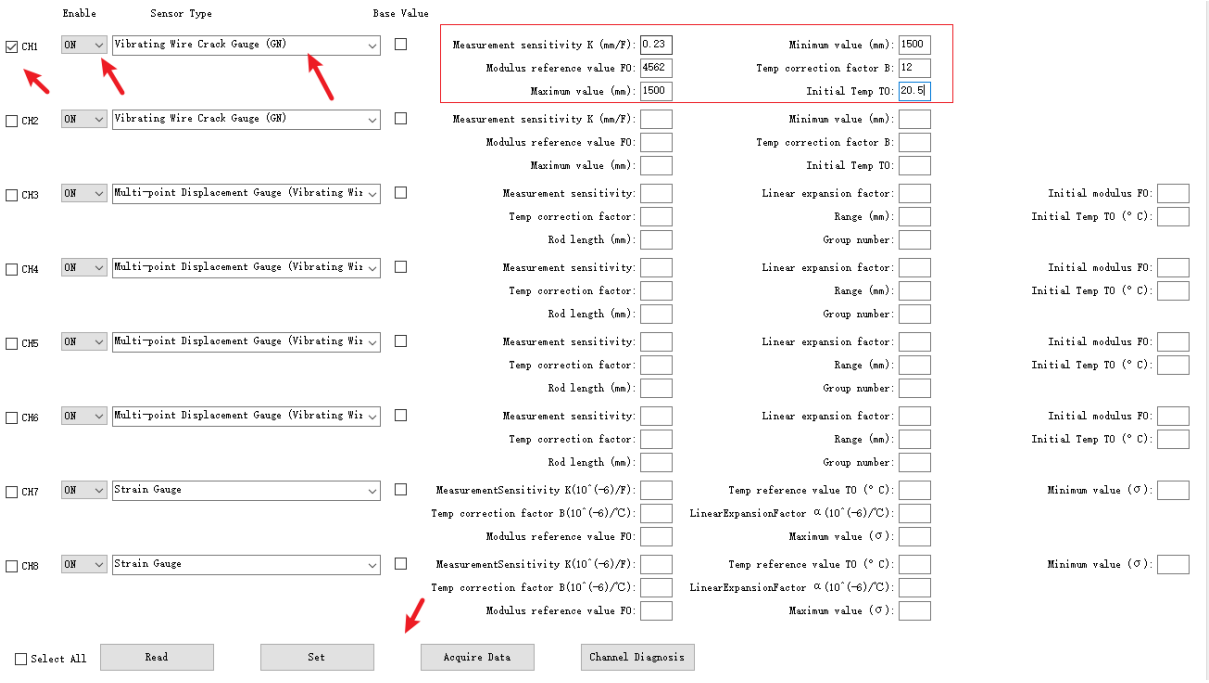
The 1-5 terminals of H960 are connected to temperature - (green), temperature + (white), shield, frequency - (black), and frequency + (red) from left to right.

(2) Upper computer debugging

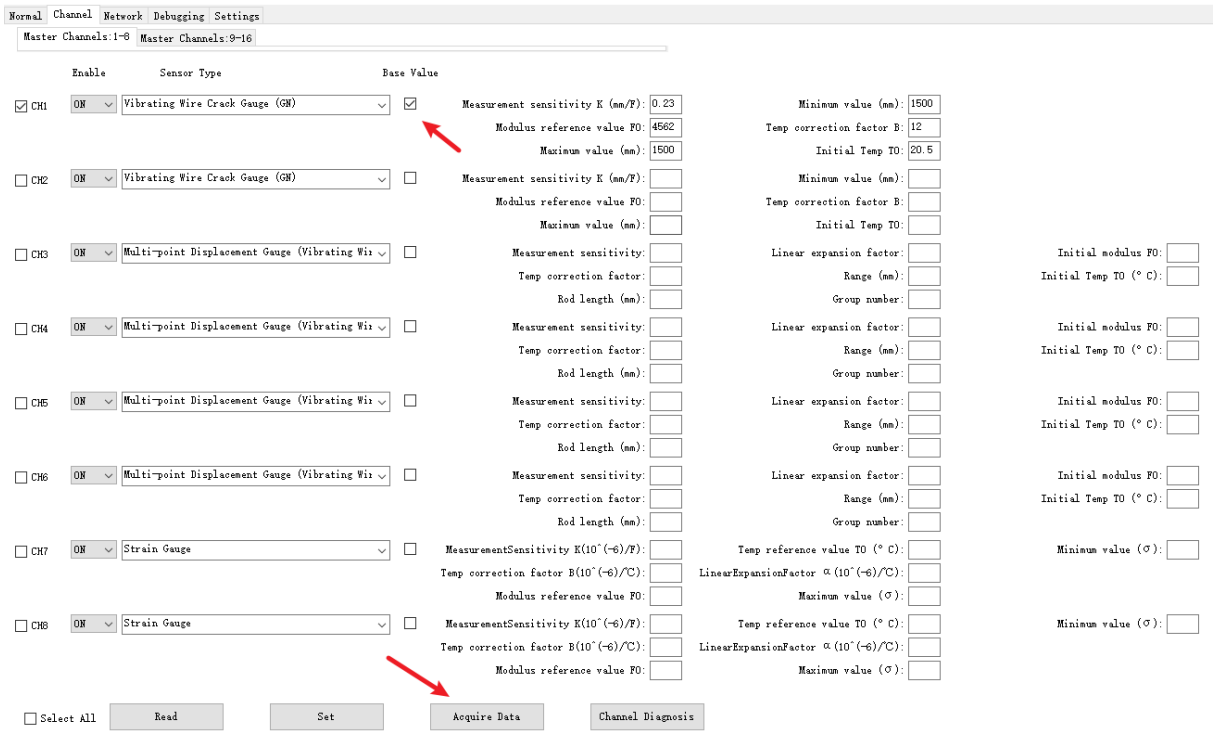
Check the channel, turn on the enable, select the joint gauge for the sensor category, and then fill in:

Measurement sensitivity: obtained from the accompanying rating table (sensitivity K),

Maximum value/minimum value: see the measurement range in the rating table.



Modulus reference value: after the installation is completed, check the base value calibration, and select a set of data collected in a stable state as the reference value.



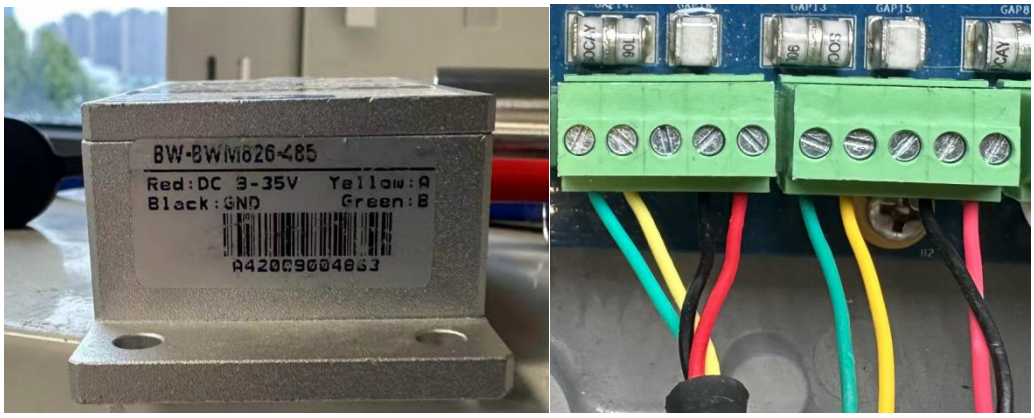
5.2 RS485 Devices

The wiring of the RS485 device refers to the RS485 wiring method, and the terminals 1-5 are connected to RSRS485B, RSRS485A, shield, power -, and power + respectively.

5.2.1 Inclinometer - BMW426 / Inclinometer - BMW826

(1) Wiring

The 1-5 terminals of H960 are connected to RSRS485B (green), RSRS485A (yellow), shield (empty), power - (black), and power + (red) from left to right.

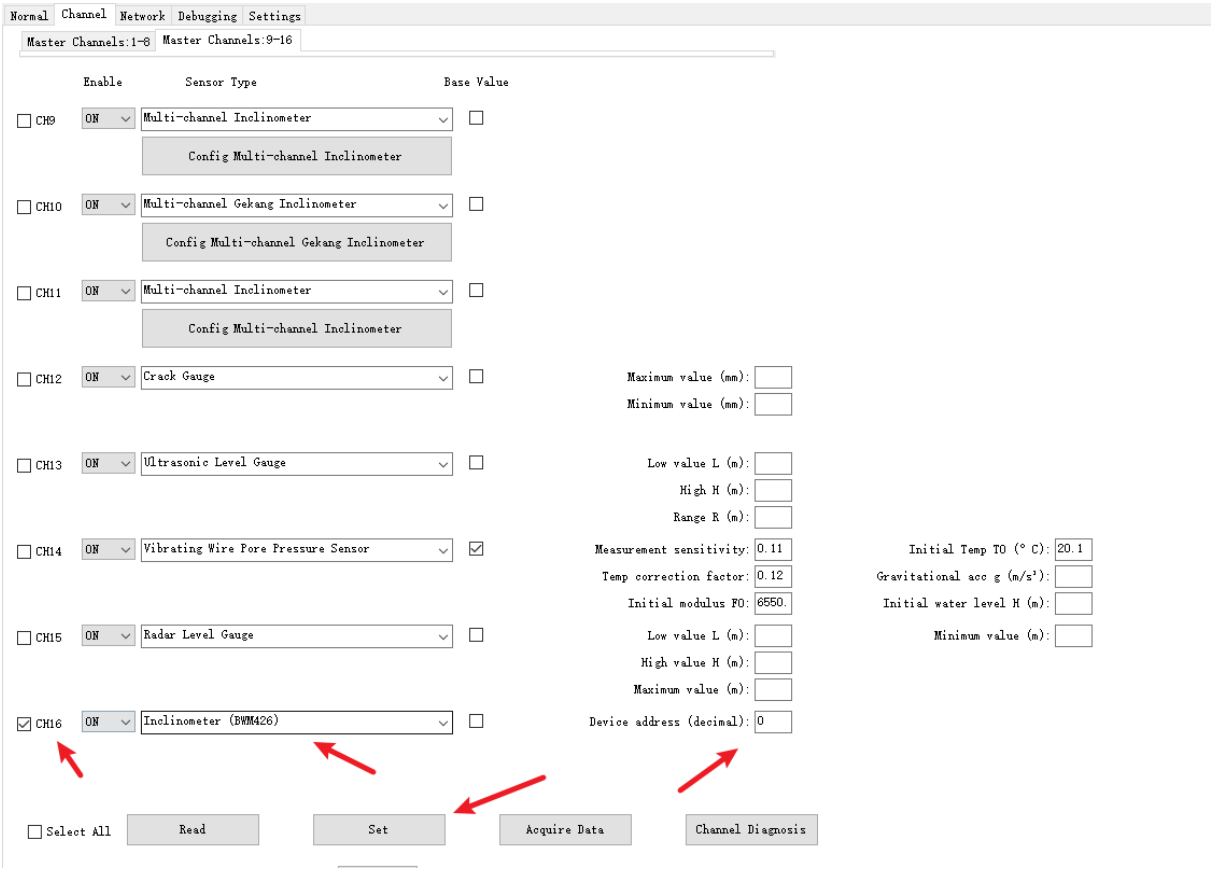


(2) Upper computer channel configuration

Check the channel, turn on the enable, and select the corresponding sensor

model according to the on-site inclinometer model.

The default device address of the inclinometer is 1. Do not modify the device address at will, otherwise 960 cannot collect data.



5.2.2 Fixed Inclinometer

(1) Wiring

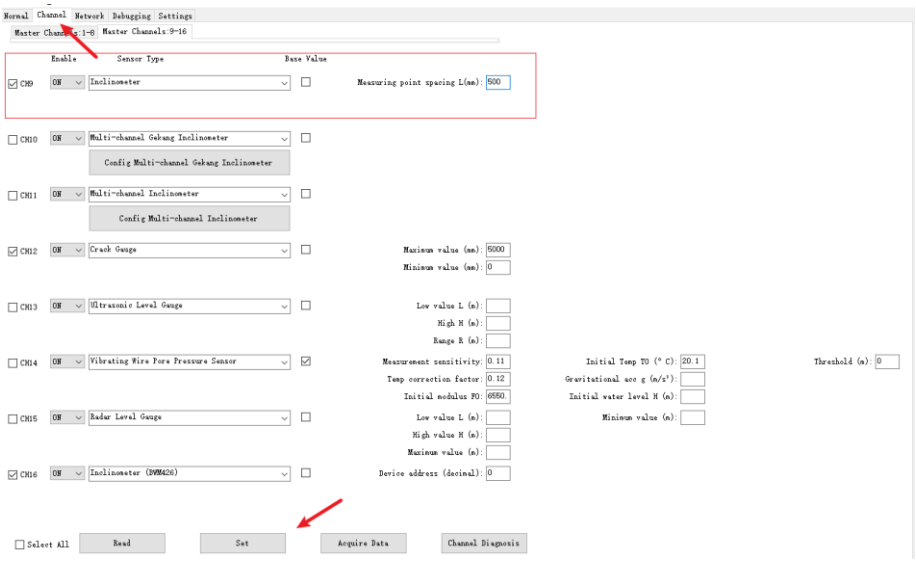
The 1-5 terminals of H960 are connected to RSRS485B (green), RSRS485A (white), shield (empty), power - (black), and power + (red).

(2) Host Computer Channel Configuration

1. Check the channel and enable it.

2. Select "Inclinometer" as the sensor type.

3. Fill in the Measurement Point Interval: Recommended value is 500 (distance between the upper and lower pulleys, unit: mm).

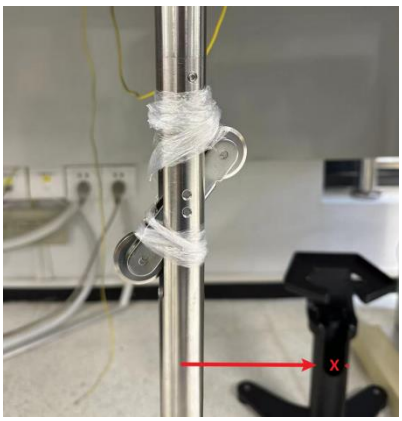


Note:

- Setting the interval to the pulley distance measures local displacement near the device.

- Setting it to the inter-device distance does not reflect true borehole displacement.

- For accurate borehole displacement, install devices adjacently or use flexible internal displacement sensors.



5.2.3 Cable Extension Displacement Sensor (5m Large Range Crack Gauge)

(1) Wiring

Connect terminals 1-5 of H960 from left to right as follows:

- RSRS485B (White wire)
- RSRS485A (Yellow wire)
- Shield (Leave unconnected)
- Power Negative (-) (Black wire)
- Power Positive (+) (Red wire)

(2) Host Computer Channel Configuration

1. Check the channel and enable it.
2. Select "Crack Gauge" as the sensor type.
3. Fill in the parameters:

- Maximum/Minimum Value: Enter the maximum measurement range (unit: mm) based on the device specification. Set minimum value to 0.

- If the collected data is abnormally large after configuration, the sensor might not be extended. Pull it out slightly to resolve this.

5.3 Digital Input Devices

5.3.1 Rain Gauge

(1) Wiring

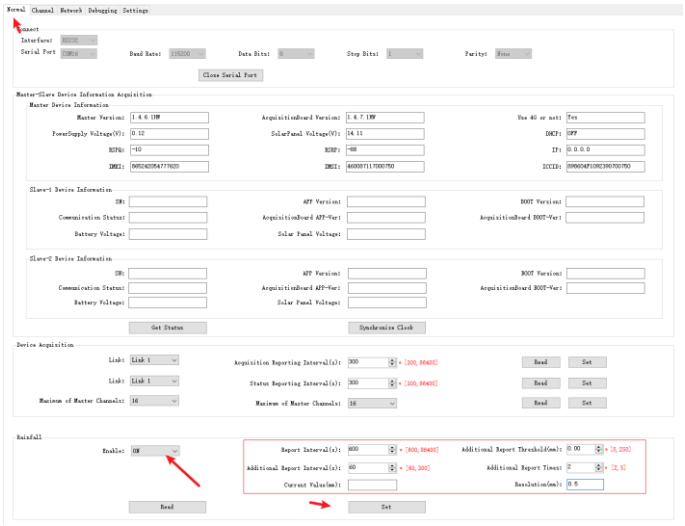
The H960 rain gauge connection is non-polarized. Connect the wires directly.

(2) Host Computer Channel Configuration

1. Enable the channel.

2. Adjust the reporting interval according to project requirements.

3. Configure resolution, threshold for additional reports, and reporting intervals based on the rain gauge specifications.



VI. H960 Product Package List

All components are into one box.

List of main components:

Device name	Model	Image	Quantity
Automated Data Collector	H960		1
H960 Wall Mounting Plate			1
Cross Recessed Countersunk Screw	M5*10 (304)		5
Certificate & Warranty Card			1

External Antenna	QC0827M5A 4G Sucker Antenna		1

Este equipamento nÃao tem direito à protecao contra interferência prejudicial e nao pode causar interferência em sistemas devidamente autorizados. Para maiores informacöes, consulte o site da ANATEL-www.anatel.gov.br

FCC warning statements:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The device has been evaluated to meet general RF exposure requirement This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 40cm between the radiator & your body.