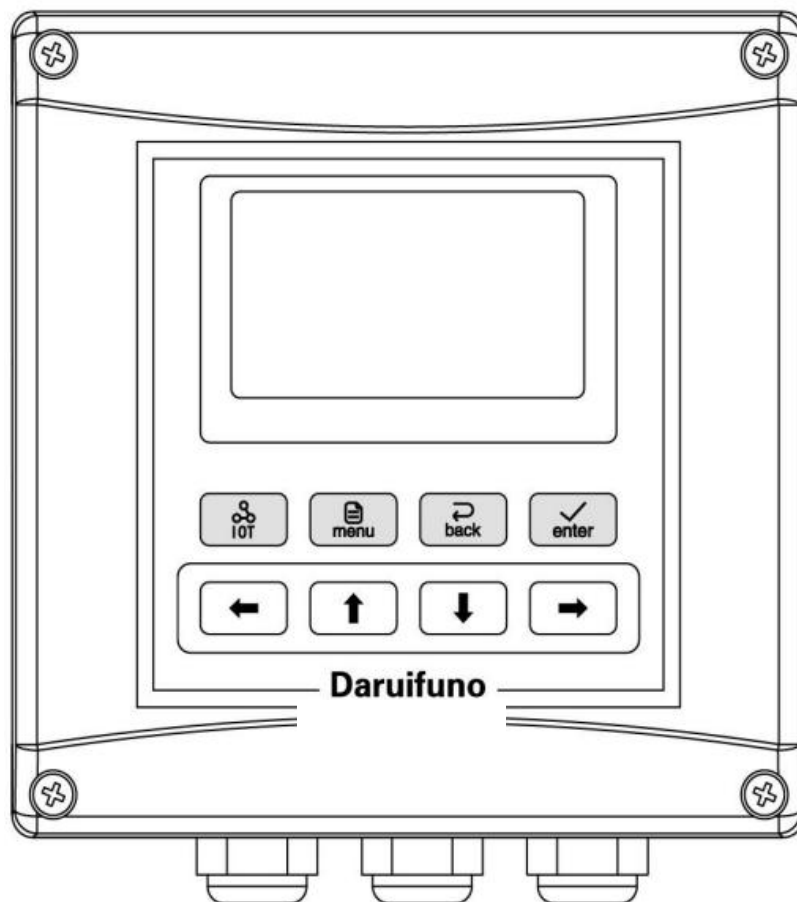




Daruifuno

Multi-parameter Controller

User Manual



Model:MCC100/200

Version 1.0

Important Safety Information

Please read and observe the following:

Please read this entire manual before unpacking, installation and operation, with particular attention to all danger warnings and precautions. Failure to do so may result in damage to the instrument or personal injury to the operator due to misuse. Do not install or use the instrument by any means other than those specified in this manual.

- After opening the analyzer case, the user may touch the instrument supply voltage. Please make sure to disconnect the power, before you open the analyzer cases. Analyzer housing assembly only low voltage, the operation is safe.

- The analyzer must be installed in accordance with relevant local codes and the professional and technical personnel, to comply with the analyzer's technical specifications and input ratings. If you are not sure which of the main power lines is the zero line, use a double-blade switch to disconnect the analyzer.

- As soon as a problem occurs with the analyzer, disconnect the analyzer from power to prevent any unintentional operation that could result in damage to the instrument. For example, it may be in an unsafe state when the following situations occur:

- (1) The analyzer appears visibly damaged ;

- (2) Analyzer fails to operate properly or provide the intended measurements;

- (3) Analyzer has been stored for a long period of time at temperatures over 70°C environment.

- Wiring or repair should be done by professionals, and only the power-off analyzer should be operated.

Power Wiring Note

1. Please install voltage stabilization and surge protection equipment that meets the instrument parameters at the power supply terminal to ensure that the power supply provided by the instrument is stable and reliable and meets the standards, otherwise the instrument will be irreversibly damaged due to poor power supply.

2. Damage caused by incorrect power supply is not covered by our quality guarantee.

3. Detailed parameters see the technical parameters.

Useful signs

In addition to installation and operation information, the manual also includes warning signs related to user safety, caution signs related to possible instrument failure, and note signs related to important and useful operating instructions.

Warning:

The warning sign is shown above, which warns the user might get hurt

Caution:

The caution sign is shown above, it reminds the user that the instrument may malfunction or be damaged



The note sign is shown on the left, warns the user of important information about operation.

Guarantee

Our company warrants the instrument for one year (12 months) from the date of delivery. Consumables and consumable parts in the equipment are not covered by the warranty. The terms of this warranty shall not apply if damage to the instrument occurs beyond the warranty period, or in the opinion of the company, the breakage or destruction of the instrument is due to improper use, lack of maintenance, improper installation, improper modification, abnormal environmental conditions, etc. The company's obligation under this warranty is limited to providing replacement or repair of this product, as the case may be. The product must be thoroughly cleaned to remove any contaminated chemicals before it is accepted for replacement or repair. Our obligations shall not exceed the price of the product itself. In no event shall the company be liable for damage caused by incidental or consequential damages, whether to persons or objects. The company shall not be liable for any other loss, damage or expense of any kind, including economic loss resulting from the installation, use or improper use of the product.

- For details, please refer to the product's quality promise with the product, and keep this manual and the quality promise properly.

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Part 1 Introduction

Chapter 1

Overview

This product is a digital analytical instrument. According to the measurement object, it is connected to a digital electrode to measure various material parameters. The instrument supports two current outputs, one digital communication output and two control relays with configurable functions.

1.1 Technical parameters

Relay control: Number of channels: 2

Control type: high and low alarm/cleaning control/ambient temperature alarm

Contact type: SPST

Contact capacity: 3A 250VAC

Current output: Number of channels: 2

Output type: active 4~20mA or 0~20mA

Maximum load: 1000 Ω

Communication interface: RS485 MODBUS-RTU

Memory backup: All user settings are kept in EEPROM indefinitely

Historical data: 14000 storage points, record interval can be set

Operating environment: 0~+60°C, 0~95% relative humidity, non-condensing

Storage environment: -20~+70°C, 0~95% relative humidity, non-condensing

Power requirements: 100~240VAC or 18~36VDC, 24W MAX

Installation method: Panel/ wall/ Pipe installation

Instrument size: 144*144*120 (unit mm)

Protection level: IP66

Meter weight: About 800g

Part 2 Installation

Chapter 2

Unpacking

After unpacking, it is recommended that the shipped cardboard boxes and packing materials be saved for instrument storage or reshipment. Inspect equipment and packing materials for signs of damage during shipment. If there are signs of damage, immediately notify the person delivering the shipment.

Chapter 3

Installation

3.1 Installation location

The installation location of the meter is:

Unaffected by weather (rain, snow, ice, dust, etc.)

- Clean, dry and with little or no vibration
- Keep away from corrosive liquids
- Within ambient temperature limits (32~140°F or 0~60°C)

Caution:

Analyzer directly exposed to the sun,
its operating temperature may exceed
its specified limit temperature,
and will reduce the visibility of the display.



Note: Please read this operation manual thoroughly before installation to avoid damage to the instrument due to wrong wiring.

- Please choose a well-ventilated location to install the instrument to avoid direct sunlight.
- The electrode signal transmission must use specific cables or cables provided by our company, and cannot be replaced by random wires.
- When using AC220V power supply, avoid using three-phase power supply to avoid power spike interference (if power spike interference occurs, the power supply of the controller can be separated from the power supply of the control device, so that the controller uses a separate power supply, or the coil ends of all electromagnetic switches and power control devices are connected to spike absorbers to eliminate spikes, such as dosing machines, mixers, etc.).
- It is generally recommended that the controller be accessible to the electrode during installation.
- Avoid corrosive liquids, or need to protect and isolate the environment.

3.2 Dimension

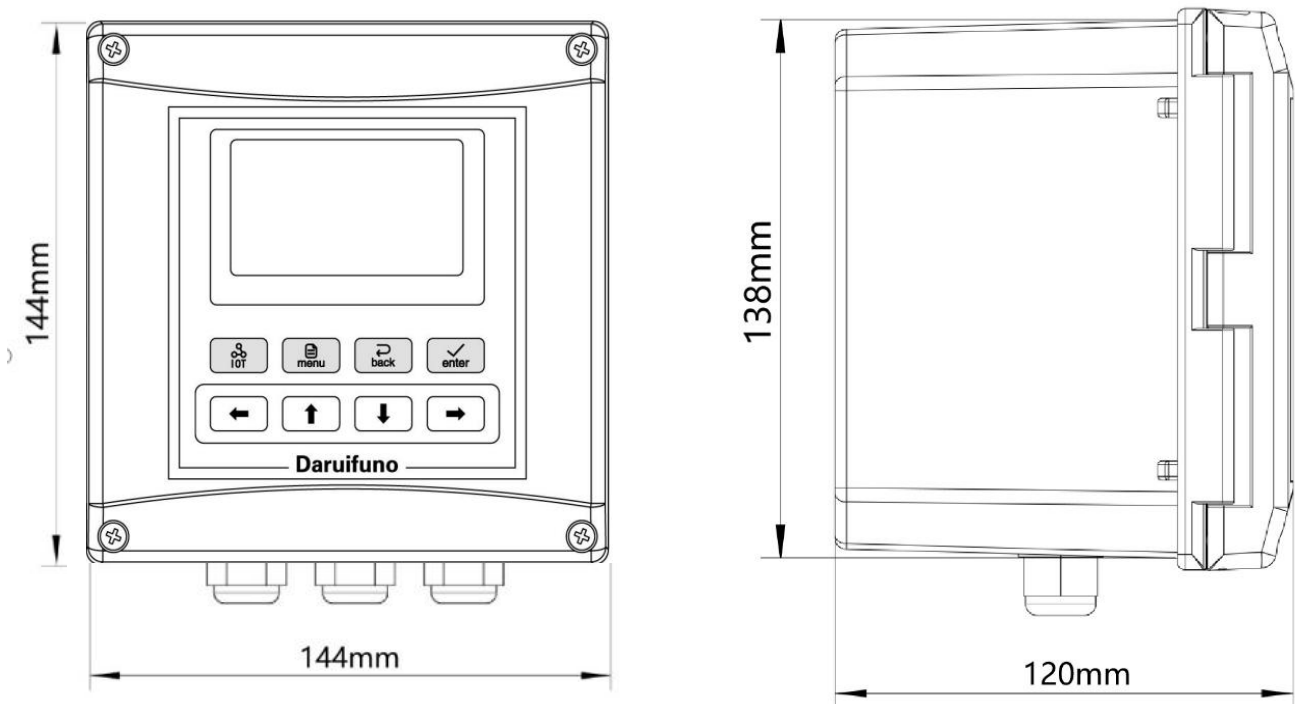


Figure 3-1 Schematic diagram of the appearance and dimensions of the instrument

3.3 Panel mounting

When the instrument is installed in the panel cabinet type, use two fixing brackets to fix the instrument. The installation diagram is as follows:

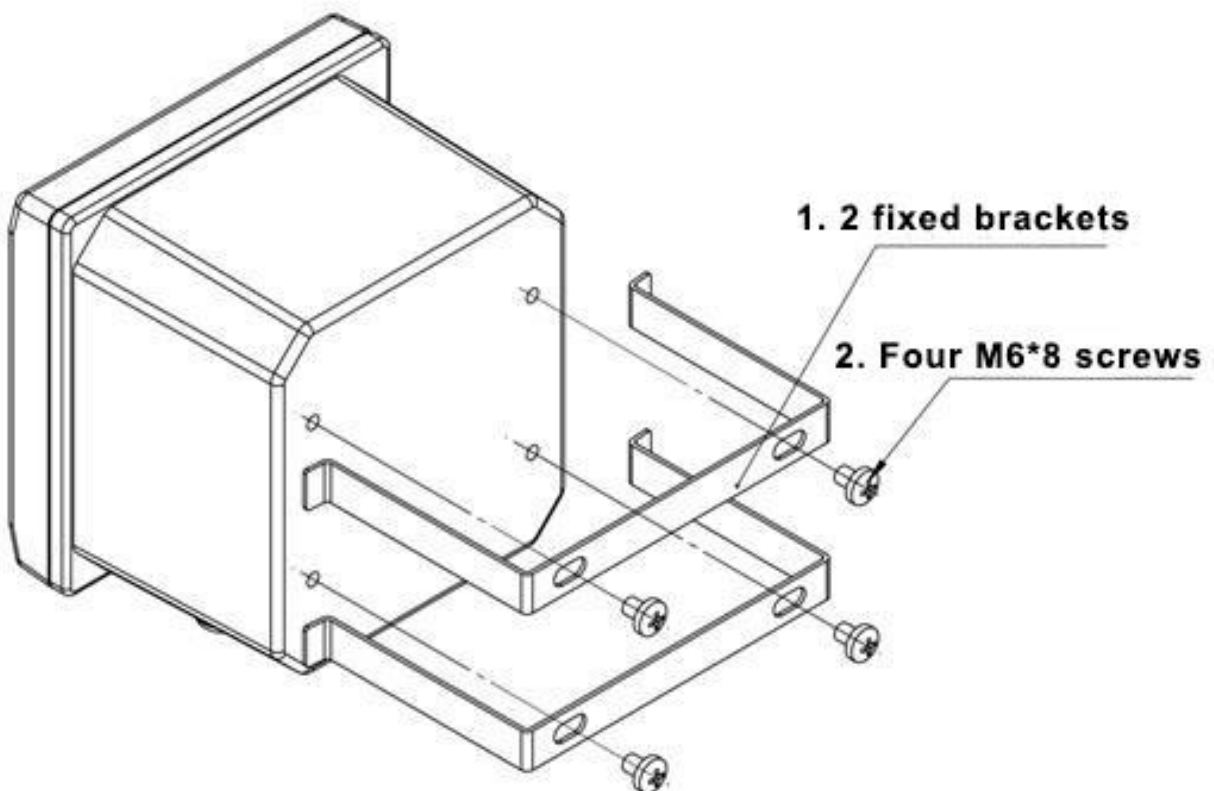


Figure 3-2 Panel mounting

3.4 Wall mounting

Connect the gray back panel to the instrument, and then install it on the box or the side wall of the wall. The installation dimensions and schematic diagram are as follows:

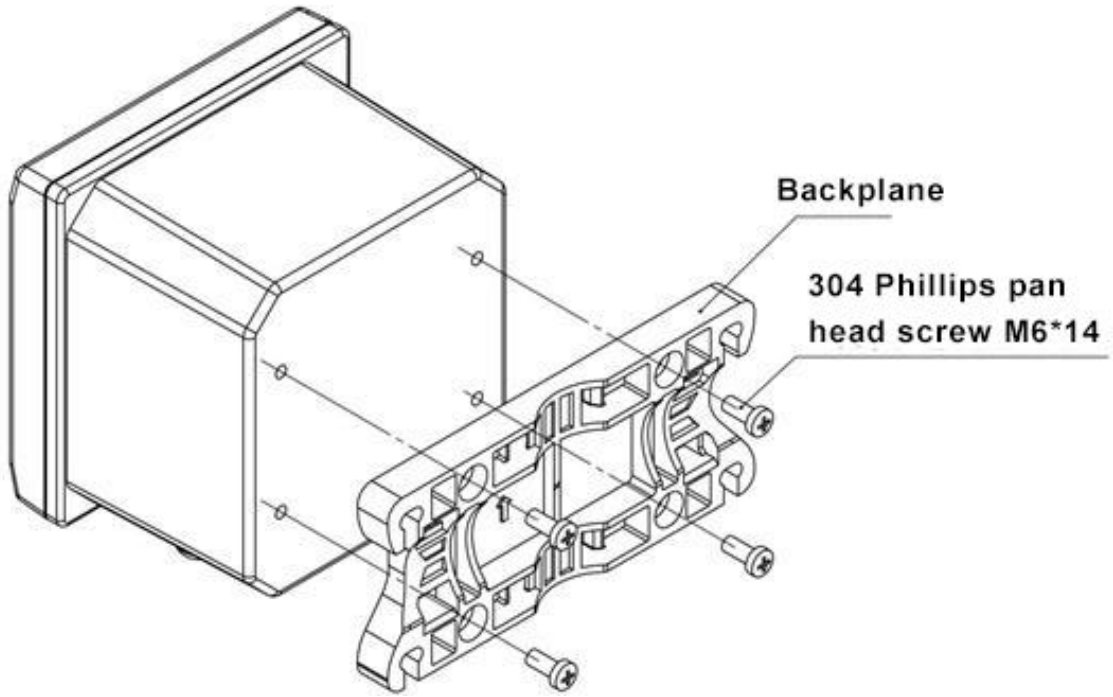


Figure 3-3 Schematic diagram of wall-mounted installation

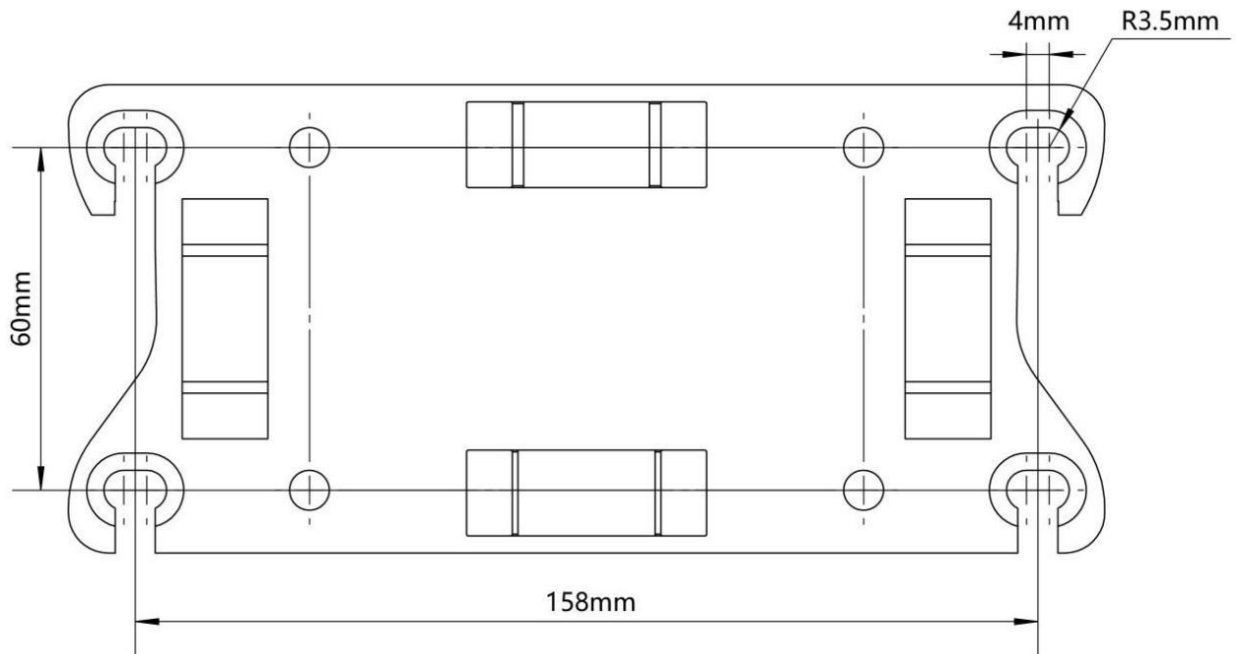
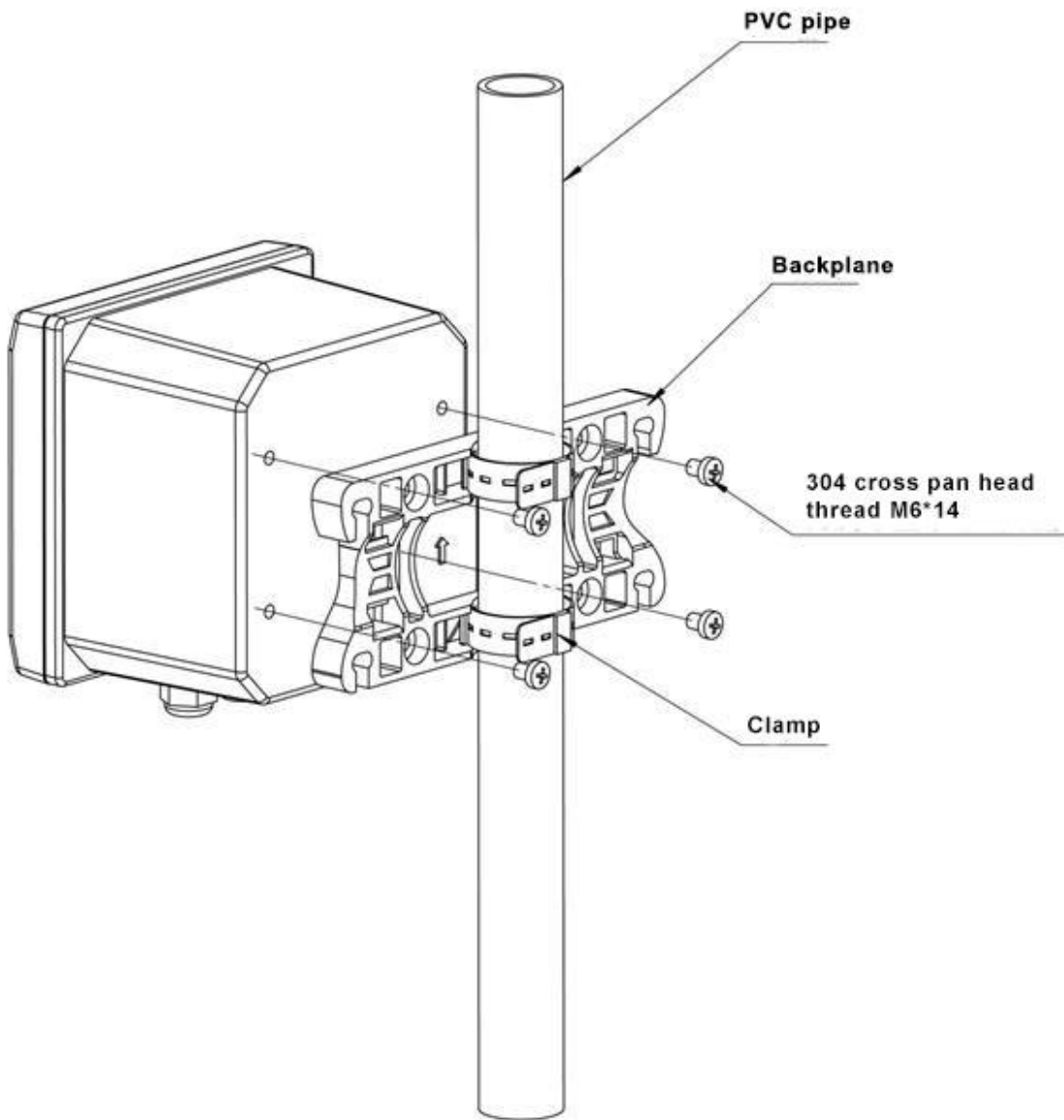


Figure 3-4 Wall-mounted installation hole size diagram

3.5 Pipeline mounting

Connect the gray backplane to the instrument, and then fix the backplane to the horizontal pipe or vertical pipe with a clamp. The installation diagram is as follows:



4.1 Power connection

Two types of power supply: AC power supply 100~240VAC and DC power supply 18~36VDC.

After unscrewing the screws at the back of the meter and taking off the cover, you can see two rows of terminals.

Figure 4-1 indicates the location and name of the access terminals for both power supplies.

Note: Before connecting AC power, be sure to cut off the power supply

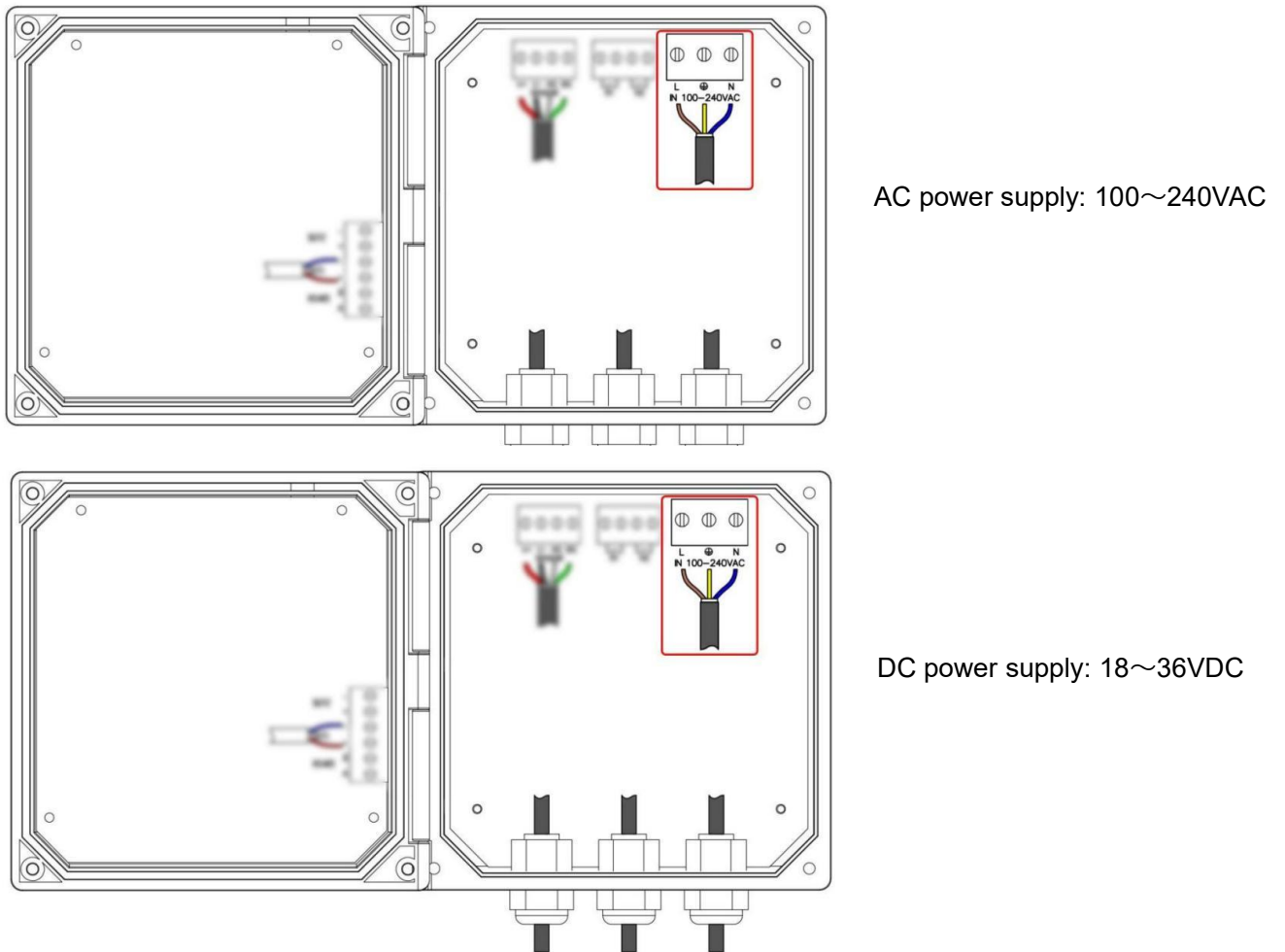


Figure 4-1 Two types of power terminals

Two kinds of power terminals are defined in Table 4-1:

POWER AC IN 100-240V	L	AC power fire wire input	POWER DC IN 18-36V	+	DC power positive
	⊕	AC power ground wire		NC	Floating terminal
	N	AC power zero line input		-	DC power negative

4.2 Wiring terminals

The terminal locations and names are shown in Figure 4-2:

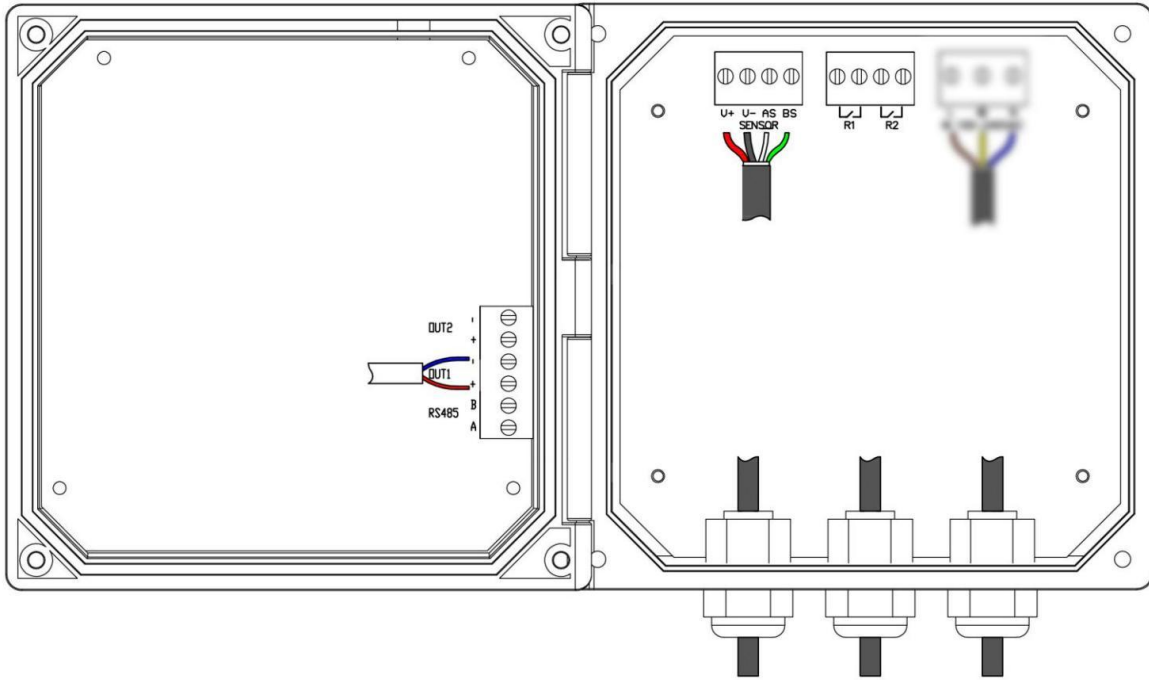


Figure 4-2 terminal blocks

The following table is the terminal definition:

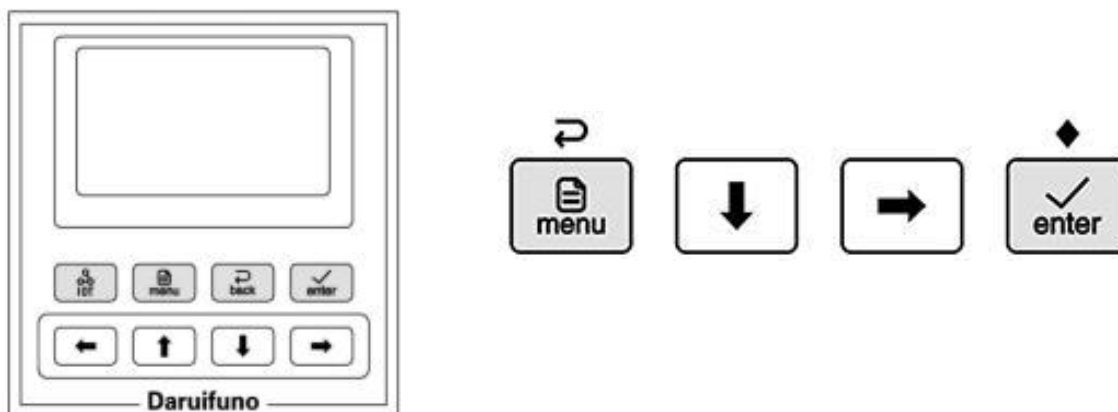
OUT2	+	Current two output positive	V-	Electrode power-terminal
	-	Current two output negative	V+	Electrode power + terminal
OUT1	+	Current one output positive	BS	Electrode communication terminal B
	-	Current one output negative	R1	Relay one contact
RS485	A	RS485 signal D+(A) end		
	B	RS485 signal D-(B) end	R2 Electrode communication terminal A	Relay two contacts
AS	Electrode communication terminal A			Relay two contacts

Part 3 Operation

Chapter 5

User Interface

The instrument panel consists of a display screen and four buttons, which are the MENU button, the ENTER button, and the down and the right direction button. As shown below:

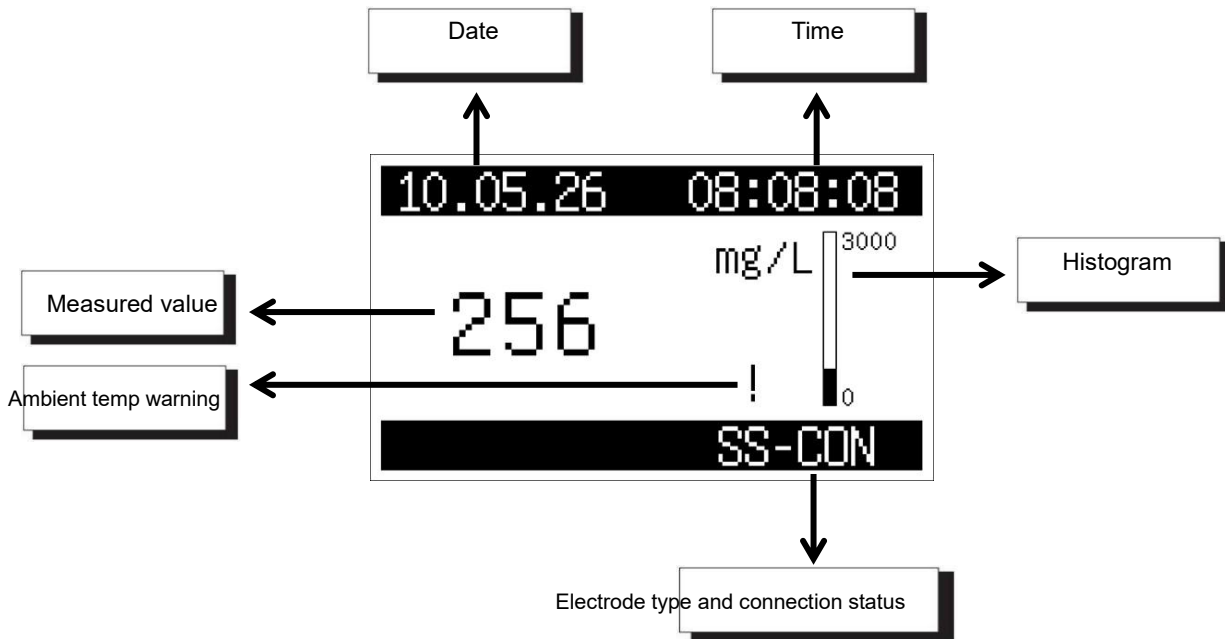


5.1 Button

Button	Function
	<p>In the main menu, press this key to return to the measurement mode</p> <p>In the sub menu, press this key to return to the previous menu</p> <p>When setting the value, press this key to abandon the modification and return to the previous menu</p> <p>During calibration, press this key to cancel the calibration process</p> <p>In measurement mode, long press this key to enter the main menu</p>
	<p>In measurement mode, press this key to switch between two secondary display modes</p> <p>In the menu, press this key to move the cursor down</p> <p>When setting the value, press this key to subtract 1 from the value, or to change the sign bit</p>
	<p>In measurement mode, press this key to switch between two measurement value display modes (only pH measurement mode is available)</p> <p>In the menu, press this key to move the cursor up</p> <p>When setting the value, press this key to add 1 to the value</p>
	<p>In measurement mode, long press this key to open the quick calibration menu</p> <p>In the menu, press this key to enter the sub menu or the item selected by the cursor</p> <p>When setting the parameter (value or option), press this key to save the setting and return to the previous menu</p>

5.2 Display

The meter normally displays the measurement interface after power-on.
The specific information is as follows:



Date and time: Display current date and time information.

Measured value: Display the current measurement value, the unit changes according to the measurement object.

When "<" appears in front of the measured value, it means that the current measured value is lower than the zero point, and zero point calibration is required.

When ">" appears in front of the measured value, it means that the current measured value is out of the display range of the meter.

Histogram: Indicates the ratio of the current measured value to the range.

Ambient temperature alarm: When the operating environment temperature exceeds 50°C, a "!" will appear on the screen, indicating that the working environment temperature of the instrument is too high, and heat dissipation measures are needed.

Temperature: The temperature value is not displayed when the temperature electrode is not connected.

Electrode connection status: Display the current electrode connection status.

No electrode connection: XX-NC

Electrode connection: XX-CON

Analog measurement: XX EMLUATOR (flashing)

— — — Chapter 6 — — —

System Default Settings

Setting type	Setting Options		Initial value
Alarm Set	Relay I	Function Set	Main Value Control
	Relay II	Function Set	Main Value Control
Current Set	Current I	Output Type	4-20mA
	Current II	Output Type	4-20mA
Comm. Set	Net Address		001
	Baud Rate		9600
	Verify Bit		NONE
	Stop Bit		1 bit
System Set	Display Speed		Buffers 8
	Backlight		Scanty Power 01 Minute
	Contrast Set		25
	Password		000000
History Logs	Set Interval		5min
Servings	Measure Mode		Probe Measure
	ETMP Calibrate		25°C
	ETEMP Alarm		OFF

In the measurement interface, long press the MENU button to enter the menu. The following is a detailed introduction to the menu content.

7.1 Probe set

According to the measurement object, the meter is connected to different electrodes, and the menu items are set according to the electrode type. For details, please refer to the "Digital Universal Controller Electrode Setting Instructions".

7.2 Temperature set


7.2.1 Probe type

When the meter is connected to a pH electrode with temperature compensation, the menu needs to be set according to the temperature electrode type. If you need to input the compensation temperature manually, you can select "Manual Compensation" and set the manual compensation temperature.

7.2.2 Temperature format

Select the temperature display unit, either "°C" or "°F".

7.2.3 Temperature CAL

In this menu, enter the target temperature value and press the key  to calibrate the temperature measurement to the entered target value. Reset the temperature calibration data to the factory default values.

7.3 Alarm set

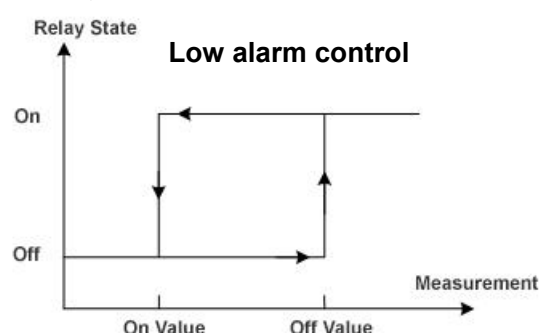
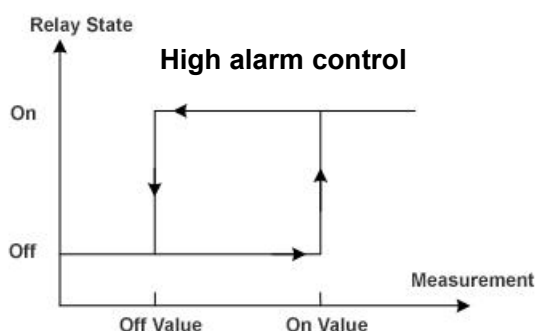
The meter provides two completely independent relay output contacts, corresponding to the "Relay 1" and "Relay 2" menus, which allow the user to set the functions and parameters of the two relays separately.

7.3.1 Control function

When the "Main Menu" -> "Alarm Settings" -> "Relay X" -> "Function Settings" menu selects "Main Measurement Control" or "Temperature Control", this relay is a control output relay. When "Main Measurement Control" is selected, the relay state is controlled by the main measurement value; when "Temperature Control" is selected, the relay is controlled by the temperature measurement value.

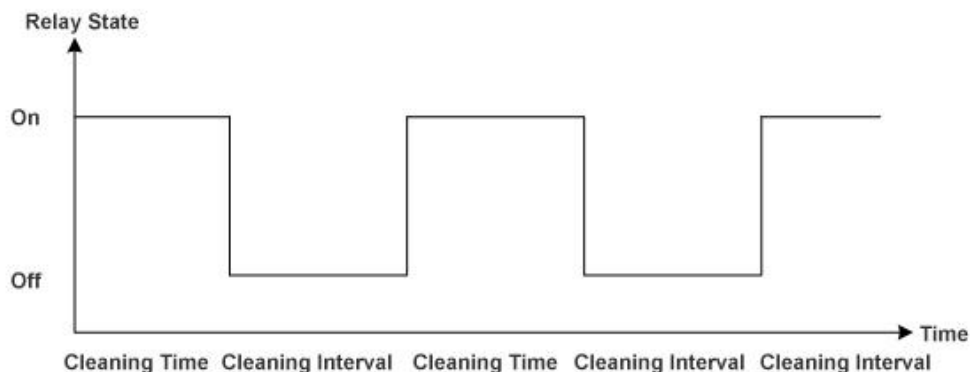
When the "closed value" > "open value" is set in the menu, the relay is in high alarm control.

When the "closed value" < "open value" is set in the menu, the relay is under low alarm control.



7.3.2 Cleaning output

When selecting "Cleaning Output" in "Main Menu" -> "Alarm Set" -> "Relay X" -> "Function Set" menu, the relay is in the cleaning output state, the relay can be closed periodically to do cleaning control.



7.3.3 Cleaning state

Select the state of the measured value during cleaning.

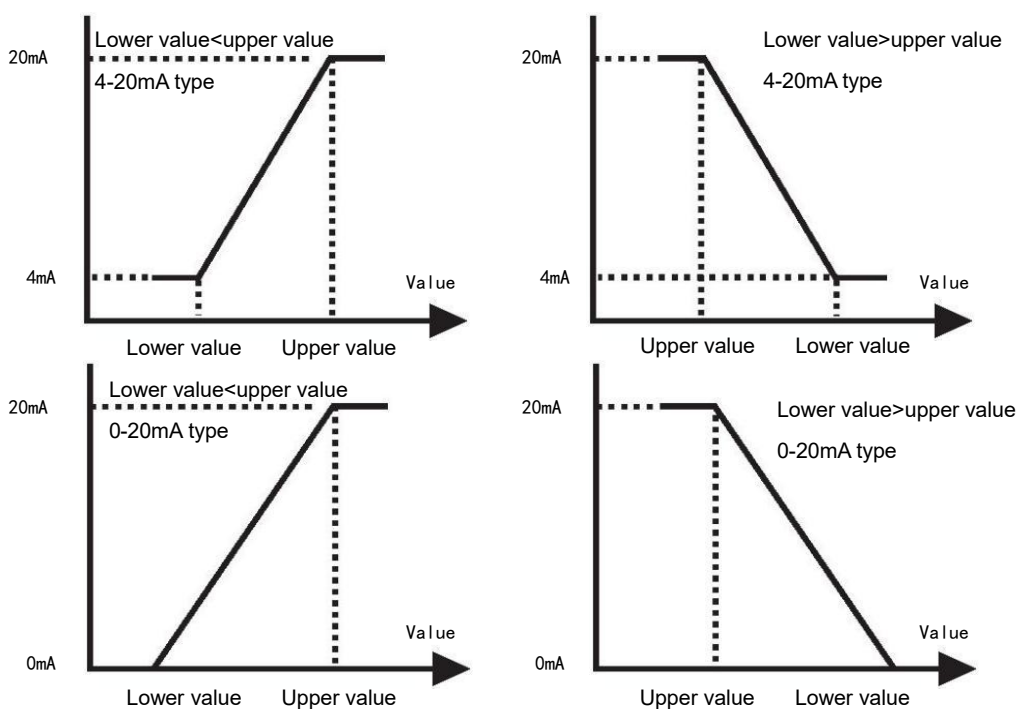
After selecting "Keep", when cleaning, the measured value displayed maintains the value before the relay action. After selecting "Continuous", the measured value is the real-time value of continuous measurement.

7.3.4 ETEMP

When "Ambient Temperature Alarm" is selected in the "Main Menu" -> "Alarm Settings" -> "Relay X" -> "Function Settings" menu, the relay is in the alarm control output state. The relay status is controlled by the working environment temperature of the instrument. When the environment temperature exceeds 50°C, the relay is closed.

7.4 Current set

The meter provides two current signal outputs with independent parameters that can be set, corresponding to the "Current 1" and "Current 2" menus respectively. The user can set the corresponding channels and upper and lower limits of the two currents respectively.



7.4.1 Output type

The output current type can be selected as “4-20mA” or “0-20mA”.

7.4.2 Channel selection

The measurement value corresponding to the current can be specified as the “main measurement channel” or “temperature channel”.

7.4.3 Upper value

Specify the measured value corresponding to the maximum output current.

7.4.4 Lower value

Specify the measured value corresponding to the minimum output current.

7.5 Communication set

The instrument provides a digital communication interface, this menu can set the communication interface parameters.

7.5.1 Slave ID

Sets the slave address used by the instrument in the communication

7.5.2 Baud rate

Select the baud rate to be used for the communication interface.

7.5.3 Verify bit

Select the check mode, the default is “None”.

7.5.4 Stop bit

Select the number of stop bits, the default is “one bit”.

7.6 System set

7.6.1 Language

Select the system display text as “Chinese” or “English”.



7.6.2 Display rate

Adjust the rate of the change of the measured display value. The display rate from fast to slow is “buffers 2”, “buffers 4”, “buffers 8”, “buffers 16”, and “buffers 32”.

7.6.3 Backlight

Set the working mode of the LCD backlight. If it is set to “energy saving” mode, the backlight will automatically turn off if there is no key operation within the set time.

7.6.4 Contrast set

Set the contrast of the LCD display screen, key  to decrease the contrast, key  to increase the contrast.

7.6.5 Software


View program version information.

7.6.6 Password

Used to set the verification password to be entered when entering the menu in the measurement mode. The password is set to “000000” when leaving the factory, and you can enter the menu directly without password in the measurement mode. If the user sets other password, they will be prompted to enter the password when entering, and the password will be verified before entering the menu.

7.7 Test maintenance

7.7.1 Current CAL

To calibrate the current output value, take calibrating current 1 20mA as an example, first connect the ammeter to the current 1 output terminal, then enter the menu “Test Maintenance” -> “Current Cal” -> “Current 1 “ -> “Calibrate 20mA”. Press the key to increase or decrease the value displayed on the screen until the ammeter reads 20mA, then press the key  to save the calibration result.



Note: When performing current calibration operation, for each current output, two points (4mA and 20mA) need to be calibrated to achieve the calibration effect.

7.7.2 Relay testing

Two sets of relays can be tested for on or off.

After entering, select “close” or “open” and the corresponding relay will make an open or close action.

7.7.3 Current testing

Two current outputs can be tested. First, connect the ammeter to the current output terminal to be tested, enter the menu and change the output current value by pressing the key, and verify whether the meter current output is correct by the ammeter reading.

7.7.4 Measurement method

The measurement value can be set to “Electrode measurement” or “Analog measurement”.

Electrode measurement: The measured value displayed on the screen is the value measured by the electrode.

Analog measurement: The measured value is displayed as the input value set by the user.

7.7.5 Ambient temp

Ambient temperature value: Display the current ambient temperature value.

Ambient temperature calibration: Calibrate the ambient temperature measurement value of the meter.

Buzzer alarm: Set whether the buzzer outputs an alarm sound when the ambient temperature is alarmed.

7.7.6 Meter reset

The instrument calibration parameters and all setting parameters can be reset to the factory default state.

7.8 Setting List

All calibration and setting parameters of the instrument can be viewed.

Part 4 Maintenance

Chapter 8

General Remarks

8.1 Clean the controller

1. Make sure the controller cover is closed tightly.
2. Wipe the outside of the controller with a cloth dampened with water or a mixture of water and mild detergent.

Note: Do not use flammable or corrosive solvents to clean any parts of the controller. The use of these solvents may reduce the environmental protection level of the equipment and may invalidate the warranty.

8.2 Common problems and solutions

Problem	Approach
No current output	Check current output setting
	Set a value in the current test menu and check whether the controller output is normal
	Please contact technical support
Inaccurate current output	Check current output setting
	Recalibrate the current in the current calibration menu
	Please contact technical support
The controller cannot be powered on or is powered on intermittently	Ensure that the power supply connected to the controller meets the requirements
	Ensure that the power supply is connected to the correct terminal of the controller
	Please contact technical support
Characters on the display are dim or blurred	Make sure that the protective film on the display has been removed
	Clean the outside of the controller, including the display
	Adjust display contrast

Appendix

A Modbus register information

1. Modbus RTU Overview:

The instrument acts as a slave on the network and supports Modbus RTU communication protocol.

Data communication is initiated by the host, and the first byte of the transmitted message is the target slave address. When the first byte is received by all the slaves on the network, each slave will decode it to determine whether the message is sent to itself.

The transmission of the RTU message frame must start with a pause interval of at least 3.5 characters. After the last character is transmitted, a pause of at least 3.5 characters marks the end of the message frame. A new message can start after this pause. In the transmission process, the entire message frame must be transmitted in a continuous stream. If there is a pause interval of more than 1.5 characters before the completion of the message frame transmission, the receiving device will refresh the incomplete message and assume that the next byte is the beginning of a new message. Similarly, if a new message starts after the previous frame in less than 3.5 characters, the receiving device will consider it a continuation of the previous frame, and this will cause an error because of the final CRC. The value cannot be correct.

The meter uses the function code 0x04 to complete the output of the measurement results and the output of two current values.

2. Function code details (function code 0x04):

This function enables the master (host computer) to obtain the real-time measurement value of the slave (instrument). The value is specified as a single-precision floating-point type (that is, occupying two consecutive register addresses), and the corresponding parameters are marked with different register addresses;

The host can send a command frame to read a single or all data results. The data frame format is as follows (the data is all in Hex format):

Host send:

1	2	3	4	5	6	7	8
Slave address	Function code	Register start Address high 8 bit	Register start address low 8 bit	Register number high 8 bit	Register number low 8 bit	CRC low 8 bit	CRC high 8 bit
Addr	04	xx	xx	xx	xx	CRC	CRC

Slave response:

1	2	3	4	5	5+n	5+n+1	5+n+2	5+n+3
Device Address	Function code	Length	Data 1 high 8 bit	Data 1 low 8 bit	Data n high 8 bit	Data n low 8 bit	CRC low 8 bit	CRC high 8 bit
Addr	04	Len	xx	xx	xx	xx	CRC	CRC



- Note :**
- 1. Addr is the slave address, with an optional range of 0 x 01 to 0 x FE.**
 - 2. Len is the number of bytes of returned data.**

For example:

Send frame: [01 04 00 00 00 02 71 CB], the meaning is as follows:

[01]: Instrument address

[04]: Function code

[00 00]: The starting register address is 0x0000

[00 02]: Read 2 registers starting from the starting address (that is, read 1 single-precision floating-point data result)

[71 CB]: CRC check data

Return frame: [01 04 04 CC CD 41 48 65 4D], the meaning is as follows:

[01]: Instrument address

[04]: Function code

[04]: Number of bytes returned (here 4)

[CC CD 41 48]: 0x4148CCCD (that is, the floating-point value is 12.55, and the specific value means to find the corresponding address) (Note: Combine two 16-bit integer registers to form a single-precision floating-point number, pay attention to the order of the data)

[65 4D]: CRC check data

3. Corresponding parameter table of communication address:

According to the measurement object, the meter is connected to different electrodes. Please refer to the "Digital Universal Controller Electrode Setting Instructions" for the corresponding parameter table of the communication address.



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