

Mass Flowmeter Manual

2023

Micro Thermal Mass Flowmeter Instructions



Application Fields:
Aerospace, Semiconductor
Processing, Medical Biology,
Electronic Automobile, Iron and
Steel Metallurgy, Marine
Electronics, Industrial Gas
Production and Other Industries.

1. Product Introduction

The micro gas mass flow meter is specially designed for the measurement and process control of various small flow gases. This series of sensors are made of advanced micro-electromechanical system (MEMS) flow sensor chips and are suitable for all kinds of clean gases. The unique packaging technology makes it suitable for all kinds of pipe diameters, low cost, easy to install, and no need temperature and pressure compensation, can replace traditional volumetric or differential pressure flow meters.

2. Product Features

- ★ Using micro-electromechanical system (MEMS) flow sensor chip, the sensor has high precision, high sensitivity, and anti-strong interference and other characteristics.
- ★ The zero point of the sensor is stable.
- ★ High accuracy and good repeatability within the measuring range .
- ★ Standard mechanical interface, easy to install .
- ★ RS485 communication output, standard MODBUS RTU protocol .
- ★ LCD is used to display instantaneous flow and cumulative flow, which is clear and intuitive and easy to read.
- ★ 4~20mA standard current signal output and pulse output are optional.

3. Technical Parameters

Working Power Supply	DC12-24V /100mA	Accuracy (%)	$\pm(1.5+0.2 \text{ FS})$
Medium Temperature	-10~55 °C	Humidity	<95%RH (no frost, no ice)
Work Pressure	$\leq 1.6 \text{ MPa}$ (Customizable Pressure)	Show	Instantaneous Flow, Cumulative Flow
Output	4-20mA, Pulse	Communication	RS485 (Modbus Rtu

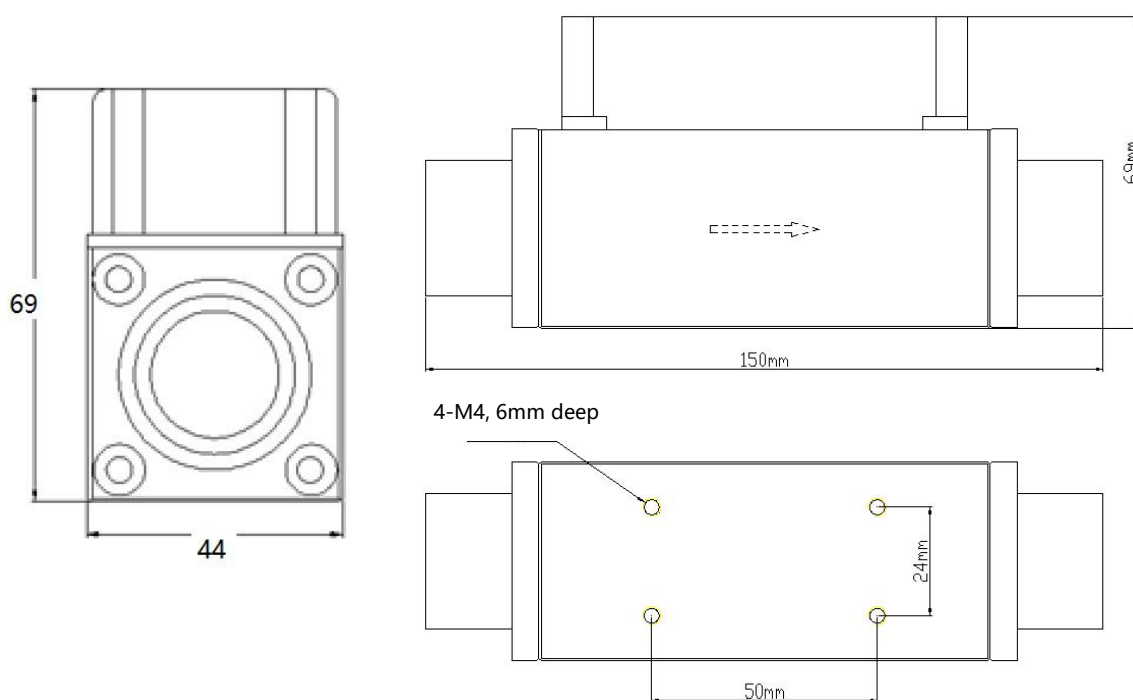
Method	(Optional)		Protocol)
Mechanical Connection	BSPT1 / 4 internal thread (DN10) B SPT3/8 internal thread (DN10) BSPT1/2 internal thread (DN15) B SPT 3/4 internal thread (DN 20) B SPT1 internal thread (DN25) BSPT1-1/4 internal thread (DN32) G internal thread interface is optional	Response Time (ms)	50-1000

Note: The above data were measured at 25 °C , 101.32kPa, dry air.

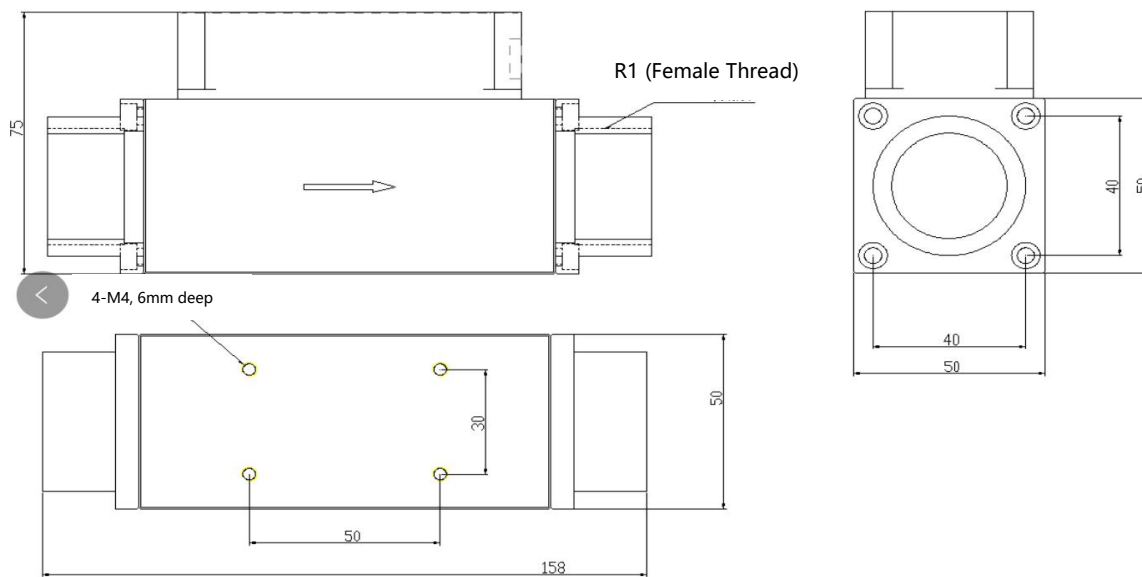
Minimum Measurable Flow Rate: 0.3NL/ min

Maximum Measurable Flow Rate: 3000 NL/ min

4. Mechanical Dimensions



DN8-DN25 Dimensional Drawing



DN32 Pipe Diameter Dimension Drawing

Mechanical Interface Connection Dimensions					
DN8	D N10	D N15	D N20	D N25	DN32
G 1/4 internal thread B SPT 1/4 internal thread	G3/8 internal thread B SPT3/8 internal thread	G1/2 internal thread B SPT1/2 internal thread	G3/4 internal thread B SPT3/4 internal thread	G1 internal thread BSPT1 Internal thread	G1-1/4 internal thread BSPT1-1/4

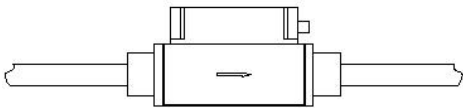
Maximum Measurable Flow Rate					
DN8	D N10	D N15	D N20	D N25	DN32
100L/MIN	300L/MIN	500L/MIN	1000L/MIN	2000L/MIN	3000L/M IN

If a larger flow rate is required, it can be customized.

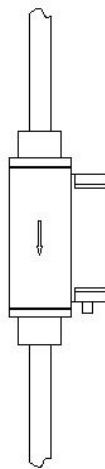
Standard connectors can be used for interface conversion as needed.

Transfer ferrule connector	Quick-connect fitting	Transfer Pagoda Connector
		

5. Installation Method

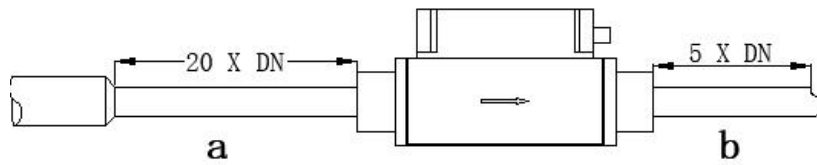


horizontal installation

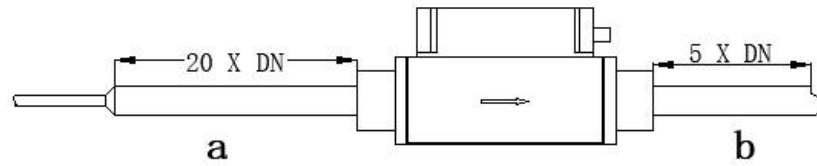


vertical installation

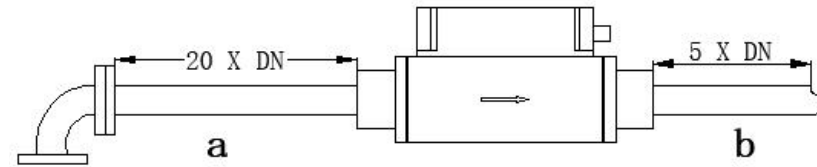
Reduce the pipe diameter



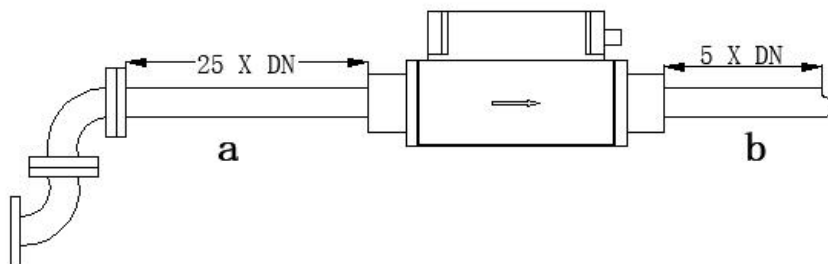
Increase the pipe diameter



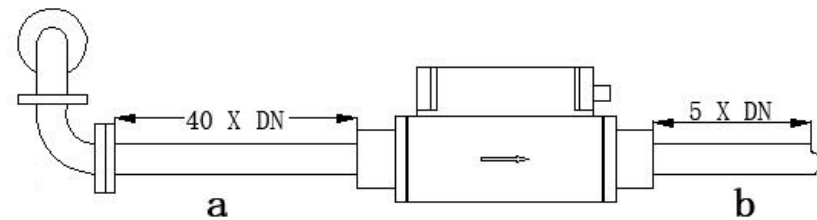
With 90-degree elbows or T-shaped pipes



A pipe with two 90-degree elbows



3. Pipe with 2 90-degree elbows



Attention!

a = Front Straight Pipe Section b = Rear Straight Pipe Section

Try to install the control valve and buffer cut-off valve behind the thermal gas mass flow meter.

6. Wiring Instructions

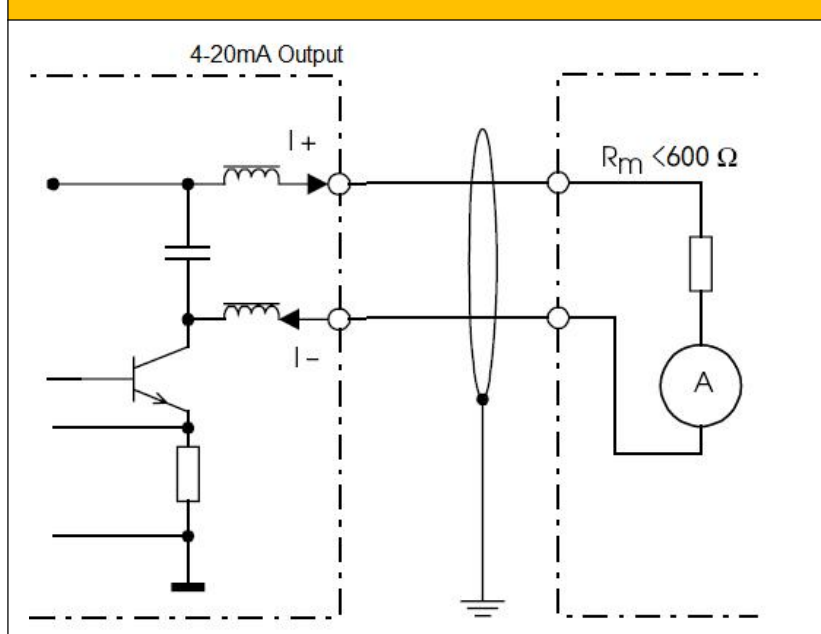
M8 6-Core Aviation Cable Description

Logo	Meaning
1-Pink	24V-/ Current I-
2-Black	Current I +
3-Blue	Shell Ground
4-White	24V+
5-Brown	RS485 Communication Output A
6-Ash	RS485 Communication Output B

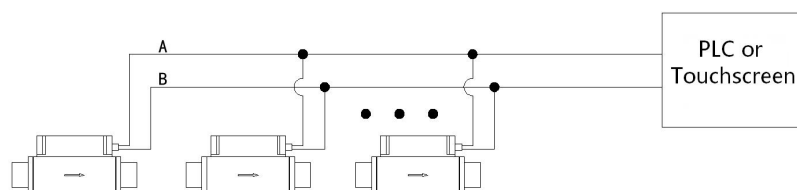
Gx16 6-Core Aviation Cable Description

Logo	Meaning
1-Red	24V+
2- Black	24V-/ Current I-
3-Green	Alarm Output (PNP)
4-Brown	Current I +
5-White	RS485 Communication Output B
6-Yellow	RS485 Communication Output A

4 -20mA Current Output Wiring Instructions



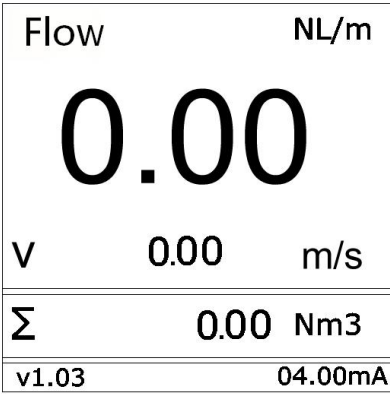
RS485 Bus Wiring Instructions

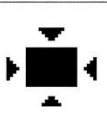
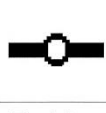
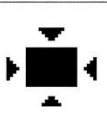
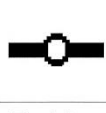
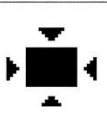
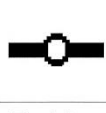


The 485 bus communication is configured by default to support 32 devices.

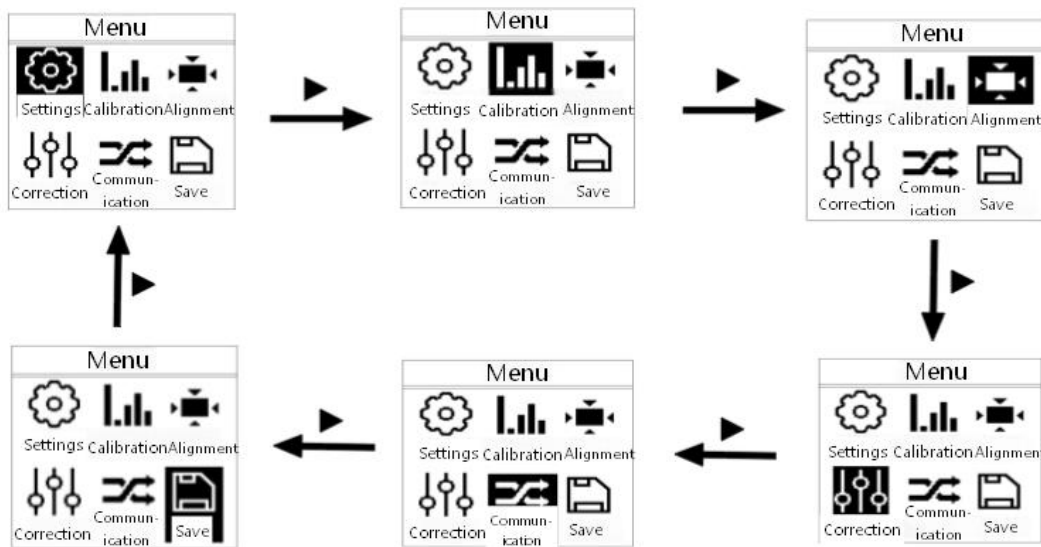
7. Operation Instructions

Key Description	
Logo	Meaning
ESC	Cancel or Exit The Interface
	Shift Key
	Edit/Page Key
ENT	Confirm/Enter Key

Show Menu	
	All information display windows The first line: Displays instantaneous flow and unit Second line: Display instantaneous flow rate and unit The third line: Displays the cumulative flow and unit The fourth line: Displays the version number and the current loop output current value

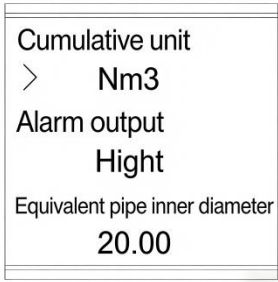
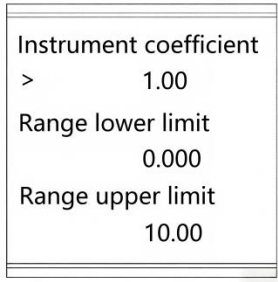
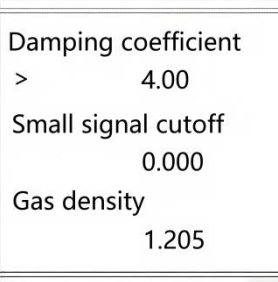
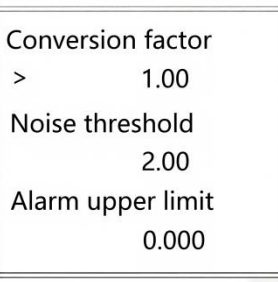
Menu Selection And Password Entry										
Press ENT Menu to Enter <table border="1"><thead><tr><th colspan="3">Menu</th></tr></thead><tbody><tr><td> Settings</td><td> Calibration</td><td> Correction</td></tr><tr><td> Revision</td><td> Communication</td><td> Save</td></tr></tbody></table>	Menu			 Settings	 Calibration	 Correction	 Revision	 Communication	 Save	Menu Selection Settings : Basic Parameter Settings Calibration : Calibration Settings Correction : Set Zero Voltage, Current Calibration, And Clear Accumulated Flow Communication : RS485 Communication Parameter Setting Save: Parameter Save and Restore Correction : Secondary Correction of Flow
Menu										
 Settings	 Calibration	 Correction								
 Revision	 Communication	 Save								
<table border="1"><tr><td> Enter Password ***** Password Press ENT to enter </td></tr></table>	Enter Password ***** Password Press ENT to enter	Setup, Calibration, Communication, Save, Password : 1000								
Enter Password ***** Password Press ENT to enter										

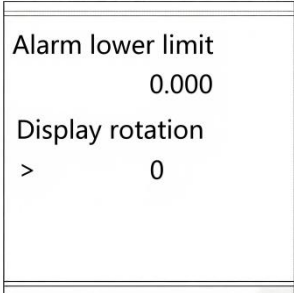
Use the shift key to select the function menu you want to enter.

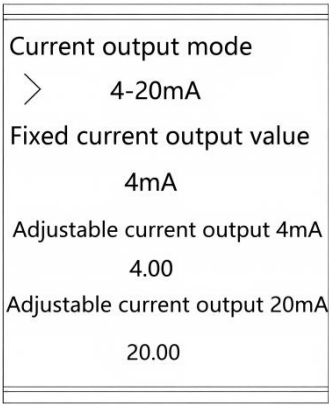


Set the basic parameter menu, move the black rectangle to "Settings", press the "ENT" key, and the password input window will appear menu, and then press the "ENT" key, a flashing cursor appears, enter the password, and after entering the password, press the "ENT" key again to confirm. If the password is correct, you can directly enter the parameter setting menu. If the password is incorrect, the character "Error" will appear. Press again press the "ENT" key to re-enter.



Settings Menu	
	Language selection: Chinese or English . Backlight options: automatic and always on . The flow units are as follows: g / min, g/s, Kg / min , Kg / h , Nm3/ h, Nm3 / min, N L/ h, N L/ min, mL/min . Note: To change the flow unit, please re-set the upper limit of the range according to the newly designed flow unit.
	The cumulative units are: g, Kg, Nm3, NL. Alarm output: Hight means the alarm output is high level, Low means the alarm output is low level. The default is Hight. Pipe inner diameter: Enter according to actual application, the unit is mm.
	Instrument coefficient: The calibration correction coefficient can be changed to compensate for the disturbance of fluid cross-sectional velocity distribution and the influence of specific application environment. Range upper and lower limits: Set the maximum and minimum flow rates.
	Damping coefficient: default 4.0, range 0-50. Reducing the damping coefficient can quickly detect the jump in flow rate, and increasing the damping coefficient can smooth the current flow display value. Small signal cutoff: Eliminate zero point fluctuation as a percentage of the range. Gas density: unit Kg/m3.
	Conversion factor: The conversion factor between the calibration gas and the measured gas. Noise threshold: The value is 0-10, used to eliminate noise signals. The larger the value, the larger the noise signal eliminated. Upper alarm limit:

	When the measured flow exceeds the alarm upper limit, an alarm is triggered. A value of 0 means no alarm is set. The default value is 0.
	Lower alarm limit: When the measured flow rate is lower than the alarm lower limit, an alarm will be triggered. A value of 0 means no alarm is set. The default value is 0. Display Rotation: The optional rotation angles are 0, 90, 180, 270.

Correction	
	Current output mode: 4-20mA and fixed current output Select fixed current output to set the fixed current output value. Fixed current output values: 0 mA, 4 mA, 8 mA, 12 mA, 16 mA, 20 mA
	Example: Current output mode is 4-20mA When there is no flow, the output current value measured by a multimeter is 3.89 mA Then adjust the current output zero point to: 3.89 mA At maximum flow, the output current value measured by a multimeter is 19.75 mA Then adjust the current output zero point to: 19.75 mA

Method for calibrating current output in fixed current output mode:

The first step is to connect the multimeter in series into the current loop;

The second step is to set the current output mode to fixed current output (Fixed);

Step 3. Press the shift key to move '>' to the next line, press the confirm key to enter the setting state, press the modify/page key to select the output current value, select 4mA output, and press the confirm key to exit the setting state;

Step 4. Observe the multimeter display. If it is 4mA, no calibration is required. If it is 3.90mA, press the Modify/Page key to enter the calibration menu, move the '>' to before zero current adjustment (Adjust lout Zero), press the Confirm key to enter the setting, enter 3.90, and press the Confirm key to exit the setting.

Step 5. Press the Shift key and the Modify/Page key at the same time, the menu returns to the previous level, move the '>' to the next line, press the Confirm key to

enter the setting state, press the Modify/Page key to select the output current value, select 20mA output, and press the Confirm key to exit the setting state;

Step 6. Observe the multimeter display. If it is 20mA, no calibration is required. If it is 19.90mA, press the Modify/Page key to enter the calibration menu, move the '>' to before zero current adjustment (Adjust lout Span), press the Confirm key to enter the setting, enter 19.90, and press the Confirm key to exit the setting.

Step 7. Press the Shift key and the Modify/Page key at the same time. The menu returns to the previous level and moves the '>' to the next line.

Press the confirm key to enter the setting state, press the modify/page key to select the output current value, and observe the displayed value on the multimeter at the same time. If they are consistent, it means the calibration is successful. If there is still a difference, recalibration is required. The recalibration steps are the same as above.

User zero point V 1.113 Current voltage V 0.756 Total flow cleared > 0.00	User zero point and current voltage settings When there is no flow in the pipeline, the flow displayed on the meter is not zero and can be adjusted by modifying the user zero point. To set the user zero point with one key, move the arrow to the current voltage item and press the E NT key twice to set the zero point voltage to the current voltage. Accumulated decimals and integers are cleared or set.
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Save Recovery Menu

Password 0603 can enter the save and restore menu. Saving parameters can be used as a backup of the current parameters. Generally, the factory will use the factory settings. Users should not overwrite the factory configuration unless necessary. Restoring parameters can restore the backup parameters, which is generally used to restore the factory configuration.

Save parameters > save Restore parameters Restore Save Parameters	Save parameters > save OK Restore parameters Restore Saved Successfully	Save parameters > save Err Restore parameters Restore Save Failed
Save parameters save Restore parameters > Restore Restore Parameters	Save parameters save Restore parameters Restore OK Recovery Success	Save parameters save Restore parameters Restore Err Failed Recovery

Communications Menu	
Device ID > 001 Baud rate 9600 Parity None Stop bits 1bit	Device ID for MODBUS Communication, 0-255 Baud Rate Selection 4800/9600/19200/38400 Check Digit: None/Odd/Even Stop Bits: 1 bit / 2 bit

8. Quality Assurance and After-Sales Service

In accordance with ISO9001 quality management and control system, this product is produced with brand new raw materials and components and has undergone strict factory testing, product quality and product performance meet the relevant standards and technical documents. However, due to transportation or use, there may be in the face of uncertainties, we promise the following service guarantee terms:

- ★ Within two weeks from the date of delivery, if the product you purchased has a recognized quality defect, we will replace it free of charge;
- ★ Within one year from the date of delivery of the product, if the product you purchased has any problem during normal use that is not caused by improper use or human error, If the product is damaged due to any factors, we will repair it free of charge;
- ★ Equipment damage caused by the following reasons during use is not within the scope of free replacement or repair:
 - Installation or use conditions that violate the relevant requirements and regulations of this manual;
 - Incorrect or violation of relevant instrument installation, wiring or usage regulations of the country;
 - Use with other products that are electrically incompatible with this product or have no definite quality assurance and valid certification;
 - Dismantle or repair by yourself;
 - Natural aging or loss of equipment that is more than one year old;
 - Force majeure as defined by applicable law

★ For products within the warranty period, the user shall bear the shipping cost of the product, and we shall bear the replacement or repair and return costs of the product;

★ When the products sent by the user are confirmed by us to be free of defects or damage, the relevant shipping and insurance costs incurred shall be borne by the user;

★ Once the product is confirmed, we will send the new or used product within 48 hours or two working days unless there are special circumstances.

Repaired products;

★ If you find any defective or damaged product, please contact your local supplier or us.

Appendix 1. MODBUS Register Address Table

Communication Baud Rate: 9600,8,1,None, Floating Point Data Arrangement: 2143

Read Data Function Code: 03 (Holding Register)

Instrument Address: can be set through the menu, 0-255

Register Address	Register Name	Number of Registers	Data Types	Data Format
4x0001-4x0002	Instantaneous Flow	2	float	IEEE754
	Send	01 03 00 00 00 02 C4 0B		
	Take Over	01 03 04 00 00 00 00 FA 33		
4x0003-4x0004	Instantaneous Flow Rate	2	float	IEEE754
	Send	01 03 00 02 00 02 65 CB		
	Take Over	01 03 04 00 00 00 00 FA 33		
4x0005-4x0006	Current Value	2	float	IEEE754
	Send	01 03 00 04 00 02 85 CA		
	Take Over	01 03 04 00 00 00 00 FA 33		
4x0007-4x0008	Accumulating Integers	2	Unsigned long	Unsigned long integer
	Send	01 03 00 06 00 02 24 0A		
	Take Over	01 03 04 00 00 00 00 FA 33		
4x0009-4x0010	Cumulative Decimals	2	float	IEEE754

	Send	01 03 00 08 00 02 45 C9		
	Take Over	01 03 04 00 00 00 00 FA 33		
4x0011-4x0012	Cumulative Floating Point Number	2	float	IEEE754
	Send	01 03 00 0A 00 02 E4 09		
	Take Over	01 03 04 00 00 00 00 FA 33		
4x0013-4x0014	Medium Temperature	2	float	IEEE754
	Send	01 03 00 0C 00 02 04 08		
	Take Over	01 03 04 BA 4A 41 F8 CF 2F		
4x0015-4x0016	Current Acquisition Signal Value	2	float	IEEE754
	Send	01 03 00 0E 00 02 A5 C8		
	Take Over	01 03 04 82 1F 40 36 52 5B		
4x00 21	Register Write Protection	1	Unsigned int	Unsigned integer
	Send	01 06 00 16 55 AA D 7 21		
	Take Over	01 06 00 16 55 AA D 7 21		
	Illustrate	After writing 0x55AA to this register, the write protection is unlocked, and other registers can be written at this time. After 10 seconds, the write protection is automatically locked and needs to be unlocked again to continue writing.		