

Mass Flowmeter Manual

2024

Mass Flow Controller Specification



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

- ★ The mass flow meter measurement value is used as a feedback signal to control the motor regulating valve, thereby achieving precise flow control.
- ★ The flow sensor adopts advanced micro-electromechanical system (MEMS) technology, with fast measurement response and accurate accuracy, and is suitable for all kinds of clean gases.
- ★ The regulating valve adopts a servo motor, which can accurately control the valve opening.
- ★ 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.

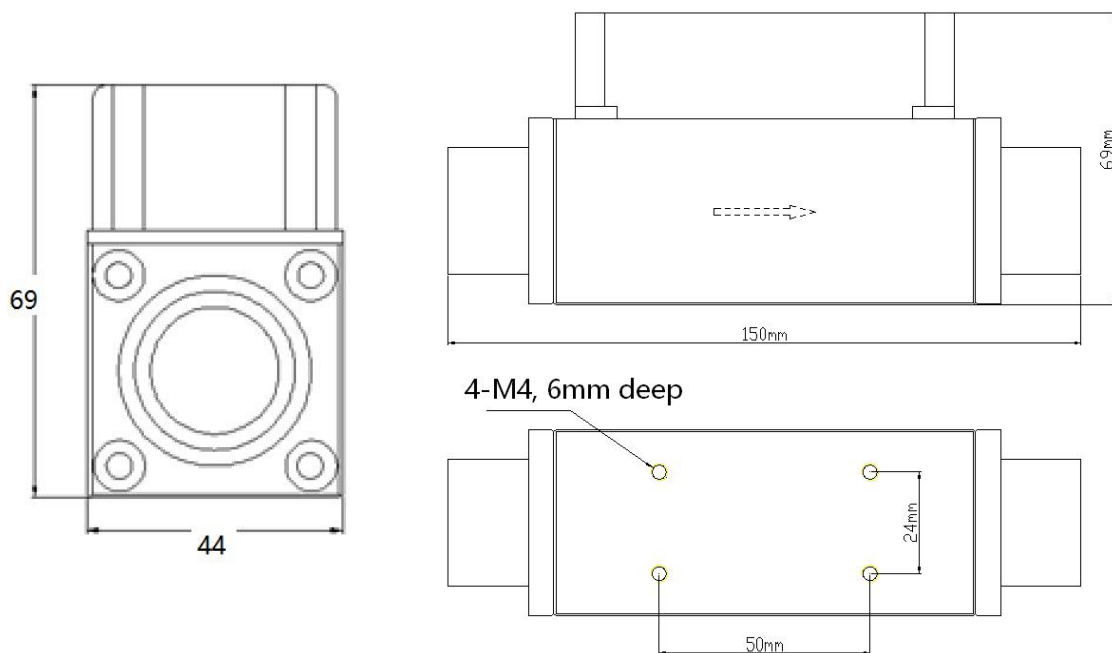
3. Technical Parameters

Working power Supply	DC12-24V/ 2.5W
Accuracy (%)	Control Accuracy: $\pm 1.0\%$ S P, <1000L/min, Measurement Accuracy 1.5% FS , >1000L/min , Measurement Accuracy 2.0 % FS ,
Control and Measurement Turndown	1:20
Valve Type	Normally Closed
Operating Temperature	-10~55 °C
Humidity	<95%RH (No Frost, No Ice)
Working Pressure Range	Measurement: 0-1.5MPA Control: 0-1.0MPA
Typical Control Response Time	Less Than 20S (T90)
Measuring Response Time	<200mS
Output Method	4-20mA or 1-5V
Communication	RS485 (Modbus Rtu Protocol)
Control Method	Key Operation, Modbus, 4-20mA
Mechanical Connection	PT3/8 PT 1/ 2 PT3/4 PT1 PT1-1/4 PT1-1/2
Protection Level	IP40

Other Features

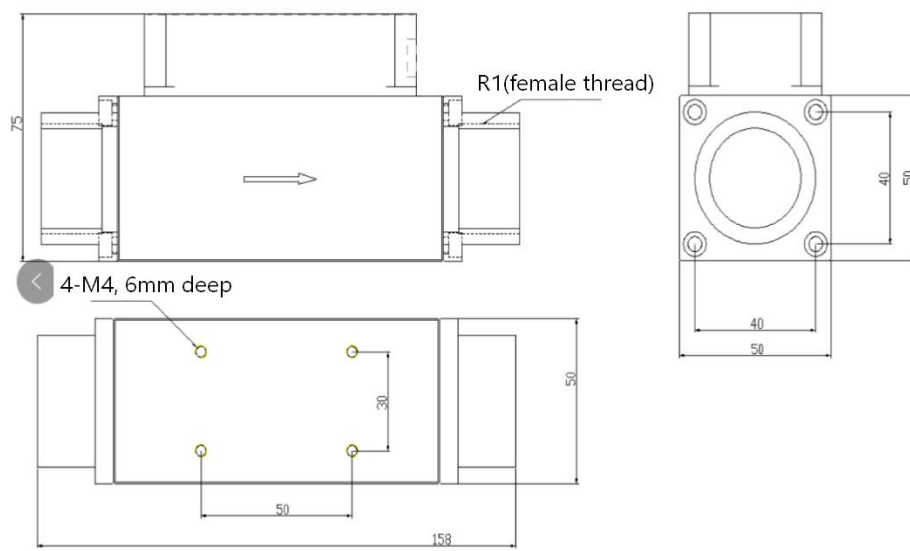
Selectable Standard Temperature Conditions	0°, 20°, 25°, User Adjustable, Default 25°
Selectable Gas Type	Air, N2, O2, CH4, Ar, CO2, He, H2 , C3H8
Working Pressure Difference	No Pressure Difference Required

4. Mechanical Dimensions of Flow Meter



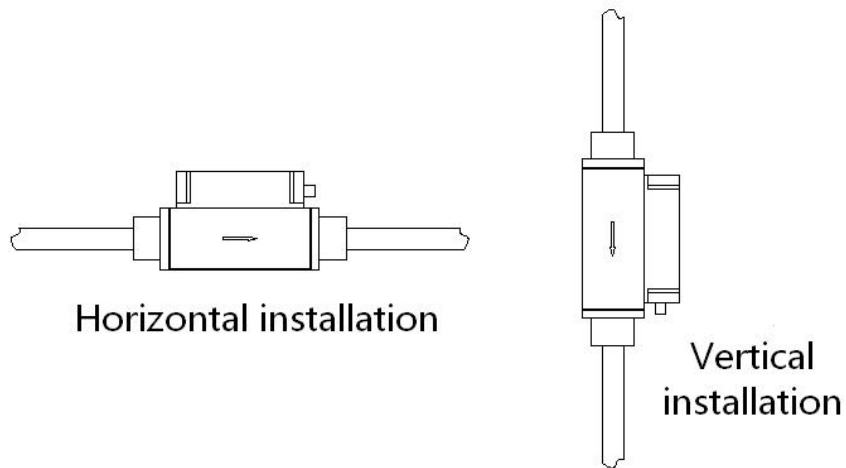
DN10-DN25 Dimension Drawing (Excluding Straight Pipe)

Mechanical Interface Connection Dimensions				
DN10	DN15	DN20	DN25	DN32
B SPT3/8 Internal Thread	B SPT1/2 Internal Thread	B SPT3/4 Internal Thread	BSPT1 Internal Thread	BSPT1-1/4 Internal Thread
Maximum Controllable Flow				
DN10	DN15	DN20	DN25	DN32
300L/MIN	500L/MIN	1000L/MIN	2000L/MIN	3000L/ MIN

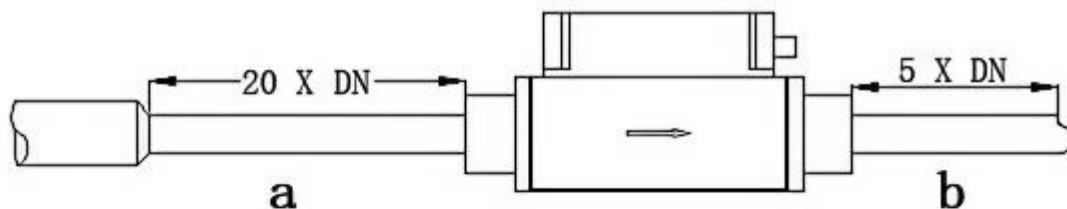


DN32 Pipe Flowmeter Dimension Drawing (Excluding Straight Pipe)

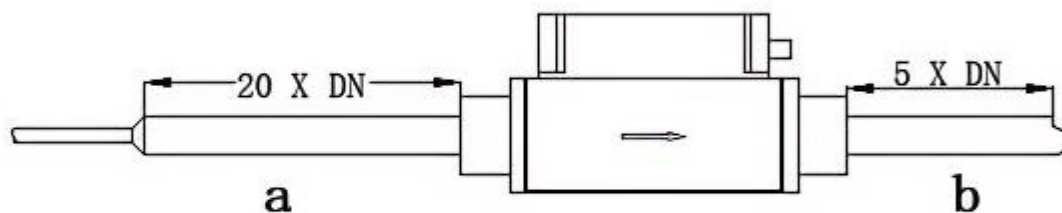
5. Installation Method



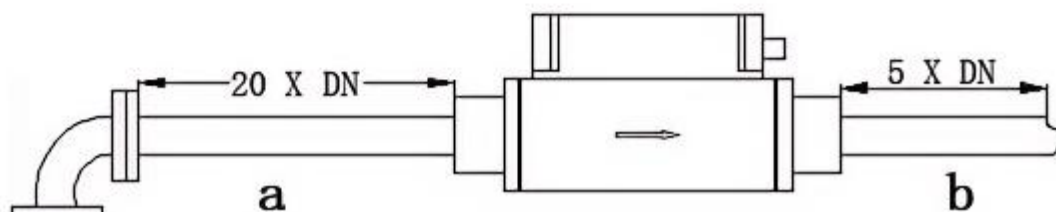
Reduced
pipe
diameter



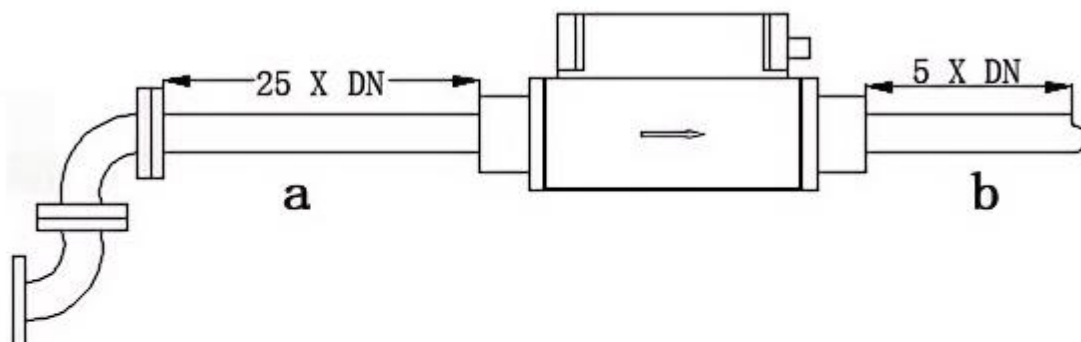
Expansion
diameter



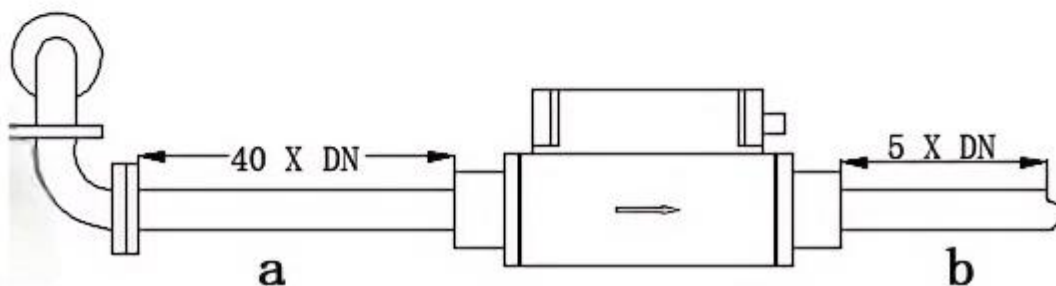
Pipes with
90-degree
elbows or T-
shaped
fittings



Pipes with
two 90-
degree
elbows.



3-way
piping with
two 90-
degree
bends



a = front straight pipe section b = rear straight pipe section



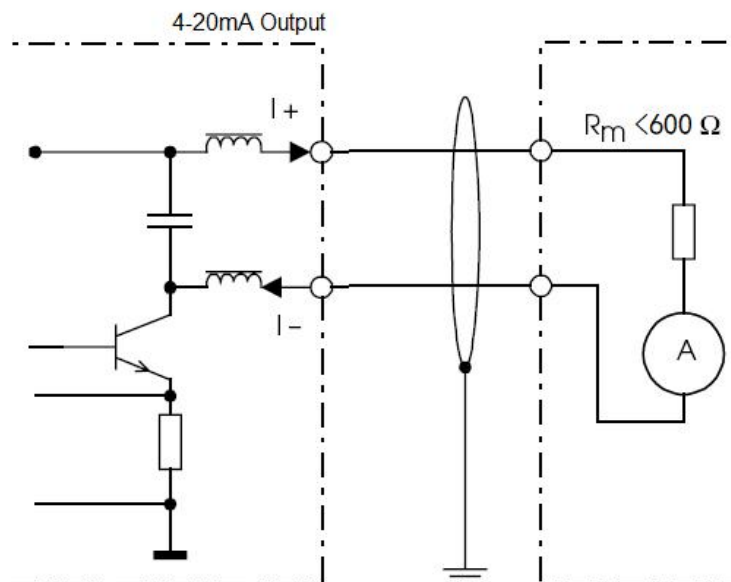
Attention! Try to install the control valve and buffer cut-off valve behind the thermal gas mass flow meter.

6. Wiring Instructions

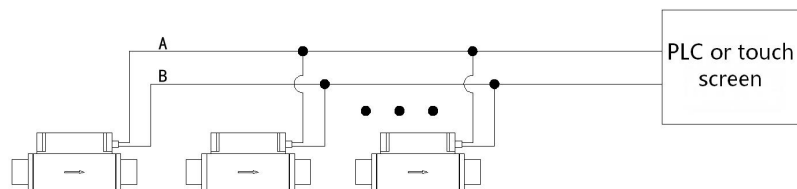
GX16 6-Core Aviation Cable Description

Logo	Meaning
1-Red	24V+
2-Black	24V-/ Current I-
3-Green	Flow Control Input (4-20 mA)
4-Brown	Flow Measurement Output (4-20 mA)
5-White	RS485 Communication Output B
6-Yellow	RS485 Communication Output A

4 -20mA Current Output Wiring Instructions

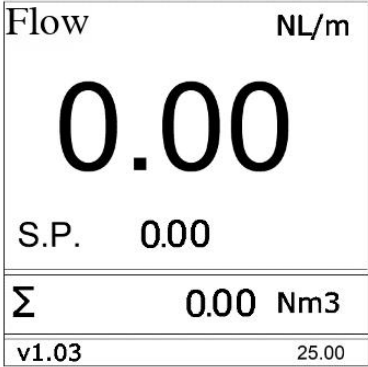


RS485 Bus Wiring Instructions



485 bus communication is configured for 32 units by default.

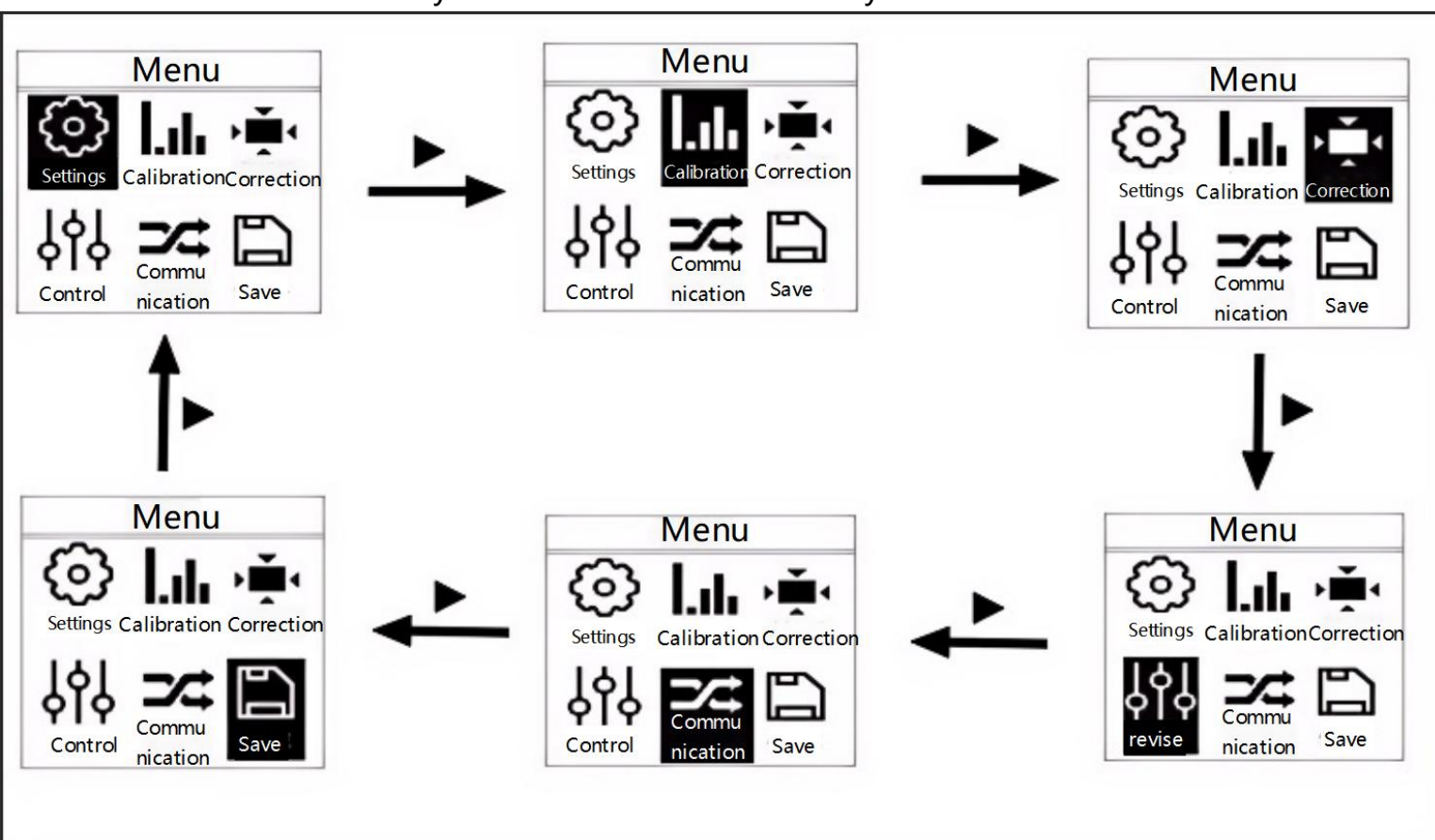
7、Operation Instruction

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 current set flow point The fourth line: displays the accumulated flow The fifth line: displays the version number and valve opening

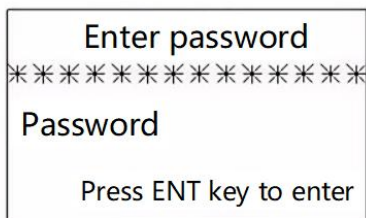
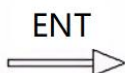
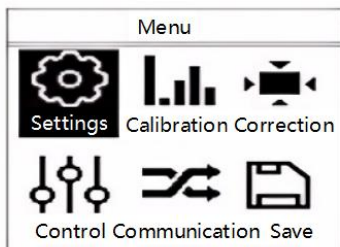
Key Description	
Logo	Meaning
ESC	Cancel or Exit the Interface
	Shift Key
	Edit/Page Key
ENT	Confirm/Enter Key

Menu Selection and Password Entry	
Press ENT Menu to Enter Menu    Settings Calibration Correction    Control 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 Control: Set flow
Enter password ***** Password Press ENT key to enter	Setup, Calibration, Communication, Save, Password : 1000 Calibration password: 0603

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 > Chinese Backlight Always On Flow Rate Unit NL/min	Language selection: Chinese or English . Backlight options: automatic and always on . The flow units are as follows: g / min, g/s, K g / min, K g / h, Nm3 / h, Nm3 / min, N L/ h, N L/ min, mL/min .
Cumulative unit > Nm3 Alarm output Hight Equivalent pipe inner diameter 20.00	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 > 1.00 Range lower limit 0.000 Range upper limit 10.00	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 > 4.00 Small signal cutoff 0.000 Gas density 1.205	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 > 1.00 Noise threshold 2.00 Alarm upper limit 0.000	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.
Alarm lower limit 0.000 Display rotation > 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.

Flow Control

Control point > 0.000 Flow rate 0.000 PID value 0.000	Control point: Set the flow value. Flow : Actual flow value (read only). PID value: Ball valve opening or closing instruction (read only). A value greater than 0 indicates that the valve is opening, and a value less than 0 indicates that the valve is closing.
Voltage error > 0.006 Speed 10.23 Mode Normal	Voltage error: operation control error, The adjustable range is (0.003V~0.02V). Speed: Average speed of the ball valve (read only). Mode: Normal, Normally Open, Normally Closed. In normal mode, the flow meter controls the valve opening. When the valve is normally open, it remains fully open; when the valve is normally closed, it remains fully closed.

Correction

Current output mode
> 4-20mA
Fixed current output value
4mA
Adjustable current output 4mA
4.00
Adjustable current output 20mA
20.00

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:

Step1. Connect the multimeter in series into the current loop;

Step2. Set the current output mode to fixed current output (Fixed);

Step3. 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;

Step4. 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.

Step5. 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;

Step6. 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.

Step7. 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.

Communications Menu

Device ID
> 001
Baud Rate
9600
Parity
None
Stop Bits
1 bit

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

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

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: 3412

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	Flow Control	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	2	float	IEEE754

	Number			
	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.		