

NBLB

TARGET FLOW METER

Operation Manual

NBLB- DT- JS- 1025- 2018(A)



Preface

Thank you for choosing the products of Dandong Top Electronics Instrument (Group) Co., Ltd.

This operation manual provides you with important information on installation, connection and commissioning as well as on maintenance, troubleshooting and storage. Please read it carefully before installation and commissioning and keep it as part of the product near the meter for easy reading.

This manual can be downloaded by entering the version number at www.ddtop.com .

If the instructions are not followed, the protection provided by the meter may be destroyed.

Trademark, Copyright and Restriction Instructions

Dandong Top Electronics Instrument (Group) Co.,Ltd.®, Dandong Top Pump Co., Ltd.®, DDTOP® are registered trademarks of the company.

The performance specifications of the meter are effective as of the date of publication and are subject to change without notice. Dandong Top Electronics Instrument (Group)Co.,Ltd. reserves the right to modify the products described in this manual at any time without prior notice.

Quality Assurance

Dandong Top Electronics Instrument (Group) Co.,Ltd. guarantees that all glass plate level gauge have no defects in materials and manufacturing processes within one year from the date of delivery.

During the warranty period, if the product returns with quality problems and the claim is determined by the manufacturer to be within the scope of warranty, Dandong Top Electronics Instrument (Group) Co.,Ltd. is responsible for repair or replacement of the buyer (or owner) free of charge.

Dandong Top Electronics Instrument (Group) Co.,Ltd. is not responsible for the costs caused by improper use of equipment, labor claims, direct or subsequent damage and installation and use of equipment. In addition to the special written warranty certificate for certain products of Dandong Top Electronics Instrument (Group) Co.,Ltd., Dandong Top Electronics Instrument (Group) Co.,Ltd. does not provide any express or implied warranty.

Quality

Dandong Top Electronics Instrument (Group) Co.,Ltd. has passed the ISO9001 quality system certification. The whole process of product production is strictly in accordance with the scope of the quality system, providing the strongest guarantee for product and service quality.

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1. Safety Tips

It is expressly prohibited to modify or change products for safety reasons, repair or replacement only allows the use of accessories specified by the manufacturer.

1.1 Explosion May Result In Death or Serious Injury.

When installing equipment in an explosive atmosphere, be sure to follow applicable local, national, international standards, codes, and procedures. Be sure to install the equipment in intrinsically safe or non-flammable site operating procedures.

1.2 Process Leaks Can Cause Serious Injury or Death.

Care should be taken to lift the transmitter. If the process seal is damaged, the medium may leak at the joint.

1.3 Failure to Follow Safe Installation Guidelines May Result In Death or Serious Injury.

The operations described in this manual are performed by professionally trained and qualified professionals or end-user specialized professionals to complete.

2 Product Manual

2.1 Main Structure of Product - Figure 1

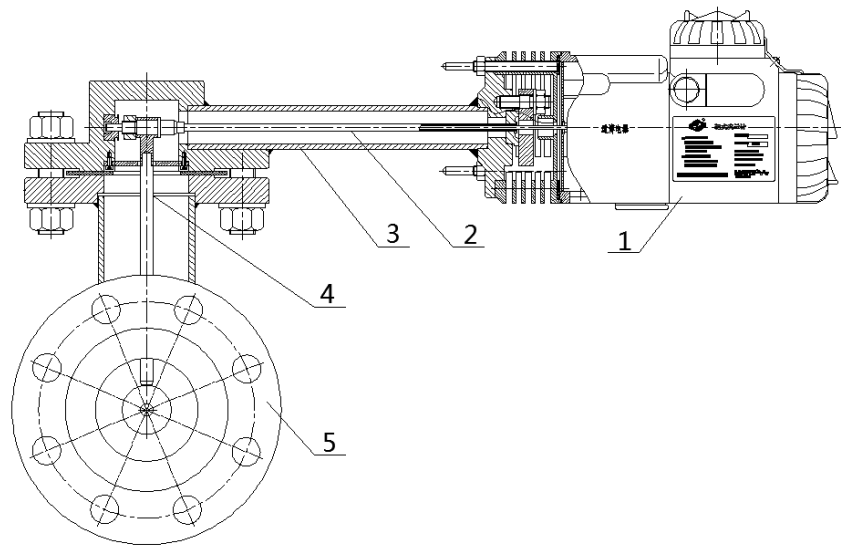
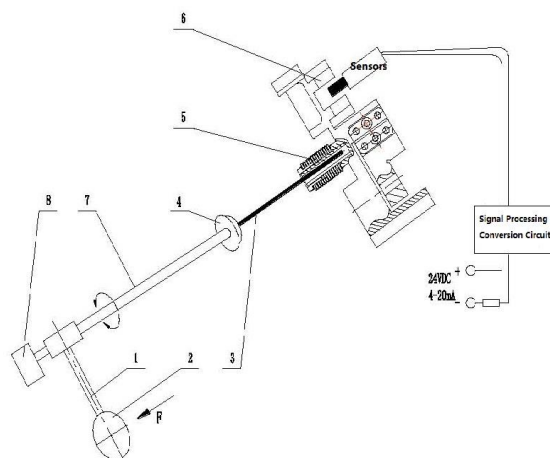


Figure 1 Main structure of the product

1. Transmitter assembly, namely transmitter.
2. Torque tube assembly, transmit signal.
3. Connect the body assembly, connect the transmitter and the three-way body assembly.
4. Target plate and target rod assembly, determine the specifications according to the range.
5. Tee components, connected with the pipeline.

2.2 Operating Principle

After the target 2 is stressed, the torsion tube 7 is twisted through the target rod 1, which drives the bellows 5 connected with the force transmission mandrel 3 to rotate. The rotation of the bellows 5 drives the other end of the connected magnet assembly 6 to rotate, and the sensor part Detect the change of the rotation angle of the magnetic steel assembly 6, the signal processing conversion circuit calculates the corresponding flow value according to the previously inputted corner scalar and the calibrated flow value and converts it into a 4-20mA standard signal output, that is, the flow measurement process is realized (see Figure 2 -1, Figure 2-2).



1. Target rod 2. Target plate 3. Force transmission mandrel 4. Mechanical seal 5. Bellows 6. Magnetic steel components 7. Torsion tube 8. Pivot bearing
- Figure 2-1 Target Flow Meter Schematic Diagram

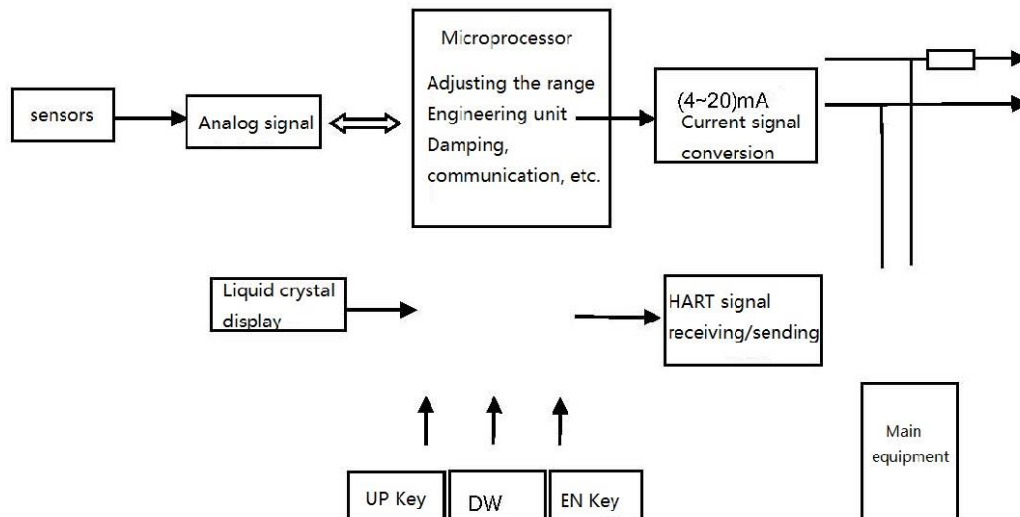


Figure 2-2 Electrical schematic block diagram

2.3 Packaging

Please send packaging waste to a special recycling agency.

2.4 Transporting

Please use quality lifting equipment and lifting straps, and pay attention to safety.

2.5 Warehousing

Storage temperature 5°C~40°C; storage humidity ≤90%.

3. Technical Characteristics

3.1 Main Performance

3.1.1 Has Passed the National Explosion-Proof Certification, Certification Mark:

Intrinsically safe type Ex ia II C T5 Ga

Explosion isolation type Ex d II C T5/T6 Gb

3.1.2 Product implementation standards

HG/T4598 Chemical Target Type Flow Meter

Q/AMM 002 Target Flow Transmitter

3.2 Main Parameters

3.2.1 Power supply voltage: 12V ~ 30VDC

3.2.2 Output signal: two-wire (4 ~ 20) mA DC output with HART protocol communication.

3.2.3 Measuring range ratio: 5:1

3.2.4 Flow range: minimum 3m³/h (20°C water)

4. Dimensional Schematic -Figure 2

The dimensions in parentheses are for the high temperature version with insulation sleeve (in mm).

Figure 3-1 Diagram of External Dimensions - Straight Pipe Section Type

Figure 3-2 Diagram of External Dimensions - Insertion Type

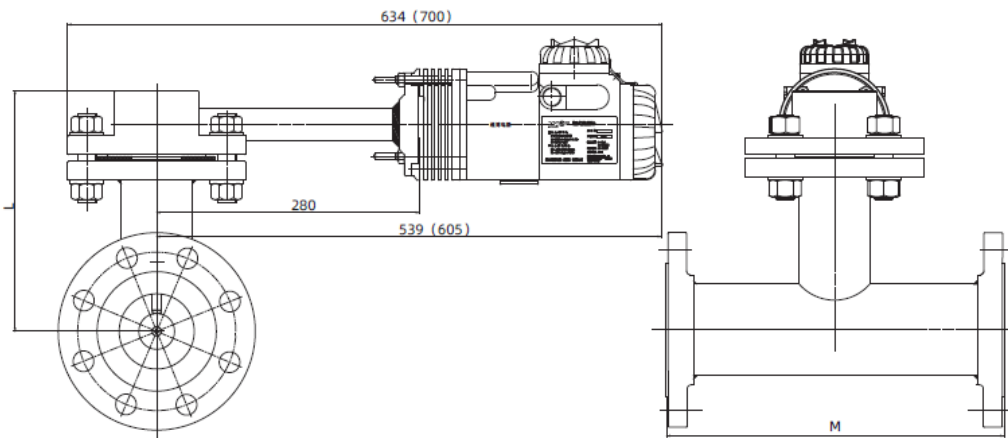
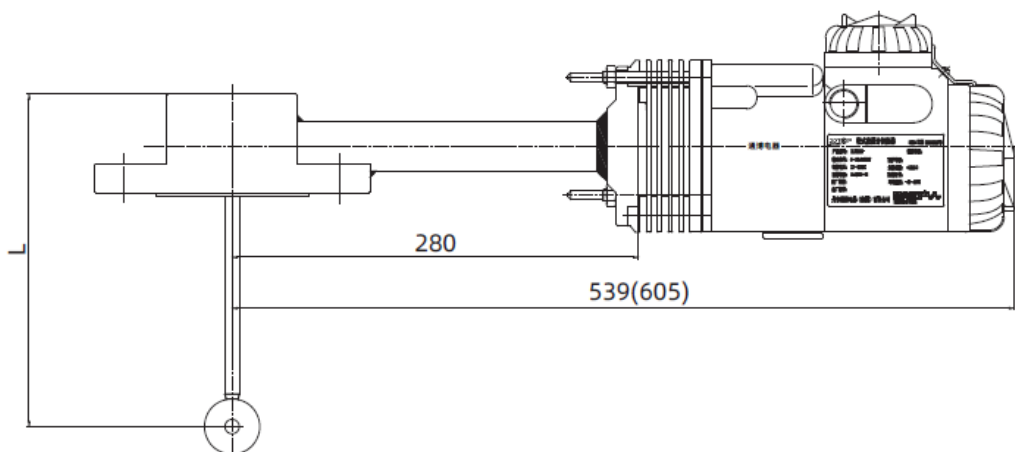


Figure 3-1 Diagram of outline dimensions - straight tube section type

Nominal diameter	L(mm)	M(mm)
DN25	213.5	250
DN40	198.5	280
DN50	204.5	300
DN80	219	350
DN100	228.5	400
DN150	234	500
DN200	244	600
DN250	271	600



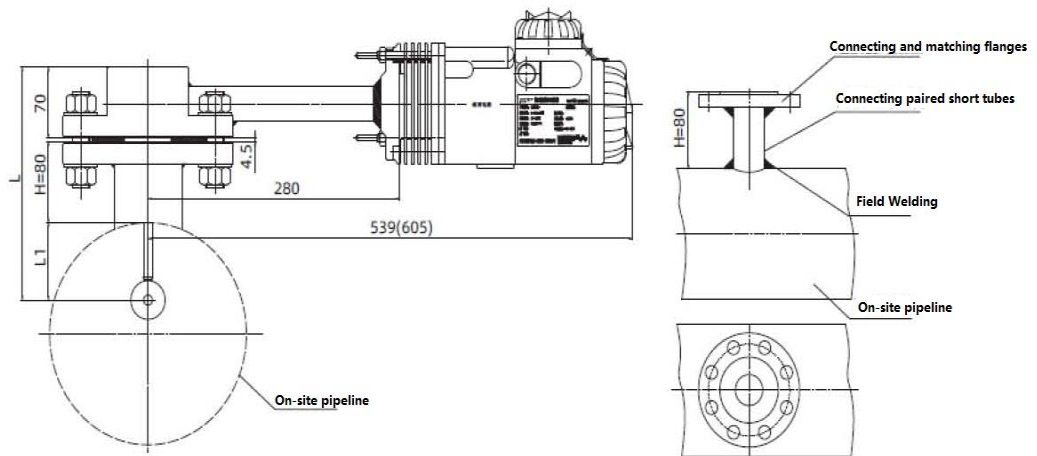


Figure 3-2 Diagram of External Dimensions - Insert Type

Pipe nominal diameter	L1(mm)	L(mm)	Note
≤DN200	Pipe radius	154.5+ Pipe radius	When PN ≤ 6.3MPa, H=80mm.
> DN200	100	254.5	When PN > 6.3MPa, H is as per specific design.

Note: According to the pressure level and the flange standard implemented, the user matches the connection pair flange.

If there are special installation dimension requirements when ordering, please specify in advance.

5 Unpacking and Inspection

5.1 Unpacking Inspection Notice

5.1.1 Check whether the product nameplate (Figure 4) is consistent with the supply list information.

5.1.2 Check whether the certificate of conformity, instruction manual, accessories, etc. are complete against the packing list.

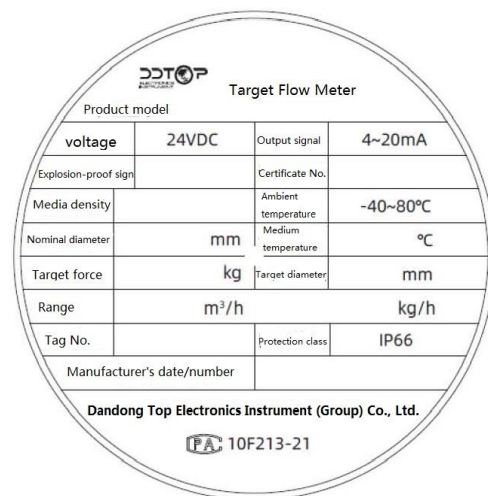


Figure 4 Product nameplate

5.2 Check Content

Check the appearance of the instrument for defects, damage and other abnormal conditions; Check the fasteners to ensure that the connection components are not loose.

6 Installation

6.1 Installation tool

Wrenches, flange washers and flange bolts for process connections

6.2 Installation Technical Requirements

6.2.1 Before installation, the instrument should be checked to see if the explosion-proof level, temperature group and associated equipment and the use of the site environment is consistent with the specification requirements.

6.2.2 When installing the flow meter, the pipe fittings connected to the flow meter should be firmly fixed to prevent the stress generated by the pipe fittings from being transmitted to the measuring tube of the flow meter.

6.2.3 According to the needs of inspection, repair, replacement of flow meters and cleaning of pipelines, bypass pipelines should be installed at both ends of the instrument when necessary.

6.2.4 New pipeline shall be flushed when the flow meter is installed.

6.2.5 Large diameter and heavy flow meters should be equipped with fixed supports when necessary to avoid pipe bending.

6.2.6 Valves should be installed upstream of the flow meter flow control valve is recommended to be installed 5 to 10 times the nominal diameter downstream of the flow meter.

If the measured liquid contains bubbles, an exhaust port should be set upstream of the flow meter as required.

6.2.8 The instrument is installed in the pipe to measure the horizontal or vertical flow of the fluid, the vertical flow of the fluid direction should be from the bottom up, the direction of the fluid should be the same as the direction of the arrow on the instrument.

6.2.9 In order to ensure measurement accuracy, a certain length of straight pipe section should be configured before and after the instrument, the upstream straight pipe section of the instrument is not less than 10 times the nominal diameter, the downstream not less than 5 times the nominal diameter.

6.2.10 If there is a backflow in the pipeline, especially water hammer to prevent damage to the flow meter should be installed in the flow meter downstream after the valve one-way check valve.

6.2.11 The instrument should not be installed in an environment subject to severe vibration.

6.3 Installation Process

Connect the connection flange to the field connection mating flange, ensuring good contact between the flange and the gasket. See Figure 5-1 straight pipe section installation diagram, Figure 5-2 inserted installation diagram.

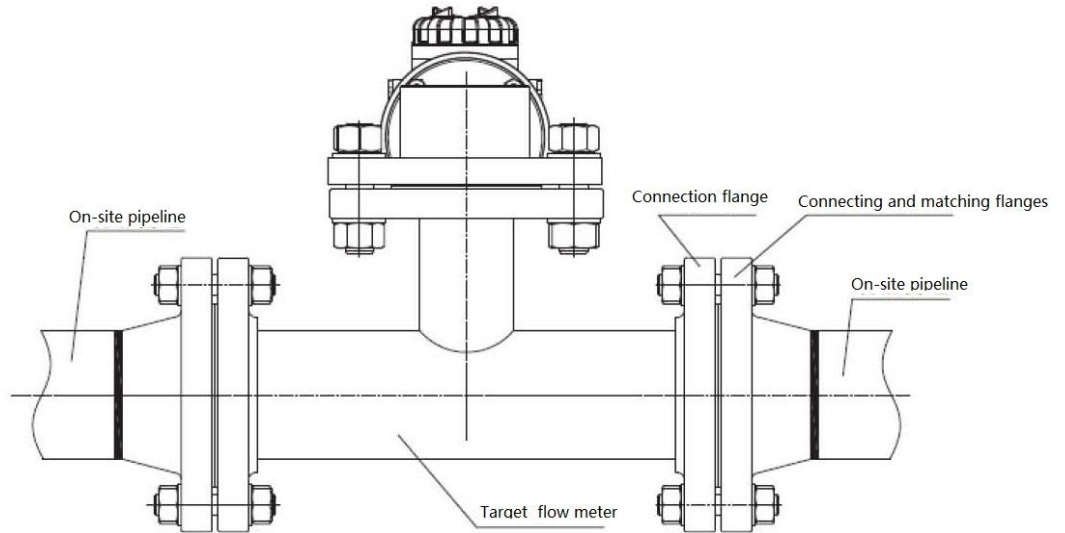


Figure 5-1 Schematic diagram of straight pipe section installation

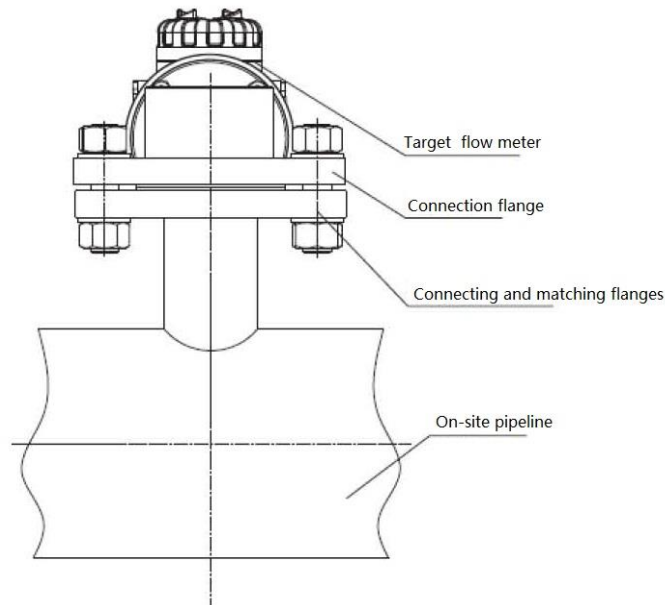


Figure 5-2 Schematic diagram of plug-in installation

7. Debugging

7.1 Preparation for Commissioning

The meter needs to be coupled to the transmitter during the installation of the flow meter as follows.

1. Slide the wedge into the locked position to expose the entry hole. Press the back of the wedge

and slide the wedge toward the front of the device as shown in Figure 7-1, ensuring that the wedge falls into its slot.

2. Tighten the torque tube mandrel with a socket wrench with a 10mm concave depth through the entry hole.
3. Close the entry hole by sliding the wedge into the unlocked position, thus completing the coupling.

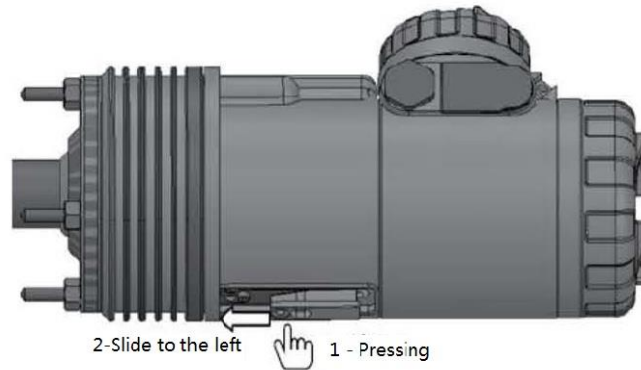


Figure 6 Entry Handle Use Diagram

7.2 Electrical Wiring

Electrical installation must be correct to prevent errors due to electrical noise. For best results in an electrically noisy environment, shielded cables should be used. A resistance in the range of 250 to 1100 Ω must be available in the circuit for communication with the HART communicator. For current loop connections, see Figure 7.

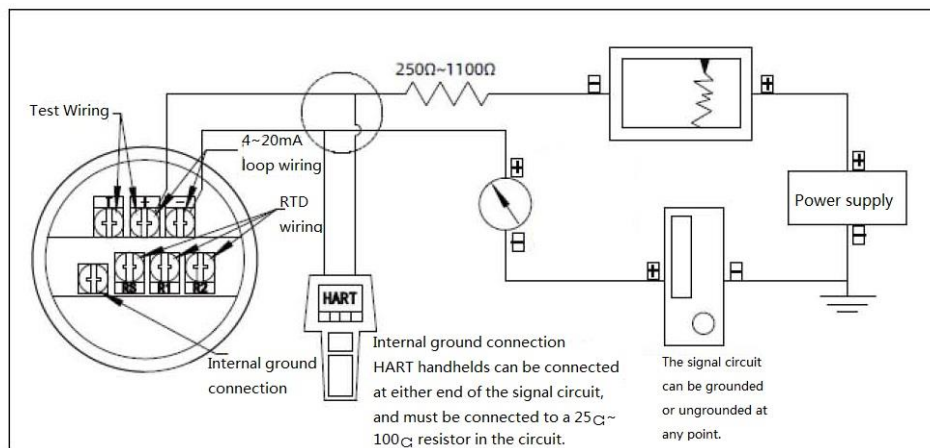


Figure 7 Loop connection diagram

To communicate with this meter, the user needs to provide a power supply of a minimum of 17.75 volts DC. See Figure 8 for specific power supply requirements. If the power supply drops below the critical voltage while being configured, the configuration information will be incorrect.

The voltage provided by the DC power supply shall fluctuate by less than 2% and the total resistive load shall be the sum of the resistance of the signal leads and the load resistance of any

controller, indicator, or several devices associated with the circuit. Note that if an intrinsically safe isolated safety barrier is used, its resistance must be included. The power inlet is marked M20 x 1.5 on the housing. A power inlet is not supplied with this product, the user should use a cable inlet which is Ex d approved.

7.3 Debugging Operation Process

7.3.1 Key Descriptions

The transmitter keypad consists of external and internal keys. The external keys are distributed as shown in Figure 7-4. The external anti-explosion keypad has only "UP" and "EN" keys. Only the sliding key cover on the right side of the keypad can be opened and used; the left side is not used.

The internal keys are on the LCD screen, which can be seen by unscrewing the sight glass cover, including "UP" key, "DW" key and "EN" key, when configuring. The "UP" key is used to increase data and add menu items, the "DW" key is used to decrease data and decrease menu items, and the "EN" key is used for data shifting and confirmation.

7.3.2 Key Menus

The key menu is shown in the table below, the menu parameters need to be entered with the correct opcode before the key configuration operation.

7.3.3 Key Configuration Descriptions

In normal display menu, press "EN" key to enter menu interface, when "888" character in the lower left corner shows 1~19, it indicates that the instrument is in field configuration mode, at this time, you can enter operation code to modify parameters.

In the data setting process, "UP" and "DW" keys are used to adjust the digits and decimal point, "EN" key is used for shift operation.

The process of setting the data is as follows.

- 1) Press "EN" key to enter the data setting interface, and the symbol bit starts flashing to indicate that the symbol bit can be modified. If only positive numbers are allowed to be entered in the parameter, it will go directly to 3).
- 2) Press "UP" or "DW" key to toggle the data positive or negative.
- 3) Press the "EN" key, the first digit begins to flash, indicating that it can be modified, at this time, press and hold or press the "UP" or "DW" key several times in a row to set the number between 0 to 9 cycle.
- 4) Press the "EN" key again, you can set the second to fifth digit in sequence, the setting method is exactly the same as the first.
- 5) After setting the fifth digit, press the "EN" key to start setting the decimal point. The decimal point starts blinking at the same time, which means the decimal point can be set, at this time, press "UP" or "DW" key to switch the decimal point position cyclically.
- 6) When the decimal point setting is finished, press the "EN" key, the lower left arrow starts blinking, which means you can save the setting.
- 7) Press the "EN" key to exit the setting and remain in the item.
- 8) If you need to reset the item, press the "EN" key to reactivate the menu. Otherwise, press the "UP" or "DW" key to toggle the menu.

During the option setting process, "UP" and "DW" keys are used to adjust the option content, and "EN" key is used to confirm.

The data selection process is as follows.

1) Press "EN" key to enter the data setting interface, and at the same time, the data to be set will start blinking, indicating that the data selection operation can be carried out.

"888"字符显示 "888" character display	名称 Item	内容 Content	备注 Note
00 或不显示 00 or Not shown	测量模式 Measurement mode		
01	设置操作码 Set the opcode		操作码 Opcode
02	单位 Unit		主变量单位 Principal variable units
03	量程下限 Lower limit of range		单位同 PV Unit as PV
04	量程上限 Upper limit of range		单位同 PV Unit as PV
05	阻尼 Damping		0~32S
06	定点微调 Fixed-point fine-tuning		输入当前的实际流量值 Enter the current actual flow value.
07	输出特性 Output characteristics	LIN: 线性输出 SQRT: 开方输出 LIN: Linear Output SQRT: Open-side output	线性输出: 配合外部开方器实现电流开方输出 开方输出: 输出电流已经经过开方 Linear output: With an external opener to achieve a square output of current. Open-side output: The output current has been open-side.
08	介质密 Media Density		被测介质密度, 单位 SGU Density of the measured medium Unit SGU
09	干耦合 Dry-coupling		
10	小信号切 Small signal resection		0%~40%范围 0% to 40% range
11	低点校 Low Point Calibration		单位同 PV Unit as PV
12	高点校准 High Point Calibration		单位同 PV Unit as PV
19	保存/退出 Save/Exit		保存或者不保存当前组态数据 To save or not to save the current configuration data.

2) Press "UP" or "DW" key to switch the current data. After selecting the data you want to set, press "EN" key to confirm the selection and end the setting.

7.3.4 Keystroke Configuration

In measuring mode, press the "EN" key for 5 seconds to enter the password.

- 1) Enter the operation code: 00005 to start the parameter setting.
- 2) If the operation code is not entered correctly, the parameter can not be modified, only the parameter can be viewed.
- 3) Use the key to switch to the menu you want to operate and then modify the parameters directly.

Note: After starting common parameter setting, if the key is not operated, it will return to measurement mode automatically for 10 minutes.

Note: When you open the instrument cover during use, be sure to cut off the power supply to the instrument and wait for more than 40 minutes until the temperature inside the instrument drops below 60°C.

7.3.5 Calibration Process

For field use, both "zero" and "full" calibration must be performed to ensure accurate transmitter measurements.

The calibration process is as follows.

- 1) First, adjust the flow rate to zero or close the valve, use the key to enter menu item 11 and enter the current flow rate to complete the zero calibration.
- 2) Adjust the flow rate to full or known flow rate, use the button to enter menu item 12, enter the current full flow rate (or known flow rate) to complete the full calibration.

7.3.6 Display Type Switching

The LCD supports dual-variable display, the display variables can be set including electronic module temperature, the main variable percentage, instantaneous flow rate, each variable can be independently set to display the decimal point position: 0, 1, 2, 3.

The full brightness of the LCD is shown in Figure 8.

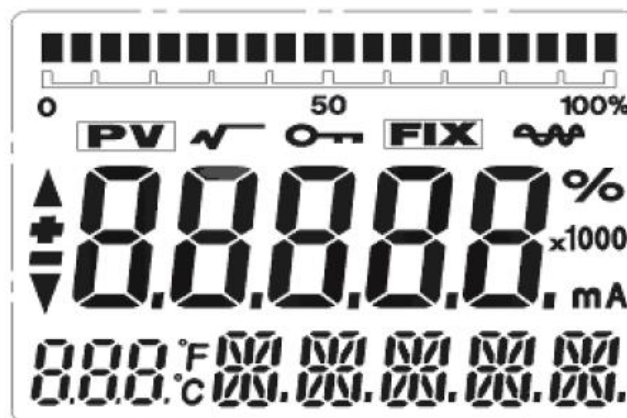


Figure 8 Full brightness display of the LCD

In normal measurement mode, the main display menu display can be modified by pressing a key.

The switching process is as follows

- 1) Press and hold the UP key once, the main display menu will switch to the electronic module

temperature and display the cycle between the electronic module temperature and the main variable value.

- 2) Press and hold the UP key once again, the main display menu will switch to the percentage and display the cycle between the percentage and the main variable value.
- 3) Press and hold the "UP" key once again, the main display menu will switch to the percentage, and only the percentage will be displayed.
- 4) Press the "UP" key once again, the main display menu returns to the main variable value.
- 5) Press the "DW" key, then cycle in the reverse order.

No matter which display type is selected, the ratio bar graph on the upper part of the LCD displays the percentage at the same time.

8 Precautions

8.1 The user must not open the display case during normal use.

8.2 The actual operating conditions should be the same as the design conditions, if changed, the parameters should be changed again and the instrument should be calibrated; the measuring range of the instrument should not exceed the value specified on the label.

8.3 In the process of disassembly and installation, the instrument should be protected as much as possible to prevent it from being damaged by force; in the process of disassembly and installation of the meter head, care should be taken to avoid damage to the thread surface of explosion-proof products.

8.4 Make sure that the power supply is safe and reliable, and that the power supply is connected according to the correct positive and negative poles; the transmitter housing must be well grounded.

8.5 Do not use mismatched hand manipulators to operate the instrument.

8.6 The use of target flow meters is not suitable for applications with high shock and vibration.

8.7 The operating temperature range of the electronic components is $-40^{\circ}\text{C}\sim+80^{\circ}\text{C}$, and the temperature range displayed on the LCD screen is $-20^{\circ}\text{C}\sim+80^{\circ}\text{C}$ (no display on the LCD beyond the range, telecommunication is normal).

8.8 When servicing, the power supply should be cut off first.

8.9 Tighten the display and power cover after commissioning to prevent water and moisture from entering the instrument.

8.10 Meters are marked at the factory in the adjustment part, so the transmitter painted red paint is strictly prohibited to adjust, otherwise it will cause permanent damage to the instrument. If you find problems, contact the manufacturer in time for a proper solution.

8.11 The electrical parameters and specifications and types of components shall not be changed during commissioning and maintenance.

8.12 The instrument is installed and ready for use only after the main variable is set to zero.

8.13 Pipelines in the production before the air sweeping, gas tightness and water pressure and other technical tests, be sure to close the instrumentation at both ends of the valve, so that fluid flow from the bypass pipe (because the flow at this time is often greater than the instrumentation several times or even more than ten times the specified value), to avoid damage to the instrumentation.

8.14 The valves at both ends of the instrument should be opened gradually when the instrument is in formal use to avoid the sudden introduction of fluid into the instrument, which may damage the measuring components of the instrument.

8.15 The front of the target shall be facing the direction of the fluid.

9 Fault Analysis and Elimination

Fault Phenomenon	Causal Analysis	Exclusion Method
No output display after power on	<ol style="list-style-type: none"> Reverse power supply polarity or power failure. Breaks in the line. 	<ol style="list-style-type: none"> Correctly connect the positive and negative poles and check the power circuit for disconnections. Connecting the disconnects.
Flow in the pipe without change in current	<ol style="list-style-type: none"> The direction of target installation is not consistent with the direction of flow. Impurities jamming the target. Sensor damage. Circuit board damage. 	<ol style="list-style-type: none"> Install the target in the correct direction. Remove impurities. Interchangeable plate debugging, if it does not change and then replace the sensor.
The output current changes without changing the liquid crystal display.	The LCD board is not wired properly or the LCD board is damaged.	Reconnect the connector of the LCD board, if it is still not good, you need to replace the LCD board.
The LCD display max or min and the indication is incorrect and does not change.	<ol style="list-style-type: none"> Sensor damage. Circuit board damage. Damaged display boards. 	<ol style="list-style-type: none"> Replacement of sensors. Replacement of circuit boards. Replacement of display panels.
No indication of current.	<ol style="list-style-type: none"> The locking mechanism on the watch head is not pushed to the unlocked position. process parameter settings have input error or process parameter inaccuracy This instrument has been squared, whether the 	<ol style="list-style-type: none"> Push the locking device to the unlocked position. Check process parameter settings and correct or reset process parameters. .The output current signal of this instrument

	user squared again to cause errors.	is already squared. No secondary square is required.
Bad linearity	<ol style="list-style-type: none"> There is a medium stuck in the lumen between the torque tube and the jacket tube. The instrument has been squared, whether the user squared again to cause errors. 	<ol style="list-style-type: none"> Clean out and recalibrate solid media. The output current signal of this instrument has been squared, no secondary squared is required.

10 Disassembly

10.1 Warning







Before disassembly, be aware of hazardous process conditions, e.g., pressure in the vessel, high temperatures, corrosive or toxic media.

Refer to the installation procedures in 6.3 and the instructions in section 7.2 Electrical Wiring for dismantling of the completed components in reverse order of operation.

10.2 Waste Removal

Please follow the existing guidelines for waste disposal in your region.

11 Product Certifications

Product Certifications			
Certification	Certificate No.	Scope of certification/Description	
ATEX Certification		10855485	II 2 G Ex db IIC T5/T6 Gb T5: -40°C ≤Tas +80°C T6: -40°C ≤Tas +60°C II 2G Ex ia IIC T5 Gb(-40°C ≤Tas +80°C)
IECEX Certification		IECEX TUR 13.0001X	Ex db IIC T5/T6 Gb T5: -40°C ≤Tas +80°C T6: -40°C ≤Tas +60°C Ex ia IIC T5 Gb(-40°C ≤Tas +80°C)
CSA Certification		C170815	Original Certification. Transmitter, Types DLT 9010, rated 12-30Vdc, 22.5mA Max, Type 4X, IP66. XP: Class I, Division 1, Groups B, C and D T5: -40 ° C ≤ Tamb ≤ +80 ° C; T6: -40 ° C ≤ Tamb ≤ +60 ° C; IS: Class I,
SIL Certification	SIL 2	70194741	IEC 61508 (edition 2)-Parts 1,2,3,4
EMC Certification		AE 504635040001	
Explosion Proof Certificate		Exia/Exd CE16.5039X	Ex ia IIC T5 Ga Ex d IIC T5/T6 Gb
Type Approval Certificate for Measuring Instruments		10F213-21	