

MTF

VARIABLE AREA FLOW METER FOR MICROFLOW

Operation Manual

MTF - DT - JS - 1023 - 2018(A)



Preface

Thank you for choosing the products of Dandong TOP Electrical Appliance (Group) Co.

This instruction manual provides you with important information on installation, connection and commissioning as well as for maintenance, troubleshooting and storage. Please read it carefully before installation and commissioning and keep it close to the instrument as an integral part of the product, so that you can refer to it at any time.

You can download this instruction manual by entering the version number at www.ddtop.com.

If the instrument is not operated in accordance with these instructions, the protection provided by the instrument may be impaired.

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Dandong Top Electronics Instrument (Group) Co., Ltd. guarantees all LBTC Positive Displacement Rotary Vane Flow Meter to be free from defects in materials and manufacturing processes within one year from the date of delivery.

During the warranty period, Dandong Top Electronics Instrument (Group) Co., Ltd. is responsible for repairing or replacing the equipment free of charge for the buyer (or owner) if the product is returned with quality problems and the claim made is determined to be covered by the warranty after inspection by the manufacturer.

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Dandong Top Electronics Instrument (Group) Co., Ltd. has passed the ISO9001 quality system certification. The whole production process is carried out in strict accordance with the provisions of the quality system to provide the strongest guarantee for the quality of products and services.

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1 Safety Tips

Unauthorized modification or alteration of the product is expressly forbidden for safety reasons. Repair or replacement is permitted only with parts specified by the manufacturer.

1.1 An explosion may cause death or serious injury.

When installing equipment in explosive atmospheres, always follow applicable local, national, and international standards, codes, and procedures. Ensure that equipment is installed in accordance with intrinsically safe or non-flammable site work procedures.

1.2 Serious injury or death may result from process leakage.

If the process seal is damaged, leakage of media may occur at the connection.

1.3 Failure to comply with safety installation guidelines may result in death or serious injury.

All operations described in these instructions must be performed by trained and qualified or end-user appointed personnel.

2 Product Description

2.1 Main product structure - Figure 2

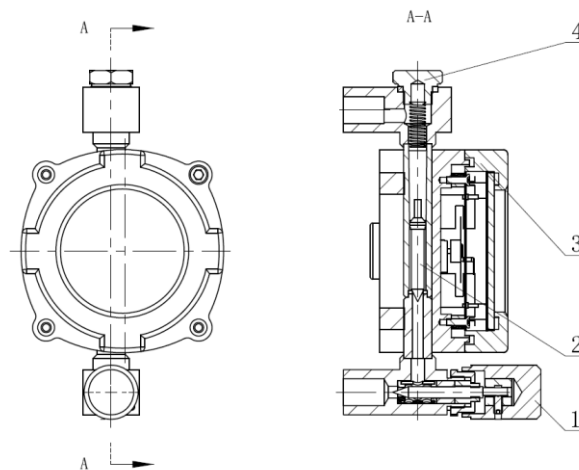


Figure 1 Main Product Structure

1. Inlet needle valve
2. float assembly
3. Indicator
4. Seal nuts

2.2 Operating Principle Figure 2

The measuring device consists of a metal conical tube in which the float is free to move up and down. As the medium passes bottom-up through the measuring tube, the float adjusts itself so that the buoyant force F and the pressure W equal to the float's gravity G , which is $G = F + W$.

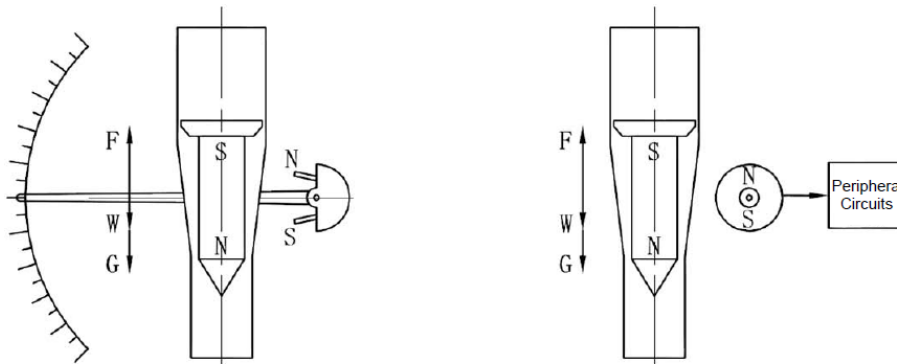


Figure 2 Operating Principle

For the mechanical pointer display type, the measured flow rate corresponds to the position of the float in the measuring cone tube. The flow rate is displayed on the dial by means of a magnetic coupling mechanism.

For the digital display type, the measured flow rate corresponds to the position of the float in the measurement cone tube. By means of magnetic coupling structure and circuit conversion, the flow rate is displayed on the liquid crystal screen, and a 4-20 mA signal can be output.

2.3 Packaging

Please take the packaging waste to a special recycling facility.

2.4 Lifting for transport

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

2.5 Storage

Storage temperature $-20^{\circ}\text{C} \sim 40^{\circ}\text{C}$; storage humidity $\leq 20\%$.

3 Technical Characteristics

Product Features

3.1.1 Solid, corrosion resistance:

It is sturdy and corrosion resistant because the measuring cone tube and float are made of stainless steel metal material.

3.1.2 Flexible connections

It can be selected to connect with tube $\varnothing 6\text{mm}$, $\varnothing 8\text{mm}$, $\varnothing 10\text{mm}$ and $\varnothing 12\text{mm}$, or flange connection, the flange standard will be determined according to the requirements of users.

3.1.3 The output flow can be controlled

Horizontal type may be equipped with an inlet needle valve to control flow at the outlet. Constant value can be set.

For cases where there are large pressure fluctuations at the inlet or outlet, a pressure regulator (constant flow valve) is available as an option to stabilize the flow at the outlet.

3.1.5 Display type

Mechanical pointer type; LCD digital type, convenient to read, output 4~20mA current signal.

3.2 Main Parameters

1. Measurement range: water (20°C) (0.3 to 100)L/h; air (20°C 101325Pa) (1.2 to 3400)L/h
2. Range ratio: 10:1
3. Accuracy level: 4
4. Maximum working pressure: 2.5 MPa (can be increased as required)
5. Temperature of the medium: -40 to +150°C
6. Ambient temperature: -25 ~ +70°C
7. Connection: 1/4" NPT female thread or $\Phi 6(\Phi 8)$ ferrule connection or horizontal/vertical connection according to customer's requirement.
8. Limit alarm: 1 to 2 alarm switches (optional)

3.3 Scope of application

3.3.1 Conditions for micro-flow measurements

The metal rotor flowmeter is a special instrument for micro flow measurement, with a minimum of 0.3L/H for liquid flow.

3.3.2 Conditions for Pressure Fluctuations

Under these conditions, if the constant flow output is affected by the pressure fluctuation at the

instrument inlet or outlet, the instrument and constant flow valve can be used together to achieve a constant flow output.

3.3.3 Conditions for pressure port anti-clogging of orifice plate flow meter

The orifice plate flowmeter adopts small aperture pressure tap to take pressure. If there are impurities in the measured medium, it is easy to block the pressure port and affect the product measurement. The instrument and constant flow valve can be used to form a purging device to blow air at constant pressure and flow rate to ensure that the pressure port is not blocked for a long time without affecting the product measurement effect.

4 Outline drawing for dimensions. Figure 3

Figure 3-1 Side-in, side-out type

Figure 3-2 Bottom-in, top-out type

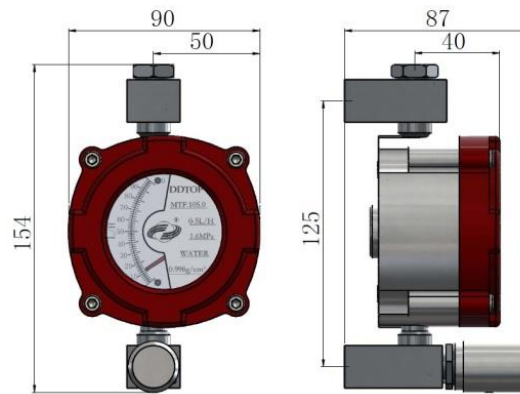


Figure 3-1 Side-in, side-out type

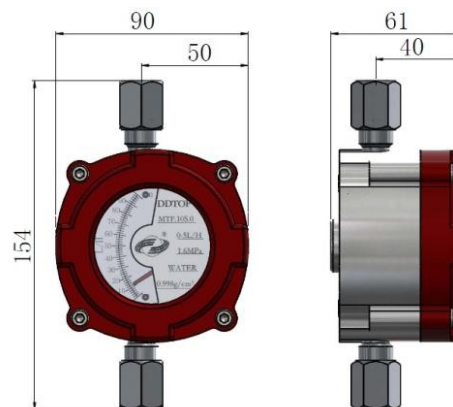


Figure 3-2 Bottom-in, top-out type

5 Unpacking and Checking

5.1 Precautions for unpacking inspection

5.1.1 Check whether the Product Name Plate (Figure 4) is consistent with the information in the supply list.

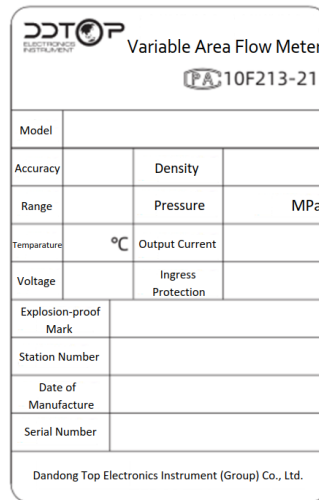


Figure 4 Product Name Plate

5.1.2 Check whether the quantity and material of each part are correct against the packing list.

5.2 Check the contents

5.2.1 Check the appearance of the meter for defects, damage, etc.

5.2.2 If the Micro Flow Variable Flow Meter and its accessories are packaged separately, please confirm the quantity and specifications are correct before unpacking.

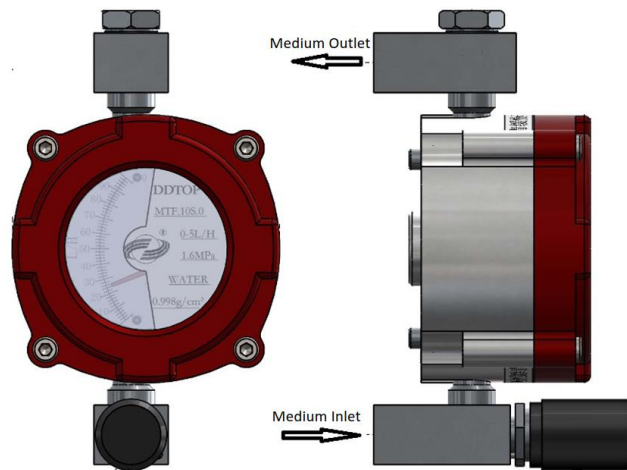
6 Installation

6.1 Installation tools

6.1.1 Wrenches, flange washers and flange bolts for process connections

6.2 Installation technical requirements

6.2.1 During Micro Flow Variable Flow Meter installation, you need to pay attention to the medium flow direction. As shown in Figure 5, the medium flow direction is that the medium inlet at the bottom and the medium outlet at the top.



6.2.2 Before the instrument is installed in the process piping, all packaging should be disassembled and checked for transportation damage.

6.2.3 The upstream and downstream piping of the instrument shall be of the same caliber as the instrument. The connection flanges or threads shall match the flanges and threads of the instrument. The length of straight pipe section upstream of the instrument should be guaranteed to be more than 5 times the nominal caliber of the instrument. The length of downstream straight pipe section h_2 is not less than 250mm.

6.2.4 As the measuring mechanism of the instrument adopts magnetic transfer, in order to ensure the performance of the float flowmeter, at least 100mm around the installation of the sensor does not allow the presence of ferromagnetic substances.

6.2.5 Before the instrument installation, the process pipeline should be purged to prevent the retention of ferromagnetic substances in the pipeline attached to the instrument, which will affect the performance of the instrument and even lead to damage to the instrument. If this is unavoidable, a magnetic filter should be installed at the inlet of the instrument.

6.2.6 Instruments for measuring gases are calibrated at special pressures. If the gas is discharged directly to atmosphere at the instrument outlet, it will create a pressure drop at the float and cause distortion of the data. If this is the case, a valve should be installed at the instrument outlet so that the desired flow rate can be set. When the calibration pressure is maintained on the float, the gas will expand at the valve.

6.2.7 Instrument installation form is divided into vertical installation and horizontal installation. For vertical installation, the vertical degree of the instrument should be better than 1%; for horizontal installation, the horizontal degree of the instrument should be better than 1%.

6.2.8 Instruments installed in piping should not be subjected to stress. Suitable pipe supports should be provided at the outlet and inlet of the instrument to keep the instrument under minimum stress.

6.2.9 When calibration and other operations are performed on the product in connection with a computer, etc., they must be performed in a safe place.

6.3 Installation Notes

6.3.1 Prior to installation of the flow meter, the pipe shall be blown clean of dirt, welding press impurities. If the liquid contains solid impurities, a filter shall be installed between the valve and the straight pipe section.

6.3.2 Shielding and grounding are very important to ensure the ideal EMC performance of the system. Especially the bus cable, to make the cable as continuous as possible to shield.

6.3.3 For the safety area, the cable should be grounded as far as possible in accordance with conventional requirements.

6.3.4 In hazardous locations, it is important to ensure that there is sufficient equipotential matching between the safe location and the hazard throughout the bus range. In this case, multiple grounding is superior.

6.4 Use

6.4.1 To avoid fluid impact on the instrument float, especially when the instrument is used to measure gas flow, the valve must be opened slowly to avoid impact vibration or magnetic coupling drive system decoupling, resulting in the instrument can not be installed normally.

6.4.2 The instrument is tested at the factory. If the installation and the actual measured value does not match, may be in the assembly process due to vibration, verticality and other reasons, resulting in zero point or range change. This can be resolved through zero migration or range migration to match actual current value.

6.4.3 When wiring the digital display indicator, terminal 1 is connected to the "+" pole, terminal 2 to the "-" pole, and terminal 4 to the ground wire.

7 Failure analysis and troubleshooting

Failure Description	Causes	Troubleshooting Method
Display 21mA at any position.	Improper commissioning	Recommissioning
The displayed value remains unchanged.	No change in sensor value	Replace the circuit board and commissioning
Display stops sometimes.	There's debris on the float.	Install magnetic filters upstream
The needle of the indicator is jittering, and indication is not correct.	Unstable medium working pressure.	Install constant-flow valve devices.
There is flow in the field, but no change in the meter.	The medium may have solidified due to low temperature, resulting in no change in flow or a stuck float.	Add heat to important parts of the instrument to reduce medium solidification. If the instrument still does not work properly, then check the float measuring tube.
Less than 20% of instructions.	Debris in the measuring tube.	Disassemble and clean.
Pointer does not change at maximum, but changes after vibration.	Debris in the measuring tube.	Clean of debris from the measuring section of the instrument and install.
Instructions are inaccurate.	Inflexible float movement or jammed by impurities.	Clean the measuring tube or add filters.

8 Maintenance

After the flow element has been put into service, it must be maintained to ensure that it measures accurately and reliably.

8.1 In the long-term use process, the pipeline will inevitably have ferromagnetic impurities adsorbed on the float, which will jam the float or affect the measurement accuracy. Therefore, the float in the sensor should be cleaned from time to time, even if a magnetic filter is installed.

8.2 There are electronic components in the instrument indicator, so the instrument should tighten the screws after wiring or removing the housing. The sealing of the housing must be ensured to prevent the entry of impurities, water or other substances. It is also necessary to ensure reliable grounding of the instrument housing.

8.3 After the instrument is installed, during the first use, pay attention to.

When opening the valve, in order to avoid the formation of pressure shocks that cause the float to hit the limit device and cause damage to the instrument, the valve must be opened slowly to minimize the oscillation of the float. To ensure the stability of the float, a throttle valve can be installed at the outlet of the instrument.

8.4 For remote type instrument, it is necessary to ensure that the instrument is wired correctly before it is energized. For hazardous situations, the explosion-proof type must be selected and the installation and use should be according to the explosion-proof requirements.

9 Disassembly

9.1 Warnings

Before disassembly, attention should be paid to hazardous process conditions, e.g., pressure in the vessel, hot, corrosive, or toxic media, etc.

9.2 Waste removal

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

10 Product Certifications

Product Certification		
Type of Certification	Certificate Number	Scope/Description of Certification
Pattern Approval of Measuring Instrument	 10F213-21	