Coriolis Flowmeter

DMF Series

Instruction Manual

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Notice

We thank you very much for your purchase of our coriolis mass flow meter. This instruction manual describes the notes on using a mass flow meter, installation, configuration and maintenance; it is intended for the personnel in charge of installation, operation and maintenance.

To use this product properly and safely, read the manual carefully before using this product. After reading this manual, store it in a place where it can be referred to whenever needed.

About safety precautions

◆Read the safety precautions described at the front carefully and understand the contents before using this product.

The information contained in this manual is subject to change or review without prior notice.

◆Be sure to follow all safety, operating and handling precautions described in this manual and the regulations in force in the country in which this product is to be used.

Handling Precautions

To obtain the optimum performance from the mass flow meter for years of continuous operation, observe the following precautions.

1. Do not store or install the flow meter in:

◆ Places where there is direct sunlight;

◆ Places where excessive vibration or mechanical shock occurs;

◆ Places where corrosive atmospheres obtain;

◆ Places submerged under water;

◆ Places where there is slop floor. To put the flow meter temporarily on the floor, place it carefully with something, such as stopper, to support it as that the flow meter will not topple over.

2. Wire cables correctly and securely

◆ Be sure to ground at the transmitter side. Avoid a common ground used with other equipments which earth currently may flow. An independent ground is preferable.

3. Select the paths away from electrical equipment, which causes electromagnetic or electrostatic interference.

4. If the inside of the transmitter or cable terminals are wetted or humidified, it may cause insulation deterioration, which can result in fault or noise occurrence, so do not conduct wiring in the open air on rainy days.

Also, be careful not to wet down the transmitter even in the case of indoor wiring, and complete wiring work in a short period of time.

5. Observe the following precautions when you open the transmitter housing cover;

◆ Do not open the cover in the open air unprotected against rain or wind. This can cause electric shock or cause damage to the flow meter electronics.

◆ Do not open the cover under high ambient temperature or high humidity conditions or in corrosive atmospheres. This can cause deterioration of system accuracy or cause damage to the flow meter electronics.

6. Since a varistor is built in transmitter, do not conduct a withstand voltage test for the transmitter.

7. This product may cause interference to radio and television sets if they are used near the installation site. Use metal consults etc. for cables to prevent this interference.

8. Radio transmitters such as transceivers or cellular phones may cause interference to the flow meter if they are used near the installation site. Observe the following precautions when using them;

- Close a transmitter cover before using a transceiver;
- Do not use a transceiver whose output power is more than 5W;
- Move the antenna of a transceiver or a cellular phone at least 50cm away from the flow meter and signal cables when using it;
- Do not use a radio transmitter or cellular phones near the flow meter while it is operating online. The transmitter or cellular phone's output impulse noise may interference with the flow meter.
- Do not install a radio transmitter antenna near the flow meter and signal cables.

9. For reasons of flow meter failure, inappropriate parameter, unsuitable cable connections or poor installations conditions, the flow meter may not operate properly. To prevent any of these problems causing system failure, it is recommended that you have preventive measures designed and installed on the flow meter signal receiving side.

We assume no responsibility for nonconformity caused by violation of precautions described in this manual or used in violation of the installation method and the operation method stipulated in a relevant ordinance or other regulations.

Contents

I. Main technical parameters

(I) Measurement scope ： 2kg/h~500t/h

(II) Accuracy ： ±0.2%~±0.15%

(III) Work pressure ： (0~32) MPa (in case of other high pressure, it must be of special order)

(IV) Medium temperature ： -50℃~ +350℃,

measurement accuracy ： ±1℃

(V) Environment temperature ： -20℃ ~ +70℃

(VI) Measurement medium: liquid, gas, solid, or two phases and three phases mixed fluid

(VII) Output signal:

(1) 4-20mA current signal of flow, with load resistance ≤500Ω

(2) 0-10KHz frequency signal of flow.

(3) RS485 Communication protocol

(4) Hart protocol

(VIII) Power supply voltage: 24VDC

(IX) Material of measuring pipe: 316L stainless steel

(X) Response time: 0.1s～5s, adjustable

(XI) Explosion-proof grade: Ex(ib)II BT2-T5

II. Flow Range

Micro Flow Meter ----- DMF-1-1-A, DMF-1-1-B, DMF-1-2-A, DMF-1-2-B

Model	DN	Measurement scope （kg/h）	Work Pressure （MPa）	Connection type (mm)
-1-1-AB	1.5	0~4	0~32	Weld Joints Φ6×1.5
DMF-1-1-A	3	0~40	0~32	Weld Joints Φ6×1.5
DMF-1-1-B	6	0~100	0~25	Weld Joints Φ10×2
DMF-1-2-A	8	0~200	0~20	Weld Joints Φ10×1

Medium-Small Flow Meter ---- DMF-1-3-A, DMF-1-3-B, DMF-1-4

Model	DN	Measurement scope (kg/h)	Work Pressure (MPa)	Connection Type(mm)
DMF-1-3-A	12	0～500	0～4	Weld Joints Φ18×3
	12	0～500	0～25	Weld Joints Φ20×4
DMF-1-3-B	14	0～1000	0～4	Weld Joints Φ18×2
	14	0～1000	0～25	Weld Joints Φ20×3
DMF-1-4	16	0～3000	0～4	Weld Joints Φ18×1
	16	0～3000	0～25	Weld Joints Φ20×2

Large-scale Flow Meter---DMF-1-5, DMF-1-6-A, DMF-1-6-B, DMF-1-6-C, DMF-1-6-D

Model	DN	Measurement scope (t/h)	Work Pressure (MPa)	Connection Type(mm)
DMF-1-5-A	25	0-10	0～4	Flange 25
DMF-1-5-B	40	0-20	0～4	Flange 40
DMF-1-6-A	50	0-30	0～4	Flange 50
DMF-1-6-AB	65	0-50	0～4	Flange 65
DMF-1-6-B	80	0-100	0～4	Flange 80
DMF-1-6-C	100	0-150	0～4	Flange 100
DMF-1-6-D	150	0-500	0～2	Flange 150
DMF-1-6-E	200	0-800	0～2	Flange 150

III. Installation requirements

(I) Unpacking inspection

1. Prior to unpacking, check the completeness of the packing box, in case of any damage thereof, timely contact the transportation agent;

2. Check the number of things in the packing box as per packing list, if the things in the packing box are not consistent with that in the packing list, timely contacts our company;

3. After power on of flow meter, trigger the Zero Adjustment switch; if the Zero Adjustment light flashes, it is normal.

(II) Precautions to sensor installation

A. Requirements to installation environment:

1.The flow meter and its cable shall not be installed near the equipments with fairly great electromagnetic disturbance, the flow meter shall be over 1m away from motor and large scale relay, etc.,

2.The flow meter must be over 3m away from the strong vibration source equipments as motor, pump, vibrator and bumper jar, otherwise it must be taken by separation bracing measures, or taken by special measures as adding the metal hose between the connected vibration sources.

3.The power line of the transducer shall be separated from that of the main power consumers.

As to outdoor installation, it shall take into account the wind-proof and rain-proof measures to avoid disturbance in wind and rain, and improve the service life of flow meter.

B. Installation operation requirements:

1、The lower reaches pipe of the flow meter shall have certain back pressure, at the flow meter inlet and outlet, the regulation valve is mounted. Regulate the flow through regulating the regulation valve at the outlet, and it shall not be directly in the open status, during measurement of flow meter, it shall ensure the measuring section of the flow meter full of fluid, otherwise it shall incur very serious deviation and the error of measurement.

2、In the actual application, the flow meter would not be in contact with the other objects, the upper and lower parts of the transducer encasing shall not be stocked by foreign substances, and it is not allowed to use the transducer encasing as the pipe support, and it must be away from the ground.

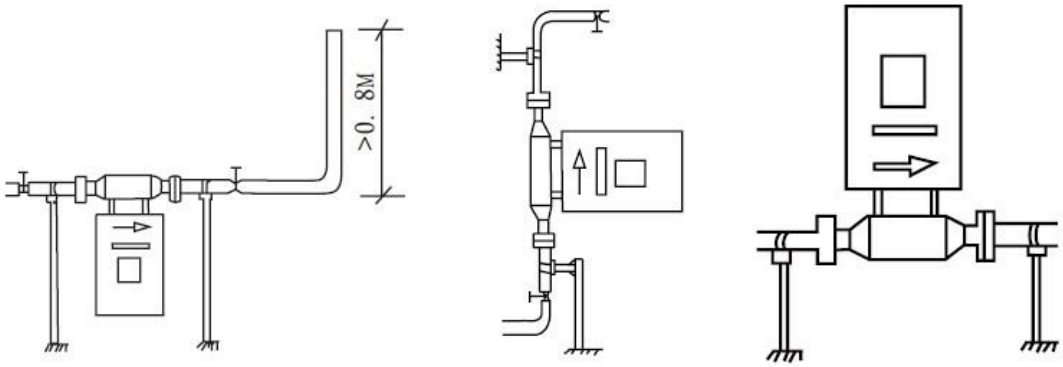
3、The upper reaches pipe diameter of the flow meter must be equivalent to or over the flow meter size.

4.The flow meter may be directly mounted on the pipe, nevertheless the pipe openings at two sides of the flow meter, or the position of 6-10 folds pipe diameters on the flange, must be added by bracing with

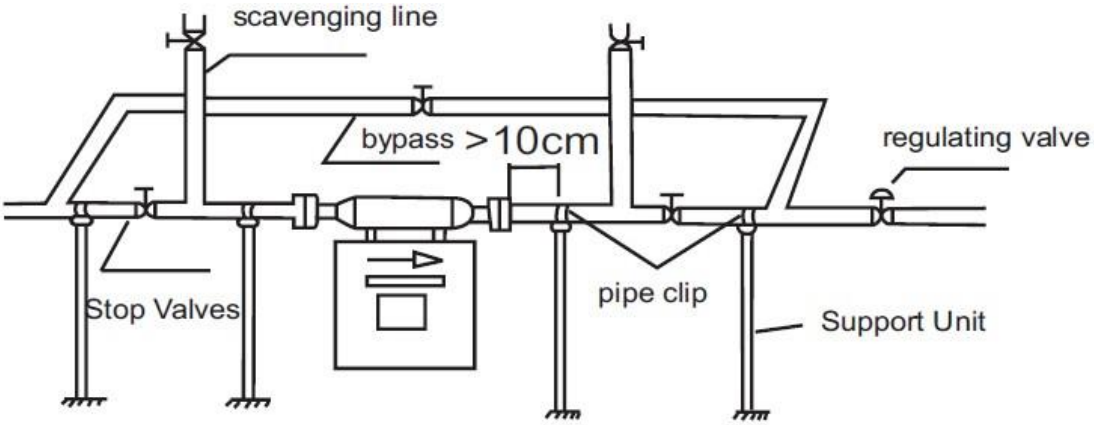
sufficient strength, rigidity and mass. The bracing and pipeline shall be fixed by fastener to minimize the impact of pipeline vibration to flow meter.

5. During installation, the pipe shall be aligned to enable the coaxial between the flow meter and pipe either in axial or radial direction, the forcible position alignment is not allowed, so as to avoid the torque or bending moment on the primary instrument; it shall strive to implement zero stress installation. In the strong vibration environment, the expansion joint shall be used to eliminate the impact of vibration to flow meter. The flow meter installation shall adopt the proper means as the case may be (refer to chart below)

Note: the output is over 0.8m higher than the highest point of the flow meter.



6.When flow meter is used for batch filling, the flow meter shall be in parallel connected to the bypass (see typical installation chart), and this shall also be in favor of maintenance.



Typical installation chart

7.The measured fluid shall be in the appropriate flow status, in the natural environment conditions, if the flow status of the fluid is not appropriate, it shall adopt the external improvement, for example, it may regulate the temperature of fluid (increase/decrease temperature, heat preservation), and thus the measured fluid is in the appropriate flow status.

8. Installation direction: the arrow direction of the nameplate of the sensor is consistent with the flow direction of fluid (the direction of fluid passing through the pipe);

9. The No. of the sensor shall be corresponding to the No. of transducer one by one, without change at will; otherwise it may incur the measurement error.

(IV) Zero adjustment of flow meter

The upper and lower reaches of the mass sensor (inlet and outlet) must be configured by stop valves that can be completely closed, and it cannot be replaced by regulation valve in the lower reaches; when the short time cutoff zero adjustment is not allowed in the flow process, it shall all be mounted by upper and lower reaches stop valves and bypass valve, and these valves and related pipelines shall all be of the stable and firm bracing protection.

On the mass flow sensor upstream and downstream (inlet and outlet), there must be the stop valves closed completely, and cannot be replaced by the regulation valve in downstream; if the flow range does not allow short-term closure zero adjustment, should install the upstream and

downstream cut-off f valve and bypass valve, and these valves and the corresponding pipeline should have a firm support.

The zero adjustment method is below:

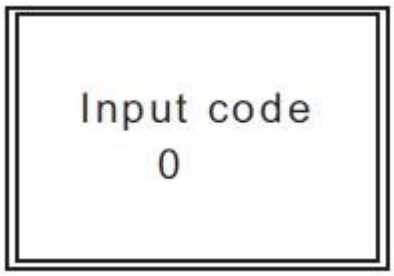
(1) The sensor installation is stable without shaking;

(2) The temperature and pressure of liquids should reach the normal work state.

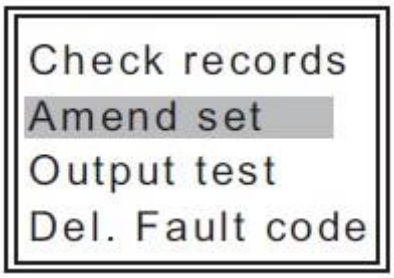
(3) Before zero adjustment, there should be fully filled with the pure liquid phase liquid in the pipe, and also close the stop valves on the inlet and outlet of flow meter to ensure the zero flow speed.

(4) When power on, the LCD display “flow meter..”

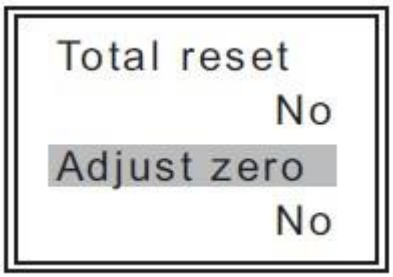
◆Press “set” key to show:



◆Press “up” or “down” key， after inputting‘20’，Press “set” key to get into the first grade menu and press “Down” to move the cursor from “Check records” to “Amend set”:



◆Press “set” key to get into the second grade menu, and press “down” to move the cursor from “Total reset” to “Adjust zero”:



◆Press “set” to get into the menu, then choose “yes” and press “set” to do it. Press “esc” to exit. Then zero adjustment is finished.

(5) Open the inlet valves and outlet valves by steps to measure.

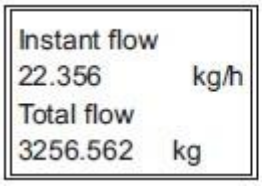
Note:

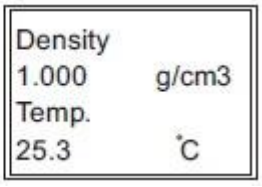
1. Before zero adjustment, ensure the stop valves on the sensor inlet and outlet are closed and the pipe is fully filled with the measured liquids;

2. When the fluid is solidified in the tube, although the flow speed is zero, the zero adjustment is invalid, because it is not pure liquid phase at that time, and maybe the pipe is not fully filled.

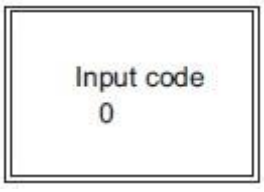
(V) Panel operation

◆When power on, the LCD display “flow meter, Press “up” or “down” key，to achieve the switch between the two interfaces:

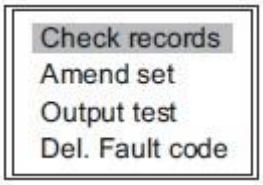




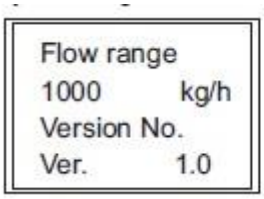
◆Press “set” key to show:

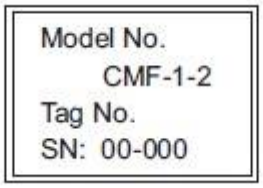


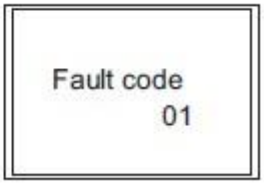
◆Press“up”or“down”key，after inputting‘20’，press“set”key to get into the first grade menu:



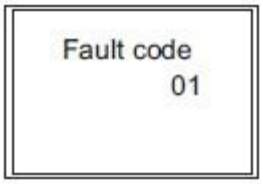
◆Press “set” key to get into the second grade menu. Pressing “up” or “down” key can achieve the cycle display among several interfaces to check the meter information:



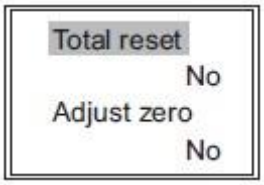




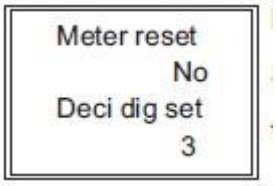
◆Press “esc” key to turn back the last grade menu. Press “up” or “down” key ， move the cursor to “Amend set” and press “set” key to get into:



◆Press “down” to move the cursor from “Total reset” to “Adjust zero”； press “set” to get into the menu, then choose “yes” and press “set” to do it. Press “esc” to exit.



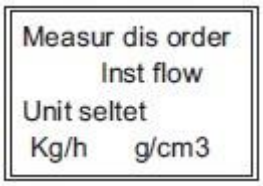
◆Meter reset， soft start. Set the decimal digits of the flow display.

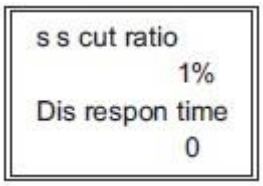


◆Set the boot display interface

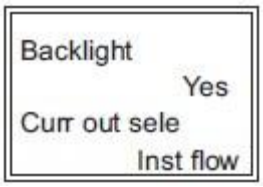
Flow unit：kg/h, g/h, kg/min, g/min, m3/h, L/min, ml/min, t/h. Density unit： g/cm3. kg/L,

t/m3



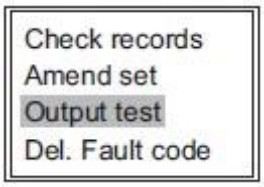


◆Can select the 4-20mA signal output of flow or density. Density range: 0.5g/cm3---2.5g/cm3



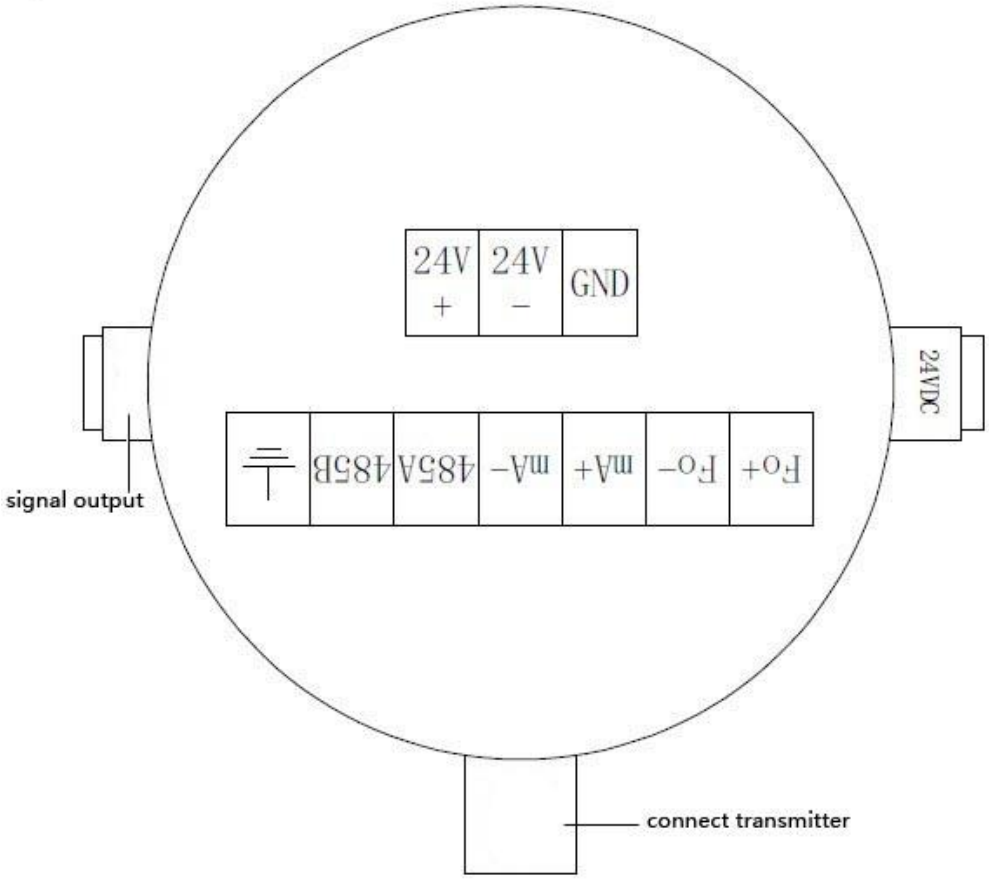
◆The menu is used for testing the 0—10khz signal and 4—20mA signal.

Press “set” to get into the menu, press “up” or “down” to amend the test point.



(VI) Wiring sketch

24VDC+、-		24VDC power supply
Fo	Gnd	Frequency output (instant mass flow or volume flow)
Io	Gnd	Current output （Instant flow or density）
485A	485B	RS-485 communication



Description:

(1) This power supply is 24V DC; Meter power line cannot be connected with other high-power electrical equipment.

(2) The 0-10KHz pulse signal and 4 ~ 20mA current signal can be directly connected with the external PLC, DCS and other external devices. Pay a special attention to this instrument's output signals are active output, the power supply from external devices is forbidden. (3) The signal output terminal name and function description.

Notes:

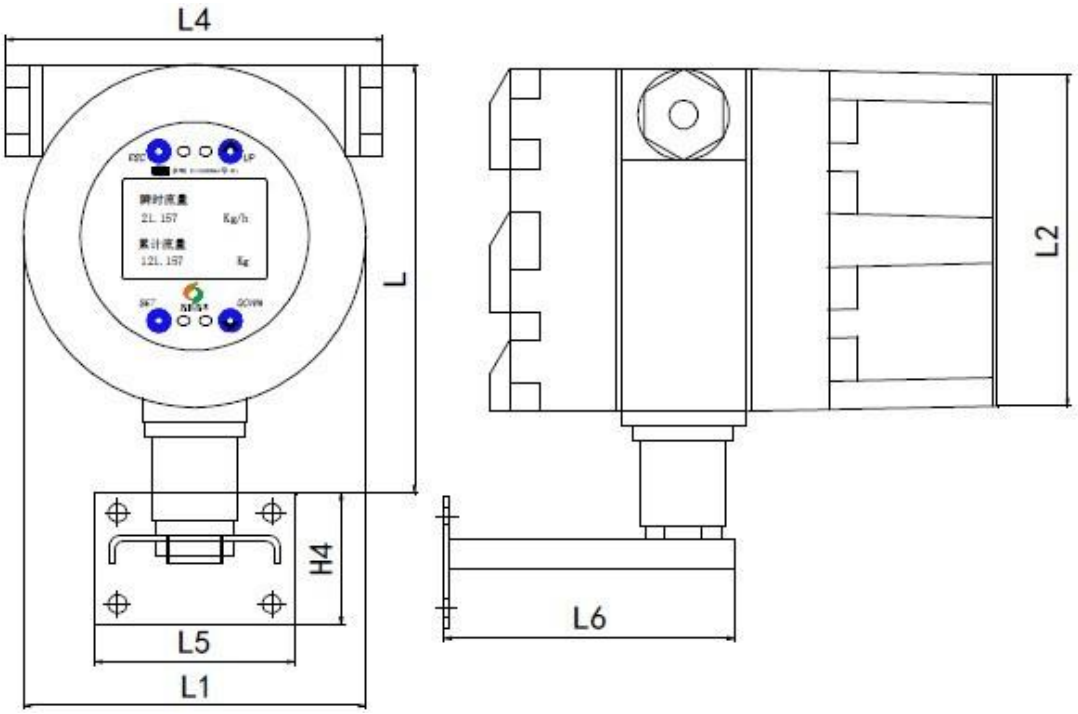
1. After 20-min liquids flow in the pipe with full-scale, close the flow meter inlet and outlet

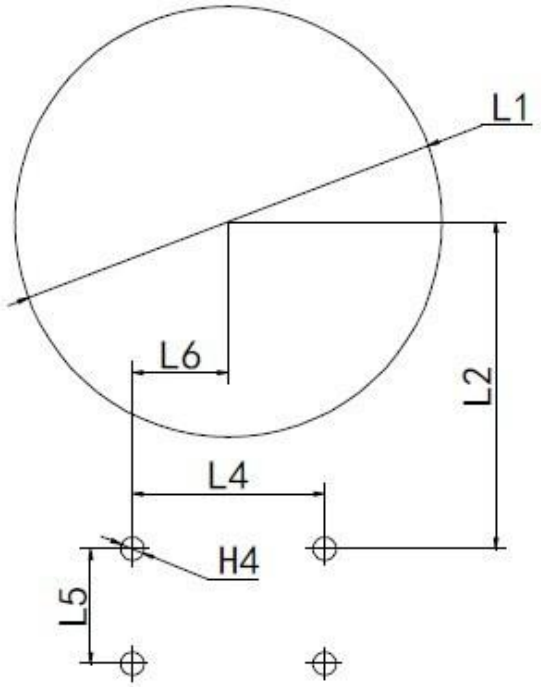
valves, and then do take the zero adjustment.

2. When the "conductor resistance+ display internal resistance" varies in scope of 0 ～ 500 ohm, it will not impact the indication accuracy of 4 ～ 20mA current signal.

(VII) Integral structure chart

Transducer Size





	L	L1	L2	L4	L5	L6	H4
Sensor	156	125	118	130	70	102	46
Cabinet		120	91	54	32	21	Φ6.5

Small Flow Sensor Outline-DMF-1-1, DMF-1-2

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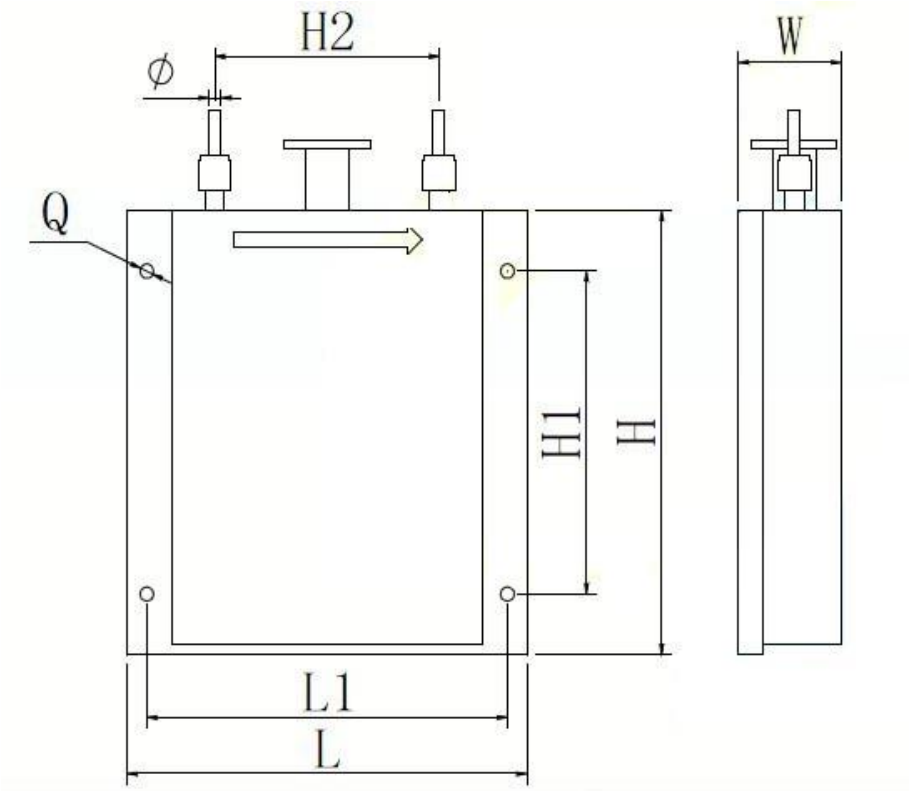

Model	DN	L	L1	H	H1	H2	W	Q
DMF-1-1-AB	6	205	185	220	160	115	52.5	7
DMF-1-1-A	6	205	185	220	160	115	52.5	7
DMF-1-1-B	10	205	185	220	160	115	52.5	7
DMF-1-2-A	10	208	188	245	185	117	58.5	7

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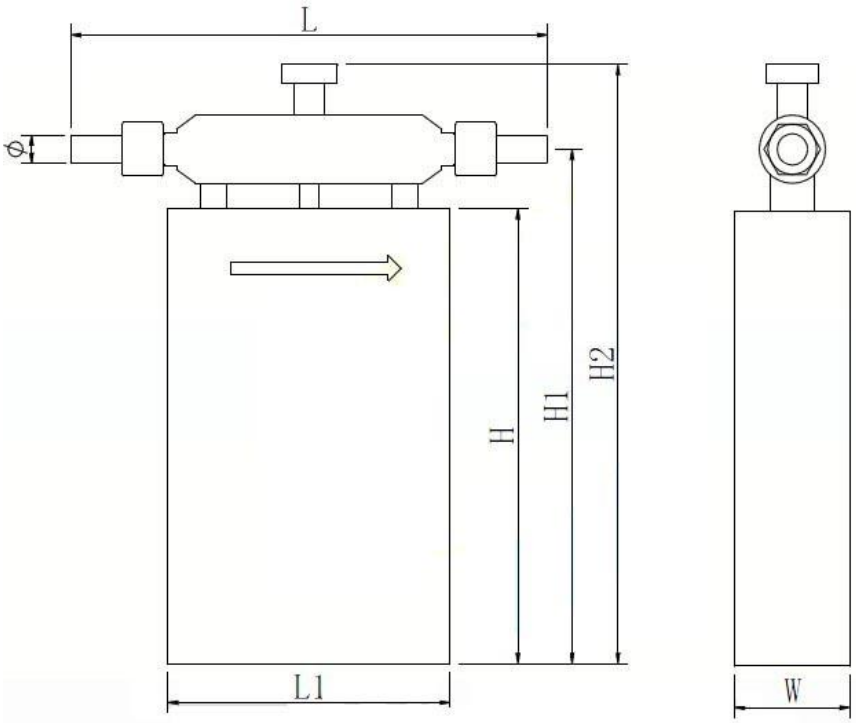
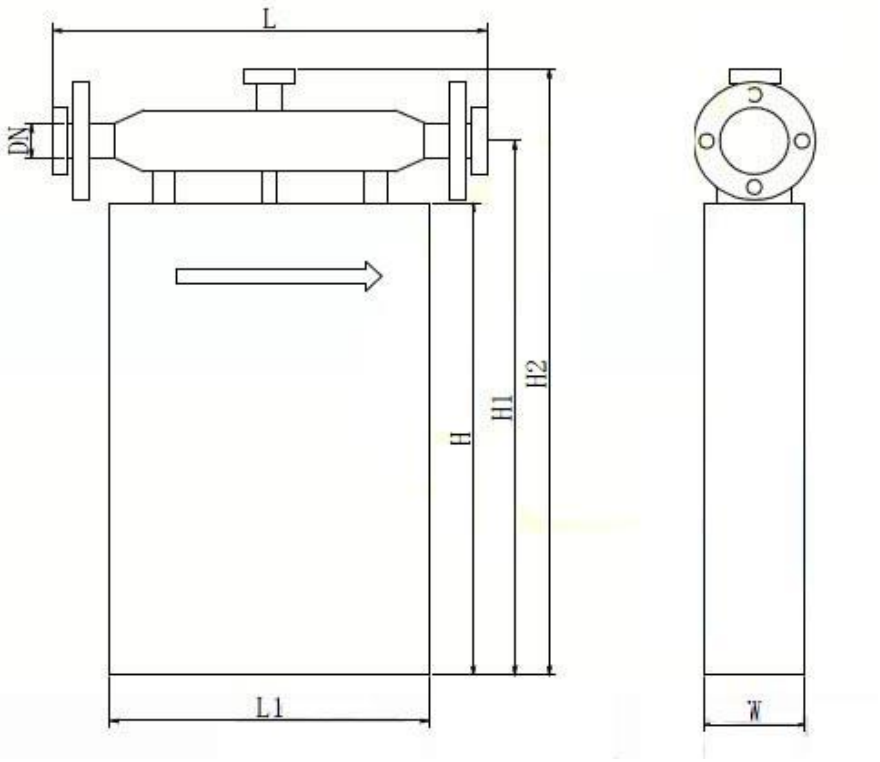
Medium Flow Sensor Outline-DMF-1-3, DMF-1-4



Model	DN	L	L1	H	H1	H2	W	Working Pressure
DMF-1-3-A	18	370	210	240	292	335	90	0-4MPa
	20	360	210	240	280	330	90	0-25MPa
DMF-1-3-B	18	370	210	240	292	335	90	0-4MPa
	20	360	210	280	320	370	90	0-25MPa
DMF-1-4	18	390	230	320	372	415	100	0-4MPa
	20	380	230	320	360	400	100	0-25MPa

Large Flow Sensor Outline-DMF-1-5, DMF-1-6



Model	DN	L	L1	H	H1	H2	W
DMF-1-5-A	25	410	300	440	500	540	120
DMF-1-5-B	40	520	360	480	585	640	130
DMF-1-6-A	50	550	372	545	670	718	170
DMF-1-6-AB	65	560	440	600	715	785	220
DMF-1-6-B	80	660	470	700	795	860	220
DMF-1-6-C	100	680	490	760	855	920	270
DMF-1-6-D	150	900	730	930	1080	1180	300

(VIII) General failure and cause

Failure phenomenon	Possible cause
The digital display of the flow meter is not brightened	Check whether the power supply is normal
It has flow, with instant display of “0”	The flow direction of the fluid is reverse to that indicated on the encasing of sensor
During measurement, the flow display greatly fluctuates between the scope of positive and negative.	The pipeline vibration is great and the bracing is not firm, with strong vibration sources around the flow meter, or electromagnetic disturbance around the transducer, and a lot of gas contained in the fluid.
The zero point is not stable with a backward and forward fluctuation, or the offset is great and it cannot adjust the zero.	The flow meter bracing is not stable, the shielding line is not grounded, the fluid is solidified in the measurement tube, two sides stop valves are not completely closed, the measurement tube is not full of fluid, or air bubble contained in the fluid, the installation stress is too great, and the insulation capacity drops.