



Metal Tube Float Flowmeter



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Metal Tube Float Flowmeter

1. Overview

Metal tube float flowmeter, also known as the “metal tube rotameter”, is a measuring instrument commonly used in the industrial automation process management to measure the variable area flow. Being featured with characteristics of small size, wide application range, convenient usage, etc., it is designed for measuring the flows of liquids, gases and steam, especially applicable for measurement of low flow speed and small flow rate.

Over the years, with its excellent property and reliability as well as preferable cost performance, the metal tube float flowmeter has been applied widely in a variety of industries, such as the petrochemical engineering, iron and steel, electric power, metallurgy, light industry, food, pharmacy, water treatment, etc.

This manual, which is compiled to meet the needs of specialized technical personnel, is applicable for design selection of the metal tube float flowmeters and can be used as a reference for end users during operation as well.

In the manual, the operational principle, functional features, technical parameter, types and dimensions, flow rate calculation, electrical connection and installation, maintenance of TF Series Metal Tube Float Flowmeters have been respectively introduced.

This manual only focuses on the design selection and application of TF Series Metal Tube Float Flowmeters. In addition, the manufacturer reserves the right to conduct modification on some of the technical parameters.

2. Measuring Principle

TF Series Metal Tube Float Flowmeters are principally composed of two major parts: sensor and indicator. The sensor mainly consists of the joint flange, cone, float as well as upper and lower guiders; while, the indicator mainly consists of the casing, magnetic transmission system, dial scale and electric transmission system.

In the cone-shaped measuring tube, there is a measuring component which is flexible for upward and downward movements – float (Figure 1). As the fluid goes through the tube from bottom to top, the float moves upwards along the cone-shaped tube due to the acting force imposed by the fluid. The more the flow rate increases, the greater distance the float will travel; on the contrary, the distance the float travels decreases with the flow rate of the fluid. In other words, the flow rate of the fluid determines the location where the float stops in the measuring tube, which consequently determines the size of the annular area formed between the float and the cone-shaped tube. When the flow rate is maintained at a constant value “ Q ”, the float is in a dynamic equilibrium state, remaining at a fixed location “ h ” in the cone-shaped tube. At such moment, the annular area formed between the float and the cone-shaped tube is kept unchanged. There are three forces acting on the float: the gravity force “ G ” of the float, the buoyancy force “ F ” and the acting forces “ P ” the fluid imposes on the float, which are maintained in equilibrium. On the basis of Bernoulli Equation, force-balance principle and law of fluid continuity in the hydrokinetics, the instantaneous rate of flow currently passing through the annular area can be



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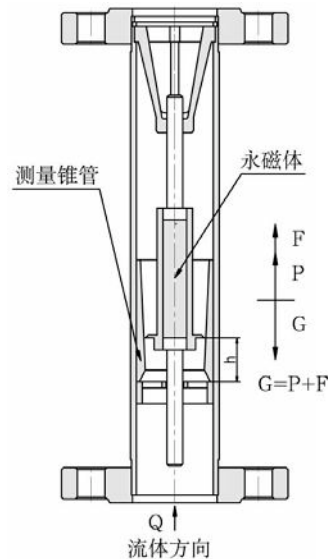
hereby figured out. Therefore, it is the principle of variable area that the metal tube float flowmeter adopts to measure the flow rate.

A permanent magnet with high performance is embedded into the interior of the float. When the float maintains an equilibrium position, a homogeneous and stable magnetic field occurs around the float. In addition, a magnetic sensor will be installed outside the cone-shaped tube, which consequently makes it possible to transmit the straight-line displacement of the float inside the measuring tube to the indicator in a non-contact manner and finally display the results on the dial scale of the indicator or output corresponding standard current signals of 4~20mA after examination and treatment.

测量锥管 cone-shaped measuring tube

永磁体 permanent magnet

流体方向 direction of flow



3. Functional Features

- ◆ Designed for measurement of small caliber and low-speed medium
- ◆ With reliable performance, few maintenance and long service life
- ◆ Low requirement for the straight tube section
- ◆ Widely measure ratio: 10:1
- ◆ Dual-line display, instantaneous/ cumulative flow rates displayed at the field
- ◆ With a keyboard on the indicator for convenient operation and setting
- ◆ All in metal construction, designed for measuring corrosive medium of high temperature, high pressure and strong
- ◆ Non-contact magnetic coupling transmission
- ◆ Applicable for inflammable and explosive occasion
- ◆ Optional charging modes: DC power supply or battery power
- ◆ With the functions of data recovery, data backup and power failure protection
- ◆ Multiple parameters calibrating function



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4. Technical parameter

▲ Caliber of flow meter	DN15, DN25, DN50, DN80, DN100, DN150 (For other caliber dimensions, please negotiate with the manufacturer.) Liquid:
▲ Range of flow	1.0~150000l/h Gas: 0.05~3000m ³ /h (For the detailed flow range, refer to the Table of Flow on Page 11.)
▲ Measure Ratio	10 : 1, 20 : 1 (special)
▲ Precision	Grade 0.5, Grade 1.0 (special)
▲ Pressure rating	DN15、DN25、DN50: 4.0MPa (Max: 20MPa) DN80、DN100、DN150: 1.6MPa (DN80: Max 10MPa; DN100: Max 6.4MPa; DN150: Max 4.0MPa)
▲ Medium temperature	Standard: -30℃~+120℃, high temperature: 120℃~350℃
▲ Power supply	24VDC (12~36VDC)
▲ Output signal	4~20mADC (two-wire configuration); attached HART Protocol allowed
▲ Output load	500Ω (24V power supply)
▲ Environmental temperature	Local type: -40℃~120℃ Remote-control type: -30℃~60℃
▲ Storage requirement	Temperature: -40℃~85℃ humidity: ≤85%
▲ Connection mode	Flange connecting. Flange standard : GB/T9119-2000; User's appointment allowed (For other connection modes, please negotiate with manufacturer)
▲ Cable interface	M20×1.5
▲ Housing protection grade	IP65
▲ Mark of explosion-proof	Intrinsic safety type: ExiaIICT6, explosion-proof type: ExdIICT6
▲ Pressure loss	See table of flow for detailed information
▲ Viscosity of medium	DN15: η<5mPa.s DN25: η<250mPa.s DN50~DN150: η<300mPa.s
▲ Contact material	R1: 304, 1Cr18Ni9Ti; Ro: 316, 0Cr18Ni12Mo2Ti; RL: 316L, 00Cr17Ni14Mo2Ti; Ti: Titanium alloy; Rp: PTFE lining

5. Types of Flowmeters and Dimensions

TF Series Metal Tube Float Flowmeters consist of the measuring tube (sensor) and indicator (electronic converter), Choose different forms of measuring tubes and indicators to assemble different types of overall machines to meet needs at the field. Please refer to the following descriptions of all types of flowmeters for various



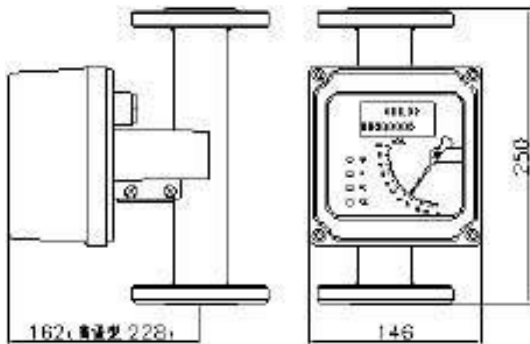
Metal Tube Float Flowmeter

configuration and dimension, joint flange standard and installation dimension of the magnetic filter.

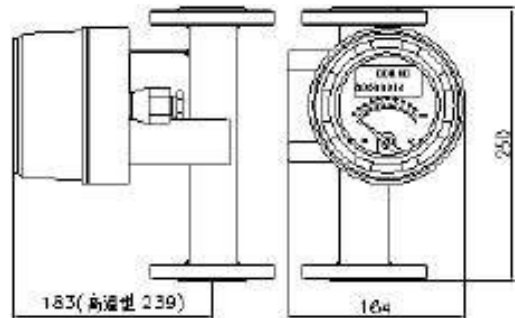
5.1 Product Category

TF Series Metal Tube Float Flowmeters can be divided into 5 types according to the direction of liquid, and each type also be classified into the standard type, high-temperature type, jacket type and so on. All types will be respectively described below.

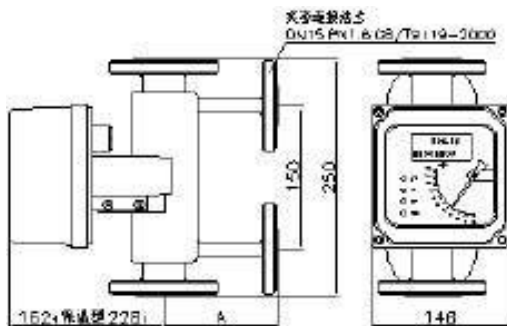
5.1.1 Vertical installation type



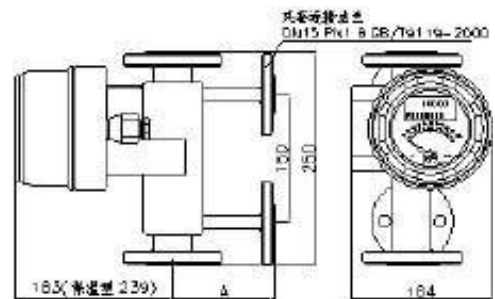
Standard Type M5 Indicator
High-temperature type



Standard Type M4 Indicator
High-temperature type



Cooling Jacket Type M4 Indicator
Normal-temperature type



Cooling Jacket Type M5 Indicator
Normal-temperature type

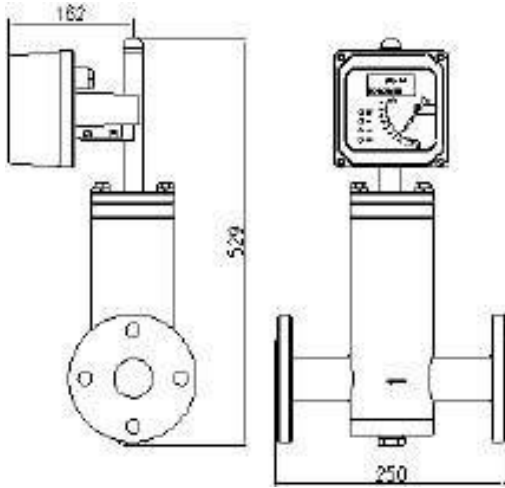
Caliber	DN15	DN25	DN50	DN80	DN100	DN150	DN200
A	100	120	135	150	160	40	200
Weight of standard type (kg)	5.0	6.5	10	16	17	35	50
Weight of jacket type (kg)	7.5	9.5	13	19	20	40	55



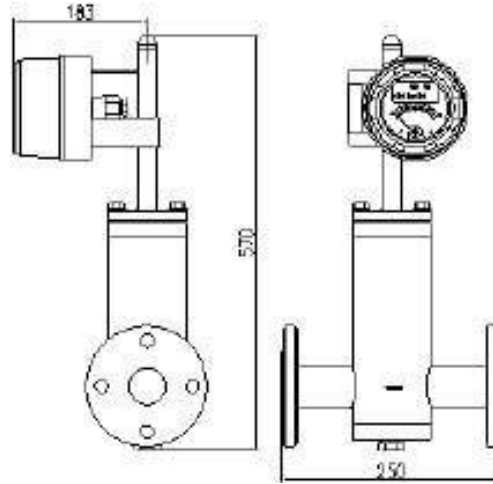
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5.1.2 Horizontal installation type

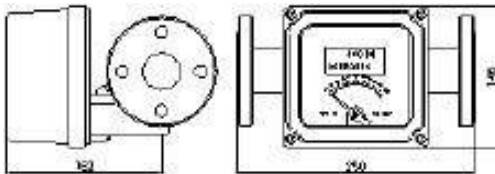
When installing the horizontal installation flowmeters, if the caliber is DN50 or below, select T type construction; if more than DN50, select spring construction.



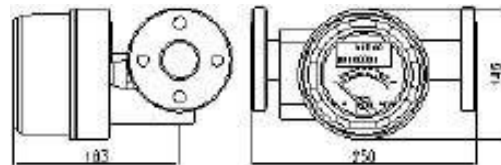
T type construction M4 indicator



T type construction M5 indicator



Spring-construction M4 indicator



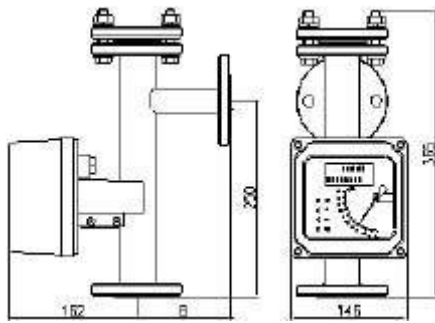
Spring-construction M5 indicator

Caliber	DN15	DN25	DN50	DN80	DN100	DN150	DN200
Weight of T type construction (kg)	6	10	20				
Weight of spring construction (kg)				16	17	35	50

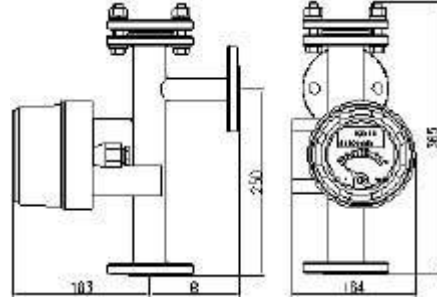


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5.1.3 Bottom-charging-and-side-discharging type



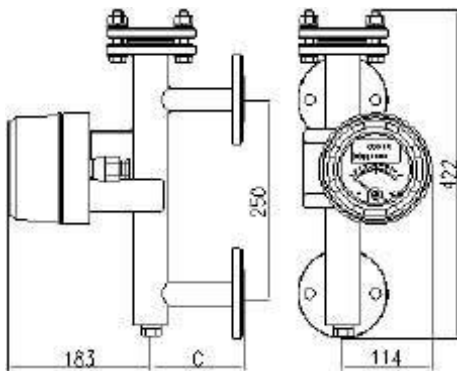
Standard Type M4 Indictor



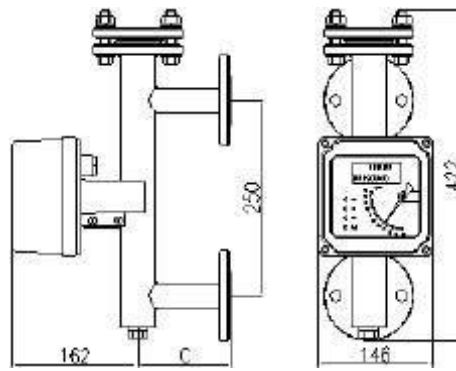
Standard Type M5 Indictor

Caliber	DN15	DN25	DN50	DN80	DN100	DN150	DN200
B	100	120	135	150	160	180	200
Weight kg	6	7	14	24	28	52	60

5.1.4 Side-charging-and-side-discharging type



Standard Type M4 Indictor



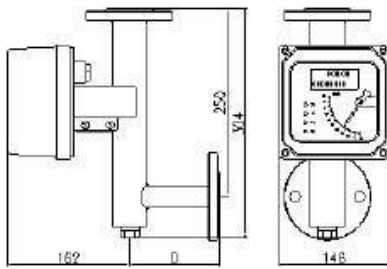
Standard Type M5 Indictor

Caliber	DN15	DN25	DN50	DN80	DN100	DN150	DN200
C	100	120	135	150	160	180	200
Weight kg	5.5	6.5	13	22	26	50	57

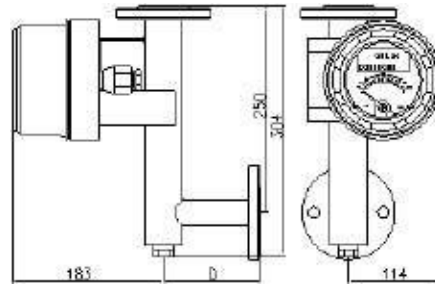


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5.1.5 Side-charging-and-top-discharging type



Standard Type M4 Indicator

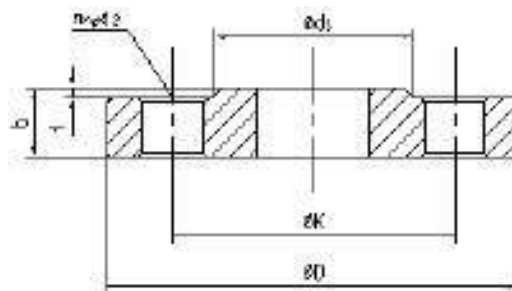


Standard Type M5 Indicator

Caliber	DN15	DN25	DN50	DN80	DN100	DN150	DN200
D	100	120	135	150	160	180	200
Weight kg	5.5	6.5	10.5	16	17	36	52

5.2 Flange dimensions

For the standard type of TF Series Metal Tube Float Flowmeters which adopts GB/T9119-2000 Flange Standard, refer to Figure 16 as below. See Table 6 for specific dimensions. Other flange standards shall be subject to customers' requirements.



Outline Dimension of Flange

China National Standard Flange Plate (GB/T9119—2000)

DN/PN	D	K	d ₃	b	f	n	d ₂
15/4.0	95	65	46	14	2	4	14
25/4.0	115	85	65	16	2	4	14
50/4.0	165	125	99	20	2	4	18
80/1.6	200	160	132	20	2	8	18
100/1.6	220	180	156	22	2	8	18
125/1.6	250	210	184	22	2	8	18
150/1.6	285	240	211	24	2	8	22



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American National Standard Flange Plate (ANSI B 16.5 150lb)

DN	D	K	d ₃	b	f	n	d ₂
1/2"	88.9	60.5	35.1	11.2	1.6	4	15.7
1"	108.0	79.2	50.8	14.2	1.6	4	15.7
2"	152.4	120.7	91.9	19.1	1.6	4	19.1
3"	190.5	152.4	127.0	23.9	1.6	4	19.1
4"	228.6	190.5	157.2	23.9	1.6	8	19.1
5"	254.0	215.9	185.7	23.9	1.6	8	22.4
6"	279.4	241.3	215.9	25.4	1.6	8	22.4

German National Standard Flange Plate (DIN2501)

DN/PN	D	K	d ₃	b	f	n	d ₂
15/4.0	95	65	46	16	2	4	14
25/4.0	115	85	68	18	2	4	14
50/4.0	165	125	102	20	3	4	18
80/1.6	200	160	138	20	3	4	18
100/1.6	220	180	162	20	3	8	18
125/1.6	250	210	188	22	3	8	18
150/1.6	285	240	218	22	3	8	22

DIN2501 Flange Standard is functioning with similarity to the following standards to such a great extent that it can be adopted in connection with them.

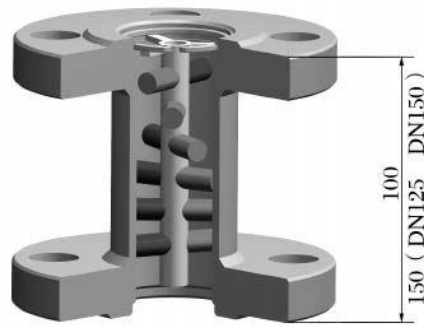
Standard Number	Standard Name	Grade of Pressure PN Mpa				
		0.6	1.0	1.6	2.5	4.0
HG20527-1992	Steel pipe flange	0.6	1.0	1.6	2.5	4.0
HG20592-1992	Steel pipe flange	0.6	1.0	1.6	2.5	4.0
HG20592-1997	Steel pipe flange	0.6	1.0	1.6	2.5	4.0
HGJ44~76-1991	Steel pipe flange	0.6	1.0	1.6	2.5	4.0
GB112~9123-2000	Steel pipe flange	0.6	1.0	1.6	2.5	4.0
DIN2527-1992	Flange plate	0.25~10.0				
DIN2566-1975	Threaded flange	1.0~1.6				
DIN2573-1975	Plate-type flat welding flange	0.6~1.0				
DIN2655-1975	Annular plate flat welding lapped flange	0.25~4.0				
DIN2673-1962	Annular plate lapped welding neck flange	1.0				

5.3 Magnetic filter

If there are magnetic granules contained in the medium, a magnetic filter shall be fixed in front of the inlet. If the standard of flange is DN100 or below, the distance between inlet and the magnetic filter should be 100mm; if the standard of flange is above DN100, the distance should be 150mm.



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6. Indicator and Level Limit Alarm Apparatus

The indicator of TF Series Metal Tube Float Flowmeter is the displaying and converting part of the flowmeter. Level limit alarm apparatus shall be activated when the flow rate becomes over-ranging, functioning as a flow switch.

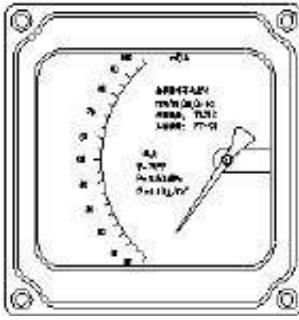
6.1 Selection of Indicator

Users can select local display type, electric transmissible type, intrinsic safety type, explosion-proof type or HART Protocol attached type according to the practical requirements at the field. For detailed functional descriptions of all indicators, refer to the following table.

Type of Indicator	Functional Description of Indicator
M1 Type	Local pointer indicates the flow rate without power supply and electrical transmission of 4~20mA; optional flow alarm apparatus; regarding the dial scale, instantaneous flow value or percent-scale value are provided for choice.
M3 Type	Local digital displaying, battery powered, without electrical transmission of 4~20mA, non-explosion-proof. LCD panel displays both the instantaneous and cumulative flow rates. Parameters can be checked or modified by pressing keys on the keyboard. Batteries have a service life of 6 months. Change the batteries (Battery Model No.: ER26500, 3.6V, 7.5AH, -55°C~85°C) when the screen displays a "T" letter.
M4 Type	Electric transmissible and intrinsically safe design; explosion-proof mark: Exd II CT6; optional HART protocol function; DC24 power supply; the pointer indicates instantaneous flow rate and digitally displays instantaneous and accumulated flow rates; two-wire configuration with output of 4~20mA; 4 keys on the panel which are used to check and modify internal parameters. Refer to Page 18 for detailed instructions.
M5 Type	Electric transmissible and explosion-proof type design; explosion-proof mark: Exd II CT6; optional HART protocol function; DC24 power supply; pointer indicates the instantaneous flow rate and digitally displays instantaneous flow rate and accumulated flow rates; two-wire configuration with output of 4~20mA; 4 keys on the panel which are used to check and modify internal parameters. Refer to Page 18 for detailed instructions.



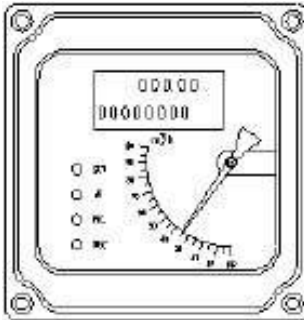
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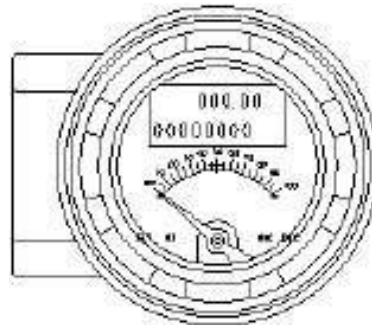
M1 Type



M2 Type



M4 Type



M5 Type

7. Table of Flow

◆ Table for flow rate of TFA vertical installation type (See the following table)

口径	浮子号	水 L/h (0.1013MPa abs, 20°C)		空气 m ³ /h	压力损失 kPa	
		不锈钢	PTFE、Ti	(0.1013MPa abs, 20°C)	不锈钢	PTFE、Ti
DN15	浮子材料	不锈钢	PTFE、Ti	不锈钢	不锈钢	PTFE、Ti
	F15.0	10	—	—	1.5	—
	F15.1	16	—	0.5	1.5	—
	F15.2	25	—	0.7	1.5	—
	F15.3	40	25	1.2	1.5	1.5
	F15.4	60	40	1.8	1.5	1.5
	F15.5	100	60	2.8	1.5	1.5
	F15.6	160	100	4.5	1.5	1.5
	F15.7	250	160	7.5	3.0	1.5
DN50	F15.8	400	250	12	3.0	3.0
	F15.9	600	400	18	3.5	3.0
	F50.0	6000	4000	180	3.0	3.0
	F50.1	8000	5000	240	3.0	3.0
	F50.2	10000	6000	300	4.0	3.0
	F50.3	12000	8000	360	4.0	3.0
DN80	F50.4	16000	10000	480	8.0	4.0
	F50.5	20000	12000	600	8.0	4.0
	F80.0	25000	16000	750	14.0	8.0
	F80.1	30000	20000	900	14.0	9.0
DN100	F80.2	40000	25000	1200	20.0	12.0
	F80.3	50000	30000	1500	20.0	15.0
	F100.0	60000	40000	1800	28.0	25.0
DN125	F100.1	80000	50000	2400	28.0	27.0
	F100.2	100000	60000	3000	40.0	38.0
DN150	F125.1	100000	80000	3000	45.0	35.0
	F125.2	125000	100000	—	48.0	40.0
DN150	F150.1	125000	100000	—	48.0	40.0
	F150.2	150000	125000	—	50.0	42.5



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◆ Table for flow rate of TFA horizontal installation type (see the following table)

口径	浮子号	水 L/h (0.1013MPa, 20℃)		空气 m ³ /h (0.1013MPa, 20℃)		压力损失 kPa (要求低压损与厂家协商)	
		浮子材料	不锈钢	Ti	不锈钢	不锈钢	Ti
DN15	F15.5	160	100	4.5	1.5	1.5	
	F15.6	200	120	6.0	1.5	1.5	
	F15.7	250	160	7.5	2.0	2.0	
	F15.8	400	250	12	2.0	2.0	
	F15.9	600	400	18	3.5	3.5	
DN25	F25.0	1000	600	30	1.5	1.5	
	F25.1	1600	1000	45	1.5	3.0	
	F25.2	2000	1200	60	3.0	3.0	
	F25.3	2500	1600	75	3.0	3.5	
	F25.4	3000	2000	90	3.5	3.5	
	F25.5	4000	2500	120	8.0	8.0	
DN50	F50.0	6000	4000	180	3.0	3.0	
	F50.1	8000	5000	240	3.0	3.0	
	F50.2	10000	6000	300	4.0	4.0	
	F50.3	12000	8000	360	4.0	4.0	
	F50.4	16000	10000	480	8.0	8.0	
DN80	F80.1	25000	16000	750	14.0	14.0	
	F80.2	30000	20000	900	14.0	14.0	
	F80.3	40000	25000	1200	20.0	22.0	
DN100	F100.0	60000	40000	1800	30.0	30.0	
	F100.1	80000	50000	2400	30.0	30.0	
	F100.2	100000	60000	3000	45.0	45.0	
DN125	F125.1	100000	80000	3000	45.0	45.5	
	F125.2	125000	100000	—	46.0	48.0	
DN150	F150.1	125000	100000	—	48.0	46.0	
	F150.2	150000	125000	—	50.0	50.0	

Description: Data in table for flow rate of TF Series are the standard parameters of apparatus.

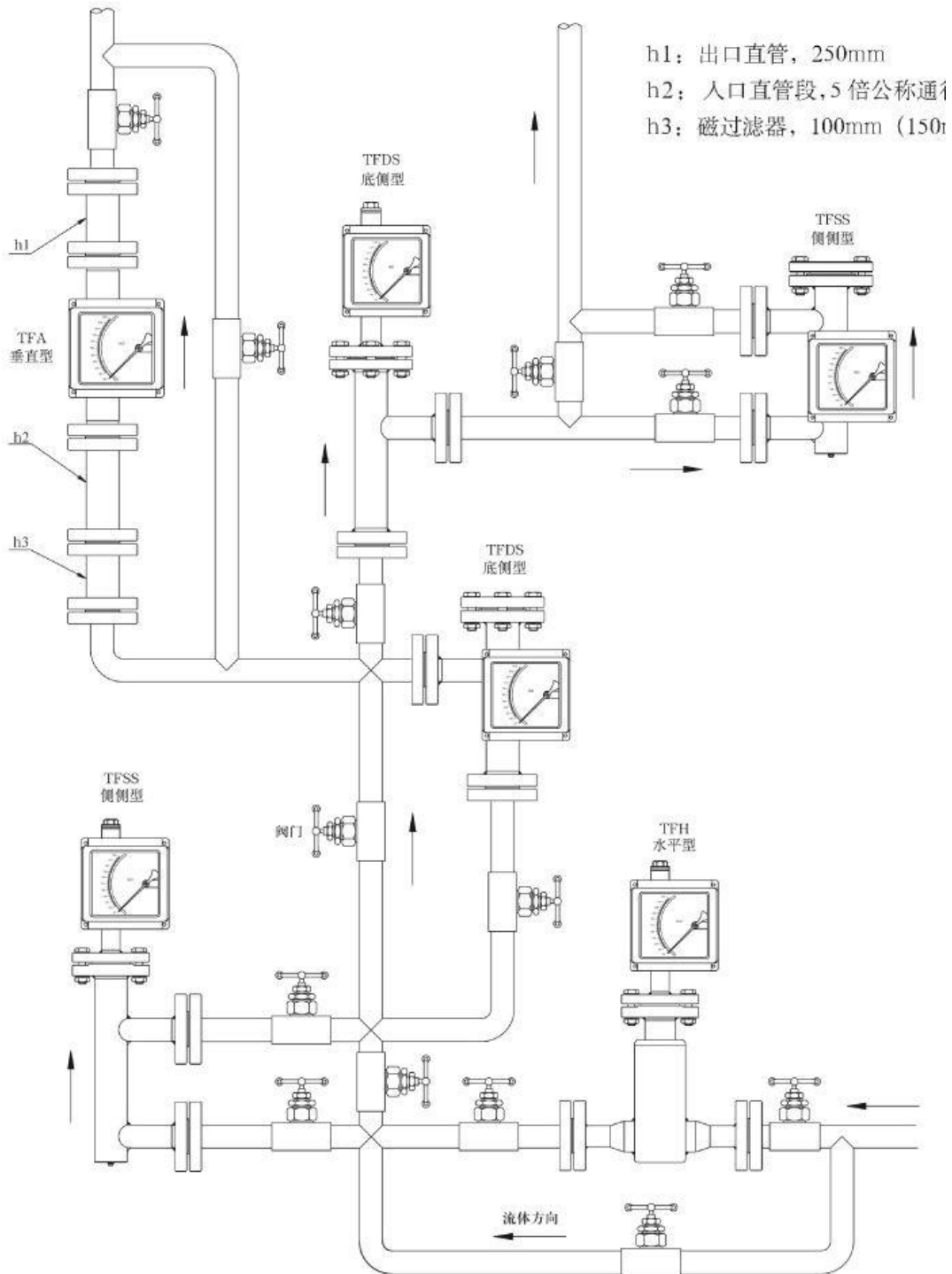
User can consult with the supplier if special flow rate ranges are required.



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8. Installation of Flowmeters and Cautions

According to the allocation of process pipelines on the field, options can be made among flowmeters of different specifications, among which the vertical installation type is the standard one while others belong to the extended type. If field conditions permit, first priority shall be given to the vertical installation type as much as possible. For the installation of flowmeters of various installation types, refer to the following schematic diagram.





Metal Tube Float Flowmeter

垂直型 vertical installation type 侧
侧型 side-to-side installation type 侧
侧型 side-to-side installation type 水
平型 horizontal installation type h1:
出口直管, 250mm

底侧型 bottom-to-side installation type
底侧型 bottom-to-side installation type
阀门 valve
流体方向 direction of fluid

h1: discharging straight tube, 250mm

h2: 入口直管段, 5 倍公称口径

h2: charging straight tube section, the length is 5 times the normal caliber of the instrument

h3: 磁过滤器, 100mm (150mm)

h3: magnetic filter, 100mm (150mm)

1. Cautions for installation of flowmeters

1. When the instrument is delivered to the field, unpack the casing, remove all the packages and inspect the instrument for damages caused by the transportation before it is fixed to process pipelines.
2. Before the instrument installation, purging work is required for process pipelines to prevent any residue of ferromagnetic impurities clinging to the float of the instrument, affecting its normal measurement. Even damages to the instrument may arise if serious adverse effects exist. If unavoidable, a magnetic filter (Figure 17) shall be allocated at the inlet of the instrument.
3. In that the measuring mechanism adopts the magnetic transmission and magnetoelectric signal processors, to assure its regular service and performance, there shall be no ferromagnetic substances, magnetic fields of high intensity or above within an installation area of 500mm.
4. The instrument installed in the pipeline shall not be acted by strains. There shall be reliable pipeline supporting structures at the inlet and outlet of the instrument to guarantee minimum strains acted on it.
5. The instrument installation is classified into two types: horizontal installation and vertical installation. For the instrument under vertical installation, the verticality shall be guaranteed within a slope deviation of 3 degrees; and for the instrument under horizontal installation, the horizontality shall be guaranteed within a slope deviation of 3 degrees.
6. During installation, the calibers of pipelines at the top and bottom shall be the same as the caliber of the instrument. Joint flanges shall match well with each other; to ensure the measuring precision and stability, the length of the straight pipeline at the top of the instrument shall be 5 times the normal caliber of the instrument, and the length of the straight pipeline shall be a minimum of 250mm.
7. In regard to the instrument for gas measurement, if the instrument discharges the gas directly into the atmosphere, it will lead to data distortion, even damages to the instrument. Under such operation conditions, throttling valves shall be installed at the outlets of the instrument.
8. Operators shall be particularly careful when installing the instrument in PTFE liner. PTFE may become deformed due to the pressure imposed on it under an operating condition of low temperatures. Therefore, do not screw it down casually during installation. For the mounting torque, refer to the table below.



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Caliber mm	Maximum Torque kgf.m	Stud Bolt
DN15	0.9~0.95	4×M12
DN25	2.0~2.2	4×M12
DN50	5.2~5.6	4×M16
DN80	4.5~4.8	8×M16
DN100	4.6~5.0	8×M16
DN125	5.0~5.3	8×M18
DN150	6.5~6.8	8×M20

2. Maintenance of Instrument

1. The instrument is one of precision equipments. Therefore, it shall be handled with care during transportation, installation, storage and use to avoid rough delivery, overstressing installation and careless placement without order. During the whole operating process, the relative locations of the sensor and indicator shall be kept unchanged, because changes in location will directly affect the measuring precision of the instrument.
2. It is inevitable that there will be some residue of ferromagnetic impurities clinging to the float during long use, which will consequently make the float jammed or affect its measuring precision. Therefore, regular cleaning work for the float is quite necessary. In case a magnetic filter has been installed, regular cleaning work is required as well.
3. The screws shall be tightened up after the connection and casing disassembly are implemented to guarantee fine tightness of the casing so as to prevent impurities, moisture or other substances from entering into the instrument, and to ensure reliable grounding of the instrument as well, because there are electronic components allocated inside the indicator of the instrument.
4. Attention shall be paid under following circumstances during the initial use after the instrument installation:

In order to avoid heavy impacts to the level limit apparatus imposed by the float due to the pressure created when opening the valves, the valve opening operation shall be conducted at a moderately slow speed.

In regard to the instrument for gas measurement, a gas damper shall be fixed to reduce vibration of the float to the greatest extent. In order to ensure the stability of the float, a throttle valve may be fixed at the outlet of the instrument.

5. For the transmissible instrument, electrical connection shall be conducted only when the instrument connection has been proved correct. At the hazardous location, the explosion-proof type must be chosen, and the installation and use shall be conducted in accordance with the explosion-proof requirements.



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9. Electrical Connection

This chapter mainly discusses the power-line connection of flowmeters, adaptation with the guard grating as well as the technical parameters of the guard grating.

1. Power-line connection of flowmeters

The initial step is to twist off the front cover. In case of a quadrate casing, connecting terminals are visible above the base, among which the one connected to the red colored lead wire shall be connected to the positive terminal of power supply, and the one connected to the black colored lead wire shall be connected to the negative terminal of power supply. In case of a circular casing otherwise, connecting terminals are visible above the circuit board. To complete the connection, connect the power lines well according to the marks. For explosion-proof type instruments, the grounding wire shall be well-connected internally. These flowmeters are two-wire configuration with output of 20mA. For details, refer to Figure 22.

2. Associated apparatus for intrinsic safety type instruments

TF Type Metal Tube Float Flowmeters used at the hazardous location shall be intrinsic safety explosion-proof type or explosion-isolated type. An associated apparatus – guard grating shall be allocated to form an intrinsic safety explosion-proof system when using intrinsic safety explosion-proof type instruments. The guard grating is classified into two types: Zener type and isolated type.

9.2.1 Technical parameters of Zener type guard grating

Explosion mark: [Exia] II C

Maximum admissible voltage: 250VAC/DC

Rated value of intrinsic safety circuits: $U_O \leq 28V$, $I_O \leq 119mA$, $C_O \leq 0.083\mu F$, $L_O \leq 2.5mH$

Installation location: secure region

Ambient condition: continuous operation temperature: $-10^\circ C \sim 45^\circ C$

Storage temperature: $-40^\circ C \sim 80^\circ C$

Relative humidity: 5-95%RH

9.2.2 Technical parameters of isolated type guard grating

Intrinsic error: $\pm 0.2\% F.S$

Explosion mark: [Exia] II C

Rated value of intrinsic safety circuits: $U_O \leq 30VDC$, $I_O \leq 30mADC$

Output load: 0-500 Ω

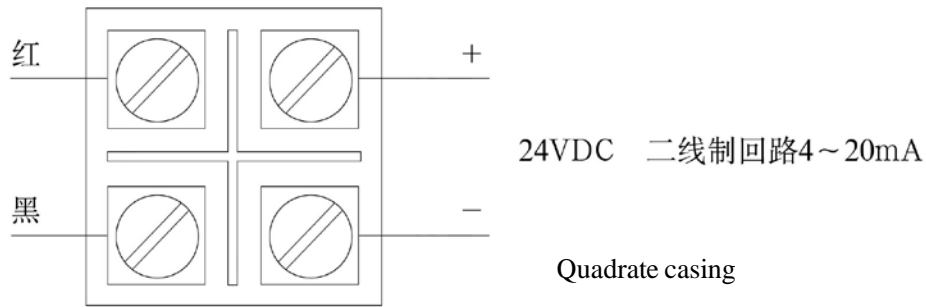
Power supply: 24VDC

9.2.3 Connection between flowmeters and guard gratings

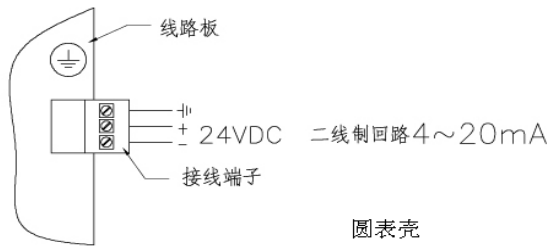
This manual illustrates methods for connecting flowmeters and guard gratings with examples of TSA528.H Zener type and FA—1100/k isolated type guard gratings. The connecting methods of other types shall be subject to their manuals respectively. For details, refer to the following figure.



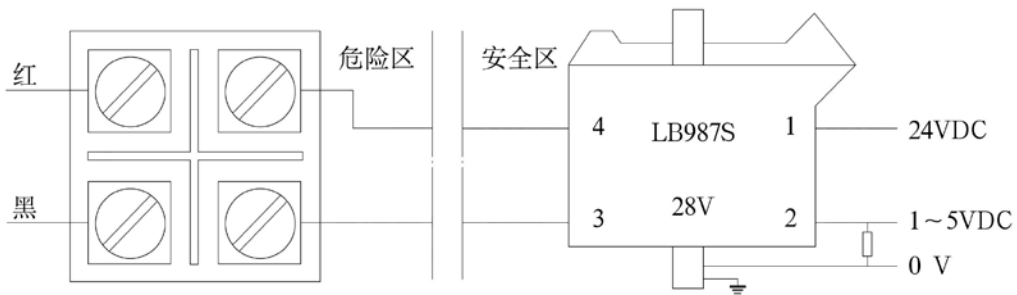
Metal Tube Float Flowmeter



红 red 黑 black 二线制回路 two-wire configuration circuit

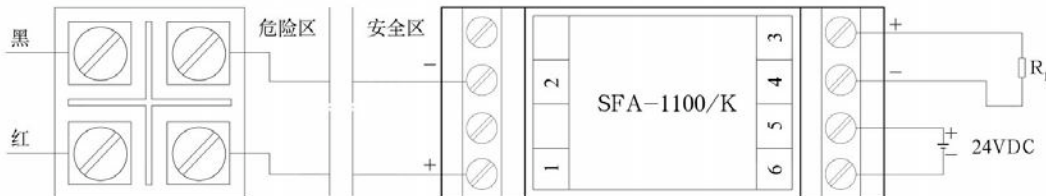


线路板 circuit board 接线端子 connecting terminal
二线制回路 two-wire configuration circuit 圆表壳 circular casing



Connection Diagram of Flowmeter and Zener Type Guard Grating

红 red 黑 black 危险区 hazardous region 安全区 secure region



Connection Diagram of Flowmeter and Isolated Type Guard Grating

红 red 黑 black 危险区 hazardous region 安全区 secure region



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10. Proper Application of Indicator

The instantaneous and accumulated flow rates of the fluid are directly displayed on the LED screen of the intelligent type indicator. By means of 4 keys on the panel, operators are able to check the internal parameters of the instrument, some of which can be reset to realize calibration function. In regard to these flowmeters, there are three groups of technical parameters available for users to check and modify by entering corresponding passwords correctly.

10.1 Key functions

SET: Function key for parameter verification; AT: Left Key for conducting left movement of the cursor;

INC: "+ 1" Key for turning to next page; DEC: "- 1" Key for turning to previous page;

2. Access to groups of technical parameters

Under the measuring interface state, operators shall press "SET" first until there are "LOC" characters appearing on the screen. Click "AT" to choose the cursor position required, and then press "INC" or "DEC" to enter corresponding passwords. Finally, to access relative groups of technical parameters, make another click on "SET" for conformation.

3. Modification of technical parameters

All technical parameters to be modified by users are in the first group. After access to the first group according to the methods mentioned above, click page turning keys to check out corresponding technical parameters and then enter into this parameter by clicking "AT". Modify the parameters by clicking Left Key (AT), "+ 1" Key (INC) and "- 1" Key (DEC) and finally make another click on "SET" for conformation.

4. Contents of each group of technical parameters and passwords for access

10.4.1 First group: For essential parameters, refer to the following table. Passwords (LOC):

000001

Parameter	Implication of parameters	Setting range	Description
LPD	Digital damping, depending on the fluid fluctuation at the field.	0~10	It is generally 2~4; revisable
IEL	Automatic zero cleaning frequency after reaching a full-scale accumulated flow rate	Starting from 0, automatically add 1 for each zero cleaning	Read-only
DFL	Corrected current value: 4mA	0~255	Revisable
DFH	Corrected current value: 20mA	0~255	Revisable
SPH	Measuring range setting, namely corresponding points of 20mA		Revisable
cod	Correction coefficient of displayed value	Default value: 1.0	Revisable
dLL	Low flow cutoff value	10% of the full scale	Revisable
dpI	Scaling position setting	0~3	Revisable
sop	Exit this group of parameters		



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2. Second group: Reset the accumulated value manually. Passwords (LOC): 000002

Accumulated value resetting operation is completed when accessing this group of parameters, and then the interface automatically returns to the measuring state.

3. Third group: Set default. Passwords (LOC): 000009

Default setting operation of internal parameters is completed when accessing this group of parameters.

11. Ordering Guide

WPZ Metal Tube Float Flow meter

Model											Description
NKD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Metal Tube Float Flow meter
Display type	Z										Local display
	D										Local display 4-20mA Output
	ZH										Local display 4-20mA Output, HART Protocol
Anti-Corrosive		F									Normal type, without anti-corrosive type Anti-Corrosive type (Lining PTFE/FEP)
Inside nominal diameter	DN15										15mm
	DN25										25mm
	DN50										50mm
	DN65										65mm
	DN80										80mm
Indicator			M1								Vertical indicator (Pointer)-
			M3								B1 Quadrate indicator(LCD)-
			M4								B2
			M5								Quadrate indicator(Pointer), Ex-intrinsically safe-B3 Circular indicator(Pointer), Ex-Flame safe-B4
Installation			L1								Vertical type (Bottom In Top
			L2								out) Horizontal type(Left in
			L3								Right out) Bottom In Side out
Flange type			S								China National Standard Flange Plate
			A								American National Standard Flange
			G								Plate German National Standard Flange Plate
Flange pressure				S1							PN1.6MPa, Optional
Housing&Float material					S3						SS321
					A3						SS304
					B2						SS316
					C2						Ti
Electrial connecto					S5						M20*1.5
					N						1/2NPT
Explosion proof	Technical Data Sheet(next page)										Ex-intrinsically
											Ex-Flame
											Page 19 / 21



Metal Tube Float Flowmeter

F. No.										
Tag. No.										
MFG. No.										
Quantity		DN	PN	DN	PN	DN	PN			
Nominal Diameter										
Flange Standard										
Body Materials										
Float Materials										
Lining Materials										
Data of Jacket	Conn. Standard	DN	PN	DN	PN	DN	PN			
	Heating Medium									
	Temp. °C/ Pres. MPa	°C	MPa	°C	MPa	°C	MPa			
Overall Height			%		%		%			
Accuracy										
Flow Name										
Fluid Conditions		Liquid <input type="checkbox"/> Gas <input type="checkbox"/>		Liquid <input type="checkbox"/> Gas <input type="checkbox"/>		Liquid <input type="checkbox"/> Gas <input type="checkbox"/>				
Operating Conditions		Min	Nor	Max	Min	Nor	Max	Min	Nor	Max
Flow Rate /h										
Temperature °C										
Pressure MPa										
Density kg/m ³										
SPGR kgf/m ³										
Viscosity mpa.s(cp)										
G.mol.Wt										
Project Range	Operating Dial		%		%		%			
	Standard Dial		%		%		%			
	Float No.									
MFG Range	Operating Dial		%		%		%			
	Standard Dial		%		%		%			
	Float No.									
Electrical Signal Output			mA		mA		mA			
Power Supply		VDC	V	Hz	VDC	V	Hz	VDC	V	Hz
Cable Conn.		M	×	mm	M	×	mm	M	×	mm
Limit Switch		Max		Min	Max		Min	Max		Min



Metal Tube Float Flowmeter

Fittings

Name	TAG No.	Standard/Model	Quantity
Flanges			
Conn. Bolts			
Pressurize Mat			
Magnetic Filter			
Other			

Note: For the technical data sheet of metal tube float flowmeters, please refer to the company.