(insertion target Flowmeter)

Typical Application:Measurement of high viscosity and low Reno number fluids.

LB Intelligent Target Flowmeter

1.General

The target flowmeter is based on the traditional isolated diaphragm target flowmeter. The new strain sensor is applied to the target flowmeter. And using the latest digital technology and microelectronic technology, the detected sensor signal is processed into 4~20mA signal output proportional to the flow rate, and the instantaneous flow rate and accumulated flow rate are displayed simultaneously by double-row large liquid crystal, which significantly improves the structure and performance of the traditional target flowmeter. The intelligent strain target flowmeter is applying for a national patent.

2.Product Features

•High temperature and high pressure resistance:-80 C-+200 C, and the highest pressure can reach l0MPa.

•It is suitable for various diameters.

•Suitable for measuring liquid, gas and steam.

•It can measure medium with low flow rate, which can be measured when the flow rate is greater than 0.1 m/s (Reynolds number is greater than 1000).

•It can measure the medium with high viscosity and silt.

•Accurate measurement, high precision, up to 0.2% (special order)

•The pressure loss is small, the small diameter is half that of the standard orifice plate, and the large diameter is obviously reduced.

•The software is powerful and can be calibrated online or by dry method.

•Double-line LCD display can display instantaneous flow, cumulative flow, over-range and battery power.

•Easy and convenient installation.

•Multi-choice of installation methods.

3.Structure Principle

3.1 Structure (see Fig. 3-1)

Target flowmeter includes 1. a transmitter head 2. an elastic tube sensor 3. a target rod 4. a target plate 5. measuring tube. According to different medium working conditions, different elastic tube sensors, target rods, target plates and measuring tubes must be selected. Therefore, users need to provide accurate process parameters, which is important for application of meters.

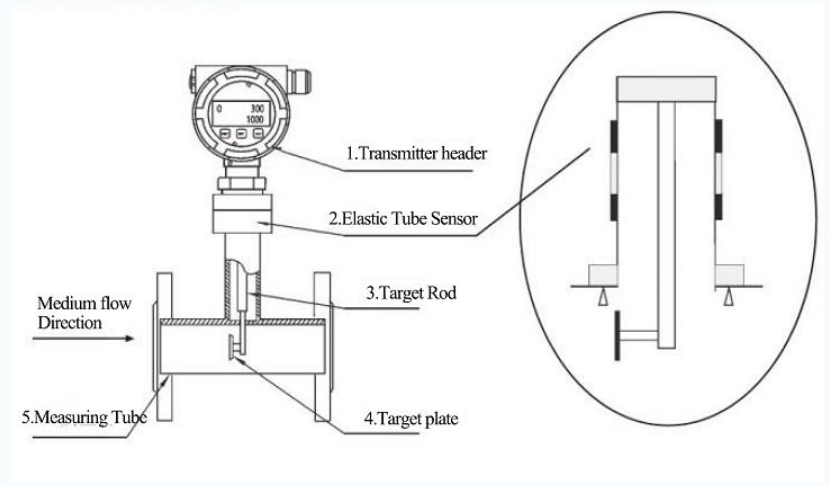


Fig. 3-1 Schematic Diagram of Target Flowmeter Structure

3.2 Operating Principle

The medium flows in the measuring tube, and the flowing medium impacts on the target plate, so that the target plate is subjected to an impact force F. The force of the target is transmitted to the elastic tube sensor through the target plate rod, and the relationship between the force F of the sensor and the flow rate V, the medium density P and the force area A of the target plate is as follows:

$$F = CA\rho V^2/2g$$

Where: F: force on target plate C: resistance coefficient A: force area of target plate

ρ: medium density $V^2/2g$: characteristic velocity V: medium velocity

It can be seen that the velocity of medium is proportional to the square root of the force on the target plate for a certain target plate. Namely: $V \propto \sqrt{F}$.. Therefore, under the condition of a certain measuring tube: medium flow $Q \propto \sqrt{F}$. The target force of the elastic tube sensor is proportional to its electrical signal output, then the signal is amplified by the preamplifier, and finally the target force F is converted into 4~20mA signal output proportional to the medium flow through the A/D converter, microprocessor and D/A converter.

4.Specifications

Tab. 4-1 Basic Parameters of target flowmeter

Nominal Diameter & Pressure	Flange type:DN15-DN300mm （pressure 1.6-10 MPa） Holding type:DN15-DN300mm （pressure 1.6-10 MPa） Immersible type:DN15O-DN1500mm （pressure 1.6-10MPa） Thread type:DN15-DN50mm （pressure 1.6-4MPa）
Accuracy	±0.5%~±2.5%FS Standard type:±1.0%FS
Medium Temperature	-40℃-+200℃ （If the temperature exceeds 100℃, heat sink should be added， jacket devices are required above+200 ℃ or below-30 ℃）
Ambient Temperature	-40℃-+85℃ （LCD will not be damaged）Normal working temperature of LCD:-30℃-+80℃
Power	24VDC-Line System 4~20mA（12VDC-32VDC）Type of battery: 3.6V@7.5AHLithium battery, which can be used continuously for three years.
Output Signal	4~20mA
Pipe Material	Stainless steel 304,316
EX-mark	Intrinsic ExiallCT5, flameproof ExdIIBT6
Cable Interface	Flameproof 1/2NPT internal thread, other M20X1.5 internal thread
LCD Display	Instantaneous flow display value range: 0-50000 (decimal point is optional) Cumulative flow display value range: 0-9999999 (with decimal point) automatically reset.
Shell Material	Cast Aluminium
Load Characteristic	RLmax=50*（Power voltage-12） Ω@24V
Protection Grade	IP65

5. Type Selection of Flowmeter

5.1 Type selection calculation

For the type selection of target flowmeter, it is necessary to convert the actual flow rate of medium into the standard flow rate of water or air in the standard state, and then select the type according to the table. The calculation formula is as follows:

(1) Conversion formula of liquid volume flow: $Q_o=Q_v \times \sqrt{p/p_0}$

(2) Conversion formula of liquid mass flow: $Q_{om} = Q_m \times \sqrt{p_0/p}$

(3) Conversion formula of volume flow of gas in operating state: $q_0=q_v \times p/p_n$

Where: Q_o - standard water volume flow (m^3/h)　　Q_{om}-Standard water mass flow rate（t/h）

q_o - air volume flow in standard state (Nm^3/h)　　q_v - Flow rate of gas medium in operating state (m^3/h)

p -density of medium in operating state (kg/m^3)　　p_0-density of water in standard state (kg/m^3)

p_n- density of air in standard state　　Qv - Flow rate of gas medium in operating state (m^3/h)

Q_m - mass flow rate of liquid in operating state (t/h)

5.2 Notes

Intelligent target flowmeter is suitable for measuring various occasions and media. In order to ensure satisfactory use effect, it is recommended to pay attention to the following items when selecting models:

（1） Determine the required normal flow, and the maximum flow is 1.2-1.5 times of it;

（2） Explain the standard and sealing form of connecting flange.

（3） The name of the fluid to be measured and the working condition density of the medium shall be included.

5.3 Standard water flow measurement range table

Tab. 5-3 Measurement range of target flowmeter

Mounting Type				Diameter (mm)	Minimum Full-range Flow(m^3/h) (t/h)	Maximum Full-range Flow (m^3/h) (t/h)	Target Diameter Ratio Range	Maximum Pressure Drop (KPa)
Thread Type	Sanitary Type	Holding Type	Flange Type	15	1.0	3.0	0.6-0.8	97.5
				20	2	5.5	0.6-0.8	56.7
				25	3	8.5	0.6-0.8	38.1
				32	5	14	0.6-0.8	25.3
				40	8	21	0.5-0.8	16.2
				50	12	34	0.5-0.8	6.5
				65	20	58	0.4-0.7	5.3
				80	30	88	0.4-0.7	4.1
				100	47	136	0.4-0.7	2.2
				125	70	213	0.4-0.7	2.4
				150	110	300	0.3-0.6	1.3
				200	190	545	0.3-0.6	1.1
				250	290	850	0.3-0.5	0.7
				300	420	1220	0.25-0.5	0.4
			Immersible Type	350	580	1680	0.25-0.5	0.11
				400	750	2180	0.25-0.5	0.08
				450	950	2760	0.25-0.4	0.07
				500	1180	3400	0.2-0.4	0.06
				550	1400	4125	0.2-0.35	0.05
				600	1690	4900	0.2-0.3	0.04
				700	2300	6680	0.2-0.3	0.009
				800	3000	8700	0.2-0.3	0.008
				900	3800	11000	0.2-0.3	0.006
				1000	4700	13600	0.1-0.2	0.005
				1100	5700	16500	0.08-0.2	0.004
				1200	6770	19600	0.05-0.2	0.0034
				1300	7950	23000	0.05-0.2	0.0026
				1400	9220	26700	0.05-0.2	0.0024
				1500	10580	30680	0.05-0.2	0.0017

Note: Actual pressure drop of flow $\triangle P$ = (actual flow/maximum flow) ^{2}x maximum pressure drop

5.4 Meter Selection Table

Tab. 5-4 Target Flowmeter Type Selection

Model									Description
YK-LB	□	/□	/□	/□	/□	/□	/□	/□	
Mounting Type	1								Flanged Connection
	2								Flange Holding
	3								Immersible Type
	4								Threaded Connection
	5								Sanitary Type (quick-loading type)
	6								On-line detachable
Measuring Medium		1							Gas
		2							Liquid
		3							Steam
Nominal Diameter			0						DN15
			1						DN20
			2						DN25
			3						DN32
			4						DN40
			5						DN50
			6						DN65
			...						DN15
			200						DN20
Structural Form				Z					Integrated Converter
				F					Split Converter
Converter Type					B				Battery Power, on-site display
					C				24VDC power supply, field display and output 4~20mA
					C1				24VDC power supply, field display and output 4~20mA, communication output modbus
					C2				24VDC power supply, field display and output of 4-20mA, with HART protocol.
					D1				Temperature/pressure single compensation
					D2				Temperature/pressure double compensation
Explosive-proof Grade						N			No mark, non-explosion-proof
						E			Explosion-proof
Pressure Grade							N		General (2.5MPa)
							H(x)		High pressure (negotiated order)
Temperature Grade							N		Medium temperature is less than 100 C.
							H(1)		Medium temperature less than 200°C, with fins
							H(2)		Medium temperature less than 300°C, with heat sink jacket device

6. Installation and Overall Dimensions

6.1 Flanged Pipe Type

Tab. 6-1 Installation Dimensions of target flowmeter Flange Type

Nominal Diameter	Total Width	Total Height	Nominal Diameter	Total Width	Total Height
DN (mm)	A	B	DN (mm)	A	B
15	150	370	125	200	500
20	150	380	150	200	530
25	150	390	200	250	580
32	150	400	250	250	630
40	200	410	300	250	680
50	200	430	350	250	730
65	200	440	400	250	780
80	200	460	450	250	830
100	200	480	500	250	880

Note: ①The above parameters are applicable to target flowmeter with flange connection and pressure below 1.6MPa.

②The meter is of standard size, and the length with integrated pressure compensation is lengthened by 50mm.

③Flanged target flowmeter is not equipped with pipe flanges and bolts at the factory, and users need to buy them separately. The standard of connecting flanges is GB/T9119-2000 protruding plate flat welded steel pipe flanges.

Note: ①The above size is for reference only, the actual factory or order confirmation shall prevail.

②Commonly used seamless steel pipe diameter, such as british-made steel pipe, need to be noted when ordering.

③Dimensions are subject to confirmation at the time of delivery or order.

④ The installation flange of flowmeter adopts national standard GB/T9119-2000, and other national departments or industry standards can also be adopted according to the needs of users. Special standards are required shall be noted.

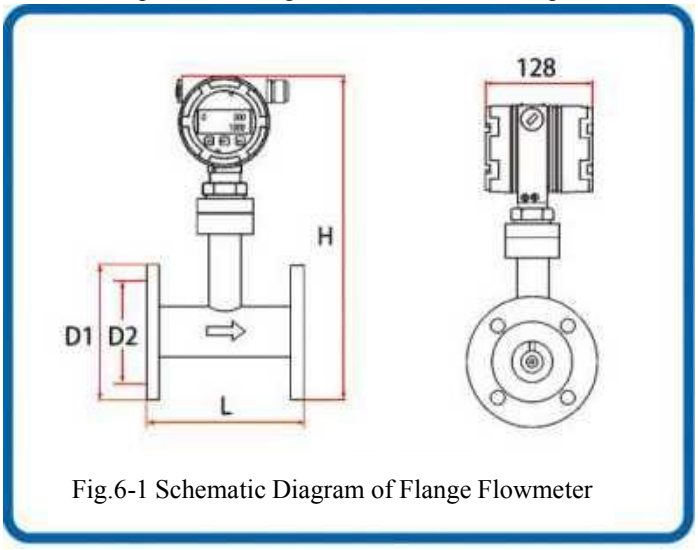


Fig.6-1 Schematic Diagram of Flange Flowmeter

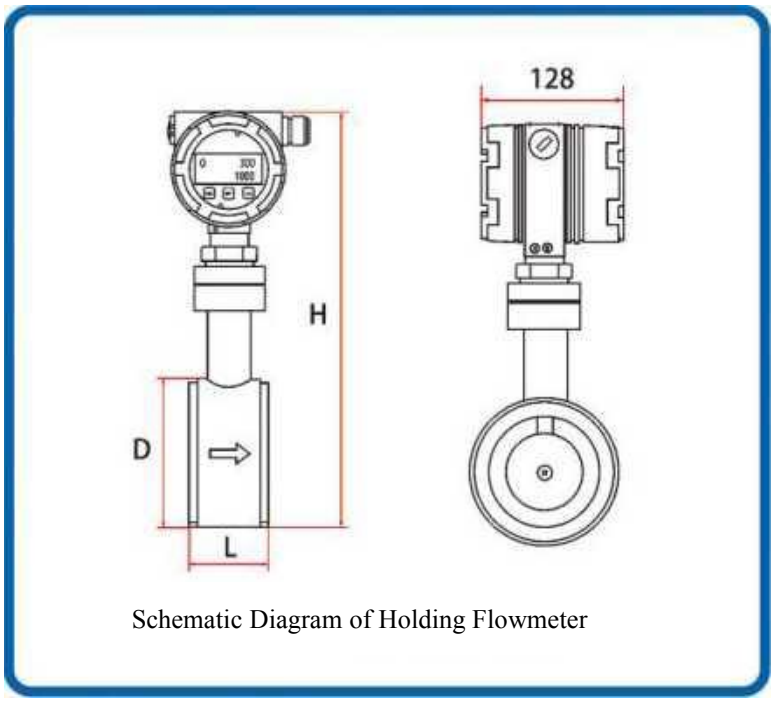
6.2 Holding Type

Tab. 6-2 Holding mounting dimensions of target flowmeter

Nominal Diameter DN (mm)	Total Width A	Total Height B	Nominal Diameter DN(mm)	Total Width A	Total Height B
15	80	320	125	80	430
20	80	325	150	80	455
25	80	330	200	80	505
32	80	337	250	80	555
40	80	345	300	80	605
50	80	355	350	80	655
65	80	360	400	80	705
80	80	385	450	80	755
100	80	405	500	80	805

Note: ①The above parameters are applicable to flange-mounted target flowmeter with pressure below 2.5MPa.

②The factory has been equipped with special flanges, and the installation standard is enterprise standard.



Schematic Diagram of Holding Flowmeter

Figure 6-3 Schematic diagram of threaded flow meter

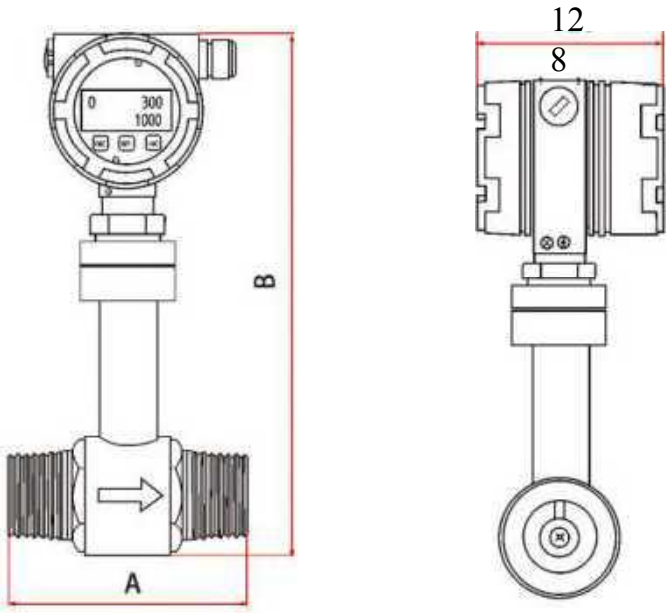
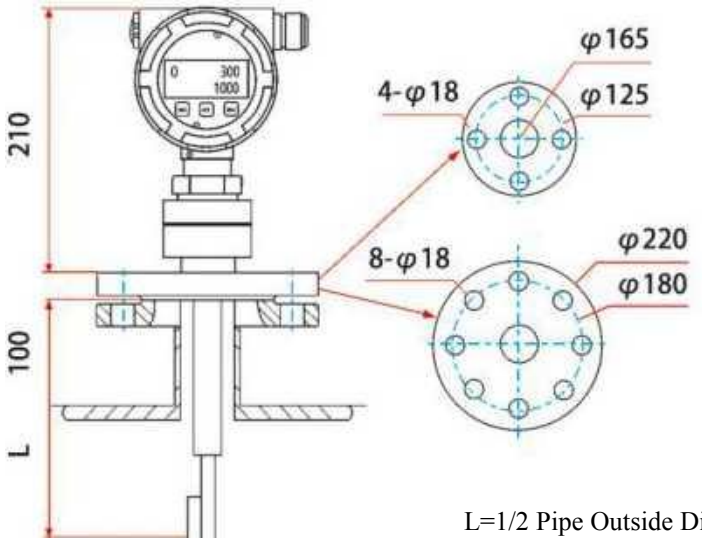


Fig.6-4 Schematic Diagram of Immersible flowmeter



DN50 Flange

Or

DN100 Flange

L=1/2 Pipe Outside Diameter

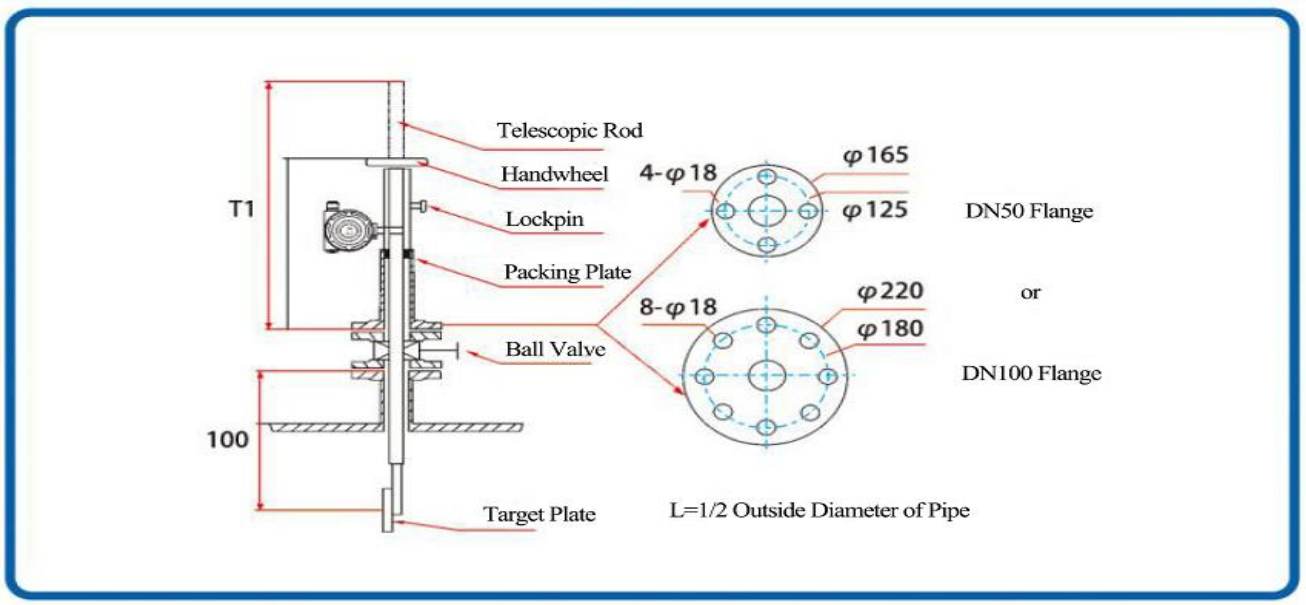
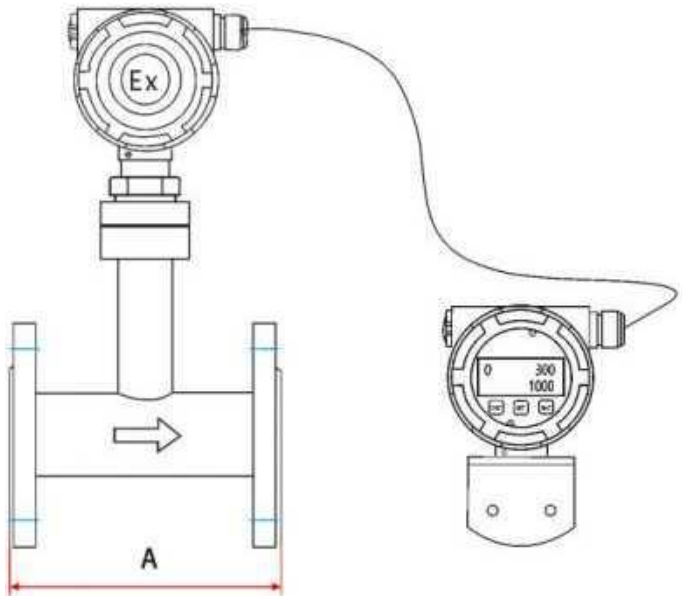


Fig. 6-5 Schematic diagram of online detachable flowmeter

Fig. 6-6 Schematic diagram of split flowmeter



1. If the inspection pipeline can't be installed at the site due to special reasons such as temperature or location, the meter head and the measuring tube can be divided into two types. The measuring body and meter head are shielded copper-core four-core cables with a length of no more than 5m.
2. The dimension of A is the same as that of flanged pipe.

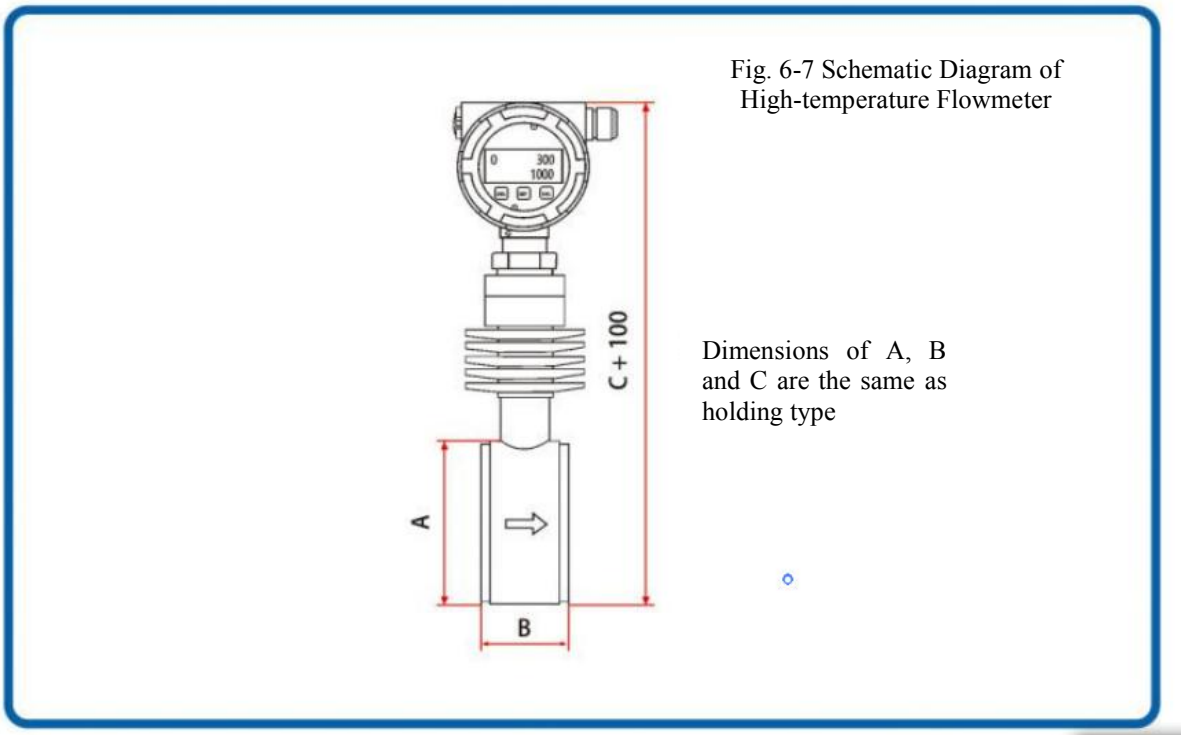


Fig. 6-7 Schematic Diagram of High-temperature Flowmeter

Dimensions of A, B and C are the same as holding type

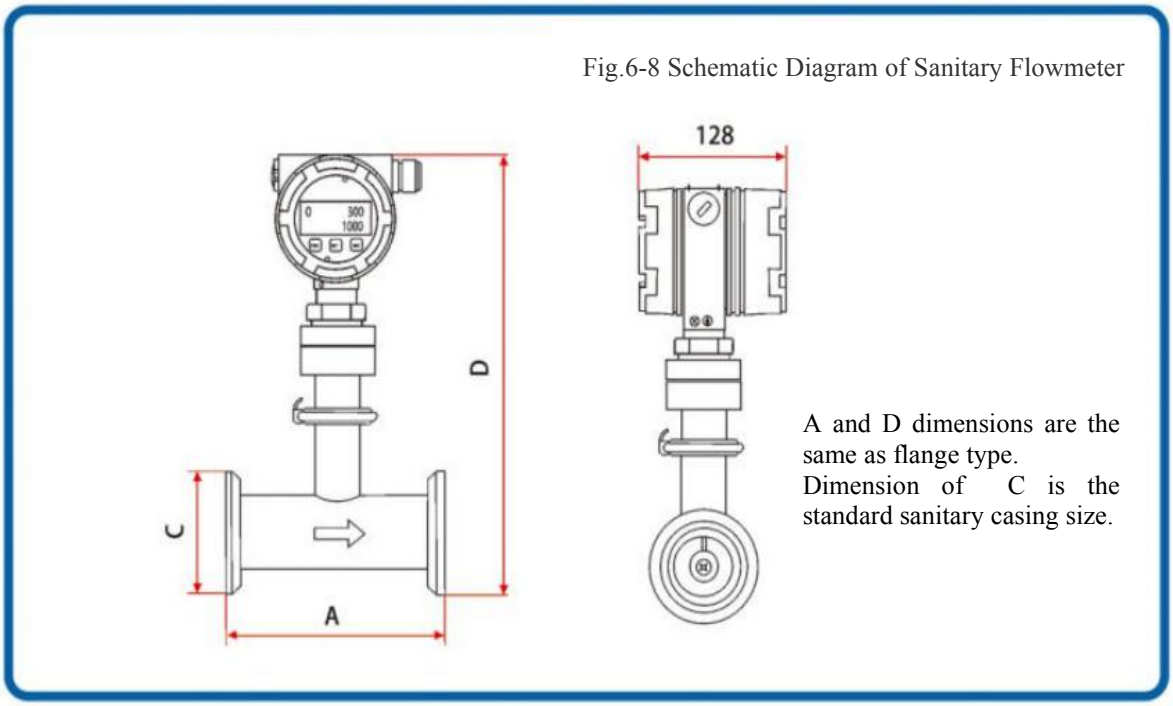


Fig.6-8 Schematic Diagram of Sanitary Flowmeter

A and D dimensions are the same as flange type.
Dimension of C is the standard sanitary casing size.