

[Please refer to page 9 for selection details](#)

Target Flowmeter FO70-T



Overview

The FO70-T digital target flowmeter is a new type of force induction target flowmeter developed based on the measurement principle of traditional target flowmeters, fully utilizing their best characteristics, and combining new sensor technology and modern digital technology. It not only has the characteristics of traditional target flowmeters, orifice plates, vortex streets, and other flowmeters without movable parts, but also has measurement accuracy comparable to volumetric flowmeters. In addition, its unique anti-interference and anti impurity performance makes it lightweight and reliable.

Function Characteristics

It can accurately measure the flow rates of liquids, gases, vapors, viscous media, and various fluid media under various normal temperature, high temperature, and low temperature conditions. It has extremely high sensitivity and can measure ultra-low flow rates. It can measure low flow rates of 0.08m/s
No movable parts, safe and reliable to use

Accurate measurement, high precision, total measurement can reach 0.2%

Wide measurement range, with a maximum measurement range of 1:30

Good repeatability, generally 0.1-0.08%, fast measurement

The pressure loss is small, only about $1/2 \Delta P$ of the standard orifice plate

Dry calibration method can be used, namely the method of hanging weight with the legal code

The force bearing components can be replaced according to actual needs to change the measurement flow range

Can read the displayed values directly online and also transmit and send messages

Easy to install and maintain

Application

Widely used in various fields such as petroleum, chemical, energy, food, environmental protection, water conservancy, etc. From its effectiveness after use, the digital target intelligent flowmeter has extremely broad applicability.

Namely:

Suitable for various pipe diameters: from 4 to 2000mm to larger

Suitable for high and low temperature media: from -196 °C to +450 °C

Suitable for high-pressure working conditions: from 0 to 42Mpa (gauge pressure)

Measuring Principle

The measurement principle of FO70-T digital target intelligent flowmeter is Wheatstone bridge strain gauge, and the resistance of the varistor is not less than 5K ohms. As shown in Figure 1, during the measurement the measuring force element is placed coaxially at the center of the tube (instrument housing). When the measured medium flows at a certain speed (m/s), it generates corresponding kinetic energy directly. The force acting on the load-bearing element and the pressure difference generated by the separation of the load-bearing element due to its flow velocity reflects the magnitude of the liquid flow rate. Due to stress the component is rigidly connected to the sensor, and the sensor is directly subjected to the force F generated by fluid kinetic energy and differential pressure, which is related to the flow velocity V, medium density p, and the force bearing component. The relationship between the force area A is as follows:

$$F = C_D \frac{\rho V^2}{2} A$$

F: The force exerted on the load-bearing component

C: Drag coefficient

p: Fluid density, kg/m

V: Fluid flow velocity, m/s

A: The force area of the load-bearing element, m

After deduction and conversion, the flow calculation is as follows:

$$Q_m = 4.512 \alpha D \left(\frac{1}{\beta} - \beta \right) \sqrt{\rho F} \text{ kg/h}$$

$$Q_v = 4.512 \alpha D \left(\frac{1}{\beta} - \beta \right) \sqrt{\frac{F}{\rho}} \text{ m}^3/\text{h}$$

式中 Q_m , Q_v 分别为质量流量和体积流量, kg/h, m^3/h ;

α --- 流量系数;

D --- 测量管内径, mm

β --- 直径比 $\beta = d/D$

d --- 靶板直径, mm

In the formula, Q_m , Q_v represents mass flow and volume flow, respectively, kg/h, m^3/h

α --- flow coefficient;

D --- Measuring the inner diameter of the tube, mm

β --- Diameter ratio $\beta = d/D$

d --- target plate diameter, mm

Technical Specifications

Measurement Accuracy	$\pm 0.2\%$, $\pm 0.5\%$, $\pm 1.0\%$, $\pm 1.5\%$
Repeatability Accuracy	0.1% ~ 0.08%
Applicable Pressure	0.6~42MPa
Applicable Temperature	-20 °C~70 °C (normal temperature type) -196 °C~+450 °C (high and low temperature type)
Compensation Form	Depends on the strength of the probe
Measurement Tube Material	Carbon steel, 304, 316L (other customizable)
Range Ratio	1: 10; 1:15; 1: 20 (Other customizable)
Applicable Pipe Diameter	Pipeline type 4~300mm, clamp type 4~600mm, insertion type 100~2000mm
Applicable Medium	Liquid; Gas; steam
Power Supply	Built in 3.6V lithium battery; External power supply 24VDC; 220VAC (only for split digital display)
Output Format	On site display reading value; 4-20mA (two-wire system); Pulse; 0-10V; RS232/RS485 (optional); hart protocol
Explosion-proof Marking	Intrinsic safety type (ExiallCT4) explosion-proof type (ExdIICT6)
Protection Level	IP65; IP66; IP67; IP68

Note: The specifications of the flowmeter flange comply with the GB/T9115.1~9115.4-2000 series standards, and the pipeline type can produce small openings such as DN6, DN8, DN10 according to user needsRadial flowmeter.

Instrument Type

The FO70-T digital target flowmeter is mainly divided into the following categories and forms:

1) Category:

- Liquid flow meter: at room temperature and high temperature
- Gas flowmeter: ordinary room temperature and high temperature
- Steam flow meter: saturated steam and superheated steam

2) Form and corresponding specifications

·Pipeline type: pipe cone thread type, corresponding specifications DN4~DN80 (mm)

Pipeline flange type: corresponding specifications DN4~DN300 (mm)

·Clamp on type: corresponding specifications DN4~DN600 (mm)

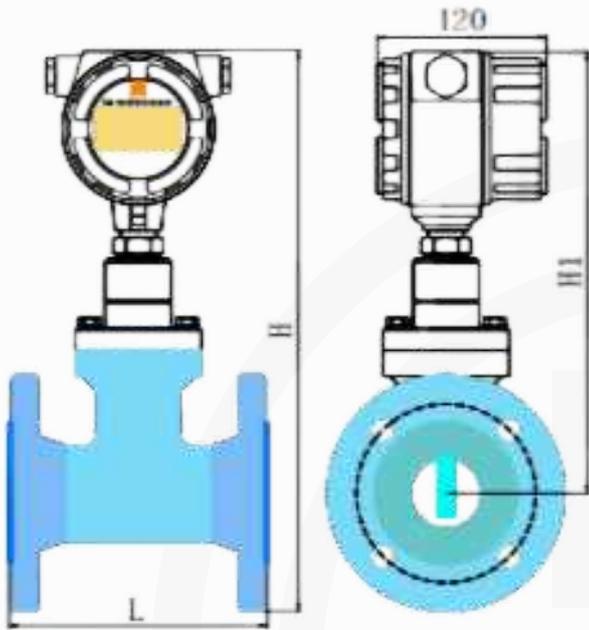
·Insertion type: corresponding specifications DN100~DN2000 (mm)

Plug in fixed type, expandable online detachable type



Schematic Diagram Of Target Flowmeter

Flange Pipeline Type At Room Temperature

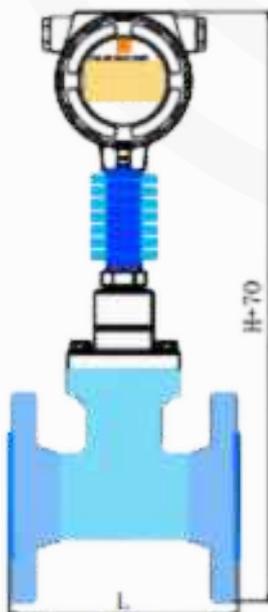


Note:
If the pressure is greater than 15Mpa, the width of the shell shall be determined at the factory

External Dimensions Of Flange Pipeline

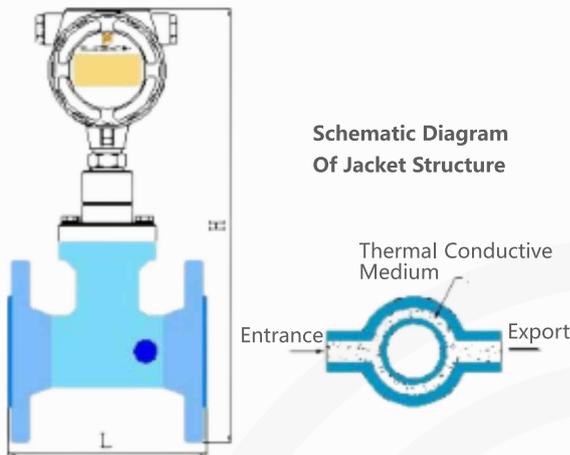
Nominal Diameter	Pressure ≤ 4.0		11.0 ≥ Pressure ≥ 5.0		remark
	overall width	total height	overall width	center height	
	L	H	L	H1	
DN15	170	345	200	300	The above dimensions are for reference only, and the actual size is subject to the factory product
DN20		350			
DN25		355			
DN32		380			
DN40	190	390	220	310	
DN50		400			
DN65	220	415	250	320	
DN80		425		325	
DN100	240	445	260	325	
DN125	260	460	280	350	
DN150	280	515	300	365	
DN200	300	580	320	390	
DN250	360	450	Confirmed by factory		
DN300	400	480			

High Temperature Type (70 °C~200 °C)



Note:
The external dimensions of high-temperature flow meters are larger than those of normal temperature flow meters Flow meter height 70mm; for extreme temperature flow meter size Additional explanation.

Jacket Insulation Type (thermal Conductivity Type)



Schematic Diagram Of Jacket Structure

Instructions

The connecting flange shall comply with the relevant technical requirements of the national standard GB/T9115.1-9115.4-2000: +other countries' (Japanese standard, American standard, German standard, etc.) standard flanges are all special orders;

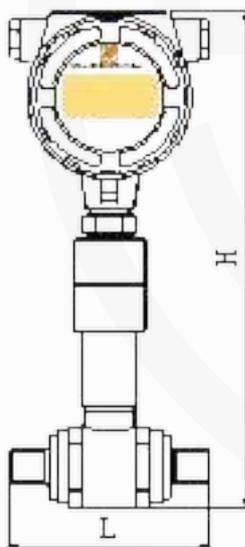
The connection methods for high temperature and temperature pressure compensation can be either clamped, inserted, or threaded structures, in addition to pipeline flange types;

Jacket insulation type (thermal conductivity type) is suitable for preheating and insulation during the process flow, eliminating the solidification and crystallization of media in pipelines or process insulation. It is commonly used for improving viscous media such as asphalt and coal tar;

When ordering the medium fluid from top to bottom or from bottom to top, please indicate: right view, left view (display header)

Pipe Cone Thread: The Connection Thread Standard Is 55 °

Pipe Cone Thread Type External Dimensions

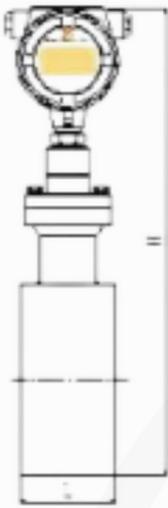


Nominal Diameter		A	B
mm	in		
15	1/2"	120	240
20	3/4"	120	240
25	1"	120	240
32	1 1/4"	125	255
40	1 1/2"	125	255
50	2"	125	255
65	2 1/2"	180	275

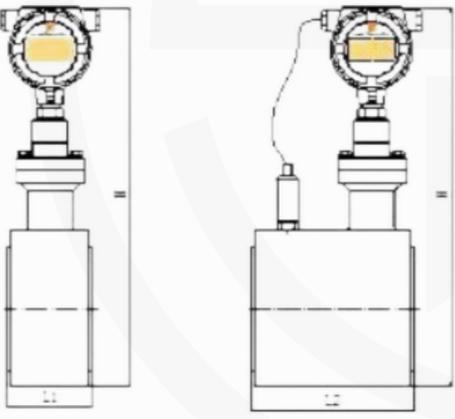
Instructions

- A、 The connection screw system can also be customized according to the user's requirements;
- B、 High temperature type, temperature pressure compensation type L, H size, subject to factory (or order confirmation);
- C、 The L and H dimensions corresponding to the special order specifications shall be based on the actual dimensions of the instrument;
- D、 When ordering the medium fluid from top to bottom or from bottom to top, please indicate: right view, left view (display header)
- E、 The size of small flow or temperature pressure compensation flow meters shall be based on the actual product..

**Clamp on type
Integrated casting (suitable for ≤ 4MPa)**

	Nominal Diameter	Overall Width	Total Height	Applicable To	Remark
	mm	L	h		The above dimensions are for reference only, and the actual size is subject to the factory product
	DN15	54	385	1.6 2.5 4.0 (MPa)	
	DN20				
	DN25				
	DN32				
	DN40				
	DN50				
	DN65	85	420	2.5 4.0 (MPa)	
	DN80		445		
	DN100		475		
	DN125				

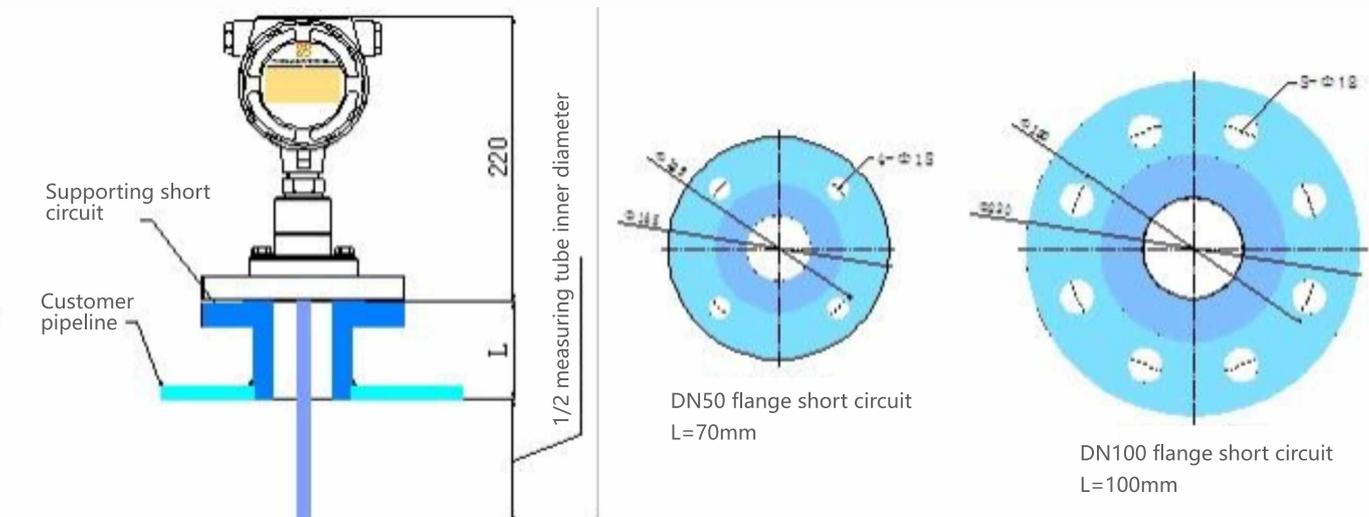
Welded Type (suitable For ≤ 42mpa)

	Nominal Diameter	Overall Width		Total Height	Remark
	mm	L1	L2	H	The above dimensions are for reference only, and the actual size is subject to the factory product
	DN15	54	100	385	
	DN20				
	DN25				
	DN32				
	DN40				
	DN50				
	DN65	85	120	420	
	DN80			445	
	DN100				

Instructions

- a、 Connect the relevant technical requirements of the national standards GB/T9115.1 to 9115.4-2000 in France,
- b、 The A and B sizes corresponding to special orders, high and low temperature types, and temperature pressure compensation types are consistent with the regular product sizes;
- c、 Other countries' (Japanese, German, American, etc.) standard flanges are all special orders;
- d、 When ordering the medium fluid from top to bottom or from bottom to top, please indicate: right view, left view (display header).

Plug-in



Instructions

1. Flange description

Short circuiting flanges shall comply with the relevant technical requirements of the national standards GB/T9115.1 to 9115.4-2000. It can also be executed according to user needs in the Americas, Europe, etc. Special standards.

2. Structural description

- The actual size of plug-in high-temperature or temperature pressure compensation type shall be subject to the factory (order);
- When ordering the medium fluid from top to bottom or from bottom to top, please indicate: right view, left view (display header).

Split-type



The body type connection can be divided into: pipe flange type, pipe cone thread type, clamp type, and insertion type.

Split type refers to the conversion of LCD display to digital tube display, with the instrument body and display part separated and connected by ordinary multi-core or shielded multi-core cables. Factory standard 25 meter cable.

The power supply is generally directly supplied with 220VAC or 24VDC.

This type of flowmeter is suitable for reading flow values directly from a distance of no more than 100m between the meter body and the display unit.

The external structure and dimensions of the header shall be based on the factory product.

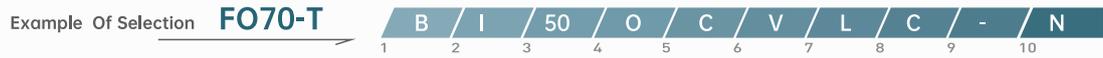
FO70-T-Selection Composition

Example Of Selection **FO70-T**

1	B	2	I	3	50	4	O	5	C	6	V	7	L	8	C	9	-	10	N
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1. Process Installation Method	A	Pipe cone thread type
	B	Flanged pipeline type
	C	plug-in
	D	Clamp on type
	E	Online disassembly and assembly
	F	Articulated type
	G	
2. Signal output types (can be combined and selected multiple times)	H	Separate secondary instrument display
	I	4~20mA
	J	Pulse transmission
	K	Voltage transmission
	L	Communication output (RS485)
	M	HART protocol
	T()	Other output signals
3. Nominal Caliber	U()	The nominal diameter of the pipeline is measured in millimeters
4. Shell Material	O	stainless steel
	P	carbon steel
	T()	other materials
5. Nominal Pressure	A	0.6MPa
	B	1.0MPa
	C	1.6MPa
	D	2.0MPa
	E	2.5MPa
	F	4.0MPa
	G	5.0MPa
	H	6.3MPa
	I	10MPa
	J	11MPa
	A1	16MPa
	A2	20MPa
A3	26MPa	
A4	42MPa	
A5	42MPa以上	
6. Medium Temperature	V	Room temperature: -20 to+70 °C
	W	High and low temperatures: -196 to+600 °C
7. Type Of Medium	L	liquid
	M	gas
	O	steam
8. Compensation Method	A	Equipped with temperature compensation
	B	With pressure compensation
	C	without compensation

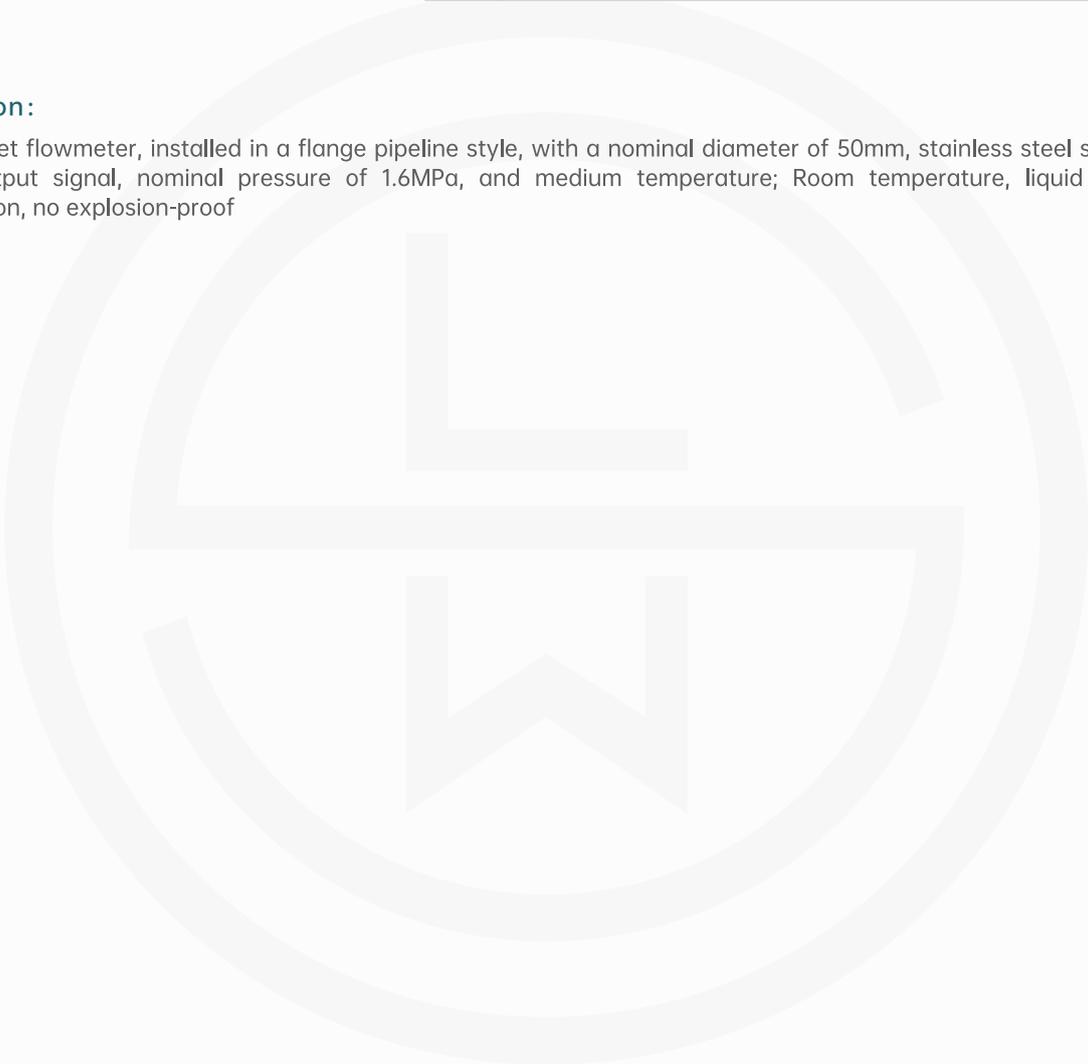
FO70-T-Selection Composition



9. Special Requirements	D	Small traffic
	G	Wide range
	E	bidirectional stream
10. Explosion Proof Requirements	Y	flameproof
	U	intrinsically safe
	N	No explosion-proof

Explanation:

FO70-T target flowmeter, installed in a flange pipeline style, with a nominal diameter of 50mm, stainless steel shell material, 4-20mA output signal, nominal pressure of 1.6MPa, and medium temperature; Room temperature, liquid medium, no compensation, no explosion-proof



Product Certification

Compliance and approval; The Ludwig water quality analyzer meets key standards and certifications for process measurement technology; To ensure the highest reliability in such settings;