

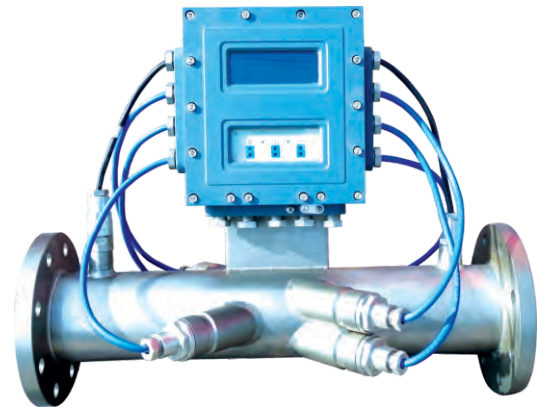
BFUG-Ultrasonic gas flowmeter

Description

BFUG Ultrasonic gas flowmeter is China National Key Technologies R&D Program of 863, and it's high-value product researched and developed by Yinuo with Independent Intellectual Property Rights. It gets an invention patent and a practical new-type patent. It can be extensively applied to the supply, transmission, distribution of most dry gas in fields such as underground air storage, power stations, petrochemical industry, aluminum melters etc. A wide range of gas can be measured by BFUG including natural gas, compact gas, air, fuel gas, corrosive gas, poisonous gas, high-pure gas, etc.



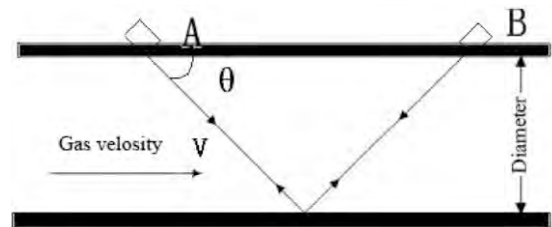
DN300 Ultrasonic gas flowmeter



DN100 Ultrasonic gas flowmeter

Principle

Ultrasonic gas flowmeter is based on the theory of acoustic transit time to calculate the average gas move velocity by measuring upstream and downstream time, in which the ultrasonic waves generated by a pairs of by-directional transducers assembled with an angle respect to axis.



$$(1) \text{ Flow velocity is calculated by } v = \frac{D}{\sin\theta \cos\theta} \left(\frac{1}{t_1 - \tau_1} - \frac{1}{t_2 - \tau_2} \right)$$

$$(2) \text{ Sound velocity is } C = \frac{D}{\sin\theta} \left(\frac{1}{t_1 - \tau_1} + \frac{1}{t_2 - \tau_2} \right)$$

$$(3) \text{ Flow volume is } Q = 3600 v_i \frac{\pi D_i^3}{4} \quad v = 900 v_i \pi D_i^2 v$$

Where v : Gas velocity, m/s;

C : Sound velocity, m/s;

Q : Volume of flowing medium, m^3/h ;

D : Diameter of pipe (m);

θ : Angle of path to the flow ($^\circ$);

t_1, t_2 : Upstream and downstream transit time (s);

T_1, T_2 : The upstream and downstream sound delay time by circuit, cable and transducer (s)

Features

No moving parts, low pressure drop, long life span;
 Bi-directional measurement;
 Simple installation, easy maintenance;
 High accuracy and good reliability;
 Ex-proof: Exd(ib)IIBT4(exclude acetylene);
 Temperature and pressure compensation;
 Suitable for small flowrate and large size pipe.

Specification

Communication Protocol: Modbus;
 Output signal: pulse, 4 to 20mA, RS485;
 Working temperature: -25 to +55 °C
 Ambient temperature: -40 to +70 °C
 Working pressure: 0.6 to 5MPa;
 Humidity: ≤80%(25°C);
 Power supply: 24V or 12V (600mA).

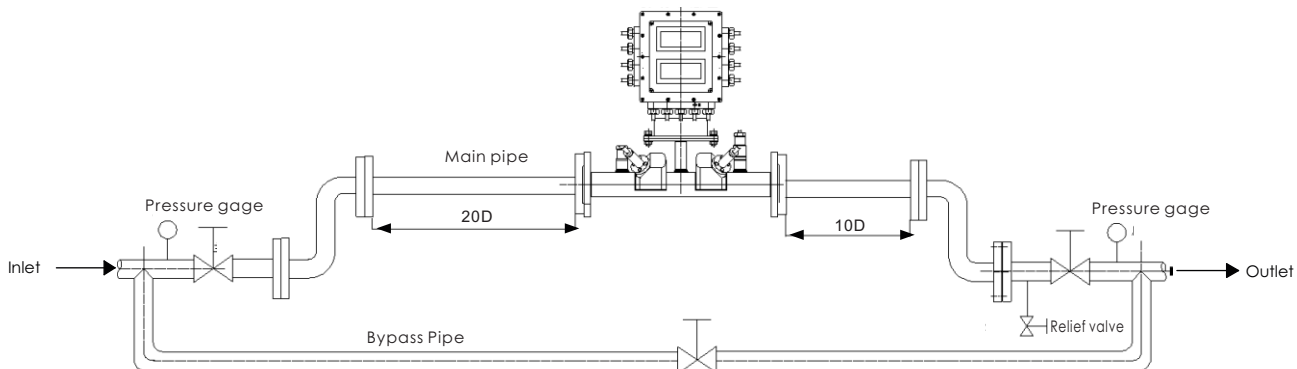
Table1

Size (mm)	Flow range(m ³ /h) and Accuracy		
	0.5%	1.0%	1.5%
	Velocity: 1.25~25m/s	Velocity: 1~25m/s	Velocity : 0.8~25m/s
25	2.5~45	1.8~45	1.4~45
40	5.5~115	4.5~115	3.6~115
50	9~180	7~180	5.5~180
80	23~450	18~450	14~450
100	35~700	28~700	23~700
150	80~1600	64~1600	50~1600
200	140~2830	115~2830	90~2830
250	220~4420	180~4420	140~4420
300	320~6360	250~6360	200~6360
Turndown ratio	1:20	1:25	1:25
Max. Error	Qt≤Q<Qmax	±1.0%	±1.5%
	Qmin≤Q<Qt	±1.0%	±3.0%
Note:	1.Qt is the transition flowrate at velocity of 3m/s. 2.For PN≥4.0MPa, the flowmeter must work under pressure ≥1.0MPa.		

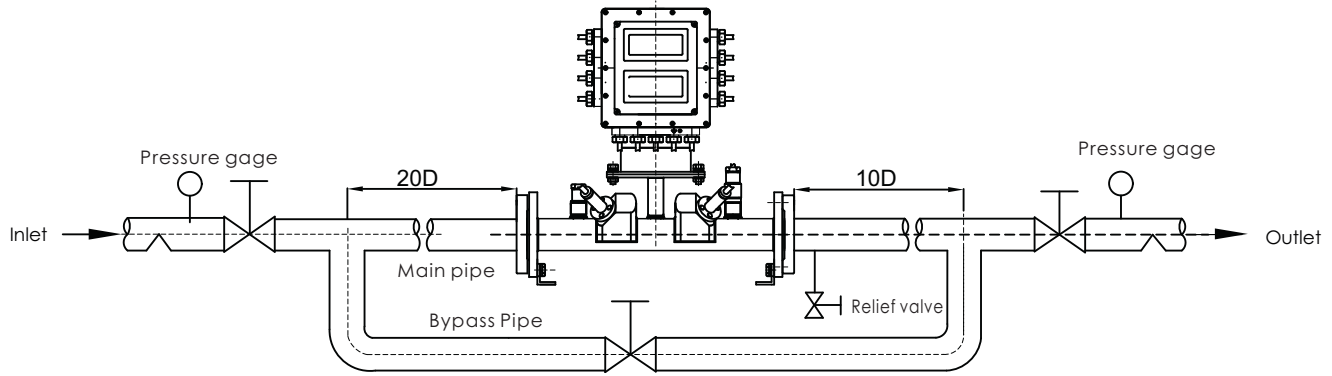
Installation

1.Installation type

Generally, the flowmeter should be installed horizontally. The length of pipe line both up stream and down stream of flowmeter is no less than 10 DN. When install flowmeter in other mode, it should be installed where pipe upward, in case of water to be left in meter body. Direction of medium flow should be the same as marked arrow. No leakage is allowed at joints between pipes and the sealing washer can't protrude into the pipe which would change the current flow and give rise to vortex that could influence the accuracy of flowmeter.



Picture 1 Installation for wet gas



Picture .2 Installation for dry gas

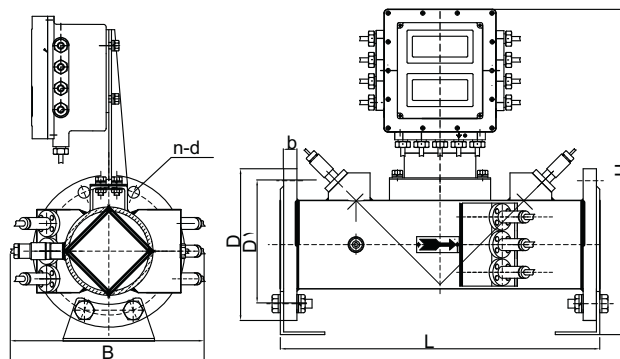
2. Pipe requirements

Make sure the straight pipes upstream and downstream is clean inside without any dents, rust, and delamination etc. There should be no obstacles or branch pipes except pressure tap, and thermowell in those pipes. Plus, flanges and pipes upstream and downstream should have same inside diameter and be smooth at joints.

Installation Notes

- A. Installation of intrusive transducer: It should be installed by specialists with professional tool, transducers should be installed at $\pm 90^\circ$ to the pipe. After installation, there should be no gas leakage where transducers are inserted.
- B. Two transducers are not interchangeable and they are in match with the meter. And it should be recalibrated when the transducer is changed.
- C. To ensure the performance of LYNSB, the pipe length upstream should not be less than $10 \cdot DN$ s, and same with downstream.
- D. Cable length of transducer is not allowed to change except by specialists. And flowmeter shall be recalibrated after changing cable length.
- E. Ultrasonic gas flowmeter shall be installed by specialist and be fixed with pipes by flanges and the arrow marked on meter shall be the same to flow direction.
- F. The meter should be protected from being interfered because the signal received by transducer is very small. Non-professional staff shall not touch elements on circuit board.

3. Outline Dimension (See picture 3 and table 2)



Picture 3

Table 2

DN (mm)	Dimension PN _{4.0} MPa			Weight (kg)
	L	B	H	
25	500	230	460	17
40	500	270	470	21
50	500	280	480	24
80	600	310	510	30
100	600	320	520	35
150	600	360	580	49
200	700	410	630	70
250	700	460	680	92
300	800	480	730	117

Note: Please contact us for PN>4MPa.

Model Selection

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 0 1 2 3 4 5 6 7 8 9 10

Explanation:

0. BigFlow ultrasonic gas flowmeter

1. DN (mm): 025-25, 032-32, 040-40, 050-50, 065-65, 080-80, 100-100, 125-125, 150-150, 200-200, 250-250, 300-300;

2. Medium: Q- Gas;

3. Electricity Shield: A- General Type, B- Ex-proof Type Exd(ib)IIBT4 (exclude acetylene)

4. Power Supply: 1-24VDC, 2-12VDC;

5. Modbus Output: R2- RS232, R4-RS485, R0-NO

6. Structure: 1-Integrate Type, 2- Separate Type (to be developed), 3- Flush-mounted type (to be developed), 4- Portable Type (to be developed)

7. Compensation Function: W-with temperature and pressure compensation, N- no compensation

8. Nominal Pressure (MPa): 1-0.6, 2-1.0, 3- 1.6, 4- 2.5,5-4.0,6-6.3;

9. Output signal: F- pulse signal, I-(4-20)mA current signal

10. Accuracy : 0.5- 0.5%, 1.0- 1.0%, 1.5- 1.5%

e.g. BFUG-200 Q B 1 R4 1 W 6 I 0.5

BigFlow ultrasonic gas flowmeter, DN200, to measure gas, ex-proof type, power supply is 24VDC, output port is RS485, Integrate type, with temperature and pressure compensation, Nominal Pressure is 6.3MPa, output signal is current (4~20)mA, accuracy is 0.5%.



BFUG-200mm PN6.3MPa application
 for shale gas distribution metering in Ning 201H1 platform in Sichuan gas field