LGB ANNUBAR FLOW METER

Summary

Because of the wide variety of flow measurement techniques and instrumentation types, and the complexity of the objects being measured, flow measurement instrumentation is technically complex to apply. It is very different from the traditional application of metrology measuring instruments - it is not simply to install the flowmeter, open the meter to run will necessarily be able to achieve the purpose of measurement. As most of the flow meters are medium contact type, it is necessary to ensure the safe operation of the instrument on the basis of the instrument, and strive to improve the accuracy of the measurement instrument and energy saving. This is not only to select flow meters with the required accuracy, but also to select a reasonable measurement method according to the characteristics of the measured medium.

Operating Principle

The principle of operation of an Annubar Flow Meter is the same as that of other differential pressure flowmeters, which is based on the principle of energy conservation in a sealed pipe. However, due to its unique structural design, the Annubar Flow Meter offers the following advantages.

• Unique rhombic single-piece, double-cavity structure: a metal-cavity structure made by special processing, which avoids the leakage or breakage between the chambers, caused by the multi-piece structure or welding process of other shapes of rheostat transducers, and increases the overall strength of the sensor part.
• It is suitable for measuring a wide range of medium, like gases/ vapors/liquids, and has a wide range of applications.
• High measurement accuracy and good repeatability - accuracy up to ±1.0% and repeatability up to 0.1%.
• Stable measurement signals with low fluctuations.
• Permanent pressure loss is very small, which is about 3% of full scale differential pressure and can be virtually ignored.
• Low installation cost and basically maintenance-free - the installation only requires a simple hole and welding on the pipe, with very low cost. There're little moving parts overall and it's basically maintenance-free.
• The temperature and pressure of the medium can be measured directly, and also the mass flow rate and standard flow rate of vapors and gases can be calculated.
• The choke (sensing) elements and transmitters are all common and freely interchangeable, saving the cost of spare parts. Optional intelligent, with HART communication, makes remote configuration possible.

Flow Meter Components

The Annubar Flow Meter consists of a primary choke (sensing) element, a transmitter, and a valve unit.

Transmitter   +   Primary Element   =
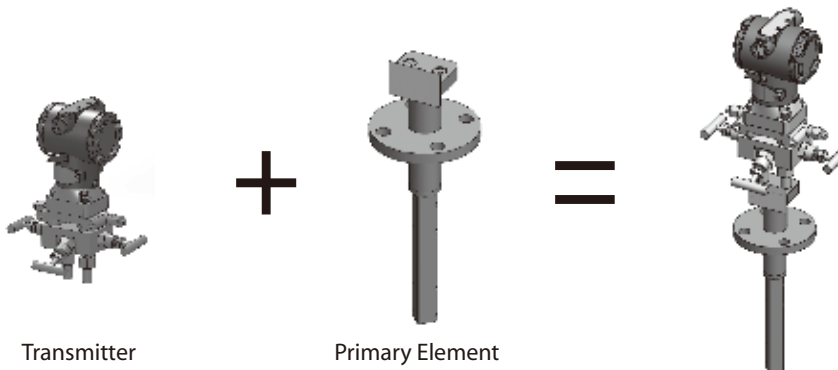
Measurement Principle

The Annubar Flow Meter is a differential pressure flow meter. Flow instruments based on the differential pressure principle have been in use for more than a hundred years so far. The differential pressure principle is based on the principle of energy conversion in a sealed pipe, which means that for a stable fluid, the flow rate is proportional to the square root of the flow rate of the medium in the pipe. As we know, the pressure decreases as the velocity increases. When the medium is close to the throttle, the pressure is P1; when the medium goes through the throttle area, due to the medium circulation area decreases, so the flow rate will increase, the pressure decreases to P2. When the flow rate changes, the differential pressure value between the two pressure ports of the flow meter will increase or decrease. When the flow rate is constant, if the throttling area is large, the resulting differential pressure will be large.

$$Q = K \cdot Y \sqrt{\frac{\Delta P}{\rho}}$$

- Q: Volumetric Flow Rate
- K: Dimensionless Constant, varies by flow meter
- Y: Gas Compression Coefficient, Y=1 for non-compressed fluids
- ΔP=P1-P2, the Pressure Difference between upstream and downstream of the primary choke.
- ρ: Fluid Density

Main Advantages

- Widely used in the measurement of various dry or humid gases, liquids, vapors and other media.
- Special 1.4528 and Hastelloy probe materials are available to cope with a variety of aggressive media.
- Low pressure hole diameter of 8mm, providing good anti-clogging performance.
- Symmetrical probe cross-section, allowing bidirectional measurement.
- Low loss of pipeline power.
- Easy to install, with integrated or split installation options.

Technical Specifications

Type of primary choke (sensing) element (1) (2) (3)

Model	Economical threaded connection	Economical flange connection	Accuracy Pipelined
Accuracy	±1.0%		±0.5%
Repeatability	±0.2%		
Range Ratio	Usually 10:1, special cases depending on parameters		
Requirements for Straight Pipe	Usually 8D in front, 4D in back.		
Suitable Sensor Type	Reynolds number >6500, No.05 probes. Reynolds number >12500, No.10 probes. Reynolds number >25000, No.20 probes		
Pressure Loss	Differential pressure value of 3%, calculated		
Size	DN50-1800		
Temperature	Integral installation up to 260℃ Split type installation up to 400℃		
Flange Standard		ANSI B16.5 HG20592	ANSI B16.6
Pressure		150#-1500#	150#-1500#
Pressure Extraction Method	Thread, Socket Weld, Coplanar Flange		
Medium	Gases, Liquids, Vapors		
Applicable Situations	Medium/low pressure, conventional applications	High /medium/low pressure, conventional applications	Small diameter, where precise measurement is required

Note:

(1) Use the relevant software package to calculate the flow rate before selecting products.

(2) This catalog does not include transmitter selection information. if it's needed, please consult the local agent or manufacturer directly.

(3) The flow meter can be installed vertically, but this should be specified in advance when ordering. For liquids, it is recommended to keep the flow direction from bottom to top, and for gases, it is recommended to keep the flow direction from top to bottom.

Model Selection Table

1. Inserted Type

LGB-C			Annubar Flow Meter			
Process Connection	01		Process Connection			
	02		Double-sided support type with threaded connection			
	03		Flange connection type			
	04		Double-sided support type with flange connection			
Sensor Mode		A	Type A Sensor（Suitable to Size DN50-DN200）			
		B	Type B Sensor（Suitable to Size DN150-DN900）			
		C	Type C Sensor（Suitable to Size DN300-DN1800）			
Sensor Material		S	S316L			
		A	alloy steelSpecial materials (to be specified)			
		E				
Pipe			DN XXX	Pipe XXX		
Pipe Material				CS	Carbon Steel	
				S1	SS304	
				S2	SS316	
				C5	15CrMo	
				00	Special materials (to be specified)	
Pressure Port					R	Threaded connections, openings on both sides
					RS	Socket welded, openings on both sides
					P	Threaded connection, opening end up
					PS	Socket weld, open end up
					F1	Direct standard (connected to a Tri-valve manifold)

2. Pipelined Type

| LGB-G		Annubar Flow Meter						
Process Connection	S	Flat welded flange						
	W	Butt welded flange						
	H	Straight welding (flangeless)						
Sensor Mode		A	Type A Sensor（Suitable to Size DN50-DN200）					
		B	Type B Sensor（Suitable to Size DN150-DN900）					
		C	Type C Sensor（Suitable to Size DN300-DN1800）					
Sensor Material			S	S316L				
			A	alloy steel				
			E	Special materials (to be specified)				
Pipe Size				05	DN50			
				08	DN80			
				10	DN100			
				-	-			
Nominal pressure					150	ANSI B16.5 150#Flange RF sealing surface		
					300	ANSI B16.5 300# Flange RF sealing surface		
					600	ANSI B16.5 600# Flange RJ sealing surface		
Pipe Material						CS	Carbon Steel	
						S1	SS304	
						S2	SS316	
						C5	15CrMo	
						00	Special materials (to be specified)	
Pressure Port							R	Threaded connections, openings on both sides
							RS	Socket welded, openings on both sides
							F1	Direct standard type
							F3	Coplanar standard type
☐	☐	☐	☐	☐	☐	☐	☐	

Example

LGB-GSAS05 150CSR: Annubar Flow Meter; Process Connection: Flat Welded Flange; Sensor Type: Type A; Sensor Material: 316L; Piping size: DN50; Nominal Pressure: CL150#; Sealing Surf: RF; Pipe Material: Carbon Steel; Pressure Port: Threaded; Openings: On Side.

Structural Dimensions
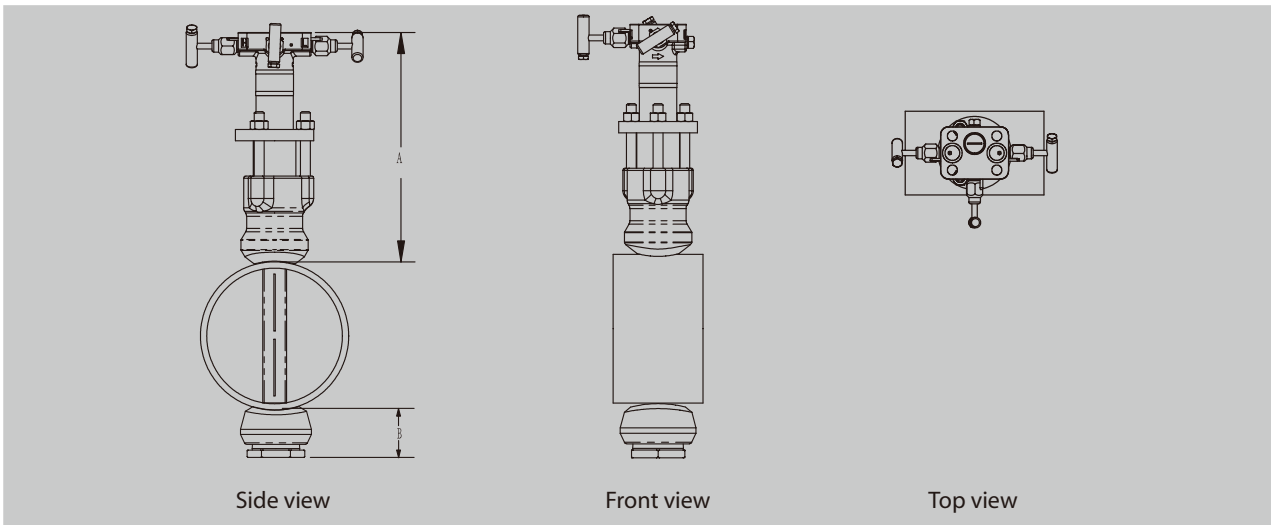
1. Economical Threaded Connection

Outline Diagram (Threaded)

Side view   Front view   Top view
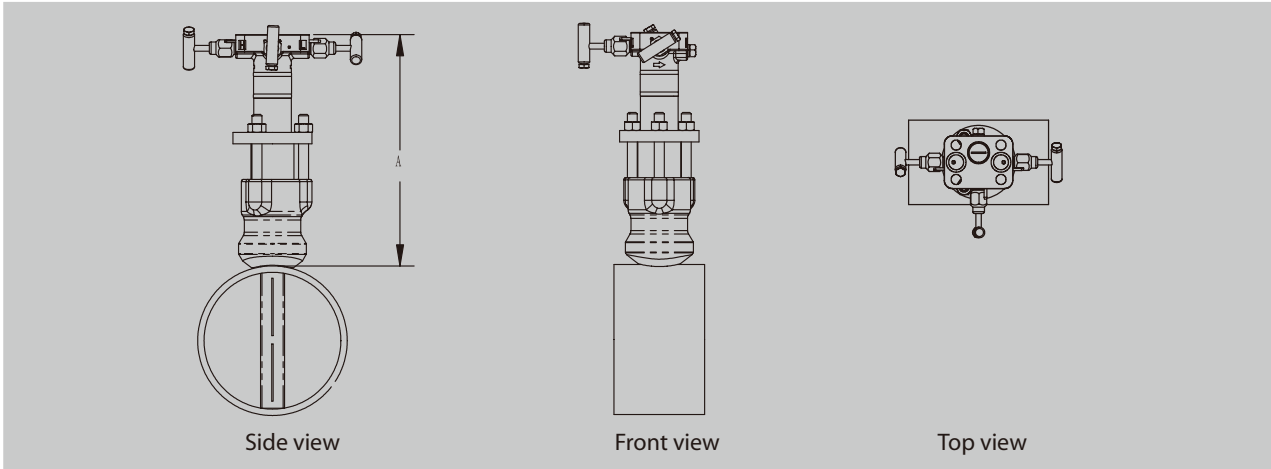
Structural Dimension Table

Sensor Model	A(Max. mm)
Type A	220
Type B	280
Type C	320

Outline Diagram (Double-Sided Support)

Side view   Front view   Top view

Structural Dimension Table

Sensor Model	A(Max. mm)	B(Max. mm)
Type A	220	70
Type B	280	70
Type C	320	100

2. Flange connection

Outline Diagram (Flange)

Side view   Front view   Top view
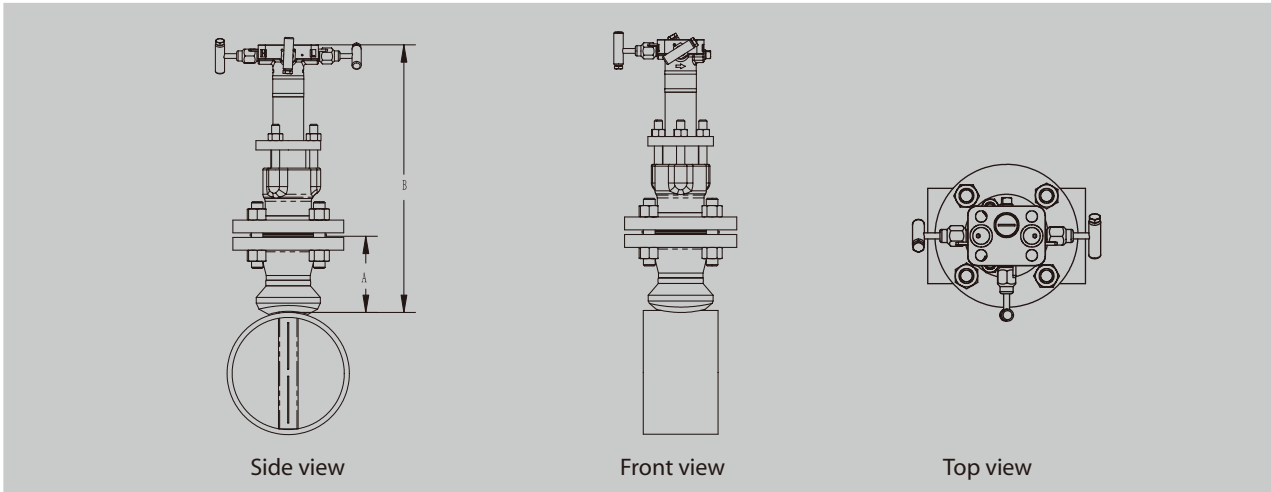
Structural Dimension Table

Sensor Model	A(Max.mm)*	B(Max.mm)*
Type A	110	310
Type B	120	360
Type C	130	440

Outline Diagram (Double-Sided Support)

Side view   Front view   Top view
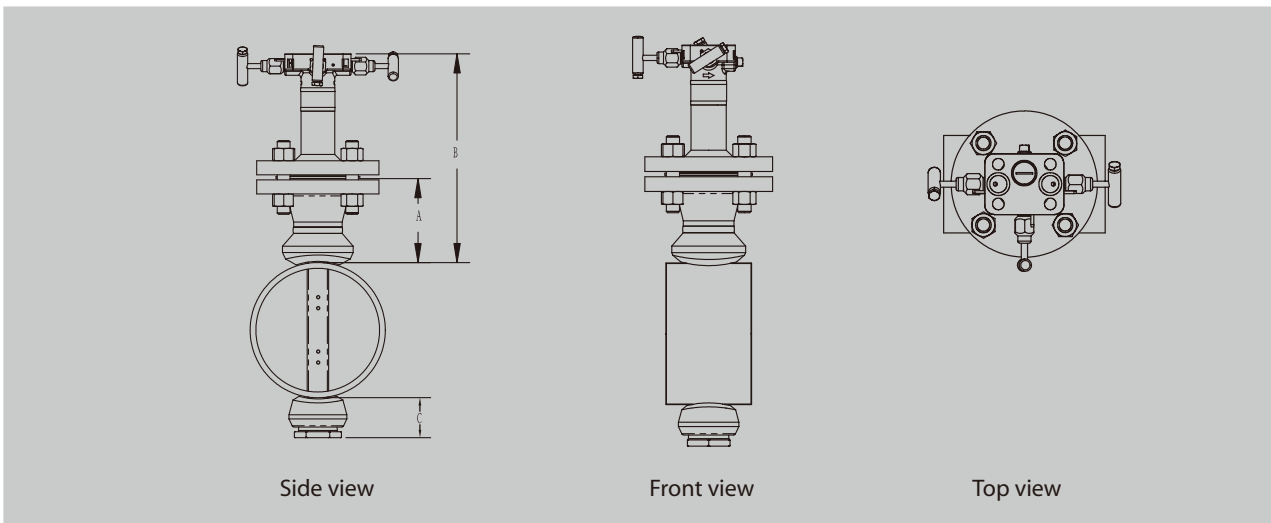
Structural Dimension Table

Sensor Model	A(Max. mm)	B(Max. mm)	C(Max. mm)
Type A	110	310	70
Type B	120	360	70
Type C	130	440	100