LOMAS
TECHNOLOGY - GERMANY

Description

Vortex flow meter is one kind of velocity type flow meter, it's based on Karman vortex theory and adopts piezoelectric crystal to detect the burble frequency of the fluid caused by flowing through the triangular prism in the pipeline and then measure the flow of fluid. It is widely used in petrol, chemical industry, light industry and power heat supply and so on.

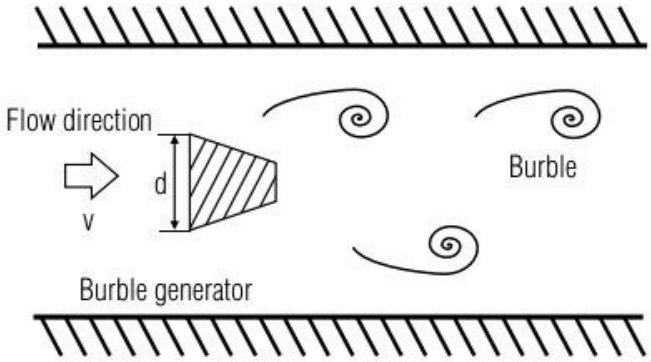
Working Principle

When the fluid in the pipeline passes the burble generator(triangular prism),burble will generate due to the acceleration of partial flow rate. The burble will arise alternatively in two burble lines, which is called Karman vortex.

The releasing frequency of Karman vortex depends on the size of triangle prim and flow rate of fluid, while independent of the medium feature parameter, such as the temperature, pressure, it can be indicated by the following formulas:

F=sR*v(1-1.27*d/D) Q=3600*F/K M=Q*P

- F.....ThereleasingfrequencyofKarmanvortex(Hz)
- Sr.....Strouhalnumber(unit:dimensionless)
- V.....Mediumflowrate(m/s)
- d.....Thewidthoftriangleprim
- D.....Vortexmeterinnerdiameter(m)
- Q.....Instantaneousvolumeflowrate(m3/h)
- K.....Vortexmetercoefficient(unitpulsenumber/m3)
- M.....Instantaneousqualityflowrate(kg/h)
- P.....Fluiddensity(kg/m3)



Benefit

- Integrated pressure and temperature compensation. 4-20mA, pulse with HART; Optional pulse with
- RS485 Wide temperature range up to highest temperature 350℃ Adopt Japan OVAL technology and
- design
- Embedded sensor, 4 piezo-electric crystal encapsulated inside the sensor.
- No moving parts, no abrasion, non-wearing parts inside, fully welded SS304 body (Optional SS316)
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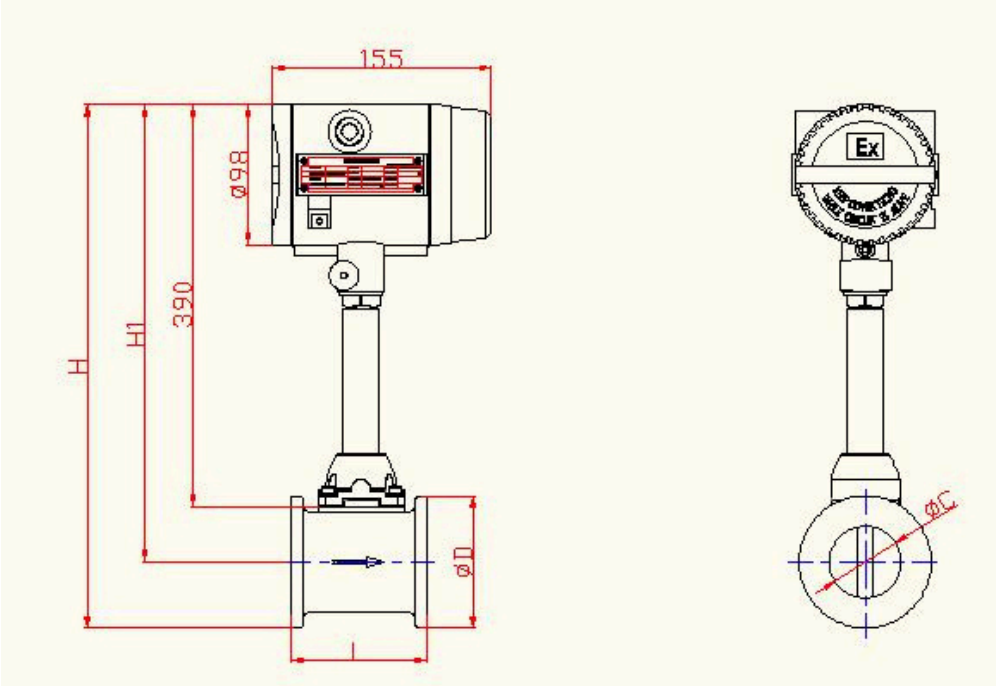
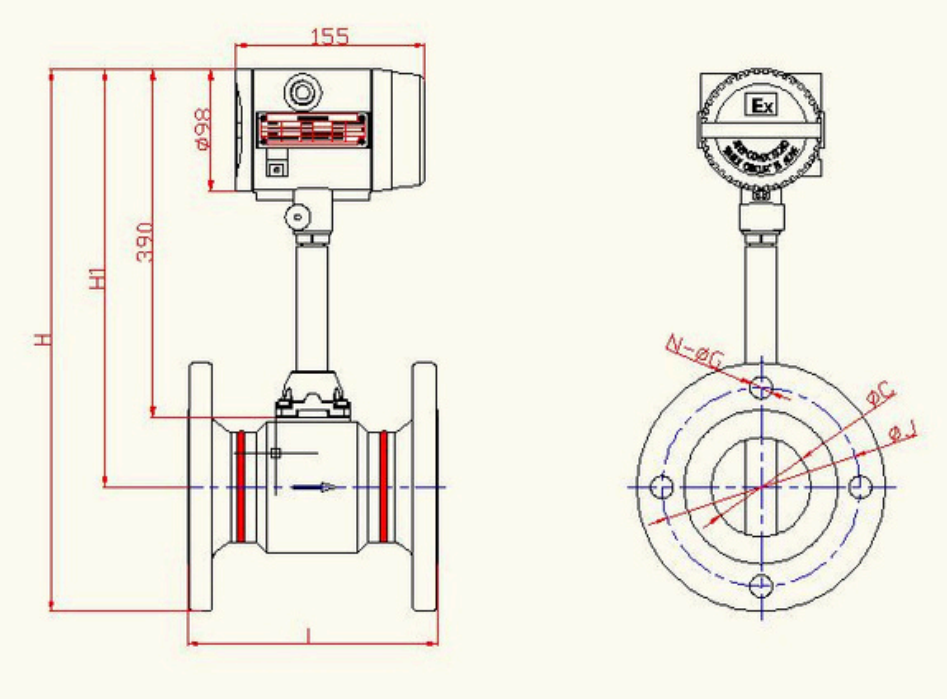
Standard Specification

- Size : DN15-DN300mm
- Accuracy : ±1.5%(standard),±1.0%(optional)
- Power Supply : 12VDC,24VDC
- Communication : RS485/Modbus, Hart, Profitbus
- Flange Standard : EN1092-1
  PN10,PN16,PN25,PN40
  ANSIBS16.5 Class150,300,600
  JIS2220 10K,20K,40
  AS2129 TableD,TableE
  AS4087 PN16,PN21,PN35
- Straight Pipe : Inlet Path ≥ 12D,Outlet Path ≥ 5D
- Signal Output : 4~20 mA,pulse
- Frequency Output : 2~3000 Hz
- RelativeHumidity :≤85%
- Explosion-proof :ExiaIICT6Gb
- Ambient Temperature :-40℃~55℃ (Non Ex-proof Place)
  -20℃~55℃ (Non Ex-proof Place)
- Nominal Pressure : 1.6 MPa, 2.5 MPa, 4.0 MPa
- ProtectionGrade :IP65
- Velocity :0.4~7.0m/sliquid
  4.0~60 m/s gas
  5.0~70 m/s steam
- BodyMaterial :SS304(Standard),SS316(Optional)
- Resistance Coefficient : Cd ≤2.6
- Oscillatory Acceleration: ≤0.2g
- ReynoldsNumber :2x104~7x106



Wafer type

Pipe size	H1	H	L	D	C
15	431	448	70	35.1	15
220	431	452	70	43	20
25	431	456	70	50.8	25
32	431	463	70	64	32
40	428	464	70	73	40
50	431	477	75	92	50
65	440	492	75	105	65
80	448	511	100	127	80
100	459	537	120	157.2	100
125	471	564	103	186	125
150	484	592	120	216	150
200	504	624	98	240	200
250	535	684	114	298	250
300	560	734	130	348	300



Flange type

Pipe size	L	H1	China GB 1.6MPa			ANSI 150RF			ANSI 300RF			C
			H	J	N-ϕG	H	J	N-ϕG	H	J	N-ϕG	
15	170	431	478	65	4-ϕ14	/			/			15
20	170	431	483	75	4-ϕ14	480	70	4-ϕ15	489	82.5	4-ϕ19	20
25	170	431	488	85	4-ϕ14	485	79.5	4-ϕ15	493	89	4-ϕ19	25
32	170	431	501	100	4-ϕ18	490	89	4-ϕ15	497	98.4	4-ϕ19	32
40	170	428	503	110	4-ϕ18	491	98.5	4-ϕ15	506	114.5	4-ϕ23	40
50	170	431	513	125	4-ϕ18	507	120 .5	4-ϕ19	513	127	8-ϕ19	50
65	170	440	532	145	4-ϕ18	529	139 .5	4-ϕ19	535	149	8-ϕ23	65
80	200	448	548	160	8-ϕ18	543	152 .5	4-ϕ19	553	168	8-ϕ23	80
100	220	459	569	180	8-ϕ18	573	190 .5	8-ϕ19	586	200	8-ϕ23	100
125	220	471	596	210	8-ϕ18	598	216	8-ϕ23	610	235	8-ϕ23	125
150	270	484	626	240	8-ϕ22	623	241 .5	8-ϕ23	643	270	12-ϕ23	150
200	310	504	674	295	12-ϕ22	675	298 .5	8-ϕ23	694	330	12-ϕ25	200
250	370	535	737	355	12-ϕ26	738	362	12- ϕ25	757	387.5	16-ϕ30	250
300	400	560	790	410	12-ϕ26	801	432	12- ϕ25	820	451	16-ϕ33	300

Flange Type Vortex Flow Meter Dimensions

Table 2: Superheated Steam Density & Relative Temperature and Pressure (Kg/m³)

Absolute Pressure (MPa)	Temperature (℃)					
	150	200	250	300	350	400
0.1	0.52	0.4	0.42	0.38		
0.15	0.78	0.7	0.62	0.57	0.52	0.49
0.2	1.04	0.9	0.83	0.76	0.69	0.65
0.25	1.31	1.1	1.04	0.95	0.87	0.81
0.33	1.58	1.3	1.25	1.14	1.05	0.97
0.35	1.85	1.6	1.46	1.33	1.22	1.13
0.4	2.12	1.8	1.68	1.52	1.40	1.29
0.5	-	2.3	2.11	1.91	1.75	1.62
0.6	-	2.8	2.54	2.30	2.11	1.95
0.7	-	3.3	2.97	2.69	2.46	2.27
0.8	-	3.8	3.41	3.08	2.82	2.60
1.0	-	4.8	4.30	3.88	3.54	3.26
1.2	-	5.9	5.20	4.67	4.26	3.92
1.5	-	7.5	6.58	5.89	5.36	4.93
2.0	-	-	8.96	7.97	7.21	6.62
2.5	-	-	11.5	10.1	9.11	8.33
3.0	-	-	14.2	12.3	11.1	10.1
3.5	-	-	17.0	14.6	13.0	11.8
4.0	-	-	-	17.0	15.1	13.6

Table 3: Flow Range

Caliber (mm)	Liquid (m³/h)	Gas (m³/h)
15	0.8~6	6~40
20	1~8	8~50
25	1.3~15	8~100
32	1.5~16	14~350
40	3~33	18~450
50	4~44	30~750
65	6~66	50~1250
80	13~140	70~1750
100	20~220	100~2500
125	36~400	200~5000
150	50~600	400~10000
200	100~1200	600~15000
250	150~1800	1000~25000
300	200~2400	-
400	300~3600	-
500	400~4800	-
600	500~6000	-

The Choice for Measured Medium

The choice for gas flow range The upper limit of vortex flowmeter does not influenced by the temperature and pressure of medium. Flow range is depended on the medium's density and viscosity at working condition.Thus, the confirmation of flow range is calculation the available lower limit flow. Calculation 1:First of all, using QP formula to calculate the working condition lower limit flow,which is determined by viscosity

Intheformula QP=Q0X

QP: Medium's lower limit flow at working condition density

Qo: Lower limit flow of flowmeter at reference condition

ρo:Referencetheairdensity, ρo=1.205kg/m³

ρ: Working condition density of medium to be measured

Calculation 2 Qv formula for calculation the lower flow limit by kinematic viscosity

Intheformula: Q₹Q OxV/VO ³

Qv : Lower limit flow of the medium Qo: Low flow limit at reference condition Vo: Reference viscosity,15kgm/S² V: The working condition viscosity of medium(kgm/S²) Compare Qo and Qv, the larger flow as the real low flow limit of gas. **The choice for liquid flow range** As shown on flow range table 3 **The choice of steam flow range** Saturated steam: Reference to table 1 to choose Superheated steam: Through table 2 to get the pressure, temperature and corresponding density,taking the similar density's flow range from table six to confirm the flow range of superheated steam.

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Selection Table Vortex Flow Meter

Model	LUGB									
Caliber	DN15-DN300									
Structure	Integrated	I								
	Seperated	S								
Nominal	1.6MPa		P1							
	2.5MPa		P2							
	4.0MPa		P3							
Connection	Flange			C1						
	Wafer			C2						
	Tri-clamp			C3						
	Thread			C4						
Medium	Liquid				M1					
	CommonGas				M2					
	SaturatedSteam				M3					
	SuperheatedSteam				M4					
ShellMaterial	Stainlesssteel304					K2				
	Stainless steel 316					K3				
Flange Standard	ANSI 150#, 300#, 600#						F1			
	JIS 10K, 20K, 40K						F2			
	DIN PN10,PN16,PN25,PN40						F3			
PowerSupply	24V							D1		
	3.6V Lithium							D2		
SignalOutput	4~20mA,HART								G1	
	Pulse,RS485								G2	
SpecialMark	Standard signal output									B1
	Intrinsically safe ex-proof									B2
	On site display									B3
	Temperaturecompensation									B4
	Pressure compensation									B5
	Temperature and pressure compensation									B6
	High Temperature 350℃									B7

Sensor

Swirler

Available Flow Totalizer

Installation Straight Length Requirement

Upstream Straight pipe form	The Straight length of upstream	The Straight length of downstream
Concentric tube fully open valve	≥ 12DN	≧ 5DN
Concentric contraction fully open valve	≥ 15DN	
Single quarter bend	≥ 20DN	
Two quarter bends on the same surface	≥ 25DN	
Two quarter bends on the different surface	≥ 40DN	
Regulating valve、Half-open gate valve	≥ 50DN	