



VORTEX FLOW METER

Vortex Flowmeter Advantages:

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

AKTEK ENDÜSTRİYEL EKİPMAN VE ENSTRÜMANTASYON LTD. ŞTİ

☎ 0090 216 540 7300 🖨 0090 216 540 7303

Overview

Vortex flow meter is one kind of speed type flow meter,

It 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.

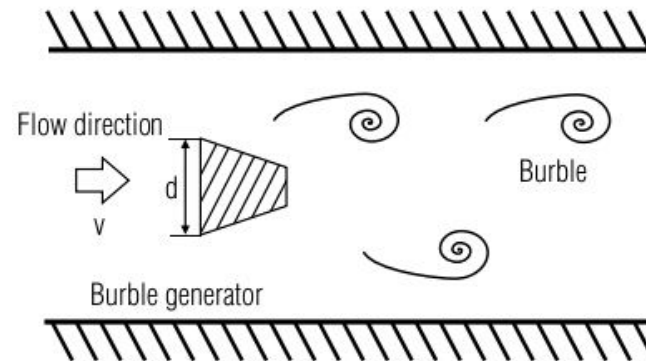
Vortex flow meter is widely used in petrol, chemical industry, light industry and power heat supply and so on.



Measuring Principle

When the fluid in the pipeline passes the burble will generate due to the acceleration of partial alternatively in two burble lines, which is called

The releasing frequency of Karman vortex prim and flow rate of fluid, while independent



generator(triangular prism),burble flow rate. The burble will arise Karman vortex.

depends on the size of triangle of the medium feature parameter,

such as the temperature, pressure, it can be indicated by the following formulas:

$F = sR \cdot v(1 - 1.27 \cdot d/D)$formula 1

$Q = 3600 \cdot F/K$formula 2

$M = Q \cdot p$formula 3

- F.....The releasing frequency of Karman vortex (unit: Hz)
- Sr.....Strouhal number (unit: dimensionless)
- V.....Medium flow rate (unit:m/s)
- d.....The width of triangle prim
- D.....Vortex meter inner diameter (unit:m)
- Q.....Instantaneous volume flow rate (m³/h)
- K.....Vortex meter coefficient (unit pulse number/m³)
- M.....Instantaneous quality flow rate (unit: kg/h)
- P.....Fluid density (unit:kg/m³)

Measuring range of liquid & gas (Working condition)

Caliber (mm)	Liquid(m ³ /h)	Gas(m ³ /h)
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15	0.8~6	6~40
20	1~8	8~50
25	1.5~12	10~80
32	1.5~15	15~150
40	2.5~30	25~200
50	3~50	30~300
65	5~80	50~500
80	8~120	80~800
100	12~200	120~1200
125	20~300	160~1600
150	30~400	250~2500
200	50~800	400~4000
250	80~1200	600~6000
300	100~1600	1000~10000
400	200~3000	1600~16000

500	300~5000	2500~25000
600	500~8000	4000~40000

Note: if client want to know the mass flow rate, they need to calculated according to density, density is depends on the different temperature and pressure.

Vortex Flow Meter Type



Flange Vortex Flow Meter



Wafer Vortex Flow Meter



**Flange Vortex Flow Meter with
Temperature & Pressure Compensation**

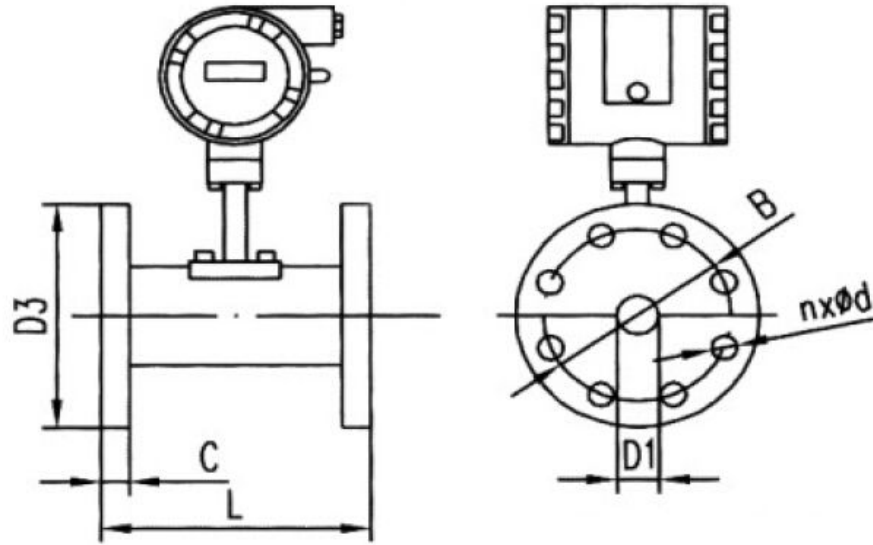


Insertion Vortex Flow Meter



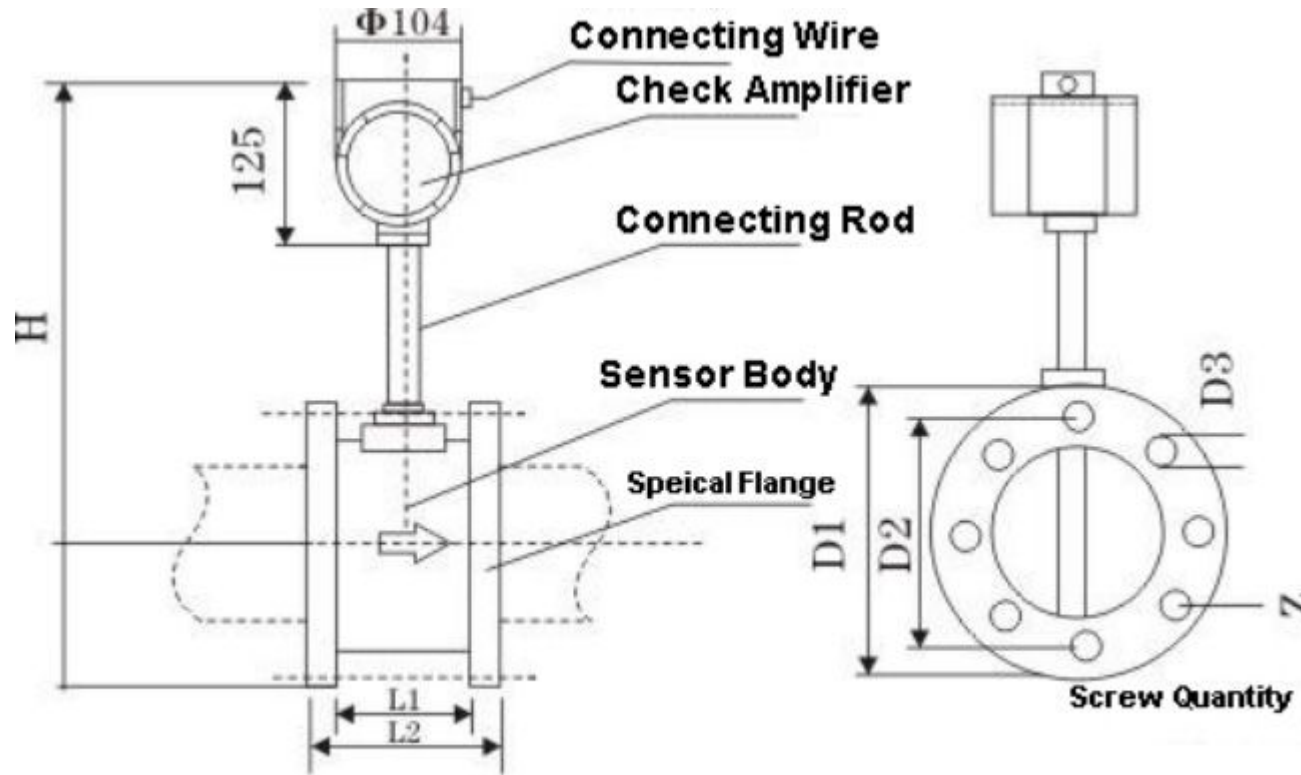
**Sanitary (Tri-clamp) Vortex
Flow Meter**

Flange Connection External Dimension (JIS 10K)



Caliber (mm)	Inner Diameter D1(mm)	Length L (mm)	Flange Outer Diameter D3(mm)	Central Dia of Bolts Hole B(mm)	Flange Thickness C(mm)	Bolt Hole Diameter D(mm)	Hole No.(N)
25	25	170	125	90	14	19	4
32	32	170	135	100	16	19	4
40	40	190	140	105	16	19	4
50	50	190	155	120	16	19	4
65	65	220	175	140	18	19	4
80	80	220	185	150	18	19	8
100	100	240	210	175	18	19	8
125	125	260	250	210	20	23	8
150	150	280	280	240	22	23	8
200	200	300	330	290	22	23	12
250	250	360	400	355	24	25	12
300	300	400	445	400	24	25	16

Wafer Connection External Dimension



Wafer Vortex Flow Meter Structure Drawing

Caliber(mm)	Inner Length (L1)mm	Length (L2)mm	D1	D2	Height (H)mm	Bolt Hole Diameter(D3)mm	Hole No.(N)
15	66	93	95	65	460	14	4
20	66	95	125	100	460	14	4
25	66	95	125	100	460	14	4
40	80	109	145	110	470	16	4
50	80	109	160	125	481	18	4
65	92	117	180	145	497	18	4
80	100	122	195	160	510	18	8
100	125	132	230	190	544	18	8
125	158	146	245	210	564	18	8
150	165	170	280	240	594	18	8
200	197	200	335	295	646	23	12
250	115	214	405	355	708	25	12
300	127	224	460	410	760	25	12

Vortex flowmeter-Saturated Steam Flow Range (kg/h)

Absolute Pressure P(Mpa)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
Temperature T(deg C)	120.2	133.5	143.62	151.84	164.96	164.96	170.41	175.36	179.68	187.96	195.04	201.37	207.11	212.37
Density kg/m3	1.129	1.651	2.163	2.669	3.667	3.667	4.162	4.665	5.147	6.127	7.106	8.085	9.065	10.05
DN20 Qmax	80	102	130	160	190	220	250	279	309	368	426	485	544	603
Qmin	9	11	12	13	15	16	17	18	19	20	22	24	25	26
DN25 Qmax	136	198	260	320	380	440	499	559	618	735	853	970	1088	1206
Qmin	14	17	19	21	23	25	27	28	30	33	35	37	39	42
DN40 Qmax	400	498	649	801	951	1100	1249	1397	1544	1838	2132	2426	2720	3015
Qmin	32	38	44	48	53	57	60	64	67	73	79	84	89	94
DN50 Qmax	667	826	1080	1335	1585	1834	2081	2328	2574	3054	3553	4043	4533	5025
Qmin	52	64	73	81	88	95	100	107	112	122	132	140	149	157
DN65 Qmax	933	1320	1730	2135	2536	2934	3330	3724	4118	4902	5685	6468	7252	8040
Qmin	88	106	121	135	147	158	168	178	187	204	220	234	248	261
DN80 Qmax	1400	1980	2596	3240	4015	4644	5270	5896	6520	7760	9000	10240	11480	12730
Qmin	105	127	1445	161	176	189	201	213	224	345	263	280	298	313
DN100 Qmax	2332	3300	4320	5400	6430	7320	8320	9310	10300	12260	14200	16160	19120	20100
Qmin	175	212	242	269	293	315	336	335	374	408	439	468	496	522
DN125 Qmax	3500	4950	6490	8000	9510	11000	12500	14000	15440	18400	21300	24260	27200	30200
Qmin	262	317	363	404	440	473	504	533	560	611	658	702	744	783
DN150 Qmax	4666	6600	8650	10680	12680	14670	16650	18620	20590	24500	28420	32340	36260	40200
Qmin	350	423	484	538	586	631	672	711	747	815	878	936	990	1044
DN200 Qmax	9330	13200	17300	21360	25360	29340	33300	37240	41180	47000	56850	64680	72520	80400
Qmin	610	740	848	942	1026	1104	1176	1243	1308	1427	1536	1638	1735	1827
DN250 Qmax	13997	19810	25960	32030	38040	44000	49940	55860	61760	73520	85270	97000	108780	120600
Qmin	875	1056	1210	1345	1466	1577	1680	1776	1868	2038	2195	2340	2480	2610
DN300 Qmax	20995	29720	38930	48040	57050	66000	74900	83800	92650	110300	127900	145530	163200	180900
Qmin	1050	1270	1453	1614	1759	1892	2016	2132	2241	2446	2634	2808	2975	3132

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

Absolute Pressure (MPa)	Temperature (°C)					
	150	200	250	300	350	400
0.1	0.52	0.46	0.42	0.38		
0.15	0.78	0.70	0.62	0.57	0.52	0.49
0.2	1.04	0.93	0.83	0.76	0.69	0.65
0.25	1.31	1.16	1.04	0.95	0.87	0.81
0.33	1.58	1.39	1.25	1.14	1.05	0.97
0.35	1.85	1.63	1.46	1.33	1.22	1.13
0.4	2.12	1.87	1.68	1.52	1.40	1.29
0.5		2.35	2.11	1.91	1.75	1.62
0.6		2.84	2.54	2.30	2.11	1.95
0.7		3.33	2.97	2.69	2.46	2.27
0.8		3.83	3.41	3.08	2.82	2.60

1.0		4.86	4.30	3.88	3.54	3.26
1.2		5.91	5.20	4.67	4.26	3.92
1.5		7.55	6.58	5.89	5.36	4.93
2.0			8.968	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

Vortex Flowmeter Model Selection

Selection

QTLU		XXX	X	X	X	X	X	X	X	X
Caliber (mm)	DN15-DN3000 Reference Code, please check caliber code table 10									
Nominal Pressure	1.6Mpa	1								
	2.5Mpa	2								
	4.0Mpa	3								
	Others	4								
Connection	Flange	1								
	Wafer	2								
	Tri-clamp(Sanitary)	3								
	Thread	4								
	Insertion	5								
	Others	6								
Medium	Liquid	1								
	Common Gas	2								
	Saturated Steam	3								
	Superheated Steam	4								
	Others	5								
Special Mark	Normal								N	
	Standard Signal Output								M	
	Intrinscally safe Explosion-proof								B	
	On Site Display								X	
	High Temperature (350°C)								G	

Table 10 Caliber Code Table

Caliber	Code
15	150
20	200
25	250
32	320
65	650
80	800
100	101
125	125
150	151
200	201
250	251
300	301
350	351
400	401
450	451
500	501
600	601
700	701
800	801
900	901

	Temperature Compensation	W				
	Pressure Compensation	Y				
	Temperature&Pressure Compensation	Z				
Structure Type	Compact/Integral		1			
	Remote		2			
Power Supply	DC24V			D		
	3.6V Lithium Battery			E		
	Others			G		
Output Signal	4-20mA				A	
	Pulse				B	
	4-20mA,HART				C	
	Pulse,RS485				D	
	4-20mA/Pulse,HART				E	
	Others				F	
Flange Standard	DIN PN16					1
	DIN PN25					2
	DIN PN40					3
	ANSI 150#					A
	ANSI 300#					B
	ANSI 600#					C
	JIS 10K					D
	JIS 20K					E
	JIS 40K					F
Others					G	

1000	102
1200	122
1400	142
1600	162
1800	182
2000	202
2200	222
2400	242
2600	262
2800	282
3000	302