VFM

Series 8000
Vortex Flow Meter

Operating Principle

The operation of the **VFM 8000** is based on the Karman Vortex Street. Vortices are formed as the fluid flows around the shedder body which are alternately shed from its sides. The flow causes these vortices to be released forming a vortex street (Karman Vortex Street), see Fig.2.

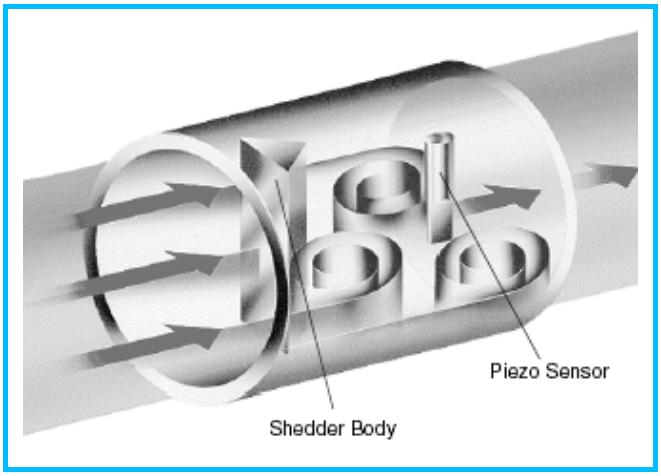


Fig. 2 Measurement Principle 8000 VFM

The frequency **f** of the vortex shedding is proportional to the flow velocity **v** and inversely proportional to the width of the shedder body **d**:

$$\mathbf{f} = \mathbf{Sr} \times \frac{\mathbf{v}}{\mathbf{d}}$$

Sr, the Strouhal Number, a dimensionless number, defines the quality of the vortex flowrate measurements. By appropriate design of the shedder body, **Sr** is constant over a wide Reynolds Number **Re** range (Fig. 3).

$$\mathbf{Re} = \frac{\mathbf{v} \times \mathbf{D}}{\mathbf{v}}$$

v = Kinematics viscosity
D = Meter tube diameter

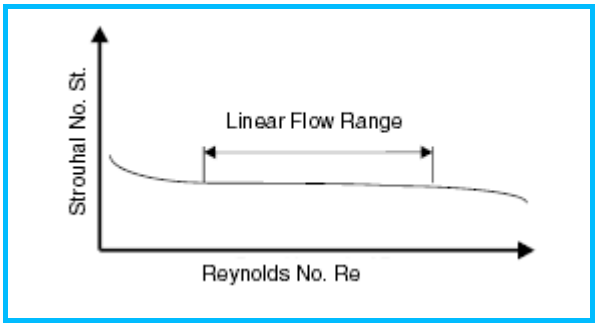


Fig. 3 Strouhal No. / Reynolds No. Relationship

As a result, the vortex shedding frequency to be evaluated, is only a function of the flow velocity and is independent of the fluid density and viscosity.
The local pressure changes resulting from the vortex shedding are detected by a Piezo sensor and converted into electrical pulses corresponding to the vortex shedding frequency.
The flowrate proportional frequency signal generated in the flowmeter primary is processed in the converter into a current output (4- 20 mA) signal.

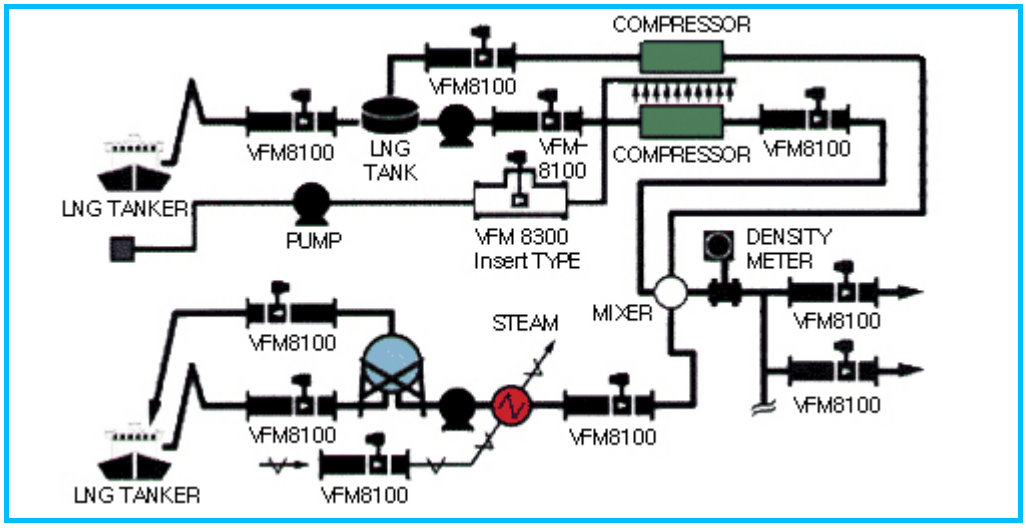
Features

- The Ratio is big, the accuracy is high and the press drop is few, the medium popular use characteristic is good.
- There is pulse signal output and it is possible to connect at computer and use it.
- Sensing parts vortex shedder body and separation saddle.
- The inside high temperature piezo crystal does not contact measurement medium, so the flow meter structure is simple, the popular use characteristic is good and the stability is high.
- It will be able to use various gas and the liquid Steam flow rate inspection and calculation.
- Using together computer, temperature, pressure and the density sensor, high precision mass flow rate or it will be able to create a calorie flow rate inspection weighting system.

Applications

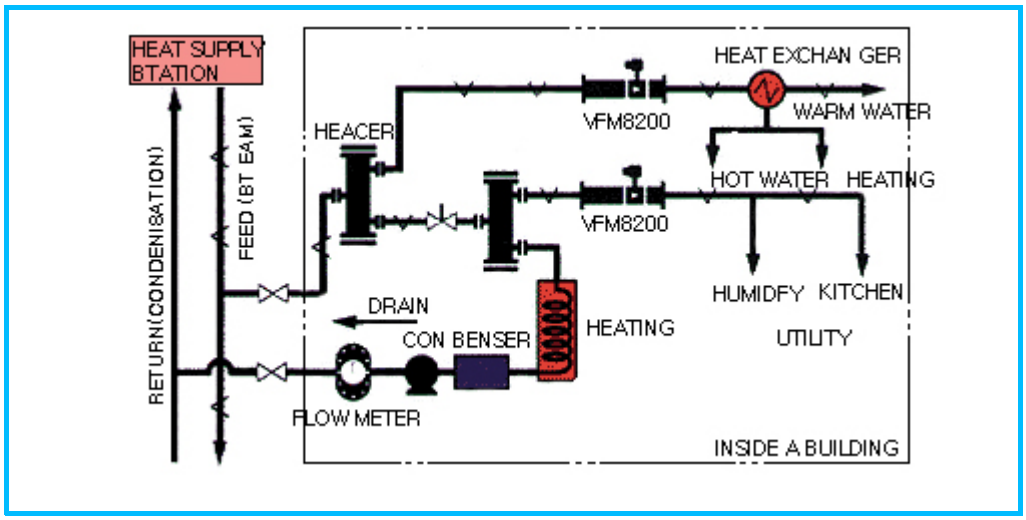
Gas measurement at LNG yard

At an LNG yard, LNG and LPG unloaded from carrier tankers are accepted as raw materials, gas tide and then sold to town gas companies and large users. VFM 8100 and other ientek meters are applicable to gasifying lines, steam lines and many other uses.



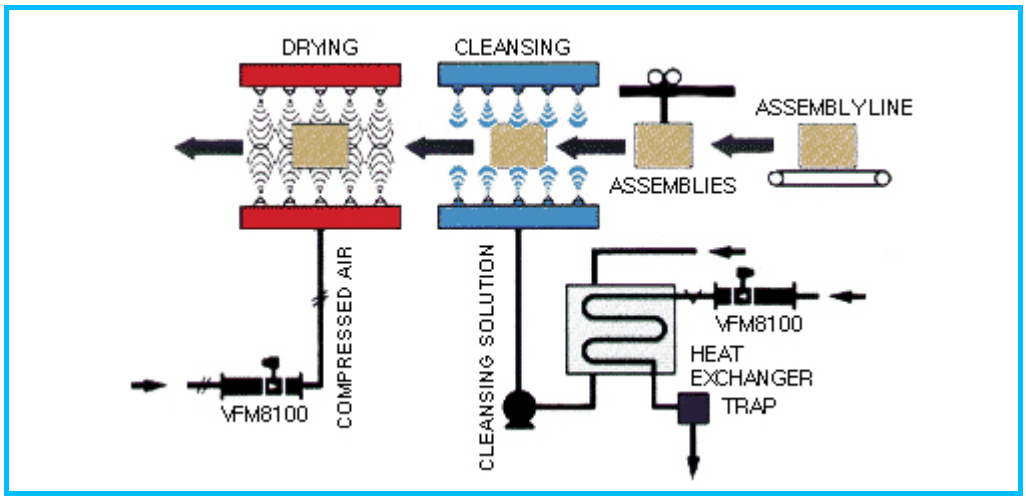
Air conditioning steam measurement

Calorific consumption in steam heating is normally calculated for business transactions by metering the quantity of returned condensation with ientek flow meter. On the other hand, utility steam consumed in room humidification, heating, of cleaning is sold directly through VFM 8100.



Energy measurement in the cleanings and drying processes of assemblies

In the cleaning process of automotive assemblies and subassemblies in the manufacture of motor vehicles of other machines, work is exposed to cleansing solutions sprayed form nozzles and then exposed to large quantities of dry air directed to accelerate the drying step. Here, the VFM 8100 plays an important role of metering the quantities of steam used for heating the solutions as well as those of the drying air, thus contributing to precise energy cost control and saving.



Specifications

Measurement Medium : Various Gas and Liquid, Steam

Pipe Size(DN) : 25~1000mm

Accuracy : 1.0%, 0.5%(Custom-built), Insert : 2.5%

Medium & Ambient Temperature : Medium ..... -40°F to 662°F (-40℃ to 350℃)
Ambient ..... -40°F to 131°F (-40℃ to 55℃)
Relative Temperature ..... 5%~90%

Linearity : ≤±1.0%

Repeatability : ≤0.5%

Standard Pressure : 2.5Mpa, 4.0Mpa, 6.9Mpa (Special Custom-built)

Output Signal : Current pulse, low level 4±0.5mA, high level 20±lmA

Power Requirements : 24V DC

Load Capacity : ≤350Ω

Connection Method : Flange, wafer type, Insert type (≥250mm)

Wetted Materials : ICr18Ni9Ti

Enclosure : IP65

Explosion Class : ia ⅡCT1~6(nature safety) Safety barrier power distribution unit
DⅡBT4 Power supply Power

Relation Equipment : ① Local Indicator/Totalize ② Panel mounting Indicator/Totalize
③ LCD Computer ④ Power Supply Unit
⑤ Power Mounting Indicator/Totalize

Flow Ranges

Table 1. Flow rate range

Sensor Model	DN (mm)	Flow rate range (m^3/h)			Sensor Model	DN (mm)	Flow rate range (m^3/h)		
		Liquid	Gas	Steam			Liquid	Gas	Steam
VFM	25	1~10	10~97	9~80	VFM	300	100~1600	1500~15000	1200~12000
VFM	40	2~30	24~230	20~190	VFM	350	140~2000	2000~20000	1620~16200
VFM	50	3~40	40~370	30~300	VFM	400	180~2700	2700~27000	2100~21000
VFM	65	5~70	63~630	50~500	VFM	500	280~4000	4230~42300	3300~3000
VFM	80	7~100	97~970	80~800	VFM	600	400~6000	6100~61000	4780~47800
VFM	100	10~160	152~1520	125~1250	VFM	700	550~8300	8300~83000	6500~65000
VFM	125	20~260	240~2430	200~2000	VFM	800	720~10800	10850~108500	8500~85000
VFM	150	25~370	350~3500	280~2800	VFM	900	710~13700	13740~137400	10700~107000
VFM	200	50~720	660~6600	540~5400	VFM	1000	1100~16900	16900~169000	13200~132000
VFM	250	80~1100	1000~10000	850~8500					

※ The parameter means is an actual flow rate range and a medium viscosity, pressure, density and temperature all relationship. It refers, it wishes.

Dimension

Figure 1. 8100 Series Wafer Type

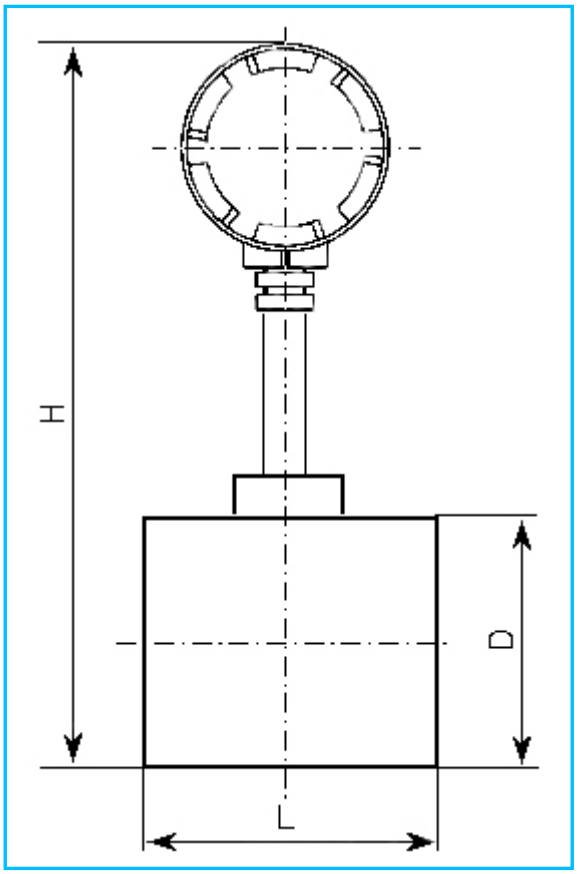


Table 2. VFM 8100 Series Wafer Type size(mm)

DN	Inner dia.	Wafer Type Body		
		L	Outer D	H
25	25	80	76	344
40	39	80	76	335
50	49	80	86	346
65	64	80	102	362
80	79	80	112	374
100	99	80	132	395
125	125	80	175	433
150	149	80	202	458
200	207	100	258	515
250	259	120	311	568
300	309	140	362	618

(1) Measurement medium steam one case H (60mm) increase. There are shedder bodies.

(2) By a user request Flange type body production possibility.

Figure 2. 8300 Series Insert Type Size

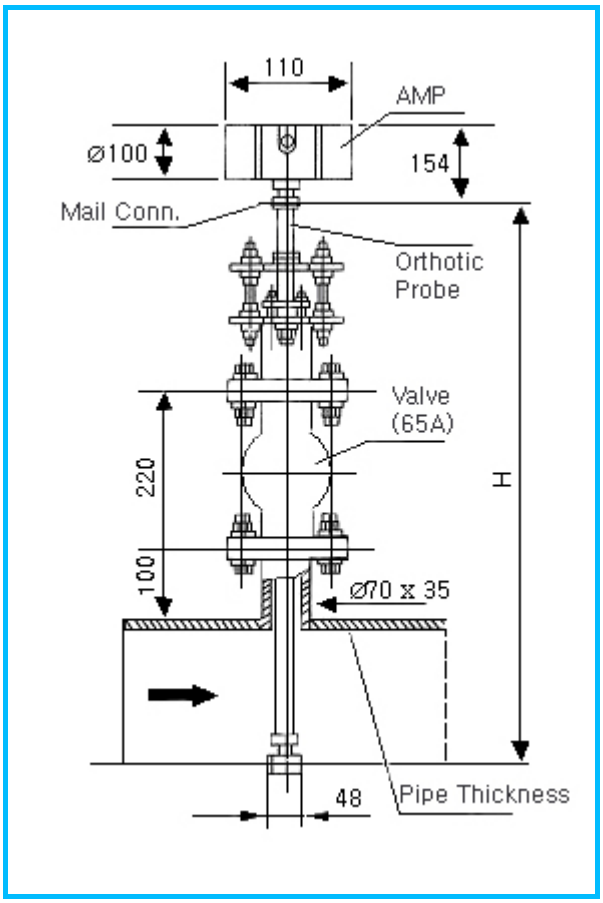


Table 3. VFM 8300 Series Insert type size(mm)

DN(mm)	H(mm)	
dia	Non ball valve	Ball valve
250	~600	~825
300		
350	~650	~875
400		
500	~750	~975
600		
700	~850	~1075
800		
900	~950	~1175
1000		

Figure 3. Flange Dimensional

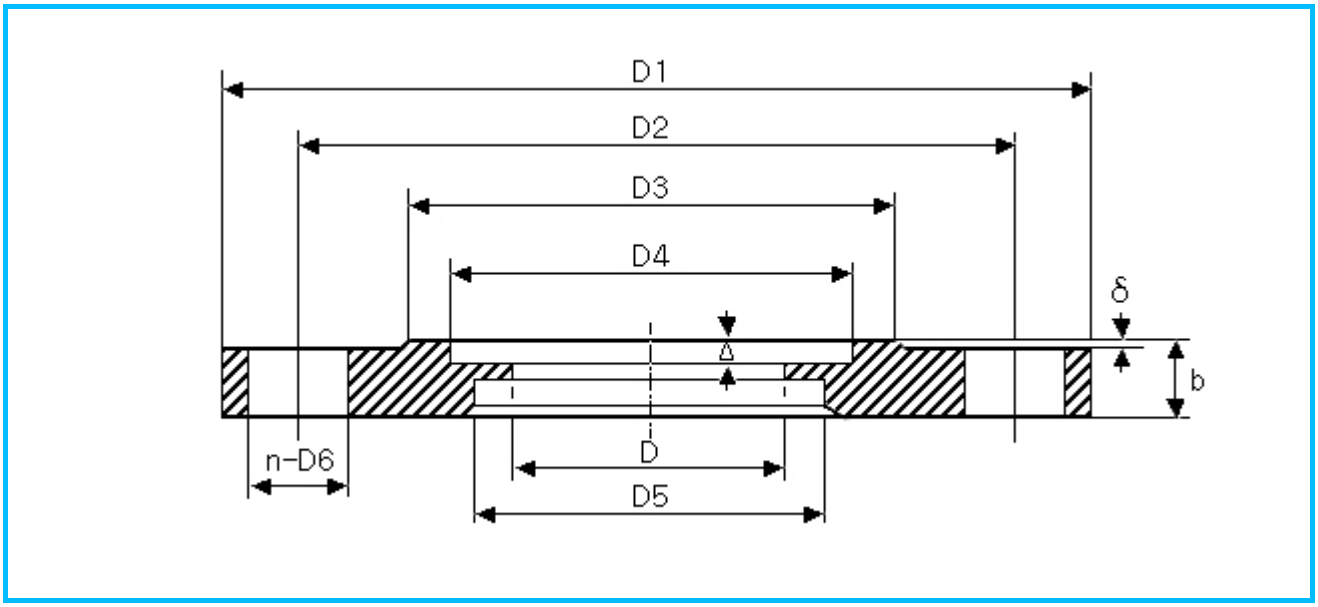


Table 4. P_N2.5Mpa Saddle flange and dual head bolt size table (Size unit：mm)

Size (DN)	D	D1	D2	D3	D4	D5	D6	n	δ	b	Dual head bolt standard = bolt outer Diameter x thread length x bolt length
25	25	145	110	85	77	33	18	4	2	18	M16 x 35 x 165
40	39	145	110	85	77	46	18	4	3	18	M16 x 35 x 165
50	49	160	125	100	87	58	18	4	3	20	M16 x 35 x 165
65	64	180	145	120	103	74	18	8	3	22	M16 x 35 x 165
80	79	195	160	135	113	90	18	8	3	22	M16 x 35 x 165
100	99	230	190	160	133	109	23	8	3	24	M20 x 35 x 180
125	125	270	220	188	176	134	25	8	3	26	M22 x 40 x 190
150	149	300	250	218	203	161	25	8	3	28	M22 x 40 x 190
200	207	360	310	278	259	221	25	12	3	30	M22 x 40 x 210
250	259	425	370	332	312	275	30	12	3	32	M27 x 50 x 240
300	309	485	430	390	328	328	30	16	4	36	M27 x 50 x 270

Table 5. P_N4.0Mpa Saddle flange and dual head bolt nut size table (Size unit：mm)

Size (DN)	D	D1	D2	D3	D4	D5	D6	n	δ	b	Dual head standard = bolt outer Diameter x thread length x bolt length
25	25	145	110	85	77	33	18	4	2	18	M16 x 20 x 165
40	39	145	110	85	77	46	18	4	3	18	M16 x 25 x 165
50	49	160	125	100	87	58	18	4	3	20	M16 x 25 x 165
65	64	180	145	120	103	74	18	8	3	22	M16 x 25 x 165
80	79	195	160	135	113	90	18	8	3	24	M16 x 25 x 170
100	99	230	190	160	133	110	23	8	3	26	M20 x 30 x 180
125	125	270	220	184	176	140	27	8	3	28	M24 x 35 x 190
150	149	300	250	218	203	161	27	8	3	30	M24 x 35 x 190
200	207	375	320	282	259	222	30	12	3	38	M27 x 35 x 240
250	259	445	385	345	312	278	34	12	3	42	M30 x 40 x 270
300	309	510	450	408	363	330	34	16	4	46	M30 x 40 x 290

Saddle indicating drawing

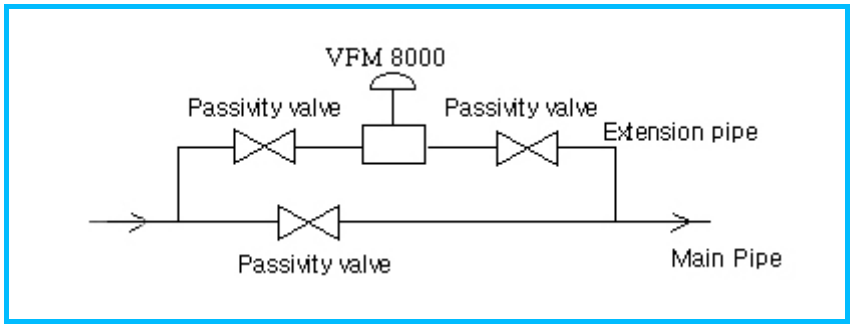


Figure 4. Standard saddle drawing

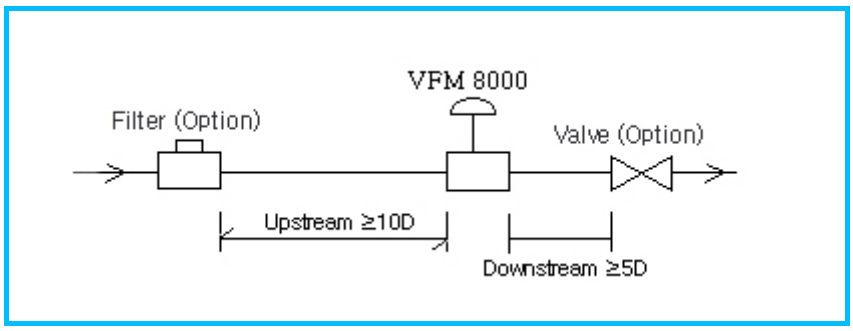


Figure 5. Where flow straightened is used

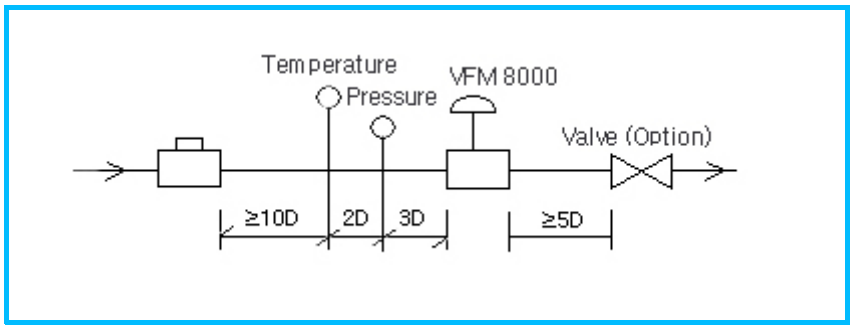
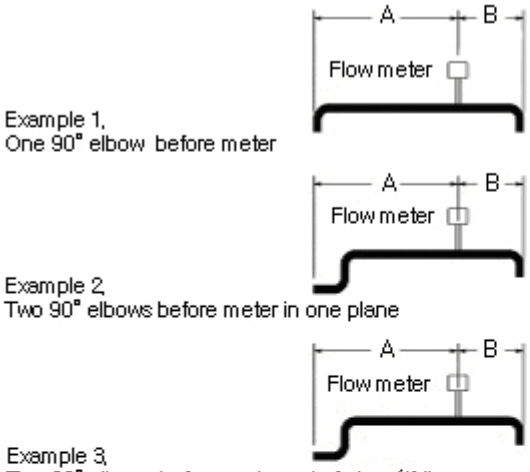
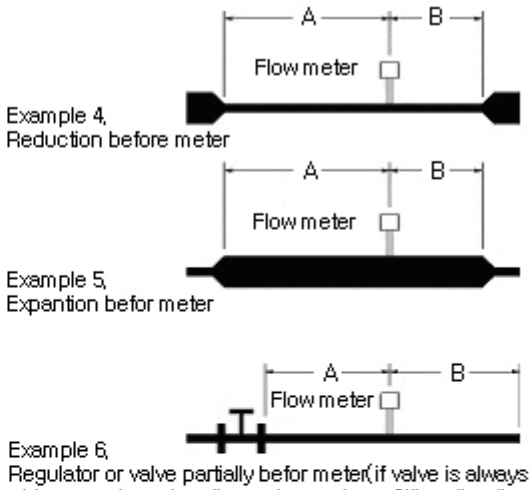


Figure 6. Pressure gage & Thermometer Installation.

Table 6. Up & Down Stream Requirements.





Example	A-Upstream(1) Requirements	B-Downstream(2) Requirements
1	15D	5D
2	20D	5D
3	40D	10D
4	15D	5D
5	30D	10D
6	40D	5D

(1) Number of diameter(D) of straight pipe required between upstream disturbance and the flow meter,
(2) Number of diameter(D) of straight pipe required downstream of tje flow meter,

Wiring Connection

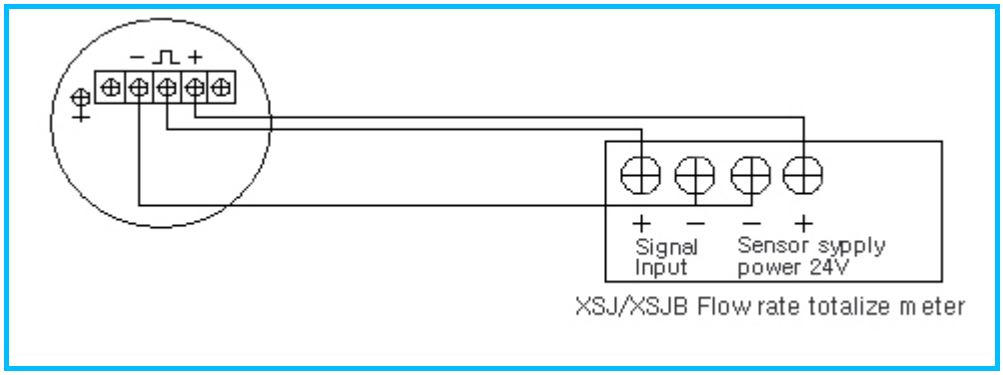


Figure 7. VFM 8000 Series and XSJ/XSJB wiring connection

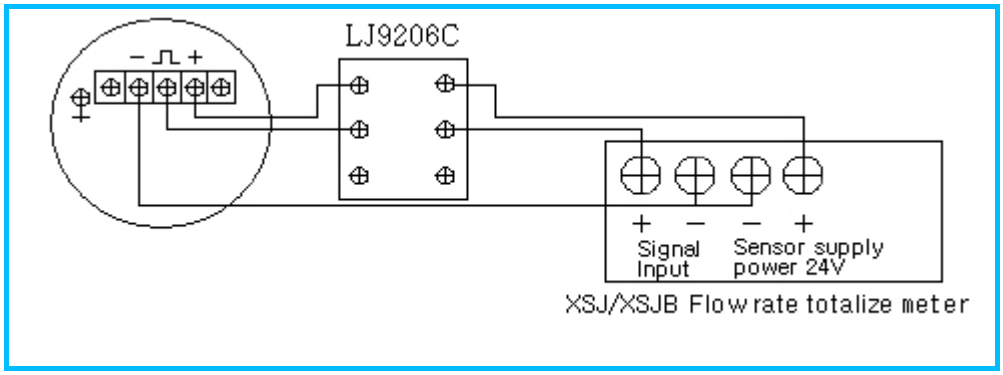


Figure 8. VFM 8000 Series Explosion place wiring connection

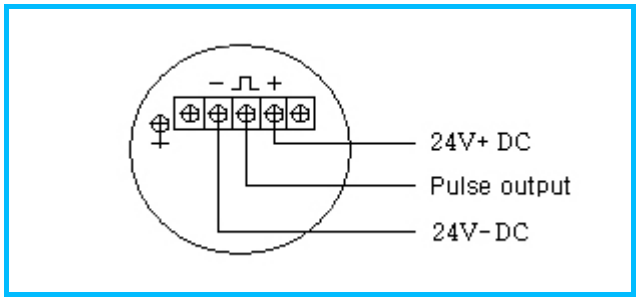


Figure 9. VFM 8000 Series wiring Terminal drawing

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Order Information Sheet(OIS)

VFM 8000S

Vortex Flow Meter

	Type	Fluid	Pipe Size	Material	Power	Output	Display	Temp.	Pressure	Option
VFM–8		–		–		–	P	–	V	–		–		–		–		–		–	
	1		2		3		4		5		6		7		8		9		10	

Model Direction	Code 1
Wafer Type	100
Flange Type	200
Insert Type	300
Agency approved, customer specified	W

Fluid Type and saddle method		Code 2
Liquid	Wafer Type	00
Gas	Wafer Type	01
Steam	Wafer Type	02
Gas, Liquid	Insert Type	10
Steam	Insert Type	11
Other(Optional)	Flange Type	20
Agency approved, customer specified		WW

Pipe Size DN(mm)			
DN(mm)	Code 3	DN(mm)	Code 3
25	2	300	30
40	4	350	35
50	5	400	40
65	6	500	50
80	8	600	60
100	10	700	70
125	12	800	80
150	15	900	90
200	20	1000	100
250	25		

Material	Code 4
Carbon Steel	C
Stainless	S
Agency approved, customer specified	WW

Input Power	Code 5
DC24V ±10%	2
Agency approved, customer specified	W

Output	Code 6
Pulse	1
Pulse, 4-20 mA (Optional)	2
4-20 mA	3
Agency approved, customer specified	W

Display	Code 7
No Readout	NR
Digital Display (Optional)	DD
Agency approved, customer specified	WW

Temperature	Code 8
-40℃~200℃ (-40°F~392°F)	T1
200℃~350℃ (392°F~662°F)	T2
Agency approved, customer specified	WW

Pressure	Code 9
2.5Mpa	1
4.0Mpa	2
6.9Mpa	3
Agency approved, customer specified	W

Option	Code 10
XSJ Flow rate totalize meter	XSJ
24VDC Supply Unit	DC
Flange Type	FL