ALVT
Vortex Flowmeter
ALVT Series

GENERAL

The ***ALVT*** is a Vortex flowmeters based on Van Karman theory of vortices generated by a bluff body in the pipe. The number of vortices are linearly proportional to the volumetric flow in the pipe. The ALVT is versatile flowmeter widely used for Gases, Steam & Liquid applications. There are no moving parts. The inline version comes with either flange or wafer version, while the insertion style comes in flange or hot-tapped connections. Standard configuration comes with local display indicating flowrate and total flow. Signal interface includes, 4-20mA, RS485, MODBUS etc. The electronics are designed to filter out erroneous signals as well as noise due pipe vibration.

FEATURES

- No moving parts, high reliability and durability
- Convenient installation and maintenance
- Non-wetted sensor provides stable performance and long life
- Output pulse signal is proportional to flow rate; high accuracy and no zero drift
- Wide measuring range; turndown ratio of 20:1
- Low pressure loss, low cost
- Frequency output unaffected by changes in fluid media's physical character and composition; meter factor (K) is determined purely by the shape and dimensions of the bluff body. No need to compensate for volume flowrate.
- Meter may be re-calibrated using original K-factor if damaged parts be exchanged.
- Wide array of applications for steam, gasses, liquids

SPECIFICATION

- Process connections : flanged(standard),Insertion(fixed and adjustable) type, Wafer style
- Process temperature : -30~662 °F (-35~350 °C) without LCD display
  -23~480 °F (-5~250 °C) with LCD display
- Operating pressure : up to 930 psig (64 barg)
- Velocity Range : Depends on fluid, pressure and temperature
- Liquids : ≤0~40 feet/second (0~12m/s)
  Gas & Steam : ≤12 feet/sec (3.5m/s) gas; ≤230 feet/sec (70m/s) steam
- Accuracy : ±1.0% for liquid, ±1.5% for gas, ±2.5% for insertion ty
- Repeatability : ±0.33% for liquid, ±0.5% for gas, ±0.83% for inse
- Turn down ratio : 20:1
- Material : SS #304 (housing) , Carbon Steel (standard flange)
- Signal output : Puls output, Two-wire 4~20mA, RS485, Hart, ModBus
- RAM Back-up : Lithium Battery, 3.6V_{DC}
- Housing protection : IP65; IP67; IP68
- Ex-protect Exid B T4; Exib C T 4
- Cable: 30' (10M) free for remote version
- weight (approximate) :
  Wafer : 22 lb (10Kg)~ 28lb (12.7 Kg) (to 12" nomina
  Insertion: 33 lbs (15 Kg)
  Notes:-Flange weight contact factory.
- Signal Interface : RS232 & RS485, HART
- Display units : 4 digit rate and 8 digit total
- Keypad : Rate, Total, setup functions
- Power supply : 110/220 V_{AC} or isolated 14~36 V_{DC}
- NIST traceable : Dependant on fluid media
- Data storage : EPROM storage up to 5 years
- Data logger : Reading, sampling times ≤500 mS

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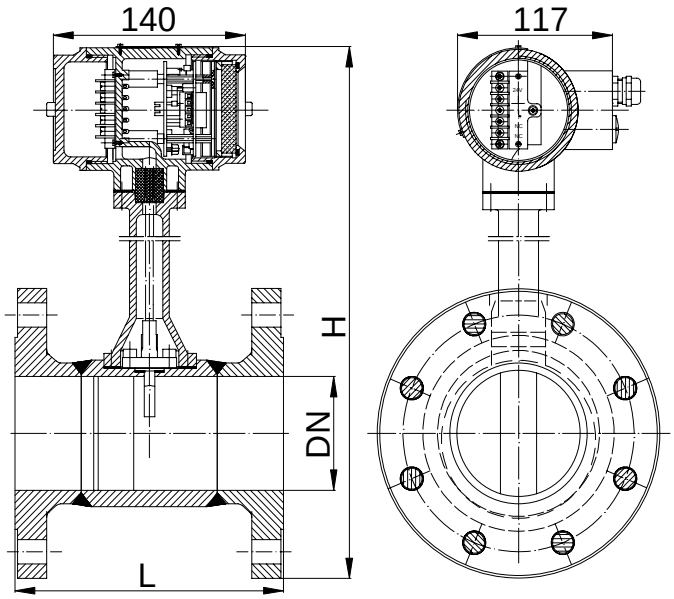
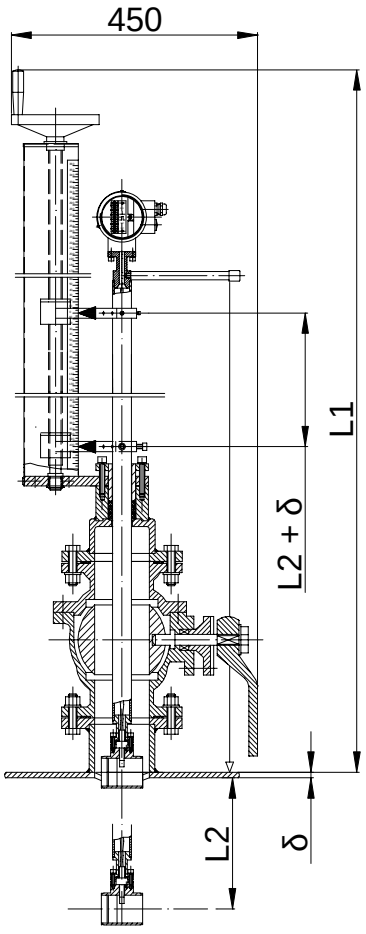
Wafer



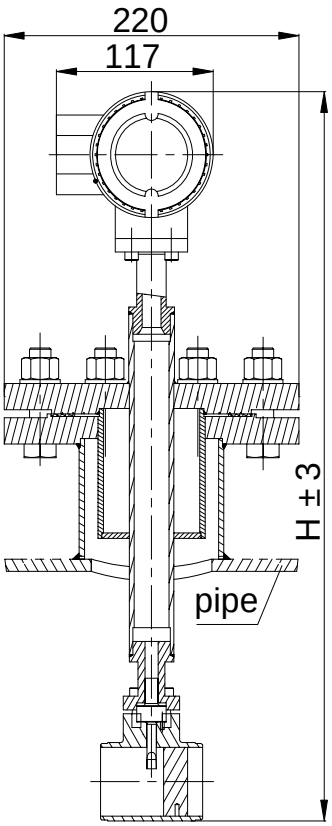
Nom. Pipe Size	L ± ⅛"			H ± ⅛"			Weight
	class 150#	class 300#	class 600#	class 150#	class 300#	class 600#	
1"	5.91	7.48	8.66	15.83	16.14	16.14	22.7 lbs
1 ¼"		7.87	9.06	16.14	16.42	16.42	24.3 lbs
1 ½"		7.87	9.45	16.54	16.93	16.93	31.7 lbs
2"	6.69	8.27	9.84	16.93	17.13	17.13	36.4 lbs
2 ½"	7.48	8.66	10.63	17.72	17.91	17.91	41.9 lbs
3"	7.87	8.66	10.63	18.11	18.50	18.50	51.4 lbs
4"	8.66	9.84	12.60	19.29	20.28	20.16	64.6 lbs
5"	9.45	10.83	14.17	20.28	21.34	21.81	66.8 lbs
6"	10.63	12.20	15.35	21.34	23.23	22.83	123.5 lbs
8"	12.20	13.19	17.72	23.62	24.41	25.20	166.4 lbs
10"	14.57	15.35	20.08	25.87	25.20	27.95	240.3 lbs
12"	15.75	16.93	21.65	28.46	27.17	29.92	258.8 lbs

Insertion - with ball valve



Pipe Size	L1 ± ⅛"	L2	Weight
10"~28"	1570	0.5 d	39.7 lbs
32"~72"	1570	0.121 d	79.4 lbs

Insertion - fixed



Pipe Size	H ± ⅛"	Weight
10"~28"	D/2 + 14.5	39.7 lbs
32"~72"	0.121 d + 14.5 + δ	79.4 lbs

D is outside diameter of pipe.
d is inside diameter of pipe.
δ is thickness of pipe.

Note: all dimensions are mm unless stated.

Mass flow of saturated steam (tons/hr) unless otherwise r

ID(in.)	29 psi (2 bar)		58 psi (4 bar)		87 psi (6 bar)		116 psi (8 bar)		bar)		bar)		203 psi (14 bar)		232 psi (16 bar)	
½"	15.4-102.3 lbs/h		19.4-165.3 lbs/h		22.9-227.1		25.6-288.1 lbs/h		28.2-349 lbs/h		30.2-409.6 lbs/h		32.8-470 lbs/h		34.8-529.1 lbs/h	
¾"	28.2-181.9 lbs/h		35.7-293.9 lbs/h		42.1-403.7		47.4-512.3 lbs/h		52.5-620.4		57.5-728.2 lbs/h		62.2-835.8 lbs/h		67-943.1 lbs/h	
1"	35.7-284 lbs/h		45.2-459 lbs/h		53.1-630.7		59.7-800.5 lbs/h		66.1-969.2		71.4-1137.8		76.7-1305.8		82-1517.7 lbs/h	
1 ¼"	58-465.4 lbs/h		73.4-752.2 lbs/h		86.4-1033.5		97.9-1311.5		83.8-1588 lbs/h		0.06	0.94	0.06	1.07	0.07	1.21
1 ½"	70.5-727.1 lbs./h		89.5-1175.3		105.2-1614.9 lbs/h		0.06	1.03	0.07	1.25	0.07	1.46	0.07	1.68	0.08	1.88
2"	0.04	0.57	0.07	0.91	0.08	1.26	0.10	1.60	0.11	1.94	0.12	2.27	0.13	2.61	0.14	2.94
2 ½"	0.09	0.96	0.11	1.55	0.13	2.13	0.15	2.70	0.17	3.27	0.17	3.85	0.18	4.41	0.20	4.98
3"	0.13	1.46	0.15	2.35	0.18	3.23	0.20	4.10	0.22	4.96	0.24	5.82	0.26	6.69	0.29	7.54
4"	0.20	2.27	0.25	3.67	0.30	5.05	0.33	6.40	0.36	7.72	0.40	9.10	0.43	10.45	0.45	11.78
5"	0.34	3.55	0.45	5.74	0.56	7.88	0.67	10.01	0.79	12.13	0.94	14.22	1.07	16.33	1.18	18.42
6"	0.44	4.92	0.56	8.27	0.66	11.35	0.78	14.41	0.93	17.45	1.19	20.48	1.38	23.50	1.53	26.52
8"	0.93	9.09	1.17	14.69	1.38	20.18	1.57	25.62	1.81	31.02	2.06	36.41	2.35	41.79	2.63	47.16
10"	1.66	14.20	2.12	22.95	2.49	31.54	2.80	40.02	3.13	48.50	3.56	56.89	3.87	65.29	4.18	73.68
12"	2.39	20.45	3.04	33.06	3.56	45.41	4.01	57.63	4.42	69.78	4.95	81.91	5.49	94.02	6.02	106.10
14"	3.25	27.83	4.13	45.00	4.84	61.82	5.46	78.44	6.01	94.97	6.74	111.55	7.47	127.98	8.15	144.40
16"	4.25	36.35	4.03	58.76	6.32	80.74	7.12	102.46	7.85	124.01	8.80	145.61	9.76	167.11	10.64	188.60
18"	5.37	46.01	6.81	74.37	7.99	102.19	9.01	129.63	9.93	156.97	11.02	184.30	12.35	211.53	13.45	238.76
20"	6.62	56.77	8.40	91.82	9.87	126.21	11.02	160.05	12.26	193.78	13.56	227.51	15.32	261.13	16.60	294.76

Note: The pressures in the avove table are gauge pressure

Mass flow of superheated steam (tor

ID (in.)	min flow	max flow
½"	$11.92\sqrt{\rho}$ lbs/h	63.1 ρ lbs/h
¾"	$21.81\sqrt{\rho}$ lbs/h	112.1 ρ lbs/h
1"	$27.57\sqrt{\rho}$ lbs/h	175.2 ρ lbs/h
1 ¼"	$44.92\sqrt{\rho}$ lbs/h	287.1 ρ lbs/h
1 ½"	$54.92\sqrt{\rho}$ lbs/h	448.6 ρ lbs/h
2"	$81.90\sqrt{\rho}$ lbs/h	700.9 ρ lbs/h
2 ½"	$144.97\sqrt{\rho}$ lbs/h	1184.5 ρ lbs/h
3"	$220.00\sqrt{\rho}$ lbs/h	1794.3 ρ lbs/h
4"	$0.15\sqrt{\rho}$	1.40 ρ
5"	$0.24\sqrt{\rho}$	2.20 ρ
6"	$0.34\sqrt{\rho}$	3.15 ρ
8"	$0.72\sqrt{\rho}$	5.58 ρ
10"	$1.16\sqrt{\rho}$	8.76 ρ
12"	$1.49\sqrt{\rho}$	12.62 ρ
14"	$2.03\sqrt{\rho}$	17.17 ρ
16"	$2.65\sqrt{\rho}$	22.43 ρ
18"	$3.35\sqrt{\rho}$	28.38 ρ
20"	$4.16\sqrt{\rho}$	35.04 ρ

Note: ρ = density of the superheated steam under operating condition (Kg/m^3)

Volumetric flow of gas (SCFM)

ID (in.)	min flow	max flow
½"	3.10k / $\sqrt{\rho}$	17.0k
¾"	5.51k / $\sqrt{\rho}$	30.0k
1"	7.91k / $\sqrt{\rho}$	1.3k
1 ¼"	11.58k / $\sqrt{\rho}$	76.6k
1 ½"	14.02k / $\sqrt{\rho}$	120.1k
2"	23.24k / $\sqrt{\rho}$	187.2k
2 ½"	35.14k / $\sqrt{\rho}$	316.1k
3"	53.33k / $\sqrt{\rho}$	478.9k
4"	83.34k / $\sqrt{\rho}$	748.7k
5"	130.0k / $\sqrt{\rho}$	1,169.6k
6"	186.1k / $\sqrt{\rho}$	1,684.5k
8"	332.7k / $\sqrt{\rho}$	2,994.7k
10"	520.2k / $\sqrt{\rho}$	4,679.2k
12"	748.7k / $\sqrt{\rho}$	6,738.0k
14"	1,019.2k / $\sqrt{\rho}$	9,167.7k
16"	1,331.4k / $\sqrt{\rho}$	11,975k
18"	1,684.9k / $\sqrt{\rho}$	15,150k
20"	2,080.0k / $\sqrt{\rho}$	18,713k

Note:1. ρ---- density of gas under operating condition (Kg/m^3)

2. Standard conditions: 70 °F, 14.7 psia (absolute pressure), or under atmosphere at 70 °F

3. $k = \frac{P+0.101325}{0.101325} \times \frac{293.15}{t+273.15}$

Volumetric flow of liquid (GPM)

ID (in.)	min flow	max flow
½"	52.88 / $\sqrt{\rho}$	14.13
¾"	93.26 / $\sqrt{\rho}$	24.88
1"	146.19 / $\sqrt{\rho}$	38.88
1 ¼"	469.40 / $\sqrt{\rho}$	63.72
1 ½"	588.73 / $\sqrt{\rho}$	99.56
2"	735.36 / $\sqrt{\rho}$	155.57
2 ½"	996.92 / $\sqrt{\rho}$	262.88
3"	1,510.8 / $\sqrt{\rho}$	398.19
4"	2,360.2 / $\sqrt{\rho}$	622.19
5"	3,688.7 / $\sqrt{\rho}$	972.26
6"	5,312.2 / $\sqrt{\rho}$	1,399.8
8"	9,444.3 / $\sqrt{\rho}$	2,488.8
10"	14,757 / $\sqrt{\rho}$	3,888.6
12"	21,250 / $\sqrt{\rho}$	5,599.7
14"	28,923 / $\sqrt{\rho}$	7,621.9
16"	37,766 / $\sqrt{\rho}$	9,955.1
18"	47,806 / $\sqrt{\rho}$	12,599
20"	59,030 / $\sqrt{\rho}$	15,555

Note: 1. ρ-----density of liquid under operating condition (g/cc)

2. Density of water under normal temperature and pressure is 1.0 g/cc.

3. $\sqrt{\rho}$ = 31.623 g/cc

**** Please contact your local SMC application engineer**

You also need to provide the following information:

Type of Fluid (liquid/gas or steam)	**Please provide the name of your fluid, including operating density and viscosity**
Full Scale Flow	**Please indicate maximum and minimum flow rates, in units of Kg/hr, Lb/hr, LPM or GPM, etc.**
Line Size	**Please specify pipe size as well connection type (flange, threaded, etc..)**
Process Pressure and Temperature	**We will calibrate your flowmeter as close to your operating conditions as possible**
Type of Electronics	**Please specify either integral or remote electronics**
Power Requirements	**Specify your power requirements (24 V_{DC} or 115 V_{AC} or 230 V_{AC})**

Model Selection Guide

ALVT meters											
Example:ALVT-23-15D-11N-IN (0-20,000 kg/hr)											
ALVT-	**	**	- **	**	- **	**	**	- **	**		Description
Flanged	1										Style
Wafer	2										
Insertion- fixed	3										
Insertion- with ball valve mounting assembly	4										
Liquid		2									Fluid
Gas		3									
Steam		4									
½" (15mm)			015								Line Size
¾" (20mm)			020								
1" (25mm)			02								
1 ¼" (32mm)			03								
1 ½' (40mm)			04								
2" (50mm)			05								
2 ½" (65mm)			06								
3" (80mm)			08								
4"-57" (100mm-1500mm)			**								
With digital display (standard only)				D							Display
No display				N							
24V_{DC}					1						Power Supply
3.6V lithium battery					2						
Dual power supply (24V_{DC}, 3.6V lithium battery)					3						
No output						0					Signal Output
Pulse output						1					
Two wire 4-20mA DC output						2					
Three wire 4-20mA DC output						3					
RS-485 Communication						4					
Hart Communication						5					
Standard -40~480 °F (-40~250 °C)							N				Fluid Temperature
High Temp 480~660 °F (250~350 °C)							H				
230 psig (16 bar)								1			Pressure
360 psi (25 bar)								2			
580 psi (40 bar)								3			
930 psi (64 bar)								4			
Non									N		Explosion - Proof
Explosive Isolated									G		
Intrinsically safe									B		
Flow range											Flow rate