

# Vortex Flow Meter

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## Datasheet



**LUGB-SUP-A**

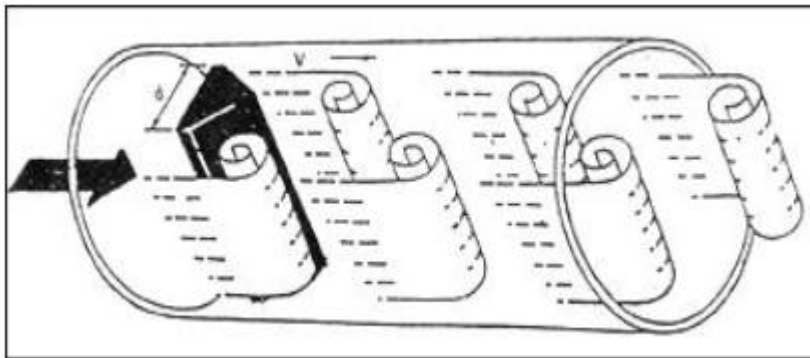
SUP-LUGB Vortex flow meter is on the principle of Karman street, to measure liquid, gas and vapor even turbid liquid including micro grain and impurity. Applications: petroleum, chemical industry, paper making, metallurgy, electric force, environmental protection, food industry and etc.

## Features

- small pressure loss, wide range, high accuracy;
- It is hardly affected by fluid density, pressure, temperature and viscosity when measuring volume flow under working status;
- No moving mechanical parts, thus high reliability and low maintenance. Instrument parameters can be stable for long term.
- Vortex flowmeter can be used in a temperature range of  $-40^{\circ}\text{C} \sim +400^{\circ}\text{C}$ .
- It has both analog standard signals and digital pulse signal output to match with computers and other digital systems.

## Principle

Set bluff body in the fluid, two columns of regular vortex are alternately generated from both sides of bluff body. This vortex is called Karman vortex.



Alternating and regular vortex columns are formed at downstream of the bluff body. They existing the following relationship:

$$\text{Formula 1 : } f = StV/d$$

In the formula:

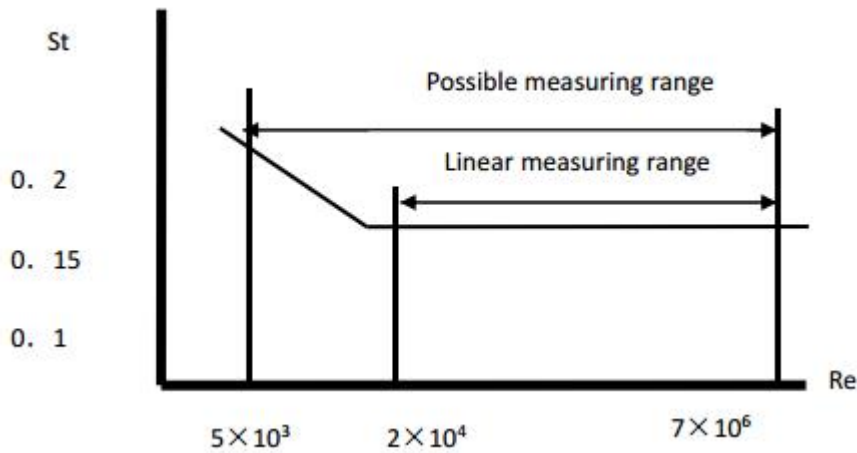
f - Karman vortex frequency generated at one side of bluff body (HZ)

St - strouhal number (non-dimensional number)

V - average speed of fluid (m/s)

d - width of bluff body (m)

the Strouhal number ( $St$ ) is a dimensionless unknown. The figure below shows the relationship between Strouhal number ( $St$ ) and Reynolds number ( $Re$ ).



In the curve table, the flat part of  $St = 0.17$ , the release frequency and velocity are proportional, that is the measuring range of vortex flow sensor. As long as the frequency  $f$  is detected, the flow velocity of fluid in the pipe can be obtained. Volume flow rate is determined by the velocity  $V$ . The ratio of measured pulse number and the volume is called meter constant ( $K$ ), see Formula 2.

Formula 2 :  $K = 3600 f/Q$  ( $1/m^3$ )

In the formula:

$K$ = meter constant ( $m^{-3}$ )

$f$ =pulse number

$Q$ = Volumetric flow ( $m^3$ )

## Product Introduction

Nominal Diameter (mm)	DN10-DN500
Nominal pressure wafer connection	DN10-DN500 ( priority PN2.5MPa )
Nominal pressure flange connection	DN10-DN80 ( priority PN2.5MPa ) DN100-DN200 ( priority PN1.6MPa ) DN250-DN500 ( priority PN1.0MPa )
Medium temperature (°C)	-40°C ~ +160°C; -40°C ~ +280°C; -40°C ~ +350°C; -40°C ~ +420°C
Main body material	Stainless steel
Accuracy	± 1%R, ± 1.5%R; Insertion type: ± 2.5%R
Power Voltage	12VDC; 24VDC; 3.6V Li battery
Output	Pulse: high level $\geq 6V$ , low level $\leq 1V$ ; current: 4-20mA
Communication	RS485, Modbus-RTU
Protection Grade	IP65, IP68
Ambient conditions	Temp. -20°C to 60°C , relative humidity 5% to 95%, atmospheric pressure 86 to 106 KPa
Pressure lose	$\Delta P \leq 1.2\rho V P^2$ ( $\Delta P$ unit is Pa, $\rho$ unit is kg/m <sup>3</sup> , V unit is m/s)
Applicable mediums	Gas, liquid and steam
Transmission distance	3 wire pulse output: $\leq 300m$ , 2 wire current output (4-20mA) $\leq 1500m$ ; Load resistance $\leq 500\Omega$ ; RS485 / HART $\leq 1200m$



## Instrument Flow Range

1. Reference conditions:

Gas: air under normal temperature and normal pressure,  $t = 20\text{ }^{\circ}\text{C}$  ,  $P = 0.1\text{ MPa}$   
 (absolute pressure),  $\rho = 1.205\text{ kg/m}^3$ ,  $v = 15 \times 10\text{ m/s}$

Liquid: water under normal temperature:  $t = 20\text{ }^{\circ}\text{C}$ ,  $\rho = 998.2\text{ kg/m}^3$ ,  $v = 1.006 \times 10\text{ m/s}$

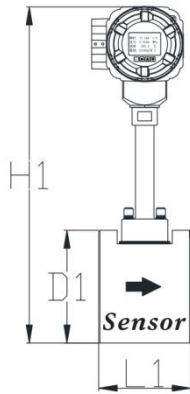
2. LUGB Vortex flowmeter measure saturated steam of different density corresponding with flow range under working condition:

MPa	0.10	0.20	0.30	0.40	0.50	0.60	0.80	0.90	1.00	1.20	1.60	2.00	
$^{\circ}\text{C}$	120	134	144	152	159	165	175	180	184	192	204	215	
$\text{Kg/m}^3$	1.12	1.67	2.19	2.68	3.18	3.67	4.62	5.16	5.63	6.67	8.52	10.57	
mm	Range	Different steam density corresponding with its measurable flow range											
10	Omin	1.55	22.8	2.99	3.68	4.46	5.10	6.48	7.27	7.82	9.11	11.8	14.6
	Qmax	15.5	229	30.0	36.9	44.6	51.0	64.8	72.8	78.2	91.1	119	146
15	Omin	3.50	5.15	6.74	8.29	10.0	11.4	14.5	16.3	17.6	20.5	26.7	32.9
	Qmax	35.0	51.5	67.4	83.0	100	115	146	163	176	205	268	329
20	Omin	6.22	9.15	11.9	14.7	17.8	20.4	25.9	29.1	31.3	36.4	47.5	58.5
	Qmax	62.2	91.6	120	147	178	204	259	291	313	365	476	586
25	Omin	9.71	14.3	18.6	23.0	27.9	31.8	40.5	45.4	48.9	56.9	74.3	91.4
	Qmax	97.1	143	187	230	279	318	405	454	489	569	743	914
32	Omin	15.9	23.3	30.6	37.7	45.7	52.2	66.3	74.5	80.1	93.3	121	149
	Qmax	159	234	306	378	457	522	664	745	802	933	1218	1499
40	Omin	23	33	43	53	64	73	93	100	110	130	170	210
	Qmax	300	440	575	710	860	980	1250	1400	1500	1750	2280	2810
50	Omin	35	35	52	63	76	88	111	125	130	150	200	250
	Qmax	550	460	680	845	1020	1170	1480	1670	1800	2100	2730	3360
65	Omin	59	87	114	137	166	190	240	276	297	345	450	550
	Qmax	790	1160	1520	1835	2222	2540	3230	3620	3970	4620	6030	7422
80	Omin	89.5	131	172	212	257	290	370	410	450	520	680	840
	Qmax	1195	1760	2300	2800	3400	3900	4900	5580	6000	6999	9100	11000
100	Omin	0.14	0.20	0.27	0.33	0.40	0.46	0.58	0.65	0.70	0.82	1.00	1.30
	Qmax	1.87	2.75	3.60	4.43	5.36	6.12	7.78	8.73	9.40	11	14.3	17.6
125	Omin	0.22	0.32	0.42	0.51	0.62	0.71	0.91	1.00	1.10	1.28	1.67	2.00
	Qmax	2.91	4.29	5.62	6.91	8.37	9.56	12	13.6	14.7	17	22.3	27.4
150	Omin	0.32	0.46	0.60	0.74	0.90	1.03	1.31	1.47	1.58	1.84	2.40	2.96
	Qmax	4.20	6.18	8.09	9.96	12	13.8	17.5	19.6	21.1	24.6	32.1	39.5
200	Omin	0.56	0.82	1.08	1.32	1.60	1.83	2.33	2.61	2.81	3.28	4.28	5.27
	Qmax	7.50	11	14.4	17.7	21.4	24.5	31.1	35	37.6	43.7	57.1	70.3
250	Omin	0.87	1.28	1.68	2.0	2.51	2.87	3.64	4.09	4.40	5.10	6.69	8.20
	Qmax	11.6	17	22	27.6	33	38	48	54	58.7	68	89	110
300	Omin	1.25	1.85	2.42	2.98	3.61	4.13	5.25	5.89	6.34	7.38	9.60	11.8
	Qmax	16.7	24.7	32	39	48	55	70	78	84	98	128	158
350	Omin	1.71	2.52	3.30	4.06	4.92	5.62	7.15	8.02	8.60	10.0	13	16
	Qmax	22.8	33.6	44	54	65	74.9	95	106	115	133	174	215
400	Omin	2.24	3.29	4.30	5.30	6.40	7.30	9.30	10.5	11.2	13.1	17	21
	Qmax	29	43.5	57	70	85	97	124	139	150	174	228	281
450	Omin	2.83	4.17	5.45	6.72	8.13	9.29	11.8	13.2	14.2	16.6	21.6	26.6
	Qmax	37	56	72	89	108	123	157	176	190	221	289	355
500	Omin	3.49	5.15	6.74	8.29	12.3	14	17.9	20.1	21.6	25.2	33	40.5
	Qmax	46	68	89.8	110	164	188	239	268	289	336	439	540

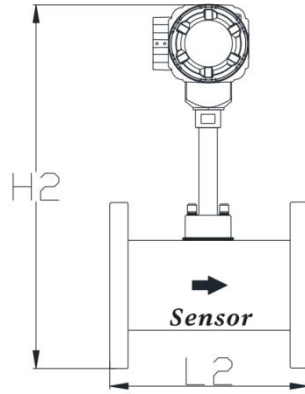
(unit) Kg/h

(unit) t/h

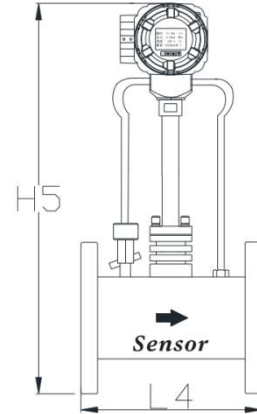
## Instrument Dimensions



Wafer version



Flange version

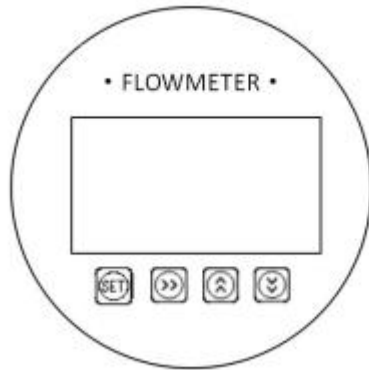


P&T compensation  
compact version





Pipe diameter	H1	H2	H5	D1	L1	L2	L4
DN10	441	428	/	90	50	200	/
DN15	445	430	/	95	50	200	/
DN20	450	435	/	100	50	200	/
DN25	451	440	455	50	50	200	275
DN32	456	452	468	105	54	200	275
DN40	435	468	505	92	78	200	275
DN50	438	480	518	98	78	200	275
DN65	453	502	535	110	78	200	275
DN80	476	515	550	134	90	225	300
DN100	499	534	571	158	78	250	350
DN125	520	564	599	175	78	275	375
DN150	545	593	631	200	100	300	400
DN200	595	647	682	250	120	350	450
DN250	645	700	735	300	140	400	500
DN300	695	750	785	350	160	450	550
DN350	745	805	840	400	165	500	600
DN400	795	861	895	450	185	550	650
DN450	845	910	945	500	205	600	700
DN500	895	965	998	550	225	650	750

## Operation Instruction

### 1. Interface



### 2. Key functions

-  key (K1): Enter the setting status and confirm the setting value;
-  key (K2): moves the cursor position to the next loop;
-  key (K3): Add 1 or function selection to the value of the cursor;
-  key (K4): Returns to the previous menu item.

### 3. Menu

press key (K1) to enter the menu.

Press (K2) to cycle through the menus and press (K1) to enter.

### 4. Parameter settings

In the menu, press key (K1) to enter the password verification interface. After entering the correct password, you can set the parameters.

## Ordering code

Vortex Flow Meter													
Model											Description		
-	-	-	-	-	-	-	-	-	-	-			
LUGB-SUP												-	
Medium	MM1											Liquid	
	MM2											Gas	
	MM3											Steam	
Nominal pipe size		DNXX										DN15 - DN300	
Accuracy		J1										1.5%(Gas、 Steam)	
		J2										1.0%(Liquid)	
Display		DT0										Without display	
		DT1										With display	
Output		O0										No output	
		O1										Pulse output	
		O2											4-20mA output
Communication output		D0										No output	
		D1										RS232	
		D2											RS485
		D3											HART
Compensation type		C0										No compensation	
		C1										Temperature compensation	
		C2											Pressure compensation
		C3											Temp & pressure compensation
Installation		I2										Flange installation	
		I3											Wafer connection
Power supply		V1										3.6V lithium battery	
		V2											24VDC
		V3											24V & 3.6V lithium battery
Pressure rating		P1										1.0MPa	
		P2											1.6MPa
		P3											2.5MPa
		P4											4.0MPa
		PZ											Others
Temperature rating		T1										- 40℃ - 260℃	
		T2											- 40℃ - 300℃



# Supmea

## Headquarters

5th floor,Building 4,Singapore Hangzhou Science Technology Park,No. 6 street,  
Hangzhou Economic Development Area,Hangzhou 310018,China

## Singapore

2 Venture Drive #11-30 Vision Exchange Singapore

## Philippines

Majestic Subdivision, Lot 1, 1800 Rainbow St, Marikina, 1811 Metro Manila, Philippines

✉ info@supmea.com

🌐 www.supmea.com

Supmea Automation Co.,Ltd.