



VSAN
Sensors



VSAN - Mass Flowmeter - H Series

VSAN HIGH CONFIGURATION MASS FLOWMETER

1. General

H Series Mass Flowmeter (Hereafter We Call VSAN MFT) is designed according to the Coriolis Principle. It can be widely used for the process detecting and custody transfer/fiscal unit in many industries such as petroleum, petrochemical industry, pharmacy, paper making, food and energy etc.. As a fairly advanced kind of flow measuring instrument, it has been paid attention by the Circle measurement and accepted by many customers home and abroad.



2. Principle

VSAN is designed according to the principle of Coriolis force. Under the alternating current effect, the magnet and coil installed on the measuring tube will make two parallel measuring tubes vibrate according to some fixed frequency. Once there is flow passing through the pipes, Coriolis force will give rise to deflection (phase shift) on the vibration of two pipes and the deflection of vibration is directly proportional to the mass flow of fluid. Pick up them and the mass flowrate could be calculated.

The vibration frequency of measuring tube is determined by the total mass of measuring tube and inner fluid. When the fluid density changes, the vibration frequency of measuring tube will be also changed, as a result, the fluid density can be calculated.

The temperature transducer installed in the pipeline can pick up the fluid temperature on time under the coordination of measuring circuit.

3. Feature

3.1 Digital transmitter Feature

Comparing with traditional analog circuit and analog transmitter, digital circuit and digital transmitter has the following obvious merits:

3.1.1 The DSP chip is the core of digital transmitter for VSAN

As we know, the techniques of Digital Signal Processing can greatly increase the accuracy of flowmeter and broaden turndown ratio.

3.1.2 The sampling rate of digital transmitter is much higher than traditional products, so it provides shorter response time for the flow, quicker reaction to the flow change, higher efficiency and better accuracy for small amount tank loading/unloading system.

3.1.3 Digital Signal Processing techniques can filter and shape the flow signal better.

Well-designed digital filter can remove industrial frequency electromagnetic fields, spatial electromagnetic fields and noise effect on mass flowmeter, markedly enhance stability and reliability of mass flowmeter.

3.2. Mass Flowmeter Feature

Comparing with the traditional flow measurement method, VSAN has following obvious merits:

- 3.2.1 Enable to directly measure mass flow rate of fluid in the pipeline without changing any parameters, which avoids some measurement error of intermediate links. Its mass flow rate can be high accuracy and good repeatability within bigger range of turndown ratio.
- 3.2.2 Fluid measured can be more extensive, such as the steady uniform flow of common viscosity fluid, the high viscosity fluid, non-Newtonian fluid, slurry containing some solid components and the liquid containing some trace of gas.
- 3.2.3 Besides mass flow measurement, the density and temperature and water cut (ratio) can also be picked up and output by RS485-Modbus / HART.
- 3.2.4 VSAN coriolis mass flow meter manufacture in-house certified by RITES
- 3.2.5 VSAN mass flow meter tested as per OIML R117 standard, approved custody transfer application legal metrology government of india.
- 3.2.6 Torission bar feature available if required.
- 3.2.7 VSAN flow can use hazardous area zone I, & II, gas group II B II C & T6.

4. Main Technical Specification

4.1. Specification of Sensor and Flow Range for Liquid

DN(mm)	3~300
Structure	Integrate Type (-50~+125)C High temp. separated type: 50°C-+350°C Separate Type (-50~+200)C Low temp. separated type: -200C-+125°C
Sensor	U-Series /Micro bend / straight tube
Transmitter	Digital Type
Explosion-proof	PESO/CCOE & CIMFR Certificate
Power supply	DC(18-36)V / AC(85-265)V
Output Interface	RS485 Modus HART / general special output available if required
Nomini Pressure (MPa)	1.6 2.5 4.0 6.3 10.0 16.0 25.0
EMI	Conform to IEC 61326 (Industrial) EMC Directive
Signal output	Pulse output / (4-20)mA
Accuracy	0.05% 0.1% 0.15%
Hygeian type	Customized as customers' needs.
Process connection	GB/T 9115-2010, HG/I 20592-2009,HG/T20615-2009,ASME B16.5 or other customized.

U-Series / micro bend / straight sensor with digital transmitter

DN (mm)	Standard Flow(Kg/h)
3	12~240
8	85~1700
10	135~2700
15	300~650
25	850~17000
40	2150~43000
50	3300~66000
80	8500~170000
100	13500~270000
150	30000~630000
200	52500~1050000
250	120000~2400000

Note: Flow rate & sizing sheet will vary against customer specification above values are indicated purpose only

4.2 Accuracy & Repeatability

Accuracy
±0.05%
Repeatability
± 0.025%
Accuracy is calculated based on the water measurement under the condition of
±25°C~30°C and 0. IMPa~0.2MPa
Verification based on sample tested @ FCRI Palakkad

4.4. Measurement of Density

Density Range	± 0.0003 gm/cc
Repeatability	± 0.0002gm/cc

4.5. Measurement of Temperature

	Integrated Type	(-50~+125) °C
Temperature	Separate Type	(-50~+200) °C
Range	High Temperature Separated Type	(-50~+350) °C
	Low Temperature Separated Type	(-200~+125) °C
Basic Error		<±1.0°C

4.5. Measurement of Temperature

Water Ratio %
Crt Net Water Mass Amount
Crt Net Oil Mass Amount
Calculation based on API 15°C

5. Specification of Function

5.1 Current Output

4-20mA Current Output can be configured to denote the mass flow or volume flow.

Output Range	4~20mA
Basic Error	0.1%F.S
Repeatability	±0.01%
External resistor should be 250 ~ 6000	

5.2 Frequency Output

Active Frequency Output can be configured to denote the mass flow or volume flow.

Output Range	0 ~ 10kHz
Basic Error	±0.005%
Repeatability	±0.001%/°C
Max.capability of outrange is 12kHz	

5.3 RS485 Output / HART

RS485 output adopts the RTU communication mode which is compatible with MODBUS protocol.

5.4 Ambient Limitation

5.4.1 Ambient vibration

Frequency Range	(10-2000) Hz
Acceleration amplitude value	2g
Circulation time	50 times

5.4.2 Ambient temperature

Working Temperature	(-40~+55) °C
Storage Temperature	(-40~+70) °C

Model Selection

$$\frac{\text{VSAN}}{\text{MFT}}$$

Type		1	2	3	4	5	6	7	8	9	10	11	12	Instructions	
		DN	Medium	Structure	Sensor	Power	Output port	Nominal pressure	End Connection	Exd Hazardous Area	Signal output	Accuracy	Configuration		
VSAN														Coriolis Mass Flowmeter	
MFT		003												3mm	
		008												8mm	
		010												10mm	
		015												15mm	
		025												25mm	
		040												40mm	
		050												50mm	
		080												80mm	
		100												100mm	
		150												150mm	
		200												200mm	
		250												250mm	
		300												300mm	
			Y												To measure liquid
			Q												To measure gas
			HC												To measure two-phase flow
				1											Integrated -50-150 °C
				2											Separated -50~200 °C
				3											High temp, separated: -50 - 350 °C
				5											Low temp. separated: -200-125°C
					U										U-type sensor
					W										Microbend-type sensor
					D										Short u-type sensor
					C										Super bend-type sensor
					T										Torision bar
						1									DC(8~36)V
						2									AC(85~265)V
						3									24VDC/220VAC self adapted
							S								RS485
							H								HART
								1.6							1.6 MPa
								2.5							2.5 MPa
								4.0							4.0 MPa
							6.3							6.3 MPa	
							10							10 MPa	
							16							16 MPa	
							26							26 MPa	
								150						Class 150	
								300						Class 300	
								600						Class 600	
								900						Class 900	
									PE					PESO/ CIMFR Certificate	
										F				Pulse output	
										I				(4-20mA) current output	
											0.05%			± 0.05%	
											0.1%			± 0.1%	
											0.15%			± 0.15%	
											0.2%			± 0.2%	
												H		Hygeian	
												J		Jacket	
												D		Standard high configuration	
												G		General configuration	