Datasheet

Miniature Vortex Flowmeter

SIN-FVM200

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Datasheet

Miniature Vortex Flowmeter
SIN-FVM200

The miniature vortex flowmeter features a simple structure, high accuracy, and convenient installation, maintenance, and operation. It provides real-time monitoring of both flow rate and temperature of liquids in pipelines. The device supports flow and temperature outputs via (4 – 20) mA analog signals or RS-485 communication, as well as alarm switch outputs. It is equipped with an OLED display for real-time indication of flow and temperature, enabling integrated monitoring of both parameters within the pipeline.

This product is widely used in industries such as petrochemical, electric power, metallurgy, steel manufacturing, paper production, food processing, water treatment, and battery manufacturing.

Features

- Integrated temperature and flow sensor for real-time monitoring of both flow rate and temperature in pipelines.
- Digital communication and analog output integration.
- Supports flow rate and temperature intelligent display with alarm contact output.
- Self-illuminating OLED display, providing clear and sharp visuals.
- The vortex flowmeter features quick-connect ends for easy installation and removal, reducing costs.
- 304 stainless steel base and aluminum alloy housing, offering excellent resistance to scaling and corrosion.
- IP65 protection rating, suitable for use in harsh environments.

Miniature Vortex Flowmeter

Principle

The vortex flowmeter operates based on the Kármán vortex street theory and the relationship between vortex shedding frequency and flow velocity, as described by Kármán and Strouhal. It is designed for measuring the flow rate of steam, gases, and low-viscosity liquids.

As illustrated in Figure 1, a triangular bluff body—known as the vortex shedding element—is mounted perpendicular to the flow within the meter body. When the fluid flows past this element, alternating vortices are generated downstream on both sides in a regular pattern, forming what is known as a Kármán vortex street. The shedding frequency (F) of these vortices is directly proportional to the flow velocity (V) of the fluid.

By detecting the number of vortices using a sensor, the flow velocity can be determined. Based on the pipe's cross-sectional area, the volumetric flow rate of the fluid can then be calculated.

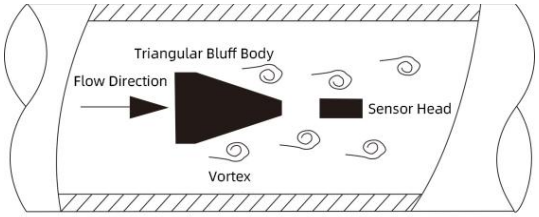

Figure 1 Working Principle of Vortex Flowmeter

The relevant equations are as follows:

$F = St \times V / (m \times d)$ ..... (Equation 1)

$Q = 3600 \times F / K$ ..... (Equation 2)

$M = Q \times \rho$ ..... (Equation 3)

Where:

F: Vortex shedding frequency (Hz)
St: Strouhal number (dimensionless)
V: Average flow velocity in the pipeline (m/s)

m: Ratio of arcuate flow area on both sides of the bluff body to the pipe's cross-sectional area (dimensionless)

d: Width of the bluff body facing the flow direction (m)

Q: Instantaneous volumetric flow rate (m^3/h)

K: Instrument coefficient (pulses per cubic meter)

M: Instantaneous mass flow rate (kg/h)

ρ: Fluid density (kg/m^3)

Note: The instrument coefficient (K) varies depending on the diameter of the vortex flowmeter. It is determined through calibration using a flow standard device and represents the number of output pulses per cubic meter of fluid under operating conditions.

Parameters					
Input					
Specification	20	60	100	200	300
Measured Variables	Mass Flow				
Flow Range	0.2~20	0.6~60	1~100	2~200	3~300
Wide Turndown Ratio	1:100				
Output					
Transmitter Output	(4~20) mA output, load resistance ≤650 Ω				
Communication Output	RS485 Interface, MODBUS Communication Protocol				
Pulse Output	Pulse width: 2 ms, passive output, external voltage ≤ 30 VDC				
Alarm Output	Single channel				
Power Supply					
Power Supply Input	(9–24) VDC Note: When using (4–20) mA current output, 24 VDC supply is required.				
Power Consumption	≤2VA				
Electrical Interface	GX16-7 Aviation Connector				
Performance Parameters					
Accuracy	±1.5%FS				
Repeatability	0.5%				
Instantaneous Flow Resolution	< 100 L/min: resolution 0.01 ≥ 100 L/min: resolution 0.1				
Process Conditions					
Medium Type	Air, Oxygen (O_2), Nitrogen (N_2), Argon (Ar), Carbon Dioxide (CO_2), Carbon Monoxide (CO)				
Process Pressure	≤1MPa				
Pressure Loss	≤600Pa	≤1000Pa	≤1000Pa	≤2000Pa	≤2000Pa
Environmental Conditions					
Operating Temperature	-10℃~55℃				
Operating Humidity	≤80%RH（No icing, no condensation）				
Storage Temperature	-25℃~80℃				
Protection Rating	IP52				
Construction					
Material	Housing: Aluminum alloy Base: 304 stainless steel				
Weight	750g				

Wiring

1.Alarm + (4–20) mA Output Type

2-Channel PNP Alarm Outputs, 1-Channel (4–20) mA Analog Output

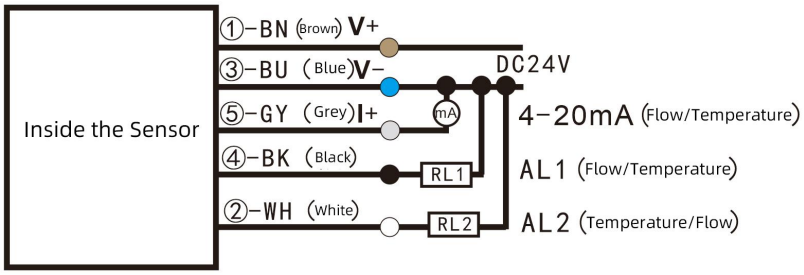

Figure 2

1-Channel PNP Alarm Outputs, 2-Channel (4–20) mA Analog Output

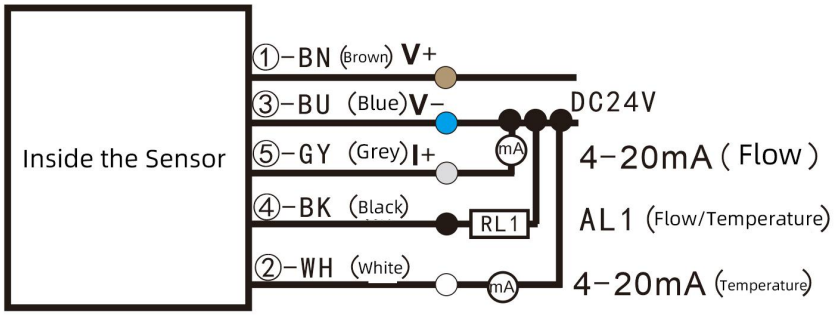

Figure 3

2.Alarm + RS485 Output Type

1-Channel PNP Alarm Outputs, 1-Channel RS485 Communication Output

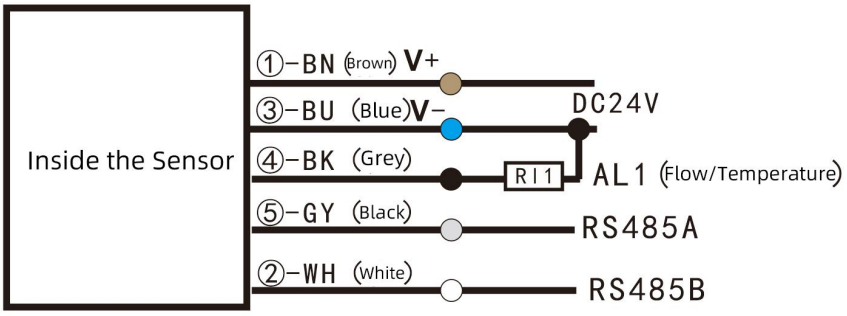

Figure 4

Dimension

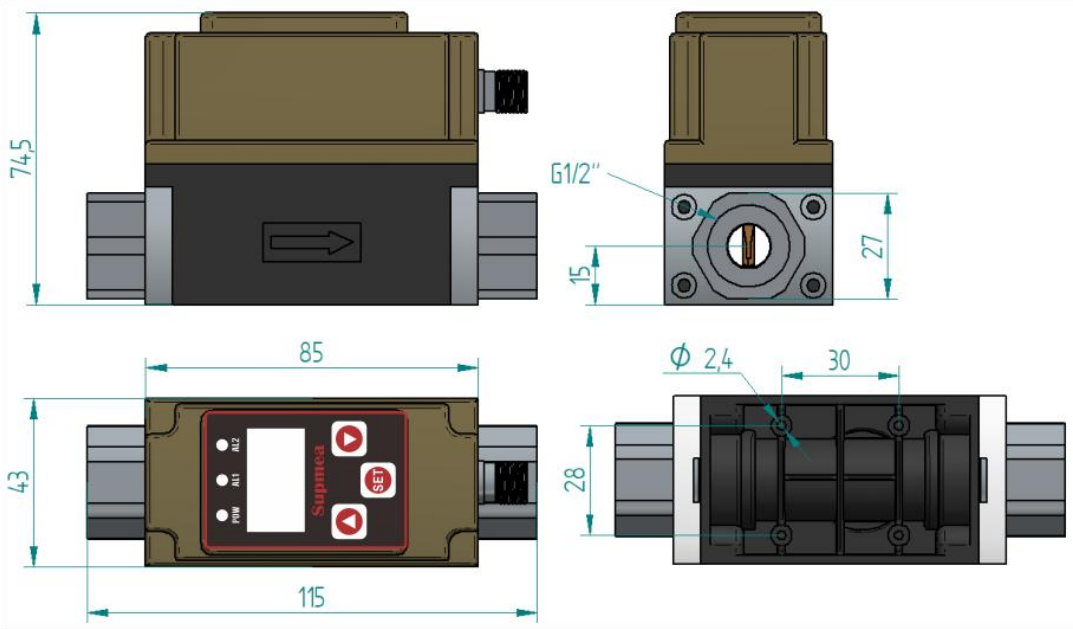

Figure 5 Product Dimensional Drawing (Unit: mm)

Ordering Code

SIN-FVM200-08-IB-C-Q-0-K8-TS-5-02										Description
SIN-FVM200	-	-	-	-	-	-	-	-	-	
Nominal Diameter	08									DN8(1/4")
	10									DN10(3/8")
	15									DN15(1/2")
	XX									Other
Process Connection and Body Material		IB								G-type Internal Thread (BSPP)，304SS
		XX								Other
Measuring Medium			C							Liquid
Accuracy				Q						3.0 Class
Compensation Method					0					Standard Configuration without Compensation
Output, Display, and Power Supply						K8				4-20mA+PNP，Display，24VDC
						K9				RS485+PNP，Display，24VDC
						XX				Other
Heat Resistance Temperature							TS			0-90℃
							XX			Other
Housing Material and Protection Rating								5		Aluminum Alloy,，IP65
Cable Length									02	2m
									05	5m
									10	10m
									XX	Other