Datasheet

Miniature Vortex Flowmeter

SUP-FVM200

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Datasheet

Miniature Vortex Flowmeter
SUP-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.

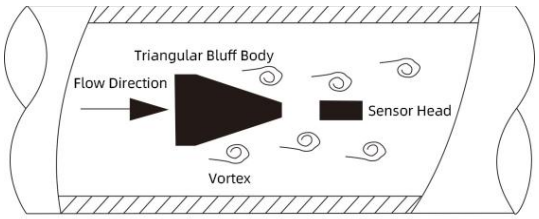

Figure 1 Working Principle of Vortex Flowmeter

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				
Measured Variables	Flow Rate, Temperature			
Nominal Diameter and Flow Measurement Range	Nominal Diameter	DN8	DN10	DN15
	Flow Range	（1~15）L/min	（3~30）L/min	（5~50）L/min
Temperature Measurement Range	（0~90）℃			
Output				
Transmitter Output	Flow/Temperature: (4–20) mA, Load Resistance ≤500 Ω			
Alarm Output	Flow/Temperature Alarm – PNP Alarm Contact, Contact Capacity: 24V / 50 mA			
Communication Output	RS485 Interface, MODBUS-RTU Protocol			
Electrical Specifications				
Power Supply Input	24VDC			
Power Consumption	＜3W			
Electrical Interface	M12 × 1.5 Aviation Connector			
Performance Parameters				
Accuracy	Flow Rate:3.0 Class Temperature:±1℃			
Insulation Resistance	50 MΩ at 100 VDC			
Process Conditions				
Medium Type	Liquids (Water or water-soluble liquids such as ethylene glycol)			
Medium Temperature	0℃~90℃			
Process Pressure	Maximum Pressure: 1.2 MPa (at 40°C)			
Environmental Conditions				
Environmental Conditions	Temperature: –20°C to +85°C Humidity: <95% RH			
Protection Rating	IP65			

Wiring

1.Alarm + (4–20) mA Output Type

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

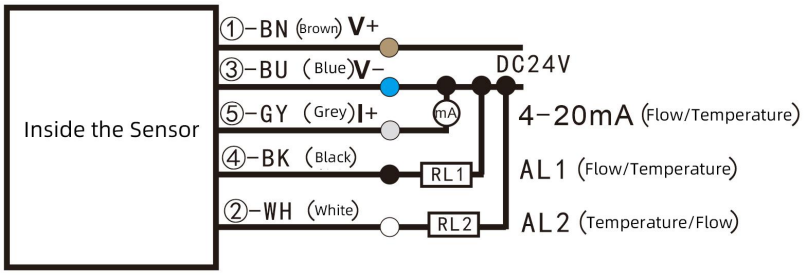

Figure 2

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

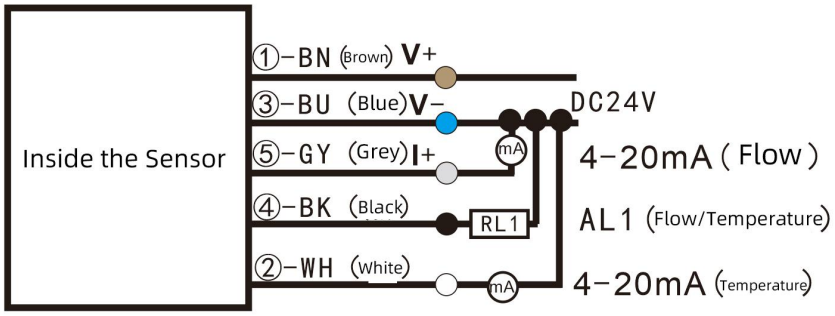

Figure 3

2.Alarm + RS485 Output Type

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

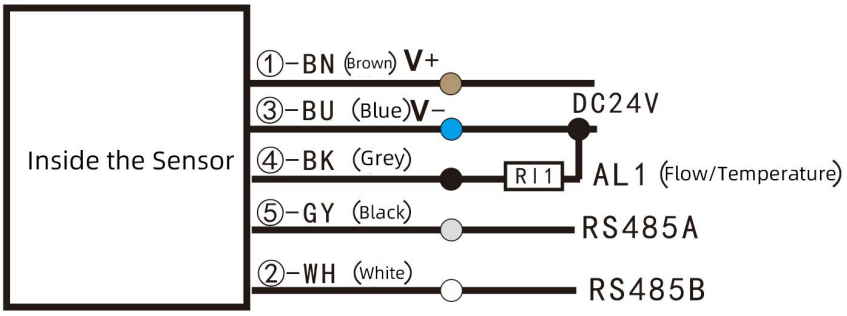

Figure 4

Dimension

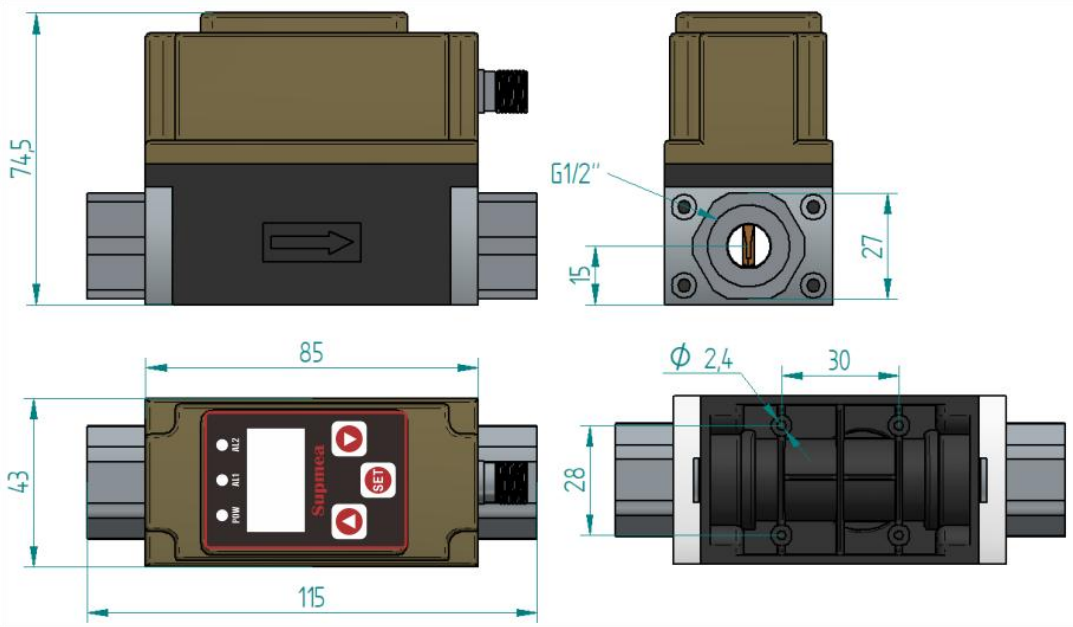

Figure 5 Product Dimensional Drawing (Unit: mm)

Ordering code

SUP-FVM200 -08-IB-C-Q-0-K8-TS-5-02										Description
SUP-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