



FDM09-I

Flow-FDM09-I

www.eyc-tech.com

Venturi Thermal Mass Flow Meter (Liquid / Air)



| Features |

- **High Sensitivity** : Detects minor flow changes for early identification of blockage, leakage, or circulation issues.
- **Bypass Design** : Directs part of the main flow through a thermal sensing path for sensitive measurement.
- **Low Pressure Loss** : Venturi flow path drives bypass flow while supporting pressure recovery.
- **Stable Repeatability** : Fixed flow path design maintains a consistent flow-split ratio.
- **No Conductivity Limitation** : Suitable for water, DI water, and selected coolants with proper calibration.
- **Flow & Temperature Measurement** : Supports cooling-capacity and energy calculations using flow and supply/return temperature difference.

| Applications |

AI Data Center Liquid Cooling / CDU Coolant Supply and Return Flow Measurement / Rack Manifold Flow Measurement / Cold Plate Water Circulation Flow Measurement / Server and GPU Liquid Cooling Circulation Systems / Semiconductor Equipment Cooling Water Flow Measurement / Cooling Circulation Systems / Industrial Equipment Cooling Water and Non-corrosive Liquid Flow Measurement

Specification

Input

Sensor type	Hot-wire sensor
Turndown ratio	50 : 1
Measuring range	DN15 : 42 l/min
	DN25 : 150 l/min
	DN32 : 250 l/min
	DN40 : 380 l/min
	DN50 : 600 l/min

*The measurement range is defined at the standard condition(1013 mbar, 25°C).

Output

Output signal	4 ... 20 mA / 0 ... 10 V / Relay / RS-485
Signal connection	M12 8pin 3-wire output
Warm-up time	60 sec
Response time	$t_{90} \leq 6$ sec
Load resistance	Current output : $\leq 500 \Omega$
	Voltage output : $\geq 10 K\Omega$

Communication

Communication methods & protocol	RS-485 Modbus RTU
RS-485 baud rate	9600, 19200, 38400, 57600, 115200 bps

Accuracy (at 25°C)

Accuracy	$\pm 1\%$ F.S.
Temp. influence	0.05% / °C
Reproducibility	0.5% F.S.

Environmental

Medium	0 ... 80°C, Non-corrosive liquid
Operating Temp. & Humid.	0 ... 60°C / 20 ... 90%RH(Non-condensing)
Storage Temp.	-20 ... +60°C
Operating pressure	16 bar

Electrical

Power supply	DC 24 V $\pm 10\%$
Current consumption	24 V : 110 mA
Relay capacity	Max current : 6 A
	Max voltage : DC 24 V (DC 36 V Max)
Electrical connection	M12 8P connector

Installation

Pipe connection	G thread
Pipe size	DN15 (1/2"), DN25 (1"), DN32 (1-1/4")
	DN40 (1-1/2"), DN50 (2")

Display

Display readout	0 ... 99999999 (Cumulative flow : 8-digit)
	0 ... 99999 (Instantaneous flow : 5-digit)
Decimal point	Button
Sampling time	1 cycle/sec
Flow unit	mL, L, m ³ , gal, ft ³ , inch ³ , UK gal
Time unit	/min, /hr
Response time adjustment range	0.5 ... 300 sec

Certification

Certification	CE
---------------	----

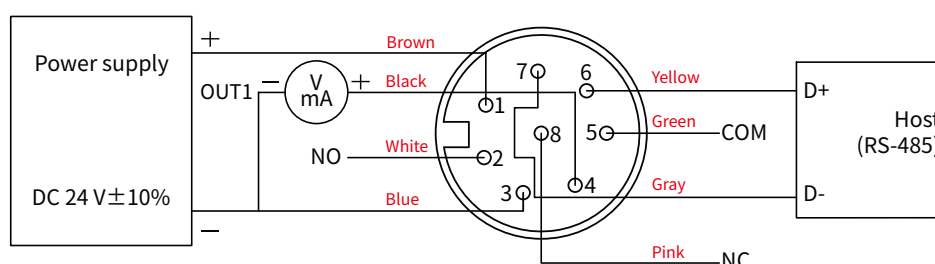
Protection

IP rating	IP65
Electrical protection	■ Reverse polarity ■ Over-voltage

Material

Pipe	Aluminum alloy / Stainless steel / POM
Housing	Aluminum alloy
Weight	DN15 (1/2") : 0.8 Kg,
	DN25 (1") : 0.8 Kg, DN32 (1-1/4") : 0.9 Kg,
	DN40 (1-1/2") : 1.1 Kg, DN50 (2") : 1.3 Kg

Diagram

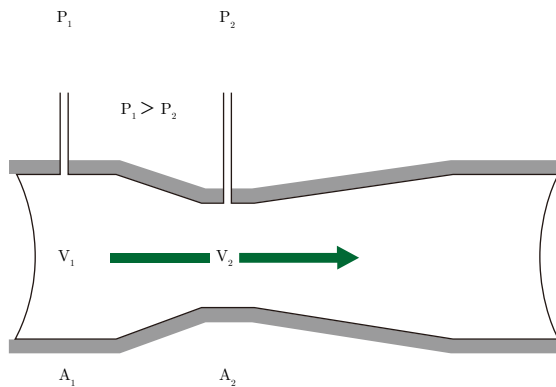


*Please make sure the product and the device which connect with RS-485 are on common ground, avoid damaged product.

| Measurement Principle |

■ Venturi tube

The Venturi tube uses a reduced flow path to increase fluid velocity and lower pressure at the throat, creating a P₁-P₂ differential pressure between the inlet and throat. This differential pressure drives the subsequent bypass measurement.



■ Formula

$$P_1 - P_2 = \frac{\rho}{2} (V_2^2 - V_1^2)$$

$$A_1 V_1 = A_2 V_2$$

P₁: Pressure 1

P₂: Pressure 2

ρ: Density

V₁: Velocity 1

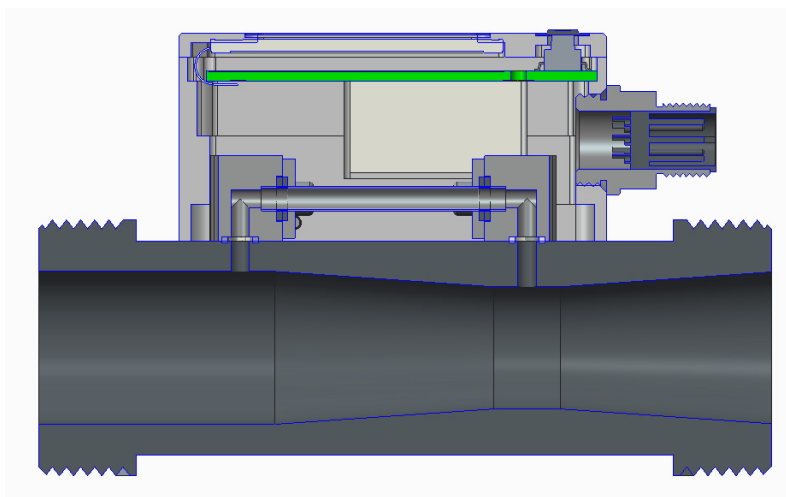
V₂: Velocity 2

A₁: Cross-sectional area 1

A₂: Cross-sectional area 2

■ Hot-Wire Bypass Measurement Principle

FDM09-I combines Venturi differential-pressure sensing with hot-wire measurement technology. The P₁-P₂ differential pressure drives a small portion of fluid through the bypass flow path. As fluid passes the hot-wire sensor, it removes heat and changes the sensing signal, which is then calibrated to calculate the main pipeline flow rate.



■ Formula

$$P = A + B \cdot V^n$$

P: Heating power

A: Power loss with no flow

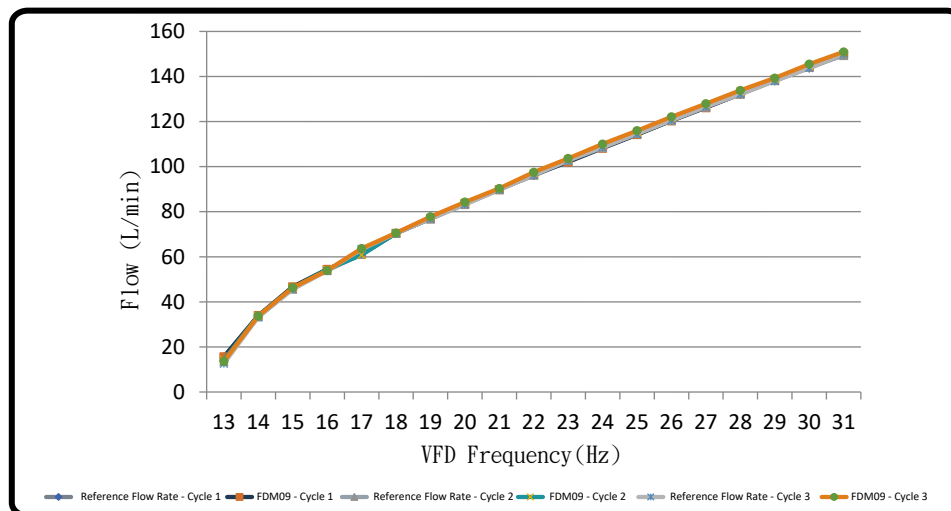
V: Velocity

B: Fluid velocity

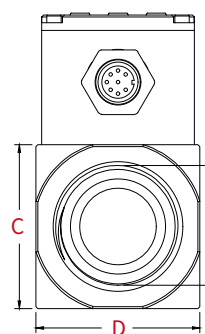
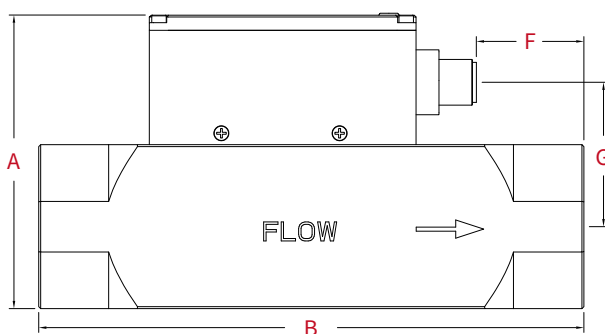
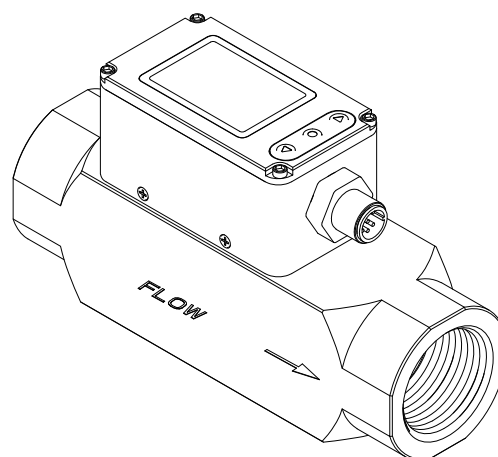
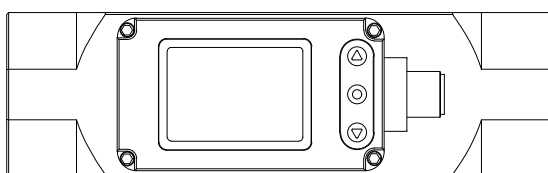
n: Velocity exponent

*For different pipeline sizes, materials, or internal/external thread specifications, please contact our sales team for consultation.

| Three-Cycle Test Report |



| Dimension | Unit : mm



	DN15 (1/2")	DN25 (1")	DN32 (1-1/4")	DN40 (1-1/2")	DN50 (2")
A	75 mm	77 mm	84 mm	91.5 mm	102 mm
B	143 mm	143 mm	152 mm	170 mm	200 mm
C	43 mm	43 mm	50 mm	57.5 mm	68 mm
D	43 mm	43 mm	50 mm	58 mm	68 mm
E	DN15 (1/2")	DN25 (1")	DN32 (1-1/4")	DN40 (1 1/2")	DN50 (2")
F	28.2 mm	28.2 mm	43.7 mm	59.2 mm	84.2 mm
G	35.8 mm	37.8 mm	41.3 mm	44.3 mm	50.3 mm

| Ordering Guide |

	Diameter & Range	Connection	Output
FDM09—I —	D25	G	2
	D15 : DN15 (1/2") , 42 l/min D25 : DN25 (1") , 150 l/min D32 : DN32 (1-1/4") , 250 l/min D40 : DN40 (1-1/2") , 380 l/min D50 : DN50 (2") , 600 l/min	G : G thread	2 : 4 ... 20 mA+RS-485+Relay 3 : 0 ... 10 V+RS-485+Relay

*For pipeline material and internal/external thread options, please contact our sales team for consultation.

| Additional Option Test Report |

For more detailed information please contact us.

■ ILAC / TAF

YUDEN-TECH CO.,LTD. Calibration Laboratory - (ILAC / TAF) Test report.

(TAF accreditation : 3032, complying with ISO / IEC 17025) TAF has mutual recognition arrangement with ILAC MRA

Project	Measurand level or range
Flow transmitter	Water flow rate : 2.54 m ³ /h ...30 m ³ /h (42.3 L/min ... 500.0 L/min)
	Water flow velocity : 0.2 m/s ... 3 m/s

■ ISO 9001

Project	Measurand level or range
Flow	Water flow velocity : 0.0 m/s ... 5 m/s
	Water flow rate : ≤ 580 L/min

* Calibration Condition : Measuring tube DN40 (1.5"), DN80 (3")