



NAGMAN FLOW LEVEL SYSTEMS & SOLUTIONS

(An Associate of Nagman Instruments Consortium)



THERMAL MASS FLOW METER



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MEASURE FLOW & LEVEL WITH **CONFIDENCE**

INTRODUCTION

Thermal gas mass flow meter is designed on the basis of thermal dispersion, and adopts method of constant differential temperature to measuring gas flow. It has advantages of small size, easy installation, high reliability and high accuracy, etc.

The meter contains two platinum resistance temperature sensors. The thermal principle operates by monitoring the cooling effect of a gas stream as it passes over a heated sensor.

Gas flowing through the sensing section passes over two sensors one of which is used conventionally as a temperature sensor, whilst the other is used as a heater.

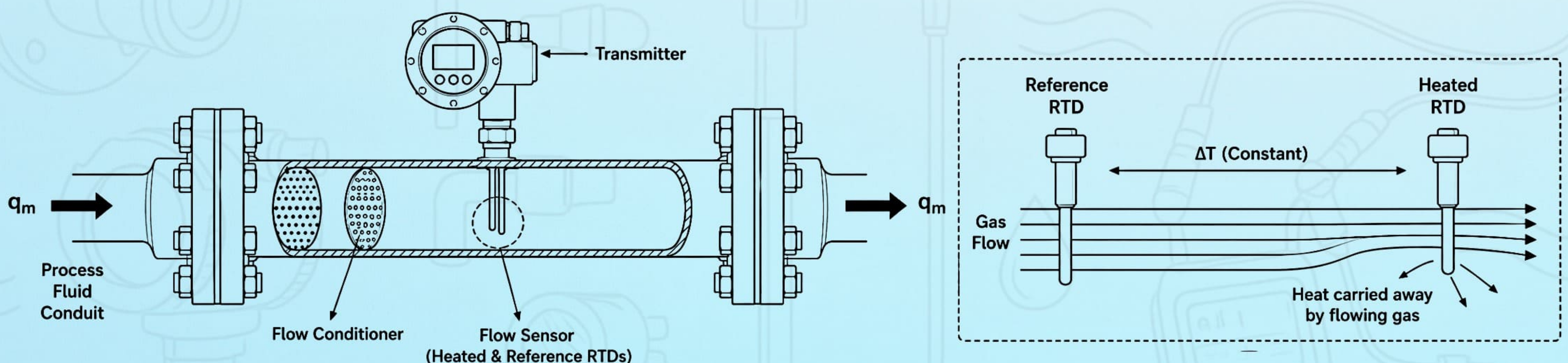
The temperature sensor monitors the actual process values whilst the heater is maintained at a constant differential temperature above this by varying the power consumed by the sensor.



WORKING PRINCIPLE

The **Thermal Mass Flow Meter** operates on the thermal dispersion principle and utilizes two precision RTD sensors: a reference sensor and a heated sensor. The reference sensor continuously measures the actual gas temperature, while the heated sensor is maintained at a constant temperature above the gas temperature. As gas flows across the heated sensor, heat is transferred from the sensor to the moving gas by convection. The higher the gas flow rate, the greater the heat loss from the heated sensor.

To maintain the preset temperature difference between the two sensors, the transmitter continuously adjusts the electrical power supplied to the heated sensor. The amount of power required is directly proportional to the mass flow rate of the gas. By measuring this power, the flow meter accurately determines the gas mass flow without the need for additional pressure or temperature compensation.



ADVANTAGES

- **Direct Mass Flow Measurement** – Measures gas mass flow directly without temperature or pressure compensation.
- **High Accuracy & Stability** – Delivers precise, repeatable, and reliable measurements across varying operating conditions.
- **Wide Measuring Range** – Handles both low and high gas flow rates with excellent sensitivity.
- **No Moving Parts, Low Maintenance** – Eliminates mechanical wear, reducing maintenance requirements and lifecycle costs.
- **Low Pressure Drop** – Minimizes energy loss and helps maintain overall system efficiency.
- **Gas Leak Detection Capability** – Sensitive enough to detect very low flow rates and gas leakage.
- **Easy Installation & Industrial Connectivity** – Available in insertion and flanged designs with RS485/HART communication for seamless automation integration.

INDUSTRIES



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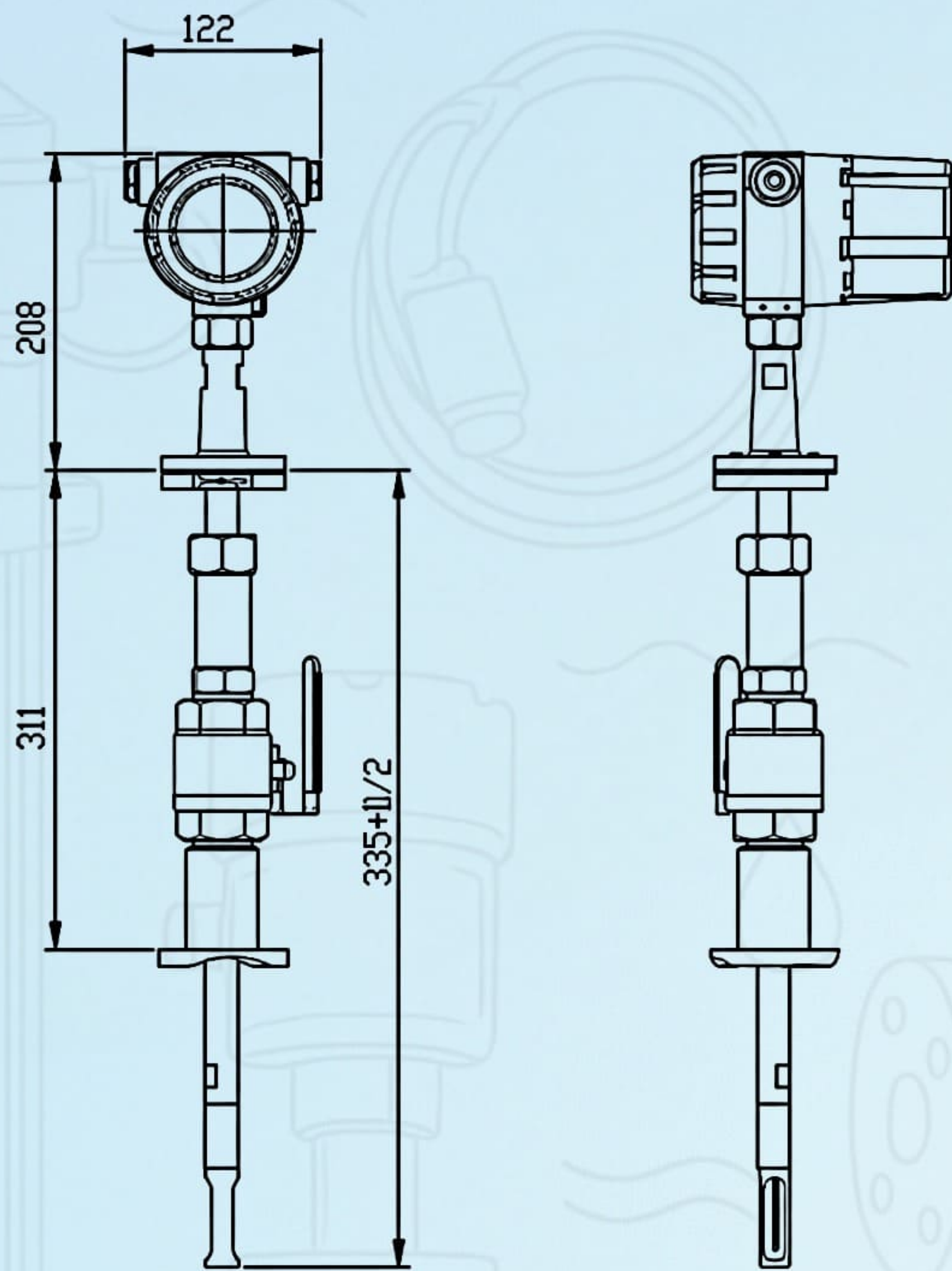
TECHNICAL SPECIFICATIONS

Description	Specification
Medium	Gas (Except acetylene)
Pipe Size	DN 10 - 4000mm
Sensor Type	Standard Insertion, Hot-tapped Insertion and Flanged
Construction	Compact and Remote
Sensor Housing Material	SS304 or SS 316
Pipe Material	Carbon Steel, Stainless Steel, Plastic, etc.,
Velocity	0.1 - 100N/ms
Medium Temperature	Sensor: -30~+200°C ;Max.350°C Transmitter:-20-+45°C
Working Pressure	Medium Pressure ≤ 1.6MPa
Accuracy	±1.0 ~ 2.5%
Power Supply	Compact type: 24VDC or 220VAC, Power consumption ≤18W Remote type: 220VAC, Power consumption ≤19W
Response Time	1S
Output	4-20mA (Optoelectronic Isolation, Maximum Load 500Ω), Pulse,RS485 (Optoelectronic Isolation) and HART
Alarm Output	1-2 line Relay, Normally Open state, 10A/220V/AC or 5A/30V/DC
Display	4 lines LCD display Mass flow, Volume flow in standard condition, Flow totalizer, Date and Time, Working time, and Velocity, etc.
Protection Class	IP65

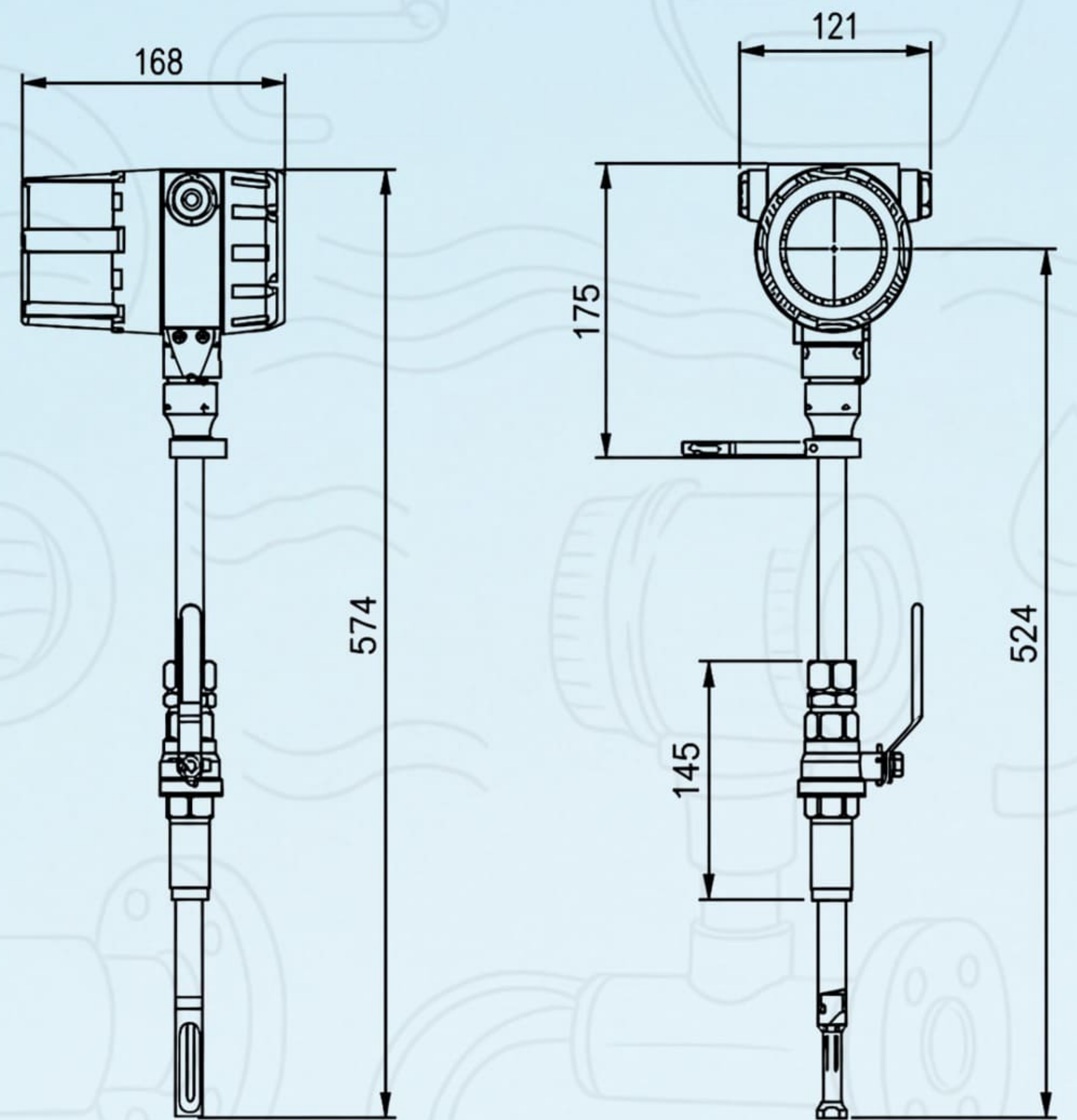


DIMENSIONS

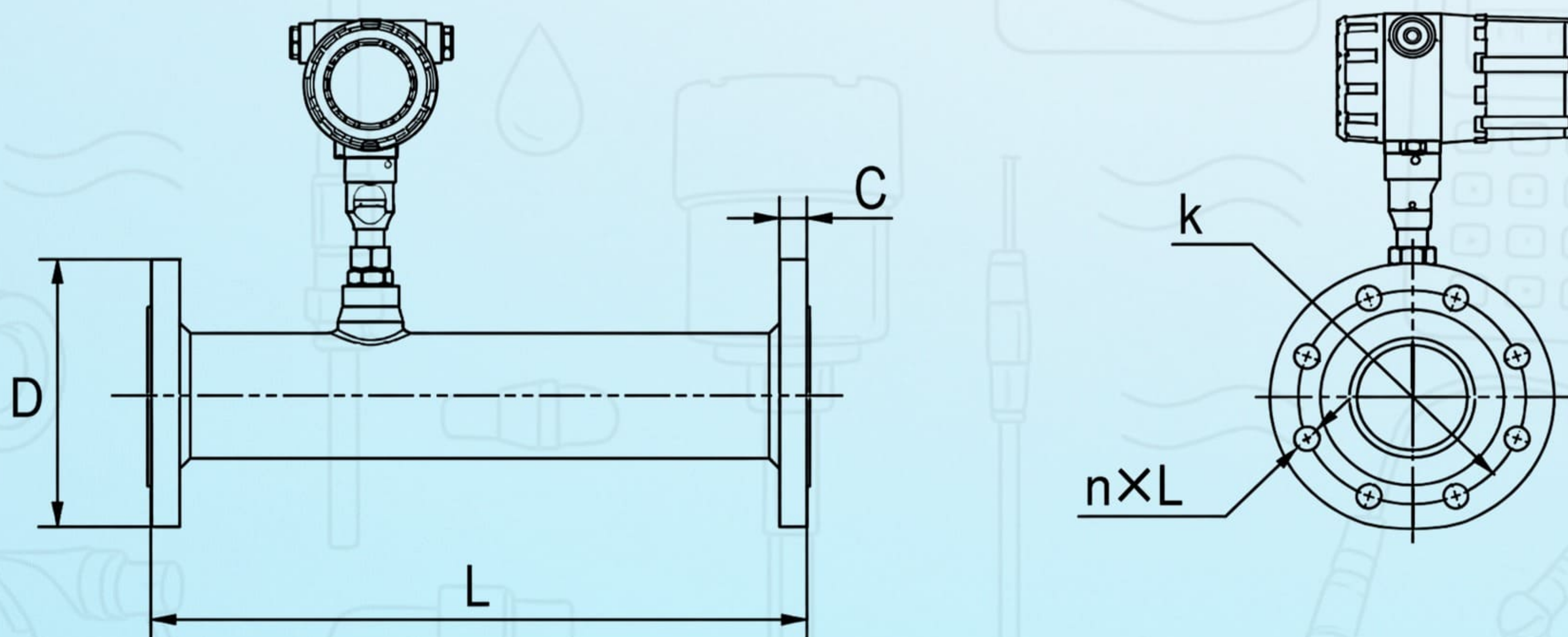
Dimensions of Hot-Tapped Insertion Sensor



Dimensions of Standard Insertion Sensor



Dimensions of Flanged Sensor



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SIZE TABLE

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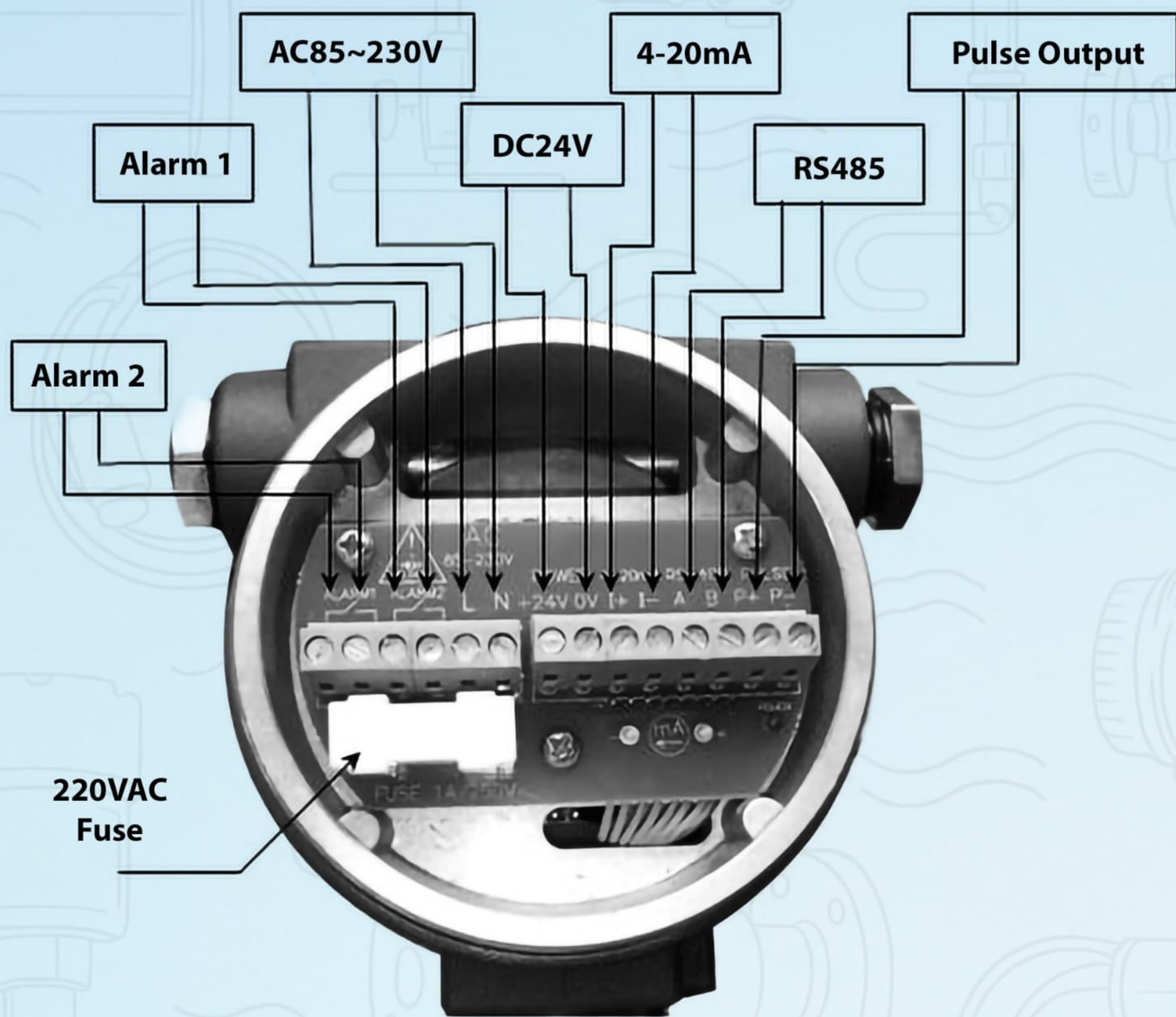
(PN16 flange, Unit: mm)

Nominal Dia	Flange Outer Dia	Center Hole	Screw Hole	Screw Thread	Sealing Face		Flange Thickness	Pipeline Length
DN	D	K	NxL		d	f	C	L
15	95	65	4x14	M12	46	2	14	280
20	105	75	4x14	M12	56	2	16	280
25	115	85	4x14	M12	65	2	16	280
32	140	100	4x18	M16	76	2	18	350
40	150	110	4x18	M16	84	2	18	350
50	165	125	4x18	M16	99	2	20	350
65	185	145	4x18	M16	118	2	20	400
80	200	160	8x18	M16	132	2	20	400
100	220	180	8x18	M16	156	2	22	500

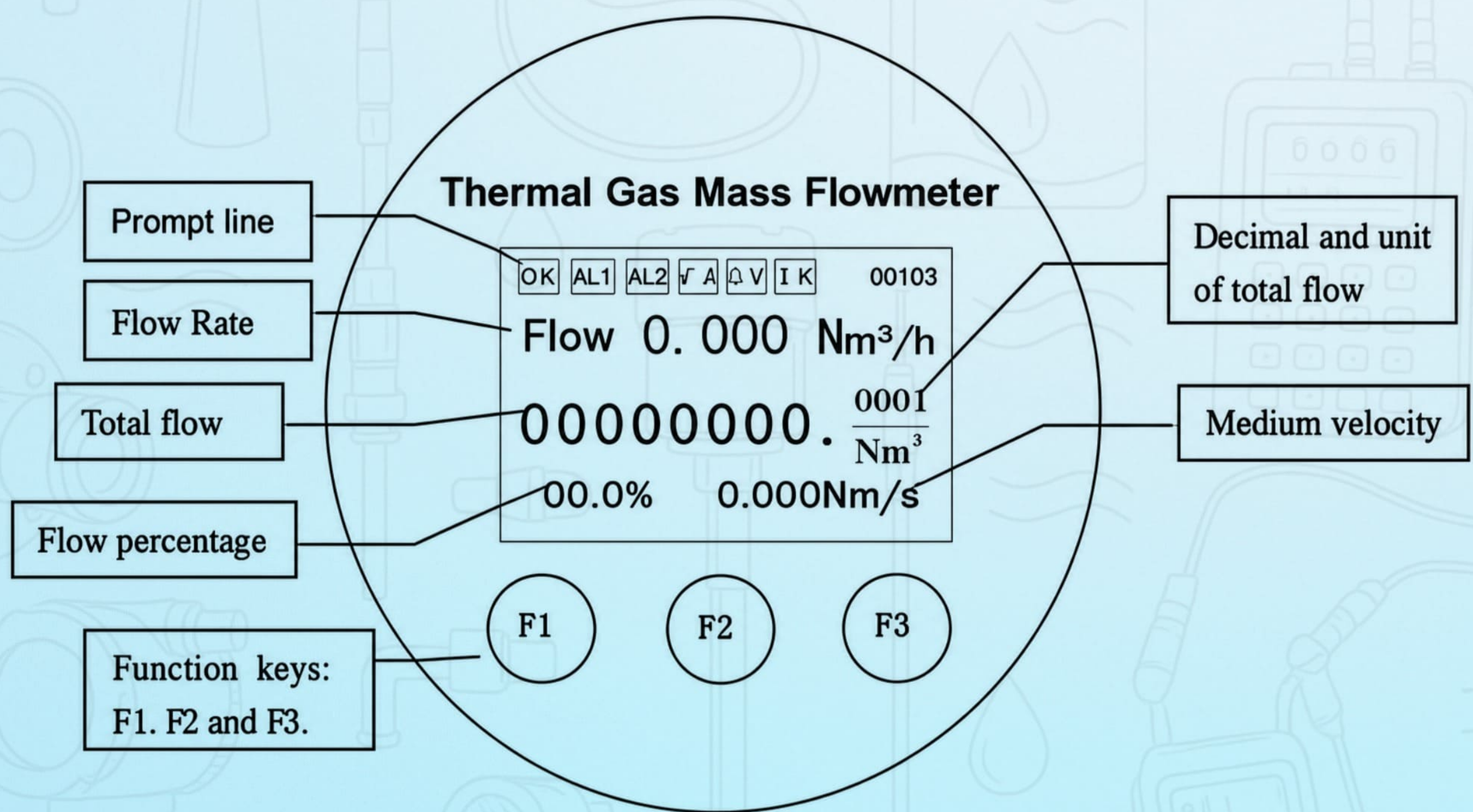
For DN15-DN80, the meter can be made with thread connection.
The above table is used for rated pressure of 1.6MPa. If the rated pressure is more than 1.6MPa, please contact us for special order.



TRANSMITTER WIRINGS



DISPLAY



— UPPER RANGE VALUE OF COMMON GAS —

(Unit: Nm3/h. The follow table can be extended)

Nominal Dia.(mm)	Air	Nitrogen (N2)	Oxygen (O2)	Hydrogen(H2)
15	65	65	32	10
25	175	175	89	28
32	290	290	144	45
40	450	450	226	70
50	700	700	352	110
65	1,200	1,200	600	185
80	1,800	1,800	900	280
100	2,800	2,800	1,420	470
125	4,400	4,400	2,210	700
150	6,300	6,300	3,200	940
200	10,000	10,000	5,650	1,880
250	17,000	17,000	8,830	2,820
300	25,000	25,000	12,720	4,060
400	45,000	45,000	22,608	7,200
500	70,000	70,000	35,325	11,280
600	1,00,000	1,00,000	50,638	16,300
700	1,35,000	1,35,000	69,240	22,100
800	1,80,000	1,80,000	90,432	29,000
900	2,20,000	2,20,000	1,14,500	77,807
1000	2,80,000	2,80,000	1,41,300	81,120
1200	4,00,000	4,00,000	2,03,480	91,972
1500	6,00,000	6,00,000	3,18,000	1,01,520
2000	7,00,000	7,00,000	5,65,200	1,80,480

The flow rate in standard condition: The flow rate is in the condition of 20°C temperature and 101.325kPa pressure



ORDERING INFORMATION

Model Selection							
Sensor Type	Thermal Gas Mass Flow Meter					Details	
	S					Streamline Insertion Type	
	I					Line Insertion Type	
	F					Flange Type	
	D					Clamp Type	
Caliber (mm)	Tube Inner Dia: 10 - 6000mm					Direct Input Dia	
	Square tube need supply side length: 25*25-2000*2000					*Special Pipe need to be marked	
Material		A				1Cr18Ni9Ti	
		B				0Cr18Ni9	
		C				0Cr17Ni12Mo2	
		D				Anti-Corrosion Coating	
		E				Other Material	
Pressure (Bar)			P1			16	
			P2			25	
			P3			40	
Temperature (°C)				T1		-40°~200°C	
				T2		-40°~450°C	
Output				R		RS-485	
				A		4-2mA	
				P		PULSE	
				N		Relay normally open contact	
				H		HART	
Power Supply					DC		24VDC
					AC		220VAC
Display						I	Integral Display
						R	Remote Display

Note:

- Integral insertion should be inserted into the the axis pipe, so the length of measurement bar is decided by the pipe size.
- When placing order, if the gas mass flow meter can't reach the pipe axis, we will supply the calibration coefficient so that the accuracy measurement is calculated



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NAGMAN FLOW-LEVEL SYSTEMS AND SOLUTIONS LLP

MANUFACTURER & EXPORTER OF FLOW, WATER AND GAS METER
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