Datasheet

Thermal Mass Flow Meter

SUP-MF

Supmea®

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Thermal mass flow meter
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The thermal mass flow meter is designed based on the principle of thermal diffusion. The instrument uses the constant temperature difference method to accurately measure the gas. It has the advantages of small size, high degree of digitization, convenient installation and accurate measurement.
Reduce your energy costs and increase your sustainability. Monitor your consumption and analyze your leakage flows with just one measuring device.

Applications

- Compressed air measurement.
- Sewage treatment aeration measurement
- Flue gas emission measurement
- Chimney flue exhaust monitoring

Thermal mass flow meter

Features

- Without temperature and pressure compensation
- Wide range: 0.5Nm/s～100Nm/s
- Vibration resistance and long service life
- Easy installation and maintenance
- Digital circuit, accurate measurement
- With RS485 communication

Principle

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. The greater the gas velocity, the greater the cooling effect and power required to maintain the differential temperature. The measured heater power is therefore a measure of the gas mass flow rate.

The format of gas velocity and power is shown as below:

$$V = \frac{K\,[Q\ /\triangle\ T\ ]^{1.87}}{\rho_{g}} \quad \text{.....（1）}$$

Where : ρ_g--specific gravity of medium

V--velocity

K--balance coefficient

Q--heater power

ΔT--is differential temperature

The medium temperature range of meter is -40℃～300℃.

In the format (1), the specific gravity of medium is related to the density:

$$\rho_{g} = \rho_{n} \times \frac{101.325 + P}{101.325} \times \frac{273.15 + 20}{273.15 + T} \quad \text{.....（2）}$$

Where: ρ_g---medium density in working condition（kg/m^3）

ρn-- medium density in standard condition, 101.325kPa and 20℃ （kg/m^3）

P--pressure in working condition（kPa）

T--temperature in working condition （℃）

In the formats (1) and (2), there is a certain functional relationship between the velocity and pressure in working condition, medium density,the temperature in working condition.

Due to the sensor temperature is always 30℃ higher than the medium temperature (environment temperature), and the meter adopts method of constant differential temperature, therefore the meter do not

need to do temperature and pressure compensation in principle.

Parameters	
Measuring Medium	Various gases (Except the C_2H_2, BCl_3, etc)
Pipe Size	DN65～ DN1000
Velocity	0. 1～ 100 Nm/s
Accuracy	±2.5%
Working Temperature	Sensor: -40℃ ~ +300℃ Transmitter: -20℃ ~ +45℃
Working Pressure	Medium pressure≤ 2.5MPa
Power Supply	24VDC or 220VAC, Power consumption ≥18W
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
Sensor Type	Standard Insertion
Construction	Compact
Pipe Material	Carbon steel, stainless steel, plastic, etc
Display	4 lines LCD: Mass flow, Volume flow in standard condition, Flow totalizer, Date and Time, Working time, and Velocity, etc.
Protection Class	IP65
Sensor Housing Material	Stainless steel (316)

Wiring

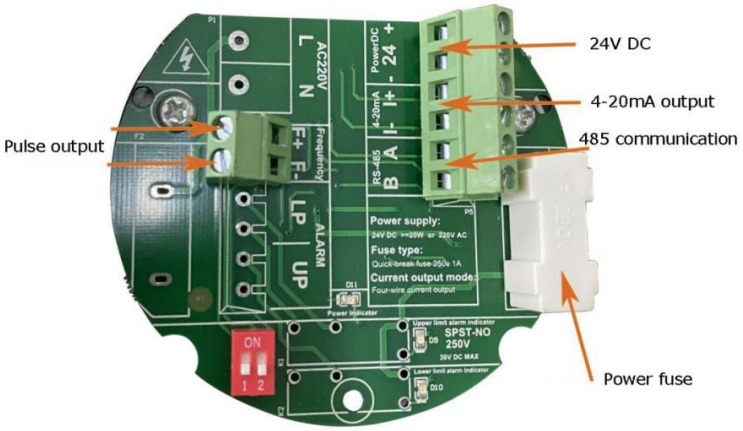
Instruction of sensor wirings

1	2	3	4
RT1	RT2	RH1	RH2

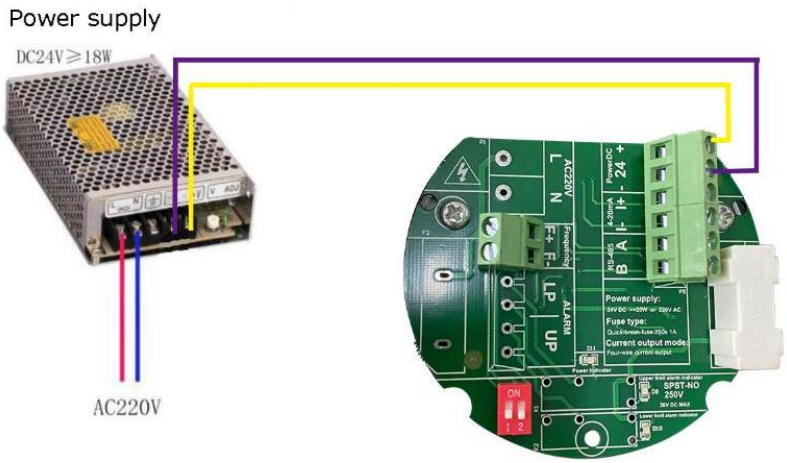
Temperature sensor (Pt1000)

Heater (Pt20)

Terminal description and wiring method

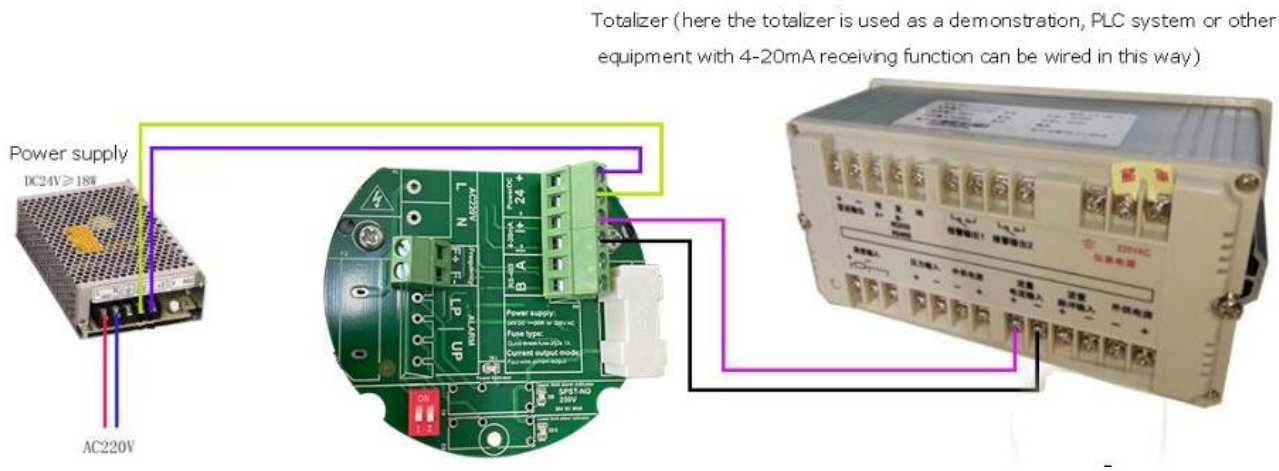


The power supply connection

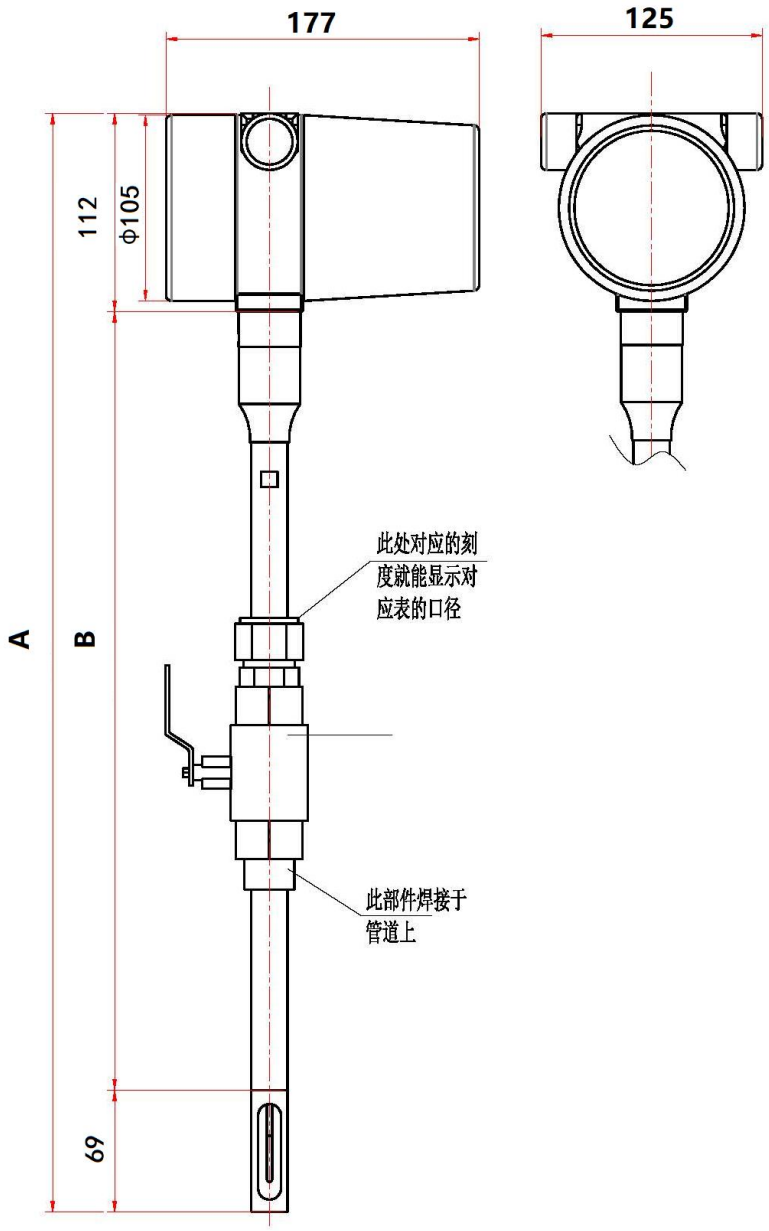


Flowmeter output wiring

4-wire 4-20mA current output



Dimension



Insertion flow meter (Unit: mm)

Nominal diamete	A	B
DN65~DN200	431mm	250mm
DN200~DN500	551mm	370mm
DN500~DN1000	811mm	630mm

Installation

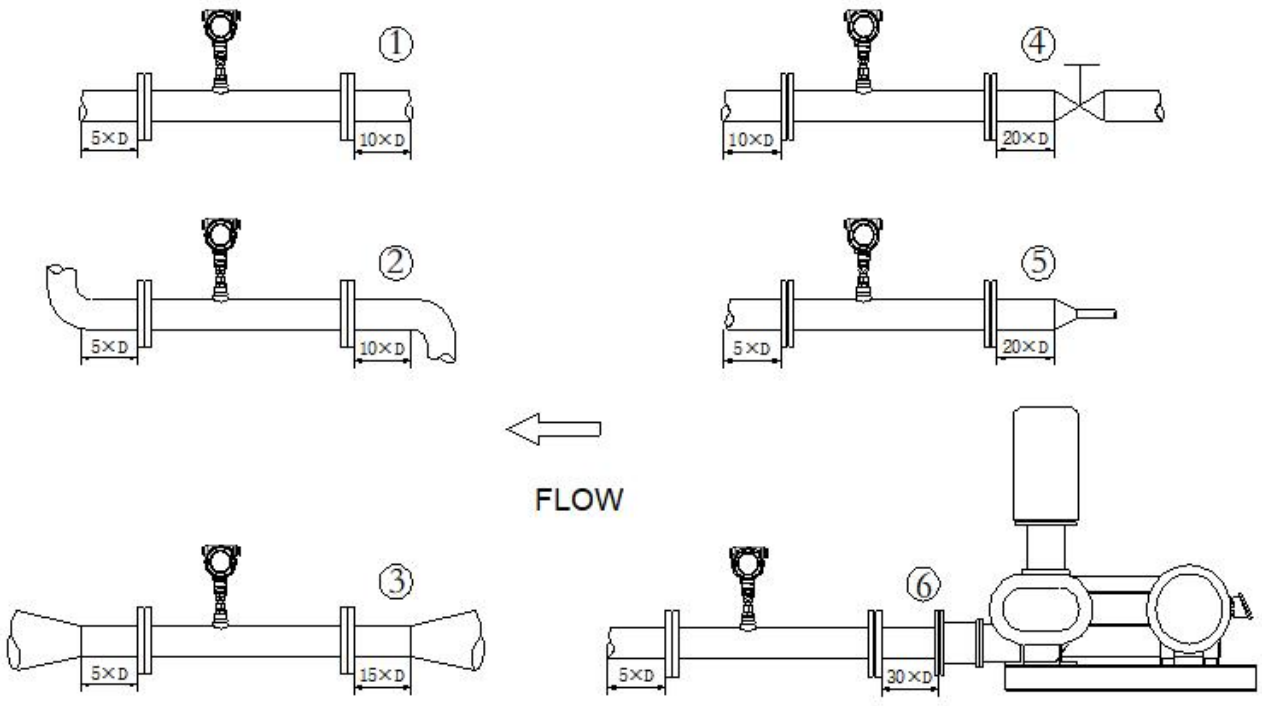
■ Installation

Installation Position

- If the instrument is installed outdoors, the instrument sunshade should be added to avoid sunlight and rain.
- Prohibit installation in strong vibration
- It is forbidden to be exposed to an environment containing a large
- amount of corrosive gas.
- Do not share power with frequency converters, electric welders and other devices that pollute the power source. If necessary, install a clean power source for the converter.

Installation location and requirements for pipeline

When installing the instrument, keep away from elbows, obstacles, variable diameters, and valves to ensure a stable flow field. One side requires a longer upper limit straight pipe, the Inlet run length is greater than 10D, and Outlet run length is greater than 5D. The following figure shows the length of straight pipe required for several situations frequently encountered on site:



Pipeline installation type	NO.	Inlet run	Outlet run
Horizontal tube	1	10D	5D
Elbow	2	10D	5D
Expansion tube	3	15D	5D

Pipeline installation type	NO.	Inlet run	Outlet run
Downstream of valve	4	20D	5D
Contractile tube	5	20D	5D
Downstream of pump	6	30D	5D

When the on-site requirements for the straight pipe section cannot be met, a gas rectifier can be connected in series to significantly reduce the requirements for the straight pipe section

Installation steps

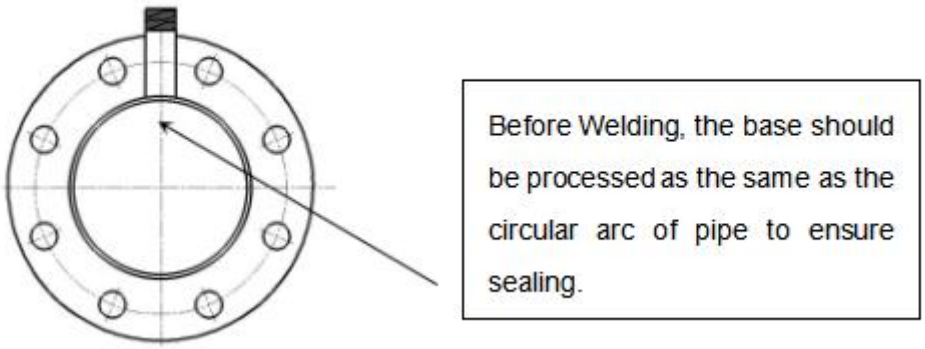
The base of thermal flowmeter

The base of standard insertion type

Note：

No welding in explosive environment Carry out the welding operation in accordance with the requirements of special environment.

When installing, place the base on the top of pipe, and make the through-hole of base be perpendicular to axis of pipe. The good welding location of base and welding process is as below.



Good welding location of base

1) Please confirm the actual inner diameter and wall thickness of the pipe before installing the plug-in thermal gas mass flowmeter.

2) Put the rest of the thermal gas mass flowmeter into the special ball valve together, and calculate the depth to be inserted according to the actual pipe inner diameter and wall thickness. In this step, you can insert a rough size and tighten the nut by hand.

3) Rotate the sensor connecting rod so that the marked arrow is the same as the flow direction of the medium.

4) Convert the corresponding scale on the sensor connecting rod according to the data measured on the spot, and then tighten the nut.

Ordering code

SUP-MF -65-B-P-1-AM-0-M3-WG-TD		Description
SUP-MF		
Nominal Diameter	65	DN65(2.5")
	80	DN80(3")
	1C	DN100(4")
	1E	DN125(5")
	1G	DN150(6")
	2C	DN200(8")
	2G	DN250(10")
	3C	DN300(12")
	3G	DN350(14")
	4C	DN400(16")
	4G	DN450(18")
	5C	DN500(20")
	6C	DN600(24")
	7C	DN700(28")
	8C	DN800(32")
	9C	DN900(36")
	A0	DN1000(40")
	X	Other
Measurement Medium	B	Gas
Accuracy	P	2.5 Class
Display Type	1	Available
Output and Power Supply	AM	4-20mA+Pulse+RS485，24VDC
	AK	4-20mA+HART+Pulse，24VDC
	XX	Other
Alarm Output	0	None
	1	Single SPST
Mounting Base	1	304SS threaded base + ball valve
	4	304SS DN50 PN16 HG/T20592 flange base
	3	316LSS threaded base + ball valve
	5	304SS DN80 PN16 HG/T20592 flange base
	X	Other
Sensor Material	M3	316LSS
	XX	Other
Electrical Interface, Housing Material, and Ingress Protection	WG	M20×1.5 Cable Gland, Aluminum Alloy, IP65
	WJ	NPT1/2 Cable Gland, Aluminum Alloy, IP65

Temperature Resistance Grade	TD	-20-150℃
	TE	-20-220℃
	TF	-20-300℃