



Application

Flexible, convenient programming based on 21 standard gases or freely definable gas mixtures thereof

High level of process control – premium measurement accuracy and repeatability

Reliable monitoring – detection of process disturbances and reverse flow

Flexible installation – suitable for large dimensional range and circular pipes or rectangular ducts

Full access to process and diagnostic information – numerous, freely combinable I/Os and fieldbuses

Reduced complexity and variety – freely configurable I/O functionality

Integrated verification

Description

KTF Provides unprecedented measurement stability in thermal insertion mass flow measurement. It compensates in real time for changes of process conditions: temperature, pressure, flow direction and gas type. Its compact transmitter offers high flexibility in terms of operation and system integration: access from one side, remote display and improved connectivity options.

Measuring principle is characterized by a high operable flow range and direct mass flow measurement

Measurement of utility and process gases and gas mixtures in circular piping or rectangular ducts

Thermal Mass Flow Meter

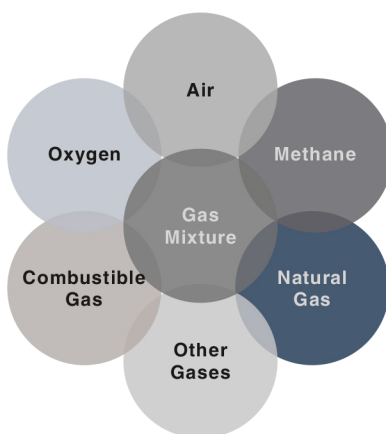
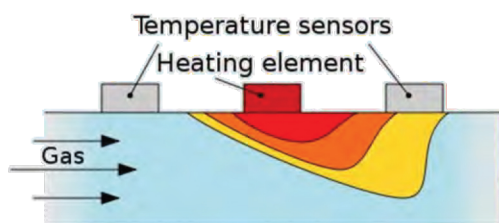
KTF Series

Working Principle

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. 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.



Measurable gases

What are the Advantages of Thermal Mass Flow Meters?

- No temperature and pressure compensation is required for gas flow measurement, and the measurement is convenient and accurate. The mass flow rate or standard volume flow rate of the gas can be obtained.
- **Wide range ratio:** Can measure gas with flow rate as high as 120Nm³/s and as low as 0.1Nm³/s, can be used for gas leak detection.
- **Good anti-vibration performance and long service life:** The sensor has no moving parts and pressure sensing parts, and is not affected by vibration on measurement accuracy.
- **Easy installation and maintenance:** If the site conditions permit, installation and maintenance can be achieved without stopping production. (Special customization is required)
- **RS-485 communication can be used to achieve factory automation and integration.**
- **Digital design:** Overall digital circuit measurement, accurate measurement and convenient maintenance.

Features

- Oxygen, nitrogen, hydrogen, chlorine and multi-component gas measurement.
- Blast furnace gas, coke oven gas measurement.
- Natural gas, liquefied gas, flare gas, and other gas flow measurement.
- Primary and secondary air flow measurement of power plant blast furnace.
- Flow measurement of underground mine ventilation or exhaust system.
- Flue gas measurement.
- Compressed air measurement.



Applications

- **Chemical Industry:** Thermal mass flow meters are extensively used in the chemical industry, primarily for monitoring the flow of gases during reactions to ensure the stability and safety of processes.

- **Oil and Gas Industry:** In the oil and gas industry, thermal gas mass flow meters are used in various stages such as wellhead measurement, pipeline transportation, and oil-gas separation.

- **Power Industry:** In the power industry, thermal gas mass flow meters are mainly used to measure the flow of gases during the combustion process in boilers.

- **Metallurgical Industry:** In the metallurgical industry, thermal gas mass flow meters are used to measure the flow of gases such as blast furnace gas and converter gas.

- **Public Engineering Monitoring:** In public engineering, thermal gas mass flow meters are mainly used to monitor the flow of gases such as natural gas and air.

- **Food and Pharmaceutical Industries:** Thermal gas mass flow meters can be used for flow control in processes such as the addition of fresh air and carbon dioxide treatment to ensure the cleanliness of the production environment and the stability of product quality.

- **Semiconductor Industry:** In the semiconductor industry, thermal gas mass flow meters are used to accurately measure the gas production of nitrogen generators and the gas consumption in various workshops to achieve efficient cost control.

- **Environmental Protection Field:** They are used to monitor the flow of industrial exhaust gases to ensure compliance with environmental protection standards. By accurately measuring exhaust gas flow, companies can control emissions reasonably and reduce adverse environmental impacts.



Thermal Mass Flow Meter Product Series



Technical Data

Structure Type	Insertion Type	Flange Type
Measuring Medium	Common steady-state gases (acetylene, boron trichloride, and other unstable media are not measurable)	
Diameter	DN65~DN4000	DN10~DN300
Velocity	1~100Nm/s	
Accuracy	Insertion Type: $\pm 2.5\%$ Flange Type: $\pm 1.5\%$	
Operating Temperature	Sensor: $-40^{\circ}\text{C}\sim+200^{\circ}\text{C}$	Converter: $-20^{\circ}\text{C}\sim+45^{\circ}\text{C}$
Pressure	Medium pressure $\leq 1.6\text{MPa}$, Inline type 4MPa	
Power Supply	(DC 24V or AC 220V) $\leq 18\text{W}$	
Response Speed	1s	
Output	4-20mA (optically isolated, maximum load 500 ohms), RS-485 (optically isolated, requires separate customization)	
Alarm	1-2 normally open contacts, 24V/0.5A	
Supply Type	Integrated Structure	
Pipe Material	Carbon steel, stainless steel, plastic, etc.	
Display	Four-line Japanese character LCD display	
Display Content	Mass flow rate, standard volume flow rate, cumulative flow rate, standard flow velocity, etc.	
Protection	IP65	
Sensor Material	SS304	
Probe Material	SS316	
Explosion Proof	ExdIICT6 Gb; ExtbIIIC T80°C Db	

Flow Range

Diameter (mm)	Air (Nm ³ /h)	Nitrogen (N ₂) (Nm ³ /h)	Oxygen (O ₂) (Nm ³ /h)	Hydrogen (H ₂) (Nm ³ /h)
10	30	30	15	4
15	65	65	32	10
20	110	110	55	17
25	175	175	89	28
32	290	290	144	45
40	450	450	226	70
50	700	700	352	110
65	1200	1200	600	185
80	1800	1800	900	280
100	2800	2800	1420	470
125	4400	4400	2210	700
150	6300	6300	3200	940
200	10000	10000	5650	1880
250	17000	17000	8830	2820
300	25000	25000	12720	4060
400	45000	45000	22608	7200
500	70000	70000	35325	11280
600	100000	100000	50638	16300
700	135000	135000	69240	22100
800	180000	180000	90432	29000
900	220000	220000	114500	77807
1000	280000	280000	141300	81120
1200	400000	400000	203480	91972
1500	600000	600000	318000	101520
2000	700000	700000	565200	180480

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

The unit of flow rate is optional: Nm³/h, Nm³/min, L/h, L/min, t/h, t/min, kg/h or kg/min.

The reduction formula of flow rate in working condition and flow rate in standard condition:

$$Q_s = \frac{0.101325 + P}{0.101325} * \frac{273.15 + 20}{273.15 + t} * Q_n$$

Qs: The flow rate in standard condition (Nm³/h).

Qn: The flow rate in working condition (m³/h).

t: The medium temperature in working condition (°C).

p: The medium pressure in working condition (Gauge pressure, MPa).

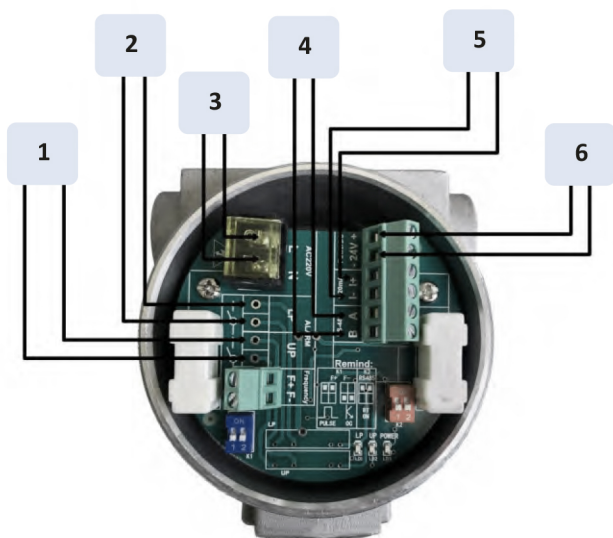


Wiring

Operation with electricity is strictly prohibited.

Confirm the power supply type

1	2	3	4
RT1	RT2	RH1	RH2

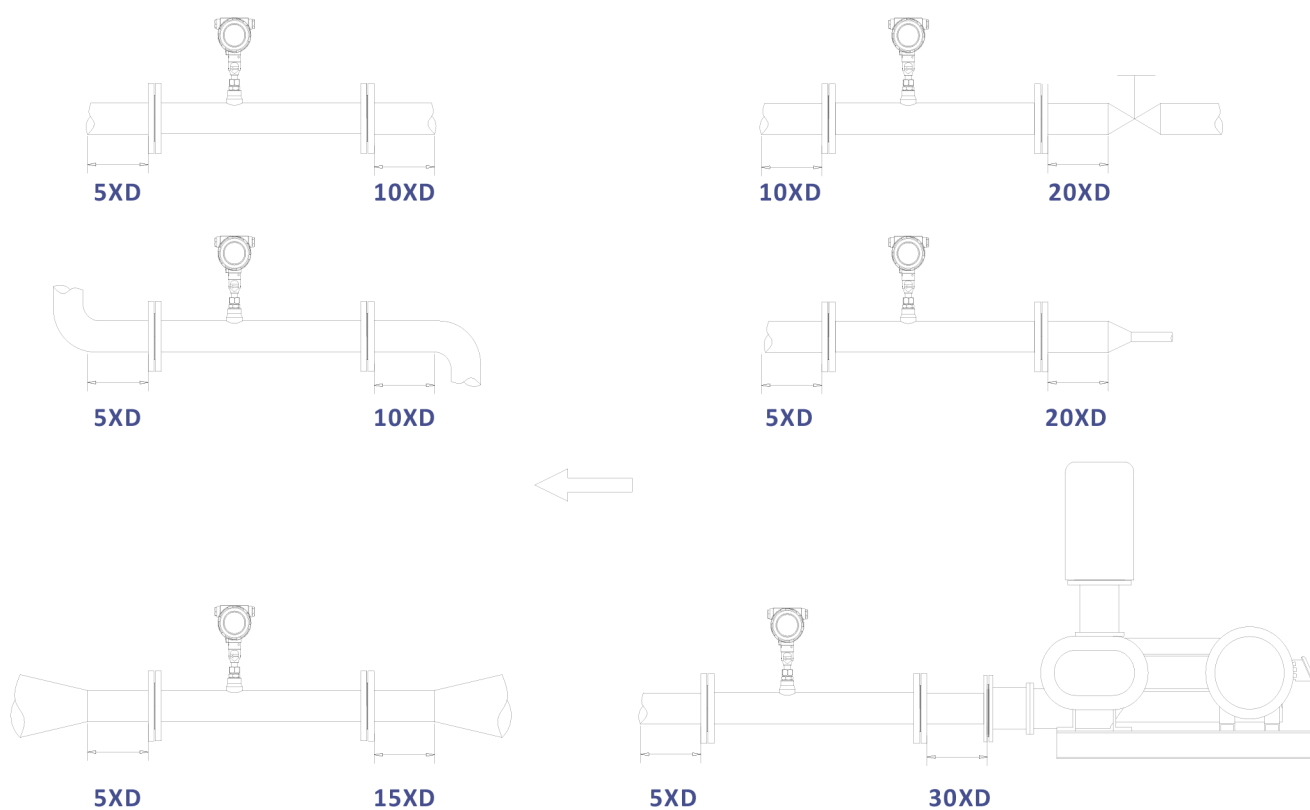


No.	Description
1	Alarm Upper Limit
2	Alarm Lower Limit
3	220V
4	RS485
5	4-20mA
6	DC 24V

Installation Environment

- ⊘ If the instrument is installed outdoors, a sunshade should be added to avoid sun exposure and rain.
- ⚠ It is forbidden to install it in places with strong vibration.
- ⚠ It is forbidden to expose it to an environment containing a large amount of corrosive gas.
- ⚠ Do not share the power supply with equipment that pollutes the power supply, such as frequency converters and electric welders. If necessary, install a purified power supply for the converter.

When installing the instrument, it should be positioned away from bends, obstructions, reducers, and valves to ensure a stable flow field. Generally, a longer upstream straight pipe is required, with the upstream straight pipe length exceeding 10D and the downstream straight pipe length exceeding 5D. The diagram below illustrates the required straight pipe lengths for several common scenarios encountered on-site:



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

Pipeline Type	No.	Upstream Straight Section	Downstream Straight Section
Horizontal Pipe	1	10D	5D
Elbow Pipe	2	10D	5D
Enlarged Pipe	3	15D	5D
Downstream of Valve	4	20D	5D
Constricted Pipe	5	20D	5D
Downstream of Pump	6	30D	5D

Model Selection

Model	Suffix Code							Description
KTF	①	②	③	④	⑤	⑥	⑦	Thermal Mass Flow Meter
Structure	S							Compact Type
	L							Remote Type
Diameter		XXX						010:DN10 100:DN100 4000:DN4000
Body Material			S4					SS304
			S6					SS316
Temperature				T1				-40...+100°C
				T2				-40...+150°C
				T3				-40...+200°C
Communication					1			RS485
					2			HART
Power Supply						1		24V DC
						2		220V AC
Connection							F	Flange Type: DIN; JIS; ANSI
							T	Thread Type
							I	Insertion Type (DN25~DN4000)
Explosion Proof							CT	ExdIICT6 Gb
							EW	ExtbIIIC T80°C Db
							NA	None

Thermal Mass Flow Meter Selection Guide

KTF-S-50-S4-T1-1-1-F-CT

KTF: Thermal Mass Flow Meter

50: DN50

S4: SS304 Material

T1: -40...+100°C

1: RS485

1: 24V DC

F: Flange Type: DIN; JIS; ANSI

CT: ExdIICT6 Gb