

## 1. Introduction

HGF-3000 Thermal Gas Mass Flow Meter is an instrument which measures fluid flow by means of heat conduction. The constant temperature differential method is adopted for this instrument to measure the gas mass flow accurately, featured by small volume, high degree of digitalization, convenient installation and accurate measurement.

The sensor element of HGF-3000 is made up of two platinum resistance temperature sensors of reference level. Bridge circuit is adopted in the instrument for flow measurement under high temperature and pressure. One sensor is applied in measuring the fluid temperature, and another is to maintain the constant temperature differential of that over fluid temperature.

### HGF-3000 Thermal Gas Mass Flow Meter has the following technological superiorities:

- a true mass flow meter which could measure the gas flow conveniently and accurately without compensation for temperature or pressure. Mass flow or standard volume flow of the gas is to be obtained.
- Great range ratio; It could measure the flow rate from 100Nm/s maximum to 0.5Nm/s minimum, and is served for gas leak detection.
- Good anti-vibration performance and long service life; There are no moving or pressure-sensitive parts in the sensor, which keeps the measurement accuracy away from the effect of vibration.
- Simple and convenient installation and maintenance: Non-stop installation and maintenance could be carried out in case of suitable field conditions.
- Digitalization design; Digital circuit measurement is applied throughout the instrument, featured by accurate detection and convenient maintenance.

## 2. Technical Parameters and Functions

### Technical Parameters

	Insertion type	Segment type
Measuring media	Various gases (except for acetylene gas)	
Range of pipe diameter	DN80-6000 mm	DN15-2000 mm
Velocity range	0.5-100 Nm/s	
Accuracy	±1.0%	
Working temperature	Sensor: normal temperature type -10°C to +200°C, high temperature type -10°C to +350°C; converter:-20°C to +45°C (for special environment, please specify)	
Working pressure	Media pressure≤2.5Mpa	Media pressure≤4.0Mpa
Power supply	Integrated type machine (DC24V or AC220V ≤18W), detachable converter (AC220V ≤19W)	
Response speed	1S	
Output signal	4-20mA (photoelectric isolation, maximum load 500Ω) RS-485 (photoelectric isolation)	
Pipeline material	Carbon steel, stainless steel and plastic, etc.	
Display	Integrated type: 8-bit field + 24 prompts Detachable type: 10x2 Chinese characters	
Display content	Mass flow, volume flow under normal condition, integrated flow, standard time and integrated runtime, etc.	
Outline of detachable converter	Wall-hanging type: 213x185x107mm Panel-mounting type: 160x80x160mm	
Distance between detachable converter and primary instrument	≤25m(primary instrument is powered by detachable converter), ≤1000m (primary instrument is powered on the site)	
Degree of protection of detachable converter	Wall-hanging type: IP65 Panel-mounting type: IP52	
Degree of protection of primary instrument	IP67	
Explosive-proof grade of primary instrument	Exd II CT4	
Sensor materials	Stainless steels	Stainless steel, carbon steels

### 3. Installation and Connection

- ☑ Install sun shades for outdoor instrument to keep out of sunshine and rain.
- ⊗ Installing in the place with strong vibration is prohibited.
- ⊗ Exposing in the environment with great amount of corrosive gases is prohibited.
- ⊗ Don't share one power source with equipments that will pollute the power source such as frequency converter, welding machine etc. Install purified power for converter if necessary.

#### 3.1 Integrated type installation and connection

##### 3.1.1 Appearance and Structure

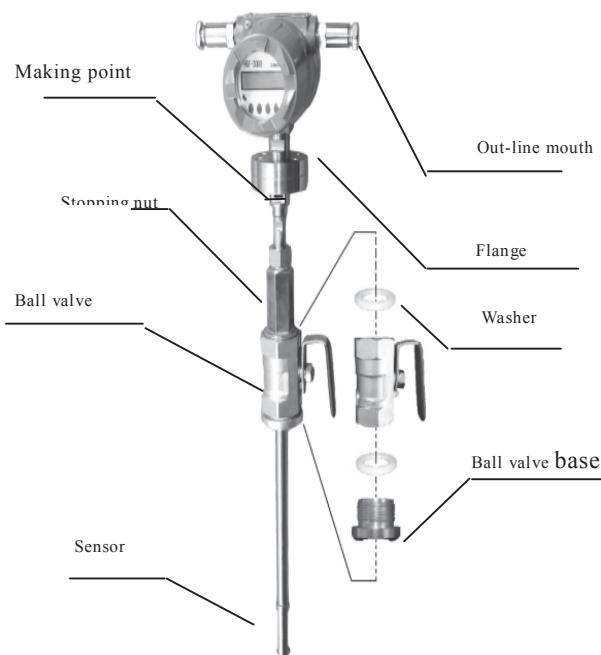


Fig.1 Integrated and insertion type

Applies to pipes with diameter more than DN80mm

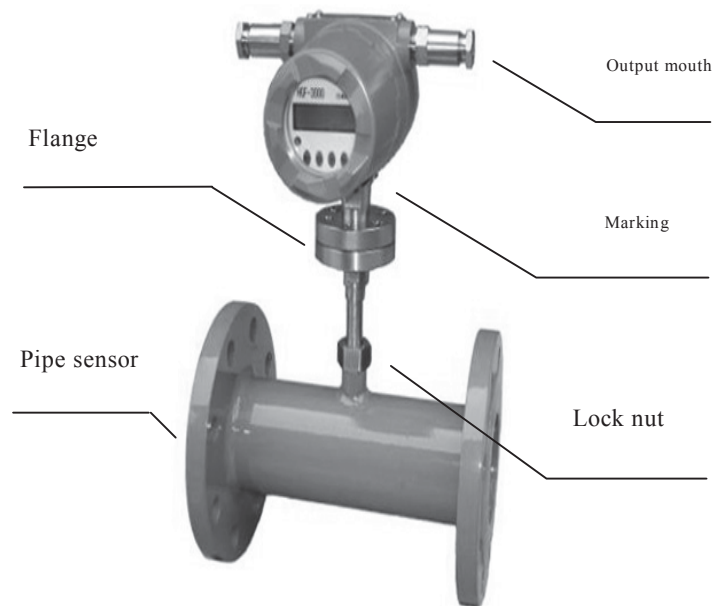


Fig. 2 one-piece and segment type

Applies to pipes with diameter more than DN15mm

① The integrated and insertion type should insert into the axle center of measured pipe, therefore, the length of measuring rod depends on the diameter of measured pipe. Please specify clearly in your order. If the instrument can't insert into the axle center of measured pipe, the manufacturer will provide standard factor for accurate measuring.

② The one-piece and segment type adopts flange connection and conforms to national standard GB/T9119 - 2000. See Appendix 2.

#### Appendix4 Physical Parameters Sheet of Gases

Name	Molecular formula	Molecular weight	Density $\rho_n/(\text{kg/m}^3)$ 20°C 101.325 kPa	Specific heat ratio $Z_n$ 20°C 101.325kPa	Name	Molecular formula	Molecular weight	Density $\rho_n/(\text{kg/m}^3)$ 20°C 101.325 kPa	Specific heat ratio $Z_n$ 20°C 101.325kPa
Air(dry)		28.9626	1.2041	1.4 <sup>①</sup>	Acetylene	C <sub>2</sub> H <sub>2</sub>	26.038	1.083	1.24
Azote	N <sub>2</sub>	28.0135	1.1646	1.4 <sup>①</sup>	Benzene	C <sub>6</sub> H <sub>6</sub>	78.114	3.2476	1.101
Oxygen	O <sub>2</sub>	31.9988	1.3302	1.397 <sup>①</sup>	Carbon Monoxide	CO	28.0106	1.165	1.395
Helium	He	4.0026	0.1664	1.66 <sup>①</sup>	Carbon dioxide	CO <sub>2</sub>	44.00995	1.829	1.295
Hydrogen	H <sub>2</sub>	2.0159	0.0838	1.412 <sup>①</sup>	Mononitrogen monoxide	NO	30.0061	1.2474	1.4
Krypton	K <sub>r</sub>	83.80	3.4835	1.67	Nitrogen Dioxide	NO <sub>2</sub>	46.0055	1.9121	1.31
Xenon	X <sub>e</sub>	131.30	5.4582	1.666	Nitrous Oxide	N <sub>2</sub> O	44.0128	1.8302	1.274
Neon	N <sub>e</sub>	20.183	0.83914	1.68	Sulfureted Hydrogen	H <sub>2</sub> S	34.07994	1.4169	1.32
Argon	A <sub>r</sub>	39.948	1.6605	1.68	Hydrocyanic Acid	HCN	27.0258	1.1235	1.31(65°C)
Methane	CH <sub>4</sub>	16.043	0.6669	1.315 <sup>①</sup>	Carbon Oxysulfide	COS	60.0746	2.4973	
Ethane	C <sub>2</sub> H <sub>6</sub>	30.07	1.2500	1.18 <sup>①</sup>	Ozone	O <sub>3</sub>	47.9982	1.9952	
Propane	C <sub>3</sub> H <sub>8</sub>	44.097	1.8332	1.13 <sup>①</sup>	Sulfur Dioxide	SO <sub>2</sub>	64.0628	2.726	1.25
Normal Butane	C <sub>4</sub> H <sub>10</sub>	58.124	2.4163	1.10 <sup>①</sup>	Fluorin	F <sub>2</sub>	37.9968	1.5798	1.358
Isobutane	C <sub>4</sub> H <sub>10</sub>	58.124	2.4163	1.11 <sup>①</sup>	Chlorin	Cl <sub>2</sub>	70.906	2.9476	1.35
Normal pentane	C <sub>5</sub> H <sub>12</sub>	72.151	2.9994	1.07 <sup>①</sup>	Chloromethane	CH <sub>3</sub> Cl	50.488	2.0990	1.28
Ethene	C <sub>2</sub> H <sub>4</sub>	28.054	1.1660	1.22 <sup>①</sup>	Anodynon	C <sub>2</sub> H <sub>5</sub> Cl	64.515	2.6821	1.19(16°C (0.3~0.5)atm)
Propylene	C <sub>3</sub> H <sub>6</sub>	42.081	1.7495	1.15 <sup>①</sup>	Ammonia	NH <sub>3</sub>	17.0306	0.7080	1.32
Butylenes -1	C <sub>4</sub> H <sub>8</sub>	56.108	2.3326	1.11 <sup>①</sup>	Freon -11	CCl <sub>3</sub> F	137.3696	5.7110	1.135
Maleic Butylenes -2	C <sub>4</sub> H <sub>8</sub>	56.108	2.3327	1.1214 <sup>①</sup>	Freon -12	CCl <sub>2</sub> F <sub>2</sub>	120.914	5.0269	1.138
Fumaric Butylenes -2	C <sub>4</sub> H <sub>8</sub>	56.108	2.3327	1.1073 <sup>①</sup>	Freon -13	CClF <sub>3</sub>	104.4594	4.3428	1.150(10°C)
Isobutene	C <sub>4</sub> H <sub>8</sub>	56.108	2.3327	1.1058 <sup>①</sup>	Freon -113	CCl <sub>2</sub> FCClF <sub>2</sub>	187.3765	7.7900	

① 15.6°C, 101.325kPa