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℃ to +200℃, high temperature type -10℃ to +350℃; converter:-20℃ to +45℃ (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

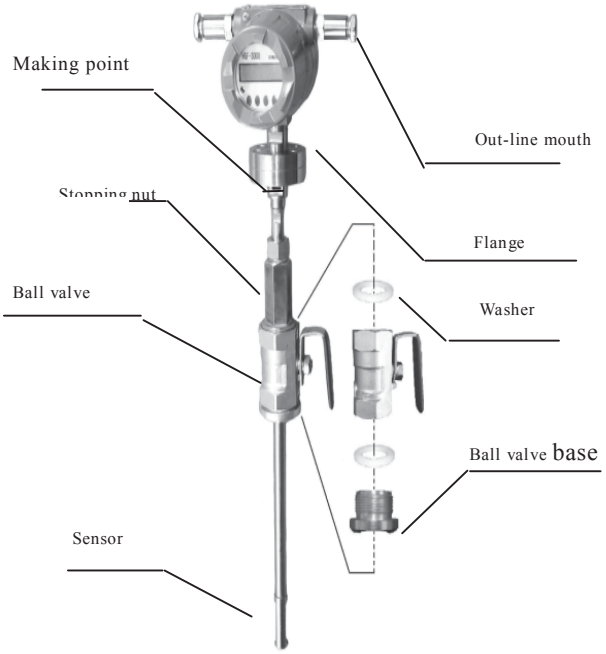

Fig.1 Integrated and insertion type

Applies to pipes with diameter more than DN80mm

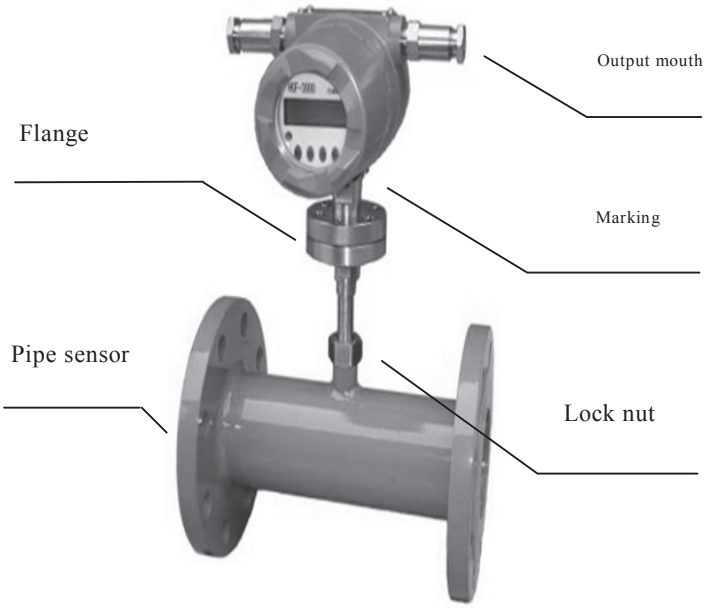

Fig. 2 one-piece and segment type

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 ρn/ (kg/m^3) 20℃ 101.325 kPa	Specific heat ratio Zn 20℃ 101.325kPa	Name	Molecular formula	Molecular weight	Density ρn/(kg/m^3) 20℃ 101.325 kPa	Specific heat ratio Zn 20℃ 101.325kPa
Air(dry)		28.9626	1.2041	1.4①	Acetylene	C_2H_2	26.038	1.083	1.24
Azote	N_2	28.0135	1.1646	1.4①	Benzene	C_6H_6	78.114	3.2476	1.101
Oxygen	O_2	31.9988	1.3302	1.397①	Carbon Monoxide	CO	28.0106	1.165	1.395
Helium	He	4.0026	0.1664	1.66①	Carbon dioxide	CO_2	44.00995	1.829	1.295
Hydrogen	H_2	2.0159	0.0838	1.412①	Mononitrogen monoxide	NO	30.0061	1.2474	1.4
Krypton	K_r	83.80	3.4835	1.67	Nitrogen Dioxide	NO_2	46.0055	1.9121	1.31
Xenon	X_e	131.30	5.4582	1.666	Nitrous Oxide	N_2O	44.0128	1.8302	1.274
Neon	N_e	20.183	0.83914	1.68	Sulfureted Hydrogen	H_2S	34.07994	1.4169	1.32
Argon	A_r	39.948	1.6605	1.68	Hydrocyanic Acid	HCN	27.0258	1.1235	1.31(65℃)
Methane	CH_4	16.043	0.6669	1.315①	Carbon Oxysulfide	COS	60.0746	2.4973	
Ethane	C_2H_6	30.07	1.2500	1.18①	Ozone	O_3	47.9982	1.9952	
Propane	C_3H_8	44.097	1.8332	1.13①	Sulfur Dioxide	SO_2	64.0628	2.726	1.25
Normal Butane	C_4H_{10}	58.124	2.4163	1.10①	Fluorin	F_2	37.9968	1.5798	1.358
Isobutane	C_4H_{10}	58.124	2.4163	1.11①	Chlorin	CI_2	70.906	2.9476	1.35
Normal pentane	C_5H_{12}	72.151	2.9994	1.07①	Chloromethane	CH_3CI	50.488	2.0990	1.28
Ethene	C_2H_4	28.054	1.1660	1.22①	Anodynon	C_2H_5CI	64.515	2.6821	1.19(16℃, (0.3~0.5)atm)
Propylene	C_3H_6	42.081	1.7495	1.15①	Ammonia	NH_3	17.0306	0.7080	1.32
Butylenes -1	C_4H_8	56.108	2.3326	1.11①	Freon -11	CCI_3F	137.3696	5.7110	1.135
Maleic Butylenes -2	C_4H_8	56.108	2.3327	1.1214①	Freon -12	CCI_2F_2	120.914	5.0269	1.138
Fumaric Butylenes -2	C_4H_8	56.108	2.3327	1.1073①	Freon -13	$CCIF_3$	104.4594	4.3428	1.150(10℃)
Isobutene	C_4H_8	56.108	2.3327	1.1058①	Freon -113	CCI_2FCCIF_2	187.3765	7.7900	

① 15.6℃， 101.325kPa