

# Thermal Gas Mass Flow Meter

## Principle

The flow meter's sensor consists of two thermal resistances (Pt100 RTD), one is gas mass flow speed sensor, short for T1; another is used to measure gas temperature, short for T2. When the two sensors immerse the measured gas, sensor T1 are heated to a constant temperature more than temperature of T2. The flowing gas will take away heat from T1, make temperature of T1 drop, in order to keep the constant temperature difference between T1 and T2, T1 must be heated continually, which will consumes energy.

According to the Kim's law of thermal effect, there is a certain mathematical relationship among heating power: P, temperature difference:  $\Delta T$  (T1-T2) and gas mass flow: Q .

This relationship as follow

$$P/\Delta T = K1 + K2f(Q)^{K3}$$

K1, K2, K3 are constants related to the gas physical properties.

## Application

1. Oxygen, Nitrogen, Hydrogen, Chlorine and fixed components of mixed gas
2. Blast furnace gas
3. Flue gas
4. Biogas, Chlorine in water treatment
5. Compressed air
6. Natural gas, LPG
7. Ventilation system of power plant
8. Ventilation or exhaust system in mines

## Features

1. Measure gas mass flow, not need temperature and pressure compensation.
2. wide Turndown rate, flow velocity: 0.1 Nm/s to 100Nm/s.
- 3.No pressure drops
4. Anti-corrosion body material, applicable to corrosive gas
5. Insertion type sensor is convenient for installation and maintenance

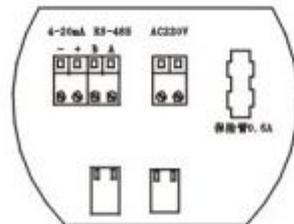
## Technical data

	Insert type	Pipe type
Medium	Single gas ( except acetylene gas) or mixed gas of fixed	
Pipe size	DN80-6000mm	DN15-2000mm

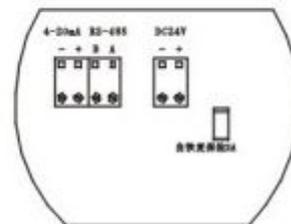
Velocity	0.1Nm/s~100Nm/s ( standard working condition 20 °C 101.33Kpa)	
Accuracy	±1%	
Medium temperature	-40~200°C	
Pressure	2.5Mpa	4.0Mpa
Power supply	AC220V or DC24V for integral converter and AC220V for split converter.	
Response time	≦ 1s	
Signal output	4~20mA RS-485	
Display	Instantaneous flow , mass flow , volume flow , cumulative flow , Beijing time, running time.	
Sensor IP code	IP68	
Converter IP code	IP67 for integral type IP 65 for separate hanging type IP 52 for separate panel type	
Explosion proof degrade	Exd II CT 4	

## Converter style

### 1. Integral type converter



Wiring terminals for power supply AC220V



Wiring terminals for power supply DC24V

Converter housing: Die cast aluminum  
protect grade: IP67

Four parameter setting keys :

MENU

CUS(for cursor shifting)

UP (value increasing key)

ENT(enter key)

LCD screen: 8-dield and 24-digit prompts, display mass flow, volumetric flow under normal temperature and pressure, accumulated flow

Maximum value of instant flow: 999999.9

Maximum value of accumulated flow:  $99999999 \times 10^3$   
 Output signal: 4-20mA/RS485 communication

2. Separated type converter



Hanging type converter

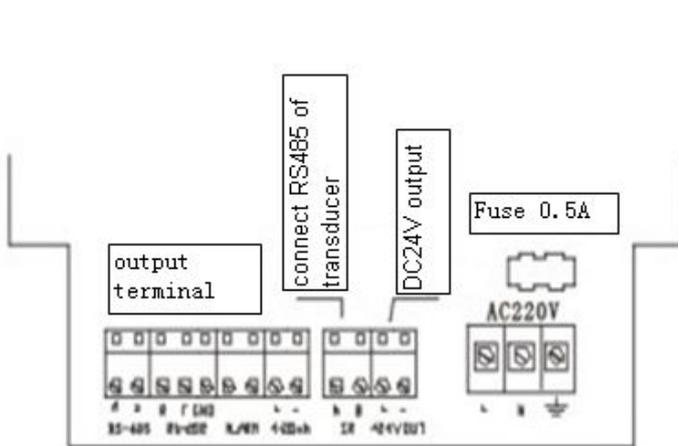
Housing: ABS  
 Protect: IP65  
 Size: 213x185x107  
 weight: 1.2Kg



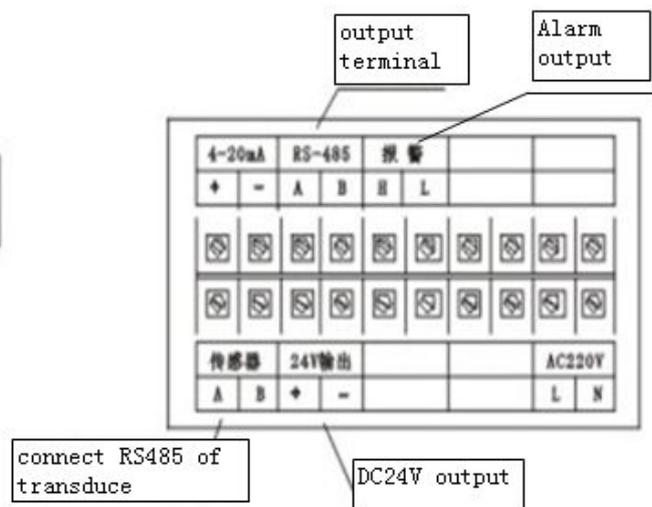
Panel type converter

Housing: ABS  
 Protect: IP65  
 Size: 160x80x160  
 weight: 1.0Kg

Keyboard: 8keys x 2line, 10digit indication x 2line  
 Maximum distance between transducer and converter: 50m  
 Maximum value of instant flow: 999999.9  
 Maximum value of accumulated flow:  $99999999 \times 10^3$   
 Output signal: 4-20mA/RS485 communication



Wiring terminals for hanging type



Wiring terminals for Panel type

## Product style

### 1. Insertion type

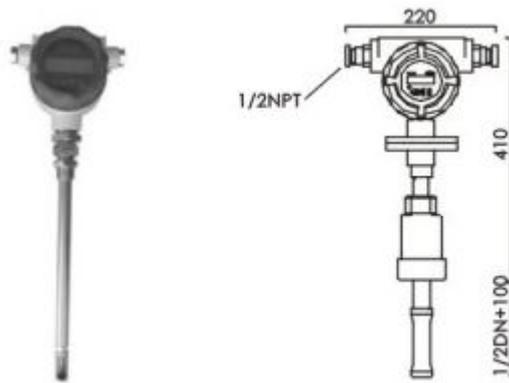
Insertion type transducer can be installed and maintained online.

Installation steps as follow:

1. Welding a thread socket on pipeline
2. Tighten the special stainless steel ball valve (Dia.1") onto the thread socket
3. Use the special tool to drill a hole on pipe, hole's diameter is 22 mm
4. After finish drilling hole, close the ball valve, remove the drilling tool, then install the transducer on the ball valve and insert the sensor to the pipe center (insert depth is determined by manufacturer)

If pipeline material (such as cast iron, PVC, glass, cement, etc.) can not welding, we can provide special fixture to fix the socket and transducer on the pipeline.

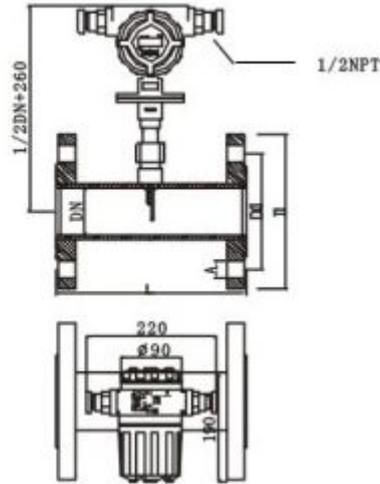
Insert type transducer is suitable for pipeline of diameter: DN80-6000 mm.



### 2. In line type

In line type transducer is suitable for pipeline of diameter DN15 to DN80, process connection is flanged or threaded. Flange standard: GB/T9119-2000.

Generally, transducer body is made of carbon steel or stainless steel, it is depend on customer requirement.



### Attention:

1. The meter can be installed horizontally, vertically or slantwise, it's up to convenience for maintaining. Requirement to straight pipe: upstream is 5D, downstream is 3D. If gas flow rate is less than 30 m/s, upstream can be 3D, downstream can be 2D.
2. If open fires are prohibited in hazardous areas, you can use special fixture to fix transducer on the pipe, then use hand-powered drills to drill hole on pipe.
3. The flow direction of printed on transducer should be same as the medium flow direction
4. If pipeline temperature is high, the converter should be protected by some heat-off device or select separate type flow meter to make environment temperature around the working converter lower than 60 degrees Celsius.
5. When the converter's power supply is DC24V, want to consider the voltage drop should be considered, make sure the input voltage for converter be  $24\text{ v} \pm 10\%$
6. If converter is installed on the outdoor, the instrument box should be added to prevent converter from strong sunlight and rain.
7. Installing flow meter in area with strong vibration is prohibited
8. Don't share an active power supply with electrical equipment which produces strong electromagnetic pollution when working, such as frequency changer, electric welding machine, etc. If necessary, provide purified power for the converter

## Code selection

Code	Description	Remark
HGRS	Thermal mass flow meter	
DN15.....DN6000	Pipeline size	
GJ	In line integral type	Flow meter structure
GI	In line seperated type	
CF	Insertion integral type	
CH	Insertion seperated type	
AC	AC 220V	Power supply
DC	DC 24V	
F	Standard transducer-20 to 120℃	Transducer type
T	High temperature transducer-20 to 200 ℃	
A	SS 304	Body material
B	Hastelloy C	
C	Ti	
D	SS 316L	
E	Aluminum	