



**IOTAFLOW**  
SYSTEMS PVT. LTD.

**Solutions | Sustainability | Service**

# TMM S Series



*flow metering at its best...*

## Compressed Air Flow Measurement

Compressed air flow measurement in the industrial environment offers significant opportunities to save money by reducing energy costs.

Compressed air generally uses more electricity than any other type of equipment, and accounts for as much as a third of the energy usage in an industrial facility. Insertion Style Thermal Mass Flow Meters help identify leaks in compressor systems, track overall usage to improve plant efficiency, and help departments reduce consumption. This can save lacs of Rupees each month in large industrial applications. For instance, the compressed air flow meter can be used with energy management systems to help determine the optimal number of compressor units that need to be in operation at any given time; this helps to meet the demand of various departments and processes. Furthermore, Thermal mass flow meters are sensitive enough to determine leaks. For example, if a typical compressor system running at 100 psi had total leaks throughout its fittings and seals of 1/4", it would pass 100 CFM of unused compressed air. That alone would waste over Rs. 13,00,000 in power each year!

Iotaflow provides easy-to-install insertion thermal mass flow meters for typical compressor lines and also offers a convenient isolation assembly valve for mounting. These direct mass flow meters do not require separate temperature or pressure transmitters, have no moving parts, are highly accurate and repeatable, and have negligible pressure drop. Iotaflow Thermal Mass Flow Meters have extraordinary rangeability of at least 100 to 1, as well as fast response. Additionally, Iotaflow Thermal Flow Meters are digitally driven, resulting in extreme low-end sensitivity without sacrificing performance at the the upper end.

IOTAFLOW flow meters have 4 – 20 mA outputs of flow rate, pulsed outputs of consumption, in conjunction with fully Modbus compliant RS485 RTU communications, which are all ideal for sophisticated energy management systems.

## Typical Applications

### Automotive Industry

Compressed air monitoring, Powder paint air flow, Paint booth/paint oven ventilation

### Utility Services

Electric, gas, water works & sewage plants, for monitoring and control of:

Stack or flue gas, Waste water aeration, Ventilation systems, Digester gas, Gas flows, Nitrogen purge, Combustion air, Boiler inlet air

### HVAC

### Heating, ventilation & air conditioning for:

Air balancing, Duct flows ,Energy conservation Fume hoods Clean rooms, Laminar flow benches, Laboratory and R & D, Flow research, Biomedical studies, University studies, Toxicology studies, Energy studies, Industrial Hygiene, Occupational Safety

### Raw Materials Industries

Pulp & paper mills, Mining, Semiconductor manufacturing, Chemical processing, Primary metals, Plastics & synthetics

### Food Processing

Drying air, Ventilation systems, Boiler inlet air, Exhaust gas, Process control, Compressor lines, PET blow molding

## Product Features

- 1) 100:1 turn down ratio in 5 ranges: 0.3–30Nm/s; 0.6–60Nm/s;0.9–90Nm/s; or 1.2–120Nm/s.
- 2) No pressure loss, suitable for pipe in any shape with known sectional area
- 3) For the insertion type, installation and maintenance can be finished on line
- 4) Measure the mass flow and standard flow directly.
- 5) Patent protected mathematical model for treatment of flow with impurity of water, is suitable for the special working environment of gas drainage
- 6) High accuracy data acquisition circuit to ensure outstanding repeatability and accuracy of the flow meter.
- 7) Electrical structure of total isolation to ensure an excellent EMC properties and avoid the interference from outside
- 8) High efficiency design of power supply, the total power consumption is only 60mA@24VDC
- 9) 16V–32V wide voltage range input to fit in all electricity environment
- 10) Self-protection design of Zener safety barrier inside
- 11) Metric Unit display and Metric/British unit selectable
- 12) RamTron F-RAM for permanent storage of date
- 13) Password function makes device management easier
- 14) Self-diagnose function makes trouble shooting easier

TMM S Series Thermal Mass Flowmeter is Iotaflow's latest thermal mass technology with more rugged design to adapt to harsh industrial applications. It implements Iotaflow latest sensor filming technology and high sensitivity sensors to ensure a stable measurement at very low flow rate down to 0.3–30Nm/s. The standard insertion model can fit in pipe line from DN25– DN400. The latest TPA600 circuit board and a dual-line LCD display provide user with most powerful and friendly operating interface. The TPA600 technology also ensures the product to give stable and accurate measurement and reliable output.

TMM S Series Thermal Mass Flowmeter measures the gas mass flow base on thermal diffusion theory. It has two filmed RTDs as its sensors, one of which sense the velocity of the gas flow (RH) and the other one will detect the temperature shift of the gas flow (RMG). When the two RTD are in the gas flow ,the RH will be heated while the RMG will sense the temperature changing of the gas flow. More heat will be taken away as the velocity of the gas flow increasing, so the temperature on RH will decline.

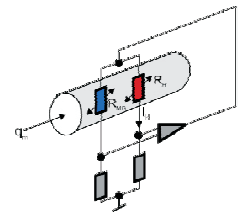
According to King's law, the heating power P, the temperature difference  $\Delta T$  (TRH-TRMG) and the mass flow rate are mathematical related.

$$P/\Delta T=K1+K2 f(Q)K3$$

the K1、 K2、 K3 are constants related to the properties of the gas.

TMM S Series Thermal mass flow meter is designed base on constant power measuring method, thus the RTD is heated in a consistent power and will be more durable and stable. That is why TMM-S flow meter has less problem of zero-off which may be caused by a function failure of RTD due to over-heated in long term.

$Q_m$  Gas mass-flow  
 $R_{mc}$  Gas temperature measuring resistor  
 $R_h$  Heating resistor  
 $I_h$  Actual value of heater



## Special designs

To meet some special requirement on actual applications, we have made some improvement on the structures, which make it easier to be used.

### 1) Anti-ejection design

In some high pressure applications, there is a risk that when the pressure is too high, the nut sleeve will fail or be loosed unintentional, and the flow meter will be ejected out and cause damage or injury. On TMM-S insertion thermal mass flow meter, when the customer need to used it in a high pressure application, the sensor base is wider than the nut sleeve. So as long as the sleeve is still fixed on pipe with thread, the meter will not be totally ejected out. Please refer to picture below

### 2) Ball valve mounting

When users want to replace or re-calibration or for any reason want to remove the flow meter while do not want to stop the flow , our ball valve mounting can help. Once the meter is installed with a customized ball valve, user can remove the meter away while still keep the pipeline sealed with the ball valve. This design should only be used when it is absolute necessary and the fluid is not explosive or hazard.

### 3) Hot taping holder and hot taping driller

Some user may not want to stop the flow when installing the flow meter. With the help of our hot taping holder and hot taping driller can help do that.

The hot taping driller can help you open a hole for inserting the flow meter without stopping the flow. It should work with a ball valve. And the in the hole process of drilling and removing the tool , the pipe will be totally sealed.

After the hole is open, user may found it is too hard to push the flow meter to a certain depth when the pressure is too high. But with the help of our hot taping holder, you can easily do that. The holder can be fixed on the ball valve and on the other side hold the flow meter, you can easily push the meter in by rotating a lever. The whole process will be much easier.

**All designs make users to be able to install or remove the flow meter without stopping the flow, and make the whole process easier. Customer do not bother to waste the time of whole team to install the meters any more, and the engineers will be able to finish their job quicker, easier and more flexible .**



Hot Tapping Driller



Ball Valve mount type



Hot Tapping Hold



Insertion Type

**Packing**

A standard package of the TMM S Series thermal mass flow meter is in a 71.5 x 24.5 x 19.5mm carton (for basic version). Along with the flow meter, the package also contains the accessories for installation (Nut sleeve set) , a copy of manual and a calibration certificate.

We ensure you that every flowmeter from IOTAFLOW have been cared for best accuracy, repeatability and durability .

**Process connection**

The insertion type TMM S Series can be installed and maintained on line. To install it, you have to weld and install a base with screw thread outside on the pipe and install a 1 inch ball valve on the base. Then drill a hole of 22mm diameter on the pipe with a special tool and install the flow meter on the pipe through the hole. The position and depth of how the sensor is fixed have already been set before delivery.

The fitting in diameter of pipe for insertion type: 1" ~ 16" .

**Other ordering information 2) Accessories available**

**1) Measurement range**

- Standard: 0.6~60Nm/s,
- Option 2: 0.3~30Nm/s,
- Option 2: 0.9~90Nm/s,
- Option 3: 1.2 ~ 120Nm/s, g

- Anti-ejection design
- Ball valve
- Hot taping driller
- Hot taping holder
- Degreasing

**Specification**

Media Compatibility	Compressed air(dry), N2 Gas, Oxygen
Pipe diameter	DN25~DN400
Flow velocity range	0.3~30Nm/s; 0.6~60Nm/s;0.9~90Nm/s; or 1.2~120Nm/s.
Accuracy	1.5% RD ±0.5% FS
Temperature of medium	— 40~+150°C
Pressure of medium	1.6Mpa
Power supply	AC85 ~ 264V or DC16 ~ 32V
Response time	1 second
Output	Frequency /4~20mA with Bluetooth as standard
Communication	RS-485 as standard , 4~20mA@HART as optional
Date displayed	Mass flow, Volume flow in normal condition Total flow , Temperature of medium. Velocity
Ingress protection grade	IP65

**Appendix I Standard Volume flow rate range in popular sizes**

Pipe Size	Pipe Size	Option 1		Standard		Option 2		Option 3	
(mm)	(inch)	(0.3~30Nm/s,)		(0.6~60Nm/s)		(0.9~90Nm/s)		(1.2~120Nm/s)	
		Min	Max	Min	Max	Min	Max	Min	Max
		(Nm3/hr)	(Nm3/hr)	(Nm3/hr)	(Nm3/hr)	(Nm3/hr)	(Nm3/hr)	(Nm3/hr)	(Nm3/hr)
25 mm	1"	0.53	53	1.05	105.9	1.58	158.8	2.11	211.8
32 mm	1 1/4"	0.87	86.7	1.73	173.5	2.6	260.3	3.47	347.1
40 mm	1 1/2"	1.36	135.6	2.71	271.1	4.06	406.7	5.42	542.3
50 mm	2"	2.12	211.9	4.23	423.7	6.35	635.5	8.47	847.4
65 mm	2 1/2"	3.58	358.1	7.1	716.1	10.7	1074.1	14.3	1432.2
80 mm	3"	5.42	542.3	10.8	1084.7	16.2	1627.1	21.6	2169.4
100 mm	4"	8.47	847.5	16.9	1694.9	25.4	2542.3	33.8	3389.8
125 mm	5"	13.2	1324.2	26.4	2648.3	39.7	3972.4	52.9	5296.6
150 mm	6"	19.1	1906.8	38.1	3813.5	57.2	5720.3	76.2	7627.1
200 mm	8"	33.9	3389.8	67.7	6779.6	101.6	10169.4	135.5	13559.3
250 mm	10"	53	5296.6	105.9	10593.2	158.8	15889.8	211.8	21186.4
300 mm	12"	76.3	7627.1	152.5	15254.2	228.8	22881.3	305	30508.4
400mm	16	135.6	13559.3	271.2	27118.6	406.8	40678	542.4	54237.3

## Model Selection

TMM-S	-	XXX	X	X	X	X	X	X	X	X	X	X
Size		25										
		32										
		40										
		50										
		65										
		80										
		100										
		125										
		150										
		200										
		250										
		300										
		400										
Type	Insertion		C									
	Insertion (With anti ejection)		D									
Probe Length	290 mm (25 mm - 150 mm)			1								
	440 mm (25 mm - 400 mm)			2								
Display	Integral				T							
	Remote				R							
Probe Material	SS304					1						
	SS316					2						
Pressure Rating	PN6					3						
	PN10					2						
	PN16					1						
Max Temp	Below 150 deg C								N			
	Above 150 deg C								Q			
Display Enclosure	IP65									1		
	IP67									2		
Output	Pulse + 4-20mA + HART										7	
	Pulse + 4-20mA + RS485										8	
Power Supply	13.5 - 42 VDC											1
	85 - 265 VAC 50 / 60 Hz											2

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