



# TECHNICAL GUIDANCE

BEST COST EFFECTIVE & COMPACT DESIGN

## TF-600 Series

MINI-MINI THERMAL MASS FLOWMETER

### OUTLINE

**TF-600** MINI-MINI THERMAL MASS FLOWMETERS are developed in the extreme priority for very competitive price. **TF-600** has not been influenced by the change in temperature and pressure, and can directly measure mass flow rate of Air and Nitrogen.

TF-600 adopted general-purpose type temperature sensor as the flow rate sensor. And low price is realized by reconsidering design thoroughly with high performance.

**TF-600** MINI-MINI THERMAL MASS FLOWMETERS are designed and developed to offer the remote indication and control of gas flow process where Purgemeters have been commonly used.

### FEATURES

- ❑ Light and compact design
- ❑ Low cost
- ❑ Mass flow measurement
  - Flow measurement is not influenced by the change in pressure and temperature.
- ❑ High speed response
  - High speed response - 90% within two seconds
- ❑ Whole quantity passage detection system
  - No by-pass tube used.
- ❑ High durability
  - Newly adopted general-purpose temperature sensor offers high durability.
- ❑ Standard power supply can be used.
  - Standard power supply is used and the analogue output of flow rate is obtained easily.

### STANDARD SPECIFICATION

Fluid	Air, Nitrogen
Scale range	Min. 0 to 20L/min(nor) Max. 0 to 100L/min(nor)
Output signal	0 to 5V DC
Accuracy	±5% F.S.
Rangeability	1:20
temp.	0 to 60°C
Gas press.	-0.05MPa to 1MPa
Temp. change effect	±0.1% F.S./°C
Press. change effect	±1% F.S. at -0.05 to 1MPa
Response	2 seconds for 90%
Material	Body and Flow path SCS14, SUS316 Sensor: POM, Ni, Polyimide, Epoxy Seal: Viton
Housing / Protection	ABS resin / Un-waterproofing
Installation	Horizontal or Vertical
Electric connection	Connector
Power supply	±12V DC
Consumption current	+: 85mA, -: 25mA
Process connection	Thread: Rc1/4
Mass	Approx. 240g

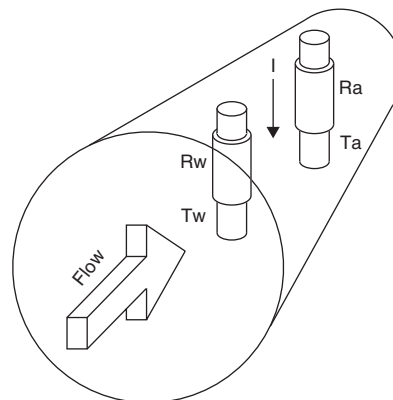


### OPERATION PRINCIPLE

As for TF-600, a resistance thermometer  $R_w$  is installed in the flow path. The current  $I$  is controlled to keep the temperature difference ( $T_w - T_a$ ) between the temperature  $T_w$  and gas temperature  $T_a$  constant by heating with electric current.

The quantity of heat ( $R_w \cdot I^2$ ) transferred from the resistance thermometer is a function of mass flow rate of passed gas, thus the mass flow rate can be measured from the electric current  $I$ .

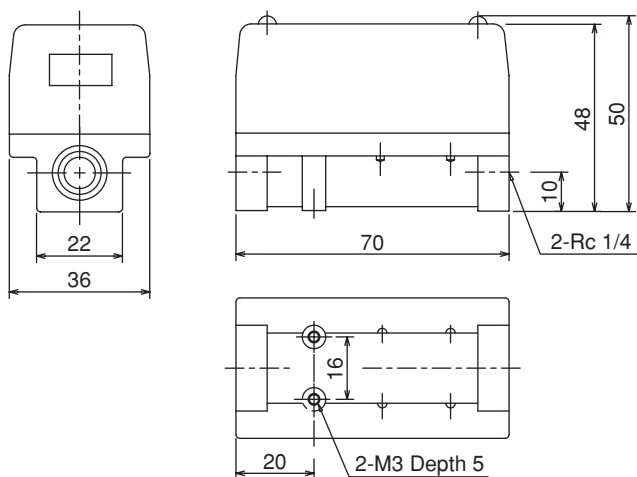
The electric circuit to detect the flow is a unique component to compensate even the minute change of performance with the change of physical properties value. Thus the mass flow rate can be measured with high accuracy. The current  $I$  is converted to an electric signal in proportion to the specified flow rate in order to be output.



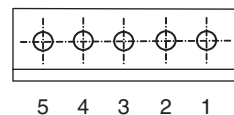
### MODEL CODE

Model code						Description
TF-60			-			
Power supply	0					±12V DC 0 to 5V output
Body material	S					SCS14
Scale range		200				0 to 20 L/min(nor)
		300				0 to 30 L/min(nor)
		500				0 to 50 L/min(nor)
		800				0 to 80 L/min(nor)
		101				0 to 100 L/min(nor)
Connection rating					P	Rc
Process connection					04	1/4

## DIMENSION



## CONNECTOR ARRANGEMENT



Pin number	Description
1	+12V
2	COM
3	-12V
4	OUT+
5	OUT-

## PRESSURE LOSS

N<sub>2</sub>, 25°C, Atmospheric pressure (Inner diameter of joint: ø6.5)

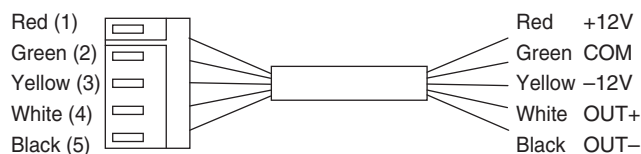
Scale range L/min(nor)	Pressure loss (kPa) (*)
0 to 20	1.5
0 to 30	2.2
0 to 50	4.5
0 to 80	13.0
0 to 100	20.0

\*: Pressure loss at the time of maximum flow in the maximum range  
The rough value of the pressure loss is proportional to the square of flow rate and is in inverse proportion to the pressure.

### Cable with connector SC-M60

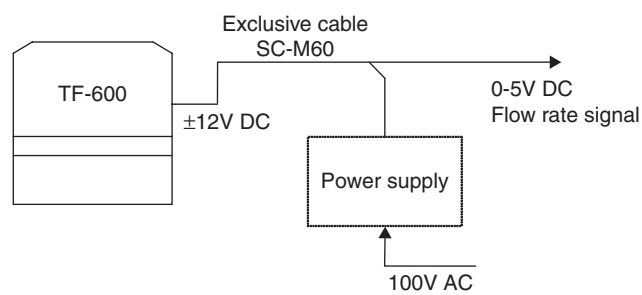
Connection: Standard power supply ±12V DC

Model code	Length (m)	Note
SC-M60-2	2	Standard
SC-M60-L	L	Max.10m

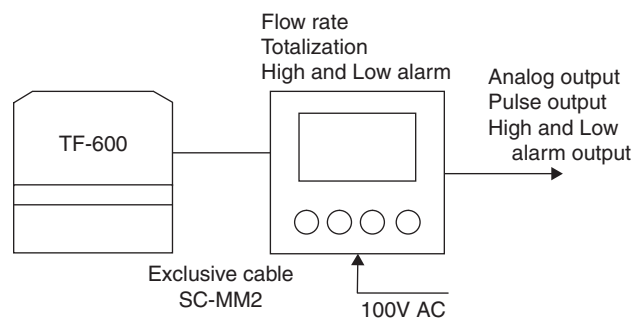


## APPLICATION

### With standard power supply



### With TM-2000 series converter unit



\* Specification is subject to change without notice.

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