



# TECHNICAL GUIDANCE

Low price & High efficiency

## TF-4000 series

THERMAL MASS FLOWMETER

### OUTLINE

TF-4000 series Thermal Mass Flowmeter for compactness and high cost performance has been developed by our long experience and the accumulation of technology for the thermal mass flow measurement. Low price, but digital indicator (fixed type) is built in. Digital and analog interfaces are fully equipped, and the indication value can be confirmed at the site, and also it can be controlled at the remote place. The power supply is DC12 to 24V. CE Marking has been obtained for the fixed type indicator. This thermal mass flowmeter can be used for the various applications.

### FEATURES

- ❑ Indicator: Digital indication.
- ❑ CE Marked
- ❑ Fully equipped with the functions for both digital and analog interfaces.
- ❑ Quick response by highly reliable and compact Pt. temperature sensor.
- ❑ Low cost secured by the stainless steel precision casting of the flow path
- ❑ Various functions (such as alarm, averaging and generation of totalized pulse) are built in.
- ❑ Excellent in linearity by using microcomputer
- ❑ High accuracy by making automatic adjustment inside circuit
- ❑ No correction of temperature and pressure is required. (Thermal mass flow measurement system)
- ❑ Wide flow range enough to cover minimum 0 to 2L/min (nor) and maximum 0 to 1000Lmin (nor).

### MAIN APPLICATIONS

- Semiconductor field
- Biochemical field
- Various precision instrument field
- Medical field

### OPERATION PRINCIPLE

Two temperature sensors are put on the flow path of gas, and one of these two sensors is heated, and the power supply shall be controlled, so that the difference in temperature between these two sensors can be always kept constant. The quantity of heat conveyed to fluid from temperature sensor changes depending on the mass velocity of fluid, and the quantity of heat becomes the function of power supply to the temperature sensor. Thus, the mass velocity becomes the function of power supply. The mass flow rate can be calculated by the power supply.



### SPECIFICATIONS

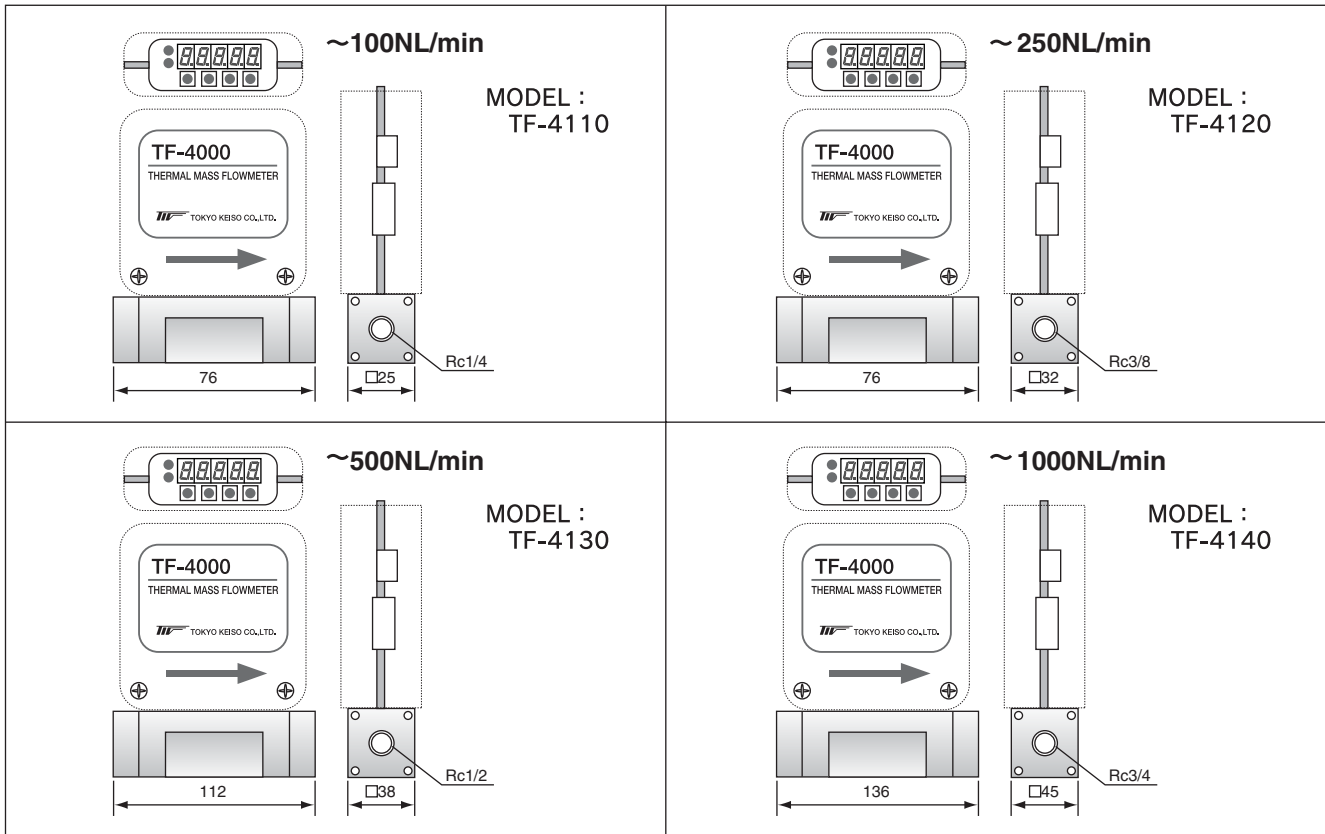
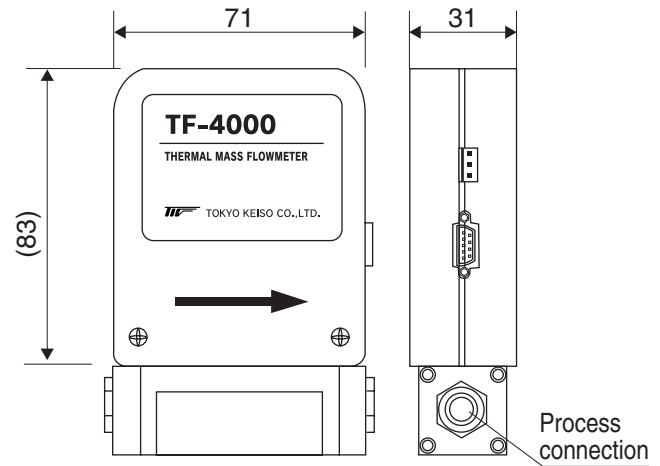
|                                     |   |   |
|-------------------------------------|---|---|
| Measuring Object                    | Air, N <sub>2</sub> , & O <sub>2</sub>  |   |
| Flow range                          | Min. 0 to 2L/min (nor)  |   |
|                                     | Max. 0 to 1000L/min (nor)   |   |
| Gas pressure                        | 0.1 to 1.0MPa   |   |
| Accuracy                            | ±2% F.S. (±1digit of indication accuracy added)   |   |
| Response                            | Within 0.5 sec. (90% response)  |   |
| Temp. & press. effect               | 0.1%F.S./°C · 0.1%F.S./0.1MPa   |   |
| Rangibility                         | 20:1 (Low flow cutoff: 5%F.S.)  |   |
| Material of gas contact part        | Main body   | SCS14   |
|                                     | Sensor  | SUS316, glass, platinum-iridium, & CTFE   |
|                                     | Seal  | Fluororubber  |
| Case                                | ABS resin (Non-waterproof)  |   |
| Process connection                  | Rc1/4, Rc3/8, Rc1/2, & Rc3/4 (Depending on Model)   |   |
| Electric connection                 | Exclusive cable with connector (1m long)  |   |
| Installation posture                | Horizontal or vertical direction  |   |
| Indication                          | 7 segments Red LED, 5 digits<br>flow rate, totalization, setting value, & error   |   |
| Indication value                    | Momentary flow rate: 0.00 to 99999.   |   |
|                                     | • A decimal point is displayed by automatic change.   |   |
|                                     | • An integrated value is not held at the time of a nonpower supply. Red LED × 2 pcs. Lighting when alarm is operating.. |   |
|                                     | • Alarm value can be set by button switch.  |   |
| Output                              | Analog  | DC 0 to 5V (Output impedance: less than 50Ω), or DC 4 to 20mA (Load resistance: less than 600Ω@ 24V Power supply)                         |
|                                     | Digital   | RS-485 (Two-wire system, half-duplex communication)<br>Baud rate: 2400, 4800 & 9600bps (Selection)<br>Protocol: 8N1, ID address: 00 to 99 |
|                                     | Integrating pulse   | Open collector (DC 24V, less than 10mA)<br>• 0.2 to 10.0% F.S.·min/pulse (Possible to set up)   |
|                                     | Alarm   | Open collector(DC24V, less than 100mA)  |
| Power supply (Supplied by customer) | DC12 to 24V, max.210mA  |   |
| CE marking                          | Acquired  |   |

SCALE RANGE AND MODEL CODE

| TF-41   | □0 - □ □                                    | Description                                |
|---|---|--|
| Connection size,<br>Flow range,<br>Pressure Loss* | 10 - 1                                      | Rc1/4, 0-2L/min (nor), 0.015kPa (Approx.)  |
|   | 10 - 2                                      | Rc1/4, 0-5L/min (nor), 0.080kPa (Approx.)  |
|   | 10 - 3                                      | Rc1/4, 0-10L/min (nor), 0.25kPa (Approx.)  |
|   | 10 - 4                                      | Rc1/4, 0-30L/min (nor), 0.47kPa (Approx.)  |
|   | 10 - 5                                      | Rc1/4, 0-50L/min (nor), 1.22kPa (Approx.)  |
|   | 10 - 6                                      | Rc1/4, 0-80L/min (nor), 1.82kPa (Approx.)  |
|   | 10 - 7                                      | Rc1/4, 0-100L/min (nor), 2.75kPa (Approx.) |
|   | 20 - 1                                      | Rc3/8, 0-150L/min (nor), 1.23kPa (Approx.) |
|   | 20 - 2                                      | Rc3/8, 0-200L/min (nor), 1.72kPa (Approx.) |
|   | 20 - 3                                      | Rc3/8, 0-250L/min (nor), 2.27kPa (Approx.) |
|   | 30 - 1                                      | Rc1/2, 0-300L/min (nor), 2.87kPa (Approx.) |
|   | 30 - 2                                      | Rc1/2, 0-400L/min (nor), 4.28kPa (Approx.) |
|   | 30 - 3                                      | Rc1/2, 0-500L/min (nor), 6.20kPa (Approx.) |
|   | 40 - 1                                      | Rc3/4, 0-600L/min (nor), 3.13kPa (Approx.) |
| 40 - 2  | Rc3/4, 0-800L/min (nor), 4.11kPa (Approx.)  |  |
| 40 - 3  | Rc3/4, 0-1000L/min (nor), 6.01kPa (Approx.) |  |
| Analog output                                     | 1   | DC 0 to 5V                                 |
|   | 2   | DC 4 to 20mA                               |

\* Gas pressure 0.1MPa, pressure loss at max flow rate

DIMENSIONS



\* Specification is subject to change without notice.

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