



TECHNICAL GUIDANCE

BEST COST PERFORMANCE ACHIEVED

TC-3000 Series

MINI-THERMAL MASS FLOW CONTROLLER

OUTLINE

TC-3000 MINI-THERMAL MASS FLOW CONTROLLER is developed based on the technology of **TF-1000 series MINI-THERMAL MASS FLOWMETER** which have been accepted by the market for long time with high reputation.

Highly accurate measurement and control of various kinds of gases are conducted free from change of process operation condition, i. e. pressure, temperature..., etc.

Thanks to simple design construction, remarkable competitive price level has been possible for easy usage in wide application.

TM-1400, DIN 72×72 compact All-in One converter, is available for simplified installation and wiring.



FEATURES

- ❑ COST
TC-3000 has broken the previous idea for cost of Mass Flow controller.
- ❑ EASY MEASUREMENT
Thermal theory based mass flow measurement eliminates compensation data processing for change of process condition.
- ❑ ALL-THROUGH DESIGN
Eliminating by-pass sensor piping which is common on ordinary mass flow controllers. **TC-3000** is insensitive against dust or particles in process gases.
- ❑ WIDE RANGE COVERAGE
TC-3000 covers maximum 800L/min (nor) flow range.
- ❑ ANALOG OUTPUT VERSION
24 V DC power supply + 4 to 20 mA DC output version (**TC-3100S**) is available standard control loop.
- ❑ ALL-IN-ONE CONVERTER
TM-1400 converter offers simple installation and wiring with lowest instrumentation cost.

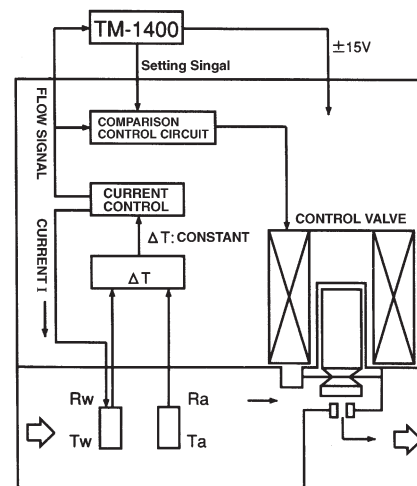
OPERATION PRINCIPLE

In **TC-3000**, Sensor **R_w** is heated by feeding electric current **I**. Temp. sensor **R_a** is not heated and detect gas temperature. The feeding current **I** is controlled by electronics to keep the difference of temperature of **R_w** and **R_a** constant.

The heat which is transferred to gas to be measured from **R_w** is the function of mass flow rate which passes through **R_w**. Thus, the mass flow rate of the gas can be calculated by the factor of feeding current **I**.

The value of **I** is converted into flow rate signal and sent to comparison/ control circuit.

In this circuit, the flow rate signal and control signal are compared and Control valve is controlled so that the two signals are equal. Normal close type solenoid valve is adopted for small/ medium size, and solenoid valve controlled Diaphragm valve is used for large sizes.



STANDARD SPECIFICATION

TC-3000 CONTROLLER UNIT

GAS TO BE MEASURED	All kinds of gases, except gases containing more than 10%(VOL) of H ₂ or He and mixtures of H ₂ or He and CrHm.				
RANGE	TC-3100S	TC-3100	TC-3300	TC-3600	TC-3800
SCALE RANGE	Min. 0 to 2L/min(nor) Max. 0 to 100L/min(nor)	0 to 300L/min(nor)	0 to 600L/min(nor)	0 to 800L/min(nor)	
MAX. GAS PRESS.	0.98MPa				
GAS TEMP.	5 to 50°C				
CONTROL RANGE	2 to 100% of Full Scale				
RESPONSE TIME	Within 2 sec.		Within 4 sec.		
CONTROL DP RANGE	2 to 70L/min(nor)---0.06 to 0.3MPa 70 to 100L/min(nor)---0.07 to 0.3MPa		0.15 to 0.34MPa	0.18 to 0.44MPa	0.20 to 0.44MPa
PROCESS CONN.	Rc1/4, OD1/4 Swagelok		Rc3/4, Rc1		Rc1
FLOW OUTPUT SIGNAL	4 to 20 mA DC(0 to 100%)	0 to 5 V DC(0 to 100%)			
FLOW CONTROL INPUT SIGNAL	4 to 20 mA DC(0 to 100%)	0 to 5 V DC(0 to 100%)			
OUTPUT, CONTROL ACCURACY	±2%F.S. (at 25°C)				
TEMP. EFFECT	SPAN : ±0.1%F.S./°C Max. ZERO : ±0.01%F.S./°C Max.				
GAS CONTACT MATERIAL	BODY : SUS316, SCS14(TC-3100/3100S) SENSOR : Combination of SUS316, Pt, Glass, CTFE CONTROL VALVE : SUS430(TC-3100/3100S), *SHOMAC(TC-/3600/3800) SEAL : FKM or CR				
POWER SUPPLY	21 to 27 V DC, 330mA	±15 V DC +150mA -200mA	±15 V DC +150mA -320mA	±15 V DC +150mA -200mA	
ELEC. CONN.	M3 screw terminal	Exclusive connector			
AMB HUMID.	85% RH(To be free from condensation)				
WEIGHT	0.8kg	6.0kg	5.1kg		

* : Specially high purity Ferrite system Stainless steel(High corrosion resistant and strong magnetic material)

CONNECTION CABLE

Type	SC-CM
Application	TC-3000 to TM-1400
Core	9 cores
Connection	Exclusive connector provided on both ends
Model code	SC-CM- <input type="checkbox"/> length in m to be filled. Std. 2m, Max. 99m

MODEL CODE

TC-3000 CONTROLLER UNIT

TC-3					Description
Size	100				MAX 100L/min (nor)
	100S				
	300				MAX 300L/min (nor)
	600				MAX 600L/min (nor)
	800				MAX 800L/min (nor)
Full scale	020				2L/min (nor)
	100				10L/min (nor)
	300				30L/min (nor)
	500				50L/min (nor)
	700				70L/min (nor)
	101				100L/min (nor)
	201				200L/min (nor)
	301				300L/min (nor)
	601				600L/min (nor)
	801				800L/min (nor)
Connection type	R			Rc Thread	TC-3100/3100S TC-3300/3600/3800
	S			Swagelok	TC-3100/3100S
Connection size	04			1/4"	TC-3100/3100S
	12			3/4"	TC-3300/3600
	16			1"	TC-3300/3600/3800

CAUTION ON USE

- Install the unit horizontally with its connector facing upwards.
- The primary pressure should be the same as the operating pressure as specified in the inquiry.
- Install the unit so that the arrow on the unit matches the flow direction of fluid.

TM-1400 CONVERTER UNIT

STANDARD SPECIFICATION	
INDICATION	3 1/2 digit Red colour LED(H; 10.2mm)
SCALING FACTOR	FACTORY SET
ACCURACY	Sensor accuracy ±0.1% F.S. ±1 dig
STANDARD SPECIFICATION	
ANALOG OUTPUT	4 to 20 mA DC
	0 to 5 V DC
STANDARD SPECIFICATION	
CONTROL SETTING	EXTERNAL SETTING SIGNAL
	MANUAL SETTING
STANDARD SPECIFICATION	
SCALE/OUTPUT	PULSE RATE
	OUTPUT OPEN COLLECTOR
STANDARD SPECIFICATION	
CONSUMPTION	Approx 15VA
ELEC. CONN.	Sensor : Exclusive Connector Ext. : M3, Screw terminal
MOUNTING	Panel mount DIN 72 × 72, Installation fitting provided
ENCLOSURE	In-door use (IP 20)
AMB. TEMP.	0 to +50°C
AMB. HUMID.	85%RH (to be free from condensation)
WEIGHT	550g

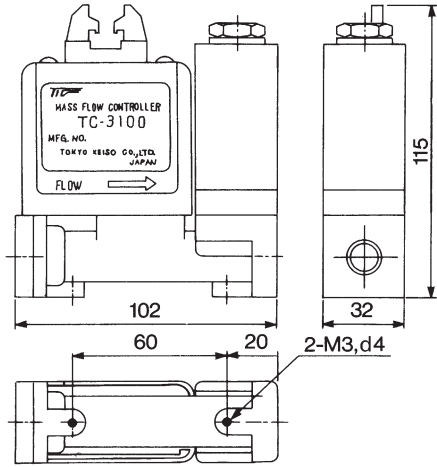
TM-1400 CONVERTER UNIT

TM-14					Description
Analog output	1				4 to 20 mA DC
	2				0 to 5 V DC
Scaled pulse output	0				Not provided
	1				Provided
Flow setting			2		External/Manual selectable
External setting signal				0	Not provided
				1	4 to 20 mA DC
				2	0 to 5 V DC
				3	1 to 5 V DC

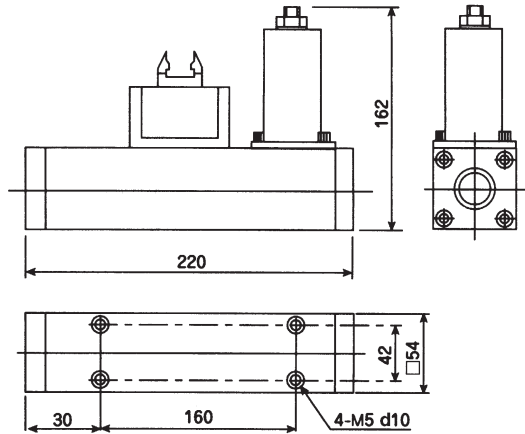
DIMENSION(mm)

□ TC-3000 CONTROLLER UNIT

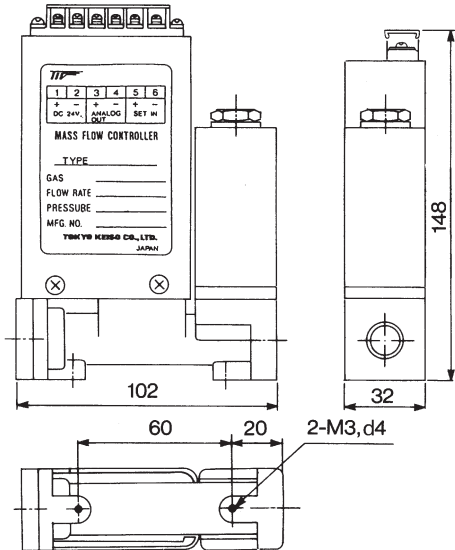
● TC-3100



● TC-3300



● TC-3100S



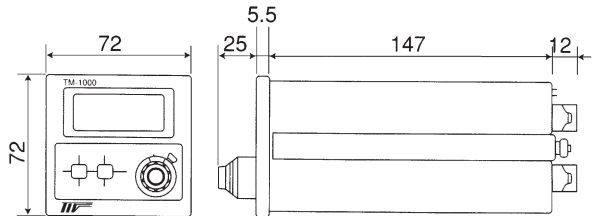
● TC-3100S TERMINAL

TERMINAL OF TC-3100S

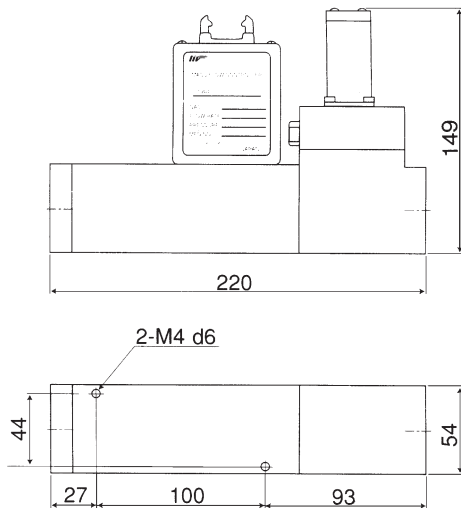
No	Description
1 +	24 V DC Powersupply
2 -	
3 +	4 to 20 mA DC
4 -	Flow signal output
5 +	4 to 20 mA DC
6 -	Setting signal input

□ TM-1400 CONVERTER UNIT

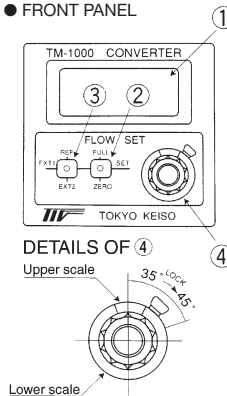
● TM-1400



● TC-3600/3800

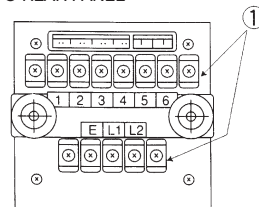


● FRONT PANEL



No.	NAME	DESCRIPTION
①	Indicator	3 1/2 digit LED
②	Flow setting switch	FULL 100% of full scale
		SET Ref. to ③
		ZERO 0% of full scale
③	Flow setting signal switch	② to be set "SET"
		REF Acc. to Dial setting (0 to 100% of full scale)
		EXT(1) Acc. to Dial setting × External signal
④	Flow setting dial	EXT(2) Acc. to External signal
		10 rotation analog dial (1% resolution)
		Clockwise Increase C-Clockwise Decrease Upper scale 10% graduation Lower scale 1% graduation

● REAR PANEL

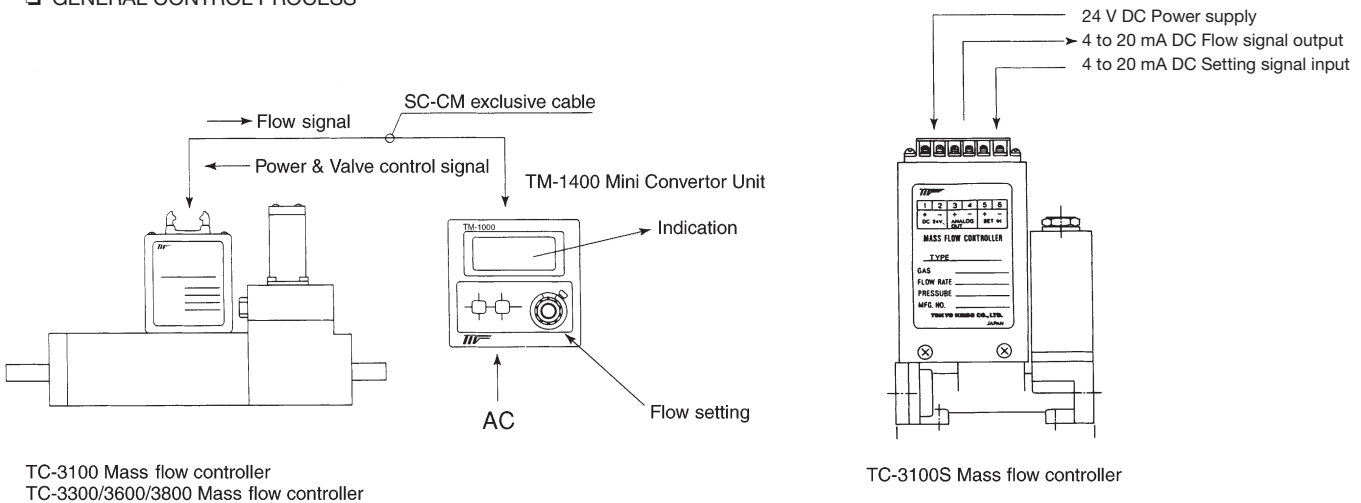


TERMINAL

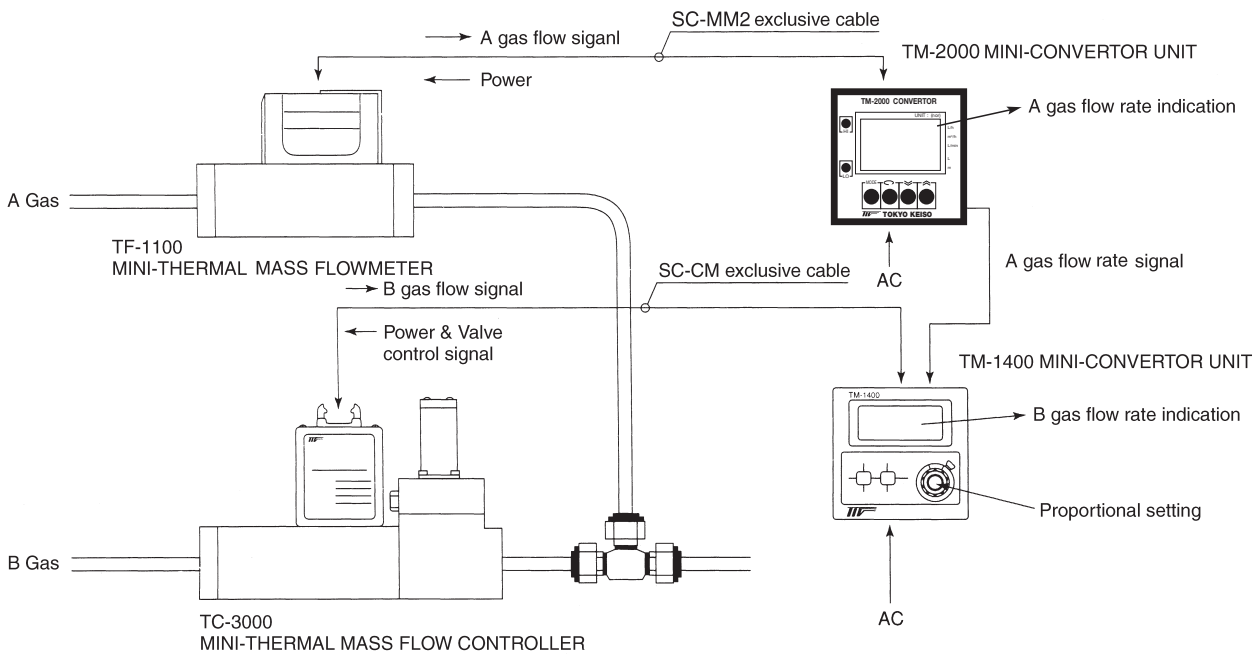
No	Description
1 +	Analog Re-output
2 -	
3 +	Scaled pulse output
4 -	
5 +	External setting signal input
6 -	
E	Grounding
L1	AC power supply
L2	

APPLICATION EXAMPLE

GENERAL CONTROL PROCESS



PROPORTIONAL MIXING PROCESS



This is an example of mixing of A and B gas in a given proportion. The flow rate of A gas is measured by TF-1000 series Mini-Thermal Mass flowmeter and its signal is input to TM-1400 as External setting signal. At TM-1400 Converter, freely adjustable setting dial is provided for set gas proportion and TM-1400 sends valve signal to TC-3000 Mini-Thermal Massflow Controller to control the operation of control valve.

* Specification is subject to change without notice.

TK TOKYO KEISO CO., LTD.

Head Office : Shiba Toho Building, 1-7-24 Shibakoen, Minato-ku, Tokyo 105-8558

Tel : +81-3-3431-1625 (KEY) ; Fax : +81-3-3433-4922

e-mail : overseas.sales@tokyokeiso.co.jp ; URL : http://www.tokyokeiso.co.jp