



# TECHNICAL GUIDANCE

PERFECT LINE-UP, BEST COST PERFORMANCE

## TF-1000 Series

### MINI THERMAL MASS FLOWMETER

#### OUTLOOK

**TF-1000 MINI THERMAL MASS FLOWMETERS** are designed and developed to offer the remote indication and control of gas flow process where glass tube purgemeters have been commonly used.

**TF-1000 MINI THERMAL MASS FLOWMETERS** are very competitive in price and very compact in size and can be a good substitution for such glass tube purgemeters.

New type in the mid to large diameter has been added to TF-1000 series. Different types of sensors cover all requirements for gas measurement. Also All-in-One type panel mount converters are ready for easy loop design.

#### FEATURES

- **Low cost, High performance**
- **High accuracy**
- **Direct mass flow measurement using thermal theory**  
Free from changes of pressure and temperature! No compensation required.
- **Quick response**  
0.5sec. for 90%
- **Easy maintenance**  
No by-pass tube used.
- **High durability**  
Newly designed sensing element offers high durability.
- **Supporting instruments are ready.**
- **Wide range**  
Min. 0 to 2 L/min(nor)., Max. 750m<sup>3</sup>/h(nor). can be covered by one line.
- **The piping layout can be freely made due to the short required straight run.**

#### PRODUCT LINE-UP

Different sensors and panel mount converters are ready to choose **Mass flowmeter**

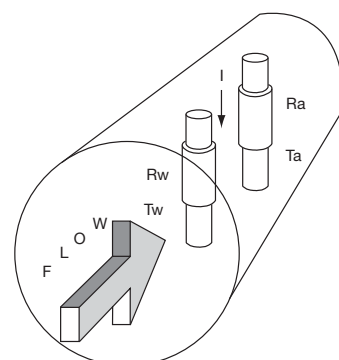
- **Low price, Compact**
  - TF-100□P Engineering plastic body
  - TF-100□S SCS14 casted body
- **Standard type**
  - TF-11□□ Stainless steel body, Mid to large connection types are available.
  - TF-13□□ Stainless steel body, Low pressure loss
- **Outdoor use, Water tight housing**
  - TF-12□□ Stainless steel body, Mid to large connection types are available
  - TF-14□□ Stainless steel body, Low pressure loss
  - TF-15□1 Stainless steel body, With indicator, Mid to large connection types are available
- **Convertor**
  - TM-2000 Flow rate, Totalizing, H and L alarm indication, Analog output, Totalizing pulse output, Alarm output






#### OPERATION PRINCIPLE




Temperature detection sensor **Ra** and velocity detection sensor **Rw** are installed in the gas flow path of **TF-1000 MINI-THERMAL MASS FLOWMETER**. The internal electronics circuits keep the temperature gap between **Rw (Tw)** and **Ra (Ta = Gas temp.)** constant by supplying electric current **I**. The transferred heat from **Ra** to passed gas (**Rw • I<sup>2</sup>**) is proportional to the mass flow rate of the gas to be measured which can be calculated from supplied current **I**. The detection principle is completely free from the change of gas pressure and the change of temperature. It is compensated by internal software and finally the measurement is totally independent of any operating conditions.

The flow rate is calculated from supplied current **I** and output in the form of electric signal.



■ STANDARD SPECIFICATION AND MODEL CODE [up to 1000L/min(nor)]

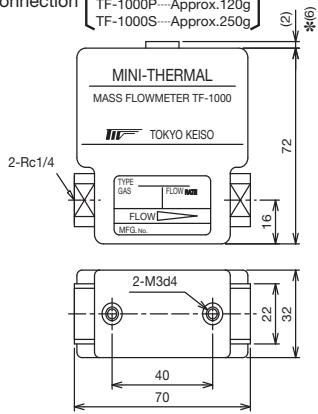
Model		TF-100□P/S	TF-11□□	TF-12□□																																																																																																																																																																																																																																																																																															
																																																																																																																																																																																																																																																																																																			
Type		Compact type	Stainless steel body, Standard type	Stainless steel body, Water tight housing																																																																																																																																																																																																																																																																																															
Gas to be measured		All kinds of gases, except gases containing more than 10%(Vol.) of H <sub>2</sub> or He and mixture of H <sub>2</sub> or He and CnHm																																																																																																																																																																																																																																																																																																	
Scale range		Min. 0 to 2 L/min(nor) Max. 0 to 120 L/min(nor)	Min. 0 to 2 L/min(nor) Max. 0 to 1000 L/min(nor)																																																																																																																																																																																																																																																																																																
Amb. and Gas temp.		0 to 60°C [0 to 50°C for TF-1000P (Poly-acethal resin body)]																																																																																																																																																																																																																																																																																																	
Gas press.		-0.07 to 1.0 MPa																																																																																																																																																																																																																																																																																																	
Accuracy		±2.0% F.S.																																																																																																																																																																																																																																																																																																	
Temp. change effect		Within ±0.1% F.S. /°C																																																																																																																																																																																																																																																																																																	
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Rangeability		1: 20																																																																																																																																																																																																																																																																																																	
Gas contact part material	Tube	TF-100□P : Poly-Acethal, PFA, SUS316 TF-100□S : SCS14, PFA, SUS316	SUS316[SUS316 and PFA (TF-1□1□)]																																																																																																																																																																																																																																																																																																
	Sensor	Combination of SUS316, Glass, PT and CTFE																																																																																																																																																																																																																																																																																																	
	Seal	FKM or CR																																																																																																																																																																																																																																																																																																	
Housing material		ABS resin IP20 equ. (Indoor use)		ADC12 IP65 equ. (Water tight)																																																																																																																																																																																																																																																																																															
Process connection		TF-100□P : Rc1/4 TF-100□S : Rc1/4 or OD1/4B SWL	TF-1□1□ : Rc1/4 OD1/4B, 3/8B, 1/2B SWL 15A, 20A, 25A, JIS10K Flange TF-1□2□ : Rc1/4, 3/8 OD1/4B, 3/8B, 1/2B SWL 15A, 20A, 25A, JIS10K Flange TF-1□3□ : Rc3/8, 1/2 OD3/8B, 1/2B, 3/4B SWL 15A, 20A, 25A, JIS10K Flange TF-1□4□ : Rc3/8, 1/2, 3/4 OD3/8B, 1/2B, 3/4B SWL 15A, 20A, 25A, JIS10K Flange																																																																																																																																																																																																																																																																																																
Power supply/ Output		TF-1□□□ ±12 V DC or ±15 V DC, +150 mA, -20 mA/0 to 5 V DC (Load resistance:More than 5kΩ) TF-1□□1 24 V DC ±10%, +150mA/4 to 20 mA DC (Load resistance:Less than 450Ω)																																																																																																																																																																																																																																																																																																	
Electric connection		Exclusive cable with connector		G1/2, M3 screw terminal																																																																																																																																																																																																																																																																																															
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Installation of the pipe is the same connection of flowmeter.</p>	Model code		Description	TF-13			Flow range L/min(nor)	2	up to 250		3	up to 500		4	up to 1000	Power supply/Output	0	±12 V DC(15V) 0 to 5 V DC		1	24 V DC/4 to 20 mA DC	Scale range L/min (nor)	1 5 1	0 to 150	2 0 1	0 to 200	2 5 1	0 to 250	3 0 1	0 to 300	4 0 1	0 to 400	5 0 1	0 to 500	6 0 1	0 to 600	8 0 1	0 to 800		1 0 2	0 to 1000	Connection rating	P	Rc thread		F	JIS10K Flange	Connection size (Choose the connection size from the above-mentioned process connection.)	0 8	1/2B(15A)		1 2	3/4B(20A)		1 6	1B (25A)	<table border="1"> <thead> <tr> <th colspan="2">Model code</th> <th>Description</th> </tr> <tr> <th>TF-14</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Flow range L/min(nor)</td> <td>2</td> <td>up to 250</td> </tr> <tr> <td></td> <td>3</td> <td>up to 500</td> </tr> <tr> <td></td> <td>4</td> <td>up to 1000</td> </tr> <tr> <td>Power supply/Output</td> <td>0</td> <td>±12 V DC(15V) 0 to 5 V DC</td> </tr> <tr> <td></td> <td>1</td> <td>24 V DC/4 to 20 mA DC</td> </tr> <tr> <td rowspan="8">Scale range L/min (nor)</td> <td>1 5 1</td> <td>0 to 150</td> </tr> <tr> <td>2 0 1</td> <td>0 to 200</td> </tr> <tr> <td>2 5 1</td> <td>0 to 250</td> </tr> <tr> <td>3 0 1</td> <td>0 to 300</td> </tr> <tr> <td>4 0 1</td> <td>0 to 400</td> </tr> <tr> <td>5 0 1</td> <td>0 to 500</td> </tr> <tr> <td>6 0 1</td> <td>0 to 600</td> </tr> <tr> <td>8 0 1</td> <td>0 to 800</td> </tr> <tr> <td></td> <td>1 0 2</td> <td>0 to 1000</td> </tr> <tr> <td>Connection rating</td> <td>P</td> <td>Rc thread</td> </tr> <tr> <td></td> <td>F</td> <td>JIS10K Flange</td> </tr> <tr> <td>Connection size (Choose the connection size from the above-mentioned process connection.)</td> <td>0 8</td> <td>1/2B(15A)</td> </tr> <tr> <td></td> <td>1 2</td> <td>3/4B(20A)</td> </tr> <tr> <td></td> <td>1 6</td> <td>1B (25A)</td> </tr> </tbody> </table> <p>*TF-121□ is recommended for scale range smaller than 120L/min(nor). *Required straight run for upstream is 5D and downstream is 0D. 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TF-14																																																																																																																																																																																																											
Flow range L/min(nor)	2	up to 250																																																																																																																																																																																																									
	3	up to 500																																																																																																																																																																																																									
	4	up to 1000																																																																																																																																																																																																									
Power supply/Output	0	±12 V DC(15V) 0 to 5 V DC																																																																																																																																																																																																									
	1	24 V DC/4 to 20 mA DC																																																																																																																																																																																																									
Scale range L/min (nor)	1 5 1	0 to 150																																																																																																																																																																																																									
	2 0 1	0 to 200																																																																																																																																																																																																									
	2 5 1	0 to 250																																																																																																																																																																																																									
	3 0 1	0 to 300																																																																																																																																																																																																									
	4 0 1	0 to 400																																																																																																																																																																																																									
	5 0 1	0 to 500																																																																																																																																																																																																									
	6 0 1	0 to 600																																																																																																																																																																																																									
	8 0 1	0 to 800																																																																																																																																																																																																									
	1 0 2	0 to 1000																																																																																																																																																																																																									
Connection rating	P	Rc thread																																																																																																																																																																																																									
	F	JIS10K Flange																																																																																																																																																																																																									
Connection size (Choose the connection size from the above-mentioned process connection.)	0 8	1/2B(15A)																																																																																																																																																																																																									
	1 2	3/4B(20A)																																																																																																																																																																																																									
	1 6	1B (25A)																																																																																																																																																																																																									
Model code		Description																																																																																																																																																																																																									
TF-15																																																																																																																																																																																																											
Flow range L/min(nor)	1	up to 120																																																																																																																																																																																																									
	2	up to 250																																																																																																																																																																																																									
	3	up to 500																																																																																																																																																																																																									
	4	up to 1000																																																																																																																																																																																																									
Power supply/Output	1	85 to 240 V AC/4 to 20 mA DC																																																																																																																																																																																																									
Scale range L/min (nor)	0 2 0	0 to 2																																																																																																																																																																																																									
	0 3 0	0 to 3																																																																																																																																																																																																									
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	1 5 1	0 to 150																																																																																																																																																																																																									
	2 0 1	0 to 200																																																																																																																																																																																																									
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	3 0 1	0 to 300																																																																																																																																																																																																									
4 0 1	0 to 400																																																																																																																																																																																																										
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6 0 1	0 to 600																																																																																																																																																																																																										
8 0 1	0 to 800																																																																																																																																																																																																										
	1 0 2	0 to 1000																																																																																																																																																																																																									
Connection rating	P	Rc thread																																																																																																																																																																																																									
	S	Swagelok																																																																																																																																																																																																									
	F	JIS10K Flange																																																																																																																																																																																																									
Connection size (Choose the connection size from the above-mentioned process connection.)	0 4	1/4B(8A)																																																																																																																																																																																																									
	0 6	3/8B(10A)																																																																																																																																																																																																									
	0 8	1/2B(15A)																																																																																																																																																																																																									
	1 2	3/4B(20A)																																																																																																																																																																																																									
	1 6	1B (25A)																																																																																																																																																																																																									

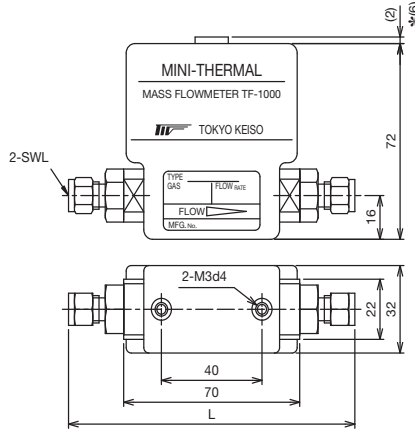
**■ DIMENSION AND WEIGHT**

TF-1000 Compact type  
[TF-1000P.TF-1000S]

· Rc screw connection (TF-1000P---Approx.120g  
TF-1000S---Approx.250g)



· SWL connection (Approx.330g for TF-1000S)

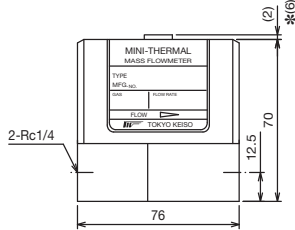


Connection, Rating	L
1/4SWL	121
3/8SWL	124
1/2SWL	128

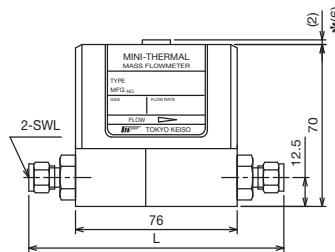
\*TF-1□□1--6mm

TF-1110 Stainless steel body, Standard type  
[TF-1110]

· Rc screw connection (Approx.450g)

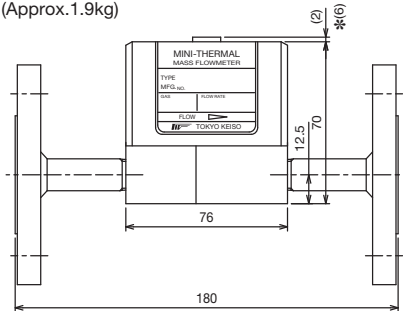


· SWL connection (Approx.530g)

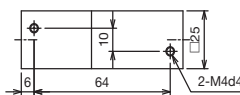


Connection, Rating	L
1/4SWL	127
3/8SWL	130
1/2SWL	134

· Flange connection (Approx.1.9kg)

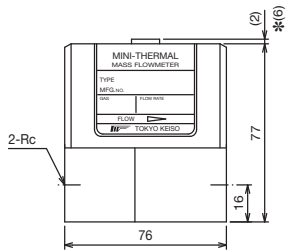


[Rc, SWL and Flange connection]  
Mounting dimension (Bottom face)

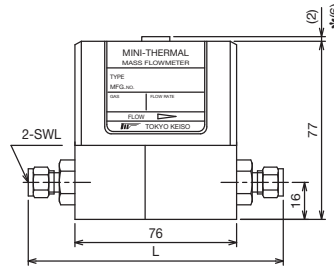


[TF-1120]

· Rc screw connection (Approx.650g)

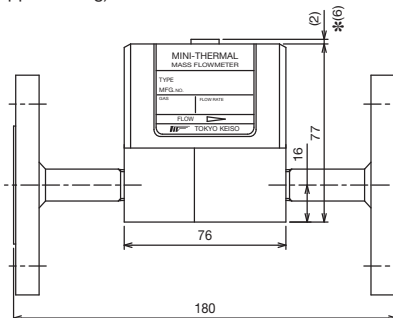


· SWL connection (Approx.740g)

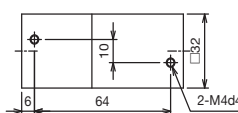


Connection, Rating	L
1/4SWL	127
3/8SWL	130
1/2SWL	134

· Flange connection (Approx.3.0kg)

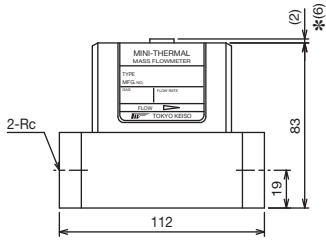


[Rc, SWL and Flange connection]  
Mounting dimension (Bottom face)

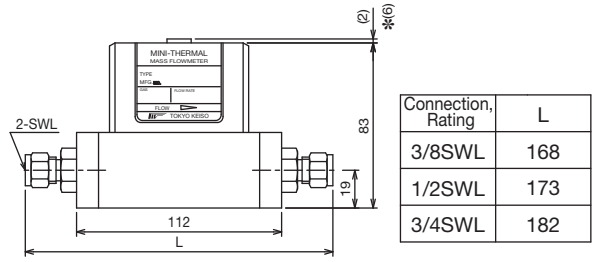


[TF-1130]

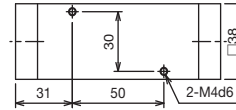
• Rc screw connection (Approx.1kg)



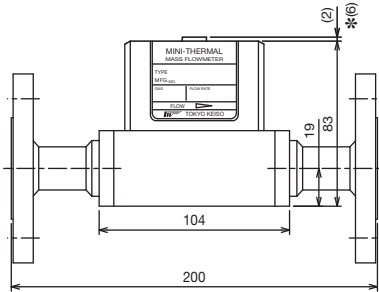
• SWL connection (Approx.1.2kg)



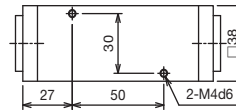
[Rc and SWL connection] Mounting dimension (Bottom face)



• Flange connection (Approx.2.5kg)

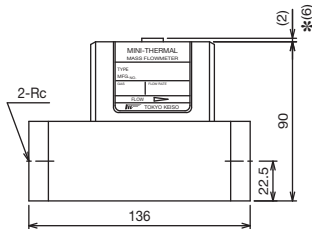


[Flange connection] Mounting dimension (Bottom face)

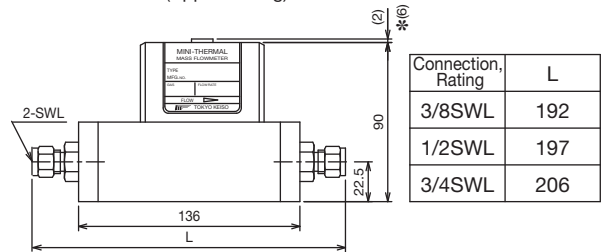


[TF-1140]

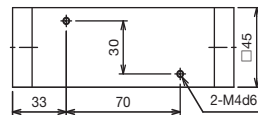
• Rc screw connection (Approx.1.5kg)



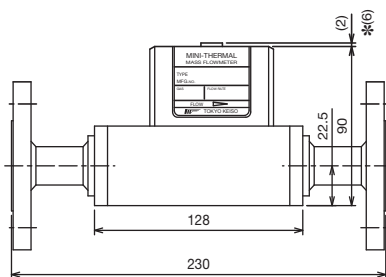
• SWL connection (Approx.1.8kg)



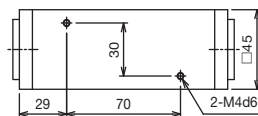
[Rc and SWL connection] Mounting dimension (Bottom face)



• Flange connection (Approx.3.3kg)

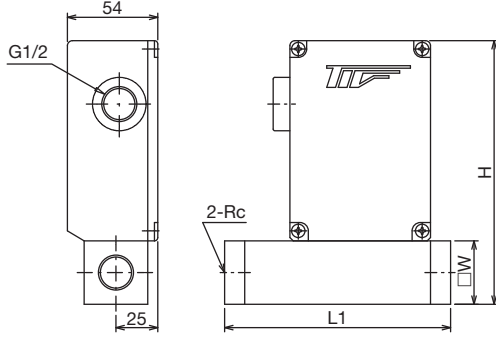


[Flange connection] Mounting dimension (Bottom face)

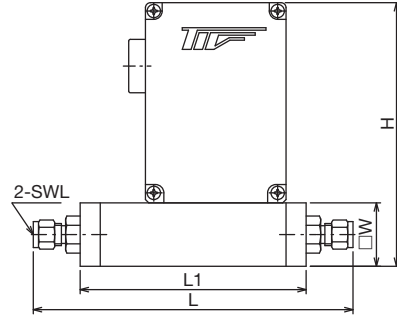


TF-1200 Stainless steel body, Water tight housing type

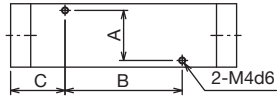
· Rc screw connection



· SWL connection

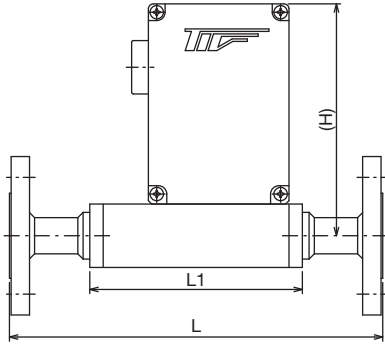


[Rc, SWL and Flange connection] Mounting dimension (Bottom face)



Size	1/4	3/8	1/2	1/4	3/8	1/2	1/4	3/8	1/2	3/8	1/2	3/4
L	159	162	166	171	176	181	188	191	196	216	221	230
L1	108			120			135			160		
H	158			158			158			165		
□W	38			38			38			45		
A	30			30			30			30		
B	50			50			70			90		
C	29			35			32.5			35		
Mass (kg)	2.1			2.2			3.4			4.1		
Model	TF-121□			TF-122□			TF-123□			TF-124□		

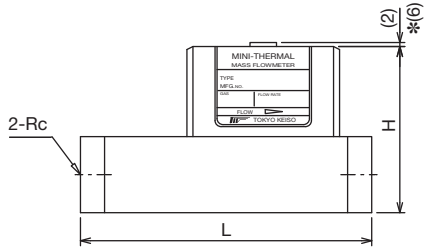
· Flange connection



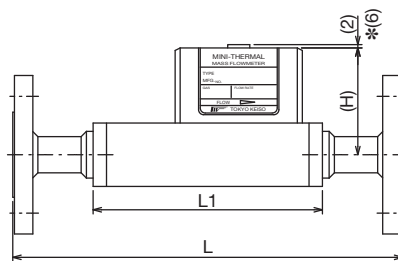
Connection	Size Rating	15A	20A	25A	15A	20A	25A	15A	20A	25A	15A	20A	25A
		JIS 10K (RF) (FF)			JIS 10K (RF) (FF)			JIS 10K (RF) (FF)			JIS 10K (RF) (FF)		
L		196			208			223			254		
L1		100			112			127			152		
□W		38			38			38			45		
H		139			139			139			142.5		
A		30			30			30			30		
B		50			50			70			90		
C		25			31			28.5			31		
Mass (kg)		4.4			4.5			5.7			6.4		
Model		TF-121□			TF-122□			TF-123□			TF-124□		

TF-1300 Low pressure loss, Indoor use type

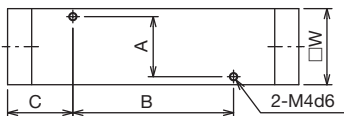
· Rc screw connection



· Flange connection



[Rc, and Flange connection] Mounting dimension (Bottom face)

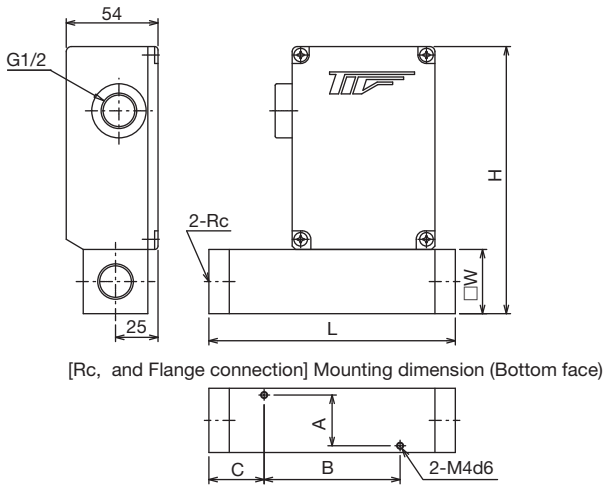


Connection	Size Rating	1/2	3/4	1	15A	20A	25A
		Rc connection			Flange connection JIS10K (RF) (FF)		
L		145	160	190	233	254	290
L1		137	152	184	137	152	184
□W		38	45	54	38	45	54
H		83	90	99	64	67.5	72
A		30	30	44	30	30	44
B		80	90	120	80	90	120
C		32.5	35	35	28.5	31	32
Mass (kg)		1.5	2.2	3.3	2.8	3.8	5.8
Model		TF-1320	TF-1330	TF-1340	TF-1320	TF-1330	TF-1340

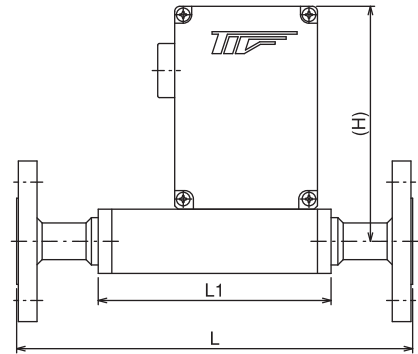
\*TF-13□1...6mm

TF-1400 Low pressure loss, Water tight type

· Rc screw connection



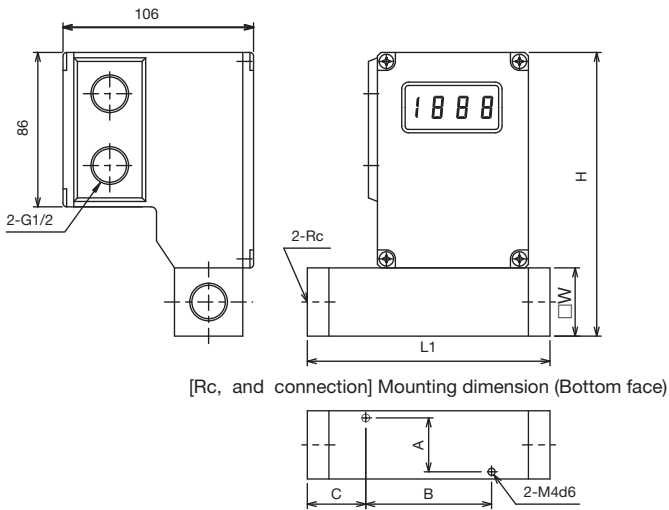
· Flange connection



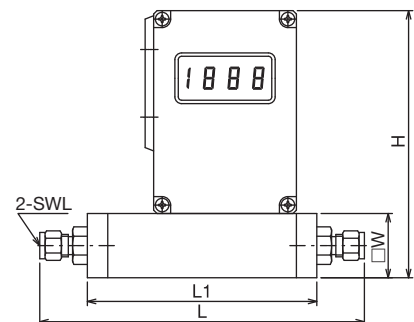
Connection	Size Rating	Rc connection			Flange connection JIS10K (RF) (FF)		
		1/2	3/4	1	15A	20A	25A
L		145	160	190	233	254	290
L1					137	152	184
□W		38	45	54	38	45	54
H		158	165	174	139	142.5	147
A		30	30	44	30	30	44
B		80	90	120	80	90	120
C		32.5	35	35	28.5	31	32
Mass (kg)		2.1	2.8	3.9	3.4	4.4	6.4
Model		TF-142□	TF-143□	TF-144□	TF-142□	TF-143□	TF-144□

TF-1500 With indicator, Water tight type

· Rc screw connection

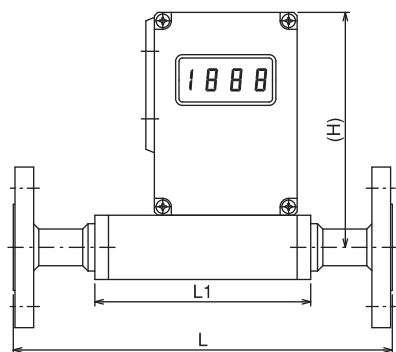


· SWL connection




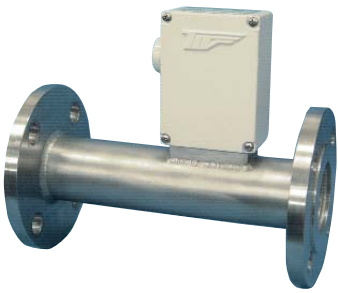

Size	1/4			3/8			1/2		
	159	162	166	171	176	181	188	191	196
L	159	162	166	171	176	181	188	191	196
L1				120			135		
H				158			158		
□W				38			38		
A				30			30		
B				50			70		
C				29			32.5		
Mass (kg)				2.6			2.7		
Model				TF-1511			TF-1521		

· Flange connection



Connection	Size Rating	15A			20A			25A		
		JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	
L		196		208		223		254		
L1		100		112		127		152		
□W		38		38		38		45		
H		139		139		139		142.5		
A		30		30		30		30		
B		50		50		70		90		
C		25		31		28.5		31		
Mass (kg)		4.9		5.0		6.2		6.9		
Model		TF-1511		TF-1521		TF-1531		TF-1541		

■ STANDARD SPECIFICATION AND MODEL CODE [Middle to Large connection type]

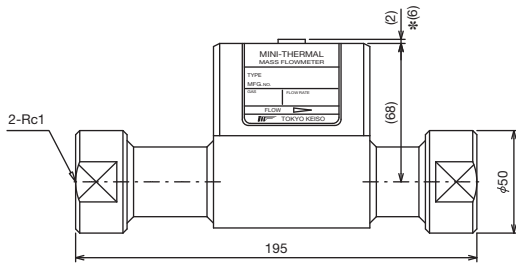
Model	TF-115□	TF-125□	TF-1551																																																																																																																																																																																																					
																																																																																																																																																																																																								
Type	Standard type	Water tight housing	With indicator, Water tight type																																																																																																																																																																																																					
Gas to be measured	All kinds of gases, except gases containing more than 10%(Vol.) of H <sub>2</sub> or He and mixture of H <sub>2</sub> or He and CnHm																																																																																																																																																																																																							
Amb. and Gas temp.	0 to 60°C																																																																																																																																																																																																							
Gas press.	-0.07 to 1.0 MPa																																																																																																																																																																																																							
Accuracy	±2.0%F.S.																																																																																																																																																																																																							
Temp. change effect	Within ±0.1%F.S./°C																																																																																																																																																																																																							
Press. change effect	Within ±0.1%F.S./0.1 MPa																																																																																																																																																																																																							
Rangeability	1 : 20																																																																																																																																																																																																							
Gas contact part material	Tube	SUS316 or SUS304																																																																																																																																																																																																						
	Sensor	Combination of SUS316, Glass, PT and CTFE (SCS14) SUS304																																																																																																																																																																																																						
	Seal	FKM or CR																																																																																																																																																																																																						
Housing material	ABS resin IP20 equ. (Indoor use)	ADC12 IP65 equ. (Water tight)	AC2A IP65 equ. (Water tight)																																																																																																																																																																																																					
Process connection	Rc female screw (1 to 2B) JIS10K Flange (25 to 80A)																																																																																																																																																																																																							
Power supply / Output	TF-1□□0 ±12 V DC or ±15 V DC, +150 mA, -20 mA/0 to 5 V DC (Load resistance: More than 5kΩ) TF-1□□1 24 V DC ±10%, +150 mA/4 to 20 mA DC (Load resistance: Less than 450Ω)		85 to 240 V AC, 4 VA 4 to 20 mA DC (Load resistance: Less than 450Ω)																																																																																																																																																																																																					
Electric connection	Exclusive cable with connector	G1/2, M3 screw terminal	2-G1/2, M3 screw terminal																																																																																																																																																																																																					
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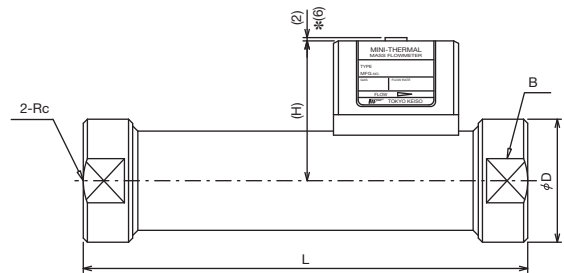
\*TF-1151...6mm

TF-115□ Standard type

- Rc screw connection (Rc1)
- Width across flat of joints: 46
- (Approx.1.9kg)

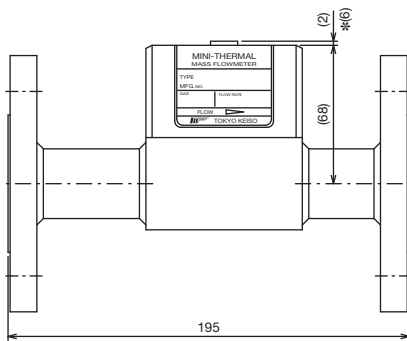


- Rc screw connection (Rc1-1/4 to Rc2)

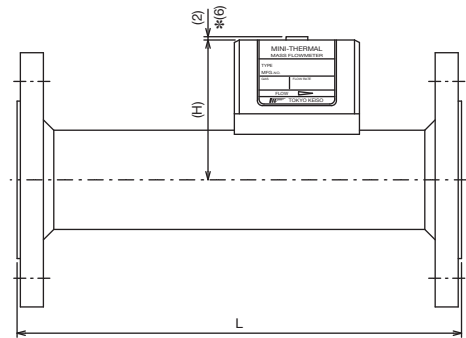


Connection	Size Rating	Rc connection		
		1-1/4	1-1/2	2
L		215	230	270
H		76	79	85
B (Width across flat)		55	60	70
φD		60	65	75
Mass (kg)		1.8	1.9	2.6

- Flange connection (25A) (Approx.3.6kg)



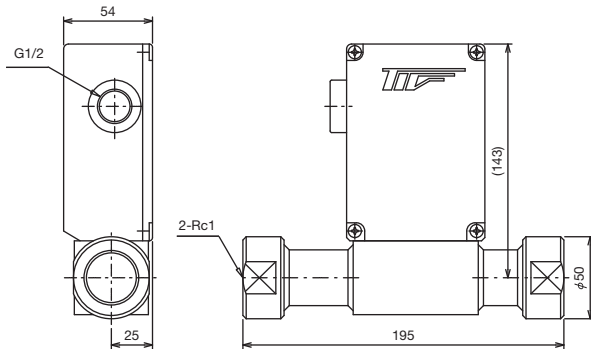
- Flange connection (32 to 80A)



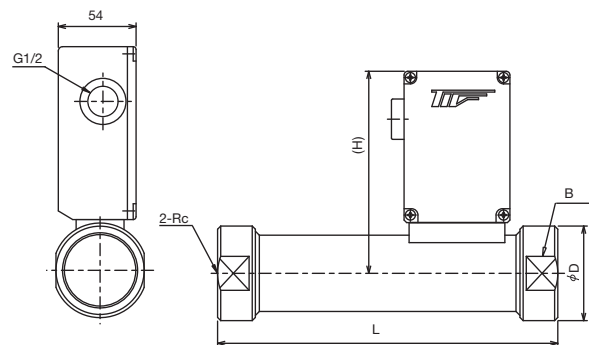
Connection	Size Rating	32A	40A	50A	65A	80A
		Flange connection JIS10K (RF) (FF)				
L		215	230	270	290	320
H		76	79	85	93	100
Mass (kg)		4.1	4.3	5.9	8.0	9.0

TF-125□ Water tight housing type

- Rc screw connection (Rc1)
- Width across flat of joints: 46
- (Approx.2.4kg)

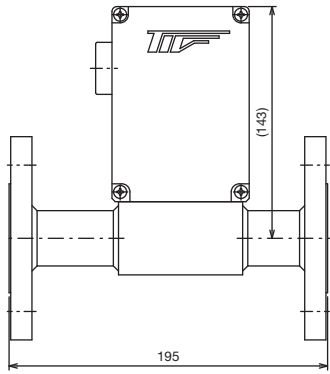


- Rc screw connection (Rc1-1/4 to Rc2)

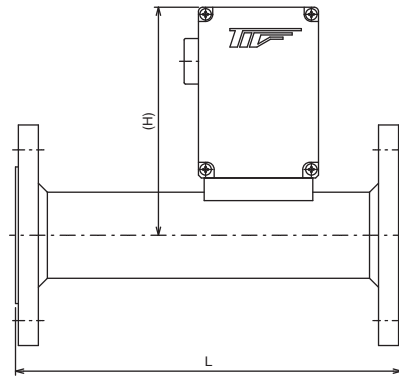


Connection	Size Rating	Rc connection		
		1-1/4	1-1/2	2
L		215	230	270
H		151	154	160
B (Width across flat)		55	60	70
φD		60	65	75
Mass (kg)		2.3	2.4	3.1

· Flange connection (25A) (Approx.4.1kg)



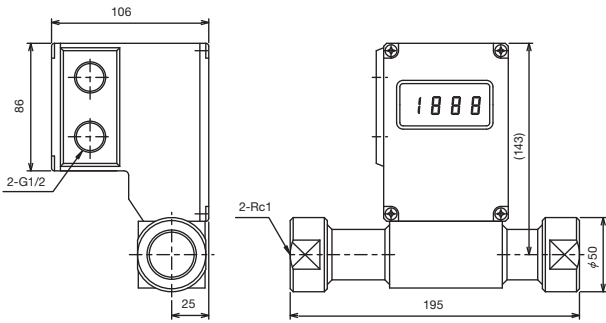
· Flange connection (32 to 80A)



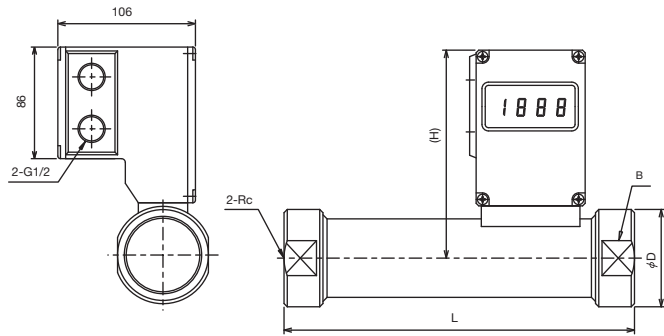
Connection	Size Rating	32A	40A	50A	65A	80A
		Flange connection JIS10K (RF) (FF)				
L		215	230	270	290	320
H		151	154	160	168	175
Mass (kg)		4.6	4.8	5.9	8.5	9.5

TF-1551 With indicator, Water tight type

· Rc screw connection (Rc1)  
Width across flat of joints: 46  
(Approx.2.9kg)

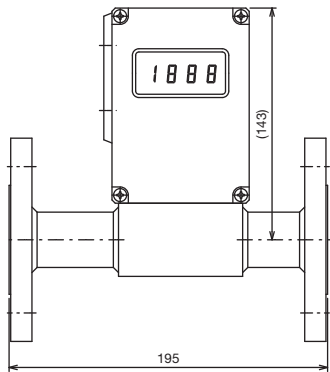


· Rc screw connection (Rc1-1/4 to Rc2)

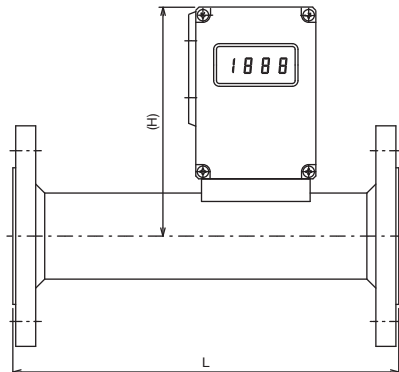


Connection	Size Rating	1-1/4	1-1/2	2
		Rc connection		
L		215	230	270
H		151	154	160
B (Width across flat)		55	60	70
φD		60	65	75
Mass (kg)		2.8	2.9	3.6

· Flange connection (25A) (Approx.4.6kg)



· Flange connection (32 to 80A)



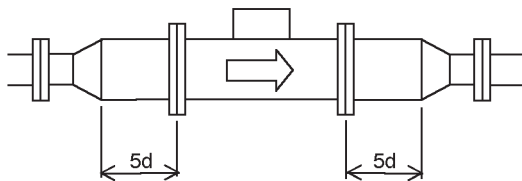
Connection	Size Rating	32A	40A	50A	65A	80A
		Flange connection JIS10K (RF) (FF)				
L		215	230	270	290	320
H		151	154	160	168	175
Mass (kg)		5.1	5.3	6.4	9.0	10.0

**PRECAUTIONS FOR INSTALLATION**

- Required straight run (d: diameter)

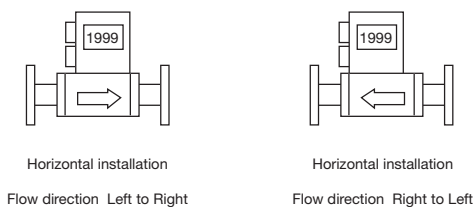
Model	Upstream	Downstream
TF-100□P TF-100□S	Not required	Not required
TF-111□ TF-112□ TF-113□ TF-114□ TF-115□	Not required	Not required
TF-121□ TF-122□ TF-123□ TF-124□ TF-125□	5d (*1, *2)	5d (*1, *2)
TF-132□ TF-133□ TF-134□	5d (*3)	Not required (*3)
TF-142□ TF-143□ TF-144□	5d (*3)	Not required (*3)
TF-151 <sup>1</sup> TF-152 <sup>1</sup> TF-153 <sup>1</sup> TF-154 <sup>1</sup> TF-155 <sup>1</sup>	Not required	Not required
	5d (*1, *2)	5d (*1, *2)

(\*1) The piping different from the diameter of flowmeter is up to ±1 size. Make the piping after installing the required straight run in the same diameter as the flowmeter.



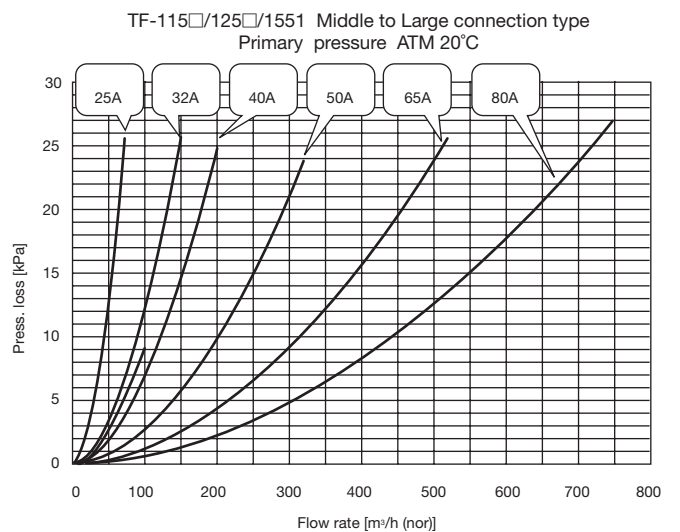
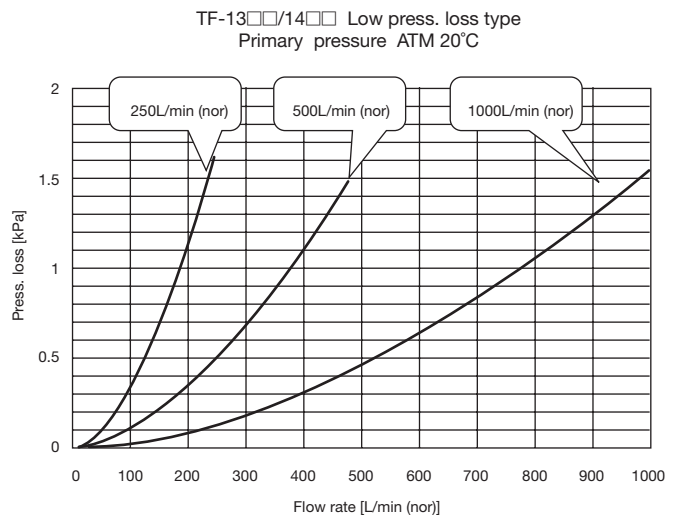
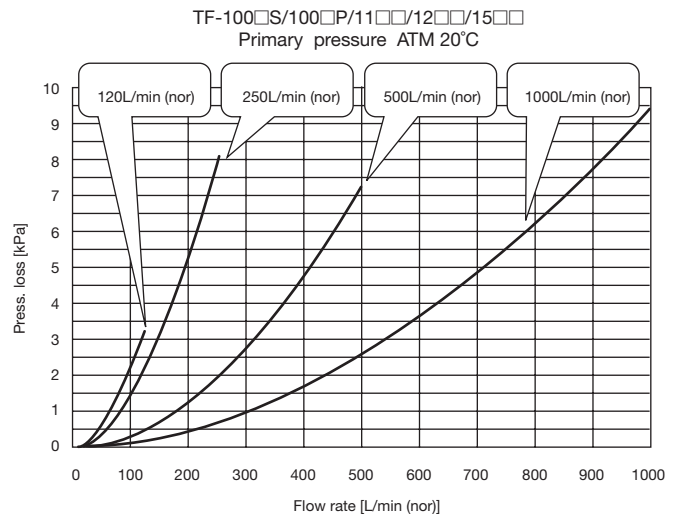
- (\*2) Make use of Rc screw fittings less than Sch. 80.
- (\*3) Make use of the piping in the same diameter as that of the flowmeter.

- Before installing the flowmeter onto process piping, flush and clean the whole piping.
- Install valves downstream if any.
- Use the shielded cable for wiring and do not locate it near to power supply line etc. to avoid the electric noise.
- Confirm the arrow mark on the tube which indicates the flow direction.
- In case of TF-15□1 (With indicator type), the flow direction and configuration are as follows. Specify the flow direction at the time of an order.



- It is recommended to provide bypass piping for maintenance.

**PRESSURE LOSS (The following graphic chart is data in case of air.)**



## ■ TM-2000 MINI CONVERTOR UNIT

### ■ OUTLINE

TM-2000 MINI CONVERTOR UNIT is power supply and indication unit which is used in combination with Tokyo Keiso's TF-900, TF-1000, TF-5000, TF-6000 and (H-) EP-TF-5000 series MASS FLOWMETERS.

All necessary functions of power supply to the detectors and scaled flow indication is provided in DIN 72mm compact housing.

Additionally, either totalization (with scaled pulse output) of flow or high and low alarm is available for total gas volume management or stable gases supply applications.

Also, analog re-output function (4 to 20 mA DC or 0 to 5 V DC) is provided as standard for further connection to recorders and/or process control loop.

### ■ STANDARD SPECIFICATION

#### ● FLOW RATE INDICATION

- Indication : By 4 digit LCD (13mm height)
- Accuracy :  $\pm 0.1\%$  F.S.  $\pm 1$  last digit additional to detector accuracy
- Analog re-output (Alternative)
  - a) 4 to 20 mA DC Max.load 500 $\Omega$
  - b) 0 to 5 V DC Min.load 100 k $\Omega$
- Output accuracy :  $\pm 0.1\%$  F.S. additional to detector accuracy

#### ● TOTALIZATION FUNCTION

- Indication : By 7 digit LCD (6mm height)
- Scaled pulse : Output Open collector
- Rating : 30 V DC, 20 mA Max.
- Pulse width : 100 mS (Fixed)
- Pulse rate : Equal to counter increments
- Indication accuracy :  $\pm 0.1\%$  F.S. additional to detector accuracy
- Scaling factor : 18,000 c/h (Max.)
- Total re-set : By manual push button or short-circuiting of terminal

#### ● LOW CUT

- : Standard 2% (Freely programmable)
- Corresponding function: Flow rate indication, Flow rate output, Totalization indication, and Scaled pulse output

#### ● ALARM FUNCTION

- Alarm indication : Red color LED (The light is turned on in operation)
- Alarm output : SPST NO (Make contact) or NC (Break contact) (The contact will be opened without power supply.)
- Contact rating : 125 V AC, 0.4A/30 V DC, 2A
- Setting point : 2 points (High and Low)
- Setting range : 0 to 100% of span
- Setting : Field adjustable through front panel key
- Hysteresis width : 1.0% F.S.(Fixed)

#### ● ANALOG INPUT (Alternative)

- a) 4 to 20 mA DC Input resistance 250 $\Omega$
- b) 0 to 5 V DC Input resistance 200k $\Omega$

#### ● OTHER FUNCTION

- Multi-data : Max.8 different data can be programmed. (Channel selection by front panel key)
- Linearise function (Option)
  - a) Fourth formula multiplier method
  - b) Extraction of square-root multiplier method
- Data back up : Total count and operation parameters are memorized by EEROM for 10 years.



#### ● EXTERNAL POWER SUPPLY : $\pm 12$ V DC, +200mA, -200mA

#### ● OTHER SPECIFICATION

- Power supply : 85 to 250 V AC 50/60Hz
- Power consumption : 15VA
- Electrical connection : Pin terminal
- Ambient temp : 0 to 50°C (To be free from condensation)
- Withstand voltage : Power supply to Earth terminal  
1500 V AC, 1 min.
- Insulation resistance : Power supply to Earth terminal  
More than 20M $\Omega$  (500 V DC)
- Construction : Indoor use (IP20 equ.)
- Housing material : ABS resin containing glass fiber
- Weight : Approx.450g

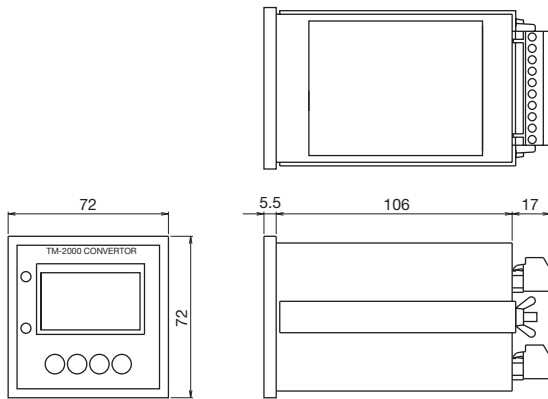
### ■ MODEL CODE

Model code					Description	
TM -	2			-		
Analog Input	1					4 to 20 mA DC
	2					0 to 5 V DC
Analog Output	1					4 to 20 mA DC
	2					0 to 5 V DC
Alarm Output	1				H : NO, L : NO	H : High
	2				H : NC, L : NC	L : Low
	3				H : NO, L : NC	NO : Make contact
	4				H : NC, L : NO	NC : Break contact
Input & Output characteristics	Standard	-				Linear
	Option	-	H			Fourth formula multiplier method
	Option	-	R			Extraction of square-root multiplier method

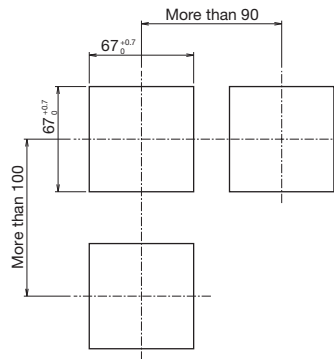
### ■ APPLICABLE FLOWMETERS AND EXCLUSIVE CABLE

Applicable flowmeters	Cable code	Cable length
TF-900/1000/1100/1300	SC-MM2	2m : Standard 100m (Max.)
TF-1200/1400	SC-MA2	
TF-5300/6300	SC-FM2	
HM-1000/5000 (Option)	SC-HM	

**■ DIMENSIONS**

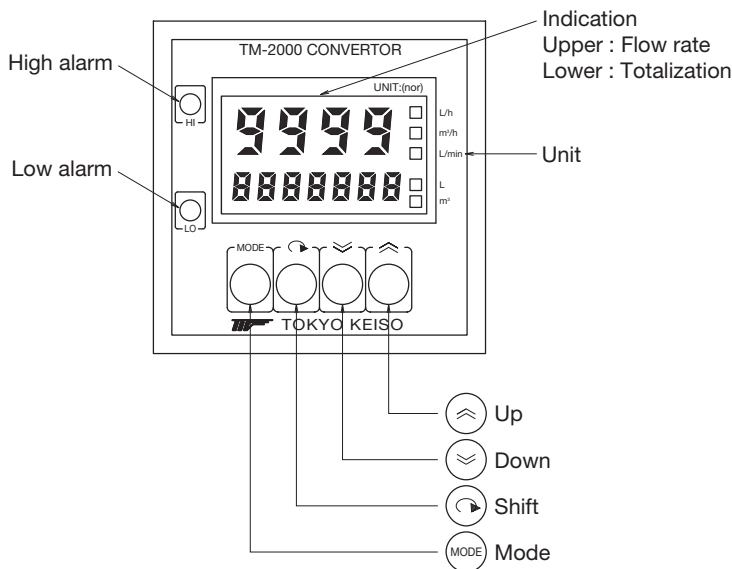


PANEL CUT AND MOUNT DISTANCE

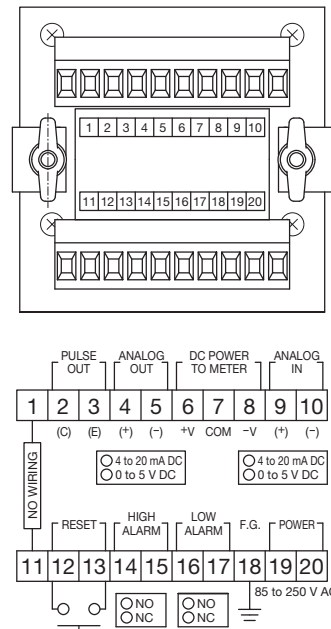


Note) Recommending mount panel in 1 to 5mm thickness.

**■ FRONT PANEL**



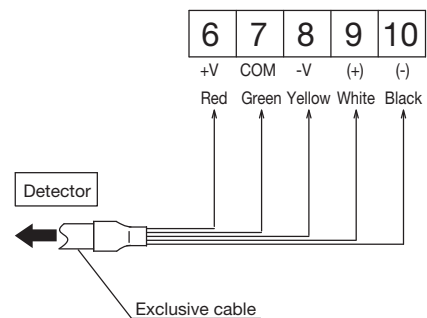
**■ TERMINAL**



**■ WIRING**

No.	Description	No.	Description
1	Non - use	11	Non - use
2	(C) Pulse	12	Reset
3	(E) Output	13	
4	(+) Analog	14	High alarm output
5	(-) Output	15	
6	(+V) DC power	16	Low alarm output
7	(COM) to meter	17	
8	(-V)	18	F. G.
9	(+) Analog	19	AC power supply
10	(-) Input	20	

Cable wiring when mass flow meter is used and model change is made from TM-1000 to TM-2000 should cut the cable of the connector socket part inserted in a converter, and strip cable coating about 7mm and carry out connection as follows.

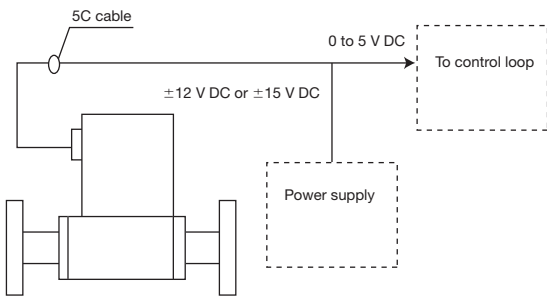
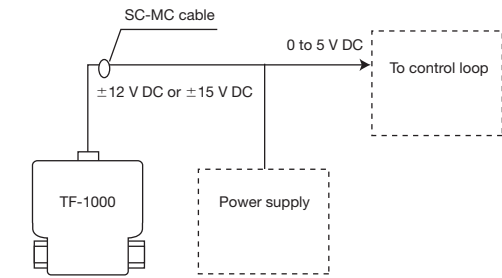


APPLICATIONS

For 0 to 5 V DC Output version

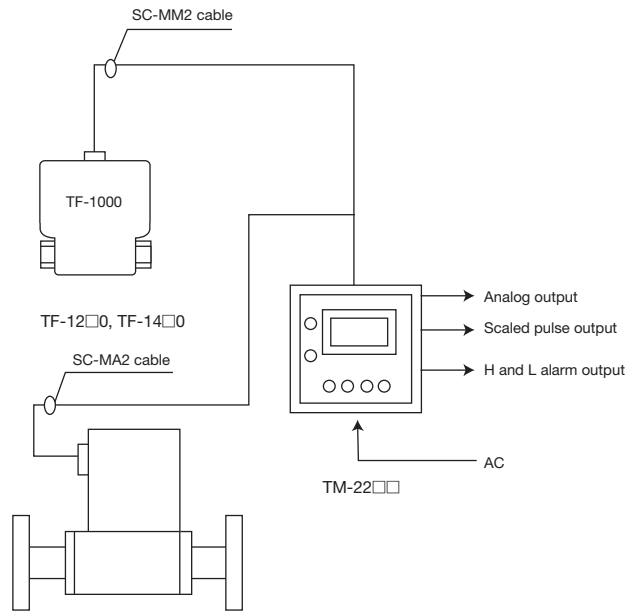
● In case standard power supply unit is used;

TF-1000P, TF-1000S, TF-11□0, TF-13□0



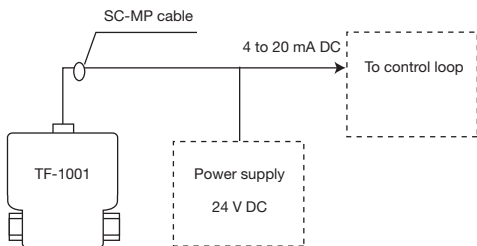
● In case TM-2000 series converter unit is used;

TF-1000P, TF-1000S, TF-11□0, TF-13□0



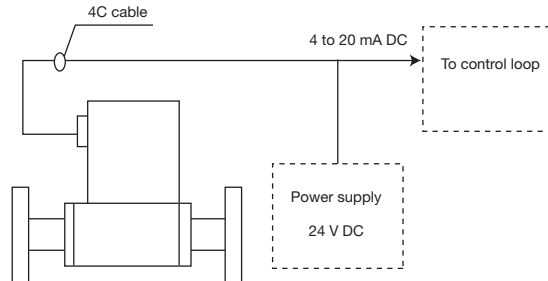
For cable with exclusive connector, 4 to 20 mA DC Output version

TF-1001P, TF-1001S, TF-11□1, TF-13□1

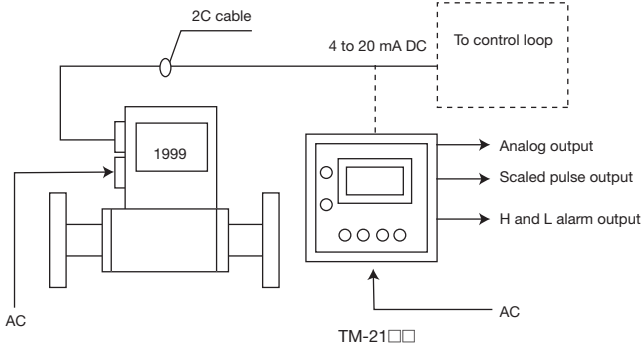


For M3 screw terminal, 4 to 20 mA DC Output version

TF-12□1, TF-14□1

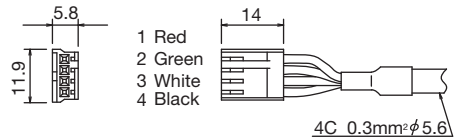


For TF15□1 series (With indicator) version

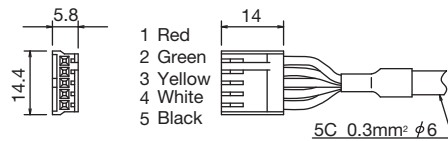


CABLE TERMINAL BY THE SIDE OF DETECTOR

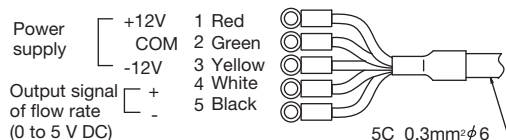
● SC-MP



● SC-MM2



● SC-MA2



## ■ ORDERING INFORMATION

Specify the following for order /inquiry

### ● MINI-THERMAL MASS FLOW METER

Model	TF-1□□□-□□□-□□□			
Gas to be measured				
Pressure	Max.	Nor.	Min.	<input type="checkbox"/> MPa <input type="checkbox"/> kPa
Temperature	Max.	Nor.	Min.	°C
Full scale	<input type="checkbox"/> L/h (nor) <input type="checkbox"/> L/min (nor) <input type="checkbox"/> m <sup>3</sup> /h (nor)			
Connection size	<input type="checkbox"/> 1/4B (8A)	<input type="checkbox"/> 3/8B (10A)	<input type="checkbox"/> 1/2B (15A)	<input type="checkbox"/> 3/4B (20A) <input type="checkbox"/> 1B (25A)
	<input type="checkbox"/> 1-1/4B (32A)	<input type="checkbox"/> 1-1/2B (40A)	<input type="checkbox"/> 2B (50A)	<input type="checkbox"/> (65A) <input type="checkbox"/> (80A)
Connection type	<input type="checkbox"/> Rc thread <input type="checkbox"/> Swagelok <input type="checkbox"/> JIS10K Flange <input type="checkbox"/> VCR (Option)			
Flow direction (TF-15□1)	<input type="checkbox"/> Left to Right <input type="checkbox"/> Right to Left			

### ● SUPPORTING INSTRUMENTS

Mini converter	TM-2□□□
Exclusive cable	<input type="checkbox"/> SC-MM2 <input type="checkbox"/> SC-MA2

\* Specification is subject to change without notice.

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