

TF

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 convertors are ready for easy loop design.

FEATURES

- **Low cost, High performance**
Competitive with purgometer prices! Why do you stick with purgemeters?
- **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. 0~2 L/min(nor.), Max. 750m³/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 convertors are ready to choose

Mass flowmeter

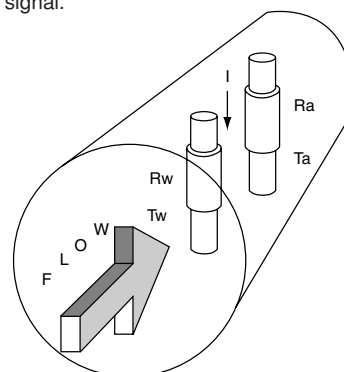
- **Low price, Compact**
 - TF-100□P Engineering plastic body
 - TF-100□S 316SS casted body
- **Standard type**
 - TF-11□□ Stainless steel body, Mid to large connection types are available.
 - TF-13□□ Stainless steel body, Low pressure loss
- **Outdoor use, Water tight housing**
 - TF-12□□ Stainless 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



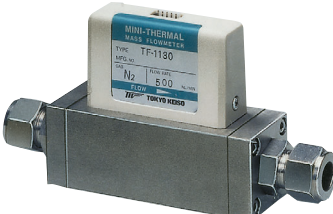
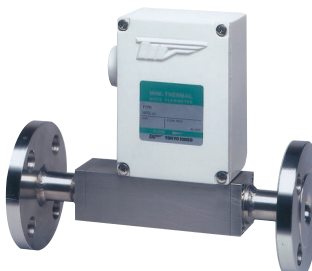
OPERATION PRINCIPLE

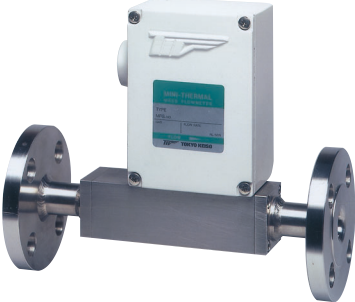
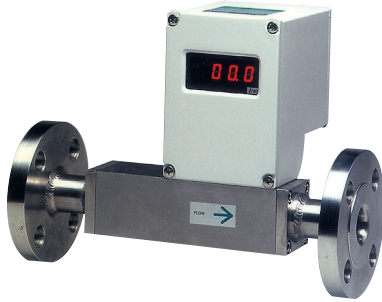
Temperature detection sensor **Ra** and velocity detection sensor **Rw** are installed in the gas flow path of **TF-1000 MINI-THERMAL MASS FLOWMETER**. The internal electronics circuits keep the temperature gap between **Rw** (**Tw**) and **Ra** (**Ta** = Gas temp.) constant by supplying electric current **I**. The transferred heat from **Ra** to passed gas (**Rw · I²**) 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)]

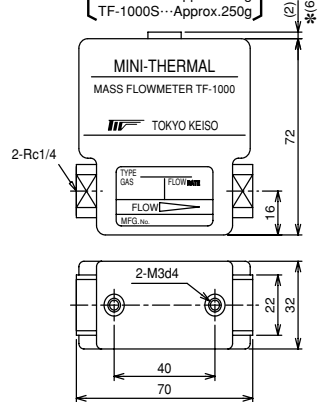
Model		TF-100□P/S	TF-11□□	TF-12□□																																																																																																																																																																																																						
																																																																																																																																																																																																										
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 ₂ or He and mixture of H ₂ or He and CnHm																																																																																																																																																																																																								
Scale range		Min. 0 to 2L/min(nor) Max. 0 to 120L/min(nor)	Min. 0 to 2L/min(nor) Max. 0 to 1000L/min(nor)																																																																																																																																																																																																							
Amb. and Gas temp.		0 to 60℃ [0 to 50℃ for TF-1000P (Poly-acethal resin body)]																																																																																																																																																																																																								
Gas press.		-0.07 to 1.0MPa																																																																																																																																																																																																								
Accuracy		±2.0% F.S.																																																																																																																																																																																																								
Temp. change effect		Within ±0.1% F.S./℃																																																																																																																																																																																																								
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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	Viton 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□□0 DC±12V or DC±15V, +150mA, -20mA/DC0~5V (Load resistance:More than 5kΩ) TF-1□□1 DC24V±10%, +150mA/DC4~20mA (Load resistance:Less than 450Ω)																																																																																																																																																																																																								
Electric connection		Exclusive cable with connector		G1/2, M3 screw terminal																																																																																																																																																																																																						
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TF-1□2□ : Rc1/2 or 15AJIS10K Flange TF-1□3□ : Rc3/4 or 20AJIS10K Flange TF-1□4□ : Rc1 or 25AJIS10K Flange		TF-1511: Rc1/4, 3/8, 1/2 OD1/4B, 3/8B, 1/2B SWL 15A, 20A, 25A, JIS10K Flange TF-1521: Rc1/4, 3/8, 1/2 OD1/4B, 3/8B, 1/2B SWL 15A, 20A, 25A, JIS10K Flange TF-1531: Rc3/8, 1/2 OD3/8B, 1/2B SWL 15A, 20A, 25A, JIS10K Flange TF-1541: Rc3/8, 1/2, 3/4 OD3/8B, 1/2B, 3/4B SWL 15A, 20A, 25A, JIS10K Flange																																																																																																																																																																																																																																										
TF-1□□0 DC±12V or DC±15V, +150mA, -20mA/DC0~5V (Load resistance:More than 5kΩ) TF-1□□1 DC24V±10%, +150mA/DC4~20mA (Load resistance:Less than 450Ω)		AC85~240V, 4VA DC4~20mA (Load resistance:Less than 450Ω)																																																																																																																																																																																																																																										
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Model code		Description	TF-14	- - - - -		Flow range	2	up to 250L/min(nor)		3	up to 500L/min(nor)		4	up to 1000L/min(nor)	Power supply/Output	0	DC±12V(15V)/DC0~5V		1	DC24V/DC4~20mA	Scale range	1 5 1	0~150 L/min(nor)		2 0 1	0~200 L/min(nor) TF-142□		2 5 1	0~250 L/min(nor)		3 0 1	0~300 L/min(nor)		4 0 1	0~400 L/min(nor) TF-143□		5 0 1	0~500 L/min(nor)		6 0 1	0~600 L/min(nor)		8 0 1	0~800 L/min(nor) TF-144□		1 0 2	0~1000L/min(nor)	Connection rating	P	Rc thread		F	JIS10K Flange	Connection size	0 8	1/2B(15A)	(Choose the connection size from the above-mentioned process connection.)	1 2	3/4B(20A)		1 6	1B (25A)	<table border="1"> <thead> <tr> <th colspan="2">Model code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>TF-15</td> <td>- - - - -</td> <td></td> </tr> <tr> <td>Flow range</td> <td>1</td> <td>up to 120L/min(nor)</td> </tr> <tr> <td></td> <td>2</td> <td>up to 250L/min(nor)</td> </tr> <tr> <td></td> <td>3</td> <td>up to 500L/min(nor)</td> </tr> <tr> <td></td> <td>4</td> <td>up to 1000L/min(nor)</td> </tr> <tr> <td>Power supply/Output</td> <td>1</td> <td>AC85~240V/DC4~20mA</td> </tr> <tr> <td>Scale range</td> <td>0 2 0</td> <td>0~2 L/min(nor)</td> </tr> <tr> <td></td> <td>0 3 0</td> <td>0~3 L/min(nor)</td> </tr> <tr> <td></td> <td>0 5 0</td> <td>0~5 L/min(nor)</td> </tr> <tr> <td></td> <td>0 8 0</td> <td>0~8 L/min(nor)</td> </tr> <tr> <td></td> <td>1 0 0</td> <td>0~10 L/min(nor)</td> </tr> <tr> <td></td> <td>1 5 0</td> <td>0~15 L/min(nor) TF-1511</td> </tr> <tr> <td></td> <td>2 0 0</td> <td>0~20 L/min(nor)</td> </tr> <tr> <td></td> <td>3 0 0</td> <td>0~30 L/min(nor)</td> </tr> <tr> <td></td> <td>5 0 0</td> <td>0~50 L/min(nor)</td> </tr> <tr> <td></td> <td>8 0 0</td> <td>0~80 L/min(nor)</td> </tr> <tr> <td></td> <td>1 0 1</td> <td>0~100 L/min(nor)</td> </tr> <tr> <td></td> <td>1 2 1</td> <td>0~120 L/min(nor)</td> </tr> <tr> <td></td> <td>1 5 1</td> <td>0~150 L/min(nor)</td> </tr> <tr> <td></td> <td>2 0 1</td> <td>0~200 L/min(nor) TF-1521</td> </tr> <tr> <td></td> <td>2 5 1</td> <td>0~250 L/min(nor)</td> </tr> <tr> <td></td> <td>3 0 1</td> <td>0~300 L/min(nor)</td> </tr> <tr> <td></td> <td>4 0 1</td> <td>0~400 L/min(nor) TF-1531</td> </tr> <tr> <td></td> <td>5 0 1</td> <td>0~500 L/min(nor)</td> </tr> <tr> <td></td> <td>6 0 1</td> <td>0~600 L/min(nor)</td> </tr> <tr> <td></td> <td>8 0 1</td> <td>0~800 L/min(nor) TF-1541</td> </tr> <tr> <td></td> <td>1 0 2</td> <td>0~1000L/min(nor)</td> </tr> <tr> <td>Connection rating</td> <td>P</td> <td>Rc thread</td> </tr> <tr> <td></td> <td>S</td> <td>Swagelok</td> </tr> <tr> <td></td> <td>F</td> <td>JIS10K Flange</td> </tr> <tr> <td>Connection size</td> <td>0 4</td> <td>1/4B(8A)</td> </tr> <tr> <td>(Choose the connection size from the above-mentioned process connection.)</td> <td>0 6</td> <td>3/8B(10A)</td> </tr> <tr> <td></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>	Model code		Description	TF-15	- - - - -		Flow range	1	up to 120L/min(nor)		2	up to 250L/min(nor)		3	up to 500L/min(nor)		4	up to 1000L/min(nor)	Power supply/Output	1	AC85~240V/DC4~20mA	Scale range	0 2 0	0~2 L/min(nor)		0 3 0	0~3 L/min(nor)		0 5 0	0~5 L/min(nor)		0 8 0	0~8 L/min(nor)		1 0 0	0~10 L/min(nor)		1 5 0	0~15 L/min(nor) TF-1511		2 0 0	0~20 L/min(nor)		3 0 0	0~30 L/min(nor)		5 0 0	0~50 L/min(nor)		8 0 0	0~80 L/min(nor)		1 0 1	0~100 L/min(nor)		1 2 1	0~120 L/min(nor)		1 5 1	0~150 L/min(nor)		2 0 1	0~200 L/min(nor) TF-1521		2 5 1	0~250 L/min(nor)		3 0 1	0~300 L/min(nor)		4 0 1	0~400 L/min(nor) TF-1531		5 0 1	0~500 L/min(nor)		6 0 1	0~600 L/min(nor)		8 0 1	0~800 L/min(nor) TF-1541		1 0 2	0~1000L/min(nor)	Connection rating	P	Rc thread		S	Swagelok		F	JIS10K Flange	Connection size	0 4	1/4B(8A)	(Choose the connection size from the above-mentioned process connection.)	0 6	3/8B(10A)		0 8	1/2B(15A)		1 2	3/4B(20A)		1 6	1B (25A)
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	3 0 1	0~300 L/min(nor)																																																																																																																																																																																																																																										
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	8 0 1	0~800 L/min(nor) TF-144□																																																																																																																																																																																																																																										
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	F	JIS10K Flange																																																																																																																																																																																																																																										
Connection size	0 8	1/2B(15A)																																																																																																																																																																																																																																										
(Choose the connection size from the above-mentioned process connection.)	1 2	3/4B(20A)																																																																																																																																																																																																																																										
	1 6	1B (25A)																																																																																																																																																																																																																																										
Model code		Description																																																																																																																																																																																																																																										
TF-15	- - - - -																																																																																																																																																																																																																																											
Flow range	1	up to 120L/min(nor)																																																																																																																																																																																																																																										
	2	up to 250L/min(nor)																																																																																																																																																																																																																																										
	3	up to 500L/min(nor)																																																																																																																																																																																																																																										
	4	up to 1000L/min(nor)																																																																																																																																																																																																																																										
Power supply/Output	1	AC85~240V/DC4~20mA																																																																																																																																																																																																																																										
Scale range	0 2 0	0~2 L/min(nor)																																																																																																																																																																																																																																										
	0 3 0	0~3 L/min(nor)																																																																																																																																																																																																																																										
	0 5 0	0~5 L/min(nor)																																																																																																																																																																																																																																										
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	1 5 0	0~15 L/min(nor) TF-1511																																																																																																																																																																																																																																										
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	8 0 0	0~80 L/min(nor)																																																																																																																																																																																																																																										
	1 0 1	0~100 L/min(nor)																																																																																																																																																																																																																																										
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	2 0 1	0~200 L/min(nor) TF-1521																																																																																																																																																																																																																																										
	2 5 1	0~250 L/min(nor)																																																																																																																																																																																																																																										
	3 0 1	0~300 L/min(nor)																																																																																																																																																																																																																																										
	4 0 1	0~400 L/min(nor) TF-1531																																																																																																																																																																																																																																										
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	8 0 1	0~800 L/min(nor) TF-1541																																																																																																																																																																																																																																										
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Connection rating	P	Rc thread																																																																																																																																																																																																																																										
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Connection size	0 4	1/4B(8A)																																																																																																																																																																																																																																										
(Choose the connection size from the above-mentioned process connection.)	0 6	3/8B(10A)																																																																																																																																																																																																																																										
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	1 6	1B (25A)																																																																																																																																																																																																																																										

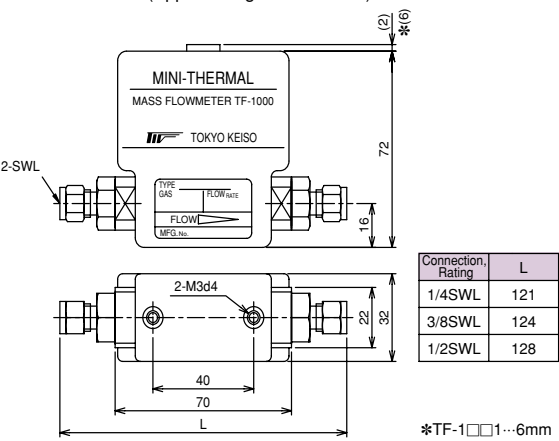
DIMENSION AND WEIGHT

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)

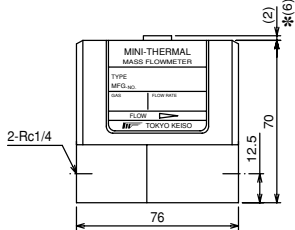


Connection, Rating	L
1/4SWL	121
3/8SWL	124
1/2SWL	128

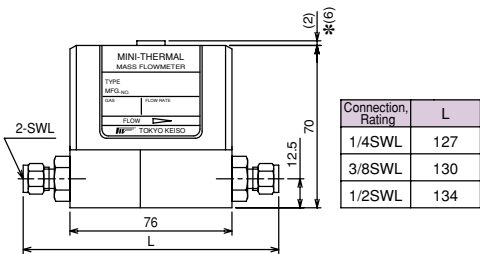
*TF-1□□1...6mm

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

- Rc screw connection (Approx.450g)

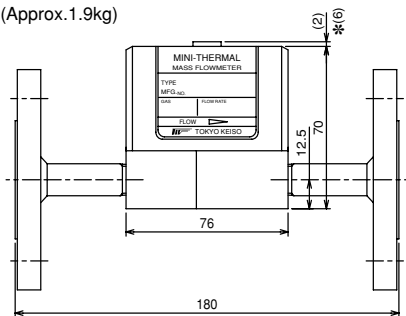


- SWL connection (Approx.530g)

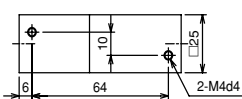


Connection, Rating	L
1/4SWL	127
3/8SWL	130
1/2SWL	134

- Flange connection (Approx.1.9kg)

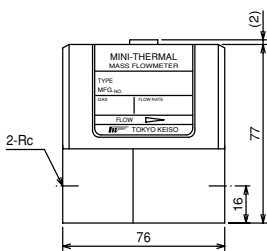


[Rc, SWL and Flange connection]
Mounting dimension (Bottom face)

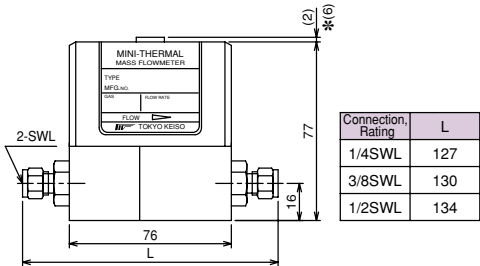


[TF-1120]

- Rc screw connection (Approx.650g)

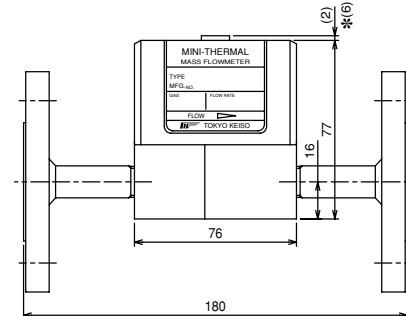


- SWL connection (Approx.740g)

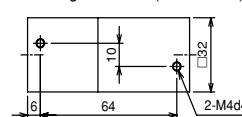


Connection, Rating	L
1/4SWL	127
3/8SWL	130
1/2SWL	134

- Flange connection (Approx.3.0kg)

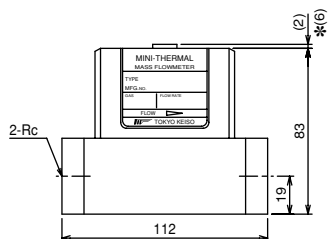


[Rc, SWL and Flange connection]
Mounting dimension (Bottom face)

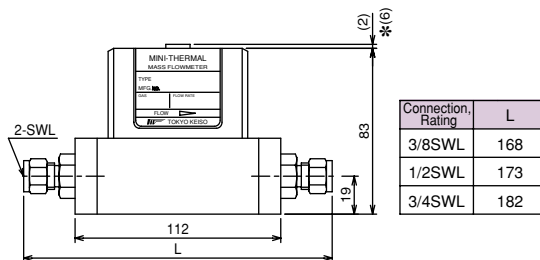


[TF-1130]

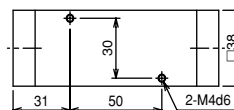
• Rc screw connection (Approx.1kg)



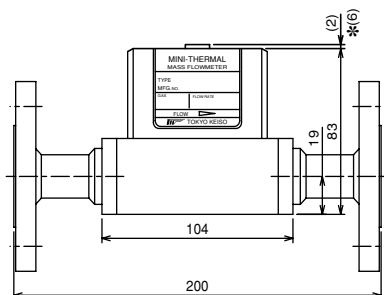
• SWL connection (Approx.1.2kg)



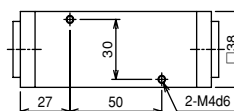
[Rc and SWL connection] Mounting dimension (Bottom face)



• Flange connection (Approx.2.5kg)

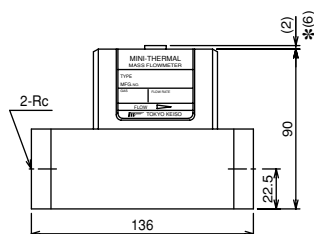


[Flange connection] Mounting dimension (Bottom face)

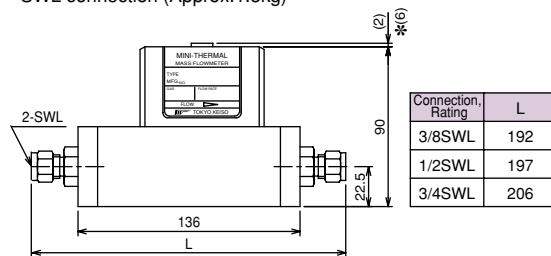


[TF-1140]

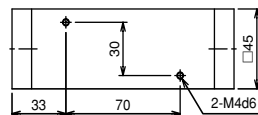
• Rc screw connection (Approx.1.5kg)



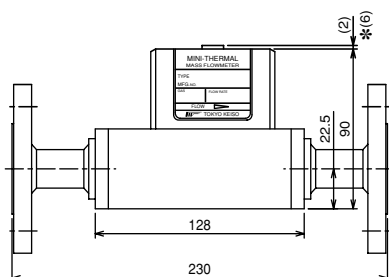
• SWL connection (Approx.1.8kg)



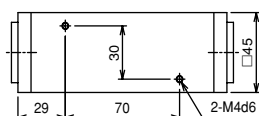
[Rc and SWL connection] Mounting dimension (Bottom face)



• Flange connection (Approx.3.3kg)

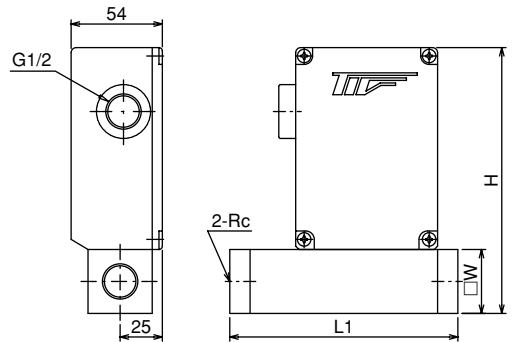


[Flange connection] Mounting dimension (Bottom face)

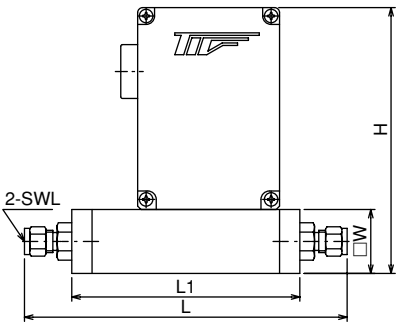


TF-1200 Stainless steel body, Water tight housing type

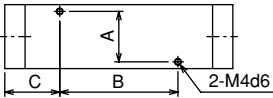
· Rc screw connection



· SWL connection

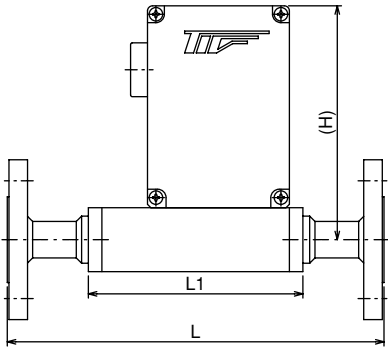


[Rc, SWL and Flange connection] Mounting dimension (Bottom face)



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	
Weight (kg)		2.1			2.2			3.4			4.1	
Model	TF-121□			TF-122□			TF-123□			TF-124□		

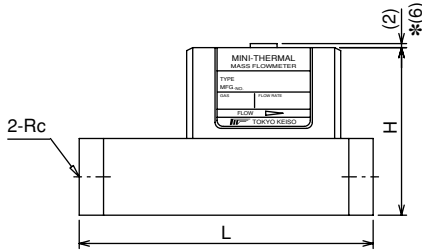
· Flange connection



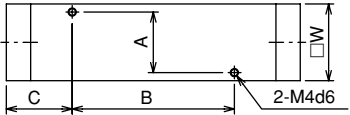
Connection	Size Rating	15A 20A 25A	15A 20A 25A	15A 20A 25A	15A 20A 25A
		JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)	JIS 10K (RF) (FF)
L		196	208	223	254
L1		100	112	127	152
□W		38	38	38	45
H		139	139	139	142.5
A		30	30	30	30
B		50	50	70	90
C		25	31	28.5	31
Weight (kg)		4.4	4.5	5.7	6.4
Model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

TF-1300 Low pressure loss, Indoor use type

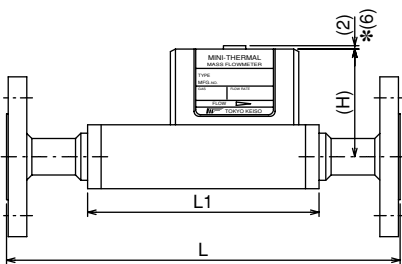
· Rc screw connection



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



· Flange connection

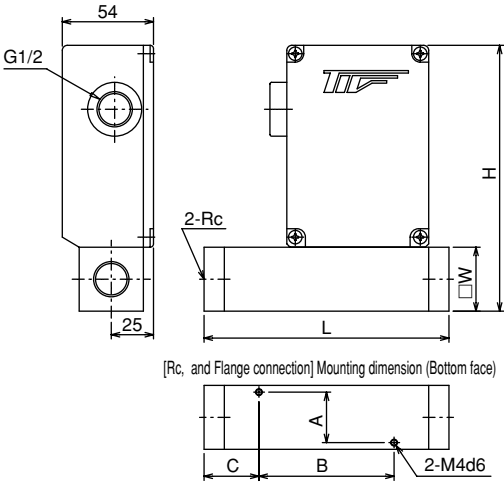


Connection	Size Rating	1/2	3/4	1	15A	20A	25A
		Rc connection			Flange connection JIS10K (RF) (FF)		
L		145	160	190	233	254	290
L1					137	152	184
□W		38	45	54	38	45	54
H		83	90	99	64	67.5	72
A		30	30	44	30	30	44
B		80	90	120	80	90	120
C		32.5	35	35	28.5	31	32
Weight (kg)		1.5	2.2	3.3	2.8	3.8	5.8
Model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

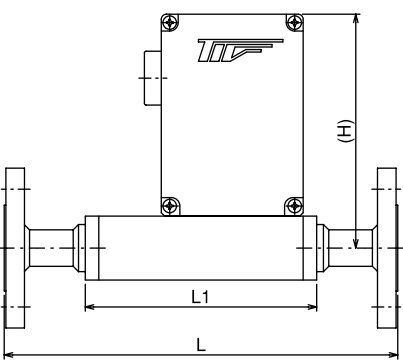
*TF-13□1...6mm

TF-1400 Low pressure loss, Water tight type

• Rc screw connection



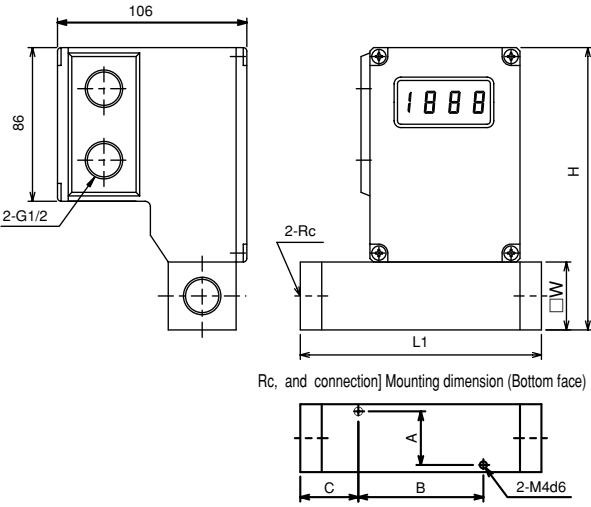
• Flange connection



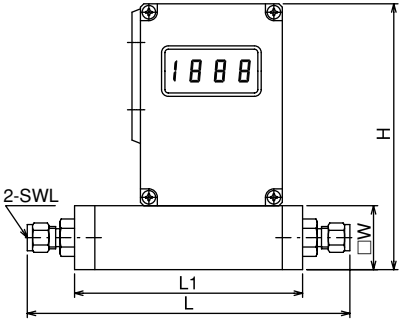
Connection	Size Rating	1/2	3/4	1	15A	20A	25A
		Rc connection			Flange connection JIS10K (RF) (FF)		
L		145	160	190	233	254	290
L1					137	152	184
□W		38	45	54	38	45	54
H		158	165	174	139	142.5	147
A		30	30	44	30	30	44
B		80	90	120	80	90	120
C		32.5	35	35	28.5	31	32
Weight (kg)		2.1	2.8	3.9	3.4	4.4	6.4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

TF-1500 With indicator, Water tight type

• Rc screw connection

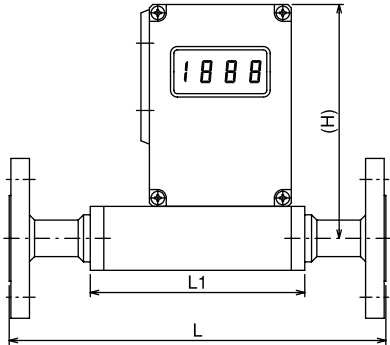


• SWL connection



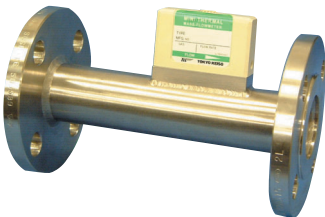
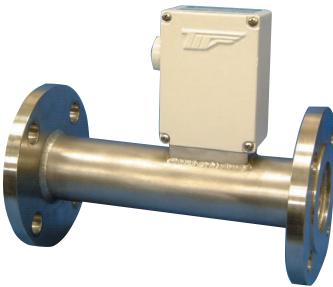
Size	1/4	3/8	1/2	1/4	3/8	1/2	1/4	3/8	1/2	3/8	1/2	3/4
L	159	162	166	171	176	181	188	191	196	216	221	230
L1	108			120			135			160		
H	158			158			158			165		
□W	38			38			38			45		
A	30			30			30			30		
B	50			50			70			90		
C	29			35			32.5			35		
Weight (kg)	2.6			2.7			3.9			4.6		
Model	TF-1511			TF-1521			TF-1531			TF-1541		

• Flange connection



Connection	Size Rating	15A[20A]25A JIS 10K (RF) (FF)	15A[20A]25A JIS 10K (RF) (FF)	15A[20A]25A JIS 10K (RF) (FF)	15A[20A]25A 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
Weight (kg)		4.9	5.0	6.2	6.9
Model		TF-1511	TF-1521	TF-1531	TF-1541

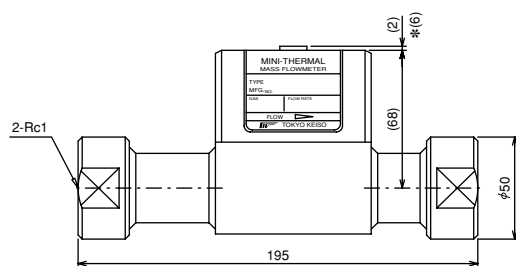
■ STANDARD SPECIFICATION AND MODEL CODE [Middle to Large connection type]

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 ₂ or He and mixture of H ₂ or He and CnHm																																																																																																																																																																																																																																																																																		
Amb. and Gas temp.		0 to 60℃																																																																																																																																																																																																																																																																																		
Gas press.		-0.07 to 1.0MPa																																																																																																																																																																																																																																																																																		
Accuracy		±2.0%F.S.																																																																																																																																																																																																																																																																																		
Temp. change effect		Within ±0.1%F.S./℃																																																																																																																																																																																																																																																																																		
Press. change effect		Within ±0.1%F.S./0.1MPa																																																																																																																																																																																																																																																																																		
Rangeability		1: 20																																																																																																																																																																																																																																																																																		
Gas contact part material	Tube	SUS316																																																																																																																																																																																																																																																																																		
	Sensor	Combination of SUS316, Glass, PT and CTFE																																																																																																																																																																																																																																																																																		
	Seal	Viton 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 DC±12V or DC±15V, +150mA, -20mA/DC0~5V (Load resistance:More than 5kΩ) TF-1□□1 DC24V±10%, +150mA/DC4~20mA (Load resistance:Less than 450Ω)		AC85~240V, 4VA DC4~20mA (Load resistance:Less than 450Ω)																																																																																																																																																																																																																																																																																
Electric connection		Exclusive cable with connector	G1/2, M3 screw terminal	2-G1/2, M3 screw terminal																																																																																																																																																																																																																																																																																
Model code		<table><tr><th colspan="6">Model code</th><th>Description</th></tr><tr><td>TF-11</td><td></td><td></td><td></td><td></td><td></td><td>up to 750m³/h(nor) (Refer to the following Scale range table.)</td></tr><tr><td>Flow range</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Power supply/Output</td><td>0</td><td></td><td></td><td></td><td></td><td>DC±12V(15V)/DC0~5V</td></tr><tr><td></td><td>1</td><td></td><td></td><td></td><td></td><td>DC24V/DC4~20mA</td></tr><tr><td>Scale range</td><td></td><td>A/B/C</td><td></td><td></td><td></td><td>Flow rate rating</td></tr><tr><td>Connection rating</td><td></td><td></td><td>P</td><td></td><td></td><td>Rc thread (1 to 2B)</td></tr><tr><td></td><td></td><td></td><td>F</td><td></td><td></td><td>JIS10K Flange (25A to 80A)</td></tr><tr><td rowspan="6">Connection size (Choose the connection size from the following Scale range table.)</td><td></td><td></td><td></td><td>2</td><td>5</td><td>1B (25A)</td></tr><tr><td></td><td></td><td></td><td>3</td><td>2</td><td>1-1/4B (32A)</td></tr><tr><td></td><td></td><td></td><td>4</td><td>0</td><td>1-1/2B (40A)</td></tr><tr><td></td><td></td><td></td><td>5</td><td>0</td><td>2B (50A)</td></tr><tr><td></td><td></td><td></td><td>6</td><td>5</td><td>2-1/2B (65A)</td></tr><tr><td></td><td></td><td></td><td>8</td><td>0</td><td>3B (80A)</td></tr></table> *Scale range=(AB)×10⁶ m³/h(nor) (Ex.) 30m³/h(nor)→300 400m³/h(nor)→401 750m³/h(nor)→751	Model code						Description	TF-11						up to 750m ³ /h(nor) (Refer to the following Scale range table.)	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50A	Min.	0 ~ 140	0 ~ 140	0 ~ 140	0 ~ 140	0 ~ 140	0 ~ 140	0 ~ 106	0 ~ 70	0 ~ 78	0 ~ 64	0 ~ 56	0 ~ 69																																																																																																																																																																																																																																																																							
	Max.	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 243	0 ~ 160	0 ~ 179	0 ~ 147	0 ~ 128	0 ~ 157																																																																																																																																																																																																																																																																							
65A	Min.	0 ~ 220	0 ~ 220	0 ~ 220	0 ~ 220	0 ~ 220	0 ~ 220	0 ~ 167	0 ~ 110	0 ~ 123	0 ~ 101	0 ~ 88	0 ~ 108																																																																																																																																																																																																																																																																							
	Max.	0 ~ 520	0 ~ 520	0 ~ 520	0 ~ 520	0 ~ 520	0 ~ 520	0 ~ 395	0 ~ 260	0 ~ 291	0 ~ 239	0 ~ 208	0 ~ 255																																																																																																																																																																																																																																																																							
80A	Min.	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 320	0 ~ 243	0 ~ 160	0 ~ 179	0 ~ 147	0 ~ 128	0 ~ 157																																																																																																																																																																																																																																																																							
	Max.	0 ~ 750	0 ~ 750	0 ~ 750	0 ~ 750	0 ~ 750	0 ~ 750	0 ~ 570	0 ~ 375	0 ~ 420	0 ~ 345	0 ~ 300	0 ~ 368																																																																																																																																																																																																																																																																							

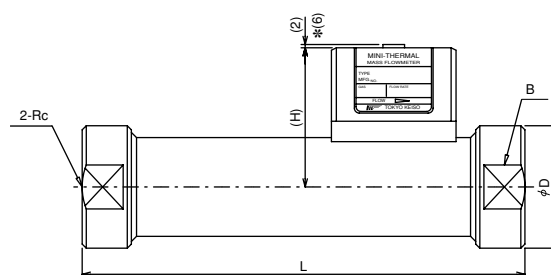
*TF-1151...6mm

TF-115□ Standard type

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

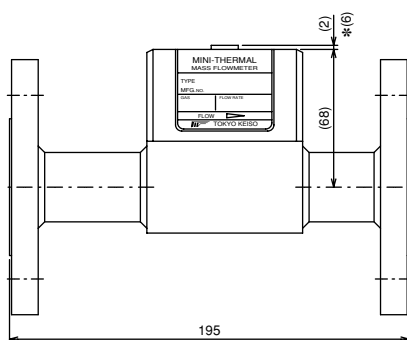


- Rc screw connection (Rc1-1/4 to Rc2)

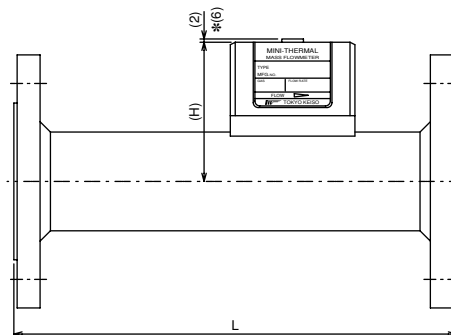


Connection	Size Rating	1-1/4	1-1/2	2
		Rc connection		
L		215	230	270
H		76	79	85
B (Width across flat)		55	60	70
φD		60	65	75
Weight (kg)		1.8	1.9	2.6

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



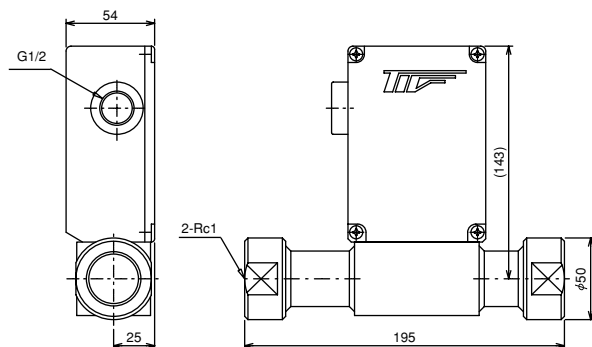
- Flange connection (32 to 80A)



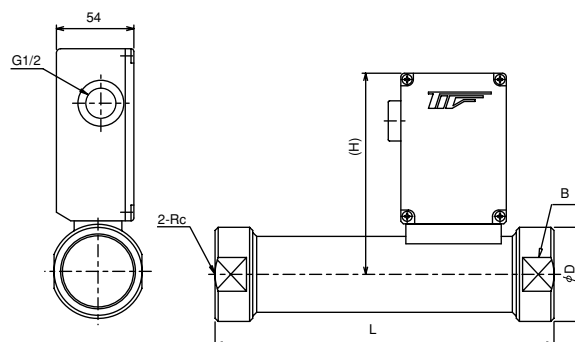
Connection	Size Rating	32A	40A	50A	65A	80A
		Flange connection JIS10K (RF) (FF)				
L		215	230	270	290	320
H		76	79	85	93	100
Weight (kg)		4.1	4.3	5.9	8.0	9.0

TF-125□ Water tight housing type

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

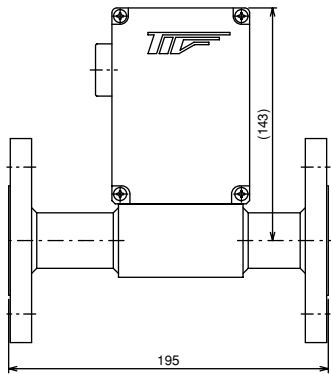


- Rc screw connection (Rc1-1/4 to Rc2)

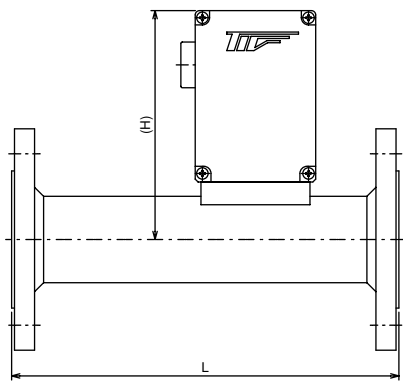


Connection	Size Rating	1-1/4	1-1/2	2
		Rc connection		
L		215	230	270
H		151	154	160
B (Width across flat)		55	60	70
φD		60	65	75
Weight (kg)		2.3	2.4	3.1

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



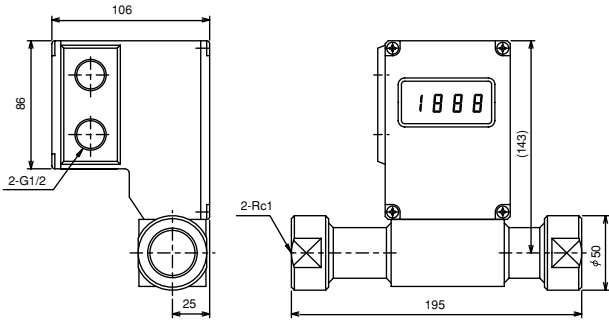
· Flange connection (32 to 80A)



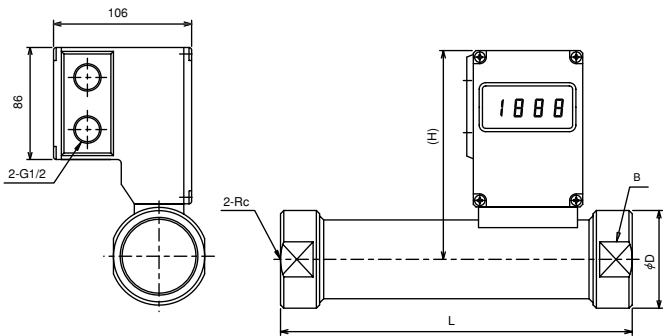
Connection	Size Rating	32A	40A	50A	65A	80A
		Flange connection JIS10K (RF) (FF)				
L		215	230	270	290	320
H		151	154	160	168	175
Weight (kg)		4.6	4.8	5.9	8.5	9.5

TF-1551 With indicator, Water tight type

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

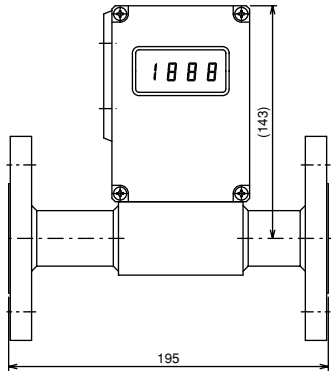


· Rc screw connection (Rc1-1/4 to Rc2)

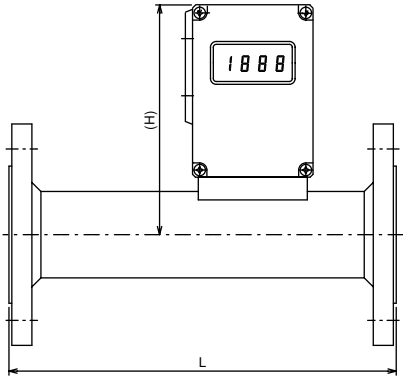


Connection	Size Rating	1-1/4	1-1/2	2
		Rc connection		
L		215	230	270
H		151	154	160
B (Width across flat)		55	60	70
φD		60	65	75
Weight (kg)		2.8	2.9	3.6

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



· Flange connection (32 to 80A)



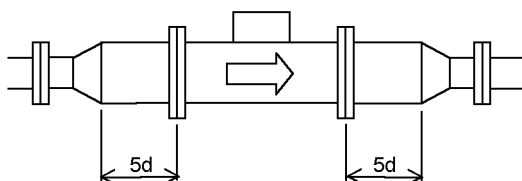
Connection	Size Rating	32A	40A	50A	65A	80A
		Flange connection JIS10K (RF) (FF)				
L		215	230	270	290	320
H		151	154	160	168	175
Weight (kg)		5.1	5.3	6.4	9.0	10.0

■ 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□	Not required	Not required
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 ¹ TF-152 ¹ TF-153 ¹ TF-154 ¹ TF-155 ¹	Not required	Not required
	5d (*1, *2)	5d (*1, *2)

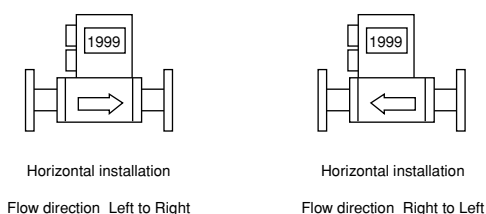
(*1) The piping different from the diameter of flowmeter is up to ± 1 size. Make the piping after installing the required straight run in the same diameter as the flowmeter.



(*2) Make use of Rc screw fittings less than Sch. 80.

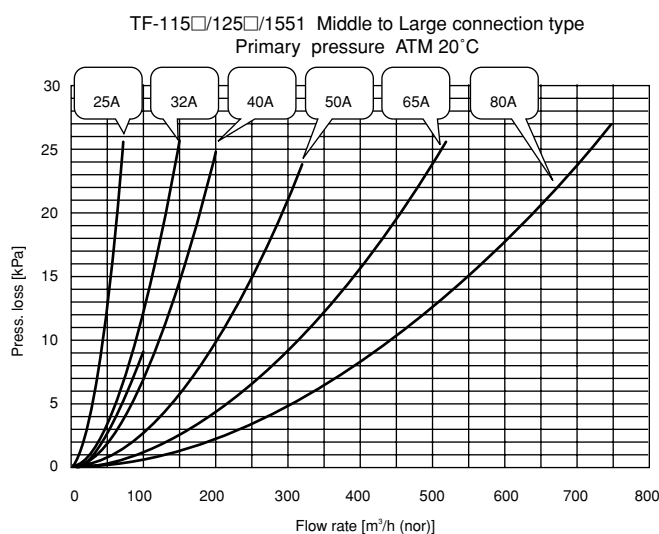
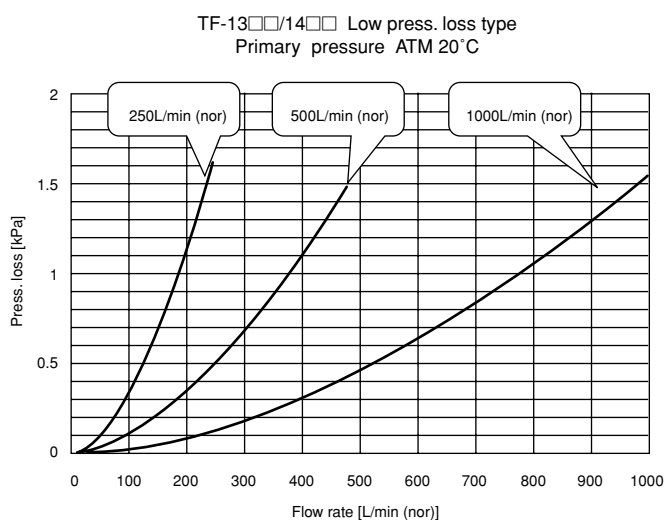
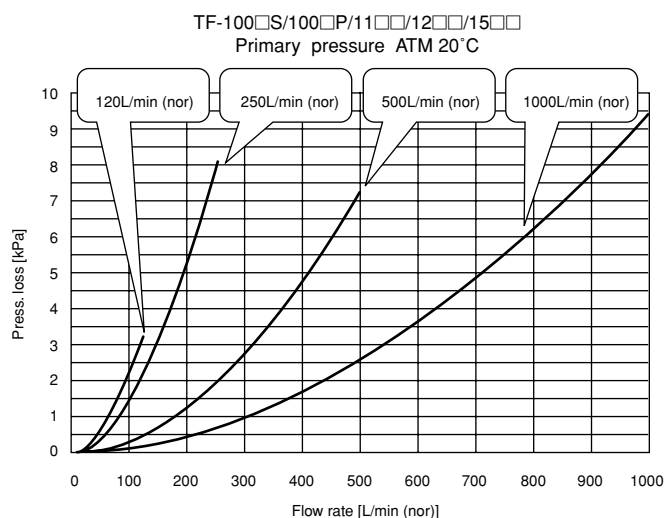
(*3) Make use of the piping in the same diameter as that of the flowmeter.

- 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-1000 and TF-1100 series MINI THERMAL 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 (DC4 to 20mA or DC0 to 5 V) 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. ± 1 last digit additional to detector accuracy
 Analog re-output (Alternative)

a) DC4 to 20mA Max.load 500 Ω
 b) DC0 to 5V Min.load 100k Ω

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 DC30V, 20mA Max.
 Pulse width 100mS (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 : AC125V, 0.4A/DC30V, 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) DC4 to 20mA Input resistance 250 Ω
 b) DC0 to 5V Input resistance 200k Ω

● 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 : DC ± 12 V, +200mA, -200mA

● OTHER SPECIFICATION

Power supply : AC85 to 250V 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
 AC1500V, 1 min.
 Insulation resistance : Power supply to Earth terminal
 More than 20M Ω (DC500V)
 Construction : Indoor use (IP20 equ.)
 Housing material : ABS resin containing glass fiber
 Weight : Approx.450g

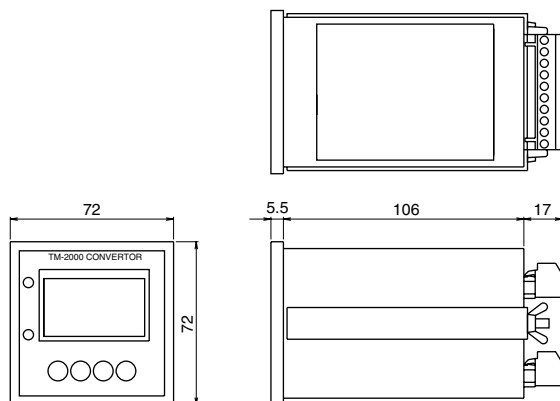
■ MODEL CODE

Model code						Description	
TM -	2				—		
Analog Input	1					DC4 ~ 20mA	
	2					DC0 ~ 5V	
Analog Output	1					DC4 ~ 20mA	
	2					DC0 ~ 5V	
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	

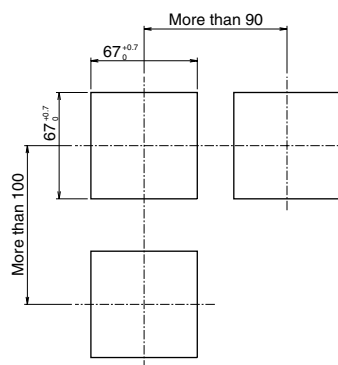
■ APPLICABLE FLOWMETERS AND EXCLUSIVE CABLE

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

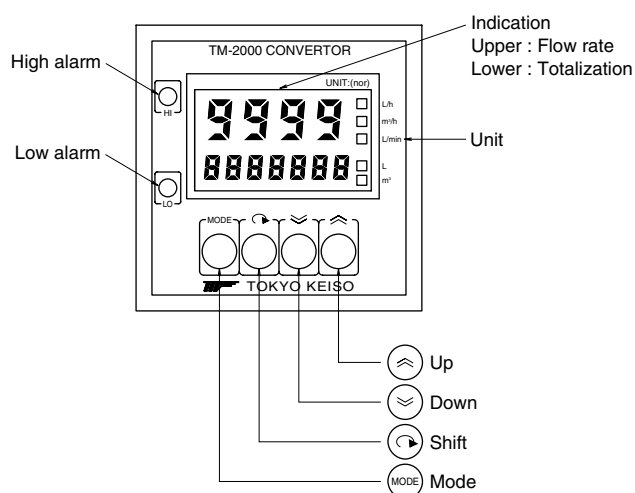


PANEL CUT AND MOUNT DISTANCE

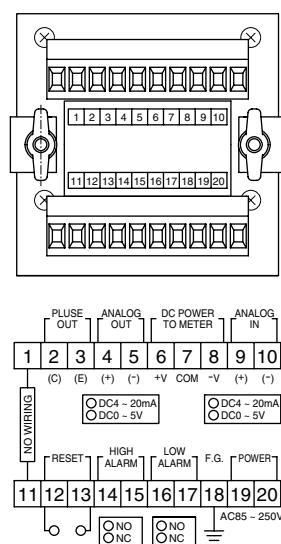


Note) Recommending mount panel in 1 to 5mm thickness.

FRONT PANEL



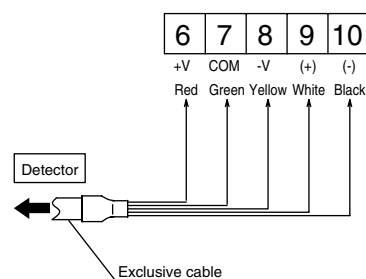
TERMINAL



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.

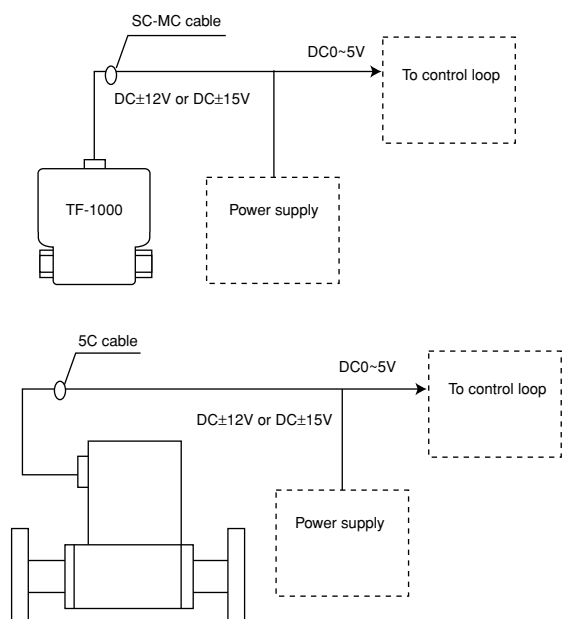


APPLICATIONS

For DC0 to 5V Output version

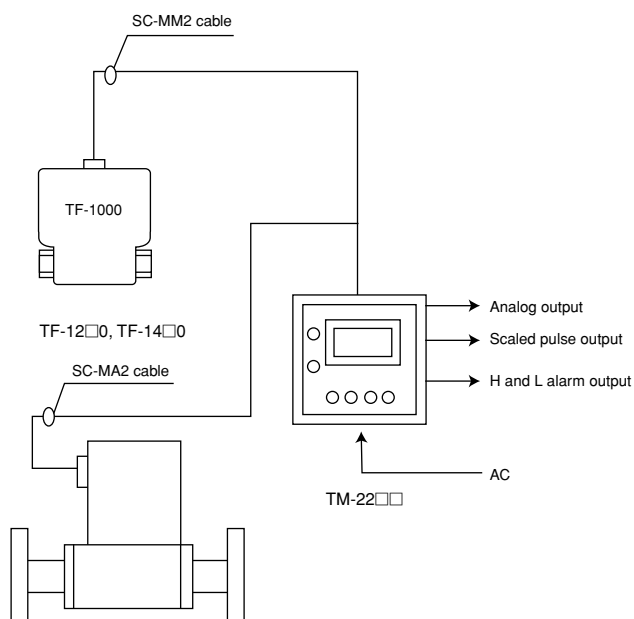
- In case standard power supply unit is used;

TF-1000P, TF-1000S, TF-11□□, TF-13□□



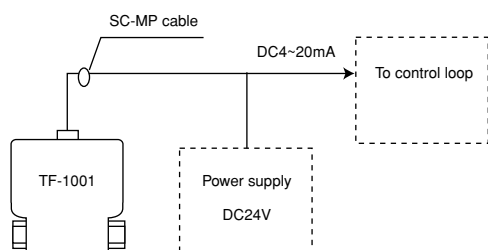
- In case TM-2000 series converter unit is used;

TF-1000P, TF-1000S, TF-11□□, TF-13□□



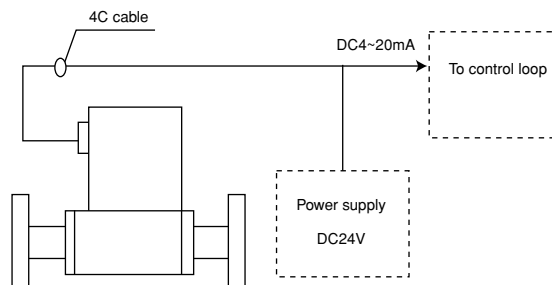
For cable with exclusive connector, DC4 to 20mA Output version

TF-1001P, TF-1001S, TF-11□□1, TF-13□□1

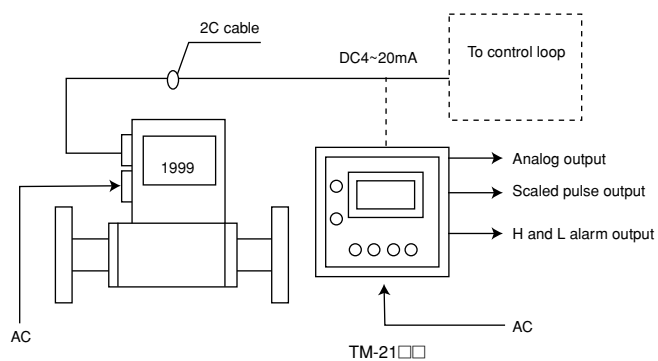


For M3 screw terminal, DC4 to 20mA Output version

TF-12□□1, TF-14□□1

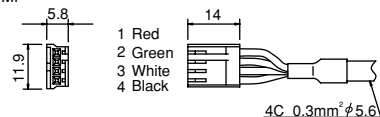


For TF15□□1 series (With indicator) version

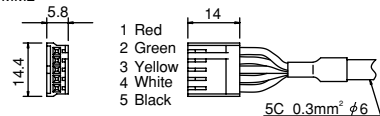


CABLE TERMINAL BY THE SIDE OF DETECTOR

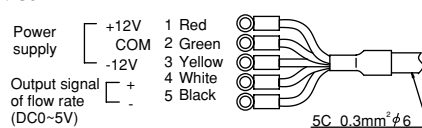
- SC-MP



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

● SUPPORTING INSTRUMENTS

Mini converter	TM-2□□□
Exclusive cable	☐ SC-MM2 ☐ SC-MA2

*Specification subject to change without notice

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

