TECHNICAL GUIDANCE

For assembling onto devices, test plants and general industrial processes

M-900 Series

MICRO FLOWMETER

OUTLINE

M-900 series MICRO FLOWMETER is a metal tube variable area flowmeter for small flow measurement.
All metallic construction covers even high temperature and high pressure applications.
Thanks to compact design, M-900 is suitable for assembling onto various devices. It also covers small sized industrial processes.
M-900 series MICRO FLOWMETER has been used for nuclear power plants for long time and HPGSL certified version is also available.
In addition to local indication, alarm output and pneumatic transmission types are ready to meet your requirements of remote monitoring and control.

FEATURES

- ❏ Compact design
  Small and light design offers easy installation onto panels as well as process pipings.

- ❏ High sensitivity
  The pivot bearing and light weight pointer enable to follow float movement swiftly.

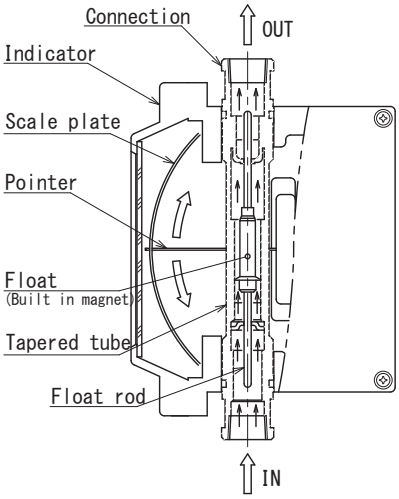
- ❏ Suitable for corrosive and opaque fluids
  Anti-corrosive materials such as titanium and MA276 are available to meet your specifications.

- ❏ Easy reading of scale and pointer
  The long pointer and wide linearized scale plate make your reading easier.

- ❏ Supporting devices
  Various supporting devices to meet your requirements are available such as flow control needle valve, strainer and constant flow valve.

OPERATING PRINCIPLE

The flow path has a tapered part. A float in which a magnet is moulded is located in the tapered tube. The fluid is introduced from the bottom end of flowmeter and goes through the tube upward.
Because of the differential pressure produced by the float and tapered tube, the float is pushed upward and stops at a position where the weight of float and the differential pressure balance. Thus, the position of float corresponds to the flow rate. The moulded magnet in the float attracts the pointer, and the pointer indicates the flow rate on the scale plate.
The inside of the tube and indication mechanism are totally isolated by magnetic coupling.



MODEL CODE

MODEL CODE– –								Contents
		M–9						
Construction								Dust-proof and weatherproof
	IS –							Intrinsically safe *2
Function			0					Local indication
			1					Pneumatic transmission
			5					Alarm output with reed switch
Flow direction				1				Bottom to Top
				2				Bottom to Top side
				3				Bottom side to Top side
				4				Bottom side to Top
				5				Bottom rear to Top rear (only available for local indicator type)
Additional function 1					–	D		With liquid damper *2
					–	DU		With gas damper
Additional function 2							– VU	Needle valve at outlet
							– VL	Needle valve at inlet
Special								/Z

*1 Intrinsically safe type is applied only for alarm output type IS-M-95□.
*2 Liquid damper can be provided on the flowmeters with Bottom side→□ and Bottom rear→Top rear connections only.

ADITIONAL FUNCTION

1. Liquid damper Model M-9□□-D
   A damper mechanism is required for gas and steam measurement especially at low pressure service to prevent float hunting.
   The damper installed at the bottom of flowmeter ensures the accuracy and durability of flowmeter.
   The damping mechanism works to reduce the abrupt movement of float utilizing the resistance generated between oil in the damper and damping element connected to float rod.
   The damper is recommended also for the liquid service having a pulsation flow.

2. Gas damper Model M-9□□-DU
   The gas damper which requires no damper liquid is available for gas measurement. A mechanical damper consists of a cylinder and a piston connected with float rod. This type needs no space for damping mechanism at the bottom of flowmeter. Therefore, this damper is applied for any direction type of flowmeters which result in the flexibility of piping design. Furthermore unnecessary re-filling of damper liquid improves the maintenability.
   The gas damper is effective for the low pressure gas services which cause hunting of indication and for the services which does not permit damping liquids. It is highly recommended to have gas damper for the services less than 0.3MPa pressure and without needle valve at the downstream.
   However, this type is applicable only for dry gas services and not applicable for liquids nor condensable vapors. Neither chlorine gas which is synthesized easily with other chemicals nor gases containing foreign materials like rust, dust and oil is applicable because of the ingress into the piston and cylinder which might lead to the malfunctioning of the flowmeter.

3. Needle valve M-9□□-V□
   A needle valve used for flow rate control is recommended at the downstream of flowmeter to avoid hunting for gas measurement.
   On the other hand, for liquid measurement the pulsation may be eased by the valve located upstream.

4. Magnet strainer. See clause "Accessories" at the following page.
   The iron particles contained in fluids may cause the malfunctioning of flowmeter due to the attracted irons on the moulded magnet in the float. The particles can be eliminated with the magnet strainer at the inlet of the flowmeter. For this purpose dedicated strainer with 100 mesh (optionally 200 mesh) is available.

5. Purge set. See clause "Accessories" at the following page.
   Purge set of M-900 micro flowmeter and constant flow valve keeps constant flow rate even supply pressure or down stream pressure is fluctuated.

ACCESSORIES

NEEDLE VALVES

Needle valve for flow adjustment. It will be assembled onto flowmeter

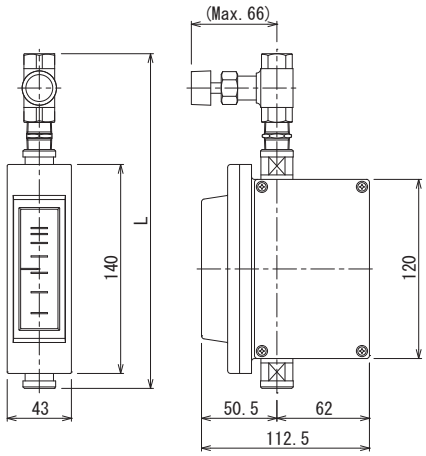
● STANDARD SPECIFICATION

Nominal size	Rc3/8
Fluid pressure	Max. 3 MPa
Fluid temperature	–15 to +150°C
Material	SUS316/PTFE

High pressure versions are available on request.
Consult factory for details

● External dimension of M-901-V (With valve)

Standard type



Thread size	Rc1/4	Rc3/8	Rc1/2
L (mm)	245	225	275

* Screw socket (s) provided for Rc1/4 and Rc 1/2.
* "L" length of the flowmeter with gas damper is extended by 40mm at downstream.

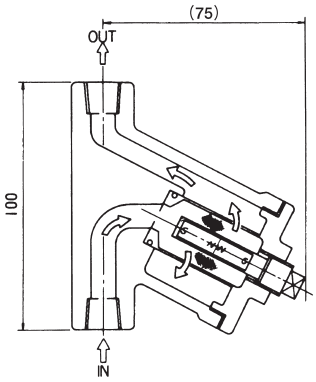
MAGNET STRAINER

A magnet strainer will be assembled into the flowmeter before delivery on request.

● STANDARD SPECIFICATION

Nominal size	1/4”, 3/8”, 1/2”
Fluid pressure	Max. 1.5MPa
Fluid temperature	Max. 200°C
Filter Std.	100 mesh
	(200 mesh as option)
Material	SUS304, SUS316

● External dimension of MAGNET STRAINER



PURGE SET

Separate TECHNICAL GUIDANCE of "C" Series is available on request for this version.

● CM-21-900 TYPE PURGE SET

Local Indication version

STANDARD VERSION

OUTLINE

Model M-900 is a local indicator for very small flow measurement.
It indicates flow rate of liquids and gases with a scale and a pointer.
Its purely mechanical construction requires neither electric power nor air.

STANDARD SPECIFICATION

Measuring fluid: Liquids and Gases
(The models with a damper are recommended for low-pressure gases (less than 0.3 MPa) in the flow range of 60 L/h (nor) or higher.)

Type		Standard type				Large-flow type
Flow range	Liquid *1 [L/h]	0.5 to 2	2 to 5	5 to 10	10 to 300	300 to 600
	Gas *1 [L/h (nor)]	15 to 60 *2	60 to 150	150 to 300	300 to 8,500	8,500 to 17,000
Fluid pressure [MPa]		Max. 10 (Option: 20) (Subject to flange ratings for the flange connection) (Max. 2.94 for the types with a liquid damper)				
Fluid temperature [°C]		0 to 120 *3	0 to 149 (High- and low-temperature types: –20 to 200 *4)			
Indication accuracy *5 [%F.S.]		±5	±5 (High-accuracy type: ±3)		±3 (High-accuracy type: ±2)	
Rangeability		10:2	10:2 (Option: 10:1)	10:1		
Connection	Screw	1/4, 3/8 (Standard), 1/2				3/8, 1/2 (Standard), 3/4
	Flange	10A, 15A, 20A, 25A				15A, 20A, 25A

*1 Liquid: water (density of 1.0 g/cm^3, viscosity of 1.0 mPa·s), Gas: air (0°C, 0 MPa)
*2 Models with a damper are not available.
*3 Allowable thermal shock: 80°C or lower
*4 Models with a damper are not available. The fluid temperature must be –15 to 150°C for the models with a needle valve.
*5 Flowmeters for liquids with the specified indication accuracies may not be available depending on the liquid viscosity.

Viscosity limit for liquid flow measurement

Fill scale	Viscosity limit (mPa·s)
up to 2 L/h	1
2 to 20 L/h	5
20 to 50 L/h	10
50 L/h or higher	20

Material availabilty

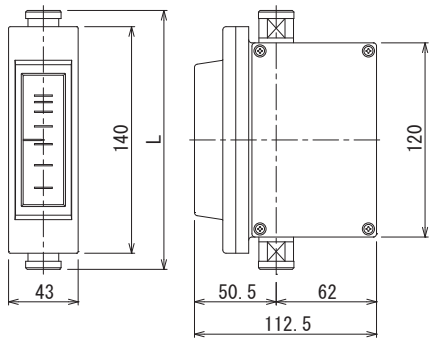
Part name	Std.	Available material
Body	SUS304	SUS316, (SCS14) SUS316L, Equivalent to MA276 *1, Titanium *1
Tapered tube	SUS304 *2	SUS316, SUS316L, Equivalent to MA276 *1, Titanium *1
Float	SUS304	SUS316, SUS316L, Equivalent to MA276 *1, Titanium *1

*1 Not applied for flowmeter with gas damper type.
*2 Heat-resistant glass, FEP, or PTFE is available for liquids and gases with flow range of less than 2 L/h and 60 L/h (nor), respectively.
(External pressure-resistance is not required for these flow ranges.)

Paint: Munsell 7.5BG4/1.5 (Indicator housing)
AMB. Temp.: –30 to 80°C
Enclosure of indication part
Dust-proof and splash-proof
(Equivalent to IP54) (Option: Equivalent to IP65)

DIMENSIONS

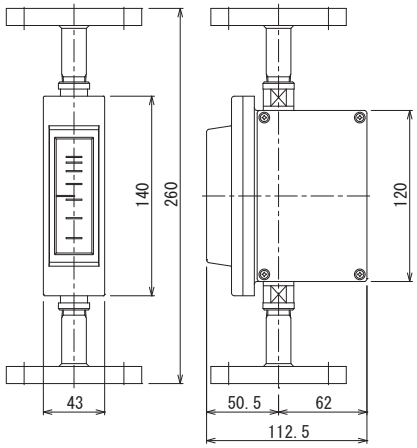
● STANDARD, SCREW CONNECTION M-901



Screw size	1/4	3/8	1/2
L (mm)	180	160	190

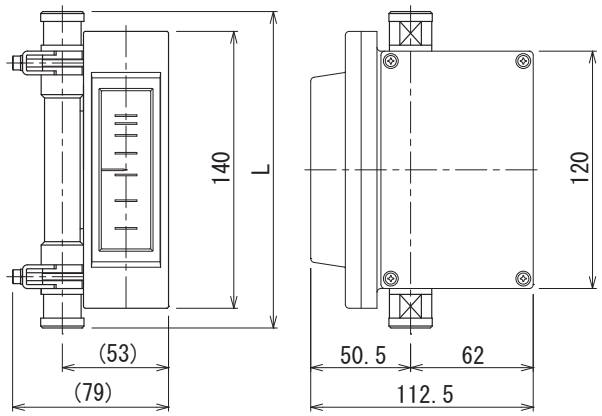
* Screw socket (s) provided for Rc 1/4 and Rc 1/2.
* "L" length of the flowmeter with gas damper is extended by 40mm at downstream.

● STANDARD, FLANGE CONNECTION M-901



* Length of flowmeter with gas damper is extended by 40mm at downstream.

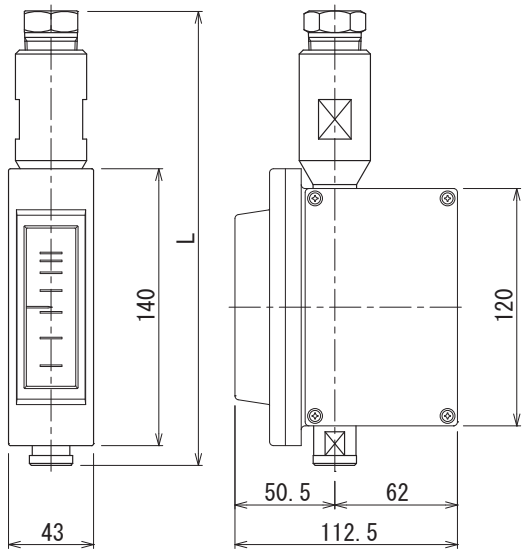
● HIGH/LOW TEMP. VERSION, SCREW CONNECTION M-901



Screw size	1/4	3/8	1/2
L (mm)	180	160	190

* Screw socket (s) provided for Rc 1/4 and Rc 1/2.
* The gas damper is not applied for high and low temperature version.

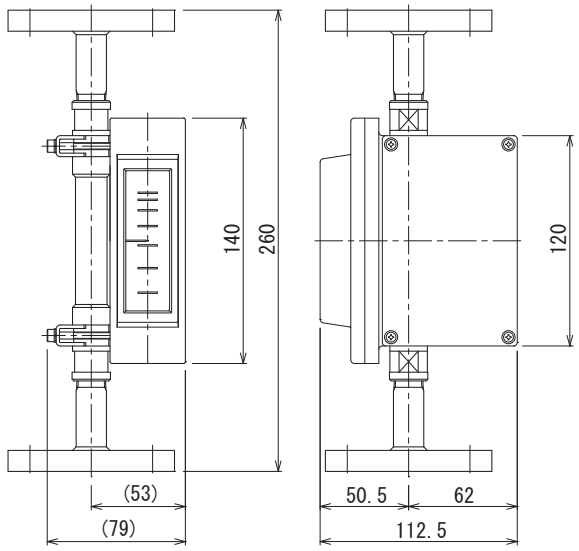
● LARGE FLOW VERSION, SCREW CONNECTION M-901



Screw size	3/8	1/2	3/4
L (mm)	230	265	245

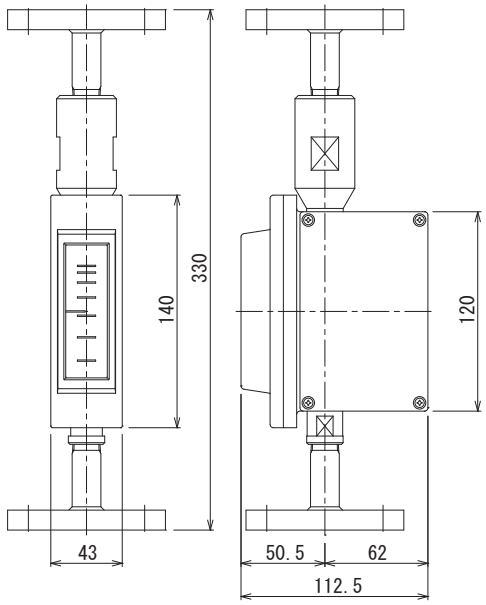
* The gas damper is not applied for this version. AM type is recommended.

● HIGH/LOW TEMP. VERSION, FLANGE CONNECTION M-901



* The gas damper is not applied for high and low temperature version.

● LARGE FLOW VERSION, FLANGE CONNCTION M-901



* The gas damper is not applied for this version. AM type is recommended.

FOR GAS SERVICES WITH LIQUID DAMPER

OUTLINE

M-90□-D equipped with liquid damper is exclusively used for low pressure gas services.
The other specifications are same as the M-900 series used for general purposes.
(High and low temperature types are not available.)

STANDARD SPECIFICATION

Measuring range

Type	Gases *L/h (nor)
Standard type	Min. 0 to 60 Max.0 to 8500
Large flow type	Min. 0 to 8500 Max.0 to 17000

*: Air, 0°C, 1atm

Fluid pressure Max. 3MPa subject to flange rating for flange connection type.

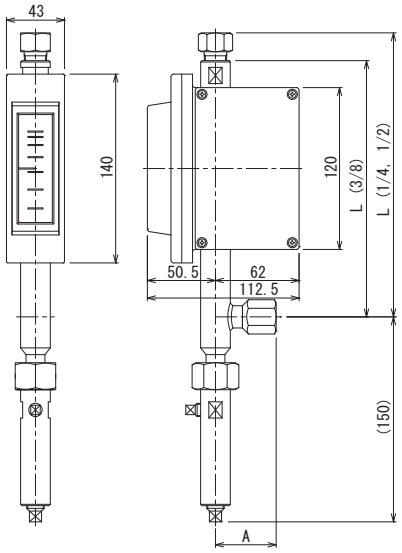
Flange size		10A	15A	20A	25A
Standard type	L	240	240	240	240
	A	100	100	100	100
Large flow type	L		290	290	290
	A		100	100	100

Screw size		1/4	3/8	1/2	3/4
Standard type	L	210	190	215	
	A	40	45	45	
Large flow type	L	260	260	270	240
	A	40	45	45	55

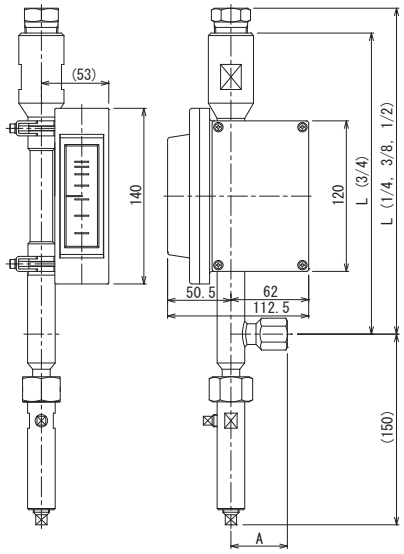
DIMENSIONS

M-904-D

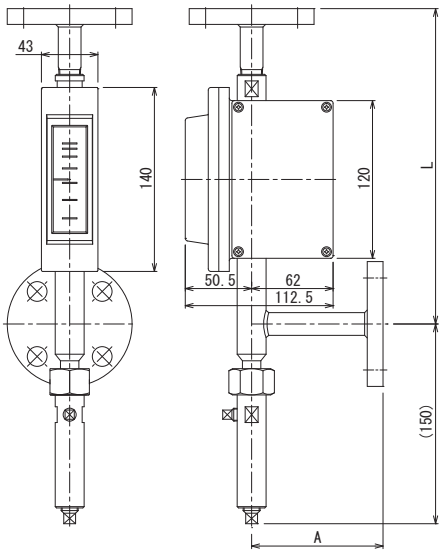
STANDARD, SCREW CONNECTION



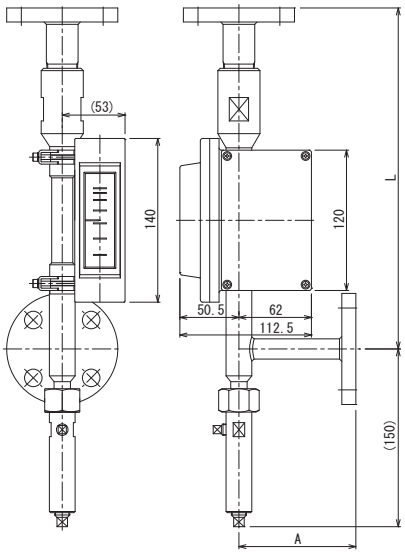
LARGE FLOW, SCREW CONNECTION



STANDARD, FLANGE CONNECTION



LARGE FLOW, FLANGE CONNECTION



Pneumatic output version

OUTLINE

M-910 is a metel tube micro flowmeter with pneumatic transmitter.
In addition to local flow indication by scale plate and pointer, pneumatic output of 20 to 100kPa is obtained. Air supply and output pressure gauges are provided for checking of operating condition. Air-set (Filter regulator) is optionally integrated.

STANDARD SPECIFICATION

Measuring fluid — Liquids and Gases
The model with damper, M-91□-D or M-91□-DU is recommended for low pressure gas services of less than 0.3MPa.

Measuring range

Type	Liquids *1 L/h	Gases *2 L/h (nor)
Standard type	Min. 0 to 2 Max.0 to 300	Min. 0 to 60 Max.0 to 8500

*1: Water (density 1.0g/cm³, viscosity 1.0 mPa·s)
*2: Air at 0°C, 1atm

Fluid temperature — 0 to 80°C
Indication Accuracy — ±5% F.S.
Enclosure of indication part
Dust-proof and splash-proof (Equivalent to IP54)

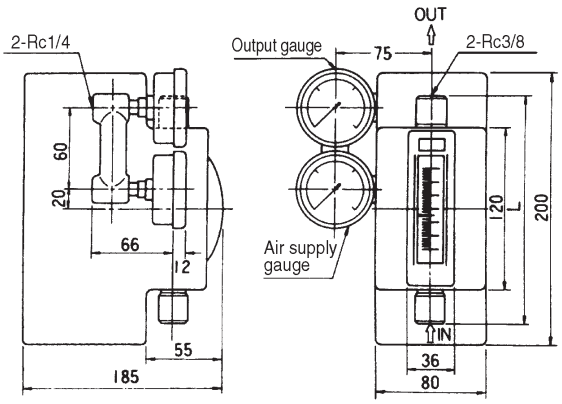
SPECIFICATION OF PNEUMATIC TRANSMITTER

Output — 20 to 100kPa against 0 to 100% span (0.2 to 1.0 barG available on request)
Air supply — 0.14 (±0.01)MPa
Air consumpion — Approx. 14L/min. (nor)
AMB. Temp — –30 to 60°C
Conduit — Rc1/4
Pressure gauge — 0 to 0.2MPa range pressure gauges are provided both for air supply and outlet
Output accuracy — ±1% F.S. (against flow calibration)
Enclosure — Dust-proof, splash-proof (equivalent to IP54)

The other specifications are same as the M-900 series used for general purposes.
High and low temperature types, and large flow type are not available.

DIMENSIONS

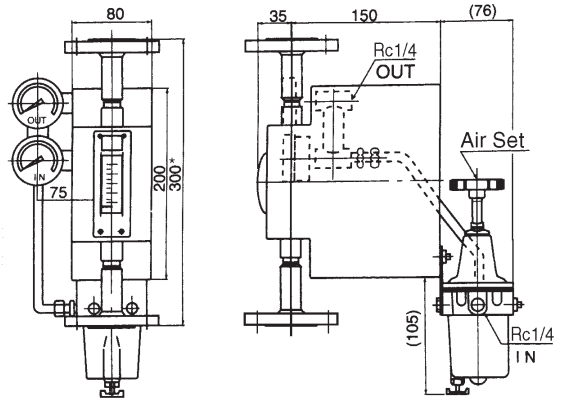
● STANDARD, SCREW CONNECTION M-911



Screw size	1/4	3/8	1/2
L (mm)	180	160	190

* Screw socket (s) provided for Rc 1/4 and Rc 1/2.
* "L" length of the flowmeter with gas damper is extended by 40mm at downstream.

● AIR SET INTEGRATED, FLANGE CONNECTION M-911



* Length of flowmeter with gas damper is extended by 40mm at downstream.

Alarm output with reed switch

OUTLINE

M-950 is a metal tube micro flowmeter with reed swich alarm contact.
It addition to local flow indication by scale plate and pointer,
alarm contact output at set point is obtained.

STANDARD SPECIFICATION

Measuring fluid — Liquids and Gases
The model with damper, M-95□-D or M-95□-DU only applied for standard type is recommended for low pressure gas services of less than 0.3MPa.
Large flow type with damper is not available.

Measuring range

Type	Liquids *1 L/h	Gases *2 L/h (nor)
Standard type	Min. 0 to 2 Max.0 to 300	Min. 0 to 60 Max.0 to 8500
Large flow type	Min. 0 to 300 Max.0 to 600	Min. 0 to 8500 Max.0 to 17000

*1: Water (density 1.0g/cm³, viscosity 1.0 mPa·s)
*2: Air at 0°C, 1atm

Fluid temperature — 0 to 80°C

Enclosure of indication part
Dust-proof and weatherproof (Equivalent to IP54)

SPECIFICATION OF ALARM CONTACT

Type of contact — 1 contact by reed switch
Either "a" or "b" instantaneous contact.
Provide holding circuit if required.

Reset span — Less than 30% F.S.

Alarm setting — Adjustable within the measuring range with external setting knob

Setting accuracy — ±3% F.S. (against flow calibration)

Contact capacity — 10VA AC (Resistance load), 10W DC

Max. current — 0.25 A

Max. voltage — 100V DC,125V AC

Insulation resistance — 100MΩ or more at 500V DC

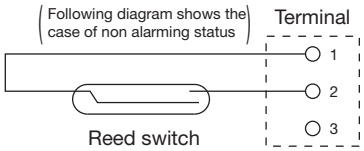
Withstand voltage — 1500 V AC (1 min.)

Cable entry — G1/2

Safety barrier — Type EB3C-R manufactured by IDEC will be supplied on your request.

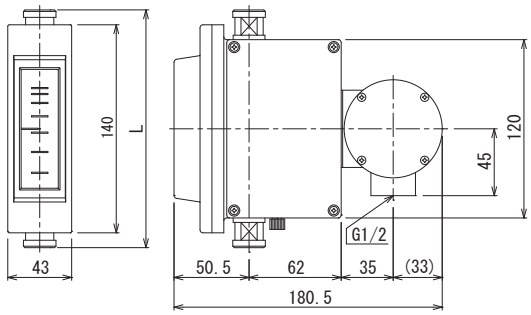
The other specifications are same as the M-900 series used for general purposes.
(High and low temperature types are not available.)

Connection diagram



DIMENSIONS (M-951 TYPE)

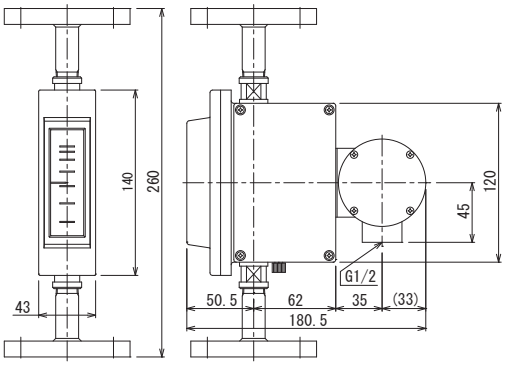
● STANDARD, SCREW CONNECTION M-951



Screw size	1/4	3/8	1/2
L (mm)	180	160	190

* Screw socket (s) provided for Rc 1/4 and Rc 1/2.
* "L" length of the flowmeter with gas damper is extended by 40mm at downstream.

● STANDARD, FLANGE CONNECTION M-951



* Length of flowmeter with gas damper is extended by 40mm at downstream.

* Specification is subject to change without notice.

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