TECHNICAL GUIDANCE

Minute flow rate measuring and transmitting with flameproof

MA-920 Series

INTELLIGENT, PURE ELECTRONICS MICRO FLOWMETER

OUTLINE

MA-920 MICRO FLOWMETER is a metal tube variable area flowmeter which has local indication with transmitting of minute flow rate of liquids and gases.

TOKYO KEISO's long time production know-how and recent electronics technology have been successfully combined.

The existing micro flowmeters generally need a signal linearizer due to mechanical problem of very minute sensing part. In **MA-920**, integrated microprocessor takes care of these automatic compensation based on individual stored calibration data and achieves high accuracy even for small flow rate.

The 4 to 20 mA with 2-wire system makes field wiring easier.



FEATURES

- ❑ Covers very low flow rates of 0.6 to 3 L/h
- ❑ 2-wire 4 to 20 mA DC output
- ❑ Magnetic field sensor detects the float movement with electronics to eliminate hysteresis.
  High accuracy and repeatability have been achieved.
- ❑ Easy- to- read digital LED display
- ❑ No liquid dampers are needed even for gas measurement applications
- ❑ Ex d IIC T6 flameproof construction suitable even for Hydrogen atmosphere

MAIN APPLICATIONS

Small flow measurement, transmitting and control for

- ❑ Liquid chemical injection and feed
- ❑ Gas injection and feed
- ❑ Various services for test plant and pilot plant
- ❑ Assembling onto various devices and equipment

MODEL CODE

Model code							Description
MA-92		–			–		
Flow direction	1						Bottom to Top
	2						Bottom to Top side
	3						Bottom side to Top side
	5						Bottom rear to Top rear
Material		–	1				Standard material
		–	9				Special material
Process Connection				1			Rc1/4
				2			Rc3/8
				3			Rc1/2
				4			Rc3/4
				5			Rc1
				8			10AJIS10KFF
				9			15AJIS10KFF
				A			20AJIS10KFF
				B			25AJIS10KFF
				X			Other thread connection
				Y			Other flange connection
				Z			Other special connection
Valve					–	00	Not provided
					–	VU	Needle valve at outlet (Upper)
					–	VL	Needle valve at inlet (Lower)

STANDARD SPECIFICATION

MEASURING FLUID: Liquids and Gases
Viscosity limit for liquid flow measurement

Meter size	Viscosity (Max.)
½	2.0 mPa·s
¾, 1	5.0 mPa·s

(Free from solids and particles)

MEASURING RANGE
- Liquid (Water): Min. 0.6 to 3 L/h; Max. 60 to 600 L/h
  Measuring range is subject to liquid viscosity.
- Gas (Air, 0°C, 1atm): Min. 10 to 100 L/h (nor); Max. 2.2 to 22 m^3/h (nor)

RANGE ABILITY: 10:1
(Accuracy guranteed range): Rangeability of the meter with the full scale range smaller than 5L/min (water) is 10:2. It may differ depending on the liquid viscosity.

FLUID TEMP: 0 to 120°C (See the explosionproof specifications for details.)

FLUID PRESS.
- Standard type : Max. 2.94 MPa
- High pressure type : Max.19.6 MPa

Allowable pressure is subject to the flange rating when the connection is flange type.
Material of high pressure type is SUS 316.

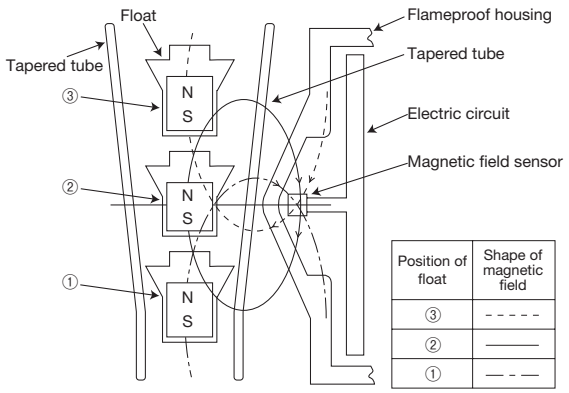
PROCESS CONNECTION
- Std.: Screw (1/4, 3/8, 1/2, 3/4 or 1")
  JIS10KFF flange (10A, 15A, 20A, or 25A)
- Opt.: NPT or other screw
  Other flanges than JIS10KFF

FLOW DIRECTION: Bottom to Top, Bottom to Top side, Bottom side to Top side, or Bottom rear to Top rear

INSTALLATION: Supported by process piping

OPERATING PRINCIPLE

As shown in figure below a magnet with vertical polarity is molded in the float. Float moves vertically in response to the flow rate of fluid. An oval shaped magnetic field exists between N pole and S pole of the magnet.Two magnetic field sensors whose sensitivities are designed equal are located at 90° angle, close to the tapered tube. These 2 sensors generate output signal which corresponds to the strength of magnetic field and its angle. By differential data processing of these outputs from 2 sensors, the angle of magnetic field which represents the position of float is obtained. Thus, the flow rate of fluid can be calculated from the position of float.



INDICATION
Upper (main display): Four digits for measurements and error codes
Lower (sub display): Five digits for supplementary information

ACCURACY (Indication and output)
- 10 L/h or more of F.S. (water) ±2%F.S.
- Less than 10 L/h of F.S. (water) ±3%F.S.
- 100 L/h (nor) or more of F.S. (air) ±2%F.S.

REPEATABILITY: 0.5%F.S.
OUTPUT SIGNAL: 4 to 20 mA DC (2-wire system)
Allowable load resistance
: 600Ω or less (at 24 V DC, including wiring resistance)
RESPONSE TIME: Within 0.4sec.
POWER SOURCE: 24 V DC ±10% (Operating voltage range: 12 to 33 V DC)
TEMP.EFFECT: Within 0.02% (F.S.) /°C
ENCLOSURE: Flameproof
- Ex d ⅡC T6 (TIIS-certified)
- Ex d ⅡC T6 Gb (NEPSI-certified)
- Ex d ⅡC T6 (KOSHA-certified)

CABLE ENTRY
- TIIS-certified : G1/2 (Flameproof cable gland provided) Cable diameter : ø8–12 mm
- NEPSI-certified : G1/2
- KOSHA-certified : G1/2

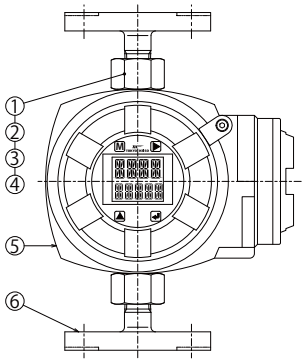
CABLE TERMINATION: M4 screw
AMBIENT TEMP.: –20 to 55°C (TIIS-certified, NEPSI-certified, KOSHA-certified)

ALLOWABLE FLUID TEMP.

Class	T6
TIIS-certified NEPSI-certified KOSHA-certified	Under the ignition temp.

MATERIAL: To be referred to MATERIAL CONSTRUCTION below.
MASS (APPROX.): 3 kg (Rc1/4 connection type)

MATERIAL CONSTRUCTION

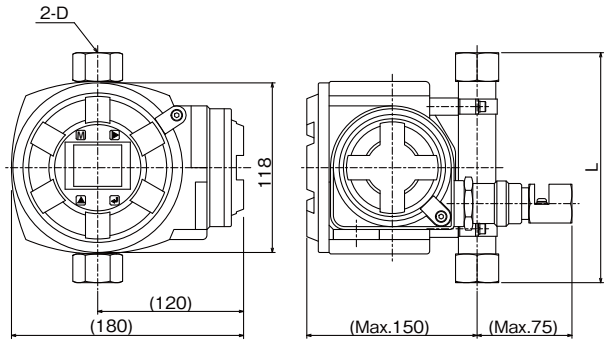


No.	Part Name	Material
1	Body	SCS14
2	Tapered tube	SUS316
3	Float	SUS316 *1
4	Packing	PTFE *2
5	Indicator / Transmitter	ADC12
6	Fittings	SUS304 (std.) or SUS316 *3

*1: PPS resin / Titanium will be used for 1/2" meter size, and PPS resin / SUS316 will be used for 3/4 and 1" meter sizes in gas measurement applications.
*2: Packing is not an external pressure part.
*3: Materials of flange and connection fitting can be selected. Specify them when ordering.

DIMENSIONS

● Flow direction: BOTTOM TO TOP, Screw connection

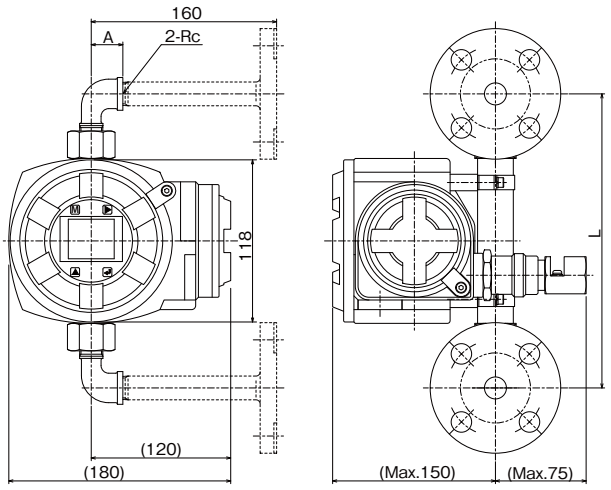


(mm)

Meter size	Full scale		Connection screw size (D)				
	Water L/h	Air L/h (nor)	1/4	3/8	1/2	3/4	1
1/2	29.9	630	180*	180*	160	230*	230*
3/4	300	4900	180*	180*	180*	160	230*
1	600	22000	200*	180*	180*	180*	160

*: Thread adaptor provided

● Flow direction:BOTTOM SIDE (or REAR) TO TOP SIDE (or REAR), Screw (Flange) connection

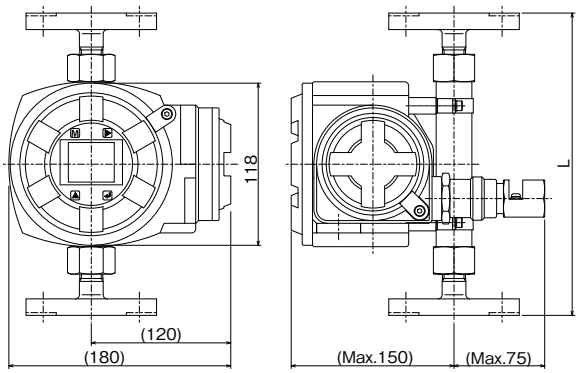


(mm)

Meter size	Full scale		Connection screw size (D)									
	Water L/h	Air L/h (nor)	1/4		3/8		1/2		3/4		1	
			L	A	L	A	L	A	L	A	L	A
1/2	29.9	630	225	19	235	23	220	27	300	32	310	38
3/4	300	4900	225	19	235	23	240	27	230	32	310	38
1	600	22000	245	19	235	23	240	27	250	32	240	38

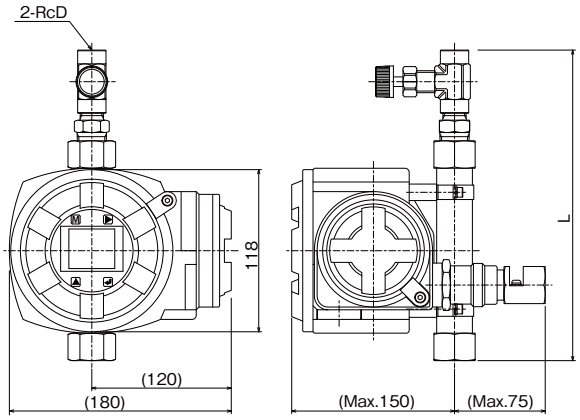
A dimension for flange connection is 160mm

● Flow direction: BOTTOM TO TOP, Flange connection



Meter size	Full scale		L (mm)
	Water L/h	Air L/h (nor)	
1/2	29.9	630	260
3/4	300	4900	
1	600	22000	

● Flow direction:BOTTOM TO TOP, Screw connection, Needle valve provided at outlet



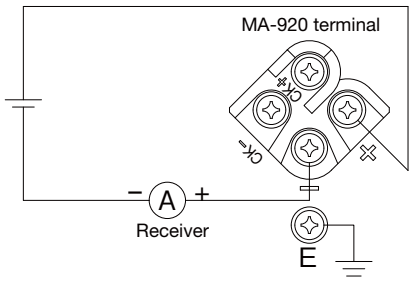
L (mm)

Meter size	Full scale		Connection screw size (D)					
	Water L/h	Air L/h (nor)	1/4	3/8	1/2	3/4	1	
1/2	29.9	630	245	225	250	295	295	
3/4	300	4900	245	225	250	260	295	
1	600	22000	265	225	250	260	260	*1
			280	260	240	275	275	*2
			290	270	270	250	285	*3

*1: Up to Air 8300 L/h (nor)
*2: Up to Water 400 L/h, Air 11000 L/h (nor)
*3: Up to Water 600 L/h, Air 22000 L/h (nor)

L (mm) may vary depending on the difference in upstream and downstream pressure of the valve.
A valve is attached as standard. Its maximum allowable working pressure is 3 MPa.

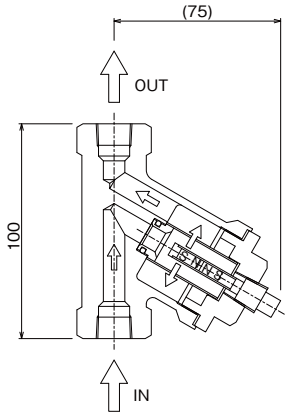
WIRING



OPTIONS

● Magnet Strainer

The strainer installed at up-stream eliminates particles in the fluid.
Select a proper mesh of the filter adequate for the size of particles.
A magnet is molded in the float and in case ferrous powder are involved in the fluid, smooth movement of float will not be obtained.
It is recommended to install a Magnet Strainer in upstream of the line to eliminate the ferrous contents.



Operating pressure (Max.)	:	1.5 MPa (Standard)
Operating temperature (Max.)	:	200°C
Nominal size	:	Rc1/4", 3/8", 1/2"
Filter	:	100 mesh/inch
		(Option : Up to 200 mesh/inch)
Material	:	Body: SCS14
		Filter: SUS304, SUS316

ORDERING FORM

Specify the following for order / inquiry ;

MODEL CODE MA-92 □-□□-□□

FLUID NAME _____

DENSITY _____

VISCOSITY _____ □ mPa•s □ _____

PRESS. _____ □ MPa □ _____

TEMP. _____ □ °C □ _____

MEASURING RANGE _____ □ L/h □ L/h (nor) □ _____

CONNECTION SIZE _____ □ mm □ _____

CONNECTION STANDARD □ Rc □ JIS10KFF □ _____

MATERIAL □ Standard □ Special (Specify)

SPECIAL INSTRUCTION IF ANY;

_____

_____

_____

* Specification is subject to change without notice.

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