



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.) | |
| | 1/2 | 2.0 mPa·s | |
| | 3/4, 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 | | |

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)
(500Ω or less for ATEX-certified)

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)
II 2 G Ex d IIC T6...T4/
II 2 D Ex tD A21 IP65 T85°C (ATEX-certified)

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

NEPSI-certified: G1/2
KOSHA-certified: G1/2
ATEX-certified: M20 × 1.5, G1/2, NPT1/2

CABLE TERMINATION M4 screw

AMBIENT TEMP. -20 to 55°C (TIIS-certified, NEPSI-certified, KOSHA-certified)
-30 to 60°C (ATEX-certified)

ALLOWABLE FLUID TEMP.

| Class | T4 | T5 | T6 |
|-----------------|-------|-------|--------------------------|
| TIIS-certified | | | |
| NEPSI-certified | | — | Under the ignition temp. |
| KOSHA-certified | | | |
| ATEX-certified | 120°C | 100°C | 85°C |

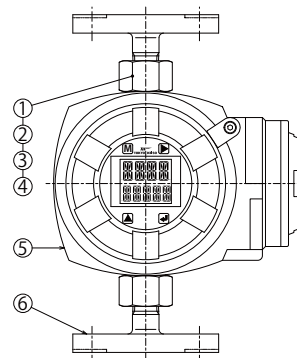
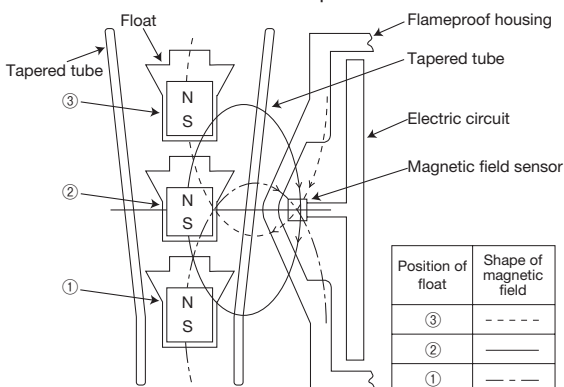
MATERIAL To be referred to MATERIAL CONSTRUCTION below.

MASS (APPROX.) 3 kg (Rc1/4 connection type)

■ MATERIAL CONSTRUCTION

■ 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.



| 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 |

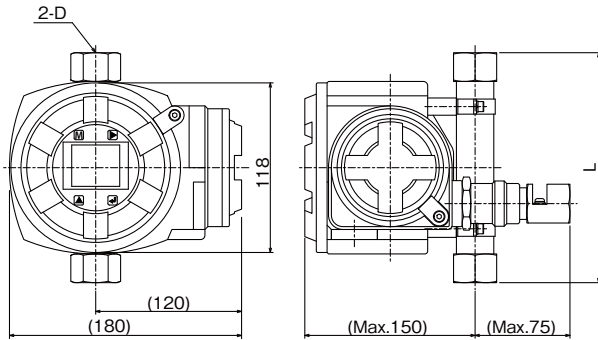
*1: PPS resin / Titanium will be used for 1/2" meter size, and PPS resin / SUS316 will be used for 3/4 and 1" meter sizes in gas measurement applications.

*2: Packing is not an external pressure part.

*3: Materials of flange and connection fitting can be selected. Specify them when ordering.

DIMENSIONS

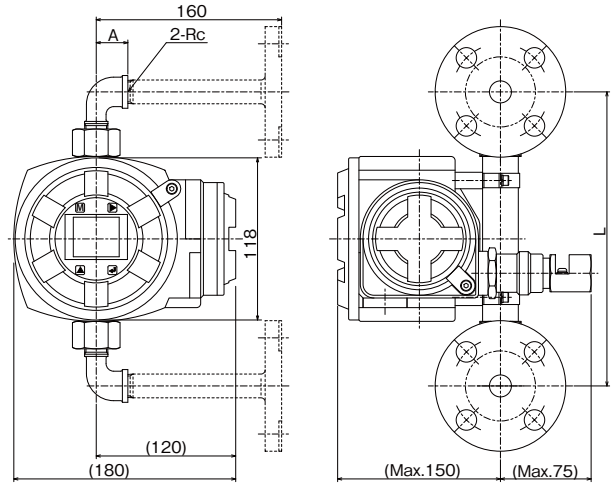
● Flow direction: BOTTOM TO TOP, Screw connection



| 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

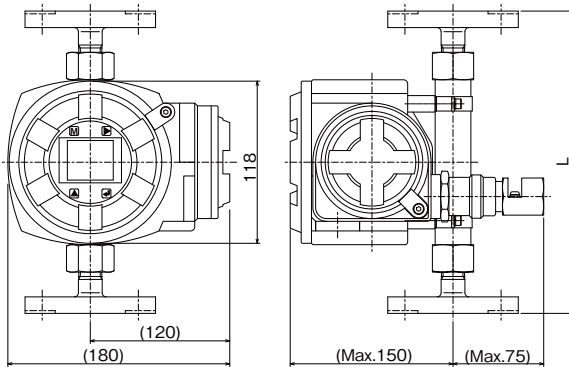
● Flow direction: BOTTOM SIDE (or REAR) TO TOP SIDE (or REAR), Screw (Flange) connection



| 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 |

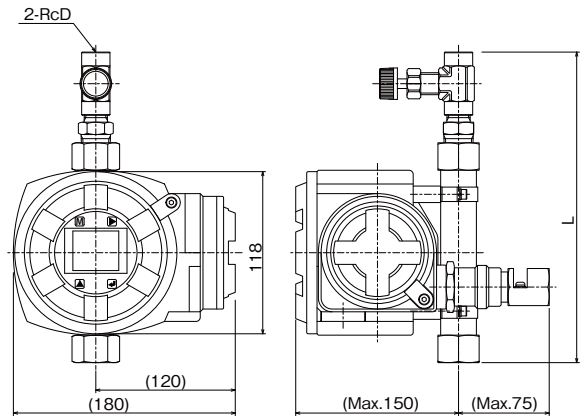
A dimension for flange connection is 160mm

● 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

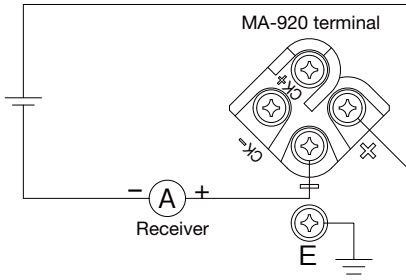


| Meter size | Full scale | | Connection screw size (D) | | | | | L (mm) | | | | | |
|------------|------------|---------------|---------------------------|-----|-----|-----|-----|--------|-----|---|---|---|---|
| | Water L/h | Air L/h (nor) | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | | |
| | | | L | A | L | A | L | | A | L | A | L | A |
| 1/2 | 29.9 | 630 | 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

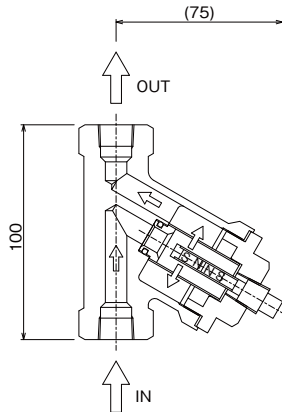
● Magnet Strainer

The strainer installed at upstream 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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