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

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

#### MEASURING FLUID

**Liquids and Gases**

Viscosity limit for liquid flow measurement

<table>
<thead>
<tr>
<th>Meter size</th>
<th>Viscosity (Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>½</td>
<td>2.0 mPa·s</td>
</tr>
<tr>
<td>¾, 1</td>
<td>5.0 mPa·s</td>
</tr>
</tbody>
</table>

(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 m³/h (nor)

#### RANGE ABILITY

Rangability 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.

![Diagram of operating principle](image)

#### 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)

#### TEMPEFFECT

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

#### AMBIENT TEMP.

- Standard type : −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
- KOSHA-certified
- ATEX-certified

#### MATERIAL

To be referred to MATERIAL CONSTRUCTION below.

#### MASS (APPROX.)

3 kg (Rc1/4 connection type)

### MATERIAL CONSTRUCTION

#### MATERIAL CONSTRUCTION

<table>
<thead>
<tr>
<th>No.</th>
<th>Part Name</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>SCS14</td>
</tr>
<tr>
<td>2</td>
<td>Tapered tube</td>
<td>SUS316</td>
</tr>
<tr>
<td>3</td>
<td>Float</td>
<td>SUS316 #1</td>
</tr>
<tr>
<td>4</td>
<td>Packing</td>
<td>PTFE #2</td>
</tr>
<tr>
<td>5</td>
<td>Indicator / Transmitter</td>
<td>ADC12</td>
</tr>
<tr>
<td>6</td>
<td>Fittings</td>
<td>SUS304 (std.) or SUS316 #3</td>
</tr>
</tbody>
</table>

#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**

![Diagram of flow direction: BOTTOM TO TOP, Screw connection]

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

![Diagram of flow direction: BOTTOM SIDE (or REAR) TO TOP SIDE (or REAR), Screw (Flange) connection]

- **Flow direction: BOTTOM TO TOP, Flange connection**

![Diagram of flow direction: BOTTOM TO TOP, Flange connection]

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

![Diagram of flow direction: BOTTOM TO TOP, Screw connection, Needle valve provided at outlet]

<table>
<thead>
<tr>
<th>Meter size</th>
<th>Full scale (\text{L/h})</th>
<th>Connection screw size (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Air</td>
<td>¼</td>
</tr>
<tr>
<td>½</td>
<td>29.9</td>
<td>630</td>
</tr>
<tr>
<td>¾</td>
<td>300</td>
<td>4900</td>
</tr>
<tr>
<td>1</td>
<td>600</td>
<td>22000</td>
</tr>
</tbody>
</table>

*: Thread adaptor provided

<table>
<thead>
<tr>
<th>Meter size</th>
<th>Full scale (\text{L/h})</th>
<th>Connection screw size (D)</th>
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<tbody>
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</tr>
<tr>
<td>1</td>
<td>600</td>
<td>22000</td>
</tr>
</tbody>
</table>

A dimension for flange connection is 160mm

<table>
<thead>
<tr>
<th>Meter size</th>
<th>Full scale (\text{L (mm)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Air</td>
</tr>
<tr>
<td>½</td>
<td>29.9</td>
</tr>
<tr>
<td>¾</td>
<td>300</td>
</tr>
<tr>
<td>1</td>
<td>600</td>
</tr>
</tbody>
</table>

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.
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.

- **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

  *Specification is subject to change without notice.*

**ORDERING FORM**

Specify the following for order / inquiry:

- **MODEL CODE**: MA-92□□□□□□□
- **FLUID NAME**: __________
- **DENSITY**: __________ mPa*s □ _______
- **VISCOSITY**: □ □ MPa □ _______
- **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;**
  __________________________________________
  __________________________________________
  _________________________________________