MAGNETIC-INDUCTIVE FLOW METER
MID SERIES

1. IDENTIFICATION
Manufacturer: Bopp & Reuther Messtechnik
Am Neuen Rheinhafen 4
67346 Speyer / Germany
Phone: +49 6232 657-0
Fax: +49 6232 657-505

Product type: Magnetic-inductive flow meter
Product name: MID series

2. AREA OF APPLICATION
The area of application for all MID magnetic-inductive flow meters includes the measurement of conductive liquids (>1 µS/cm) in dosing and filling plants. These plants are mainly used in the food and beverage industry as well as in the pharmaceutical and fine chemicals industry. Among others, milk and dairy products (also with pieces of fruit), ketchup, mayonnaise, mustard, sauces, dressings, cleaning and washing agents, medical products (e.g. stomach gels), sterile injection products and cosmetics are measured.

These applications require measuring instruments that offer fast and high-precision measurements. This is met by the unique technology of the meter. It is also approved for aseptic applications (3-A). The series includes the nominal widths DN10 - 40 and fulfils pressure level PN10/16. The maximum temperature is 140°C. Various connections are available.

3. PRINCIPLE OF OPERATION AND SYSTEM DESIGN
3.1 Measurement Principle
Magnetic-inductive flow meters belong to the group of direct volumetric meters. They work according to the Faraday principle. In contrast to all other magnetic-inductive flow meters available in the market, they work in an alternating field (AC) instead of a synchronised DC field. This enables higher measuring dynamics and quicker, precise measurements for dosing tasks above 0.1 s.
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3.2 System design

**Sensor**: The volume is measured via the magnetic-inductive flow meter. Various electronics are available for further processing. They either provide volume pulses to a primary PLC or process the signals themselves in order to control the filling process.

**UV14 Converter Module**: Converts the measuring signal into volume pulses

**MID-MDS System MDS 30/49/84**: Converts the measuring signal into volume pulses, controls the valves for the filling process and transfers the data to a primary controller.

**MDS-Terminal**: Configures and visualizes the MID-MDS system.

4. INPUTS

4.1 Measured value

Liquid volumes and volumetric flow rate

4.2 Measuring range

A speed of \( v = 1 \text{ m/s} \) should be strived for as this ensures optimum product protection and accuracy. If the speed is higher, the pressure pulsation increase when closing the valve; if the speed is lower, some products may show deposits.

<table>
<thead>
<tr>
<th>DN</th>
<th>Flow rate [ml/s] Qmax</th>
<th>( v = 0.5 \text{ m/s} ) [ml/s]</th>
<th>( v = 1.0 \text{ m/s} ) [ml/s]</th>
<th>( v = 2.5 \text{ m/s} ) [ml/s]</th>
<th>( v = 10 \text{ m/s} ) [ml/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>800</td>
<td>40</td>
<td>80</td>
<td>200</td>
<td>800</td>
</tr>
<tr>
<td>15</td>
<td>800</td>
<td>88</td>
<td>176</td>
<td>440</td>
<td>1760</td>
</tr>
<tr>
<td>20</td>
<td>800</td>
<td>157</td>
<td>314</td>
<td>785</td>
<td>3140</td>
</tr>
<tr>
<td>25</td>
<td>800</td>
<td>245</td>
<td>490</td>
<td>1225</td>
<td>4900</td>
</tr>
<tr>
<td>32</td>
<td>800</td>
<td>402</td>
<td>804</td>
<td>2010</td>
<td>8040</td>
</tr>
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<td>40</td>
<td>800</td>
<td>628</td>
<td>1256</td>
<td>3140</td>
<td>12560</td>
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</tbody>
</table>

5 CHARACTERISTIC PARAMETER

5.1 Reference conditions

- **Pressure**: approx. 2 bar
- **Temperature**: 25°C ±2K
- **Warm-up period**: 30 min
- **Medium**: water without trapped gas

The repeatability of the dosing / filling process in the plant also depends on other factors (e.g. dosing valve, valve outlet, mechanical design of the plant ... ).

5.2 Accuracy

\( ±0.5\% \)

5.3 Repeatability

- DN10 - 20: \( >250 \text{ ms} \): \( ±0.5\% \); \( >1.5\text{ s} \): \( ±0.1\% \)
- DN25 - 40: \( >1.5\text{ s} \): \( ±0.35\% \)
6 CONSTRUCTIVE DESIGN

6.1 Design / dimensions / weights

<table>
<thead>
<tr>
<th>Type: Milk thread fitting DIN 405</th>
<th>DN 10</th>
<th>DN 15</th>
<th>DN 20</th>
<th>DN 25</th>
<th>DN 32</th>
<th>DN 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal width</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm)</td>
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<td>80</td>
<td>80</td>
<td>120</td>
<td>120</td>
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<tr>
<td></td>
<td>150</td>
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<td>150</td>
<td>190</td>
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<td>80</td>
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<td>60</td>
<td>60</td>
<td>75</td>
<td>75</td>
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</tr>
<tr>
<td>Weight (kg)</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>8.1</td>
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</table>

<table>
<thead>
<tr>
<th>Type: TRI-Clamp acc. ...</th>
<th>DIN 32676</th>
<th>DIN 2852</th>
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</thead>
<tbody>
<tr>
<td>Nominal width</td>
<td>DN 10</td>
<td>DN 15</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>80</td>
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<tr>
<td></td>
<td>60</td>
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</tr>
<tr>
<td>Weight (kg)</td>
<td>3.5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Other connections upon request (e.g. Naue sterile connection, Tri-Clamp ... )

6.2 Material

<table>
<thead>
<tr>
<th></th>
<th>DN 10</th>
<th>DN 15</th>
<th>DN 20</th>
<th>DN 25</th>
<th>DN 32</th>
<th>DN 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process connection</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
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<tr>
<td>Lining</td>
<td>PTFE</td>
<td>PTFE</td>
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<tr>
<td>Lining</td>
<td>Stainless steel</td>
<td>Hastelloy</td>
<td>Hastelloy</td>
<td>Hastelloy</td>
<td>Hastelloy</td>
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<tr>
<td>Electrodes</td>
<td>Stainless steel</td>
<td>Polyurethane</td>
<td>Polyurethane</td>
<td>Polyurethane</td>
<td>Polyurethane</td>
<td>Polyurethane</td>
</tr>
<tr>
<td>Pre-amplifier enclosure</td>
<td>Cast aluminium, coated</td>
<td>Cast aluminium, coated</td>
<td>Cast aluminium, coated</td>
<td>Cast aluminium, coated</td>
<td>Cast aluminium, coated</td>
<td>Cast aluminium, coated</td>
</tr>
</tbody>
</table>

Other materials upon request
7. OPERATING CONDITIONS

7.1 Ingress protection
IP67
Ingress protection for enclosure as per IEC 529 / EN 60529

7.2 Ambient temperature / humidity
Ambient temperature: 0 to +50°C
Ambient humidity: < 75% annual average, condensation permitted

7.3 Material temperature
For measuring: 0 to +90°C, for cleaning +140°C

7.4 Process pressure – process connection
Milk thread fitting connection: PN 10
Sterile connection: PN 16
Tri-Clamp: PN 16
NEUMO small flange: PN 16

7.5 Measuring cable
Maximum length: 250m
Cable type: LIY-2CY-LIYCY

7.6 Conductivity of the medium
Minimum conductivity: 1 µS/cm

7.7 Pressure loss
Pressure loss can be neglected

8. CERTIFICATES AND APPROVALS

3-A Sanitary Standards for flow meters
Certificate number 976 (since 09/1998)

Directive 2014/30/EU (EMC Directive)
- EN 61000-6-2: Generic standards – Immunity for industrial environments
- EN 61000-6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments

9. DOCUMENTATION

Operating Manuals
A-EN-05801 Operating Manual - Dosing System MID-MDS Linear Filler
A-EN-05802 Operating Manual - Dosing System MID-MDS 4 Start Inputs, Single Control
A-EN-05803 Operating Manual - Dosing System MID-MDS Rotary Filler
A-EN-05806 Operating Manual - UV14 Input Module