FLEXMAG 4050 C
Electromagnetic flow meter for single use processes
1. Introduction
2. Measuring principle
3. The FLEXMAG 4050 versions
4. Target applications
5. Technical Data
Introduction FLEXMAG 4050 C

- A compact transmitter with
  - Magnetic field circuitry
  - Electronic

- A tube with measuring & earth electrodes
  - Diameters 3/8” and ½”

- Same transmitter for 2 diameters
  - Large flow range

KROHNE Patents:
- Product designed with the more recent patented improvements of the KROHNE flowmeters
- 3 specific KROHNE patents for the single use design

The complete range will include diameters 1/4” to 1”, for easy scale-up from lab scale to full cGMP processes
Concept – Strong quality by design
KROHNE Expertise

- Special attention to the wetted part (tube)
  - High technical plastic PSU
  - Concept of separating the tube from the magnetic circuitry
  - No electronic components in the wetted part
  - Allow manufacturing of tubes in a clean room ISO 13 485 class 7
  - Tubes packaged by unit in double pouches

- Concept of batching calibration
  - Very strong and homogeneous magnetic field of the transmitter
  - Repeatability of the positioning of tubes into the transmitter
  - Repeatability of the shape of tubes (choice of material, manufacturing process)
  - No need of ultrasonic cleaning after manufacturing the tubes
  - K factor determined by calibrating samples taken out from the manufactured tubes
Performance

Flow ranges:
- Diameter 3/8”: 0.07 l/min to 14* l/min or more
- Diameter 1/2”: 0.1 l/min to 20* l/min or more

*extended ranges per request

The best performance in the market: Inaccuracy < 1% +/- 1 mm/s:
- 3/8”: 3% inaccuracy at 0.2 l/min, 1% inaccuracy from 2 l/min and above
- 1/2”: 3% inaccuracy at 0.4 l/min, 1% inaccuracy from 4 l/min and above
FLEXMAG 4050 C

Agenda

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Electromagnetic Measuring Principle

A conductive fluid moving through a magnetic field is generating a voltage. The induced voltage signal is proportional to the flow velocity. The magnetic field is generated by magnetic coils. The induced voltage is picked up by two electrodes and supplied to a signal converter.

The electromagnetic principle is the most common principle of measurement in industrial processes for electrical conductivity liquids, in full pipe.

KROHNE is the product leader and has the best know-how worldwide from R&D to production.

- No moving part
- No influence of colored product
- No temperature compensation required
- Independent from the operation conditions
- Very accurate technology
- Measuring low flows
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Versions

<table>
<thead>
<tr>
<th>Product</th>
<th>Availability</th>
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</thead>
<tbody>
<tr>
<td>Transmitter 3/8&quot; &amp; 1/2&quot;</td>
<td>June 2017</td>
</tr>
<tr>
<td>tube 3/8&quot;</td>
<td>June 2017</td>
</tr>
<tr>
<td>tube 1/2&quot;</td>
<td>June 2017</td>
</tr>
<tr>
<td>Transmitter 3/4&quot; &amp; 1&quot;</td>
<td>2018</td>
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<tr>
<td>tube 3/4&quot;</td>
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FLEXMAG 4050 C
Target applications

Industries

- Bio Pharmaceutical Industry

Applications

In-line flow measurement in:

- Normal Filtration
- Cross flow filtration
- Tangential Flow Filtration
- Chromatography
- Buffer, media preparation
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Operating conditions:

- Temperature of the fluid: 2 to 60°C
- Working pressure: up to 4 bar
- Burst pressure: 20 bar

Transmitter:

- Material: ABS-PC
- Power: 24 VDC
- Pulse output: active, 1000 Hz at max. flow
- Analog output: active, 4-20 mA

Compliance transmitter:

- CE certification
- Vibration IEC 60721-3-3
- Ingress Protection IP 55
FLEXMAG 4050 C
Technical data

Flow tube:
- Material: PSU UDEL 1700 and SS 316L
- Rigid tube: no influence of pressure
- Sterilizable up to 50 kGray
- Single barb connections
- For braided and non braided hoses
- No retention zone with hoses
- Length 95 mm, Straight length included in the tube
- Low flow path: 5 cm³ for 3/8”, 10 cm³ for 1/2”
- Full bore, without obstruction
- Low pressure drop

Compliance tube:
- USP class VI - ISO 10 993
- BSE/TSE free
- FDA 21 CFR part 177
- Sterilizable with Gamma irradiation < 50 KGy
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Installation

- **Easy mounting**
  - Easy mounting and removal of the tube
  - Snap-in holder to maintain the tube in place

- **Transmitter setting**
  - Full scale per diameter (Max flow) preset in factory
  - Enter flow max at the first installation in PLC

- **Tubes setting:**
  - Inner diameter
  - K factor
  - Enter ID and K at each change of tube

- **No need on site calibration**

- **No need zero adjustment**

Formula for conversion mA or Hz to flow:

\[ Q = Q_{\text{max}} k (I - 4)/16 \]

\[ Q = Q_{\text{max}} k f/1000 \]

- \( Q \) = Flow rate in l/min
- \( Q_{\text{max}} \) = Max. flow rate of the tube
- \( k \) = Calibration factor of the tube
- \( I \) = current in mA
- \( f \) = frequency in Hz
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Maintenance

**Cleaning**

- External cleaning of transmitter housing (IPA or water with tissue)

**Maintenance**

- No maintenance
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Thank you for your attention!