SITRANS F flowmeters

Transmitter MAG 5000/6000

**Overview**

Transmitter MAG 5000/6000 compact version (left) and 19” insert version (right)

The MAG 5000 and 6000 are transmitters engineered for high performance, easy installation, commissioning and maintenance. The transmitters evaluate the signals from the SITRANS F M sensors type MAG 1100, MAG 1100 F, MAG 3100, MAG 3100 P and MAG 5100 W.

- Transmitter types:
  - MAG 5000: Max. measuring error ±0.4 % ±1 mm/s (incl. sensor)
  - MAG 6000: Max. measuring error ±0.2 % ±1 mm/s (incl. sensor, see also sensor specifications) and with additional features such as: "plug & play" insert bus modules; integrated batch functions.

**Benefits**

- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection.
- 3 lines, 20 characters display in 11 languages.
- Flow rate in various units
- Totalizer for forward, reverse and net flow as well as additional information available
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging (see under SITRANS F M diagnostics)
- Batch control
- Custody transfer approval: PTB, OIML R 75, OIML R 117, OIML R 49 and MI-001,
- MAG 6000 with add-on bus modules for HART, FOUNDATION Fieldbus H1, DeviceNet, MODBUS RTU/RS485, PROFIBUS PA and DP

**Design**

The transmitter is designed as either IP67 NEMA 4X/6 enclosure for compact or wall mounting or 19” version as a 19” insert as a base to be used in:

- 19” rack systems
- Panel mounting IP20/NEMA 1 (prepared for IP65/NEMA 2 display side)
- Back of panel mounting IP20/NEMA 1
- Wall mounting IP66/NEMA 4X

Several options on 19” versions are available such as:

- Transmitters mounted in safe area for Ex ATEX approved flow sensors (incl. barriers)
- Transmitters with electrode cleaning unit on request

**Function**

The MAG 5000/6000 are transmitters with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

**Displays and controls**

Operation of the transmitter can be carried out using:

- Control and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or MODBUS communication

**Application**

The SITRANS F M flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes and slurries. The main applications can be found in:

- Water and waste water
- Chemical and pharmaceutical industries
- Food & beverage industries
- Power generation and utility

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Technical specifications

**Mode of operation and design**
- **Measuring principle**: Electromagnetic with pulsed constant field
- **Empty pipe**: Detection of empty pipe (special cable required in remote mounted installation)
- **Excitation frequency**: Depend on sensor size
- **Electrode input impedance**: > 1 x 10^14 Ω

**Input**
- **Digital input**
  - 11 ... 30 V DC, R_i = 4.4 kΩ
  - **Activation time**: 50 ms
  - **Current**: I_{11 V DC} = 2.5 mA, I_{30 V DC} = 7 mA

**Output**
- **Current output**
  - **Signal range**: 0 ... 20 mA or 4 ... 20 mA
  - **Load**: < 800 Ω
  - **Time constant**: 0.1 ... 30 s, adjustable

- **Digital output**
  - **Frequency**: 0 ... 10 kHz, 50% duty cycle (unidirectional)
  - **Pulse (active)**
    - DC 24 V, 30 mA
    - 1 kΩ ≤ R_i ≤ 10 kΩ, short-circuit-protected (power supplied from flowmeter)
  - **Pulse (passive)**
    - DC 3 ... 30 V, max. 110 mA, 200 Ω ≤ R_i ≤ 10 Ω (powered from connected equipment)
  - **Time constant**: 0.1 ... 30 s, adjustable

- **Relay output**
  - **Time constant**: Changeover relay, same as current output
  - **Load**: 42 V AC/2 A, 24 V DC/1 A

**Low flow cut off**
- 0 ... 9.9% of maximum flow

**Galvanic isolation**
- All inputs and outputs are galvanically isolated

**Max. measuring error (incl. sensor and zero point)**
- MAG 5000: 0.4 % ± 1 mm/s
- MAG 6000: 0.2 % ± 1 mm/s

**Rated operation conditions**
- **Ambient temperature**
  - **Operation**: Display version:
    - -20 ... +60 °C (-4 ... +140 °F)
    - Blind version:
      - -20 ... +60 °C (-4 ... +140 °F)
  - **Storage**
    - -40 ... +70 °C (-40 ... +158 °F)

**Mechanical load**
- **Compact version**: 18 ... 1000 Hz, 3.17 g rms, sinusoidal in all directions to IEC 68-2-36
- **19” insert**: 1 ... 800 Hz, 1 g, sinusoidal in all directions to IEC 68-2-36

**Degree of protection**
- **Compact version**: IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH 2 O 30 min.)
- **19” insert**: IP20/NEMA 1 (powered from connected equipment)

**EMC performance**
- EN 61326-1 (all environments)
- EN 61326-2-5

**Display and keypad**
- Two eight-digit counters for forward, net or reverse flow
- **Display**
  - Background illumination with alphanumeric text, 5 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
  - **Time constant**: Time constant as current output time constant

**Design**
- **Enclosure material**
  - **Compact version**: Fiber glass reinforced polyamide; optional (IP67 only):
    - AISI 316 stainless steel
  - **19” insert**: Standard 19” insert of aluminum/steel (DIN 41494), width: 21 TE, height: 3 HE

- **Back of panel**
  - IP20/NEMA 1; ABS plastic

- **Wall mounting**
  - IP66/NEMA 4X; Fiber glass reinforced polyamide

**Dimensional drawings**
- Compact version See dimensional drawings
- 19” insert See dimensional drawings

**Weight**
- Compact version 0.75 kg (2 lb)
- 19” insert See dimensional drawings

**Power supply**
- **MAG 5000**
  - 115 ... 230 V AC: +10% -15%, 50 ... 60 Hz
  - 11 ... 24 V AC: 50% duty cycle
  - **MAG 6000**
    - Prepared for client mounted add-on modules
    - Optional (MAG 6000 only)
      - HART, MODBUS RTU/RS485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on modules

**Certificates and approvals**
- CE, C-UL general purpose, C-tick; CSA/FM Class 1, div 2
- **Custody transfer approval (MAG 5000/6000 CT)**
  - Cold water: MI-001, PTB/OIML R 49 (pattern approval DE/DK)
  - Hot water: PTB and DANAK OIML R 75 (pattern approval DE/DK) (MAG 6000 CT)
  - Other media than water (milk, beer etc.): PTB and DANAK OIML R 117 (pattern approval DE/DK) (MAG 6000 CT)

**Communication**
- Standard
  - **MAG 5000**
    - Without serial communication or HART as option
  - **MAG 6000**
    - Prepared for client mounted add-on modules

Optional (MAG 6000 only)
- HART, MODBUS RTU/RS485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on modules
- **MAG 5000/6000 CT**
  - No communication modules approved
Electrode cleaning unit for MAG 5000 or 6000 in 19" insert version

The purpose of electrode cleaning is to remove unwanted deposits on the electrodes in water applications by applying either a DC or AC voltage to the electrodes. AC cleaning is used in waste water applications to remove fatty deposits on the electrodes by warming up the electrode. DC cleaning is used in district heating applications to eliminate electrically conductive deposits.

Application for use with transmitters MAG 5000 and 6000 19" to clean the electrodes on sensors MAG 1100 or MAG 3100

• Must not be used with intrinsically safe ATEX sensors
• Not to be used with sensors with Hastelloy and Tantalum electrodes
Available on request
### Selection and Ordering Data

#### Transmitter MAG 5000

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide</td>
<td>7ME6910-1AA30-0AA0</td>
<td></td>
</tr>
<tr>
<td>11 ... 30 V DC / 11 ... 24 V AC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>115 ... 230 V AC, 50/60 Hz</td>
<td>7ME6910-1AA10-0AA0</td>
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</tr>
<tr>
<td>Display for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide</td>
<td>7ME6910-1AA30-1AA0</td>
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</tr>
<tr>
<td>11 ... 30 V DC / 11 ... 24 V AC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>115 ... 230 V AC, 50/60 Hz</td>
<td>7ME6910-1AA10-1AA0</td>
<td></td>
</tr>
<tr>
<td>CT for compact and wall mounting, approved for custody transfer; IP67/NEMA 4X/6, fibre glass reinforced polyamide</td>
<td>7ME6910-1AA30-1AB0</td>
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<td>11 ... 30 V DC / 11 ... 24 V AC</td>
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</tr>
<tr>
<td>115 ... 230 V AC, 50/60 Hz, with HART</td>
<td>7ME6910-1AA10-1BA0</td>
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<tr>
<td>for 19&quot; rack and wall mounting</td>
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<tr>
<td>11 ... 30 V DC / 11 ... 24 V AC</td>
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</tr>
<tr>
<td>115 ... 230 V AC, 50/60 Hz</td>
<td>7ME6910-2CA30-1AA0</td>
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<tr>
<td>115 ... 230 V AC, 50/60 Hz, with HART</td>
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#### Transmitter MAG 6000

<table>
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<th>Description</th>
<th>Order No.</th>
<th>Image</th>
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<tr>
<td>Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide</td>
<td>7ME6920-1AA30-0AA0</td>
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<tr>
<td>11 ... 30 V DC / 11 ... 24 V AC</td>
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<tr>
<td>115 ... 230 V AC, 50/60 Hz</td>
<td>7ME6920-1AA10-0AA0</td>
<td></td>
</tr>
<tr>
<td>Display for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide</td>
<td>7ME6920-1AA30-1AA0</td>
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<tr>
<td>11 ... 30 V DC / 11 ... 24 V AC</td>
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<tr>
<td>115 ... 230 V AC, 50/60 Hz</td>
<td>7ME6920-1AA10-1AA0</td>
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<tr>
<td>for 19&quot; rack and wall mounting; IP66/NEMA 4X enclosure; 11 ... 30 V DC, 11 ... 24 V AC, 50/60 Hz</td>
<td>7ME6920-2CA10-1AA0</td>
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<tr>
<td>115 ... 230 V AC, 50/60 Hz</td>
<td>7ME6920-2CB30-1AA0</td>
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<tr>
<td>SV for 19&quot; rack and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1&quot;, 11 ... 30 V DC, 11 ... 24 V AC, 50/60 Hz</td>
<td>7ME6920-2CB10-1AA0</td>
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<tr>
<td>115 ... 230 V AC, 50/60 Hz</td>
<td>7ME6920-2EA10-1AA0</td>
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<tr>
<td>with safety barrier for ATEX 2G D approved sensors, complete mounted with IP66/NEMA 4X wall mounting enclosure, ATEX, 11 ... 230 V AC, 50/60 Hz</td>
<td>7ME6920-2MA11-1AA0</td>
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<tr>
<td>For ATEX 2G D sensors</td>
<td>7ME6920-2EB30-1AA0</td>
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Short lead time (details in PMD)

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD.
## SITRANS F M  
### Transmitter MAG 5000/6000

#### Communication modules for MAG 6000

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
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<tbody>
<tr>
<td>HART (not for MAG 6000 I)</td>
<td>FDK-085U0226</td>
</tr>
<tr>
<td>MODBUS RTU/RS485</td>
<td>FDK-085U0234</td>
</tr>
<tr>
<td>PROFIBUS PA Profile 3</td>
<td>FDK-085U0236</td>
</tr>
<tr>
<td>PROFIBUS DP Profile 3</td>
<td>FDK-085U0237</td>
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<tr>
<td>DeviceNet</td>
<td>FDK-085U0229</td>
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<tr>
<td>FOUNDATION Fieldbus H1</td>
<td>A5E02054250</td>
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</table>

#### Accessories for MAG 5000 and MAG 6000

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall mounting unit for IP67/NEMA 4X/6 version, wall bracket, terminal box in polyamide</td>
<td>FDK-085U1018</td>
</tr>
<tr>
<td>• 4 x M20 cable glands</td>
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</tr>
<tr>
<td>• 4 x ½” NPT cable glands</td>
<td>FDK-085U1053</td>
</tr>
<tr>
<td>Cable for standard electrode or coil, 3 x 1.5 mm² / 18 gage with shield PVC</td>
<td></td>
</tr>
<tr>
<td>• 10 m (33 ft)</td>
<td>FDK-083F0120</td>
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<tr>
<td>• 20 m (65 ft)</td>
<td>FDK-083F0210</td>
</tr>
<tr>
<td>• 40 m (130 ft)</td>
<td>FDK-083F0211</td>
</tr>
<tr>
<td>• 60 m (200 ft)</td>
<td>FDK-083F0212</td>
</tr>
<tr>
<td>• 100 m (330 ft)</td>
<td>FDK-083F0213</td>
</tr>
<tr>
<td>• 150 m (500 ft)</td>
<td>FDK-083F3052</td>
</tr>
<tr>
<td>• 200 m (650 ft)</td>
<td>FDK-083F3053</td>
</tr>
<tr>
<td>• 500 m (1650 ft)</td>
<td>FDK-083F3054</td>
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<tr>
<td>Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm²</td>
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<tr>
<td>• 10 m (33 ft)</td>
<td>FDK-083F3020(D)</td>
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<tr>
<td>• 20 m (65 ft)</td>
<td>FDK-083F3095(D)</td>
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<td>• 40 m (130 ft)</td>
<td>FDK-083F3094(D)</td>
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<tr>
<td>• 60 m (200 ft)</td>
<td>FDK-083F3093(D)</td>
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<td>• 100 m (330 ft)</td>
<td>FDK-083F3092(D)</td>
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<tr>
<td>• 150 m (500 ft)</td>
<td>FDK-083F3056(D)</td>
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<tr>
<td>• 200 m (650 ft)</td>
<td>FDK-083F3057(D)</td>
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<td>• 500 m (1650 ft)</td>
<td>FDK-083F3058(D)</td>
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<tr>
<td>Low-noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm²</td>
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<td>• 2 m (6.6 ft)</td>
<td>A5E02272692</td>
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<td>• 5 m (16.5 ft)</td>
<td>A5E02272723</td>
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<tr>
<td>• 10 m (33 ft)</td>
<td>A5E02272730</td>
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<tr>
<td>Cable kit with standard coil cable, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm²</td>
<td></td>
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<tr>
<td>• 5 m (16.5 ft)</td>
<td>A5E02296329(D)</td>
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<tr>
<td>• 10 m (33 ft)</td>
<td>A5E01181647</td>
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<tr>
<td>• 15 m (49 ft)</td>
<td>A5E02296464(D)</td>
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<tr>
<td>• 20 m (65 ft)</td>
<td>A5E01181656(D)</td>
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<td>• 25 m (82 ft)</td>
<td>A5E02296490(D)</td>
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<td>• 30 m (98 ft)</td>
<td>A5E02296494(D)</td>
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<td>• 40 m (130 ft)</td>
<td>A5E01181686(D)</td>
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<td>• 50 m (164 ft)</td>
<td>A5E02296498(D)</td>
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<td>• 60 m (200 ft)</td>
<td>A5E01181689(D)</td>
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<td>• 100 m (330 ft)</td>
<td>A5E01181691(D)</td>
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<td>• 150 m (500 ft)</td>
<td>A5E01181699(D)</td>
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<tr>
<td>• 200 m (650 ft)</td>
<td>A5E01181703(D)</td>
</tr>
<tr>
<td>• 500 m (1650 ft)</td>
<td>A5E01181705(D)</td>
</tr>
</tbody>
</table>

### Description

- **HART (not for MAG 6000 I)**
- **MODBUS RTU/RS485**
- **PROFIBUS PA Profile 3**
- **PROFIBUS DP Profile 3**
- **DeviceNet**
- **FOUNDATION Fieldbus H1**

### Order No.

- **FDK-085U0226**
- **FDK-085U0234**
- **FDK-085U0236**
- **FDK-085U0237**
- **FDK-085U0229**
- **A5E02054250**

### Short lead time (details in PMD)

D) Subject to export regulations AL: N, ECCN: EAR99H.
F) Subject to export regulations AL: 9I999, ECCN: N.
### Description | Order No.
--- | ---
Panel mounting enclosure for 19" insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting | FDK-083F5030
Panel mounting enclosure for 19" insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting | FDK-083F5031
Back of panel mounting enclosure for 19" insert (21 TE); IP20/NEMA 1 enclosure in aluminium | FDK-083F5032
Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 1 enclosure in aluminium | FDK-083F5033
Front cover (7TE) | FDK-083F4525
**Panel mounting enclosure for 19" insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting**
**Panel mounting enclosure for 19" insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting**
**Back of panel mounting enclosure for 19" insert (21 TE); IP20/NEMA 1 enclosure in aluminium**
**Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 1 enclosure in aluminium**
**Front cover (7TE)**
**Connection plate for standard 19" transmitter** | A5E02559809
**Connection plate for transmitter ia and safety barrier** | A5E02559810
**Connection plate for transmitter ia/ib and safety barrier (only for sensors produced before October 2007)** | A5E02559811
**Connection plate for transmitter and cleaning unit** | FDK-083F4123
**SensorPROM memory unit (Sensor code and serial numbers must be specified on order)** | FDK-085U1005
**Display unit for MAG 5000/6000** | FDK-085U1038
**Sun lid for MAG 5000/6000 transmitter (Frame and lid)** | A5E02328485
**Sun shield for remote MAG 5000/6000 transmitters** | A5E01209496
**Sun Shield for compact MAG 5000/6000 transmitters on MAG 3100 (DN 15 ... 2000 (1/2" ... 78") or MAG 5100 (DN 150 ... 1200 (6" ... 48") )** | A5E01209500

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**SITRANS F flowmeters**

**SITRANS F M**

**Transmitter MAG 5000/6000**

### Dimensional drawings

**Transmitter IP67/NEMA 4X/6 compact polyamide**

- Transmitter compact mounted, dimensions in mm (inch)
- Transmitter wall mounted, dimensions in mm (inch)

**Transmitter, 19" IP20/ NEMA 1 standard unit**

- Dimensions in mm (inch)

Weight incl. back print 0.8 kg /1.8 lbs
**Transmitter, wall mounting IP66/NEMA 4X, 21 TE**

Dimensions in mm (inch)

- Weight excl. transmitter: 2.3 kg (5.0 lbs)

**Transmitter, wall mounting IP66/NEMA 4X, 42 TE**

Dimensions in mm (inch)

- Weight excl. transmitter: 2.9 kg (7.0 lbs)
SITRANS F flowmeters

SITRANS F M

Transmitter MAG 5000/6000

Transmitter, panel front IP20/NEMA 1, 21 TE

Dimensions in mm (inch)

Transmitter, panel front IP20/NEMA 1, 21 TE

Weight excl. transmitter: 1.2 kg (2.7 lbs)

Dimensions in mm (inch)

Transmitter, panel front IP20/NEMA 1, 42 TE

Weight excl. transmitter: 1.6 kg (3.5 lbs)

Dimensions in mm (inch)
Transmitter, back of panel IP20/NEMA 1, 21 TE

Weight: 0.7 kg (1.6 lbs)

Dimensions in mm (inch)

Transmitter, back of panel IP20/NEMA 1, 42 TE

Weight: 0.9 kg (2.0 lbs)

Dimensions in mm (inch)
Schematics

Electrical connection

Grounding
PE must be connected due to safety class 1 power supply.

Mechanical counters
When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables
If the output cable length is long in noisy environment, we recommend to use shielded cable.

Power supply
Transmitter

115 ... 230 V AC
11 ... 30 V DC/11 ... 24 V AC

Outputs
Current output (Powered from transmitter)

0/4 - 20 mA
Load ≤ 800 Ω

Passive output
(External powered)

56
57
58

Digital output
Vx 3 ... 30 V
max. 110 mA

Active output
(Powered from transmitter)

56
57
58

Counter or PLC-Digital input

Voltage

24 V max. 30 mA

Menu setup
Negative: Positive:

R = Pull up/down resistor
2K2 ... 10K may be required - depending on Cables/Input resistance

Relay output

44 No
45 Nc
46 Common

Digital input

11 ... 30 V DC

Sensor connection

Electrode cable

Coil cable

1) Note: Special cable with individual wire shields (shown as dotted lines) are only required when using empty pipe function or long cables.