

# Flow Measurement

## SITRANS F M

### Transmitter MAG 6000 I/6000 I Ex de

#### Overview



The SITRANS F M MAG 6000 I/MAG 6000 I Ex de transmitter is designed for the demands in the process industry. The robust die cast aluminum housing provides superb protection, even in the most harsh industrial environments. Full input and output functionality is given even in the Ex version.

#### Benefits

- Full range of Ex-rated flowmeters with intrinsically safe rated input and outputs
- For compact or remote installation
- HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA and DP, Modbus RTU/RS 485 add-on communication modules available
- 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 much more 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
- Batch control

#### Design

The transmitter is designed for either compact or remote installation in non-hazardous or hazardous areas (compact mounted transmitter to be ordered together with the sensors).

#### Function

The following functions are available:

- Flow rate
- 2 measuring ranges
- 2 totalizers
- Low flow cut-off
- Flow direction
- Error system
- Operating time
- Uni-/bidirectional flow
- Limit switches and pulse output
- Batch control

The MAG 6000 I/6000 I Ex de is a microprocessor-based transmitter 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 keypads

Operation of the transmitter can be carried out using:

- Keypad 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

#### 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	$> 1 \times 10^{14} \Omega$
<b>Input</b>	
Digital input	11 ... 30 V DC, $R_i = 4.4 \text{ k}\Omega$
• Activation time	50 ms
• Current	$I_{11 \text{ V DC}} = 2.5 \text{ mA}$ , $I_{30 \text{ V DC}} = 7 \text{ mA}$
<b>Output</b>	
<u>Current output</u>	
• Signal range	4 ... 20 mA (active/ passive)
• Load	$< 560 \Omega$
• Time constant	0.1 ... 30 s, adjustable
<u>Digital output</u>	
• Frequency	0 ... 10 kHz, 50 % duty cycle (uni-/bidirectional)
• Time constant	0.1 ... 30 s, adjustable
• Pulse (passive)	3 ... 30 V DC, max 110 mA (30 mA Ex version), $200 \Omega \leq R_i \leq 10 \text{ k}\Omega$ (powered from connected equipment)
• Time constant	0.1 ... 30 s, adjustable
<u>Relay output</u>	
• Time constant	Changeover relay, same as current output
• Load	42 V AC/2 A, 24 V DC/1 A
<b>Low flow cut off</b>	0 ... 9.9 % of maximum flow
<b>Galvanic isolation</b>	All inputs and outputs are galvanic isolated
<b>Max. measuring error</b>	
MAG 6000 I/MAG 6000 I Ex de (incl. sensor)	$\pm 0.2 \% \pm 1 \text{ mm/s}$

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<b>Rated operation conditions</b>	
Ambient temperature	
• Operation	
- MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)
- MAG 6000 I Ex	-20 ... +60 °C (14 ... 140 °F)
• Storage	-40 ... +70 °C (-40 ... +158 °F)
Mechanical load	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Transmitter: 1.14 grms
Degree of protection	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH <sub>2</sub> O 30 min.)
EMC performance	IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5 Namur NE21
<b>Display and keypad</b>	
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
Keypad	Capacitive touch keypad with LED light for feedback indication
Time constant	Time constant as current output time constant
<b>Design</b>	
Enclosure material	Die cast aluminum, with corrosion resistant Basic Polyester power coating (min. 60 µm)
• Wall mounting	Wall mounting bracket enclosed for remote version
Dimensions	See dimensional drawings
Weight	See dimensional drawings
<b>Power supply</b>	
	<ul style="list-style-type: none"> <li>Standard transmitter: 18 ... 90 V DC; 115 ... 230 V AC; 50 ... 60 Hz</li> <li>Ex transmitter: 18 ... 30 V DC</li> <li>Ex transmitter: 115 ... 230 V AC; 50 ... 60 Hz</li> </ul>
Power consumption	<ul style="list-style-type: none"> <li>230 V AC: 20 VA</li> <li>24 V DC: 9.6 W, I<sub>N</sub> = 0.4 A, I<sub>ST</sub> = 1 A (3 ms)</li> </ul>
<b>Certificates and approvals</b>	
MAG 6000 I	<ul style="list-style-type: none"> <li>CE</li> <li>C-tick</li> <li>FM Class I, Div 2</li> <li>FM Class I, Zone 2</li> <li>CSA Class I, Div 2</li> <li>CSA Class I, Zone 2</li> </ul>
MAG 6000 I Ex	<ul style="list-style-type: none"> <li>IEC Ex de [ia] [ib] ia IIC T6 Gb Ex tDa 21 IP67</li> <li>ATEX II 2(1)(2) GD EEx de [ia] ia [ib] IIC T6</li> <li>FM Class I, Div 1<sup>1)</sup></li> <li>FM Class I, Zone 1</li> <li>CSA Class I, Zone 1</li> </ul>

<b>Cable entries</b>	
MAG 6000 I	Remote installation 2 x M25 (for supply/output) and 2 x M16 (for sensor connection) or 2 x ½" NPT (for supply/output) and 2 x M16 (for sensor connection)
MAG 6000 I Ex ATEX 2G D	2 x M20 (for supply/output) and 2 x M16 (for sensor connection)
<b>Communication</b>	
Standard versions	HART, Modbus RTU/RS 485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP add-on modules
Ex versions	HART, PROFIBUS PA,
<sup>1)</sup> Applicable for: Compact mounted MAG 6000 I Ex de on MAG 3100 (sizes DN 15 ... DN 300 (½" ... 12"))	

Selection and Ordering data	Order No.
<b>SITRANS F M Transmitter MAG 6000 I/Ex de</b>	<b>7ME6930-</b>
Remote with standard wall mounting bracket, local display, die cast aluminum	<b>2BA-1A</b>
<b>Supply voltage</b>	
Standard transmitter: 115 ... 230 V AC, 50 ... 60 Hz; 18 ... 90 V DC	<b>2</b>
Ex transmitter: 18 ... 30 V DC	<b>4</b>
Ex transmitter: 115 ... 230 V AC, 50 ... 60 Hz	<b>5</b>
<b>Ex approval</b>	
Standard sensor: FM Class I, Div 2, CSA Class I, Div 2	<b>0</b>
Ex sensor: Hazardous area (ATEX 2 GD; FM Class 1, Zone 1; CSA Class 1, Zone 1)	<b>2</b>
<b>Communication</b>	
None	<b>A</b>
HART	<b>B</b>
PROFIBUS PA Profile 3	<b>F</b>
PROFIBUS DP Profile 3 (not for Ex version)	<b>G</b>
Modbus RTU/RS 485 (not for Ex version)	<b>E</b>
FOUNDATION Fieldbus H1 (not for Ex version)	<b>J</b>
<b>Cable gland entries</b>	
Metric	<b>0</b>
½" NPT	<b>2</b>
◆ Short lead time (details in PMD)	

Selection and Ordering data	Order code
<b>Further design</b>	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Tag name plate, stainless steel fixed with SS wire (add plain text)	<b>Y17</b>
Tag name plate, plastic (self adhesive)	<b>Y18</b>
Other, post-production requirements (add plain text)	<b>Y99</b>

### Operating instructions for SITRANS F M MAG 6000 I

Description	Order No.
• English	<b>A5E0208319</b>
• German	<b>A5E02210835</b>
• French	<b>A5E02342413</b>

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:  
<http://www.siemens.com/flowdocumentation>

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#### Communication modules for MAG 6000 I (All standard outputs can still be used)

Description	Order No.
HART (only for MAG 6000 I/Ex)	◆ <b>FDK:085U0321</b>
Modbus RTU/RS 485 <sup>1)</sup>	◆ <b>FDK:085U0234</b>
PROFIBUS PA Profile 3	◆ <b>FDK:085U0236</b>
PROFIBUS DP Profile 3 <sup>1)</sup>	◆ <b>FDK:085U0237</b>
DeviceNet <sup>1)</sup>	◆ <b>FDK:085U0229</b>
FOUNDATION Fieldbus H1 <sup>1)</sup>	◆ <b>A5E02054250</b>



◆ Short lead time (details in PMD)

<sup>1)</sup> Not for Ex versions

#### Operating instructions for SITRANS F add-on modules

Description	Order No.
HART, English	<b>A5E03089708</b>
PROFIBUS PA/DP	
• English	<b>A5E00726137</b>
• German	<b>A5E01026429</b>
MODBUS	
• English	<b>A5E00753974</b>
• German	<b>A5E03089262</b>
• Spanish	<b>A5E03089278</b>
• French	<b>A5E03089265</b>
FOUNDATION Fieldbus	
• English	<b>A5E02318728</b>
• German	<b>A5E02488856</b>
• Spanish	<b>A5E02512177</b>
• French	<b>A5E02512169</b>
DeviceNet, English	<b>A5E03089720</b>

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#### Accessories MAG 6000 I/MAG 6000 I Ex de

Description	Order No.
Cable for standard electrode or coil, 3 x 1.5 mm <sup>2</sup> /18 gage with shield PVC. Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 10 m (33 ft)	◆ <b>FDK:083F0121</b>
• 20 m (65 ft)	◆ <b>FDK:083F0210</b>
• 40 m (130 ft)	◆ <b>FDK:083F0211</b>
• 60 m (200 ft)	◆ <b>FDK:083F0212</b>
• 100 m (330 ft)	◆ <b>FDK:083F0213</b>
• 150 m (500 ft)	<b>FDK:083F3052</b>
• 200 m (650 ft)	<b>FDK:083F3053</b>
• 500 m (1650 ft)	<b>FDK:083F3054</b>
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm <sup>2</sup> Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 10 m (33 ft)	◆ <b>FDK:083F3020</b>
• 20 m (65 ft)	◆ <b>FDK:083F3095</b>
• 40 m (130 ft)	<b>FDK:083F3094</b>
• 60 m (200 ft)	<b>FDK:083F3093</b>
• 100 m (330 ft)	<b>FDK:083F3092</b>
• 150 m (500 ft)	<b>FDK:083F3056</b>
• 200 m (650 ft)	<b>FDK:083F3057</b>
• 500 m (1650 ft)	<b>FDK:083F3058</b>



Cable kit with standard coil cable, 3 x 1.5 mm<sup>2</sup>/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm<sup>2</sup>

• 5 m (16.5 ft)	◆ <b>A5E02296329</b>
• 10 m (33 ft)	◆ <b>A5E01181647</b>
• 15 m (49 ft)	◆ <b>A5E02296464</b>
• 20 m (65 ft)	◆ <b>A5E01181656</b>
• 25 m (82 ft)	◆ <b>A5E02296490</b>
• 30 m (98 ft)	◆ <b>A5E02296494</b>
• 40 m (130 ft)	◆ <b>A5E01181686</b>
• 50 m (164 ft)	◆ <b>A5E02296498</b>
• 60 m (200 ft)	<b>A5E01181689</b>
• 100 m (330 ft)	<b>A5E01181691</b>
• 150 m (500 ft)	<b>A5E01181699</b>
• 200 m (650 ft)	<b>A5E01181703</b>
• 500 m (1650 ft)	<b>A5E01181705</b>



Low noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm<sup>2</sup>

• 2 m (6.6 ft)	<b>A5E02272692</b>
• 5 m (16.5 ft)	<b>A5E02272723</b>
• 10 m (33 ft)	<b>A5E02272730</b>



◆ Short lead time (details in PMD)

#### Spare parts



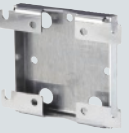
Description	Order No.
MAG 6000 I Display	<b>FDK:085U3122</b>
Accessory bag including cable gland inserts coil and electrode connectors	<b>FDK:085U3144</b>
Electronics cover with Ex glass plate. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	<b>7ME5933-0AC01</b>
Cover for connection board incl. gasket (for remote version). Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	<b>7ME5933-0AC02</b>
Cover for mains supply/communication. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	<b>7ME5933-0AC03</b>



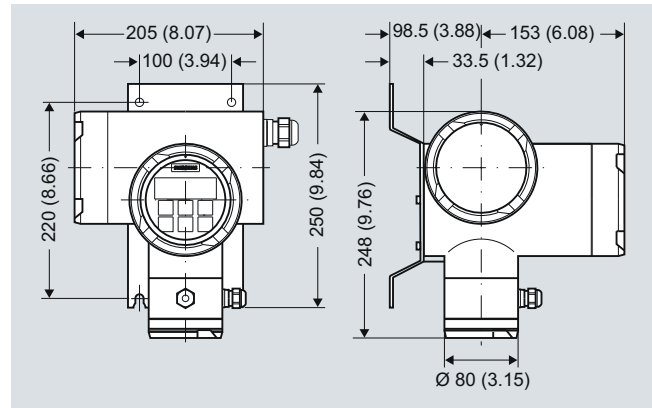
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Description	Order No.	
Safety clamp	<b>7ME5933-0AC06</b>	
Standard wall mounting bracket. Steel EN10088-2-1.4404	<b>7ME5933-0AC04</b>	
Wall-/pipe mounting bracket kit, BI 2,5 DIN59382 X6Cr17	<b>7ME5933-0AC05</b>	

### Dimensional drawings



Dimensions in mm (inch), weight: 6 kg (13.5 lbs)

### Complete spare part PCB unit

Description	Order No.	
MAG 6000 I PCBA (not for Ex)	<b>FDK:085U3123</b>	
MAG 6000 I Ex de, 18 ... 30 V DC Spare PCBA unit for use with Ex sensors with increased safety e (For Ex sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 > DN300)	<b>A5E01013340</b>	
MAG 6000 I Ex de 115 ... 230 V AC Spare PCBA unit for use with Ex sensors with increased safety e (For EX sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 > DN300)	<b>A5E01013127</b>	

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# Flow Measurement SITRANS F M

## Transmitter MAG 6000 I/6000 I Ex de

### Schematics

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