**FLUXER**
FLOOD CONTROL

# SITRANS FM (electromagnetic)

## Flow transmitters

### SITRANS FM MAG 5000 and 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 FM 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" add-on 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 SITRANS F M diagnostics)

- Batch control (MAG 6000 only)

- Custody transfer approval: MI-001 for cold water, PTB K 7.2 and OE12/C 040 for chilled water

- MAG 6000 with add-on bus modules for HART, FOUNDATION Fieldbus H1, DeviceNet, Modbus RTU/RS 485, PROFIBUS PA and DP

## Application

The SITRANS FM 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 and beverage industries

- Power generation and utility

## Design

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

- 19" rack systems

- Front panel mounting IP65/NEMA 2

- 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

Version 03/2024

## Function

The MAG 5000/6000 are transmitters with a built-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.
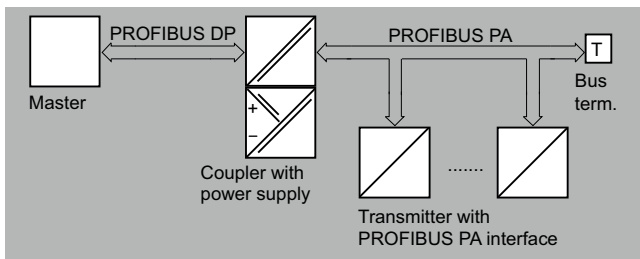
### Displays and controls

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
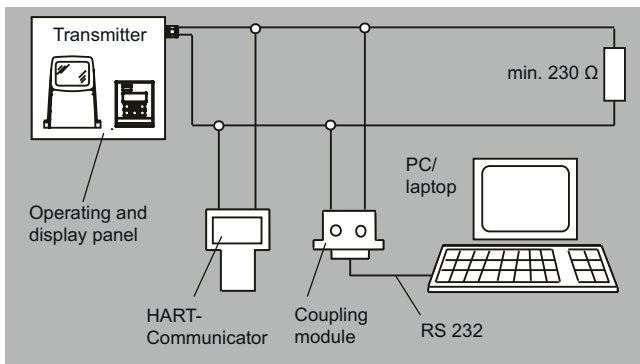


HART communication



PROFIBUS PA communication

## Selection and ordering data

*Transmitter MAG 5000*

| Description | Article No. | |
|---|---|---|
| **Transmitter MAG 5000 blind for compact and wall mounting; IP67/NEMA 6, fibre glass reinforced polyamide**<br>• 11 ... 30 V DC/11 ... 24 V AC<br>• 115 ... 230 V AC, 50/60 Hz | 7ME6910-1AA30-0AA0<br><br>7ME6910-1AA10-0AA0 | |
| **Transmitter MAG 5000 display for compact and wall mounting; IP67/NEMA 6, fibre glass reinforced polyamide**<br>• 11 ... 30 V DC/11 ... 24 V AC<br>• 115 ... 230 V AC, 50/60 Hz<br>• 115 ... 230 V AC, 50/60 Hz, with HART communication | 7ME6910-1AA30-1AA0<br>7ME6910-1AA10-1AA0<br>7ME6910-1AA10-1BA0 | |
| **Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer, without initial verification (no type approval marking); IP67/NEMA 6, glass fibre reinforced polyamide**<br>• 11 ... 30 V DC/11 ... 24 V AC<br>• 115 ... 230 V AC, 50/60 Hz | 7ME6910-1AA30-1AD0<br>7ME6910-1AA10-1AD0 | |
| **Transmitter MAG 5000 for 19" rack and wall mounting**<br>• 11 ... 30 V DC/11 ... 24 V AC<br>• 115 ... 230 V AC, 50/60 Hz | 7ME6910-2CA30-1AA0<br>7ME6910-2CA10-1AA0 | |

## Selection and ordering data (continued)

*Transmitter MAG 6000*

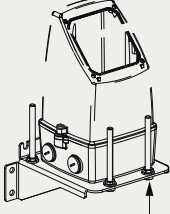| Description | Article No. | |
|---|---|---|
| **Transmitter MAG 6000 blind for compact and wall mounting; IP67/NEMA 6, glass fibre reinforced polyamide** | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-1AA30-0AA0 | |
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1AA10-0AA0 | |
| Transmitter MAG 6000 Display for compact and wall mounting; IP67/NEMA 6, glass fibre reinforced polyamide | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-1AA30-1AA0 | |
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1AA10-1AA0 | |
| **Transmitter MAG 6000 for compact and wall mounting; IP67/NEMA 6, stainless steel AISI 316/1.4436 (only for sensor with stainless steel terminal box) (for remote version order stainless steel terminal box separately)** | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-1QA30-1AA0 | |
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1QA10-1AA0 | |
| **Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer without initial verification (no type approval marking); IP67/NEMA 6, glass fibre reinforced polyamide** | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-1AA30-1AD0 | |
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1AA10-1AD0 | |
| **Transmitter MAG 6000 SV for compact and wall mounting; special excitation frequency 44 Hz for Batch application DN ≤ 25/1" IP67/NEMA 6, glass fibre reinforced polyamide** | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-1AB30-1AA0 | |
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1AB10-1AA0 | |
| **Transmitter MAG 6000 for 19" rack and wall mounting** | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-2CA30-1AA0 | |

## Selection and ordering data (continued)

| Description | Article No. | |
|---|---|---|
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-2CA10-1AA0 | |
| **Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation frequency 44 Hz for Batch application DN ≤ 25/1"** | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-2CB30-1AA0 | |
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-2CB10-1AA0 | |
| **MAG 6000 19" insert, complete mounted with IP66/NEMA 4X wall mounting enclosure in ABS plastic;115 ... 230 V AC, 50/60 Hz; cable gland PG13.5** | 7ME6920-2EA10-1AA0 | |
| **MAG 6000 19" insert with safety barrier for Ex-approved sensors, complete mounted with IP66/NEMA 4X wall mounting enclosure in ABS plastic, 115 ... 230 V AC, 50/60 Hz; cable gland PG13.5** | | |
| • For ATEX 2G D sensors | 7ME6920-2MA11-1AA0 | |
| **MAG 6000 SV 19" insert, complete mounted with IP66/NEMA 4X wall mounting enclosure in ABS plastic, special excitation frequency 44 Hz for Batch application DN ≤ 25/1"; cable gland PG13.5** | | |
| • 11 ... 30 V DC/11 ... 24 V AC | 7ME6920-2EB30-1AA0 | |
| • 115 ... 230 V AC, 50/60 Hz | 7ME6920-2EB10-1AA0 | |

*Communication modules for MAG 6000*
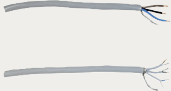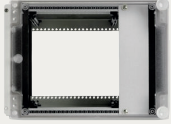
| Description | Article No. | |
|---|---|---|
| HART (not for MAG 6000 I) | FDK:085U0226 | |
| Modbus RTU/RS485 | FDK:085U0234 | |
| PROFIBUS PA Profile 3 | FDK:085U0236 | |
| PROFIBUS DP Profile 3 | FDK:085U0237 | |
| DeviceNet | FDK:085U0229 | |
| FOUNDATION Fieldbus H1 | A5E02054250 | |

*Accessories for MAG 5000 and MAG 6000*

| Description | Article No. | |
|---|---|---|
| **Accessory kit for remote use of sensor with two 5-pin terminal blocks** | A5E34827189 |  |
| **Wall mounting unit for MAG 5000/6000 with IP67/NEMA 6, terminal box in polyamide**[2] | |  |
| • 4 × M20 cable glands | FDK:085U1018 | |
| • 4 × ½" NPT cable glands | FDK:085U1053 | |
| **Special wall mounting unit for MAG 5000/6000 IP67/NEMA 6, mounting bracket in stainless steel AISI 316 (1.4401), terminal box in polyamide** | |  |
| • 4 × M20 cable glands | A5E36699702 | |
| • 4 × ½" NPT cable glands | A5E36699938 | |
| **Sun lid for MAG 5000/6000 transmitter (frame and lid)** | A5E02328485 |  |
| **Standard coil or electrode cable, 3 × 1.5 mm²/18 gage, single shielded with PVC jacket; Temperature range -30 ... +70 °C (-22 ... +158 °F)** | |  |
| • 5 m (16.5 ft) | A5E02296523 | |
| • 10 m (33 ft) | FDK:083F0121 | |
| • 20 m (65 ft) | FDK:083F0210 | |
| • 30 m (98 ft) | A5E02297309 | |
| • 40 m (131 ft) | FDK:083F0211 | |
| • 50 m (164 ft) | A5E02297317 | |
| • 60 m (197 ft) | FDK:083F0212 | |
| • 100 m (328 ft) | FDK:083F0213 | |
| • 150 m (492 ft) | FDK:083F3052 | |
| • 200 m (656 ft) | FDK:083F3053 | |
| • 500 m (1640 ft) | FDK:083F3054 | |
| **Special electrode cable[1] (empty pipe detection or low conductivity), 3 × 0.25 mm² double shielded with PVC jacket, Temperature range -30 ... +70 °C (-22 ... +158 °F)** | |  |
| • 10 m (33 ft) | FDK:083F3020 | |

**Selection and ordering data** (continued)

| Description | Article No. | |
|---|---|---|
| • 20 m (65 ft) | FDK:083F3095 |  |
| • 40 m (131 ft) | FDK:083F3094 | |
| • 60 m (197 ft) | FDK:083F3093 | |
| • 100 m (328 ft) | FDK:083F3092 | |
| • 150 m (492 ft) | FDK:083F3056 | |
| • 200 m (656 ft) | FDK:083F3057 | |
| • 500 m (1640 ft) | FDK:083F3058 | |
| Low-noise electrode coaxial cable for low conductivity and high vibration levels, 3 × 0.13 mm², Temperature range -25 ... +85 °C (-13 ... +185 °F) | |  |
| • 2 m (6.6 ft) | A5E02272692 | |
| • 5 m (16.5 ft) | A5E02272723 | |
| • 10 m (33 ft) | A5E02272730 | |
| Cable kit including standard coil cable (3 × 1.5 mm²/18 gage, single shielded with PVC jacket) and special electrode cable[1] (3 × 0.25 mm², double shielded with PVC jacket). Temperature range -30 ... +70 °C (-22 ... +158 °F) | |  |
| • 5 m (16.5 ft) | A5E02296329 | |
| • 10 m (33 ft) | A5E01181647 | |
| • 15 m (49 ft) | A5E02296464 | |
| • 20 m (65 ft) | A5E01181656 | |
| • 25 m (82 ft) | A5E02296490 | |
| • 30 m (98 ft) | A5E02296494 | |
| • 40 m (131 ft) | A5E01181686 | |
| • 50 m (164 ft) | A5E02296498 | |
| • 60 m (197 ft) | A5E01181689 | |
| • 100 m (328 ft) | A5E01181691 | |
| • 150 m (492 ft) | A5E01181699 | |
| • 200 m (656 ft) | A5E01181703 | |
| • 500 m (1640 ft) | A5E01181705 | |
| Potting kit for IP68/NEMA 6P sealing of sensor junction box | FDK:085U0220 |  |
| 19" safety barrier (21 TE)[1] [EEx e ia] IIC for MAG 1100 Ex sensors 12 ... 24 V, 115 ... 230 V and MAG 3100 Ex sensors, incl. back plate (A5E02559810) | FDK:083F5034 |  |
| Front panel mounting enclosure IP65/NEMA 2 in ABS plastic for 19" insert (21 TE) | FDK:083F5030 |  |

## Selection and ordering data (continued)
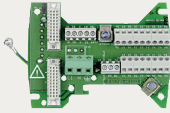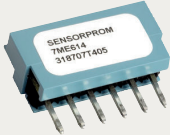
| Description | Article No. | |
|---|---|---|
| Front panel mounting enclosure IP65/NEMA 2 in ABS plastic for 19" insert (42 TE) | FDK:083F5031 | |
| Panel mounting enclosure IP20/NEMA 1 in aluminum for 19" insert (21 TE) | FDK:083F5032 | |
| Panel mounting enclosure IP20/NEMA 1 in aluminum for 19" insert (42 TE) | FDK:083F5033 | |
| Wall mounting enclosure IP66/NEMA 4X in ABS plastic for 19" insert (cable glands and connection board not included). <br> • 21 TE <br><br><br> • 42 TE | FDK:083F5037 <br><br><br><br> FDK:083F5038 | |
| Front cover (7TE) for panel mounting enclosure | FDK:083F4525 | |
| Sun shield for MAG 5000/6000 transmitter in remote design | A5E01209496 | |
| Sun Shield for MAG 5000/6000 transmitter in compact design on MAG 3100 (DN 15 ... 2000 (½" ... 78") or MAG 5100 W (DN 150 ... 1200 (6" ... 48") | A5E01209500 | |

1) Safety cables cannot be used with 19" safety barrier
2) For stainless steel wall mounting kit, order:- M20: FDK:085U1018 and A5E00836867- ½ NPT: FDK:085U1053 and A5E00836868

**Selection and ordering data** (continued)
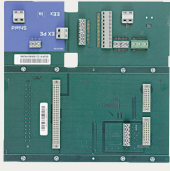
*Spare parts*

| Description | Article No. | |
|---|---|---|
| **Connection board (for polyamide terminal box)** | | |
| • 12 ... 24 V | A5E02559817 | |
| • 115 ... 230 V | A5E02559816 | |
| **Connection board (for stainless steel terminal box)** | | |
| • 12 ... 24 V | A5E02604280 | |
| • 115 ... 230 V | A5E02604272 | |
| **Connection board MAG 5000/6000 19" insert for panel mounting enclosure, 12 ... 24 V/115 ... 230 V** | A5E02559809 | |
| **Connection board MAG 5000/6000 19" insert** | | |
| • with safety barrier for panel mounting enclosure, 12 ... 24 V/115 ... 230 V | A5E02559810 | |
| • with safety barrier for panel mounting enclosure, 12 ... 24 V/115 ... 230 V (only for sensors produced before October 2007) | A5E02559811 | |
| • with cleaning unit for panel mounting enclosure, 12 ... 24 V/115 ... 230 V | FDK:083F4123 | |
| **SENSORPROM memory unit** (sensor code and serial numbers must be specified on order) | | |
| • 2 kB (for MAG 5000/6000/6000 I) | | |
| - 1 pc. | FDK:085U1005 | |
| - 10 pcs. | FDK:083F5052 | |
| **Display unit for MAG 5000/6000** | | |
| • Black neutral front | FDK:085U1038 | |
| • SIEMENS front | FDK:085U1039 | |
| **HW key** | On request | |

| Description | Article No. | |
|---|---|---|
| **Cable glands (polyamide), 4 pcs.** | | |
| • M20 | A5E00822490 | |
| • ½" NPT | A5E00822501 | |
| • PG 13.5, 2 pcs. | FDK:083G0228 | ½" NPT<br><br>M20 |
| **Sealing screws for sensor/transmitter, 2 pcs.** | FDK:085U0221 | |
| **Terminal box, in polyamide, inclusive lid, terminal blocks, gasket and screws** | | |
| • M20 | FDK:085U1050 | |
| • ½" NPT | FDK:085U1052 | |
| **Terminal box lid, in polyamide** | FDK:085U1003 | |
| **Terminal box, in stainless steel, inclusive lid, terminal blocks, gasket and screws, for MAG 6000 in stainless steel and for all Ex sensors** | | |
| • M20 | A5E00836867 | |
| • ½" NPT | A5E00836868 | |
| **Terminal box (3A) for MAG 1100 F in polyamide, inclusive lid, terminal blocks, gasket and screws** | | |
| • M20 | A5E00822478 | |
| • ½" NPT | A5E00822479 | |

## Selection and ordering data (continued)

| Description | Article No. | |
|---|---|---|
| **Gasket for terminal box lid in polyamide or for MAG 5000/6000 IP67/ NEMA 6 enclosure in polyamide (5 pcs.)** | A5E37086797 | |
| **Spare part kit for remote use of sensor with twenty 5-pin terminal blocks** | A5E34346873 | |
| **Display frame in polyamide for MAG 5000/6000 IP67/NEMA 6 (5 pcs.)** | A5E43491675 | |
| **Connection board MAG 5000/6000 19" insert for wall mounting enclosure, 12 ... 24 V/115 ... 230 V** | A5E02559813 | |
| **Connection board MAG 5000/6000 19" insert** • with safety barrier for wall mounting enclosure, 12 ... 24 V/115 ... 230 V  • with safety barrier for wall mounting enclosure, 12 ... 24 V/115 ... 230 V (only for sensors produced before October 2007)  • with cleaning unit for wall mounting enclosure, 12 ... 24 V/115 ... 230 V | A5E02559814  A5E02559812  A5E02559815 | |

## Technical specifications

| MAG 5000 and MAG 6000 | |
|---|---|
| **Mode of operation** | |
| 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 | $> 1 \times 10^{14}\ \Omega$ |
| **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 (uni/bidirectional) |
| • Pulse (active) | 24 V DC, 30 mA, 1 kΩ ≤ $R_i$ ≤ 10 kΩ, short-circuit-protected (power supplied from flowmeter) |
| • Pulse (passive) | 3 ... 30 V DC, max. 110 mA, 200 Ω ≤ $R_i$ ≤ 10 - kΩ 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) (for detailed accuracy specifications see "System information")** | |
| • 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) |
| | • Custody transfer (CT) version: -20 ... +50 °C (-4 ... +122 °F) |
| • Storage | -40 ... +70 °C (-40 ... +158 °F) |
| **Mechanical load (vibration)** | |
| 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 6 to IEC 529 and DIN 40050 (1 mH$_2$O 30 min.) |
| 19" insert | IP20/NEMA 1 to IEC 529 and DIN 40050 |
| **EMC performance** | IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5 |
| **Display and keypad** | |
| 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 |
| Time constant | Time constant as current output time constant |

| MAG 5000 and MAG 6000 | |
|---|---|
| **Design** | |
| Enclosure material | |
| • Compact version | IP67 / NEMA 6; Fiber glass reinforced polyamide IP67 / NEMA 6; Stainless steel AISI 316/1.4436 |
| • 19"-insert | DIN 41494 steel sheet housing and aluminum front plate with display; width: 21 TE, height: 3 HE |
| - Panel mounting | IP20/NEMA 1; Aluminium |
| - Front panel mounting | IP65/NEMA 2; ABS plastic |
| - Wall mounting | IP66/NEMA 4X; ABS plastic |
| **Dimensions** | |
| • Compact version | See dimensional drawings |
| • 19" insert | See dimensional drawings |
| **Weight** | |
| • Compact version | 0.75 kg (2 lbs) |
| • 19" insert | See dimensional drawings |
| **Power supply** | • 115 ... 230 V AC +10 % -15 %, 50 ... 60 Hz |
| | • 11 ... 30 V DC or 11 ... 24 V AC |
| **Power consumption** | • 230 V AC: 17 VA |
| | • 24 V AC: 9 VA, $I_N$ = 380 mA, $I_{ST}$ = 8 A (30 ms) |
| | • 12 V DC: 11 W, $I_N$ = 920 mA, $I_{ST}$ = 4 A (250 ms) |
| | • 24 V DC: 8.4 VA, $I_N$ = 350 mA, $I_{ST}$ = 4 A (10 ms) |
| | $I_{ST}$= 4 A (250 ms): for solar panel please securestable current supply |
| **Certificates and approvals** | |
| General purpose | • CE (LVD, EMC, PED, RoHS) |
| | • UL (c-UL-us) |
| Hazardous area | • FM, CSA |
| | - NI Class I Div. 2 Groups A, B, C, D |
| Custody transfer | • Cold water: MI-001 |
| | • Chilled water |
| |   - PTB K 7.2 (Germany) |
| |   - OE 12/C 040 (Austria) |
| Marine (only for remote version with MAG 5100 W, DN 50 ... 300) | • ABS |
| | • Bureau Veritas |
| | • DNV-GL |
| | • Lloyd's Register |
| Others | • CPA (China) |
| | • EAC (Russia, Belarus, Kazakhstan) |
| | • KCs (South Korea) |
| **Communication** | |
| Standard | |
| • MAG 5000 | HART 5.2 optional |
| • MAG 6000 | Optional as add-on modules |
| | • HART 5.2 |
| | • Modbus RTU/RS 485 |
| | • FOUNDATION Fieldbus H1 |
| | • DeviceNet |
| | • PROFIBUS PA |
| | • PROFIBUS DP |