

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 $\pm 0.4\% \pm 1 \text{ mm/s}$ (incl. sensor)
- MAG 6000: Max. measuring error $\pm 0.2\% \pm 1 \text{ mm/s}$ (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 FM 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/RS485, 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 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
- 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

Flow Measurement

SITRANS FM (electromagnetic) Transmitters

MAG 5000/6000

Function

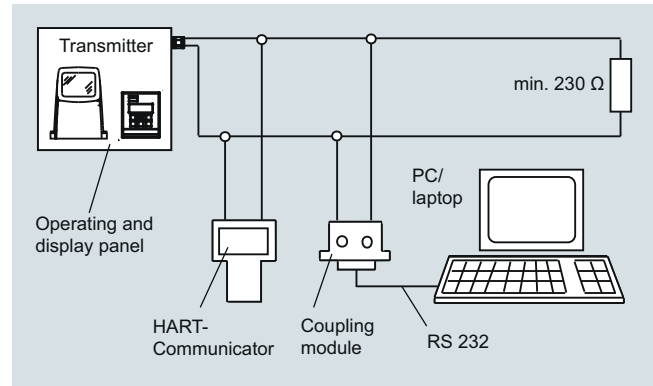
The MAG 5000/6000 are transmitters with a built-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

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

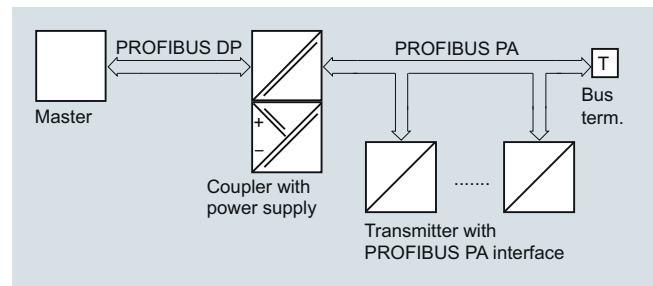
Displays and controls

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

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 | $> 1 \times 10^{14} \Omega$ |
| Input | |
| Digital input | 11 ... 30 V DC, $R_i = 4.4 \text{ k}\Omega$ |
| • Activation time | 50 ms |
| • Current | $I_{11 \text{ V DC}} = 2.5 \text{ mA}$, $I_{30 \text{ V DC}} = 7 \text{ mA}$ |
| Output | |
| Current output | |
| • Signal range | 0 ... 20 mA or 4 ... 20 mA |
| • Load | $< 800 \Omega$ |
| • 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, $1 \text{ k}\Omega \leq R_i \leq 10 \text{ k}\Omega$, short-circuit-protected (power supplied from flowmeter) |
| • Pulse (passive) | 3 ... 30 V DC, max. 110 mA, $200 \Omega \leq R_i \leq 10 \text{ k}\Omega$ 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 | $\pm 0.4 \% \pm 1 \text{ mm/s}$ |
| • MAG 6000 | $\pm 0.2 \% \pm 1 \text{ mm/s}$ |
| Rated operation conditions | |
| Ambient temperature | |
| • Operation | <ul style="list-style-type: none"> 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 4X/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 alpha-numeric 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 |
| Design | |
| Enclosure material | Fiber glass reinforced polyamide; stainless steel AISI 316/1.4436 (IP65) |
| • Compact version | Standard 19" insert of aluminium/steel (DIN 41494), width: 21 TE, height: 3 HE |
| • 19"-insert | IP20/NEMA 1; Aluminium |
| • Back of panel | IP20/NEMA 1 (prepared for IP65/NEMA 2 display side); ABS plastic |
| • Panel mounting | IP66/NEMA 4X; ABS plastic |
| • Wall mounting | |
| 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 | |
| | <ul style="list-style-type: none"> 115 ... 230 V AC +10 % -15 %, 50 ... 60 Hz 11 ... 30 V DC or 11 ... 24 V AC |
| Power consumption | |
| | <ul style="list-style-type: none"> 230 V AC: 17 VA 24 V AC: 9 VA, $I_N = 380 \text{ mA}$, $I_{ST} = 8 \text{ A}$ (30 ms) 12 V DC: 11 W, $I_N = 920 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (250 ms) 24 V DC: 8.4 VA, $I_N = 350 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (10 ms) |
| | $I_{ST} = 4 \text{ A}$ (250 ms): For solar panel please secure stable current supply |
| Certificates and approvals | |
| General purpose | <ul style="list-style-type: none"> CE (LVD, EMC, PED, RoHS) UL (c-UL-us) |
| Hazardous area | <ul style="list-style-type: none"> FM, CSA - NI Class I Div. 2 Groups A, B, C, D |
| Custody transfer | <ul style="list-style-type: none"> 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 ... DN 300) | <ul style="list-style-type: none"> ABS Bureau Veritas DNV-GL Lloyd's Register |
| Others | <ul style="list-style-type: none"> CPA (China) EAC (Russia, Belarus, Kazakhstan) KCs (South Korea) |
| Communication | |
| Standard | HART 5.2 optional |
| • MAG 5000 | Optional as add-on modules: |
| • MAG 6000 | <ul style="list-style-type: none"> HART 5.2 Modbus RTU/RS 485, FOUNDATION Fieldbus H1 DeviceNet, PROFIBUS PA PROFIBUS DP |


Flow Measurement

SITRANS FM (electromagnetic) Transmitters

MAG 5000/6000





Technical specifications (continued)

Safety barrier (e/ia)




| | | | | |
|---|----------------------------|--|---------------------------|------------------|
|  | Application | For use with MAG 5000/6000 19" and MAG 1100 Ex/MAG 3100 Ex | | |
| | Ex approval | MAG 1100 Ex [EEx e ia] IIB ATEX, EAC Ex MAG 3100 Ex [EEx e ia] IIC ATEX, EAC Ex | | |
| | Cable parameter | Group | Capacity in μF | Inductance in mH |
| | Electrode | IIC | ≤ 4.1 | ≤ 80 |
| | | IIB | ≤ 45 | ≤ 87 |
| | | IIA | ≤ 45 | ≤ 87 |
| | Ambient temperature | | | |
| | • During operation | -20 ... +50 °C (-4 ... +122 °F) | | |
| | • During storage | -20 ... +70 °C (-4 ... +158 °F) | | |
| | Enclosure | | | |
| | • Material | Standard 19" insert in aluminum/steel (DIN 41494) | | |
| | • Width | 21 TE (4.75") | | |
| | • Height | 3 HE (5.25") | | |
| | • Rating | IP20/NEMA 1 to EN 60529 | | |
| | • Mechanical load | 1 g, 1 ... 800 Hz sinusoidal in all directions to EN 60068-2-36 | | |

Selection and ordering data








Transmitter MAG 5000

| Description | Article No. | |
|--|--|---|
| Transmitter MAG 5000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | 7ME6910-1AA30-0AA0 7ME6910-1AA10-0AA0 |  |
| Transmitter MAG 5000 Display for compact and wall mounting; IP67/NEMA 4X, fibre glass reinforced polyamide • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz • 115 ... 230 V AC, 50/60 Hz, with HART | 7ME6910-1AA30-1AA0 7ME6910-1AA10-1AA0 7ME6910-1AA10-1BA0 |  |
| Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer, without verification (no approval marks - only a complete flowmeter can be verified, i.e. sensor together with the transmitter); IP67/NEMA 4X/6, fibre glass reinforced polyamide • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | 7ME6910-1AA30-1AD0 7ME6910-1AA10-1AD0 |  |
| Transmitter MAG 5000 for 19" rack and wall mounting • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | 7ME6910-2CA30-1AA0 7ME6910-2CA10-1AA0 |  |

Transmitter MAG 6000

| Description | Article No. | |
|--|--|---|
| Transmitter MAG 6000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1AA30-0AA0 7ME6920-1AA10-0AA0 |  |
| Transmitter MAG 6000 Display for compact and wall mounting; IP67/NEMA 4X, fibre glass reinforced polyamide • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1AA30-1AA0 7ME6920-1AA10-1AA0 |  |
| Transmitter MAG 6000 for compact and wall mounting; IP65/NEMA 4, 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 • 115 ... 230 V AC, 50/60 Hz | 7ME6920-1QA30-1AA0 7ME6920-1QA10-1AA0 |  |

Selection and ordering data (continued)

| Description | Article No. | |
|--|---|---|
| <p>Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer, without verification (no approval marks - only a complete flowmeter can be verified, i.e. sensor together with the transmitter); IP67/NEMA 4X/6, fibre glass reinforced polyamide</p> <ul style="list-style-type: none"> • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | <p>7ME6920-1AA30-1AD0</p> <p>7ME6920-1AA10-1AD0</p> |  |
| <p>Transmitter MAG 6000 SV for compact and wall mounting; special excitation frequency 44 Hz for Batch application DN ≤ 25/1" IP67/NEMA 4X/6, fibre glass reinforced polyamide</p> <ul style="list-style-type: none"> • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | <p>7ME6920-1AB30-1AA0</p> <p>7ME6920-1AB10-1AA0</p> |  |
| <p>Transmitter MAG 6000 for 19" rack and wall mounting</p> <ul style="list-style-type: none"> • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | <p>7ME6920-2CA30-1AA0</p> <p>7ME6920-2CA10-1AA0</p> |  |
| <p>Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation frequency 44 Hz for Batch application DN ≤ 25/1"</p> <ul style="list-style-type: none"> • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | <p>7ME6920-2CB30-1AA0</p> <p>7ME6920-2CB10-1AA0</p> |  |
| <p>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</p> | 7ME6920-2EA10-1AA0 |  |
| <p>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</p> <ul style="list-style-type: none"> • For ATEX 2G D sensors | 7ME6920-2MA11-1AA0 |  |
| <p>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</p> <ul style="list-style-type: none"> • 11 ... 30 V DC/11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz | <p>7ME6920-1EB30-1AA0</p> <p>7ME6920-1EB10-1AA0</p> |  |


Operating instructions for SITRANS FM MAG 5000/6000

| Description | Article No. |
|-----------------------------------|--|
| For SITRANS FM MAG 5000/6000 IP67 | A5E02338368 A5E02944982 |
| For SITRANS FM MAG 5000/6000 19" | A5E02082880 |

All literature is available to download for free, in a range of languages, at

<http://www.siemens.com/processinstrumentation/documentation>

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 | |

Operating instructions for SITRANS F add-on modules

| Description | Article No. |
|---------------------|--|
| HART | A5E03089708 |
| PROFIBUS PA/DP | A5E00726137 A5E01026429 |
| Modbus | A5E00753974 A5E03089262 |
| FOUNDATION Fieldbus | A5E02318728 A5E02488856 |
| DeviceNet | A5E03089720 |

This device is shipped with Safety Notes and a DVD containing further SITRANS FM literature.

All literature is available to download for free, in a range of languages, at

<http://www.siemens.com/processinstrumentation/documentation>




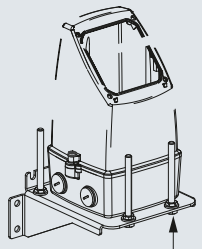

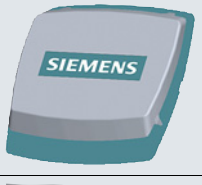

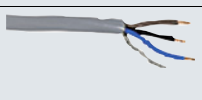
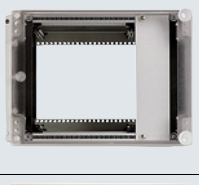
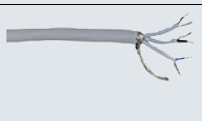
Flow Measurement

SITRANS FM (electromagnetic) Transmitters

MAG 5000/6000

Selection and ordering data (continued)

Accessories for MAG 5000 and MAG 6000

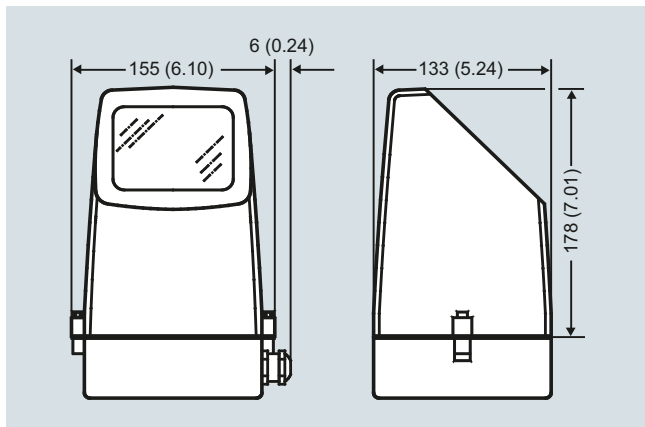
| Description | Article No. | | Description | Article No. | |
|--|--|---|--|--|---|
| Accessory kit for remote use of sensor with two 5-pin terminal blocks | A5E34827189 |  | Low-noise electrode coaxial cable for low conductivity and high vibration levels, 3 × 0.13 mm ² , Temperature range -25 °C ... +85 °C (-13 °F ... +185 °F) | A5E02272692 A5E02272723 A5E02272730 |  |
| Wall mounting unit for MAG 5000/6000 with IP67/NEMA 4X/6, terminal box in polyamide ²⁾ | FDK:085U1018 FDK:085U1053 |  | Cable kit including standard coil cable (3 × 1.5 mm ² /18 gage, single shielded with PVC jacket) and special electrode cable ¹⁾ (3 × 0.25 mm ² , double shielded with PVC jacket). Temperature range -30 °C ... +70 °C (-22 °F ... +158 °F) | A5E02296329 A5E01181647 A5E02296464 A5E01181656 A5E02296490 A5E02296494 A5E01181686 A5E02296498 A5E01181689 A5E01181691 A5E01181699 A5E01181703 A5E01181705 |  |
| Special wall mounting unit for MAG 5000/6000 IP67/NEMA 4X/6, mounting bracket in stainless steel AISI 316 (1.4401), terminal box in polyamide | A5E36699702 A5E36699938 |  | Potting kit for IP68/NEMA 6P sealing of sensor junction box | FDK:085U0220 |  |
| Sun lid for MAG 5000/6000 transmitter (Frame and lid) | A5E02328485 |  | 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 |  |
| Standard coil or electrode cable, 3 × 1.5 mm ² /18 gage, single shielded with PVC jacket; Temperature range -30 °C ... +70 °C (-22 °F ... +158 °F) | A5E02296523 FDK:083F0121 FDK:083F0210 A5E02297309 FDK:083F0211 A5E02297317 FDK:083F0212 FDK:083F0213 FDK:083F3052 FDK:083F3053 FDK:083F3054 |  | Front panel mounting enclosure IP65/NEMA 2 in ABS plastic for 19" insert (21 TE) | FDK:083F5030 |  |
| Special electrode cable ¹⁾ (empty pipe detection or low conductivity), 3 × 0.25 mm ² double shielded with PVC jacket; Temperature range -30 °C ... +70 °C (-22 °F ... +158 °F) | FDK:083F3020 FDK:083F3095 FDK:083F3094 FDK:083F3093 FDK:083F3092 FDK:083F3056 FDK:083F3057 FDK:083F3058 |  | Front panel mounting enclosure IP65/NEMA 2 in ABS plastic for 19" insert (42 TE) | FDK:083F5031 |  |

¹⁾ Safety cables cannot be used with 19" safety barrier

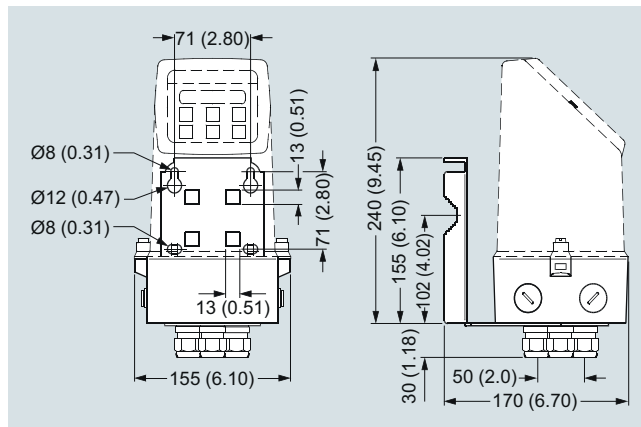
²⁾ For stainless steel wall mounting kit, order:
- M20: FDK:085U1018 and A5E00836867
- 1/2" NPT: FDK:085U1053 and A5E00836868

Dimensional drawings

Transmitter IP67/NEMA 4X/6 compact polyamide

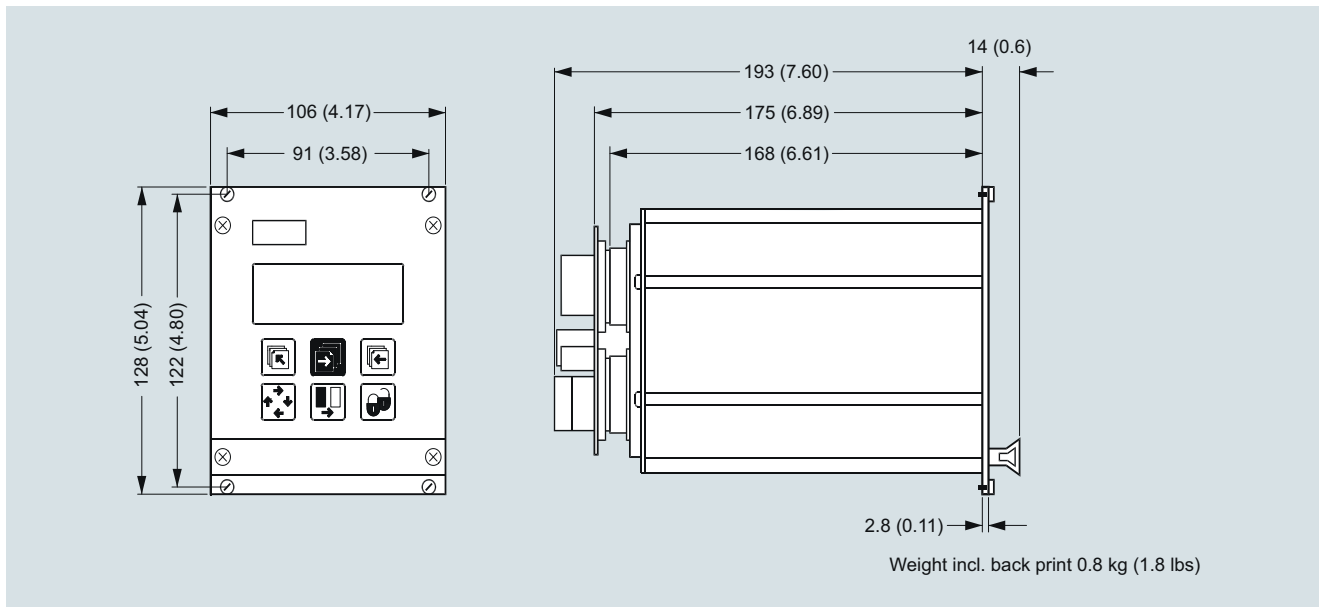


Transmitter compact mounted, dimensions in mm (inch)



Transmitter wall mounted, dimensions in mm (inch)

Transmitter, 19" IP20/NEMA 1 standard unit



Dimensions in mm (inch)