

Overview



SITRANS FUS060 transmitter

SITRANS FUS060 is a transit time based transmitter designed for ultrasonic flowmetering with any sensor in the FUS in-line series up to DN 4000. SITRANS FUS060 is engineered for high performance and is suitable for 1-, 2- and 4-tracks flowmeters.

Benefits

- Superior signal resolution for optimum turn down ratio
- Simple menu-based local operation with two-line display and four optical input elements, for unlimited use in potentially explosive atmospheres
- Self-monitoring and diagnostic
- Operate up to 4-tracks
- ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3
- Remote installation up to 120 m from sensor
- 1 analog output (4 to 20 mA) standard with HART-protocol, 1 digital frequency or pulse output, 1 relay output for limit, alarms, flow direction
- PROFIBUS PA Profile 2, 1 digital frequency or pulse output

Design

The transmitter type FUS060 is designed for remote installation in non-hazardous or hazardous areas.

The transmitter is designed for use in a flowmeter system together with sensors type SONOKIT, SONO 3300 and SONO 3100.

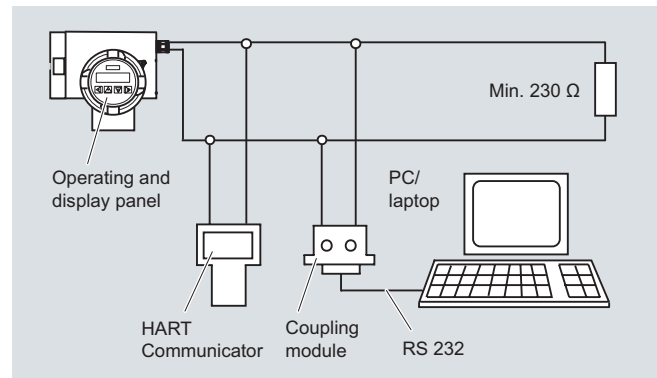
The FUS060 is ordered as part of a complete flowmeter system. It can be ordered separately as spare part and manually programmed with the sensor data.

Function

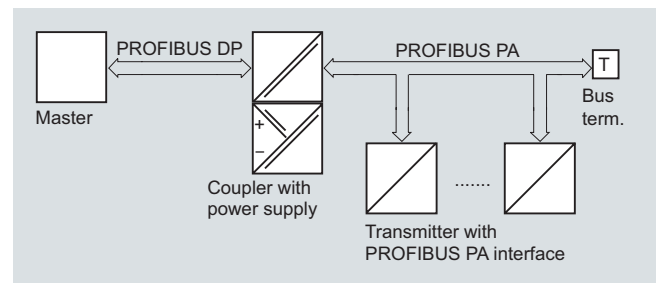
Displays and keypad

Operation of the SITRANS FUS060 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 PA communication

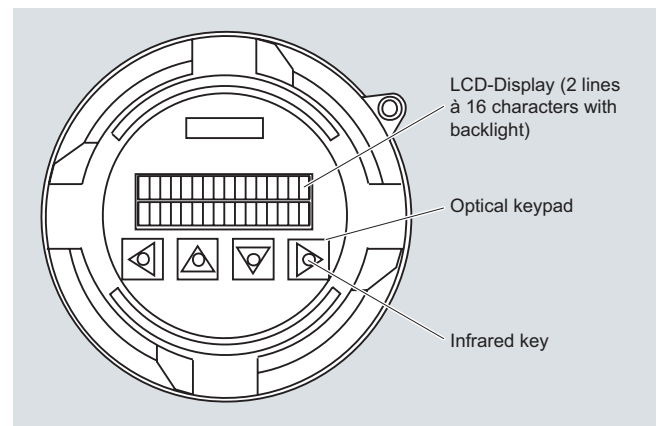


HART communication



PROFIBUS PA communication

The operating and display panel permits simple operation without supplementary equipment. It is not necessary to open the housing. All changes to a setting can therefore also be carried out in the potentially explosive atmosphere.



Operating and display panel

SITRANS F flowmeters

SITRANS F US

Transmitter FUS060

The individual functions and parameters are selected using a hierarchical, multi-language input menu and four infrared keys. The parameters can be specifically selected and modified using codes, e.g.:

- Operating parameters such as measuring range, physical dimensions, device information
- Limits for flow, totalizer, ultrasonic velocity or ultrasonic amplitude
- Noise suppression using damping, error stages and hysteresis
- Display parameters (freely-configurable display)
- Display in volume or mass dimensions
- Density as constant input value for conversion of volume into mass dimensions
- Forward/backward measurement
- Flow direction
- Diagnostics functions and control values
- Functions of the PROFIBUS PA output: flow, net quantity (volume or mass), ultrasonic velocity, ultrasonic amplitude, forward quantity (volume or mass), backward quantity (volume or mass)
- Functions of the analog output: flow, ultrasonic velocity or ultrasonic amplitude
- Functions of digital output 1: pulse output, frequency output, limit, flow direction or device status
- Functions of digital output 2: limit, flow direction or device status
- Simulation of output signal via analog output, digital output 1 and digital output 2

The HART protocol is implemented via the analog output (current output). Using this communication facility, the device can be parameterized with a PC/laptop and SIMATIC PDM software in addition to local operation.

In the SITRANS F version with PROFIBUS PA, the analog output is replaced by the digital PROFIBUS PA output. The device can then be parameterized via PROFIBUS communication and with SIMATIC PDM in addition to local operation.

Technical specifications

Input

| | |
|--|---|
| Nominal diameters and measuring ranges | 2-track DN 50 ... DN 4000 (optionally also for 1 and 4-track) |
| Max. cable length | 120 m (395 ft) (shielded coaxial cable). For Ex version the transducer cable length is restricted to 3 m (9.84 ft) in order to meet requirements for electrical immunity. |

Output

| | |
|---|--|
| Analog output | Active current output (13.2 V < open loop voltage < 15.8 V) |
| • Signal range | 4 ... 20 mA |
| • Upper limit | 20 ... 22.5 mA, adjustable |
| • Signal on alarm | 3.6 mA, 22 mA, or 24 mA |
| • Load | Max. 600 Ω ; for non Ex version $\geq 230 \Omega$ for HART communication $\geq 330 \Omega$ for Ex-version |
| • Only PROFIBUS PA version: | Analog output omitted, is replaced by digital PROFIBUS PA interface |
| Digital output 1 | |
| • Active or passive signal, can be configured with positive or negative logic | Active: 24 V DC, ≤ 24 mA, $R_i = 300 \Omega$ Passive: open collector, 30 V DC, ≤ 200 mA |
| • For explosion protection (ATEX version) | Passive: open collector 30 V DC, ≤ 100 mA |

| | |
|---|---|
| • Only PROFIBUS PA version: | Only passive signals for digital output 1 |
| • Output function, configurable | Pulse output <ul style="list-style-type: none"> • Adjustable pulse significance ≤ 5000 pulses/s • Adjustable pulse width ≥ 0.1 ms Frequency response <ul style="list-style-type: none"> • f_{END} selectable up to 10 kHz Limit for flow, totalizers, ultrasonic velocity or ultrasonic amplitude device status, flow direction |
| Digital output 2 | |
| • Relay, NC or NO contact | Switching capacity max. 5 W Max. 50 V DC, max. 200 mA DC Self-resetting fuse, $R_i = 9 \Omega$ |
| • For explosion protection (ATEX version) | Max. 30 V DC, max 100 mA DC, 50 mA AC (cf. EC-Type Examination certificate) |
| • Output function, configurable | Limit for flow, ultrasonic velocity or ultrasonic amplitude flow direction device status Digital output 2 omitted |
| • Only PROFIBUS PA version: | Digital output 2 omitted |
| Communication via analog output 4 ... 20 mA | |
| • PC/laptop or HART communicator with SITRANS F flowmeter | |
| - Load with connection of coupling module | min. 230 Ω (max. 330 Ω for Ex-version) |
| - Load with connection of HART communicator | min. 230 Ω |
| - Cable | 2-wire shielded ≤ 3 km (≤ 1.86 miles) Multi-core shielded ≤ 1.5 km (≤ 0.93 miles) |
| - Protocol | HART, version 5.1 |
| Communication via PROFIBUS PA interface | Layers 1 + 2 according to PROFIBUS PA Communication system according to IEC 1158-2 Layer 7 (protocol layer) according to PROFIBUS DP, EN 50170 standard |
| • Power supply | Separate supply, four-wire device Permissible bus voltage 9 ... 32 V See certificates and approvals |
| • Current consumption from bus | 10 mA; ≤ 15 mA in event of error with electronic current limiting |
| Electrical isolation | Outputs electrically isolated from power supply and from one another |
| Accuracy | |
| Error in measurement (at reference conditions) | |
| • Pulse output | $\leq \pm 0.5\%$ of measured value at 0.5 ... 10 m/s or $\leq \pm 0.25\sqrt{V[m/s]}$ of measured value at flow < 0.5 m/s |
| • Analog output | As pulse output plus $\pm 0.1\%$ of measured value, $\pm 20 \mu A$ |
| • Repeatability | $\leq \pm 0.25\%$ of measured value at 0.5 ... 10 m/s |

SITRANS F flowmeters

SITRANS F US

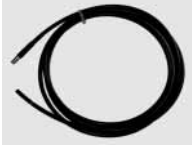
Transmitter FUS060

| | |
|--|---|
| Reference conditions | |
| • Process temperature | 25 °C ± 5 °C (77 °F ± 9 °F) |
| • Ambient temperature | 25 °C ± 5 °C (77 °F ± 9 °F) |
| • Warming-up time | 30 min. |
| Installation conditions | Upstream section > 10 x DN and downstream section > 5 x DN |
| Rated operation conditions | |
| <u>Ambient conditions</u> | |
| Ambient temperature | |
| • Operation | -20 ... +50 °C (-4 ... +122 °F) |
| • In potentially explosive atmospheres | Observe temperature classes |
| • Storage | -25 ... +80 °C (-13 ... +176 °F) |
| Enclosure rating | IP65 (NEMA 4) |
| Electromagnetic compatibility | For use in industrial environments |
| • Emitted interference | To EN 61000-6-3 (Light industry) |
| • Noise immunity | To EN 61000-6-2 (Industry) |
| <u>Medium conditions</u> | |
| • Process temperature | -200 ... +250 °C (-328 ... +482 °F) |
| • Gases/solids | Influence accuracy of measurement (approx. max. 3% gases or solids) |
| Design | |
| Separate version | Transmitter is connected to the transducers via 3 ... 120 m (9.8 ... 395 ft) long specially shielded cables (coaxial cable) For ATEX versions mounted in the Ex area only with 3 m long cables. |
| Enclosure material | Die-cast aluminum, painted |
| Wall mounting bracket (standard and special) | Stainless steel (standard: always incl.) |
| Weight of transmitter | 4.4 kg (9.7 lb) |
| Electrical connection | Cable glands (always incl.) <ul style="list-style-type: none"> • Power supply and outputs <ul style="list-style-type: none"> - 2 x M20 (HART) / M25 (PROFIBUS) or - 2 x ½"-NPT (HART) • Transducers/sensor <ul style="list-style-type: none"> - 2/4 x M16 or - 2/4 x ½" NPT |
| Displays and controls | |
| Display | LCD, two lines with 16 characters each |
| • Multi-display: | Flow, volume, mass flow, mass, flow velocity, speed of sound, ultrasonic signal information, current, frequency, alarm information |
| 2 freely-selectable values are displayed simultaneously in two lines | |
| Operation | 4 infrared keys, hierarchical menu prompting with codes |
| Power supply | |
| Supply voltage | |
| • Standard version | 120 ... 230 V AC ± 15% (50/60 Hz) or 19 ... 30 V DC / 21 ... 26 V AC |
| • Ex version | 19 ... 30 V DC / 21 ... 26 V AC |
| Power failure | No effect for at least 1 period (> 20 ms) |
| Power consumption | Approx. 10 VA / 10 W |

Certificates and approvals

| | |
|----------------------|---|
| Explosion protection | ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3 T6 for media < 85 °C (185 °F) T5 for media < 100 °C (212 °F) T4 for media < 135 °C (275 °F) T3 for media < 200 °C (392 °F) |
|----------------------|---|

Coaxial cable

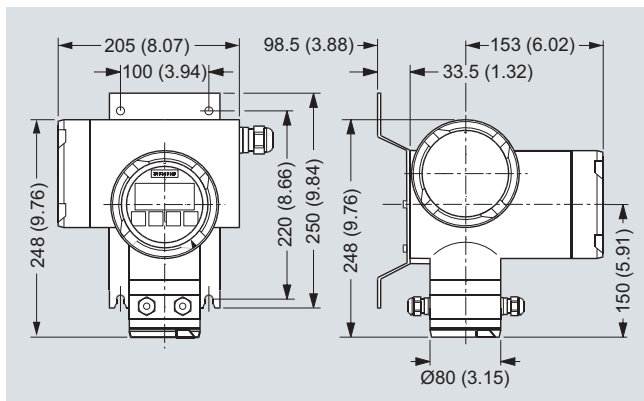
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| Standard Coaxial cable (75 Ω) | Coaxial cable with SMB straight plug on one end for the FUS060 connector |  |
| Outside diameter | Ø 5.8 mm | |
| Length | 3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter | |
| Material (outside jacket) | black PE | |
| Ambient temperature | -10 ... +70 °C (14 ... 158 °F) | |
| High temperature Coaxial cable (75 Ω) | Coaxial cable with SMB straight plug on one end for the FUS060 connector | |
| Outside diameter | Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm) | |
| Length | 3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max 3 m 9.84 ft) transducer cable length for Ex area mounted transmitters) | |
| Material (outside jacket) | Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable) | |
| Ambient temperature | -200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part) | |

SITRANS F flowmeters

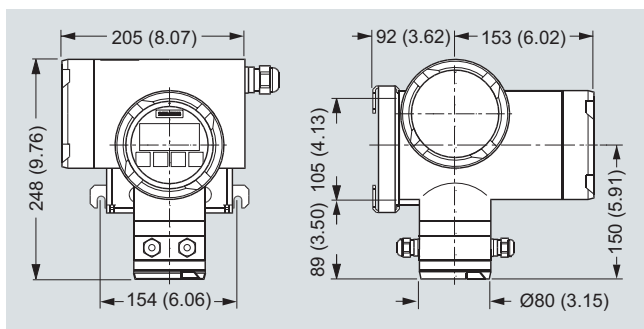
SITRANS F US

Transmitter FUS060

Dimensional drawings

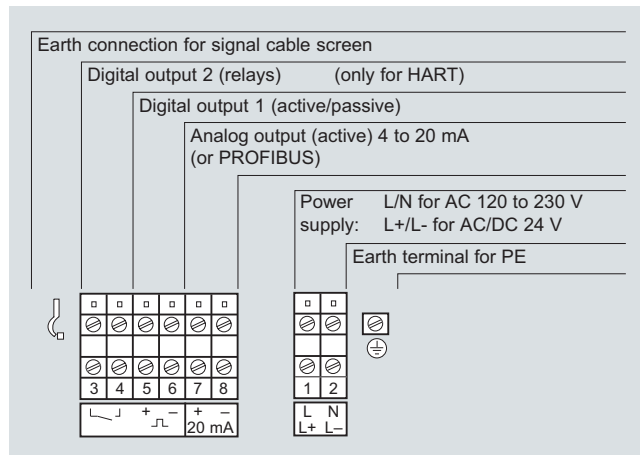


SITRANS FUS060 with standard mounting bracket, dimensions in mm (inch)



SITRANS FUS060 with optional special mounting bracket, dimensions in mm (inch)

Schematics



Electrical connection SITRANS FUS060

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Transmitter FUS060 accessories and spare parts

SITRANS FUS060 transmitter, available standard and Ex versions

The transmitter configuration is made in the flowmeter order codes (together with the sensors). Here only for spare part ordering.

| Description | Version | Enclosure | Supply | Order No. |
|---|-----------------------------------|--------------------------------|------------------------------------|---------------------------|
| FUS060, 230 V, HART, Metric cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 115 ... 230 V AC 50/60 Hz | 7ME3050-2BA10-1BA1 |
| FUS060, 230 V, HART, Imperial cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 115 ... 230 V AC 50/60 Hz | 7ME3050-2BA10-1BA2 |
| FUS060, 230 V, PROFIBUS, Metric cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 115 ... 230 V AC 50/60 Hz | 7ME3050-2BA10-1DA1 |
| FUS060, 230 V, PROFIBUS, Imperial cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 115 ... 230 V AC 50/60 Hz | 7ME3050-2BA10-1DA2 |
| FUS060, 24 V, HART, Metric cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 19 ... 30 V DC / 21 ... 26 V AC | 7ME3050-2BA20-1BA1 |
| FUS060, 24 V, HART, Imperial cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 19 ... 30 V DC / 21 ... 26 V AC | 7ME3050-2BA20-1BA2 |
| FUS060, 24 V, PROFIBUS, Metric cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 19 ... 30 V DC / 21 ... 26 V AC | 7ME3050-2BA20-1DA1 |
| FUS060, 24 V, PROFIBUS, Imperial cable glands | Transmitter for remote connection | IP65 (NEMA 4) | 19 ... 30 V DC / 21 ... 26 V AC | 7ME3050-2BA20-1DA2 |
| FUS060, ATEX, 24 V, HART, Metric cable glands | Transmitter for remote connection | IP65 (NEMA 4) ATEX approval | 19 ... 30 V DC / 21 ... 26 V AC | 7ME3050-2BA21-1CA1 |
| FUS060, ATEX, 24 V, PROFIBUS, Metric cable glands | Transmitter for remote connection | IP65 (NEMA 4) ATEX approval | 19 ... 30 V DC / 21 ... 26 V AC | 7ME3050-2BA21-1EA1 |










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.






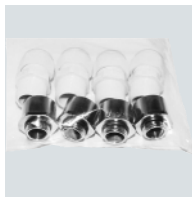
SITRANS F flowmeters

SITRANS F US


Transmitter FUS060

SITRANS FUS060 spare parts

| Type/description | Order No. | |
|--|----------------------|---|
| Operating/Display module for FUS060 | 7ME5933-0AC00 |  |
| Electronics cover with glass plate (non Ex) | 7ME5933-0AC01 |  |
| Cover for sensor cable and gasket | 7ME5933-0AC02 |  |
| Cover for mains supply/communication | 7ME5933-0AC03 |  |
| Standard wall mounting bracket for SITRANS FUS060 transmitter | 7ME5933-0AC04 |  |
| Special wall-/pipe mounting bracket kit for SITRANS FUS060 transmitter | 7ME5933-0AC05 |  |
| Safety clamp for electronic cover with glass plate (7ME5933-0AC01) | 7ME5933-0AC06 |  |

| Type/description | Order No. | |
|---|--------------------|---|
| M20 cable gland set for FUS060 (M20) power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... 100 °C (-40 ... 212 °F) | A5E02246350 |  |
| M20 cable gland set for FUS060 ATEX version power and output connection, PA plastic, 1 x in blue (ATEX Ex-i) and 1 x gray (ATEX Ex-e) • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... 95 °C (-4 ... 203 °F) | A5E02246356 |  |
| 1/2" NPT cable gland set for FUS060 (NPT) power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... 100 °C (-40 ... 212 °F) | A5E02246396 |  |
| M25 cable gland set for the FUS060 PA (M25) power and output connection, gray PA plastic, 2 pcs. • cables Ø 9 ... 16 mm (0.35" ... 0.63") • -40 ... 100 °C (-40 ... 212 °F) | A5E02246378 |  |
| M16 x 1.5 cable gland set for FUS060 (M16) sensor connection, brass chrome, 2 pcs. and 2 pcs. blind • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... 105 °C (-4 ... 221 °F) | A5E02246369 |  |
| 1/2" NPT cable gland set for FUS060 (NPT) sensor connection, 4 pcs. M16 bush to 1/2" NPT and 4 pcs. 1/2" NPT gray PA plastic glands • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... 100 °C (-4 ... 212 °F) | A5E02247877 |  |

Cables for FUS060

| Type/description | Length m (ft) | Order No | |
|--|---------------|---------------------------------|---|
| Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.) | 3 (9.84) | A5E00875101 |  |
| | 15 (49.21) | A5E00861432 | |
| | 30 (98.43) | A5E01278662 | |
| | 60 (196.85) | A5E01278682 | |
| | 90 (295.28) | A5E01278687 | |
| | 120 (393.70) | A5E01278698 | |
| High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.) | 3 (9.84) | A5E00875105^{F)} | |
| | 15 (49.21) | A5E00861435 | |
| | 30 (98.43) | A5E01196952^{F)} | |

F) Subject to export regulations AL: 9I999, ECCN: N.