

Transmitter MASS 6000 IP67 compact/remote

Overview



MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multiparameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

The MASS 6000 IP67 transmitter can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 40, and can be used in remote version for all types of MASS 2100/MC2 and FC300 sensors.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm.
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances troubleshooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as BRIX or PLATO
- Digital input for batch control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Self-explaining error handling/log in text format
 - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start-up providing:
 - Factory pre-programming with calibration data, pipe size, sensor type, output settings
 - Any values or settings changed by users are stored automatically
 - Automatically re-programming any new transmitter without loss of accuracy
 - Transmitter replacement in less than 5 minutes.
 - True "plug & play"

- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow.
- Fraction flow computation based on a 5th-order algorithm matching all applications.
- USM II platform enables fitting of add-on bus modules without loss of functionality.
 - All modules can be fitted through true "plug & play"
 - Module and transmitter are automatically configured through the SENSORPROM.
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal.

Application

SITRANS F C mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

The main applications for the MASS 6000 IP67 transmitter can be found in:

- Food and beverage industries
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed in an IP67/NEMA 4X compact polyamide enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 40 (1/8" to 1½") and remote mounted for the entire sensor series.

The MASS 6000 IP67 is available as standard with 1 current, 1 frequency/pulse and 1 relay output and can be fitted with add-on modules for bus communication.

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Error system consisting of error-log, error pending menu
- Display of operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter troubleshooting

Flow Measurement

SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ , (lbs/ft ³)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 99.9 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle
Time constant	0 ... 99.9 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, flow direction
Digital input	11 ... 30 V DC (R _i = 13.6 kΩ)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galva- nically isolated, isolation voltage 500 V.
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for for- ward, net or reverse flow
Display	<ul style="list-style-type: none"> Background illumination with al- phanumerical text, 3 × 20 cha- racters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 Reverse flow indicated by nega- tive sign
Zero point adjustment	Via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F), max. rel. humidity 80 % at 31 °C (87.8 °F) decreasing to 50 % at 40 °C (104 °F) according to IEC/EN/UL 61010-1
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95%)
Communication	Add-on modules: HART, PROFIBUS PA and DP, MODBUS RTU RS 485, DeviceNet, FOUNDATION Fieldbus H1



Enclosure	
Material	Fibre glass reinforced polyamide
Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17 Grms, in all directions, to IEC 68-2-36
Supply voltage	
24 V version	
• Supply	24 V DC/AC, 50 ... 60 Hz
• Fluctuation	18 ... 30 V DC 20 ... 30 V AC
• Power consumption	10 W
230 V version	
• Supply	87 ... 253 V AC, 50 ... 60 Hz
• Power consumption	26 VA
Fuse	
• 230 V version	T 400 mA, T 250 V (IEC 127) - not replaceable by operator
• 24 V version	T 1 A, T 250 V (IEC 127) - not replaceable by operator
EMC performance	
Emission	EN/IEC 61000-6-4 (Industry)
Immunity	EN/IEC 61000-6-2 (Industry)
NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Environment	
Environmental conditions acc. to IEC/EN/UL 61010-1:	<ul style="list-style-type: none"> Altitude up to 2000 m POLLUTION DEGREE 2
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Cable glands	Two types of cable gland are available in polyamide in the fol- lowing dimensions: M20 or ½" NPT

Transmitter MASS 6000 IP67 compact/remote

Selection and Ordering data	Order No.
SITRANS F C MASS 6000 transmitter Transmitter for wall mounting with wall mounting bracket, fibre glass reinforced polyamide (1 current output, 1 frq./pulse output, 1 relay output and connection board/PCB)	7ME4110 - AA0 - A
Version Remote IP67/NEMA 4X enclosure	2
Supply voltage 115/230 V AC, 50 ... 60 Hz 24 V AC/DC	1 2
Display/Keypad with display	1
Serial communication No communication HART PROFIBUS PA Profile 3 PROFIBUS DP Profile 3 MODBUS RTU RS 485 DeviceNet FOUNDATION Fieldbus H1	A B F G E H J
Cable glands M20 ½" NPT	1 2


Please also see www.siemens.com/SITRANSforordering for practical examples of ordering


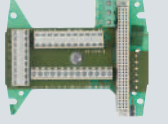



AccessoriesCable glands

Description	Order No.	
Cable glands, screwed entries type in polyamide (100 °C (212 °F)) black, 2-off • M20 • ½" NPT	A5E00822490 A5E00822501	
Display and keypad • Siemens Front	FDK-085U1039	

Note: The operating instructions should be ordered as a separate line item on the order.

Spare parts for compact or remote IP67 version

Description	Order No.	
MASS 6000 transmitter IP67/NEMA 4X Fibre glass reinforced polyamide and without connection board 1 current output 1 frq./pulse output 1 relay output • 115/230 V AC, 50/60 Hz • 24 V AC/DC	7ME4110-1AA10-1AA0 7ME4110-1AA20-1AA0	

Description	Order No.	
Wall mounting unit for IP67/NEMA 4X version with wall bracket, without connection board but with • 4 x M20 cable glands • 4 x ½" NPT cable glands	FDK-085U1018 A5E01164211	
Connection board/PCB Supply voltage: 115/230 V/24 V AC/DC	FDK-083H4260	
Terminal box kit with • M20 cable glands • ½" NPT cable glands Change from remote to compact mounting of MASS 6000 IP67/NEMA 4X with MASS 2100. The kit consists of a terminal box in polyamide incl. connection board, cable and connector between PCB and sensor pedestal, PCB, seal and screws (4 pcs.) for mounting on sensor	A5E00832338 ^{F)} A5E00832342 ^{F)}	
Terminal box with • M20 cable glands • ½" NPT cable glands	FDK-085U1050 A5E01164206	
Terminal box – lid in polyamide	FDK-085U1003	
Sun lid for MASS 6000 transmitter (Frame and lid)	A5E02328485	


Operating instructions for SITRANS F C MASS 6000 IP67

Description	Order No.
Operating instructions for SITRANS F C MASS 6000 IP67 • English	A5E03071936

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>

Add-on module

Description	Order No.	
HART	FDK-085U0226	
PROFIBUS PA Profile 3	FDK-085U0236	
PROFIBUS DP Profile 3	FDK-085U0237	
MODBUS RTU RS 485	FDK-085U0234	
FOUNDATION Fieldbus H1	A5E02054250	
DeviceNet	FDK-085U0229	

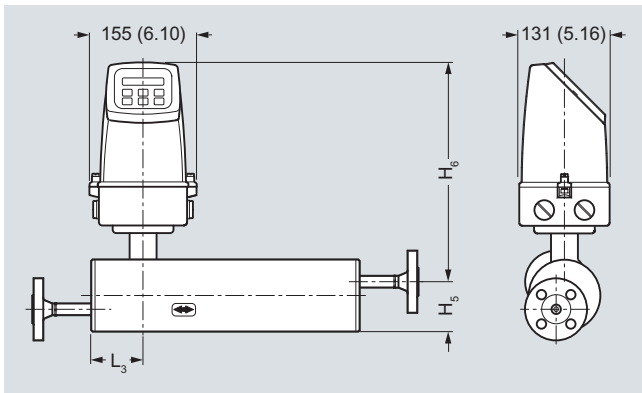
F) Subject to export regulations AL: 91999, ECCN: N.

Flow Measurement SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

Dimensional drawings

Compact

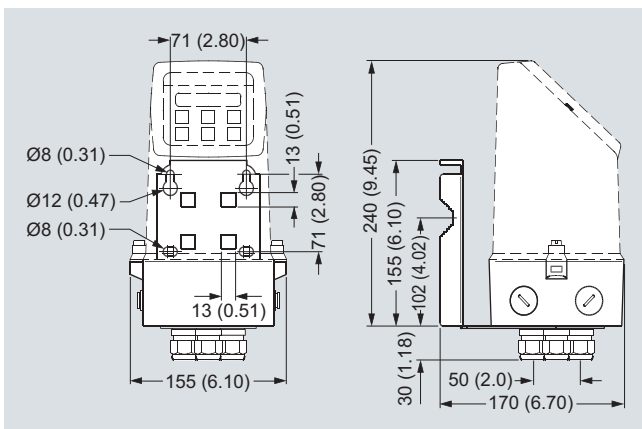


Dimensions in mm (inch)

MASS 2100

Sensor size [Di (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (1/4)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (1/2)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)
25 (1)	75 (2.95)	173 (6.81)	330 (13.00)	503 (19.80)
40 (1 1/2)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

Transmitter wall mounted



Dimensions in mm (inch)

Schematics

Electrical connection

Grounding

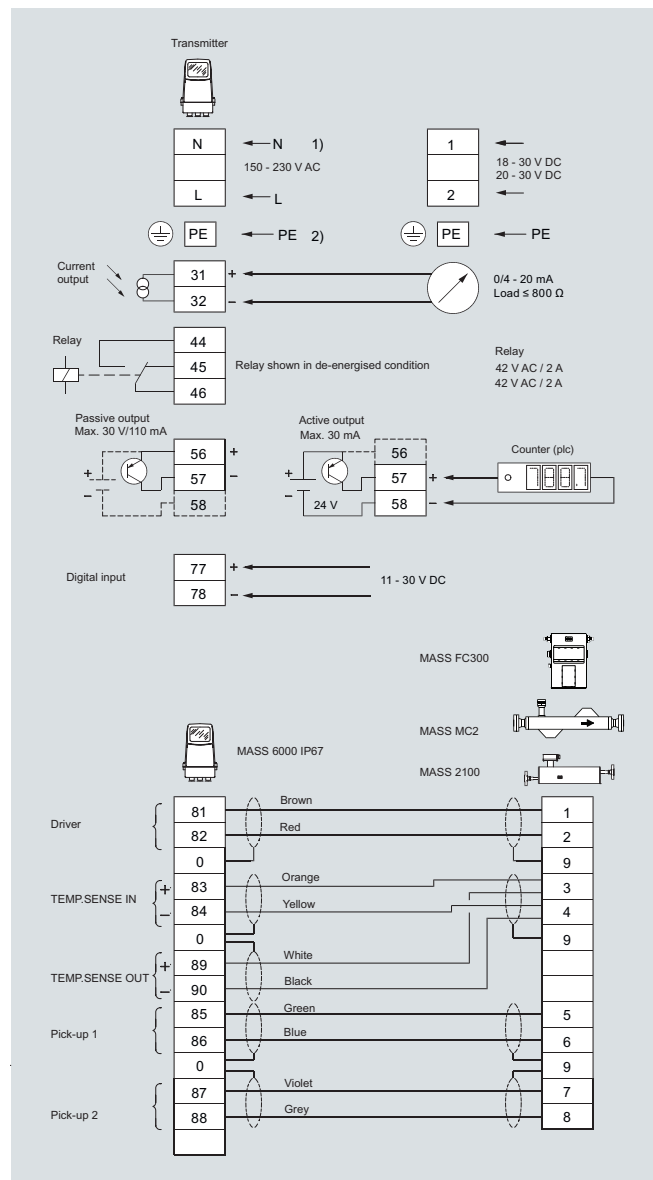
PE must be connected due to safety class 1 power supply.

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 long cables are used in a noisy environment, it is recommended to use shielded cables.



Transmitter MASS 6000 for 19" insert/19" wall mounting

Overview



MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multi parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

The MASS 6000 19" transmitter can be connected to all sensors of types MASS 2100/MC2/FC300 and are available in different versions depending of number of output facilities, Ex protection and grade of enclosure.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm.
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances troubleshooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as BRIX or PLATO
- Many output capacities, up to 3 current, 2 frequency/pulse and 2 relay outputs (excludes the possibility of an add-on module)
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Self-explaining error handling/log in text format
 - Keypad can be used for controlling batch as start/stop/hold/reset

- SENSORPROM technology automatically configures transmitter at start-up providing:
 - Factory pre-programming with calibration data, pipe size, sensor type, output settings
 - Any values or settings changed by users are stored automatically
 - Automatically re-programming any new transmitter without loss of accuracy
 - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on a 5th-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality.
 - All modules can be fitted as true "plug & play"
 - Module and transmitter automatically configured through the SENSORPROM.
- Transmitter available with ATEX and UL approval
- All electrical connections are easily accessible on the large back plane PCB

Application

SITRANS F C Coriolis mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter can measure both liquids and gases.

The main applications for the MASS 6000 19" transmitter can be found in:

- Chemical and pharmaceutical industries
- Food and beverage industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed as a 19" insert as base to be used in:

- 19" rack system
- Panel mounting IP66/NEMA 4
- Back of panel mounting IP20/NEMA 1
- Wall mounting IP66/NEMA 4

The MASS 6000 19" is available as standard or as ATEX-approved transmitter which is to be mounted in the safe area.

Flow Measurement

SITRANS F C

Transmitter MASS 6000 for 19" insert/19" wall mounting

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 2 output versions available as standard:
 - 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
 - 3 current outputs, 2 frequency/pulse outputs, 2 relay outputs, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction
- Error system consisting of error-log, error pending menu
- Operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed-back
- Full service menu for effective and straight forward application and meter troubleshooting

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ (lbs/ft ³)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 99.9 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50 % duty cycle
Time constant	0 ... 30 s adjustable
Active	24 V DC, 30 mA, 1 kΩ ≤ R _{load} ≤ 10 kΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 kΩ ≤ R _{load} ≤ 10 kΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, direction
Digital input	11 ... 30 V DC
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V.
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow

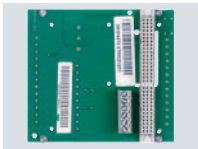
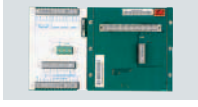
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	<ul style="list-style-type: none"> • Background illumination with alphanumeric text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults • Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
Communication	Add-on modules: HART, PROFIBUS PA and DP, MODBUS RTU RS 485, DeviceNet, FOUNDATION Fieldbus H1
Enclosure 19"	
Material	Aluminium/steel (DIN 41494)
Rating	IP20/NEMA 1 to IEC 529 and DIN 40050 (1 mH ₂ O for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17G rms, in all directions, to IEC 68-2-36
Supply voltage	<ul style="list-style-type: none"> • 87 ... 253 V AC +10 % ... -10 %, 50 ... 60 Hz • 18 ... 30 V DC or 20 ... 30 V AC
Power consumption	
230 V AC	9 VA max.
24 V DC	6 W I _N = 250 mA, I _{ST} = 2 A (30 ms)
EMC performance	
Emission	EN/IEC 61000-6-4 (Industry)
Immunity	EN/IEC 61000-6-2 (Industry)
Ex approval	[EEx ia] IIC, DEMKO 03 ATEX 135251X
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Fuse	T 400 mA, T 250 V (IEC 127), not replaceable by operator
Cable	<ul style="list-style-type: none"> • Max. 300 m • C: max. 300 [pF/m]; L_C/R_C: max. 100 [μH/Ω] • The total cable capacity must be max. 200 nF.
Cable glands	The cable gland is available in polyamide, in dimension: PG 13.5

Flow Measurement

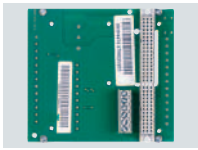
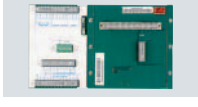
SITRANS F C

Transmitter MASS 6000 for 19" insert/19" wall mounting

Connection boards/PCB for MASS 6000 and MASS 2100 sensors

Description	Version	Order No.	
Connection board MASS 6000 for 19" IP20 rack mounting version	24 V 115/230 V	FDK-083H4272	
Connection board MASS 6000 EEx [ia] IIC for 19" IP20 rack mounting version	24 V 115/230 V	FDK-083H4273	
Connection board MASS 6000 for 19" wall mounting version, for enclosure FDK-083F5037/FDK-083F5038	24 V 115/230 V	FDK-083H4274	
Connection board MASS 6000 EEx [ia] IIC for 19" wall mounting version, for enclosure FDK-083F5037/FDK-083F5038	24 V 115/230 V	FDK-083H4275	

Connection boards/PCB for MASS 6000 and MC2 sensors

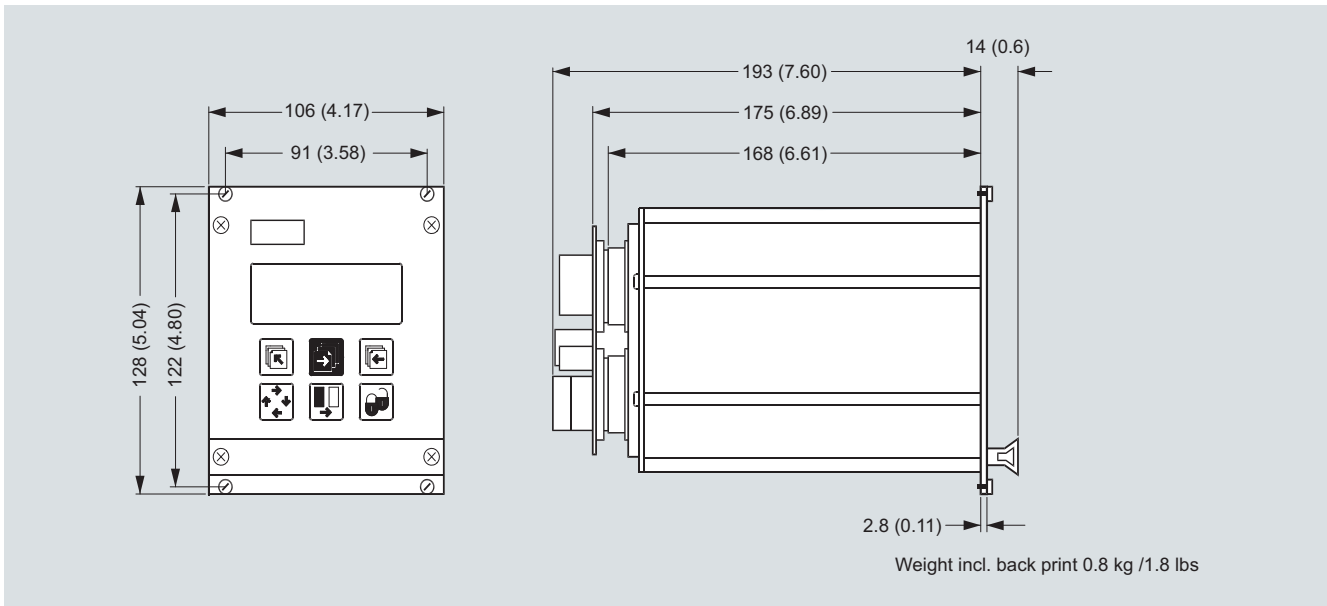
Description	Version	Order No.	
Connection board MASS 6000 for 19" IP20 rack mounting version	24 V 115/230 V	FDK-083H4272	
Connection board MASS 6000 for Ex application ¹⁾ and 19" IP20 rack mounting version (connection board MASS 6000 to MC2 sensors Ex-approved)	24 V 115/230 V	FDK-083H4294	
Connection board MASS 6000 for 19" wall mounting version, for enclosure FDK-083F5037/FDK-083F5038	24 V 115/230 V	FDK-083H4274	
Connection board MASS 6000 for Ex application ¹⁾ and 19" wall mounting version (connection board MASS 6000 to MC2 sensors Ex-approved), for enclosure FDK-083F5037/FDK-083F5038	24 V 115/230 V	FDK-083H4295	

¹⁾ Attention (Ex application): MC2 Ex version sensors must only be connected to connection board FDK-083H4294 or FDK-083H4295.

Description	Order No.	
Wall mounting enclosure for MASS 6000 19" version IP66/NEMA 4 (21 TE) with connection board/PCB for Ex application connected to MC2 Ex sensors	FDK-083H4296	

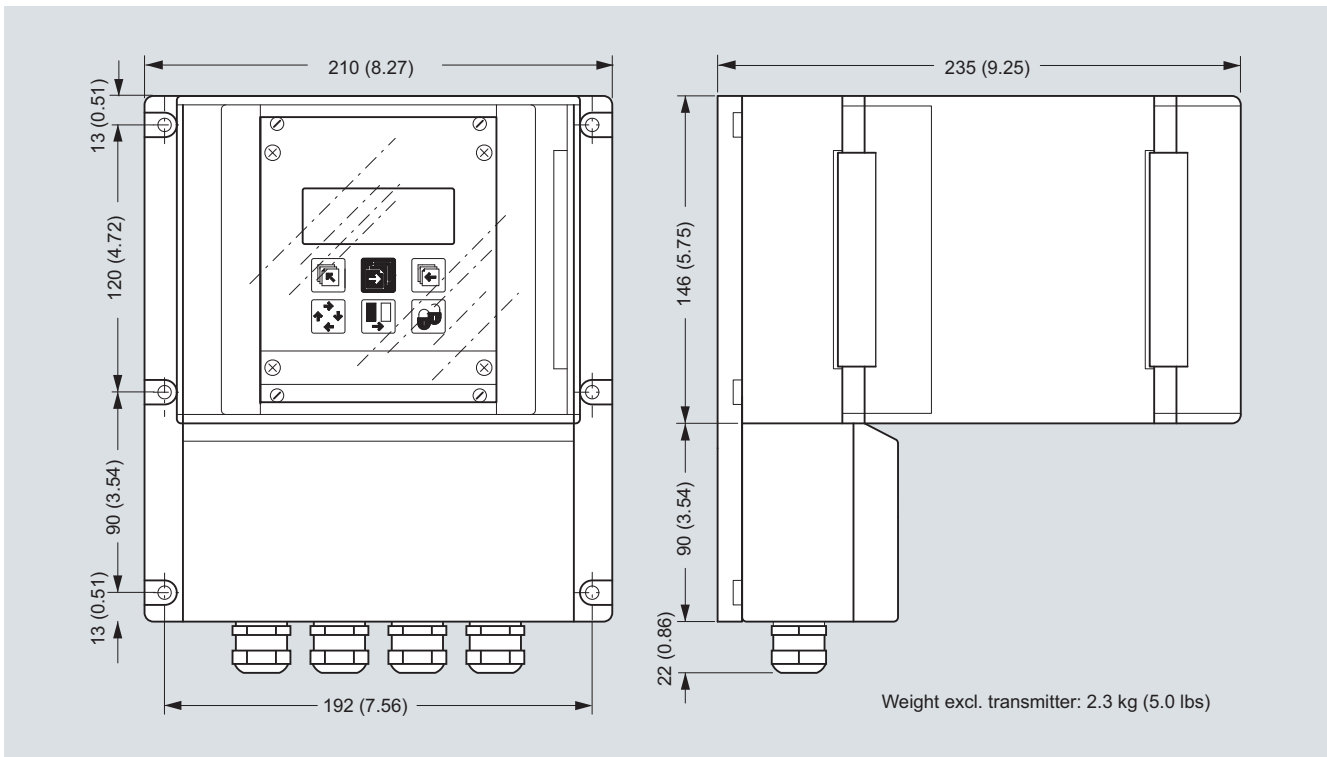
Dimensional drawings

Transmitter 19" insert



Dimensions in mm (inch)

Transmitter 19" wall mounting

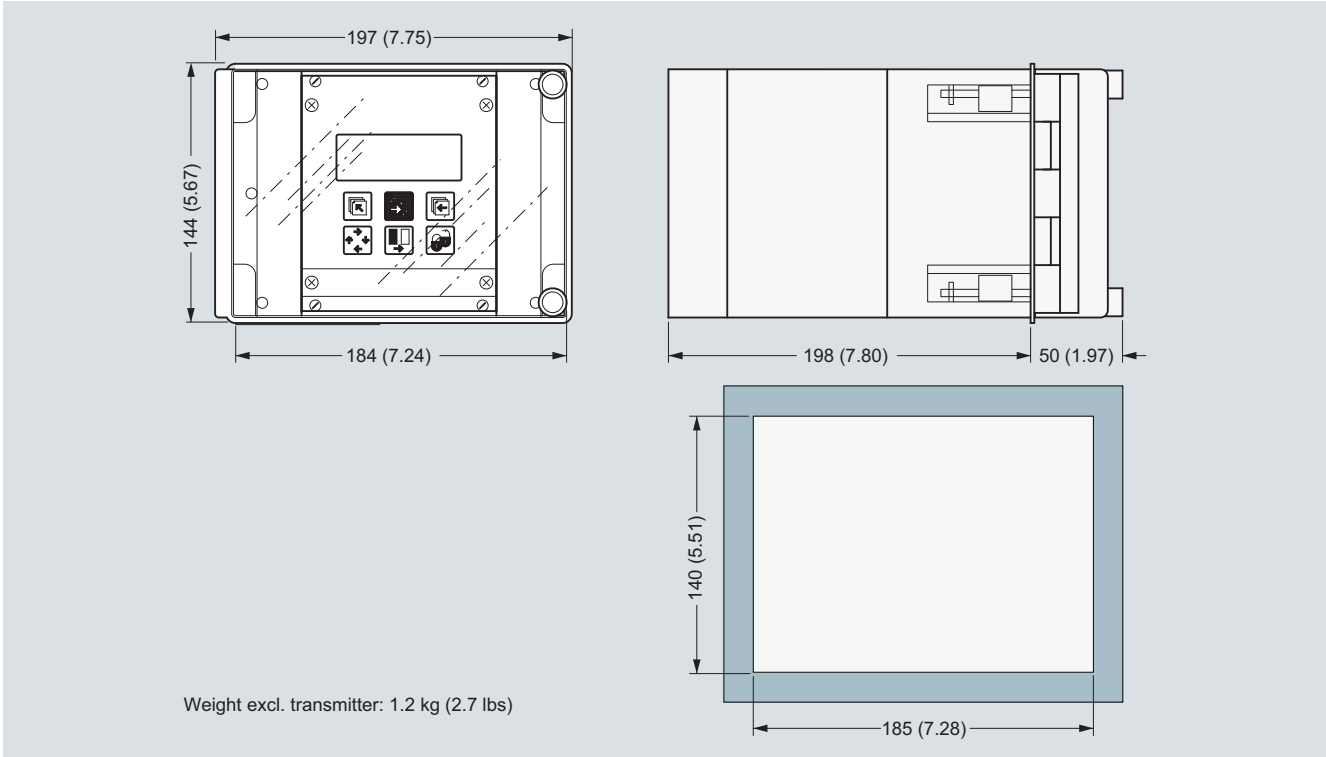


Dimensions in mm (inch)

Flow Measurement SITRANS F C

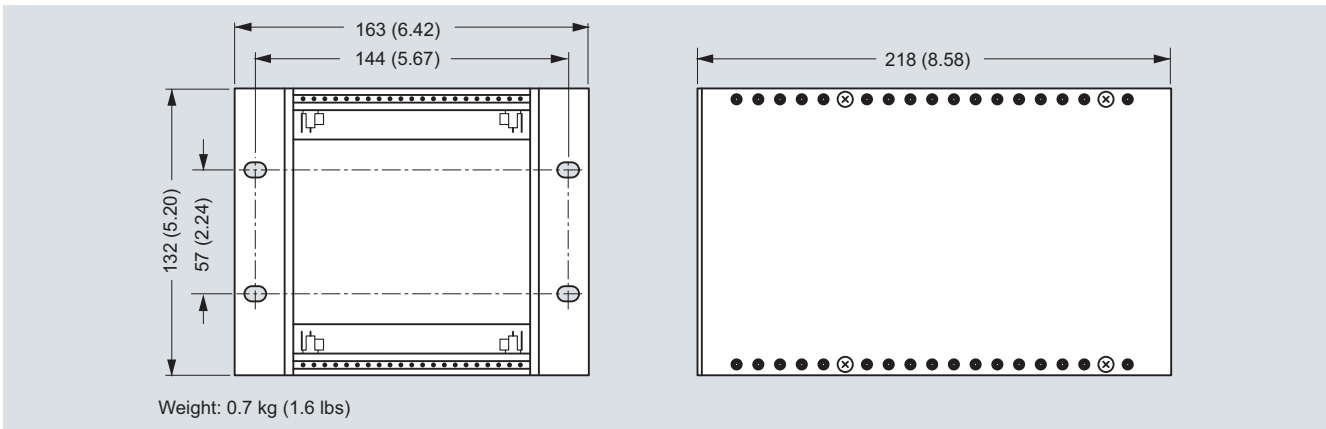
Transmitter MASS 6000 for 19" insert/19" wall mounting

Transmitter 19" front of panel



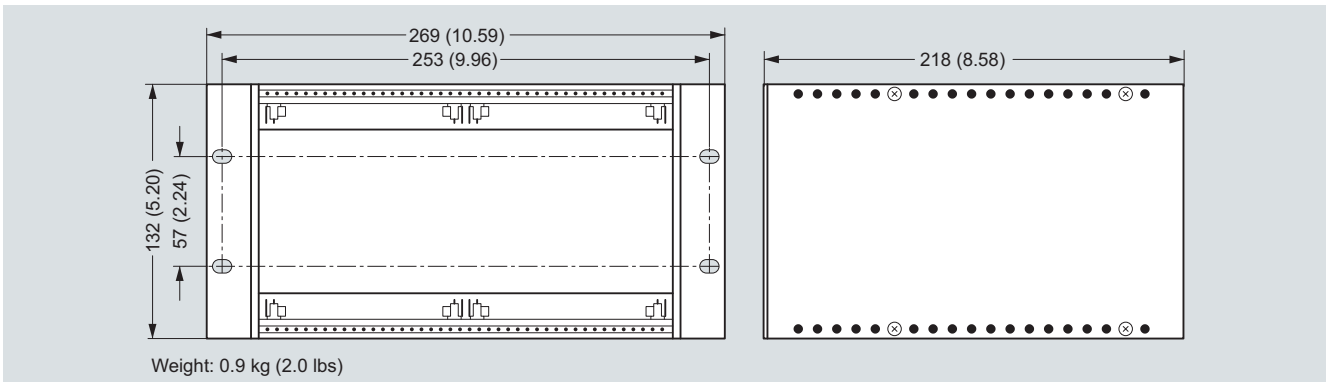
Dimensions in mm (inch)

Transmitter back of panel



Dimensions in mm (inch)

Transmitter back of panel, 42 TE



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 long cables are used in noisy environment, it is recommended to use shielded cables.

