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 trouble-shooting 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 3rd-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 6 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

Transmitter MASS 6000 IP67 compact/remote

Technical specifications

Measurement of	Mass flow [kg/s (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m^3, (lb/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 galvanically isolated. Isolation voltage: • 500 V to supply • 50 V between outputs
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	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 • 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), 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 6
Mechanical load	18 ... 1000 Hz random, 3.17 Grms, in all directions, to IEC 68-2-36
Supply voltage	
24 V version	
• Supply	18 ... 30 V DC 20 ... 30 V AC
230 V version	
• Supply	87 ... 253 V AC, 50 ... 60 Hz
Power consumption	
24 V DC	6 W
24 V AC	10 VA
30 V DC	9 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 61326-1-4 (Industry)
Immunity	EN/IEC 61326-1-2 (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:	• 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 following dimensions: M20 or ½" NPT

Transmitter MASS 6000 IP67 compact/remote

Selection and Ordering data	Article 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- ■AA■0-■■A■
Version	
Remote IP67/NEMA 6 enclosure	2
Supply voltage	
115/230 V AC, 50 ... 60 Hz	1
24 V AC/DC	2
Display/Keypad	
with display	1
Serial communication	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3	G
MODBUS RTU RS 485	E
DeviceNet	H
FOUNDATION Fieldbus H1	J
Cable glands	
M20	1
½" NPT	2

Operating instructions for SITRANS F C MASS 6000 IP67

Description	Article No.
• English	**A5E03071936**

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

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

Accessories

Description	Article No.	
Cable glands, screwed entries type in polyamide (100 °C (212 °F)) black, 2 pcs.		
• M20	**A5E00822490**	
• ½" NPT	**A5E00822501**	
Sun lid for MASS 6000 transmitter (Frame and lid)	**A5E02328485**	

Add-on module

Description	Article No.	
HART (Ex-i) ⬟	**FDK:085U0226**	
PROFIBUS PA Profile 3 (Ex-i)	**FDK:085U0236**	
PROFIBUS DP Profile 3	**FDK:085U0237**	
MODBUS RTU RS 485	**FDK:085U0234**	
FOUNDATION Fieldbus H1 (Ex-i)	**A5E02054250**	
DeviceNet	**FDK:085U0229**	

⬟ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ⬟. For details see page 9/5 in the appendix.

Operating instructions for SITRANS F add-on modules

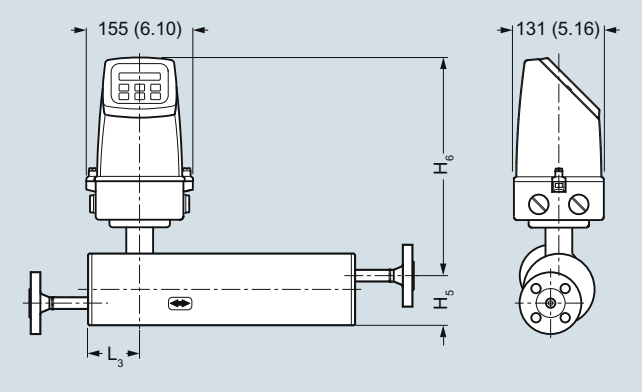
Description	Article No.
HART	
• English	**A5E03089708**
PROFIBUS PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
MODBUS	
• English	**A5E00753974**
• German	**A5E03089262**
• Spanish	**A5E03089278**
• French	**A5E03089265**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**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

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

Transmitter MASS 6000 IP67 compact/remote

Dimensional drawings

Compact

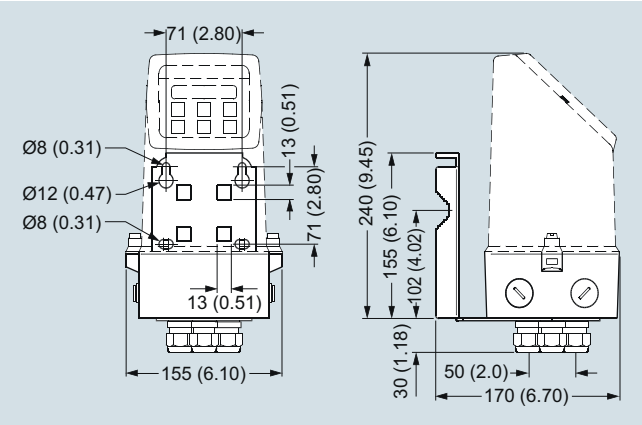


Dimensions in mm (inch)

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 (¼)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (½)	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 (1½)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

Transmitter wall mounted



Dimensions in mm (inch)

Schematics

Electrical connection

Grounding

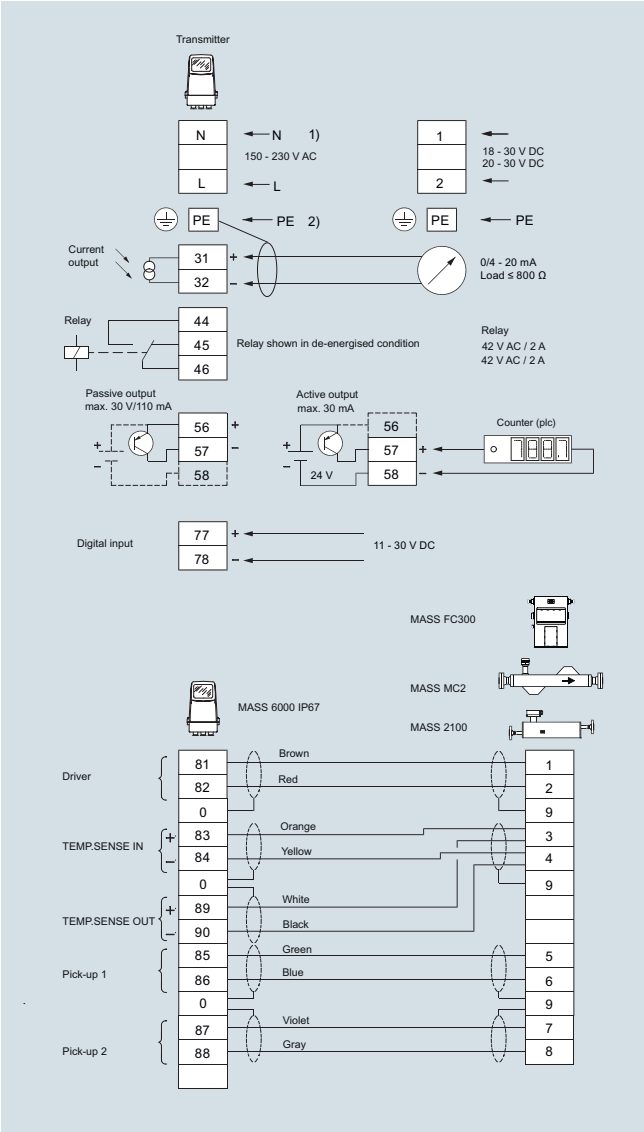
PE must be connected due to safety class 1 power supply.

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 trouble-shooting 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 IP65
- Back of panel mounting IP20
- Wall mounting IP66

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

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 (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m^3 (lb/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 to supply • 50 V between outputs
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	• Background illumination with alphanumerical 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	Aluminum/steel (DIN 41494)
Rating	IP20
Mechanical load	18 ... 1000 Hz random, 3.17G rms, 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 I_N = 250 mA, I_{ST} = 2 A (30 ms)
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
Power consumption	
230 V AC	9 VA max.
24 V DC	6 W
EMC performance	
Emission	EN/IEC 61236-1-4 (Industry)
Immunity	EN/IEC 61236-1-2 (Industry)
Ex approval	[Ex 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.
Cable	• 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

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

Selection and Ordering data	Article No.
SITRANS F C MASS 6000 transmitter	7ME4110-
Transmitter for rack and wall mounting, incl. connection board	2 ■■■■-■■A0
Enclosure	
19 inch insert IP20 (rack)	C
19 inch insert in IP65 (wall mounting)	E
Output configuration	
1 current, 1 frequency, 1 relay	A
3 current, 2 frequency, 2 relay	C
Supply voltage	
115/230 V AC, 50/60 Hz	1
24 V AC/DC	2
Ex Approvals	
Standard (No Ex-approval)	0
ATEX	1
Display/Keypad	
With display	1
Serial communication (Only possible to connect to MASS 6000 version with 1 current output)	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3	G
MODBUS RTU RS 485	E
DeviceNet	H
FOUNDATION Fieldbus H1	J

Attention (Ex applications)!

MC2 Ex version sensors must only be connected to MASS 6000 standard. The MASS 6000 connection board must be replaced by a connection board approved FDK:083H4294 or FDK:083H4295 (see connection boards/PCB for MASS 6000 and MC2 sensors).

Operating instructions for SITRANS F C MASS 6000 19“

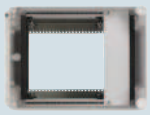
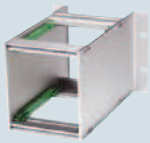
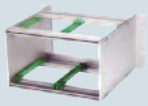
Description	Article No.
• English	**A5E02944875**

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

Accessories

Enclosure

Description	Article No.	
Panel mounting enclosure for 19“ insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	**FDK:083F5030**	
Panel mounting enclosure for 19“ insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	**FDK:083F5031**	
Back of panel mounting enclosure for 19“ insert (21 TE); IP20/NEMA 1 enclosure in aluminum	**FDK:083F5032**	
Back of panel mounting enclosure for 19“ insert (42 TE); IP20/NEMA 1 enclosure in aluminum	**FDK:083F5033**	
Front cover (7TE) for panel mounting enclosure	**FDK:083F4525**	

Cable glands

Description	Article No.	
Cable glands, screwed entries type PG 13.5 in nickel-plated brass, 2 pcs.	**FDK:083G3140**	
Cable glands, screwed entries type PG 13.5 in polyamide (100 °C (212 °F)) black, 2 pcs.	**FDK:083G0228**	

Add-on module

Note:
Only possible to connect to MASS 6000 versions with 1 current output.

Description	Article No.	
HART (Ex-i)	**FDK:085U0226**	
PROFIBUS PA Profile 3 (Ex-i)	**FDK:085U0236**	
PROFIBUS DP Profile 3	**FDK:085U0237**	
MODBUS RTU RS 485	**FDK:085U0234**	
FOUNDATION Fieldbus H1 (Ex-i)	**A5E02054250**	
DeviceNet	**FDK:085U0229**	

Operating instructions for SITRANS F add-on modules

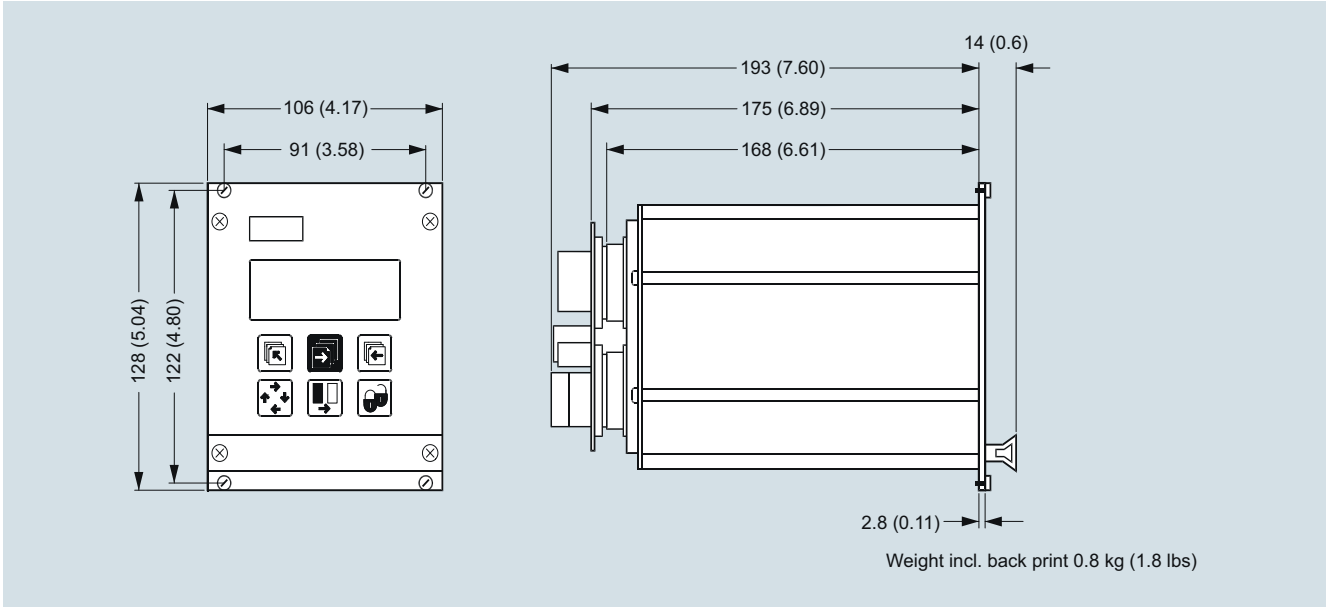
Description	Article No.
HART	
• English	**A5E03089708**
PROFIBUS PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
MODBUS	
• English	**A5E00753974**
• German	**A5E03089262**
• Spanish	**A5E03089278**
• French	**A5E03089265**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**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

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

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

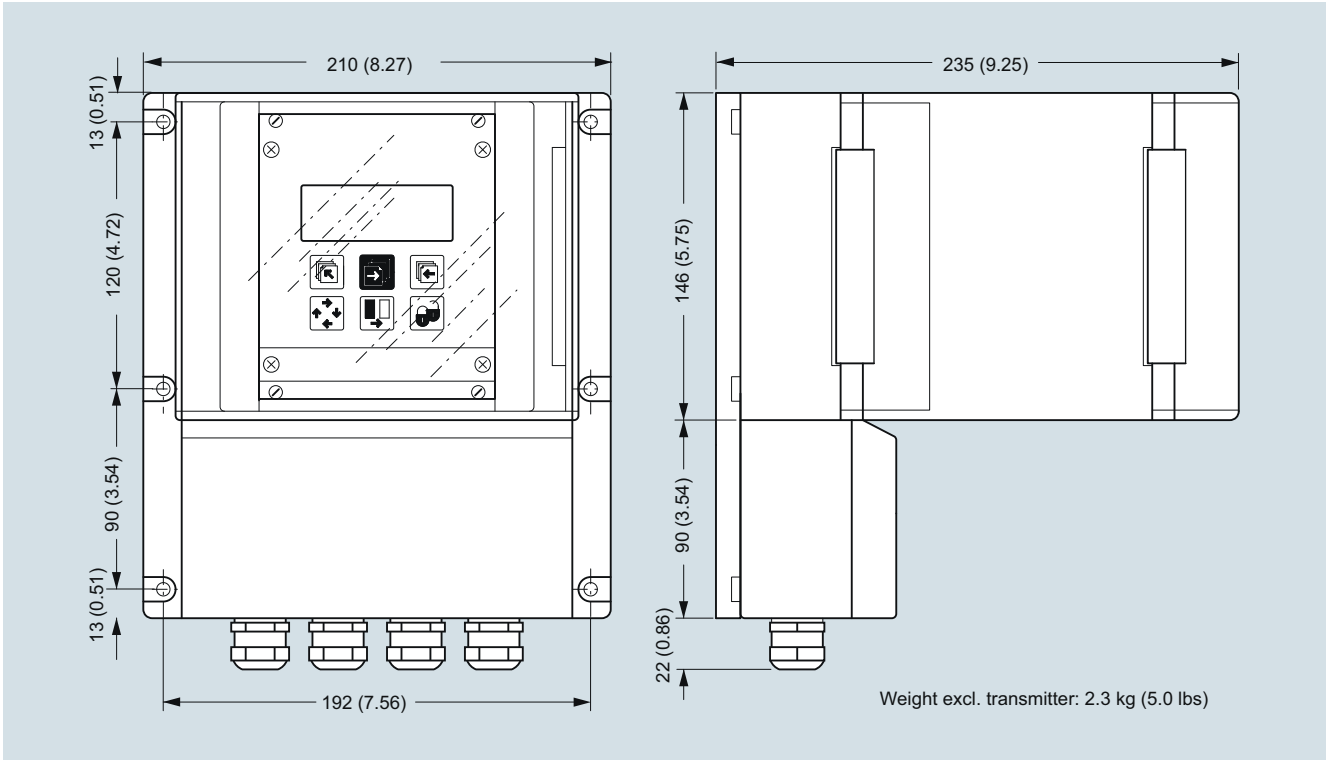
Dimensional drawings

Transmitter 19" insert



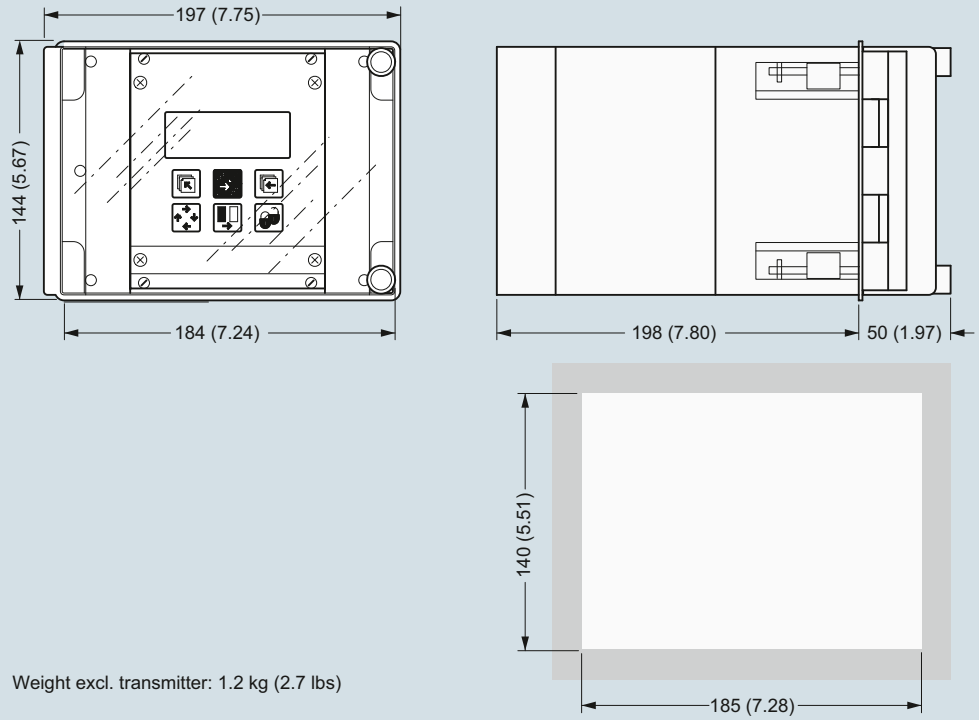
Dimensions in mm (inch)

Transmitter 19“ wall mounting



Dimensions in mm (inch)

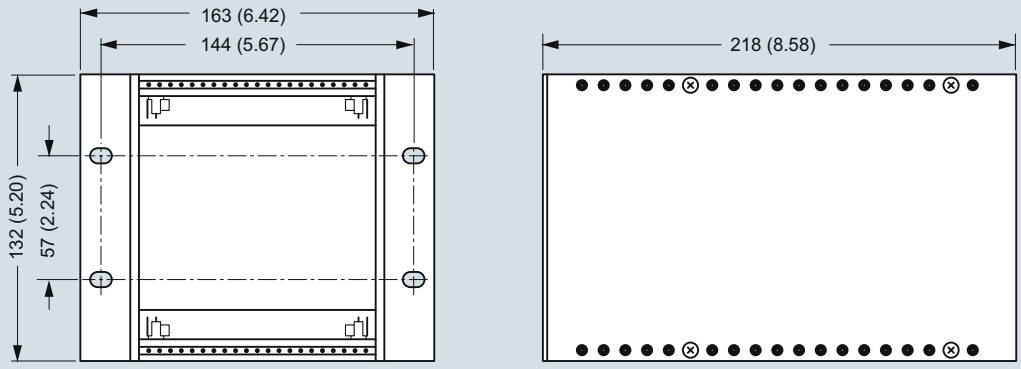
Transmitter 19“ front of panel



Weight excl. transmitter: 1.2 kg (2.7 lbs)

Dimensions in mm (inch)

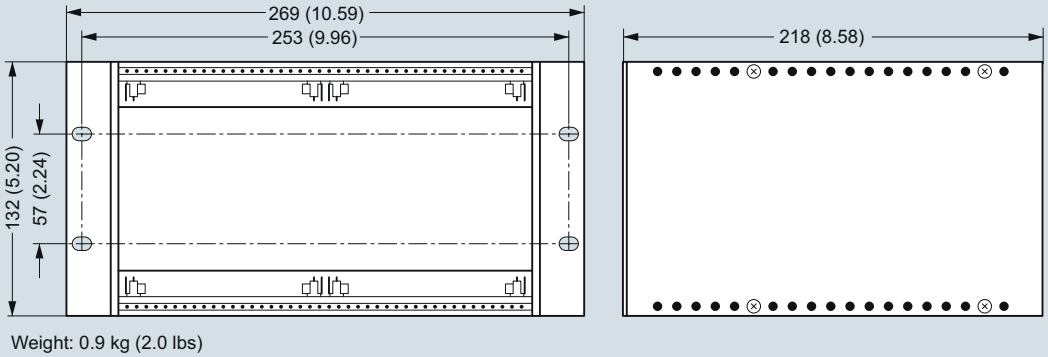
Transmitter back of panel



Weight: 0.7 kg (1.6 lbs)

Dimensions in mm (inch)

Transmitter back of panel, 42 TE



Weight: 0.9 kg (2.0 lbs)

Dimensions in mm (inch)

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

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.