Overview

MASS 6000 is based on 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 flow.

The MASS 6000 Ex d transmitter is manufactured in stainless steel (AISI 316L/1.4404) and able to withstand harsh installation conditions in hazardous applications within the process and chemical industry. The conservative choice of material guarantees the user a low cost of ownership and a long trouble-free lifetime.

The Ex d can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 15, and can be used in remote version for all types of MASS 2100.

Benefits

- Fully stainless steel flameproof Ex d enclosure, ensuring optimum cost of ownership
- Intrinsically safe keypad and display directly programmable in hazardous area
- Ex-approved transmitter which can be mounted in hazardous area Zone 1 or Zone 2.
- Sensor and transmitter interface intrinsically safe Ex ia IIC
- Exchange of transmitter directly in hazardous area without shut-down of process pipe line due to ia IIC sensor/transmitter interface.
- 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 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
- 1 current output, 1 frequency/pulse and 1 relay as standard output
- Current output can be selected as passive or active output
- 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"
- 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 as true "plug & play"
  - Module and transmitter 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 in hazardous area. The meter can measure both liquids and gases.

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

- Chemical process industry
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry

Design

The transmitter is designed in an Ex d compact stainless steel enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 15, and remote mounted for the entire sensor series.

The MASS 6000 Ex d 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.

- Flameproof „d“ enclosure
- Enclosure stainless steel, IP67/NEMA 6 as compact and IP65 as remote
- Supply voltage 24 V AC/DC
- MASS 6000 Ex d is Ex-approved together with all MASS 2100 sensors, but can not be used together with MC2 Ex versions

Note

Due to RoHs directives active from July 22nd 2017, MASS 6000 Transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.

Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...

Repair parts for MASS 6000 (all models and variants) are available. See spare part list.
Flow Measurement
SITRANS F C
Transmitter MASS 6000 Ex d compact/remote

### 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 flow
- 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 straightforward application and meter troubleshooting

### Technical specifications

<table>
<thead>
<tr>
<th>Measurement of</th>
<th>Mass flow [kg/s (lb/min)], volume flow [litres (gpm)], fraction [%], °Brix, density [kg/m³ (lb/ft³)], temperature [°C (°F)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current output</td>
<td>Classified Ex ia, selectable as active or passive outputs. Default setting is active mode.</td>
</tr>
<tr>
<td>Current</td>
<td>0 ... 20 mA or 4 ... 20 mA</td>
</tr>
<tr>
<td>Load</td>
<td>&lt; 350 Ω</td>
</tr>
<tr>
<td>Time constant</td>
<td>0 ... 99.9 s adjustable</td>
</tr>
<tr>
<td>Current characteristics</td>
<td></td>
</tr>
<tr>
<td>Active mode</td>
<td>U₀ = 24 V, I₀ = 82 mA, P₀ = 0.5 W, C₀ = 125 nF, L₀ = 2.5 mH</td>
</tr>
<tr>
<td>Passive mode (max input from external barrier)</td>
<td>Uᵢ = 30 V, Iᵢ = 100 mA, Pᵢ = 0.75 W, Cᵢ = 52 nF, Lᵢ = 100 μH</td>
</tr>
<tr>
<td>Digital output</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>0 ... 10 kHz, 50 % duty cycle</td>
</tr>
<tr>
<td>Time constant</td>
<td>0.1 ... 30 s adjustable</td>
</tr>
<tr>
<td>Passive</td>
<td>6 ... 30 V DC, max. 110 mA, 1 kΩ ≤ Rᵢ ≤ 10 kΩ</td>
</tr>
<tr>
<td>Output characteristics</td>
<td></td>
</tr>
<tr>
<td>Active mode</td>
<td>Not available</td>
</tr>
<tr>
<td>Passive mode (max input from external barrier)</td>
<td>Uᵢ = 30 V, Iᵢ = 100 mA, Pᵢ = 0.75 W, Cᵢ = 52 nF, Lᵢ = 100 μH</td>
</tr>
<tr>
<td>Relay</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Change-over relay</td>
</tr>
<tr>
<td>Load</td>
<td>30 V/100 mA</td>
</tr>
<tr>
<td>Functionality</td>
<td>Error level, error number, limit, direction</td>
</tr>
<tr>
<td>Output characteristics</td>
<td></td>
</tr>
<tr>
<td>Active mode</td>
<td>Uᵢ = 30 V, Iᵢ = 100 mA, Pᵢ = 0.75 W, Cᵢ = 0 nF, Lᵢ = 0 mH</td>
</tr>
</tbody>
</table>

### Digital input
- 11 ... 30 V DC (Rᵢ = 13.6 kΩ)
- Functionality: Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
- Output characteristics: Uᵢ = 30 V, Iᵢ = 3.45 mA, Pᵢ = 0.10 W, Cᵢ = 0 nF, Lᵢ = 0 mH

### 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
- Empty pipe: Detection of empty sensor
- Density: 0 ... 2.9 g/cm³

### 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
- 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, FOUNDATION Fieldbus H1
- HART
  - Active mode: Uᵢ = 6.88 V, Iᵢ = 330 mA, Pᵢ = 0.57 W, Cᵢ = 20 nF, Lᵢ = 100 μH
  - Passive mode (max input from external barrier): Uᵢ = 10 V, Iᵢ = 200 mA, Pᵢ = 0.5 W, Cᵢ = 0 nF, Lᵢ = 0 μH
- PROFIBUS PA
  - Active mode: Not available
  - Passive mode: Uᵢ = 17.5 V, Iᵢ = 380 mA, Pᵢ = 5.32 W, Cᵢ = 5 nF, Lᵢ = 10 μH
- FOUNDATION Fieldbus H1
  - Active mode: Not available
  - Passive mode: Uᵢ = 17.5 V, Iᵢ = 380 mA

### Enclosure
- Material: Stainless steel AISI 316/1.4435
- Rating
  - Compact mounted on sensor: IP67/NEMA 4X
  - Remote mounted: IP65
- Load: 18 ... 1000 Hz random, 1.14 g RMS, in all directions
Flow Measurement
SITRANS F C

Transmitter MAss 6000 Ex d compact/remote

Supply voltage

<table>
<thead>
<tr>
<th>24 V AC</th>
<th>20 ... 30 V AC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>6 VA I_N = 250 mA, I_ST = 2 A (30 ms)</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>24 V DC</th>
<th>18 ... 30 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>6 W I_N = 250 mA, I_ST = 2 A (30 ms)</td>
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<tr>
<td><strong>Power supply</strong></td>
<td>The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm²</td>
</tr>
</tbody>
</table>

EMC performance

<table>
<thead>
<tr>
<th><strong>Emission</strong></th>
<th>EN 55011/CISPR-11 (Class A)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Immunity</strong></td>
<td>EN/IEC 61326-1 (Industry)</td>
</tr>
</tbody>
</table>

NAMUR

Within the value limits according to “Allgemeine Anforderung” with error criteria A in accordance with NE 21

Ex approval

ATEX, EAC Ex: Ex d e ib [ia Ga] IIC T4 Gb

Note

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Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...

Repair parts for MAss 6000 (all models and variants) are available. See spare part list.

Selection and Ordering data

**SITRANS F C MAss 6000 transmitter**
Transmitter Ex d for remote mounting inclusive of wall mounting kit

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex d SS with 5 m (16.5 ft) cable</td>
<td>7ME4110-2</td>
</tr>
<tr>
<td>Ex d SS with 10 m (32.8 ft) cable</td>
<td>7ME4110-2</td>
</tr>
<tr>
<td>Ex d SS with 25 m (82.0 ft) cable</td>
<td>7ME4110-2</td>
</tr>
</tbody>
</table>

Output configuration

1 current, 1 frequency, 1 relay

Supply voltage

24 V AC/DC

Ex approvals

Ex

Display/Keypad

With display

Serial communication

No communication

HART

PROFIBUS PA Profile 3

FOUNDATION Fieldbus H1

Cable gland

M20

**Operating instructions for SITRANS F C MAss 6000 Ex d**

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
<td>A5E02944883</td>
</tr>
</tbody>
</table>

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Note:
Only communication modules with Ex approvals are allowed.
Flow Measurement
SITRANS F C

Transmitter MASS 6000 Ex d compact/remote

■ Selection and Ordering data

Accessories
Add-on module for remote and compact MASS 6000 Ex d

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HART (Ex-i)</td>
<td>FDK:085U0226</td>
</tr>
<tr>
<td>PROFIBUS PA Profile 3 (Ex-i)</td>
<td>FDK:085U0236</td>
</tr>
<tr>
<td>FOUNDATION Fieldbus H1 (Ex-i)</td>
<td>A5E02054250</td>
</tr>
</tbody>
</table>

Operating instructions for SITRANS F add-on modules

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HART</td>
<td>A5E03089708</td>
</tr>
<tr>
<td>PROFIBUS PA/DP</td>
<td>A5E00726137</td>
</tr>
<tr>
<td>FOUNDATION Fieldbus</td>
<td>A5E2318728</td>
</tr>
</tbody>
</table>

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

■ Dimensional drawings

MASS 6000 Ex d compact version

Dimensions in mm (inch)

<table>
<thead>
<tr>
<th>Sensor size [DI (inch)]</th>
<th>L₃ [mm (inch)]</th>
<th>H₅ [mm (inch)]</th>
<th>H₆ [mm (inch)]</th>
<th>H₅ + H₆ [mm (inch)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (1/8)</td>
<td>75 (2.95)</td>
<td>82 (3.23)</td>
<td>247 (9.72)</td>
<td>329 (12.95)</td>
</tr>
<tr>
<td>6 (1/4)</td>
<td>62 (2.44)</td>
<td>72 (2.83)</td>
<td>257 (10.12)</td>
<td>329 (12.95)</td>
</tr>
<tr>
<td>15 (5/8)</td>
<td>75 (2.95)</td>
<td>87 (3.43)</td>
<td>267 (10.51)</td>
<td>354 (13.94)</td>
</tr>
<tr>
<td>25 (1)</td>
<td>75 (2.95)</td>
<td>173 (6.81)</td>
<td>271 (10.67)</td>
<td>444 (17.48)</td>
</tr>
<tr>
<td>40 (1½)</td>
<td>75 (2.95)</td>
<td>227 (8.94)</td>
<td>271 (10.67)</td>
<td>498 (19.61)</td>
</tr>
</tbody>
</table>

MASS 6000 Ex d remote version

Weight: 3 kg (6.6 lbs)

Dimensions in mm

Dimensions in inch

Dimensions in mm (inch)
**Schematics**

**Electrical connection compact or remote**

- **Hazardous location**
  - Transmitter
  - Current output
  - Relay
  - Passive output
- **Non-hazardous location**
  - 16-35 V DC
  - PE
  - Relay shown in de-energised condition
  - Relay
  - 11-22 V DC
  - PE

**Digital input**
- terminals for Add-on module
- The electrical connection, please refer to documentation supplied with the Add-on.

**Driver**
- 81: Brown
- 82: Red
- 83: Orange
- 84: Yellow
- 85: Blue
- 86: Violet
- 87: Grey
- 88: Grey

**Driver**
- 1: White
- 2: Black
- 3: Black
- 4: Black
- 5: Blue
- 6: Blue
- 7: Blue
- 8: Blue

**METER MODE**
- 91: Black
- 92: Black
- 93: Black
- 94: Black
- 95: Blue
- 96: Blue
- 97: Blue
- 98: Blue

**METER MODE**
- 99: Blue
- 100: Blue
- 101: Blue
- 102: Blue
- 103: Blue
- 104: Blue
- 105: Blue
- 106: Blue

**Relay**
- 30 V AC/100 mA
- 30 V DC/100 mA

- 0-20 mA Load ≤ 350 Ω

**MASS 6000 Ex d compact/remote**

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