

# Flow Measurement

## SITRANS F C

### Transmitter SIFLOW FC070

#### Overview



SIFLOW FC070 is based on the latest developments within the digital processing technology – engineered for high performance, fast flow step response, immunity against process generated noise, easy to install, commission and maintain.

SIFLOW FC070 is available in two versions:

- SIFLOW FC070 Standard
- SIFLOW FC070 Ex CT

The SIFLOW FC070 transmitter delivers true multi-parameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

SIFLOW FC070 is designed for integration in a variety of automation systems, i.e.:

- Central mounted in S7-300, C7
- Decentralized in ET 200M for use with S7-300 and S7-400 as PROFIBUS DP/PROFINET masters
- Decentralized in ET 200M for use with any automation system using standardized PROFIBUS DP/PROFINET masters
- Stand-alone via a MODBUS RTU master, i.e. SIMATIC PDM

The SIFLOW FC070 transmitter can be connected to all sensors of types MASS 2100, MC2, FCS200 and FC300.

#### Benefits

- Easy integration in SIMATIC S7 and PCS 7
- Support of SIMATIC PDM configuration tool via MODBUS
- Dedicated mass flow chip with high-performance ASIC technology
- True 30 Hz update rate securing fast batching and step response
- 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 diagnostics enhancing troubleshooting and meter verification
- Built-in batch controller with two-stage control and compensation
- Digital outputs for direct batch control, frequency/pulse
- MODBUS RTU RS 232/RS 485 interface for connection to SIMATIC PDM or any other MODBUS master

- Digital input for batch control, zero adjust
- Extensive simulation options for measurement values, I/O and errors easy communication/fault-finding
- Multiple LED's for easy indication of flow, error and I/O state
- SENSORPROM technology automatically configures the transmitter during start-up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type and I/O settings
  - Any values or settings changed by the user is stored automatically
  - Automatically re-programming of a new transmitter, without loss of settings and accuracy
  - Transmitter replacement in less than 30 seconds
- Four-wire Pt1000 measurement ensuring optimum accuracy mass flow, density and fraction flow
- Fraction flow computation based on a 3rd-order algorithm matching all applications
- SIFLOW FC070 Ex CT is Custody transfer approved, according to OIML R 139 (Compressed gaseous fuel measuring systems for vehicles), when using the redundant digital output or the encrypted ActiveX component for SIMATIC touch panels.
- Free of charge ActiveX component for SIMATIC touch panels, enables encrypted sensor process values to be communicated between SIFLOW FC070 Ex CT and SIMATIC touch panels

#### Application

SIFLOW FC070 mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meters are suitable for measuring on liquid and gas.

The main applications for the SIFLOW FC070 transmitter can be found in the following industries:

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

#### Design

SIFLOW FC070 is designed in an IP20 SIMATIC S7-300 enclosure and for use in central and de-central cabinets where sensors: FCS200, FC300, MASS 2100 and MC2 are remotely mounted.

#### Function

The following key functionalities are available:

- Mass flow rate, volume flow rate, density, temperature and fraction flow
- Two built-in totalizers which can freely be set for counting mass, volume or fraction
- 1 frequency/pulse output
- 1 phase shifted 90°/180° frequency/pulse output
- Two-stage batch controller
- 1 digital input
- Low flow cut-off
- Empty pipe detection
- Noise filter settings for different applications
- Simulation
- Automatic zero point adjustment with zero point evaluation feed back
- Configurable upper and lower alarm and warning limits for all process values
- Comprehensive status and error reporting

#### Technical specifications

<b>Measurement of</b>	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
<b>Measurement functions</b>	
• Totalizer 1	Totalization of mass flow, volume-flow, fraction A, fraction B
• Totalizer 2	Totalization of mass flow, volume-flow, fraction A, fraction B
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed
• 4 programmable limits	4 programmable high/low limits for mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %. Limits will generate an alarm if reached.
<b>Digital input</b>	
Functions	Start batch, stop batch, start/stop batch, hold/continue batch, reset totalizer 1, reset totalizer 2, reset totalizer 1 and 2, zero adjust, force frequency output, freeze frequency output
High signal	<ul style="list-style-type: none"> <li>Nominal voltage: 24 V DC</li> <li>Lower limit: 15 V DC</li> <li>Upper limit: 30 V DC</li> <li>Current: 2 ... 15 mA</li> </ul>
Low signal	<ul style="list-style-type: none"> <li>Nominal voltage: 0 V DC</li> <li>Lower limit: -3 V DC</li> <li>Upper limit: 5 V DC</li> <li>Current: -15 ... +15 mA</li> </ul>
Input	Approx. 10 kΩ
Switching	Max. 100 Hz.
<b>Digital output 1 and 2</b>	
Functions	<ul style="list-style-type: none"> <li>Output 1: Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch</li> <li>Output 2: Redundancy pulse, redundancy frequency, 2-stage batch</li> </ul>
Voltage supply	3 ... 30 V DC (passive output)
Switching current	Max. 30 mA at 30 V DC
Voltage drop	≤ 3 V DC at max. current
Leakage current	≤ 0.4 mA at max. voltage 30 V DC
Load resistance	1 ... 10 kΩ
Switching frequency	0 ... 12 kHz 50 % duty cycle
Functions	Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch
<b>Communication</b>	
MODBUS RS 232C	<ul style="list-style-type: none"> <li>Max. baud rate: 115 200 baud</li> <li>Max. line length: 15 m at 115 200 baud</li> <li>Signal level: according to EIA-RS 232C</li> </ul>
MODBUS RS 485	<ul style="list-style-type: none"> <li>Max. baud rate: 115 200 baud</li> <li>Max. line length: 1200 m at 115 200 baud</li> <li>Signal level: according to EIA-RS 485</li> <li>Bus termination: Integrated. Can be enabled by inserting wire jumpers.</li> </ul>
<b>Galvanic isolation</b>	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V

<b>Power</b>	
Supply	24 V DC nominal
Tolerance	20.4 V DC ... 28.8 V DC
Consumption	Max. 7.2 W
Fuse	T1 A/125 V, not replaceable by operator
<b>Environment</b>	
Ambient temperature	<ul style="list-style-type: none"> <li>Storage -40 ... +70 °C (-40 ... +158 °F)</li> </ul>
Operation conditions	<p>Horizontally mounted rail. For SIFLOW FC070 Std.: 0 ... 60 °C (32 ... 140 °F) For SIFLOW FC070 Ex CT: -40 ... +60 °C (-40 ... +140 °F)</p> <p>Vertically mounted rail For SIFLOW FC070 Std.: 0 ... 45 °C (32 ... 113 °F) For SIFLOW FC070 Ex CT: -40 ... +45 °C (-40 ... +113 °F)</p>
Altitude	<ul style="list-style-type: none"> <li>Operation: -1000 ... 2000 m (pressure 795 ... 1080 hPa)</li> </ul>
<b>Enclosure</b>	
Material	Noryl, color: anthracite
Rating	IP20/NEMA 2 according to IEC 60529
Mechanical load	According to SIMATIC standards (S7-300 devices)
<b>Approvals Ex</b>	
SIFLOW FC070 Standard	CE, C-UL, ATEX II 3G Ex nA IIC
SIFLOW FC070 Ex CT	CE, C-UL, UL Haz.Loc., FM Class I, Div. 2 Groups A, B, C, D ATEX II (1)G [Ex ia] IIC Ga / II 3G Ex nA IIC T4 Gc and IEC Ex Ex nA [ia] IIC T4
<b>Approvals Custody transfer</b>	
SIFLOW FC070 Ex CT	PTB Germany approval no.: 5.4.11/11.22 OIML R 139 - Compressed gaseous fuel measuring systems for vehicles
<b>Electromagnetic compatibility</b>	Requirements of EMC law; Noise immunity according to EN/IEC 61326-1 Emitted interference according to EN 55011/CISPR-11
<b>NAMUR</b>	Within the limits according to "General recommendations" with error criteria A in accordance with NE 21
<b>Programming tools</b>	
SIMATIC S7	Configuration through backplane P-BUS, PLC program and WinCC flexible
SIMATIC PCS7	Configuration through backplane P-BUS and PLC/WinCC faceplates, certified driver
SIMATIC PDM	Through MODBUS port RS 232C and RS 485, certified driver

# Flow Measurement

## SITRANS F C

### Transmitter SIFLOW FC070

#### Selection and Ordering data

Description	Article No.
<b>SIFLOW FC070 flow transmitter</b> Remember to order 40 pin front plug connector.	<b>7ME4120-2DH20-0EA0</b>
<b>40 pin front plug</b> with screw contacts	<b>6ES7392-1AM00-0AA0</b>
<b>40 pin plug</b> with spring contacts	<b>6ES7392-1BM01-0AA0</b>
<b>SIFLOW FC070 Ex CT flow transmitter</b> Remember to order 20 pin front plug connector.	<b>7ME4120-2DH21-0EA0</b>
<b>20 pin plug</b> with spring contacts	<b>6ES7392-1BJ00-0AA0</b>
<b>20 pin front plug</b> with screw contacts	<b>6ES7392-1AJ00-0AA0</b>






#### Operating instructions for SITRANS F C SIFLOW FC070

Description	Article No.
<b>SIFLOW FC070 system manual</b>	
• English	<b>A5E00924779</b>
• German	<b>A5E00924776</b>
<b>SIFLOW FC070 with S7</b>	
• English	<b>A5E02254228</b>
• German	<b>A5E02665536</b>
• French	<b>A5E02591639</b>
<b>SIFLOW FC070 with PCS7</b>	
• English	<b>A5E03694109</b>

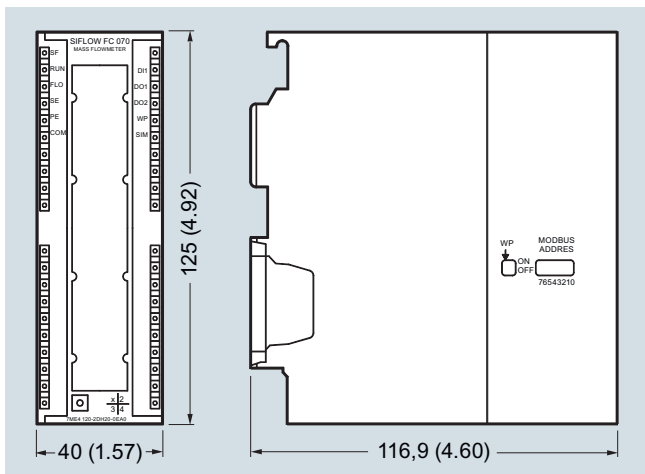
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

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

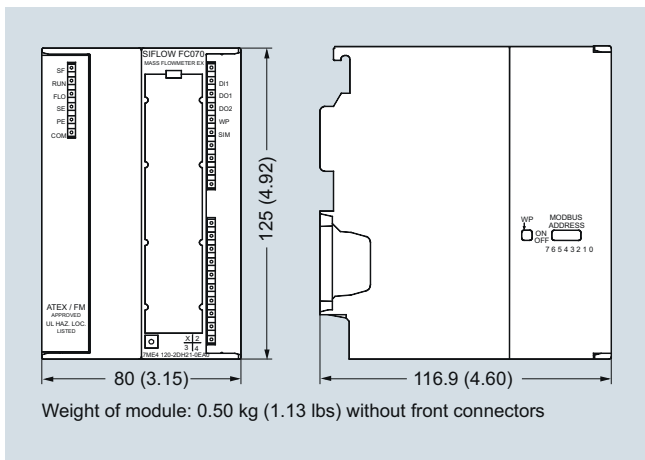
#### Accessories

Description	Article No.	
<b>Cable with multiplug</b> for connecting MASS 2100, FCS200 and FC300 sensors, 5 x 2 x 0.34 mm <sup>2</sup> twisted and screened in pairs. Temperature range -20 ... +110°C (-4 ... +230 °F)		
• 5 m (16.4 ft)	<b>FDK:083H3015</b>	
• 10 m (32.8 ft)	<b>FDK:083H3016</b>	
• 25 m (82 ft)	<b>FDK:083H3017</b>	
• 50 m (164 ft)	<b>FDK:083H3018</b>	
• 75 m (246 ft)	<b>FDK:083H3054</b>	
• 150 m (492 ft)	<b>FDK:083H3055</b>	
<b>Cable without multiplug</b> for connecting MC2 sensors, 5 x 2 x 0.34 mm <sup>2</sup> twisted and screened in pairs. Temperature range -20 ... +110°C (-4 ... +230 °F)		
• 10 m (32.8 ft)	<b>FDK:083H3001</b>	
• 25 m (82 ft)	<b>FDK:083H3002</b>	
• 75 m (246 ft)	<b>FDK:083H3003</b>	
• 150 m (492 ft)	<b>FDK:083H3004</b>	
<b>SIMATIC S7-300 rail</b> The mechanical mounting rack of the SIMATIC S7-300		
• 160 mm (6.3")	<b>6ES7 390-1AB60-0AA0</b>	
• 482 mm (18.9")	<b>6ES7 390-1AE80-0AA0</b>	
• 530 mm (20.8")	<b>6ES7 390-1AF30-0AA0</b>	
• 830 mm (32.7")	<b>6ES7 390-1AJ30-0AA0</b>	
• 2000 mm (78.7")	<b>6ES7 390-1BC00-0AA0</b>	
<b>SIFLOW FC070 Demo suitcase with MASS 2100 DI 1.5 sensor and SIMATIC HMI TP 177B touch panel</b>	<b>A5E01075465</b>	
<b>SIMATIC S7-300, stabilized power supply PS307</b> Input: 120/230 V AC Output: 24 V DC/2 A	<b>6ES7307-1BA01-0AA0</b>	

### Dimensional drawings



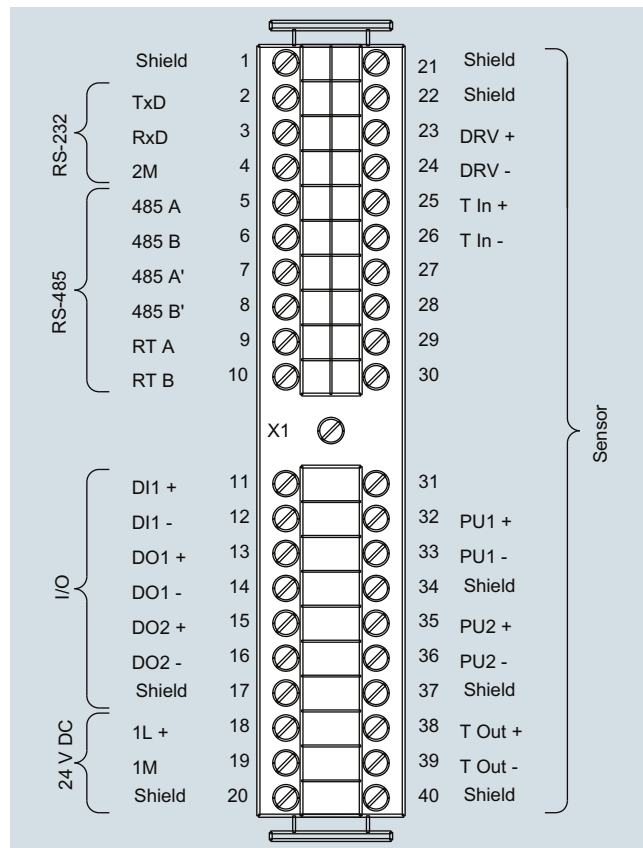
SIFLOW FC070, dimensions in mm (inch)



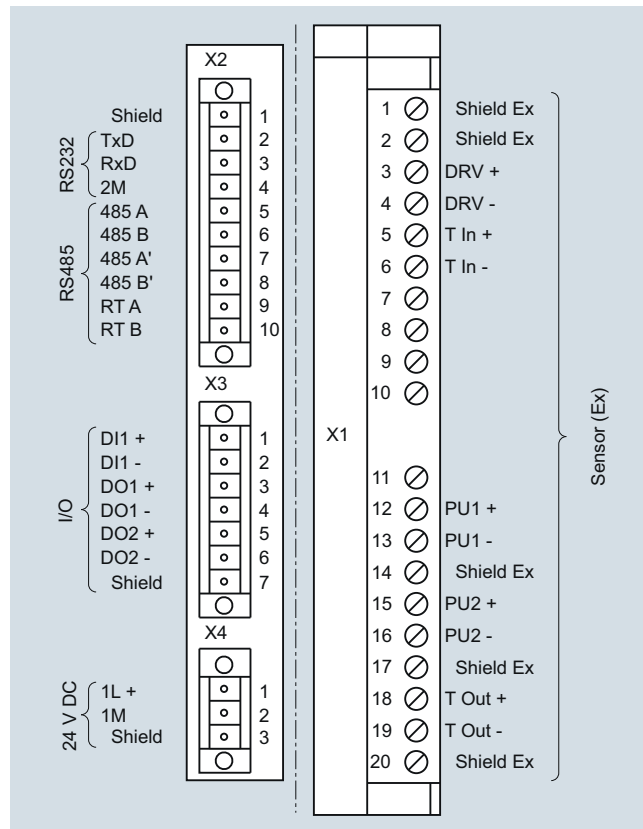
Weight of module: 0.50 kg (1.13 lbs) without front connectors

SIFLOW FC070 Ex CT, dimensions in mm (inch)

### Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex CT, electrical connection