

# 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

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 masters
- Decentralized in ET 200M for use with any automation system using standardized PROFIBUS DP 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 232/485 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 5th-order algorithm matching all applications

#### 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: 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/batch output, 1 two-stage batch output, 1 digital input
- Low flow cut-off
- Empty pipe detection
- Noise filter settings for different applications
- Simulation
- Two-stage batch controller
- Automatic zero point adjustment with zero point evaluation feed back
- Limit functionality
- 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 %	MODBUS RS 485	<ul style="list-style-type: none"> <li>• Max. baudrate: 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>Measurement functions</b>		<b>Galvanic isolation</b>	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V
<ul style="list-style-type: none"> <li>• Totalizer 1</li> <li>• Totalizer 2</li> <li>• Single and 2-stage batch function</li> <li>• 4 programmable limits</li> </ul>	<p>Totalization of mass flow, volume-flow, fraction A, fraction B</p> <p>Totalization of mass flow, volume-flow, fraction A, fraction B</p> <p>Batching function with the use of one or two outputs for dosing in high and low speed</p> <p>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.</p>	<b>Power</b>	
		Supply	24 V DC nominal
		Tolerance	20.4 V DC ... 28.8 V DC
		Consumption	Max. 6 W
		Fuse	T1 A/125 V, not replaceable by operator
<b>Digital input</b>		<b>Environment</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	Ambient temperature	<ul style="list-style-type: none"> <li>• Storage -40 ... +70 °C (-40 ... +158 °F)</li> <li>• Operation 0 ... 60 °C (32 ... 140 °F)</li> </ul>
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>	Operation conditions	Horizontally mounted rail. For vertically mounted rail, the maximum operating temperature is +45 °C (+113 °F).
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>	Altitude	<ul style="list-style-type: none"> <li>• Operation: -1000 ... 2000 m (pressure 795 ... 1080 hPa)</li> </ul>
Input	Approx. 10 kΩ	<b>Enclosure</b>	
Switching	Max. 100 Hz.	Material	Noryl, color: anthracite
		Rating	IP20/NEMA 2 according to IEC 60529
		Mechanical load	According to SIMATIC standards (S7-300 devices)
<b>Digital output 1 and 2</b>		<b>Approvals</b>	
Functions	<ul style="list-style-type: none"> <li>• Output 1: Pulse, frequency, quadrature pulse, quadrature frequency 2-stage batch, batch</li> <li>• Output 2: Quadrature pulse, quadrature frequency, 2-stage batch</li> </ul>	SIFLOW FC070 Standard	CE, C-UL, ATEX II 3G EEx nA IIC
Voltage supply	3 ... 30 V DC (passive output)	SIFLOW FC070 Ex	CE, C-UL, UL Haz.Loc., FM, ATEX II 3 G EEx nA II T4 and II (1) G [EEx ia] IIC
Switching current	Max. 30 mA at 30 V DC	<b>Electromagnetic compatibility</b>	Requirements of EMC law; Noise immunity according to IEC 61000-6-2, tested according to: IEC 61000-4-2, 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6
Voltage drop	≤ 3 V DC at max. current		Emitted interference according to EN 50081-2, tested according to EN 55011, class A, group 1
Leakage current	≤ 0.4 mA at max. voltage 30 V DC	<b>NAMUR</b>	Within the limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE21
Load resistance	1 ... 10 kΩ	<b>Programming tools</b>	
Switching frequency	0 ... 12 kHz 50 % duty cycle	SIMATIC S7	Configuration trough backplane P-BUS and PLC program
Functions	Pulse, frequency, quadrature pulse, quadrature frequency 2-stage batch, batch	SIMATIC PCS7	Configuration trough backplane P-BUS and PLC/WinCC faceplates
		SIMATIC PDM	Through MODBUS port RS 232C and RS 485
<b>Communication</b>			
MODBUS RS 232C	<ul style="list-style-type: none"> <li>• Max. baudrate: 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>		

# Flow Measurement

## SITRANS F C

### Transmitter SIFLOW FC070

#### Selection and Ordering data

Description	Order 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 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>

#### Accessories

Description	Order No.
Cable with multiplug for connecting MASS 2100, FCS200 and FC300 sensors	
• 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>
Cable without multiplug for connecting MC2 sensors	
• 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>
SIMATIC S7-300 rail 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>
Shield connecting element For mounting on S7-300 rail. 80 mm wide with 2 rows for 4 shield terminal elements each (no shield terminal elements included)	<b>6ES7390-5AA00-0AA0</b>
Shield terminal element for 1 cable with 3 to 8 mm in dia. 2 pieces	<b>6ES7390-5BA00-0AA0</b>
Shield terminal element for 1 cable with 4 to 13 mm in dia. 2 pieces	<b>6ES7390-5CA00-0AA0</b>
SIFLOW FC070 Demo suitcase	<b>A5E01075465</b>
Power supply	<b>6ES7307-1BA00-0AA0</b>

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

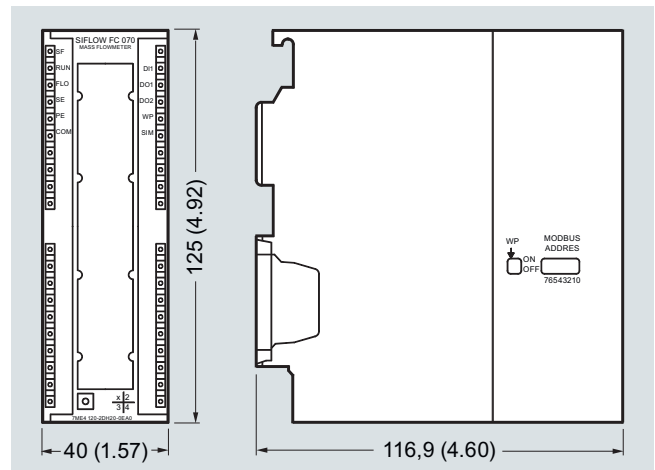
Description	Order No.
Operating instructions for SITRANS F C SIFLOW FC070	
• English	<b>A5E00924779</b>
• German	<b>A5E00924776</b>
Operating instructions for SITRANS F C SIFLOW FC070 with S7	
• English	<b>A5E02254228</b>
• German	<b>A5E02665536</b>
• French	<b>A5E02591639</b>

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

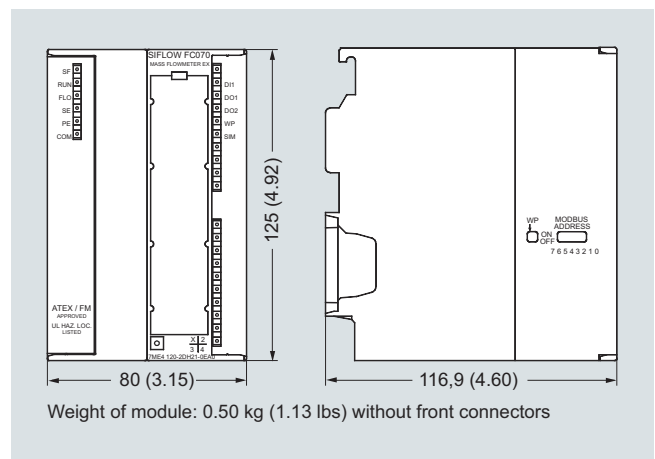
All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>

#### Dimensional drawings

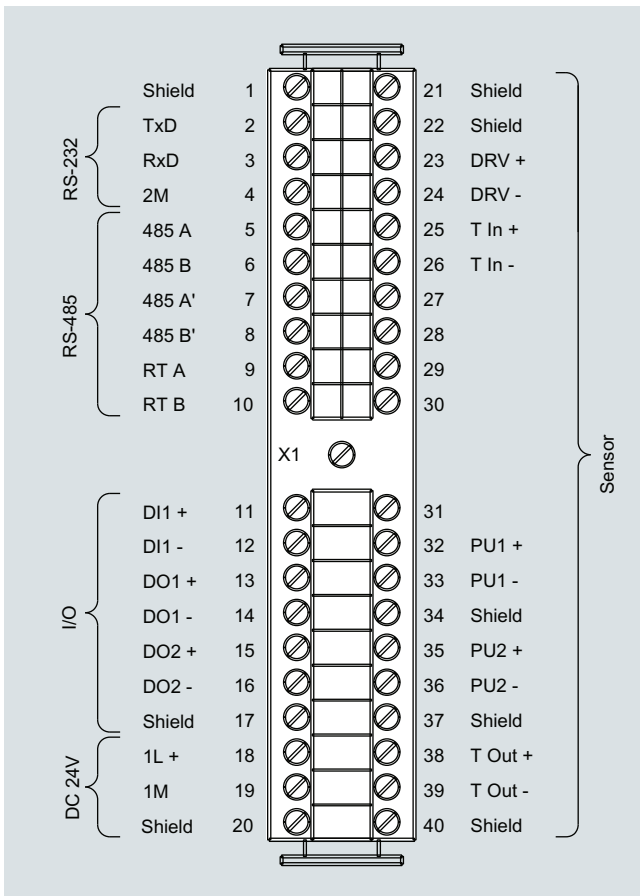


SIFLOW FC070, dimensions in mm (inch)

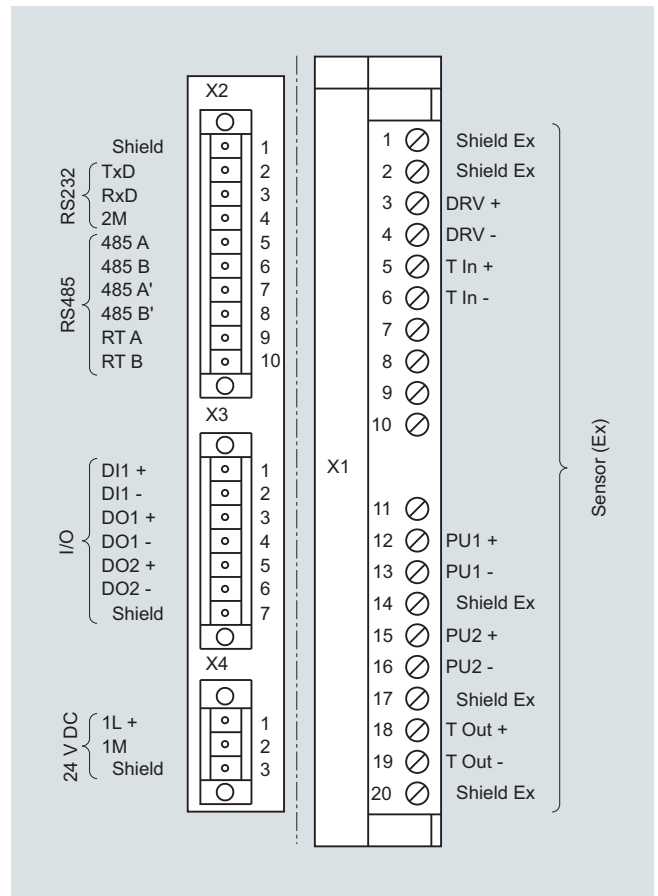


SIFLOW FC070 Ex, dimensions in mm (inch)

### Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex, electrical connection