

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Overview



The 2-path flowmeter SITRANS FUS380 comes as battery or mains-powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.

The type-approved flowmeter version is named SITRANS FUE380 - see page 3/279.

Technically, the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval for custody transfer.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 15 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-path measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on most district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanically isolated digital outputs for easy connection to a calculator (potential-free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_i (min) : Q_s (max) up to 1:400

Application

The main application for SITRANS FUS380 is measurement of water flow or water flow in energy meter systems in district heating networks or chilled water.

Design

The 2-path design of SITRANS FUS380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and a transmitter SITRANS FUS080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUS380 has two digital output functions that can be individually selected.

Pulse output rate is defined when ordering. To get optimal benefit the pulse value must be selected as low as possible.

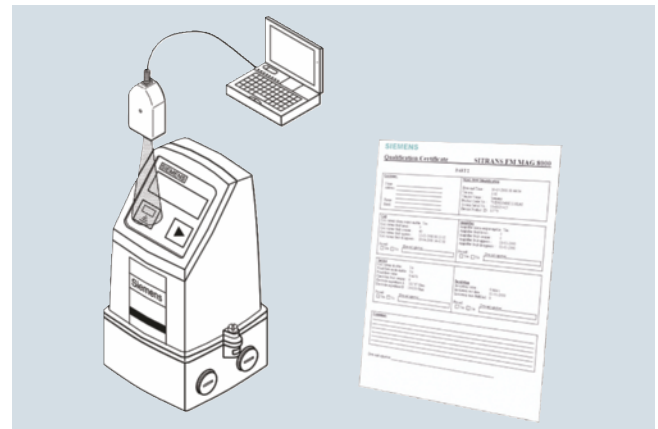
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

Function

Together with the SIMATIC PDM tool the FUS380 offers the possibility of testing and verifying the flowmeter on site and creating a printed "Qualification Certificate" with specific data that defines the quality status of the measurement.

The Qualification Certificate shows information about the actual status of the flowmeter:

- General settings, flowmeter and battery information, totalizer values, and pulse output settings
- Detailed information about the transmitter and the sensor functionality, and a main parameter list for evaluating the functionality of the flowmeter



Configuration SITRANS FUS380

Selection guide SITRANS FUS380, standard version

DN	Q _s (m ³ /h)	Q _{max} (m ³ /h) (105 % of Q _s)	Q _p (m ³ /h)	Q _i (m ³ /h) (1:100 of Q _p)	Cut-off (m ³ /h)	Cut-off (% of Q _{max})	Typical pulse value ¹⁾ (l/pulse)
50	15	15.75	15	0.15	0.075	0.48	1
50	45	47.25	15	0.15	0.075	0.16	1
50	45	47.25	30	0.3	0.150	0.32	1
65	25	26.25	25	0.25	0.125	0.48	1
65	72	75.6	25	0.25	0.125	0.17	1
65	72	75.6	50	0.5	0.250	0.33	1
80	40	42	40	0.4	0.200	0.48	2.5
80	120	126	40	0.4	0.200	0.16	2.5
80	120	126	80	0.8	0.400	0.32	2.5
100	60	63	60	0.6	0.300	0.48	2.5
100	180	189	60	0.6	0.300	0.16	2.5
100	240	252	120	1.2	0.600	0.24	2.5
125	10	10.5	100	1	0.500	4.76	2.5
125	280	294	100	1	0.500	0.17	2.5
125	400	420	200	2	1.000	0.24	2.5
150	150	157.5	150	1.5	0.750	0.48	10
150	420	441	150	1.5	0.750	0.17	10
150	560	588	300	3	1.500	0.26	10
200	250	262.5	250	2.5	1.250	0.48	10
200	700	735	250	2.5	1.250	0.17	10
200	900	945	500	5	2.500	0.26	10
250	400	420	400	4	2.000	0.48	10
250	1120	1176	400	4	2.000	0.17	10
250	1400	1470	800	8	4.000	0.27	10
300	560	588	560	5.6	2.800	0.48	50
300	1560	1638	560	5.6	2.800	0.17	50
300	2100	2205	1120	11.2	5.600	0.25	50
350	750	787.5	750	7.5	3.750	0.48	50
350	2100	2205	750	7.5	3.750	0.17	50
350	2800	2940	1500	15	7.500	0.26	50
400	950	997.5	950	9.5	4.750	0.48	50
400	2660	2793	950	9.5	4.750	0.17	50
400	3600	3780	1900	19	9.500	0.25	50
500	1475	1548.75	1475	14.75	7.375	0.48	100
500	4130	4336.5	1475	14.75	7.375	0.17	100
500	5500	5775	2950	29.5	14.750	0.26	100
600	2150	2257.5	2150	21.5	10.750	0.48	100
600	6020	6321	2150	21.5	10.750	0.17	100
600	8000	8400	4300	43	21.500	0.26	100
700	2900	3045	2900	29	14.500	0.48	100
700	8120	8526	2900	29	14.500	0.17	100
700	10 800	11 340	5800	58	29.000	0.26	100
800	3800	3990	3800	38	19.000	0.48	100
800	10 640	11 172	3800	38	19.000	0.17	100
800	14 200	14 910	7600	76	38.000	0.25	100
900	5000	5250	3800	38	19.000	0.36	100
900	14 000	14 700	5000	50	25.000	0.17	100
900	20 000	21 000	5000	50	25.000	0.12	100
1000	6000	6300	3800	38	19.000	0.30	100
1000	16 800	17 640	6000	60	30.000	0.17	100
1000	24 000	25 200	12 000	120	60.000	0.24	100
1200	9000	9450	3800	38	19.000	0.20	100
1200	25 200	26 460	9000	90	45.000	0.17	100
1200	36 000	37 800	18 000	180	90.000	0.24	100

The values Q_i, Q_p and Q_s are shown on the system label of the FUS380. Q_i (Q_{min}) means the minimal and Q_p (Q_{nom}) the nominal flow rate. Q_s is the highest operatable flow rate. The maximum flow rate (Q_{max}) is 105 % of Q_s. The low flow cut-off is 50 % of Q_i.

In order to obtain best pulse output resolution in the range Q_{min} to Q_s of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. Therefore the ordering data table also shows Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s and indicates the normal or typical flow.

To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms: L/pulse > Q_s (m³/h) /360.

For example Q_s = 300 m³/h; L/pulse > 300/360; L/pulse > 0.83; therefore the pulse value must be 1 l/pulse

¹⁾ Typical pulse values for SITRANS FUS380 with pulse length 5 ms. Other values are possible - please see the selections at the 7ME340 Order codes.

Flow Measurement

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Technical specifications

Sensor design	2-path sensor with flanges and inline transducers wet-calibrated from factory
Nominal size (DN 50 ... DN 80 in bronze)	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1
Pipe material	<ul style="list-style-type: none"> DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. DN 50 ... 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN 1982)
Transducer design	<ul style="list-style-type: none"> DN 100 ... DN 1200: Inline version and welded onto the pipe DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/brass (CuZn ₃₆ Pb ₂ As)

Sensor operating conditions

Ambient temperature	
• Operation	-10 ... +60 °C (14 ... 140 °F) (MID version: -10 ... +55 °C (14 ... 131 °F))
• Storage	-40 ... +85 °C (-40 ... +185 °F)
Measured media	Heating water, according to VDI-2035 (pH 8.2 - 10.5), industrial VdTUV information sheet 1466 and AGFW information sheet FW 510.
Media/surface temperature	DN 100 ... DN 1200: <ul style="list-style-type: none"> Remote: 2 ... 200 °C (35.6 ... 392 °F) DN 50 ... DN 80: <ul style="list-style-type: none"> Remote: 2 ... 150 °C (35.6 ... 302 °F) DN 50 ... DN 1200: <ul style="list-style-type: none"> Compact: 2 ... 120 °C (35.6 ... 248 °F)
Degree of protection	Sensor connection IP67/NEMA 4X/6
Max. flow velocity	DN 50 ... DN 1200: 9 m/s (29.5 ft/s)
Electromagnetic compatibility	
• Emitted interference	To EN 55011/CSPRI-11
• Noise immunity	To EN/IEC 61236-1 (Industry)

Transmitter

The transmitter related to this system is the SITRANS FUS080. Technical specifications to the FUS080 see page 3/240 ff.

Sensor cable

Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
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Certificates and approvals

Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according EN 3.1 is optionally available
Calibration report	A standard calibration report is shipped with every flowmeter. Extended accredited ISO/IEC 17025 calibration certificates optionally available
Approvals	No custody transfer approvals

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

SITRANS FUS380 uncertainty

	FUS380
Flow value setting	Predefined settings according to dimension
Approval	No approval
Flow rate v_f	0.02 ... 9 m/s (0.065 ... 29.5 ft/s)
Output A	Pulse: forward, reverse, forward net, reverse net (Preset: forward)
Output B	Pulse (forward, reverse, forward net, reverse net, alarm, call-up (Preset: alarm))
Pulse value A & B (depending on DN value)	0.1 l/p, 0.25 l/p, 0.5 l/p, 1 l/p, 2.5 l/p, 10 l/p, 25 l/p, 50 l/p, 100 l/p, 250 l/p, 500 l/p, 1 m ³ /p, 2.5 m ³ /p, 5 m ³ /p, 10 m ³ /p, 25 m ³ /p, 50 m ³ /p, 100 m ³ /p, 250 m ³ /p, 500 m ³ /p, 1000 m ³ /p
Pulse width	5/10/20/50/100/200/500 ms
Flow unit setup	Preset: m ³ /h
Volume unit setup	Preset: m ³

Flowmeter Calibration and traceability

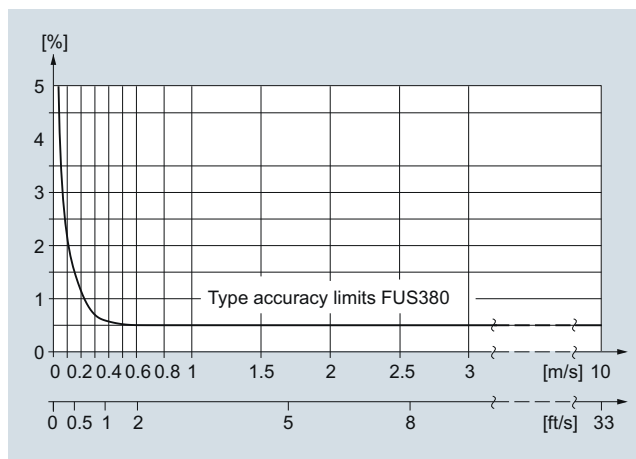
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability). Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h. Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

A standard calibration certificate with Q_n as selected flow is shipped with each SITRANS FUS380. This production calibration protocol consists of 2 x 3 points at Q_i , 10 % Q_p and Q_p (max. 4 200 m³/h).

Accuracy SITRANS FUS380:

$\pm 0.5\%$ for $0.5 \text{ m/s} < v < 10 \text{ m/s}$ and $\pm 0.25/V_{\text{act}}$ [%] below 0.5 m/s



Flow Measurement

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Selection and Ordering data			Article-No.	Order code
Flowmeter SITRANS FUS380 (standard)			7ME3400-	
			0 - A	
Diameter	Flow setting [m ³ /h] Q _p (Q _n) ¹ Q _s			
DN 50 (2") ²	15	15	1 A	
DN 50 (2") ²	15	45	1 C	
DN 50 (2") ²	30	45	1 D	
DN 65 (2½") ²	25	25	1 E	
DN 65 (2½") ²	25	72	1 G	
DN 65 (2½") ²	50	72	1 H	
DN 80 (3") ²	40	40	1 J	
DN 80 (3") ²	40	120	1 L	
DN 80 (3") ²	80	120	1 M	
DN 100 (4")	60	60	1 N	
DN 100 (4")	60	180	1 Q	
DN 100 (4")	120	240	1 R	
DN 125 (5")	100	100	1 S	
DN 125 (5")	100	280	1 U	
DN 125 (5")	200	400	1 V	
DN 150 (6")	150	150	2 A	
DN 150 (6")	150	420	2 C	
DN 150 (6")	300	560	2 D	
DN 200 (8")	250	250	2 E	
DN 200 (8")	250	700	2 G	
DN 200 (8")	500	900	2 H	
DN 250 (10")	400	400	2 J	
DN 250 (10")	400	1120	2 L	
DN 250 (10")	800	1400	2 M	
DN 300 (12")	560	560	2 N	
DN 300 (12")	560	1560	2 Q	
DN 300 (12")	1120	2100	2 R	
DN 350 (14")	750	750	2 S	
DN 350 (14")	750	2100	2 U	
DN 350 (14")	1500	2800	2 V	
DN 400 (16")	950	950	3 A	
DN 400 (16")	950	2660	3 C	
DN 400 (16")	1900	3600	3 D	
DN 500 (20")	1475	1475	3 J	
DN 500 (20")	1475	4130	3 L	
DN 500 (20")	2950	5500	3 M	
DN 600 (24")	2150	2150	3 S	
DN 600 (24")	2150	6020	3 U	
DN 600 (24")	4300	8000	3 V	
DN 700 (28")	2900	2900	4 E	
DN 700 (28")	2900	8120	4 G	
DN 700 (28")	5800	10 800	4 H	
DN 800 (32")	3800	3800	4 N	
DN 800 (32")	3800	10 640	4 Q	
DN 800 (32")	7600	14 200	4 R	
DN 900 (36")	5000	5000	5 A	
DN 900 (36")	5000	14 000	5 C	
DN 900 (36")	10000	20 000	5 D	
DN 1000 (40")	6000	6000	5 J	
DN 1000 (40")	6000	16 800	5 L	
DN 1000 (40")	12 000	24 000	5 M	
DN 1200 (48")	9000	9000	5 S	
DN 1200 (48")	9000	25 200	5 U	
DN 1200 (48")	18 000	36 000	5 V	

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD.

Selection and Ordering data			Article-No.	Order code
Flowmeter SITRANS FUS380 (standard)			7ME3400-	
			0 - A	
Flange norm and pressure rating				
System without sensor - only a transmitter FUS080 as spare part - settings as defined with this Article No.			A	
EN 1092-1 Flanges				
• PN 16 (DN 100 ... DN 1200)			C	
• PN 25 (DN 200 ... DN 1000)			D	
• PN 40 (DN 50 ... DN 250) ³			E	
Compact/remote connection				
Compact version, max. 120 °C (248 °F)			0	
Remote version, max. 150/200 °C (302/392 °F)				
• 5 m (16.4 ft)			2	
• 10 m (32.8 ft)			3	
• 20 m (65.6 ft)			4	
• 30 m (98.4 ft)			5	
Pulse output value setup ⁵⁾				
0.1 l/p			1	
1 l/p			2	
2.5 l/p			3	
10 l/p			4	
50 l/p			5	
100 l/p			6	
250 l/pulse			7	
1 m ³ /pulse			8	
0.25 l/pulse			9	NOA
0.5 l/pulse			9	NOB
5 l/pulse			9	NOC
25 l/pulse			9	NO D
500 l/pulse			9	NO E
2.5 m ³ /pulse			9	NO F
5 m ³ /pulse			9	NO G
10 m ³ /pulse			9	NO H
25 m ³ /pulse			9	NO J
50 m ³ /pulse			9	NO K
100 m ³ /pulse			9	NO L
250 m ³ /pulse			9	NOM
500 m ³ /pulse			9	NON
1000 m ³ /pulse			9	NO P
Transmitter version of SITRANS FUS080				
IP67/NEMA 4X/6 115 ... 230 V AC			B	
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack ⁴⁾			D	
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup ⁴⁾			E	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)			G	
Pulse width setup				
5 ms (standard)			2	
10 ms			3	
20 ms			4	
50 ms			5	
100 ms			6	
200 ms			7	
500 ms			8	

1) Q_p (Q_n) is the normal or typical flow. Q_p and Q_s is shown on the system label.

2) Pipe material bronze brass.

3) PN 40 standard for DN 50 ... DN 80 die-cast bronze pipes.

4) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

5) To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms:

$$L/\text{pulse} > Q_s (\text{m}^3/\text{h}) / 360,$$

$$\text{For example } Q_s = 300 \text{ m}^3/\text{h}; L/\text{pulse} > 300/360;$$

$$L/\text{pulse} > 0.83; \text{ therefore the pulse value must be } 1 \text{ l/pulse}$$

Flow Measurement

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Selection and Ordering data

Order code

Additional information

Please add „-Z“ to Article No. and following add-on code(s) with plain text.

Calibration/certificate FUS380

Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter.
Incl. Calibration protocol: 2 x 3 points, Q_i , 10 %, Q_p and Q_p (max. 8000 m³/h).

Included

Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 5 points, 5 %, 10 %, 50 % and 100 % of Q_p (max. 630 m³/h).

D20

Accredited Siemens ISO/IEC 17025 calibration for DN 250 ... DN 600 with Q_n as selected in diameter. Certificate: 2 x 5 points, 5 %, 10 %, 50 % and 100 % of Q_p (max. 2800 m³/h).

D21

Accredited Siemens ISO/IEC 17025 calibration, DN 500 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 50 % and 100 % of Q_p (max. 8000 m³/h).

D22

Output B as reverse flow pulses.
No calibration/verification of this function.

E21

Material certificate

EN 10204-3.1 (pipe material)

F10

Tag name plate

Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).

Y17

Flowmeter SITRANS FUS380 operating instructions, accessories and spare parts

Operating instructions

Description	Article No.
• English	A5E00730100
• German	A5E00740611
• Spanish	A5E00754188
• French	A5E00754173

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

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

For accessories and spare parts see chapter of transmitter SITRANS FUS080/FUE080 on page 3/243.

3



Please use online Product selector to get latest updates. Product selector link:

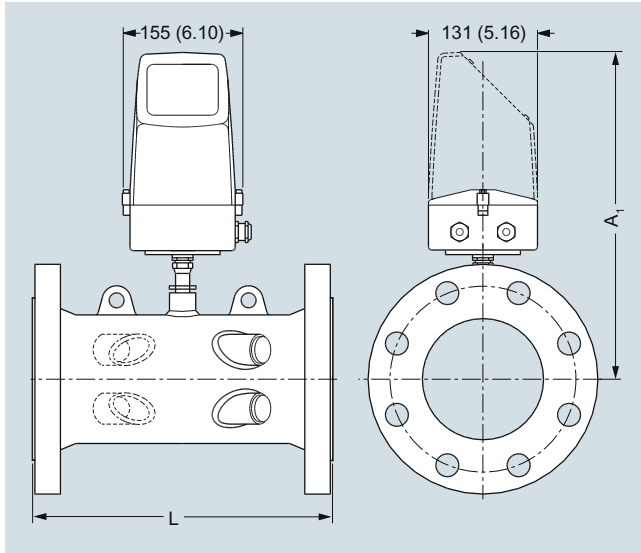
www.pia-selector.automation.siemens.com

Flow Measurement

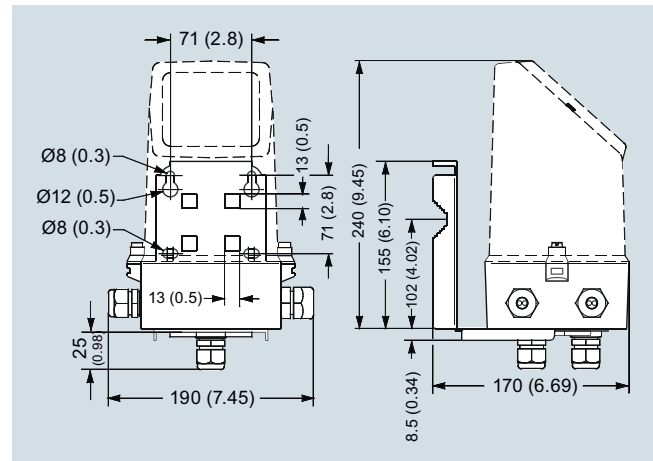
SITRANS F US Inline

Flowmeter SITRANS FUS380 and FUE380

Dimensional drawings



Transmitter IP67/NEMA 4X/6, wall mounting



Dimensions in mm (inch)

Sensor dimensions for FUS380 and FUE380

Size	PN 16		PN 25		PN 40		A1	Lift hug
	L	Weight	L	Weight	L	Weight		
DN	mm	kg	mm	kg	mm	kg	mm	
50	-	-	-	-	300 +0/-2	10	350	No
65	-	-	-	-	300 +0/-2	15	360	No
80	-	-	-	-	350 +0/-3	18	370	No
100	350 +0/-2	15	-	-	350 +0/-3	18	375	No
125	350 +0/-2	18	-	-	350 +0/-3	24	380	No
150	500 +0/-3	28	-	-	500 +0/-3	34	390	No
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	414	No
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	440	No
300	500 +0/-3	66	500 +0/-3	81	-	-	466	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	495	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	507	Yes
500	625 +0/-3	194	625 +0/-3	231	-	-	558	Yes
600	750 +0/-3	303	750 +0/-3	365	-	-	609	Yes
700	875 +0/-3	361	875 +0/-3	553	-	-	660	Yes
800	1000 +0/-3	494	1000 +0/-3	770	-	-	710	Yes
900	1230 +6/-6	475	1300 +6/-6	835	-	-	810	Yes
1000	1300 +6/-6	594	1370 +6/-6	1000	-	-	910	Yes
1200	1360 +6/-6	732	-	-	-	-	1110	Yes

Notes:

- Weight for transmitter/electronics 1.5 kg (compact version) or approximately 5 kg (remote version including 10 m cable set)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Flow Measurement

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Flowmeter SITRANS FUS380 and FUE380

Size inch	PN 16		PN 25		PN 40		A1 inch	Lift hug
	L inch	Weight lb	L inch	Weight lb	L inch	Weight lb		
2	-	-	-	-	11.81 +0/-0.08	22	13.78	No
2½	-	-	-	-	11.81 +0/-0.08	33	14.17	No
3	-	-	-	-	13.78 +0/-0.08	40	14.57	No
4	13.78 +0/-0.08	33	-	-	13.78 +0/-0.12	40	14.76	No
5	13.78 +0/-0.08	40	-	-	13.78 +0/-0.12	53	14.96	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.35	No
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.30	No
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.32	No
12	19.68 +0/-0.12	146	19.68 +0/-0.12	179	-	-	18.35	Yes
14	21.65 +0/-0.12	207	21.65 +0/-0.12	267	-	-	19.49	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	19.96	Yes
20	24.61 +0/-0.12	428	24.61 +0/-0.12	509	-	-	21.97	Yes
24	29.53 +0/-0.12	668	29.53 +0/-0.12	805	-	-	23.98	Yes
28	34.45 +0/-0.12	796	34.45 +0/-0.12	1246	-	-	25.98	Yes
32	39.37 +0/-0.12	1089	39.37 +0/-0.12	1698	-	-	27.95	Yes
36	48.43 +0/-0.24	1047	51.18 +0/-0.24	1841	-	-	31.89	Yes
40	51.18 +0/-0.24	1310	53.94 +0/-0.24	2205	-	-	35.83	Yes
48	53.54 +0/-0.24	1614	-	-	-	-	43.70	Yes

Notes:

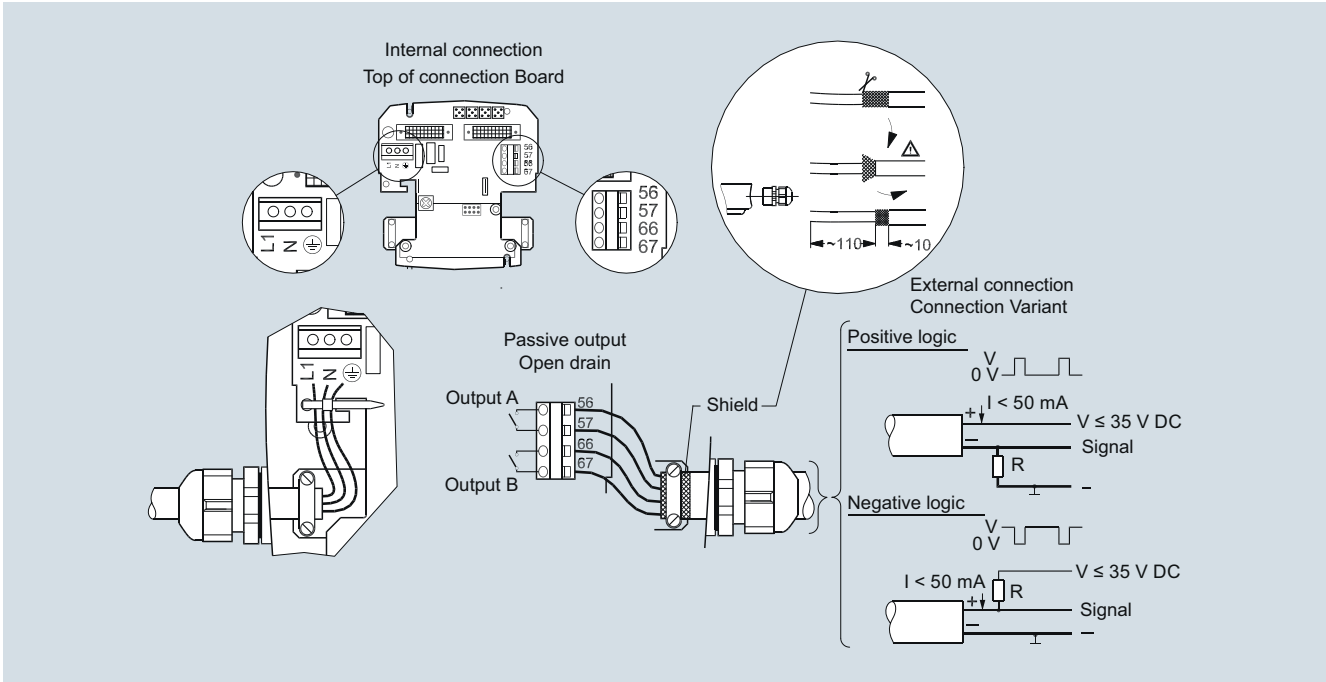
- Weight for transmitter/electronics 3.3 lb (compact version) or approximately 11 lb (remote version including 32.8 ft cable set)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Flow Measurement SITRANS F US Inline

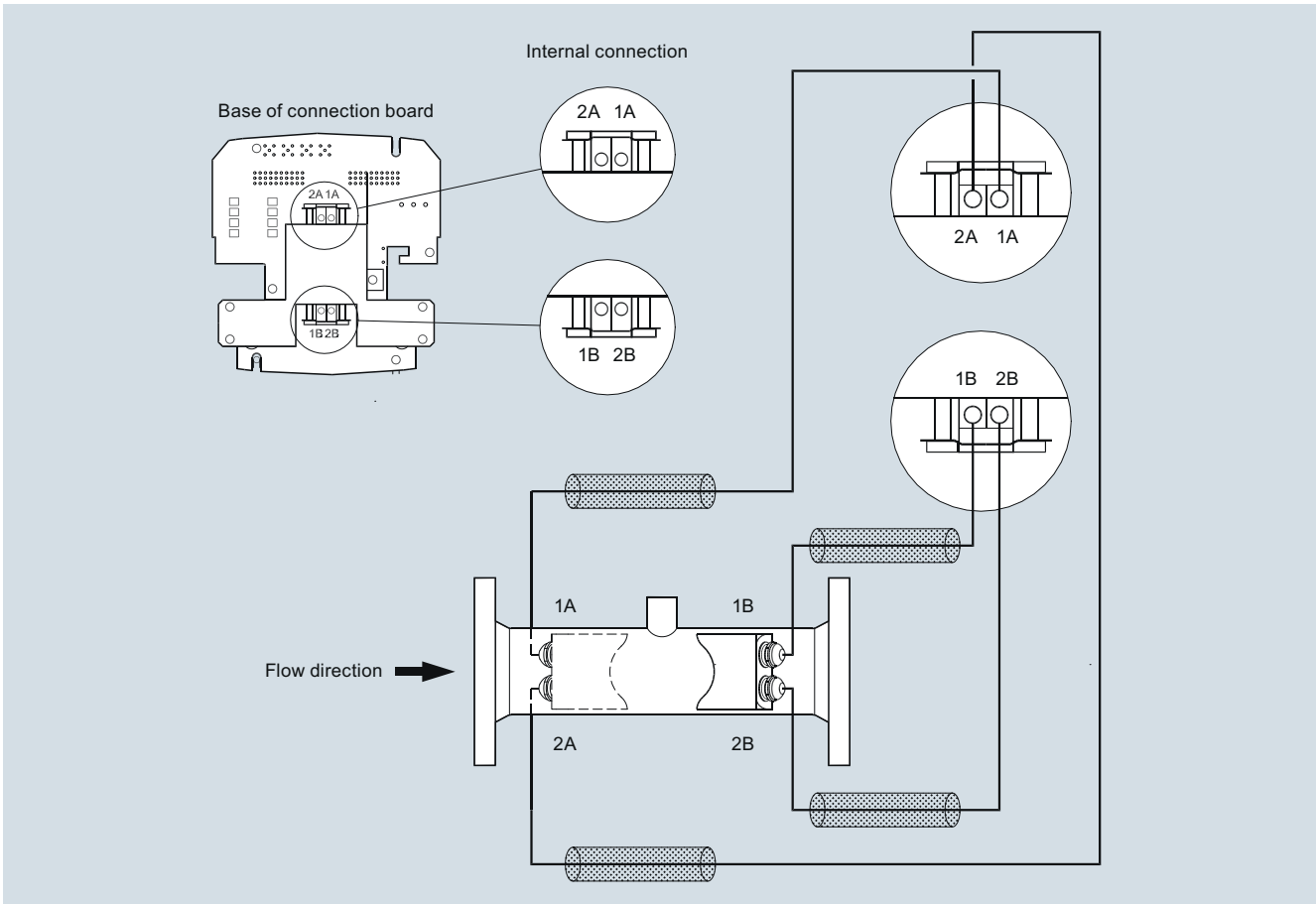
Flowmeter SITRANS FUS380 and FUE380

Schematics

3



Electrical connection of transmitter SITRANS FUS/FUE380



Electrical connection of sensor SITRANS FUS/FUE380