Flowmeter SITRANS FUS380 standard

Overview

The 2-track 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 4/259.
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 20 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all 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
- Modbus RTU/RS232, RS485

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-track 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, and optional Modbus RTU communication modules.

Pulse output rate is defined when ordering.

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.

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 maxium 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.

[1] Typical pulse values for SITRANS FUS380. Other pulse values are possible - see Selection and Ordering data table.

Flowmeter SITRANS FUS380 standard

Technical specifications

Pipe design	2-track sensor with flanges and inline transducers wet-calibrated from factory
Nominal size welded version (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	• 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 (EN1982)
Transducer design	• 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 ($CuZn_{36}Pb_2As$)
Sensor operating conditions	
Storage	-40 … +85 °C (-40 … +185 °F)
Media/surface temperature	DN 100 ... DN 1200: • Remote: 2 … 200 °C (35.6 … 392 °F) DN 50 ... DN 80: • Remote: 2 … 150 °C (35.6 … 302 °F) DN 50 ... DN 1200: • 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 61000-6-4
• Noise immunity	To EN 61000-6-2
Transmitter	
The transmitter related to this system is the SITRANS FUS080. Technical specifications to the FUS080 see page 4/221 ff.	
Sensor cable	
Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
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

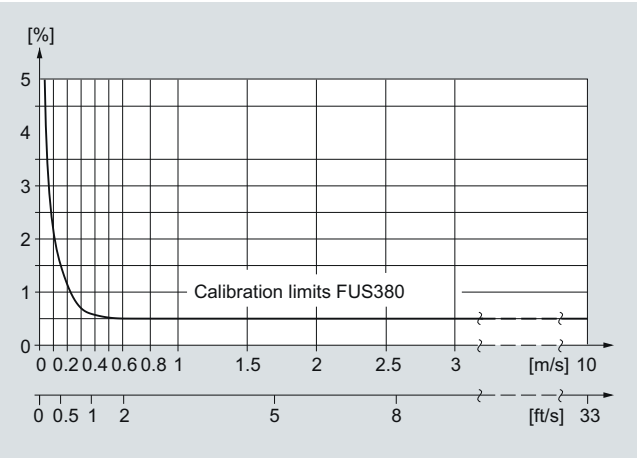
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries worldwide, including the US (NIST traceability).

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 m^3/h).

Accuracy SITRANS FUS380:

± 0.5 % for 0.5 m/s < v < 10 m/s and ± 0.25/$V_{act.}$ [%] below 0.5 m/s



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

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	Order 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 order 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		
0.1 l/p (option for DN 50 ... DN 65) with 5 ms	1	
1 l/p (typical for DN 50 ... DN 65) with 5 ms	2	
2.5 l/p (typical for DN 80 ... DN 125) with 5 ms	3	
10 l/p (typical for DN 150 ... DN 250) with 5 ms	4	
50 l/p (typical for DN 300 ... DN 400) with 5 ms	5	
100 l/p (typical for DN 500 ... DN 1200) with 5 ms	6	
250 l/pulse	7	
1 m^3/pulse	8	
0.25 l/pulse	9	N0A
0.5 l/pulse	9	N0B
5 l/pulse	9	N0C
25 l/pulse	9	N0D
500 l/pulse	9	N0E
2.5 m^3/pulse	9	N0F
5 m^3/pulse	9	N0G
10 m^3/pulse	9	N0H
25 m^3/pulse	9	N0J
50 m^3/pulse	9	N0K
100 m^3/pulse	9	N0L
250 m^3/pulse	9	N0M
500 m^3/pulse	9	N0N
1000 m^3/pulse	9	N0P
Transmitter SITRANS FUS080		
IP67/NEMA 4X/6 115 ... 230 V AC	B	
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack	D	
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup	E	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)[4]	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.

Flowmeter SITRANS FUS380 standard

Selection and Ordering data	Order code
Additional information	
Please add „**-Z**" to Order 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. Calibration protocol: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 4200 m^3/h).	**Included**
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 250 m^3/h).	**D20**
Accredited Siemens ISO/IEC 17025 calibration for DN 100 ... DN 500 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 1300 m^3/h).	**D21**
Accredited Siemens ISO/IEC 17025 calibration, DN 300 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 4200 m^3/h).	**D22**
Output B as reverse flow pulses. No calibration/verification.	**E21**
Material certificate	
EN 10204-3.1	**F10**
Tag name plate	
Stainless steel tag name plate, text length depends on font size: 8 mm up to 10 characters, 4 mm up to 20 characters, or 3 mm up to 30 characters (add plain text)	**Y17**

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

www.pia-selector.automation.siemens.com

Flowmeter SITRANS FUS380 operating instructions, accessories and spare parts

Operating instructions

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

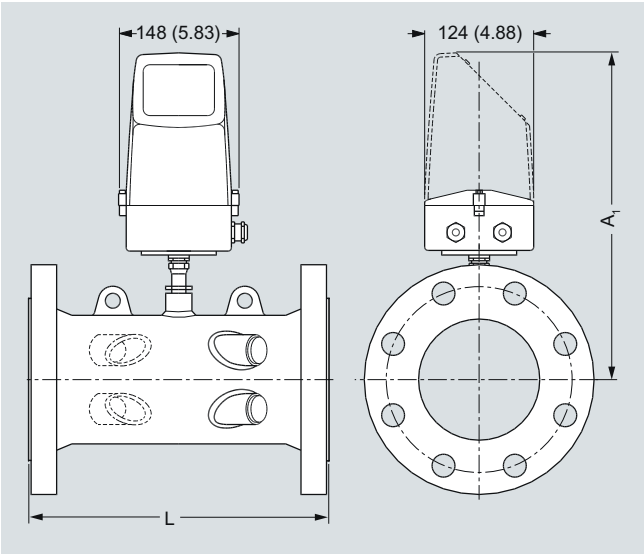
This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

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

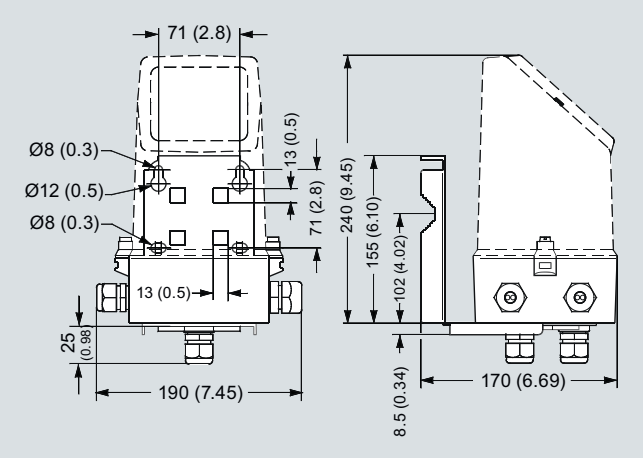
For accessories and spare parts see chapter of transmitter SITRANS FUS080/FUE080 on page 4/224.

Flowmeter SITRANS FUS380 and FUE380

Dimensional drawings



Transmitter IP67/NEMA 4X/6, wall mounting



DImensions in mm (inch)

Pipe Dimensions for FUS380 and FUE380

Nennweite	PN 16		PN 25		PN 40			
	L	Gewicht	L	Gewicht	L	Gewicht	A1	Hebevorrich-tung
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	176	625 +0/-3	235	-	-	558	Yes
600	750 +0/-3	244	750 +0/-3	292	-	-	609	Yes
700	875 +0/-3	258	875 +0/-3	416	-	-	660	Yes
800	1000 +0/-3	338	1000 +0/-3	562	-	-	710	Yes
900	1230 +6/-6	475	1300 +6/-6	835	-	-	810	No
1000	1300 +6/-6	594	1370 +6/-6	1078	-	-	910	No
1200	1360 +6/-6	860	-	-	-	-	1110	No

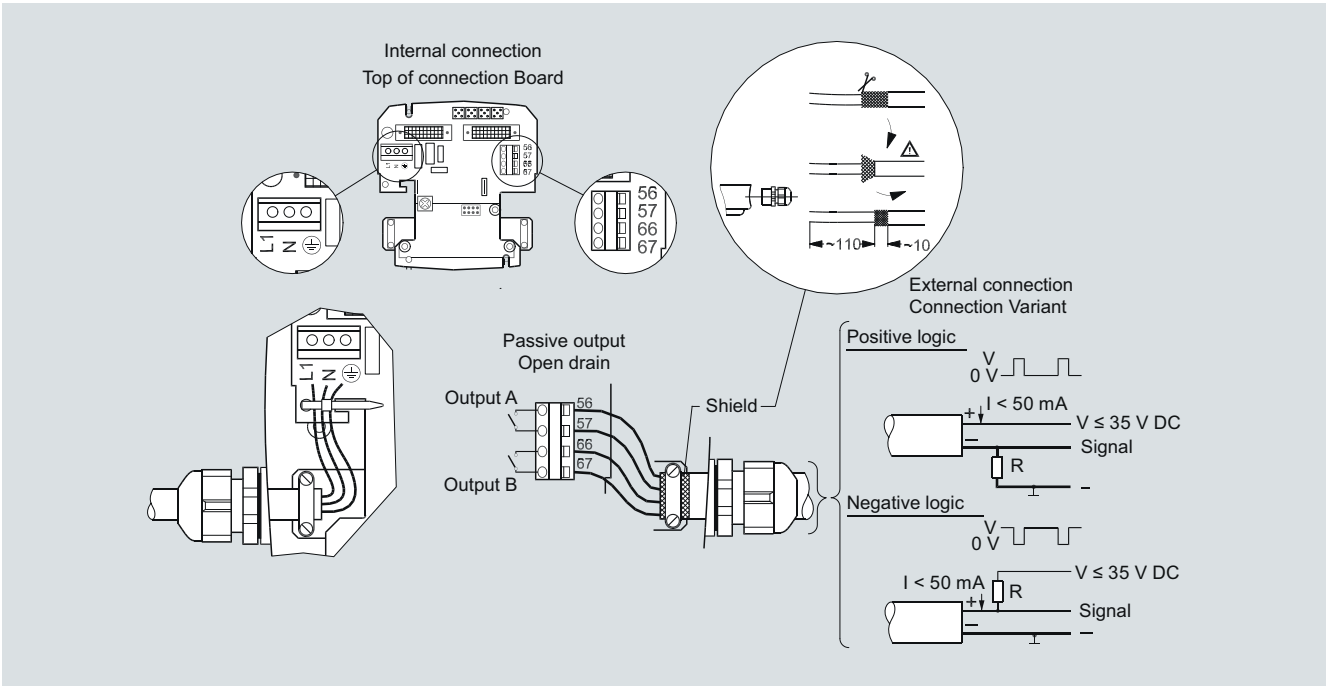
Notes:
- Weight for transmitter/electronics 1.5 kg
- - Means not available
- All weigths are **approximate**
- For flange values - see norm EN 1092-1

Nennweite	PN 16		PN 25		PN 40			
	L	Gewicht	L	Gewicht	L	Gewicht	A1	Hebevor-richtung
inch	inch	lb	inch	lb	inch	lb	inch	
2	-	-	-	-	11.81 +0/-0.08	22	14	No
2½	-	-	-	-	11.81 +0/-0.08	33	14.4	No
3	-	-	-	-	13.78 +0/-0.08	40	14.8	No
4	13.77 +0/-0.08	33	-	-	13.77 +0/-0.12	40	15	No
5	13.77 +0/-0.08	40	-	-	13.77 +0/-0.12	53	15.2	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.6	Yes
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.30	Yes
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.32	Yes
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	-	-	19.8	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	19.96	Yes
20	24.61 +0/-0.12	419	24.61 +0/-0.12	538	-	-	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	1217	-	-	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	-	-	32.4	No
40	51.18 +0/-0.24	1310	53.94 +0/-0.24	2376	-	-	36.4	No
48	53.54 +0/-0.24	1892	-	-	-	-	44.4	No

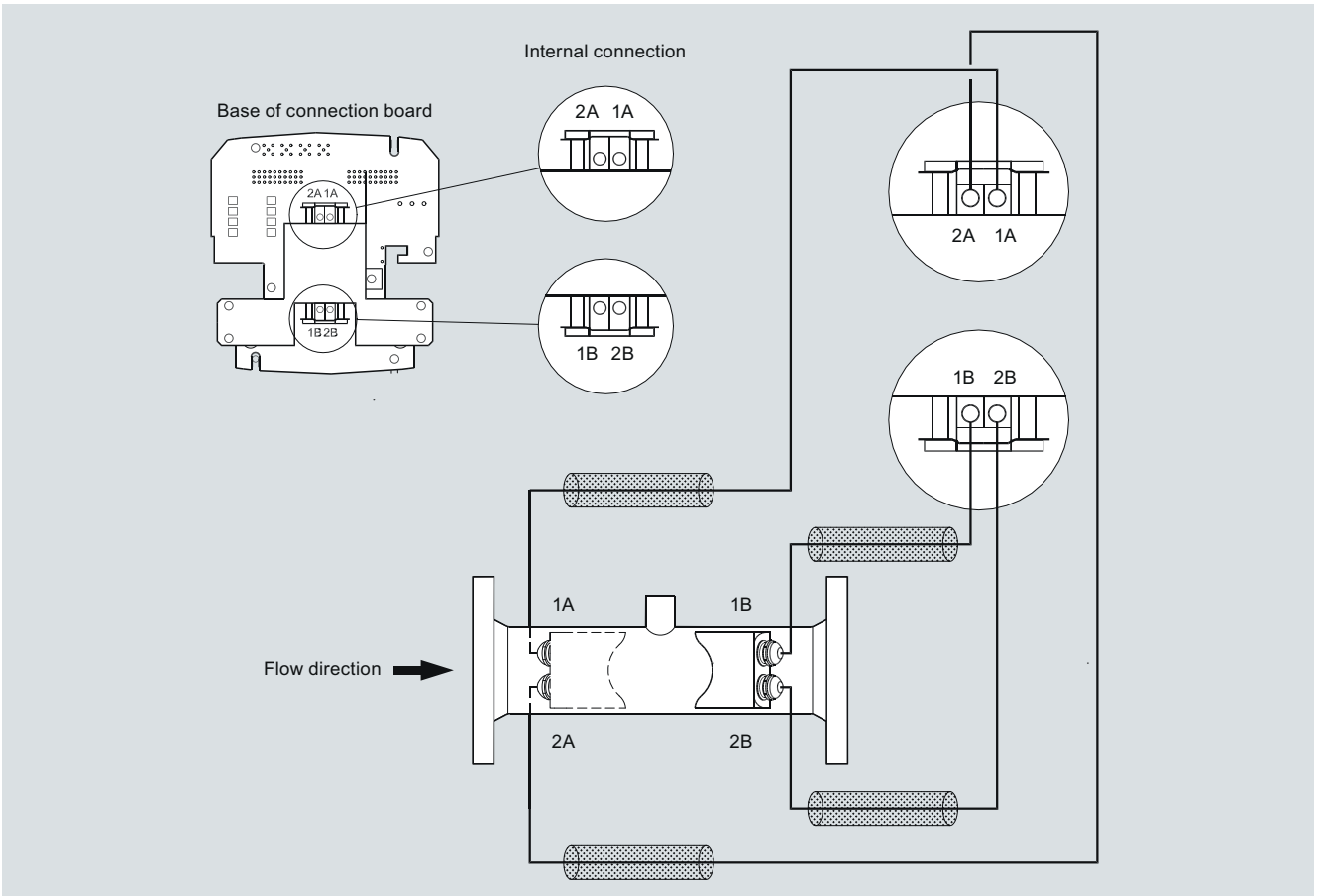
Notes:
- Weight for transmitter/electronics 3.3 lb
- - Means not available
- All weigths are **approximate**
- For flange values - see norm EN 1092-1

4

Schematics



Electrical connection of transmitter SITRANS FUS/FUE380



Electrical connection of sensor SITRANS FUS/FUE380