

Overview



The SITRANS F US SONOFLO ultrasonic flowmeters type SONO 3000 CT are designed for accurate, high resolution flow measurement in water based district heating plants e.g. local networks, boiler stations or substations and in chilled water applications.

The combination of SONOFLO ultrasonic flowmeters type SONO and a SONO 3000 CT transmitter are designed and approved for custody transfer according to PTB, class C, OIML R75, class 4 and a lot of local country approvals.

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

Benefits

- No pressure drop
- Reliable and accurate flow measurements
- Long-term stability with excellent performance
- Can measure on all district water independent of water quality and conductivity
- Low cost of ownership
- Matched pair calibration of complete system
- Local country approvals
- Outputs: one analog, pulse/frequency and relay
- Self diagnostic

Application

The main application for SONOFLO ultrasonic flowmeters type SONO 3300/3000 CT is to measure volume, on water at temperatures from 3 to 200 °C (37.4 to 392 °F) (depending on local approvals), in the following fields:

- District heating systems
- Chilled water systems
- Combined district heating- and chilled water systems

Design

The SONO 3300/3000 CT flow meter consists of a flow sensor type SONO 3300 CT, transmitter SONO 3000 CT incl. remote mounting device and 4 pcs coaxial cables for connecting the flow sensor and the transmitter.
The flow sensor is a 2-track direct shot sensor type with flanges and in the sizes DN 50 to DN 1200 (2" to 48").
The transmitter can be chosen in 3 different versions, IP67, IP20 and IP65.

All versions are sealed for custody transfer.

Integration

The flowmeter pulse output is often used as input for heat calculators. The range of meters enables optimum measurement of energy consumption.

The analog output is used to inform the SCADA system about the actual volume flow values in the distribution network.

Technical specifications

SITRANS F US SONOFLO SONO 3300 CT

Accuracy

Error in measurement at reference conditions; % of measured value

Dynamic range

- 1:20 Pulse output $\leq \pm 0,5\%$
- 1:50 Pulse output $\leq \pm 3\%$

Repeatability $\leq \pm 0,25\%$

Input

Nominal size DN 50 ... DN 1200 (2" ... 48")

Process connections, PN designated, EN 1092-1, type 11, B

- PN 10 (DN 500 ... DN 1200 (20" ... 48"))
- PN 16 (DN 50 ... DN 1200 (2" ... 48"))
- PN 25 (DN 200 ... DN 1000 (8" ... 40"))
- PN 40 (DN 50 ... DN 100 (2" ... 4"))

Transducers Integrated version welded into the pipe

Rated operating conditions

Ambient conditions

Ambient temperature

- Operating -10 ... +160°C (14 ... 320 °F) depending on approval
- Storage -40 ... +85°C (-40 ... +185 °F)

Degree of protection (enclosure) Standard version IP67

Medium conditions

Liquid temperature -10 ... +200°C (14 ... 392 °F) depending on approval

Maximum flow velocity 10 m/s (32 ft/s)

Design 2-track sensor with flanges and integrated transducers

Material

- Pipe
 - DN 50 ... DN 150 (2" ... 6"): Steel GS-16 Mn5, mat. No. 1.1131
 - DN 200 ... DN 1200 (8" ... 48"): Steel EN 1.0345
- Flange DN 50 ... DN 1200 (2" ... 48"): Steel EN 1.0025-S235JRG2
- Transducers Stainless steel

Certificates and approvals

Material certificates

The sensor is supplied with a Siemens Certificate of Conformity. Material certificate on wetted parts on request

NDT examination report

Available on request

SITRANS F flowmeters

SITRANS F US

SONOFLO SONO 3300/3000 Custody Transfer

Technical specifications (continued)

Coaxial cable

The first 0.5 m (19.7 inch) of the coaxial cable

Diameter	5.3 mm (0.21")
Length	0.5 m (19.7")
Material	PTFE
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F)

Coaxial cable > 0.5 m (19.7 inch)

Diameter	5.8 mm (0.23")
Length	Max. 250 m (820 ft) between sensor and transmitter. If distance exceeds 30 m (98.5 ft), please contact your Siemens partner.
Material	PE
Ambient temperature	-40 ... +70 °C (-40 ... +158 °F)

Transmitter SONO 3000 CT

Output

Analog output	Individually galvanically isolated, isolation voltage 500 V
• Measurement of	Volume flow, sound velocity (optional via menu)
• Current	0 ... 20 mA or 4 ... 20 mA
• Load	< 800 Ω
• Time constant	0.8 ... 30 s adjustable
Frequency/pulse output	Individually galvanically isolated, isolation voltage 500 V
• Measurement of	Volume flow, sound velocity, total volume, total mass (optional via menu)
• Time constant	0.8 ... 30 s adjustable
• Frequency	0 ... 1 kHz, 0 ... 10 kHz
• Pulse width	0.5 ms, 5 ms, 20 ms, 50 ms, 100 ms
Output mode	Output can be either active or passive depending on electrical connection
• Active	• 24 ... 30 V DC/max. 25 mA, (50 μs ... 5 s) (50 ms electromechanical counter, max 75 mA if f < 1 Hz) • 24 ... 30 V DC/max. 50 mA (500 Hz ... 10 kHz)
• Passive	5 ... 30 V DC/max. 200 mA
Relay output	
• Changeover	Error/Flow direction
• Time constant/hysteresis	5 s/0.5% F.S.O.
• Load	42 V, 0.5 A
Cut-off: low flow	0 ... 9.9% F.S.O.

Rated operation conditions

Ambient temperature	
• IP67 version	
- Operation	-20 ... +55 °C (-4 ... +131 °F)
- Storage	-40 ... +85 °C (-40 ... +185 °F)
• IP20 front of panel/IP65 wall mount	
- Operation	0 ... +55 °C (32 ... 131 °F)
- Storage	-40 ... +85 °C (-40 ... +185 °F)

Mechanical vibrations

• IP67	2 g, 1 ... 800 Hz sinusoidal in all directions to IEC 68-2-6
• IP20 front of panel/IP65 wall mount	1 g, 1 ... 800 Hz sinusoidal in all directions to IEC 68-2-6

Degree of protection (enclosure)

• IP67 version	IP67 to IEC 60529 and DIN 40050
• IP20 front panel version	IP20 to EN 60529 and DIN 40050
• IP65 wall mount version	IP65 to IEC 60529 and DIN 40050

Display and controls

Internal counters (totalizers)	Two internal counters. Selectable uni- or bi-directional counting (net flow)
• Measurement of	Total volume
Display	Back-lid with alphanumerical text, 2 x 16 digits for indication of: measured values, totalization, settings, error codes and alarms.

Design

Enclosure material	
• IP67 version	Fibreglass reinforced polyamide
• IP20 front of panel/IP65 wall mount	Standard 19" insert in aluminium/steel (DIN 41494)
Dimensional drawings and weight	See dimensional drawings

Power supply

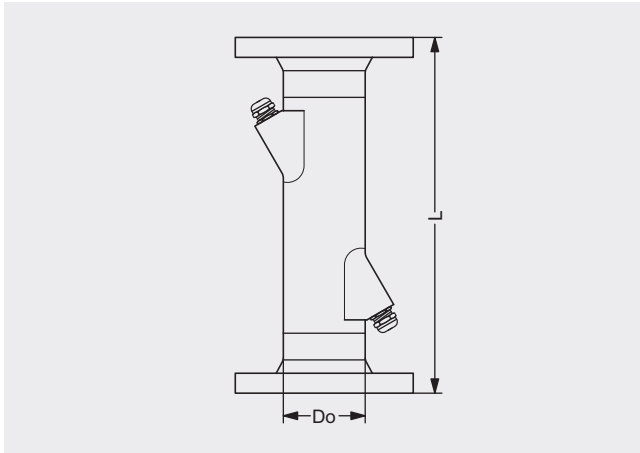
Supply voltage and power consumption	
• IP67 version/ IP20 front of panel	115/230 V AC +10%/-15%, 50 ... 60 Hz, 10 ... 20 VA
• IP65 wall mount	• 24 V DC +25%/-15%, 24 V AC ±15%, 15 VA, cable impedance < 7 Ω at 24 V • 115/230 V AC +10%/-15%, 50 ... 60 Hz, 10 ... 20 VA

Certificates and approvals

• EMC	Emission EN 61000-6-4 Immunity EN 61000-6-2
• Low voltage	According to EN 61010-1
• Approvals	
- IP67 version	PTB, class C, OIML R75, class 4
- IP20 front of panel/IP65 wall mount	PTB, class C

Dimensional drawings

Flow sensor SONO 3300 CT



Size	Build-in length L between the flanges				Do Outside diameter	Pipe wall thickness for ¹⁾			
DN	PN 10 [mm]	PN 16 [mm]	PN 25 [mm]	PN 40 [mm]	[mm]	PN 10 [mm]	PN 16 [mm]	PN 25 [mm]	PN 40 [mm]
50	-	465 ±3	475 ±3	475 ±3	66.6	-	7.0	7.0	7.0
65	-	460 ±3	475 ±3	475 ±3	78.0	-	7.0	7.0	7.0
80	-	380 ±3	400 ±3	400 ±3	92.0	-	7.0	7.0	7.0
100	-	375 ±3	400 ±3	400 ±3	116.4	-	7.0	7.0	7.0
125	-	375 ±3	400 ±3	400 ±3	143.2	-	7.0	7.0	7.0
150	-	360 ±3	400 ±3	400 ±3	170.4	-	8.0	8.0	8.0
200	-	450 ±4	490 ±4	500 ±4	219.1	-	3.7	4.8	6.5
250	-	600 ±5	575 ±5	600 ±5	273.0	-	4.0	5.3	7.3
300	-	600 ±5	560 ±5	600 ±5	323.9	-	4.4	5.5	8.1
350	-	800 ±5	840 ±5	880 ±5	355.6	-	4.6	6.1	8.6
400	-	875 ±5	925 ±5	975 ±5	406.4	-	4.9	6.6	9.7
500	950 ±6	980 ±6	1050 ±6	1080 ±6	508.0	4.1	5.6	7.9	11.7
600	1075 ±6	1105 ±6	1165 ±6	-	610.0	4.5	6.4	9.1	-
700	1100 ±6	1140 ±6	1190 ±6	-	711.0	5.0	7.2	10.4	-
800	1150 ±6	1180 ±6	1240 ±6	-	813.0	5.6	8.0	11.7	-
900	1200 ±6	1230 ±6	1300 ±6	-	914.0	6.1	8.8	13.3	-
1000	1250 ±6	1300 ±6	1370 ±6	-	1016.0	6.6	9.7	14.3	-
1200	1330 ±6	1360 ±6	-	-	1220.0	7.6	11.3	-	-

1) The stated wall thickness for DN 200 ... DN 1200 are minimum values according to the EC Directive on the Pressure Equipment 97/23/EC.

SITRANS F flowmeters

SITRANS F US

SONOFLO SONO 3300/3000 Custody Transfer

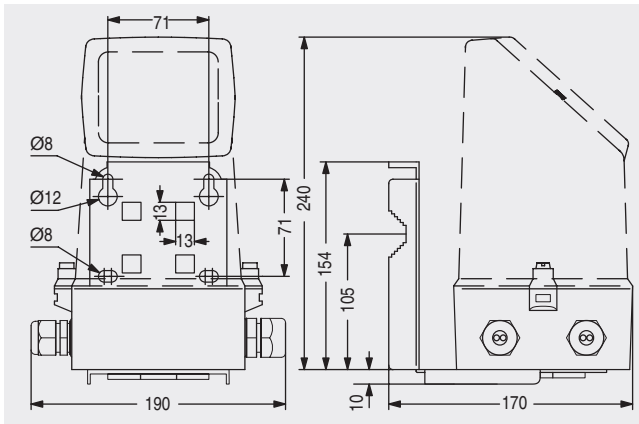
Size	Build-in length L between the flanges				Do Outside diameter	Pipe wall thickness for ¹⁾			
[inch]	PN 10 [inch]	PN 16 [inch]	PN 25 [inch]	PN 40 [inch]	[inch]	PN 10 [inch]	PN 16 [inch]	PN 25 [inch]	PN 40 [inch]
2	-	18.3 ±0.12	18.7 ±0.12	18.7 ±0.12	2.6	-	0.27	0.27	0.27
2½	-	18.1 ±0.12	18.7 ±0.12	18.7 ±0.12	3	-	0.27	0.27	0.27
3	-	14.4 ±0.12	15.7 ±0.12	15.7 ±0.12	3.6	-	0.27	0.27	0.27
4	-	14.7 ±0.12	15.7 ±0.12	15.7 ±0.12	4.6	-	0.27	0.27	0.27
5	-	14.7 ±0.12	15.7 ±0.12	15.7 ±0.12	5.6	-	0.27	0.27	0.27
6	-	14.2 ±0.12	15.7 ±0.12	15.7 ±0.12	6.7	-	0.31	0.31	0.31
8	-	17.7 ±0.16	19.3 ±0.16	19.7 ±0.16	8.6	-	0.14	0.19	0.25
10	-	23.6 ±0.2	22.6 ±0.2	23.6 ±0.2	10.7	-	0.16	0.21	0.29
12	-	23.6 ±0.2	22.0 ±0.2	23.6 ±0.2	12.7	-	0.17	0.21	0.32
14	-	31.5 ±0.2	33.1 ±0.2	34.6 ±0.2	14	-	0.18	0.24	0.34
16	-	34.4 ±0.2	36.4 ±0.2	38.4 ±0.2	16	-	0.19	0.26	0.38
20	37.4 ±0.24	38.6 ±0.24	41.3 ±0.24	42.5 ±0.24	20	0.16	0.22	0.31	0.46
24	42.3 ±0.24	43.5 ±0.24	45.8 ±0.24	-	24	0.18	0.25	0.36	-
28	43.3 ±0.24	44.8 ±0.24	46.8 ±0.24	-	28	0.19	0.28	0.41	-
32	45.3 ±0.24	46.4 ±0.24	48.8 ±0.24	-	32	0.22	0.31	0.46	-
36	47.2 ±0.24	48.4 ±0.24	51.2 ±0.24	-	36	0.24	0.35	0.52	-
40	49.2 ±0.24	51.2 ±0.24	53.9 ±0.24	-	40	0.26	0.38	0.56	-
48	52.3 ±0.24	53.5 ±0.24	-	-	48	0.30	0.44	-	-

1) The stated wall thickness for 8" ... 48" are minimum values according to the EC Directive on the Pressure Equipment 97/23/EC.

Weight of sensor SONO 3300 CT

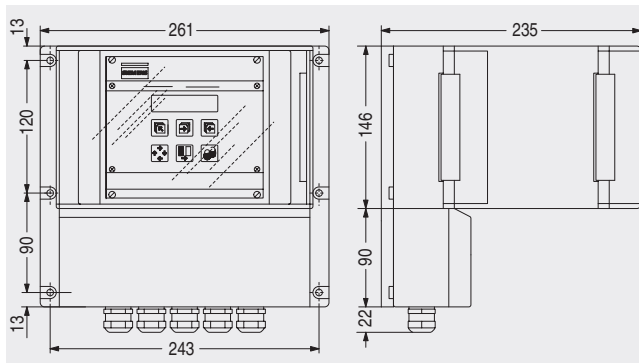
Size		Weight							
DN	inch	PN 10		PN 16		PN 25		PN 40	
		kg	lbs	kg	lbs	kg	lbs	kg	lbs
50	2	-	-	13	28.6	14	30.8	14	30.8
65	2½	-	-	15	33	16	35.3	16	35.3
80	3	-	-	18	39.7	19	42	19	42
100	4	-	-	32	70.5	35	77.2	35	77.2
125	5	-	-	38	83.8	44	97	44	97
150	6	-	-	45	99	52	114.6	52	114.6
200	8	-	-	58	128	70	154	79	174
250	10	-	-	75	165	96	211.6	117	258
300	12	-	-	92	203	114	251	151	333
350	14	-	-	113	249	145	320	191	421
400	16	-	-	141	311	191	421	274	604
500	20	153	337	207	456	284	626	379	835
600	24	193	425	276	608	363	800	-	-
700	28	262	577	303	668	480	1058	-	-
800	32	329	725	400	882	650	1433	-	-
900	36	428	943	475	1047	835	1841	-	-
1000	40	500	1102	594	1309	1078	2377	-	-
1200	48	470	1036	732	1614	-	-	-	-

Transmitter SONO 3000 CT, IP67, wall mounting



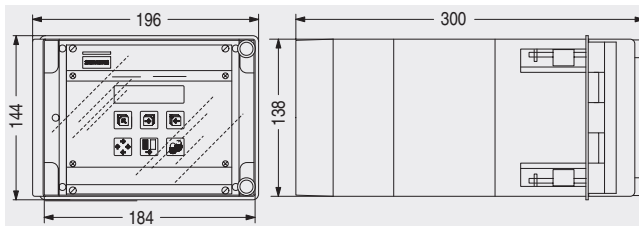
Add approximately 30 mm (1.18 inch) on each side for cabling, approx. 2 kg (4.4 lb).

Transmitter SONO 3000 CT, IP65, wall mounting



Weight 3.5 kg (7.72 lb)

Transmitter SONO 3000 CT, IP20, front of panel



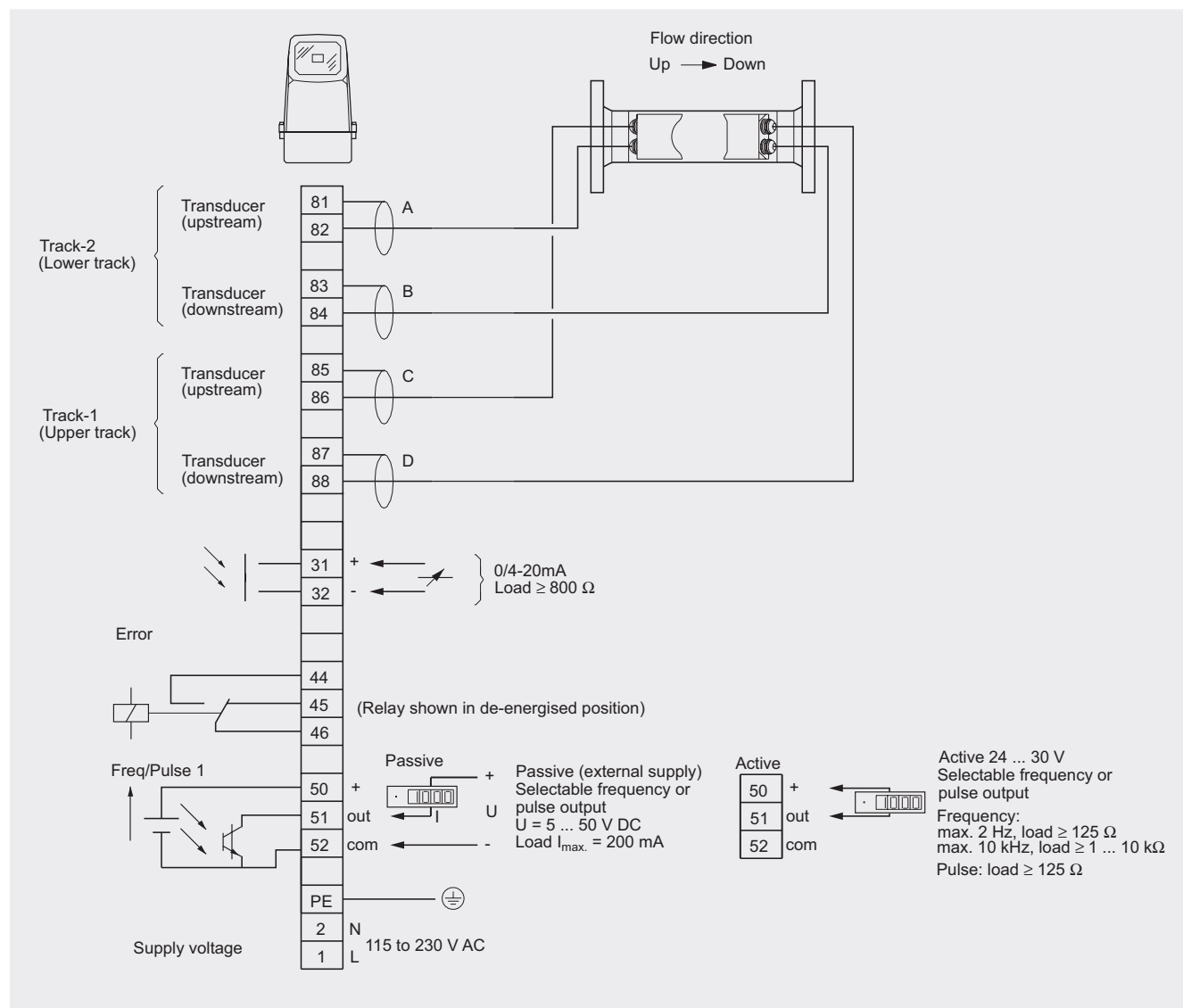
Weight 2.8 kg (6.17 lb)

SITRANS F flowmeters

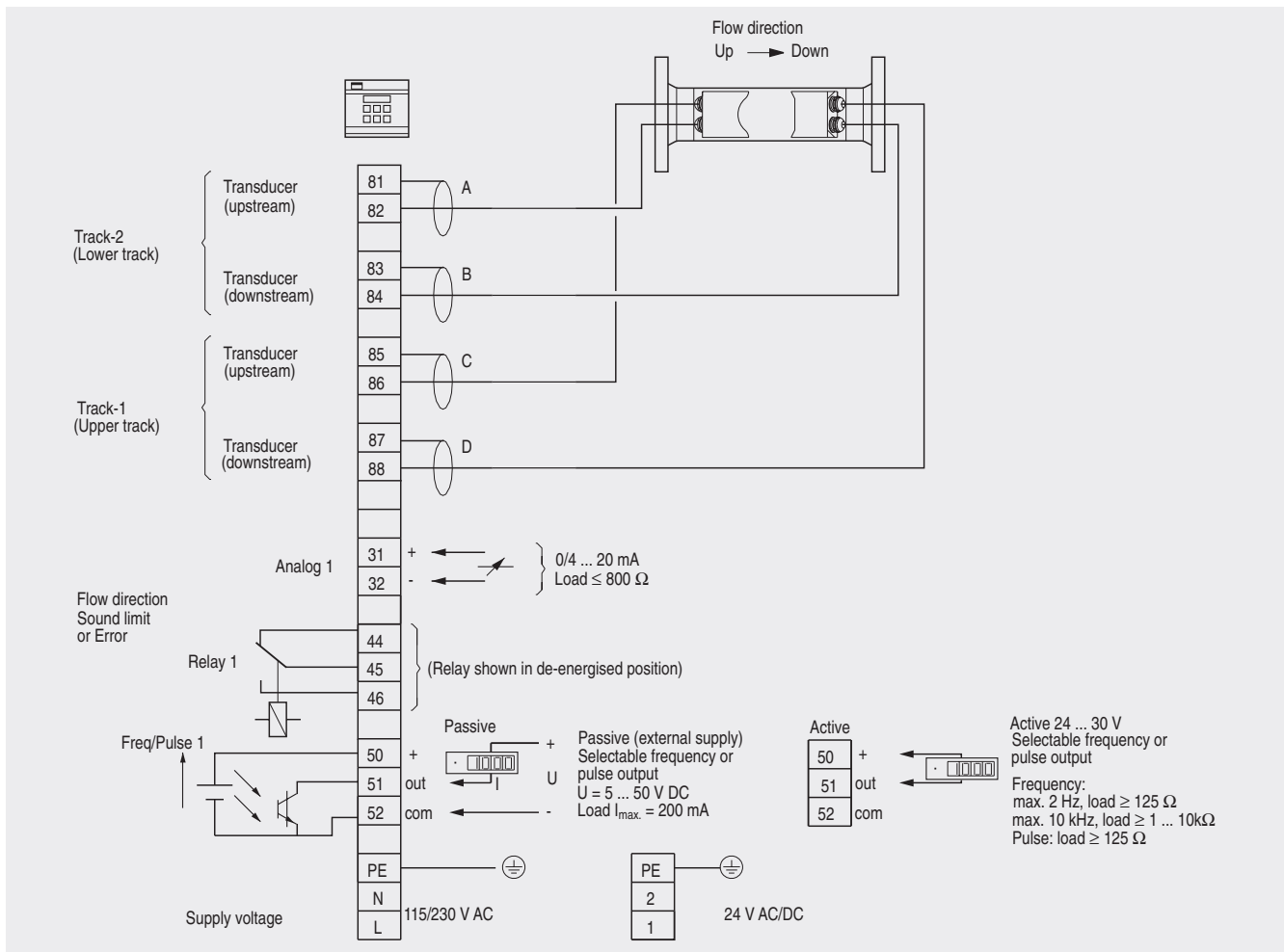
SITRANS F US

SONOFLO SONO 3300/3000 Custody Transfer

Schematics



SONO 3000/3300 CT (IP67 version), electrical connection



SONO 3000/3300 CT (wall mount), electrical connection

SITRANS F flowmeters

SITRANS F US

SONOFLO SONO 3300/3000 Custody Transfer

Selection and Ordering data

SITRANS F US Flowmeter
SONO 3000/3300 Custody Transfer

Order-No. Order Code

7ME3310-

Diameter	Qn [m³/h]	
<i>Cast steel, mat. no. 1.1131/GS-16Mn5</i>		
DN 50	15 ¹⁾	1B
	36	1C
	70	1D
DN 65	25 ¹⁾	1F
	60	1G
	120	1H
DN 80	40 ¹⁾	1K
	100	1L
	180	1M
DN 100	70 ¹⁾	1P
	180	1Q
	300	1R
DN 125	100 ¹⁾	1T
	250	1U
	450	1V
DN 150	150 ¹⁾	2B
	360	2C
	720	2D
<i>Carbon steel, mat. no. 1.0345/P235GH</i>		
DN 200	250 ¹⁾	2F
	600	2G
	1000	2H
DN 250	400 ¹⁾	2K
	1000	2L
	1800	2M
DN 300	600	2P
	1500	2Q
	2000	2R
DN 350	720	2T
	2000	2U
	3000	2V
DN 400	1000	3A
	2000	3B
	2500	3C
	3600	3D
DN 500	2000	3K
	3000	3L
	6000	3M
DN 600	2000	3T
	3500	3U
	7200	3V
DN 700	2000	4F
	4000	4G
	10000	4H
DN 800	2000	4P
	4500	4Q
	12000	4R
DN 900	5000	5C
	12000	5D
DN 1000	5000	5L
	15000	5M
DN 1200	6000	5U
	18000	5V

Selection and Ordering data

SITRANS F US Flowmeter
SONO 3000/3300 Custody Transfer

Order-No. Order Code

7ME3310-

Flange norm and pressure rating		
(All sizes are not available in all pressure ratings)		
to EN 1092-1		
PN10	B	
PN16	C	
PN25	D	
PN40	E	
Approval		
Without approval	0	
With approval mark	1	
With approval mark and seal	2	
Pulse value/ Frequency setup		
Frequency: 10 kHz at Q _{nom}	0	
Frequency: 1 kHz at Q _{nom}	9	N1A
pulse value (pulse width 5ms)		
0.1 l/pulse	1	
1 l/pulse	2	
2.5 l/pulse	3	
10 l/pulse	4	
50 l/pulse	5	
100 l/pulse	6	
250 l/pulse	7	
1 m³/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 m³/pulse	9	N0F
5 m³/pulse	9	N0G
10 m³/pulse	9	N0H
25 m³/pulse	9	N0J
50 m³/pulse	9	N0K
100 m³/pulse	9	N0L
250 m³/pulse	9	N0M
500 m³/pulse	9	N0N
1,000 m³/pulse	9	N0P
Transmitter		
SONO 3000 CT, IP67 PA, 115...230 V, 1 current, 1 frequency/pulse, 1 relay, incl. wall mounting kit	B	
SONO 3000 CT, IP65 PA, 115/230 V, 1 current, 1 frequency/pulse, 1 relay, incl. wall mounting kit	H	
SONO 3000 CT, IP65 PA, 24 V AC/DC, 1 current, 1 frequency/pulse, 1 relay, for wall mounting	K	
SONO 3000 CT, IP20 PA, 115/230 V, 1 current, 1 frequency/pulse, 1 relay, for panel mounting	L	
SONO 3000 CT, IP67 PA, no display, 115/230 V AC, 1 current, 1 frequency/pulse, 1 relay, incl. wall mounting kit	Z	P1A

1) EN 1434 reference value

Selection and Ordering data	Order-No.	Order Code
SITRANS F US Flowmeter SONO 3000/3300 Custody Transfer	7ME3310-	
Country/ Approval-type		
Neutral, none		A
Austria / OE01 C 050)		B
Czech Republic / TCM 142/97-2741		D
Denmark / TS 27.01 076 (OIML R75)		E
Germany / 2216 9802 (PTB)		G
Hungary / TH-7181/1999		H
Poland / ZT 597/2003		K
Romania / RO 176/98		L
Russia / 16373/1		M
Switzerland / ZW 138		N
Pulse width setup		
None	0	
0.5 ms	1	
5 ms, (Default)	2	
20 ms	4	
50 ms	5	
100 ms	6	
200 ms	7	
500 ms	8	

Additional information	Order code
Please add „Z“ to Order No. and specify Order code(s) and plain text.	
<u>Calibration</u>	
Verification 2x 4 points, DN 50 ... DN 80	D10
Verification 2x 4 points, DN 100 ... DN 400	D11
Verification 2x 4 points, DN 500 ... DN 1200	D12
Accredited Siemens EN 45001 calibration DN 50 ... DN 80	D20
Accredited Siemens EN 45001 calibration DN 100 ... DN 400	D21
Accredited Siemens EN 45001 calibration DN 500 ... DN 1200	D22
Accredited DELFT EN 45001 calibration DN 50 ... DN 80	D30
Accredited DELFT EN 45001 calibration DN 100 ... DN 400	D31
Accredited DELFT EN 45001 calibration DN 500 ... DN 1200	D32
<u>Flow direction setup</u>	
Bi-directional flow, current, frequency and pulse	E11
<u>Relay setup</u>	
Relay as direction	E21
<u>Current output setup</u>	
Current output 0 ... 20 mA	E31
<u>Certificate</u>	
Material certificate EN 10204-3.1.B	F10
Pressure certificate EN 10204-2.3	F21
<u>Transducer coax cable</u>	
Cable 4x 20 m with gland	R12
Cable 4x 30 m with gland	R13
Cable 4x 60 m with gland	R14
Cable 4x 90 m with gland	R15
Cable 4x 120 m with gland	R16

Additional information	Order code
<u>Tag name plate</u>	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	Y17
Self-adhesive plastic tag with 12 mm characters, max. 15 characters (add plain text)	Y18
<u>Transmitter setup</u>	
Customer specific settings (Verify setting with selected approval)	Y20

Spare parts/accessories

Description	Bestell-Nr.
SONO 3000 CT signal converter, IP67 (incl. wall mounting kit) ¹⁾²⁾	7ME3150-2AA10-1AC0
SONO 3000 CT signal converter, IP65, 115/230 V AC, 50 ... 60 ¹⁾	7ME3150-2EA10-1AC0
SONO 3000 CT signal converter, IP65, 24 V AC/DC ¹⁾²⁾	7ME3150-2AA10-1AC0
SONO 3000 CT signal converter, IP20 ¹⁾	7ME3150-2DA10-1AC0
Coax cable with transducer connection	
1x 10 m	FDK:085L2400
1x 20 m	FDK:085L2401
1x 30 m	FDK:085L2402

1) All converters have 1 current output, 1 frq/pulse output and 1 relay each.

2) 115/230 V AC, 50 ... 60 Hz

Important:

Due to CT-requirements exchange of one of the above components requires new verification of the entire systems at authorised laboratories.