

Overview



SONO3100/FUS060

The combination of the SONO 3100 sensor and the FUS060 transmitter is ideal for applications where process shut-down is impossible during service and where there is a need for extreme high/low temperatures and pressures.

Transducers can be changed without interrupting operation. SONO 3100 can optionally be delivered as a 1-path or 2-path solution.

Benefits

- Transducers can be replaced under pressure
- Measurement of all liquids less than 350 Cst, conductive or non-conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long-time stability
- On request as special versions:
 - Special sensor material, e.g. Duplex, stainless steel
 - High/low temperature sensor version: +250 °C (+482 °F)/-200 °C (-328 °F) sensors
 - Pressure rating 430 bar (6235 psi)
 - Special sensor sizes down to DN 25
 - 1-path or 2-path sensor technology

Application

The main application for SONO 3100 in combination with transmitter type FUS060 is to measure volume flow within:

- Water and waste water

Design

The SONO 3100 in combination with FUS060 consists of a SONO 3100 sensor, SONO 3200 transducers with O-rings or flanges depending on selection - and a FUS060 transmitter.

SONO 3100 is basically supplied in a 2-path solution with flanges in sizes from DN 100 to DN 500 and without flanges in sizes from DN 100 to DN 300.

2-path standard, 1-path special versions available on request, depending on size (DN 25 to DN 500).

SONO 3100 is as standard available in carbon steel from DN 100 to DN 500.

FUS060 is designed for remote wall mounting only.

Technical specifications

The transmitter related to this system is the SITRANS FUS060. The technical specifications to the FUS060 see page 3/254.

2-paths sensor fitted with four SONO 3200 transducers

Error in measurement

Error in measurement at reference conditions	$V > 0.5 \dots 10 \text{ m/s}$, $< \pm 0.5 \%$ of rate ($v = \text{flow velocity}$)
Max. flow velocity	10 m/s (32 ft)
Nominal size	DN 100 ... 500 (4 ... 20")
Media temperature	
• Standard	-10 ... +200 °C (14 ... 392 °F)
• ATEX Ex d version	-20 ... +180 °C (-4 ... +356 °F)
• ATEX Ex i version	-10 ... +190 °C (14 ... 374 °F)
• Specials	-200 °C (-328 °F) or up to 250 °C (482 °F)
Ambient temperature	
• Standard and Ex-i version	-20 ... +60 °C (-4 ... +140 °F)
• Ex d version	-20 ... +180 °C (-4 ... +356 °F)
Enclosure	IP67 (NEMA 4X/6)/IP68 (NEMA 6P) and ATEX (see below)

Process connections

PN designated EN 1092-1, type 11 (B)	
Pipe material carbon steel	<ul style="list-style-type: none"> • DN 200 ... DN 500 (8" ... 20"), PN 10 • DN 100 ... DN 500 (4" ... 20"), PN 16 • DN 200 ... DN 500 (8" ... 20"), PN 25 • DN 100 ... DN 500 (4" ... 20"), PN 40
Class designated EN 1759-1	
Pipe material carbon steel	<ul style="list-style-type: none"> • DN 100 ... DN 500 (4" ... 20") Class 150 • DN 100 ... DN 300 (4" ... 12") Class 300
Without flanges (EN 10217), weld-in version only in carbon steel	<ul style="list-style-type: none"> • DN 350 ... DN 500 (14" ... 20"), PN 10 • DN 100 ... DN 500 (4" ... 20"), PN 16 • DN 200 ... DN 500 (8" ... 20"), PN 25 • DN 100 ... DN 500 (4" ... 20"), PN 40
Transducer SONO 3200	O-ring or flange versions

Materials

Pipe	Steel EN 1.0345-P235GH
Flange	
PN	EN 10025-S235JRG2, 1E1
Class	ASTM A105, 1, 1
Transducer body	Stainless steel AISI 316 or similar
Transducer terminal house	Stainless steel AISI 316 or plastic PA 6.6

Flow Measurement

SITRANS FS (ultrasonic)

Inline ultrasonic flowmeters

SONO 3100/FUS060 flowmeter

Technical specifications (continued)

Certificates and approvals

System ATEX approval for SONO 3100 together with transmitter FUS060-Ex	ATEX II 2 G Ex dem [ia/ib] IIC T6/T4/T3 Gb or ATEX II 2G Ex d IIC T3-T6 Gb with SONO 3200 Ex d transducers (for standard FUS060 transmitter, installed outside of Ex zone) For FUS060 Ex version the trans- ducer cable length is restricted to 3 m (9.84 ft), in order to meet require- ments for electrical immunity.
Conformity certificate CE	The devices are supplied as standard with a Siemens Certificate of Confor- mity on DVD.
Material certificates	Material certificate according to EN 10204-3.1 is optionally available.
NDT examination report	Extended material certificate is optionally available.
Pressure certificate	Pressure test according EN 1024-2.3 optionally available
Calibration report	A standard calibration report is shipped with each flowmeter. Optionally available: Extended accredited ISO/IEC 17025 calibration certificates
Approvals	No custody transfer approvals

The sensor SONO 3100 with transmitter FUS060 conforms to Product Family Standard EN 61326/A3 appendix A (Title: Electrical Equipment for Measurement control and laboratory use – EMC requirements).

The sensors are approved according to EU directive 2014/68/EU regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

The SONO 3100 as weld-in version does not include the flanges. Thus, it can neither be tested nor approved according to PED. After the installation, all installation-related activities (welding, pressure test etc.) are the responsibility of the customer.

Selection and ordering data

Article No.

SITRANS F US SONO 3100 sensor 2-path

7ME3100-

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter	Qn setting [m ³ /h]	
DN 100 (4")	28	1 N
DN 100 (4")	100	1 P
DN 100 (4")	220	1 R
DN 125 (5")	44	1 S
DN 125 (5")	150	1 T
DN 125 (5")	360	1 V
DN 150 (6")	64	2 A
DN 150 (6")	220	2 B
DN 150 (6")	500	2 D
DN 200 (8")	110	2 E
DN 200 (8")	380	2 F
DN 200 (8")	900	2 H
DN 250 (10")	180	2 J
DN 250 (10")	600	2 K
DN 250 (10")	1300	2 M
DN 300 (12")	300	2 N
DN 300 (12")	850	2 P
DN 300 (12")	2200	2 R
DN 350 (14")	350	2 S
DN 350 (14")	1000	2 T
DN 350 (14")	2800 ¹⁾	2 V
DN 400 (16")	450	3 A
DN 400 (16")	1300	3 B
DN 400 (16")	3600	3 D
DN 500 (20")	1300	3 J
DN 500 (20")	2200	3 K
DN 500 (20")	4200 ¹⁾	3 M

Flange norm and pressure rating

(All sizes are not available in all pressure ratings)

EN 1092-1

- PN 10 (DN 200 ... 600)
- PN 16 (DN 100 ... 600)
- PN 25 (DN 200 ... 600)
- PN 40 (DN 100 ... 500)

ANSI B16.5

- Class 150 (DN 100 ... 300)
- Class 300 (DN 100 ... 300)

Pipe without flanges (EN 10217) (weld-in version)²⁾

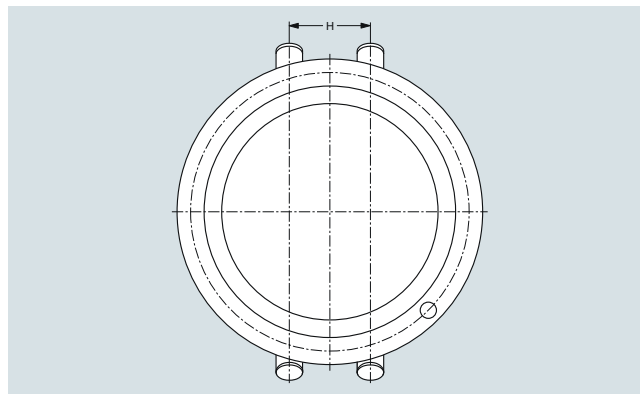
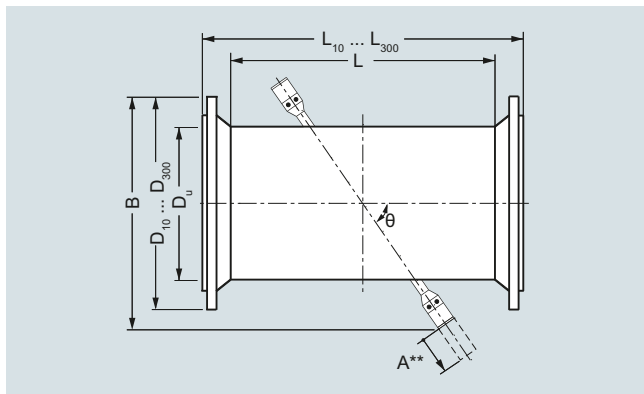
- PN 10 (DN 200 ... 600)
- PN 16 (DN 100 ... 600)
- PN 25 (DN 200 ... 600)
- PN 40 (DN 100 ... 500)

B
C
D
E

H
J

P
Q
R
S

Dimensional drawings



Sensor SONO 3100 with EN norm

DN	D _U [mm]	L ^{1) 4)} [mm]	B ⁵⁾ [mm]	θ [°]	H [mm]	PN10			PN16			PN25			PN40		
						W _{min} ²⁾ [mm]	D ₁₀ [mm]	L ₁₀ ¹⁾ [mm]	W _{min} ²⁾ [mm]	D ₁₆ [mm]	L ₁₆ ¹⁾ [mm]	W _{min} ²⁾ [mm]	D ₂₅ [mm]	L ₂₅ ¹⁾ [mm]	W _{min} ²⁾ [mm]	D ₄₀ [mm]	L ₄₀ ¹⁾ [mm]
100	114.3	860	305	45 ³⁾	42.8	-	-	-	3.6	220	960	-	-	-	3.6	235	990
125	139.7	862	325	45 ³⁾	64.5	-	-	-	4.0	250	970	-	-	-	4.0	270	990
150	168.3	862	350	45 ³⁾	78.1	-	-	-	4.5	285	970	-	-	-	4.5	300	1010
200	219.1	668	430	45 ³⁾	102.1	6.3	340	790	6.3	340	790	6.3	360	820	6.3	375	840
250	273.0	714	480	45 ³⁾	127.6	6.3	395	850	6.3	405	850	7.1	425	890	7.1	450	920
300	323.9	607	525	45 ³⁾	151.8	7.1	445	740	7.1	460	760	8.0	485	790	8.0	515	830
350	355.6	639	550	45 ³⁾	166.4	8.0	505	770	8.0	520	800	8.0	555	840	8.8	580	880
400	406.4	703	600	45 ³⁾	191.3	8.0	565	850	8.0	580	875	8.8	620	925	11.1	660	975
500	508.0	797	690	45 ³⁾	241.1	7.1	670	950	8.0	715	980	10.0	730	1050	14.2	755	1080
600	610.0	912	830	60	294.8	7.1	780	1075	8.8	840	1105	11.0	845	1165	-	-	-

¹⁾ Length tolerance (mm): DN 100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 400 +4/-5, DN 500 ... 600 +5/-6

²⁾ Wall thickness for pressure rates PN 6 ... 40. For weld-in sensor versions according EN10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y=P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of Du/Wxx > 100). W_{min} wall thickness are min. values. The delivered sensor can have larger wall thicknesses to meet the selected pressure rate. Any specific required wall thickness must be ordered as PVR.

³⁾ For all sensors with flange transducers path angle are 60°.

⁴⁾ L is the length of sensor versions without flanges (weld-in version). For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of Du/Wxx > 100).

⁵⁾ B dimension value is an approximate information and may differ a little by flange pressure rate.

A**) Space required for replacement of transducer min. 230 mm (9.1 inch).

SONO 3100, 2-path

Nominal diam. DN	Flange type - Weight [kg (lbs)]			
	PN 10	PN 16	PN 25	PN 40
100 (4")	-	32 (70.5)	-	35 (77.2)
125 (5")	-	38 (83.8)	-	44 (97.0)
150 (6")	-	45 (99.2)	-	52 (114.6)
200 (8")	59 (130.0)	58 (127.9)	70 (154.3)	79 (174.2)
250 (10")	73 (161.0)	75 (163.3)	96 (211.6)	117 (257.9)
300 (12")	83 (183.0)	92 (202.8)	114 (251.3)	151 (332.9)
350 (14")	98 (216.0)	113 (249.1)	145 (322.9)	191 (421.1)
400 (16")	119 (262.4)	141 (310.9)	191 (421.1)	275 (606.3)
500 (20")	153 (337.3)	207 (456.4)	284 (626.0)	379 (836.0)
600 (24")	193 (425.5)	276 (608.5)	363 (800.3)	-

Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lbs). For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lbs).

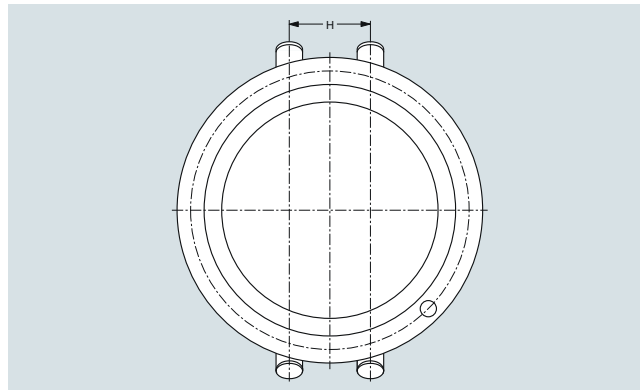
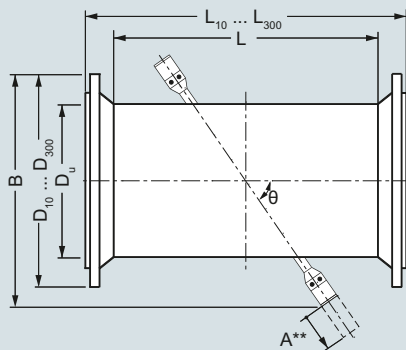
Flow Measurement

SITRANS FS (ultrasonic)

Inline ultrasonic flowmeters

SONO 3100/FUS060 flowmeter

Dimensional drawings (continued)



Sensor SONO 3100 with ANSI norm

Size (DN)	D _U	L ^{1) 4)}	B ⁵⁾	θ	H	Class 150			Class 300		
						W _{min} ²⁾	D ₁₅₀	L ₁₅₀ ¹⁾	W _{min} ²⁾	D ₃₀₀	L ₃₀₀ ¹⁾
inch (mm)	[inch]	[inch]	[inch]	[°]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]
4" (100)	4.50	33.86	12.01	45 ³⁾	1.69	0.14	9.00	39.86	0.25	10.00	40.62
5" (125)	5.50	33.94	12.80	45 ³⁾	2.54	0.15	10.00	40.94	0.27	11.00	41.70
6" (150)	6.63	33.94	13.78	45 ³⁾	3.07	0.16	11.00	40.94	0.30	12.50	41.70
8" (200)	8.63	26.30	16.93	45 ³⁾	4.02	0.16	13.50	34.30	0.29	15.00	35.06
10" (250)	10.75	28.11	18.90	45 ³⁾	5.02	0.18	16.00	36.11	0.34	17.50	37.35
12" (300)	12.75	23.90	20.67	45 ³⁾	5.98	0.20	19.00	32.90	0.39	20.50	34.14
14" (350)	14.00	25.16	21.65	45 ³⁾	6.55	0.21	21.00	35.16	-	-	-
16" (400)	16.00	27.68	23.62	45 ³⁾	7.53	0.22	23.50	33.74	-	-	-
20" (500)	20.00	31.38	27.17	45 ³⁾	9.49	0.26	27.50	42.76	-	-	-
24" (600)	24.00	35.91	32.68	60	11.61	0.30	32.00	47.91	-	-	-

¹⁾ Length tolerance (mm): 4" +0.08"/-0.12" (+2/-3 mm), 5" ... 8" +0.12"/-0.16" (+3/-4mm), 10" ... 16" +0.16"/-0.20" (+4/-5 mm), 20" ... 24" +0.20"/-0.24" (+5/-6 mm)

²⁾ Minimum wall thickness for pressure rates Class 150 or Class 300. For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of $D_u/W_{xx} > 100$). W_{min} wall thickness are min. values. The delivered sensor can have larger wall thicknesses to meet the selected pressure rate. Any specific required wall thickness to be ordered as PVR.

³⁾ For all sensors with flange transducers path angle are 60°.

⁴⁾ L is the length of sensor versions without flanges (weld-in version). For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of $D_u/W_{xx} > 100$).

⁵⁾ B dimension value is an approximate information and may differ a little by flange pressure rate.

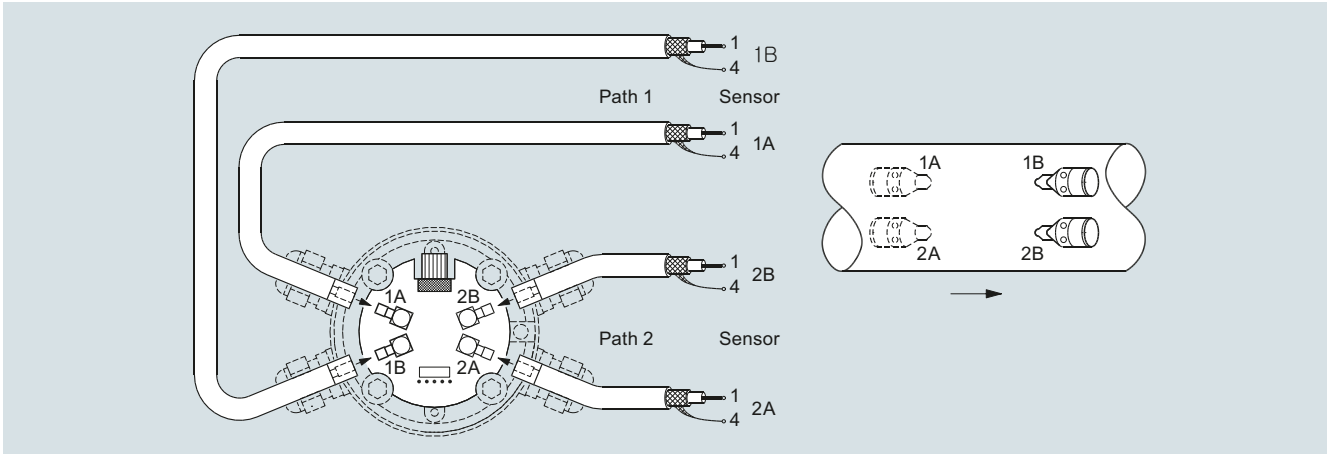
A**) Space required for replacement of transducer min. 230 mm (9.1 inch).

Approximate weights for SONO 3100 sensor with ANSI B16.5 flanges

Nominal size		Weight ¹⁾ [kg (lbs)]			
DN	DN	Class 150		Class 300	
[inch]	[mm]	[kg]	[lbs]	[kg]	[lbs]
4"	100	32	70.5	35	77.2
5"	125	38	83.8	44	97.0
6"	150	45	99.2	52	114.6
8"	200	58	127.9	79	174.2
10"	250	75	165.3	117	257.9
12"	300	92	202.8	151	332.9
14"	350	113	249.1	-	-
16"	400	141	310.9	-	-
20"	500	207	456.4	-	-
24"	600	276	608.5	-	-

¹⁾ Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lbs). For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lb).

Circuit diagrams



Electrical connection of SITRANS FUS060 and SONO 3100