

Overview



The combination of SONOFLO type 3100 and the transmitter SONO 3000 is an ideal combination for application where shut-down of processes is impossible during service and the need for extreme high/low temperatures and pressures.

Transducers can easily be changed without interrupting operations. SONO 3100 can be delivered in 4 track solution for absolute best performance and accuracy.

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

Benefits

- Replaceable transducers under pressure
- Measure on all liquids less than 350 Cst, conductive or non conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long time stability
- On request:
 - Special sensor material, e.g. Duplex
 - + 250 °C (+482 °F) / - 200 °C (-382 °F) sensors
 - max. 1140 kg (2500 lbs) / 400 bar (5800 psi)
 - 4 track sensor technology

Application

The main application for SONO 3100 / 3000 ultrasonic flowmeter is to measure volume.

- Water and waste water
- Oil and liquid gases
- Liquid cryogenic application
- District heating systems

Design

The SONO 3100 / 3000 consist of a flow sensor type SONO 3100, transducers with O-rings or flanges depending on selection - and the transmitter SONO 3000.

SONO 3100 is basically supplied in a two track solution with flanges and sizes from DN 100 to DN 1200.

4 track version is available on request.

SONO 3100 is basically delivered in AISI 316 from DN 100 to DN 300 and in carbon steel from DN 350 to DN 1200.

SONO 3000 transmitter – see data sheet.

Technical specifications



2-track sensor fitted with four SONO 3200 transducers

Accuracy

Error in measurement at reference conditions; % of measured value $v > 0.5 \dots 10 \text{ m/s}$, $\pm 0.5\%$ of rate ($v = \text{flow speed}$)

Input

Nominal size	DN 100 to DN 1200 (4" to 48")
Process connections, PN designated, EN 1092-1, type 11, B	<ul style="list-style-type: none"> • PN 6/10/16 (DN 100 to DN 1200) • PN 25 (DN 100 to DN 1000) • PN 40 (DN 100 to DN 500)
Process connections, class designated, EN 1759-1, type 11, B	<ul style="list-style-type: none"> • class 150 and class 300 (DN 100 to DN 600)

Rated operation conditions

Ambient conditions

- Ambient temperature (standard version)
 - Operating $-10 \text{ °C to } +200 \text{ °C}$ ($+14 \text{ to } +392 \text{ °F}$)

Medium conditions

- Liquid temperature (standard version) $-20 \text{ °C to } +200 \text{ °C}$ ($-4 \text{ to } +392 \text{ °F}$)

Degree of protection IP68

Max. flow velocity 10 m/s

SITRANS F flowmeters

SITRANS F US

SONOFLO SONO 3100/3000

Technical specifications (continued)

2-track sensor fitted with four SONO 3200 transducers

Design

Materials

- Pipe Steel EN 1.0345-P235GH or Steel EN 1.4404
- Flange
 - PN EN 10025-S235JRG2, 1E1 or EN 10222-5-1.4404, 13E0
 - Class ASTM A105,1,1 or ASTM F316L,2,3
- Transducer body Stainless steel ASTM 316 or similar

Certificates and approvals

- Ex approval sensor EEx d IIC T2-T6 (ATEX approval in progress)
- Material certificates The sensor is supplied as standard with a Siemens Certificate of Conformity. Material certificate on wetted parts on request.
- NDT examination report Available on request

Coaxial cable between sensor and transmitter

Coaxial cable (75Ω) for SONO 3100/3000

1 x Ø 0.8 mm (0.03") copper conductor with shield

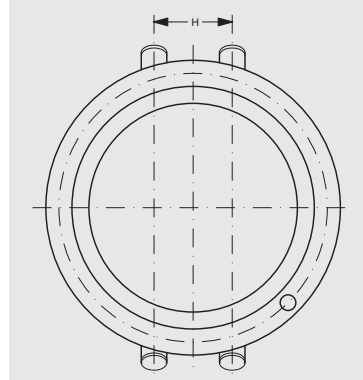
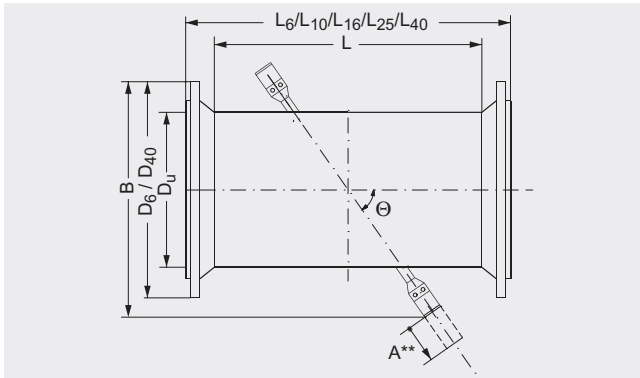
- Diameter 5.8 mm (0.23")
- Length Max. 250 m (820 ft) between sensor and transmitter
- Material (outside jacket) Black PE
- Ambient temperature -10 ... +75 °C (+14 ... +167 °F)



1 x Ø 0.65 mm (0.026") copper conductor with shield

- Diameter 5.3 mm (0.21")
- Length Max. 100 m (328 ft) between sensor and transmitter
- Material (outside jacket) Brown FEP
- Ambient temperature -200 ... +200 °C (-328 ... +392 °F)

Dimensional drawings



DN	D _U	L	B	q	H	PN6			PN10			PN16			PN25			PN40		
						W ₆ *	D ₆ Flange dia.	L ₆	W ₁₀ *	D ₁₀ Flange dia.	L ₁₀	W ₁₆ *	D ₁₆ Flange dia.	L ₁₆	W ₂₅ *	D ₂₅ Flange dia.	L ₂₅	W ₄₀ *	D ₄₀ Flange dia.	L ₄₀
	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
100	114.3	860	305	30	48.2	-	-	-	3.6	220	960	3.6	220	960	3.6	235	990	3.6	235	990
125	139.7	862	325	30	59.3	-	-	-	4.0	250	970	4.0	250	970	4.0	270	990	4.0	270	990
150	168.3	862	350	30	71.7	-	-	-	4.5	285	970	4.5	285	970	4.5	300	1010	4.5	300	1010
200	219.1	668	430	45	92.9	-	-	-	6.3	340	790	6.3	340	790	6.3	360	820	6.3	375	840
250	273.0	714	480	45	117.2	-	-	-	6.3	395	850	6.3	405	850	7.1	425	890	7.1	450	920
300	323.9	607	525	45	139.4	-	-	-	7.1	445	740	7.1	460	760	8.0	485	790	8.0	515	830
350	355.6	639	550	45	152.8	-	-	-	8.0	405	770	8.0	520	800	8.0	555	840	8.8	580	880
400	406.4	703	600	45	175.7	-	-	-	8.0	565	850	8.0	580	875	8.8	620	925	11.1	660	975
500	508.0	797	690	45	222.2	-	-	-	7.1	670	950	8.0	715	980	10.0	730	1050	14.2	755	1080
600	610.0	912	705	60	268.1	-	-	-	7.1	780	1075	8.8	840	1105	11.0	845	1165	-	-	-
700	711.0	937	895	60	312.8	-	-	-	8.0	895	1100	8.8	910	1140	12.5	960	1190	-	-	-
800	813.0	967	985	60	358.7	-	-	-	8.0	1015	1150	10.0	1025	1180	14.2	1085	1240	-	-	-
900	914.0	1007	1070	60	402.3	-	-	-	10.0	1115	1200	10.0	1125	1230	16.0	1185	1300	-	-	-
1000	1016.0	1060	1160	60	448.2	-	-	-	10.0	1230	1250	10.0	1255	1300	17.5	1320	1370	-	-	-
1200	1220.0	1100	1350	60	539.1	8	1340	1280	11.0	1455	1330	12.5	1485	1360	-	-	-	-	-	-

* Wall thickness

SONO 3100, 2-track, flange type

Nominal diam.	Weight [kg] ([lbs])				
	DN	PN 6	PN 10	PN 16	PN 25
100	-	32 (70.5)	32 (70.5)	35 (77.2)	35 (77.2)
125	-	38 (83.8)	38 (83.8)	44 (97.0)	44 (97.0)
150	-	45 (99.2)	45 (99.2)	52 (114.6)	52 (114.6)
200	-	59 (130.0)	58 (127.9)	70 (154.3)	79 (174.2)
250	-	73 (161.0)	75 (163.3)	96 (211.6)	117 (257.9)
300	-	83 (183.0)	92 (202.8)	114 (251.3)	151 (332.9)
350	-	98 (216.0)	113 (249.1)	145 (322.9)	191 (421.1)
400	-	119 (262.4)	141 (310.9)	191 (421.1)	275 (606.3)

SONO 3100, 2-track, O-ring type

500	-	153 (337.3)	207 (456.4)	284 (626.0)	379 (836.0)
600	-	193 (425.5)	276 (608.5)	363 (800.3)	-
700	-	262 (577.6)	303 (668.0)	480 (1058)	-
800	-	329 (725.3)	400 (881.8)	650 (1433)	-
900	-	428 (943.6)	475 (1047)	835 (1841)	-
1000	-	500 (1002)	594 (1010)	1078 (2377)	-
1200	470 (1036)	732 (1614)	902 (1989)	-	-

SITRANS F flowmeters

SITRANS F US

SONOFLO SONO 3100/3000

Selection and Ordering data

SITRANS F US Flowsensor SONO 3100 2-track **7ME3100-**

Diameter	Qn [m ³ /h]	
DN 100 / 4 inch	28	1 N
DN 100 / 4 inch	100	1 P
DN 100 / 4 inch	280	1 R
DN 125 / 5 inch	44	1 S
DN 125 / 5 inch	150	1 T
DN 125 / 5 inch	440	1 V
DN 150 / 6 inch	64	2 A
DN 150 / 6 inch	220	2 B
DN 150 / 6 inch	640	2 D
DN 200 / 8 inch	110	2 E
DN 200 / 8 inch	380	2 F
DN 200 / 8 inch	1,100	2 H
DN 250 / 10 inch	180	2 J
DN 250 / 10 inch	600	2 K
DN 250 / 10 inch	1,800	2 M
DN 300 / 12 inch	250	2 N
DN 300 / 12 inch	850	2 P
DN 300 / 12 inch	2,500	2 R
DN 350 / 14 inch	350	2 S
DN 350 / 14 inch	1,000	2 T
DN 350 / 14 inch	3,500	2 V
DN 400 / 16 inch	450	3 A
DN 400 / 16 inch	1,300	3 B
DN 400 / 16 inch	4,500	3 D
DN 500 / 20 inch	2,200	3 K
DN 600 / 24 inch	3,200	3 T
DN 700 / 28 inch	4,200	4 F
DN 800 / 32 inch	5,500	4 P
DN 900 / 36 inch	7,500	5 B
DN 1000 / 40 inch	9,000	5 K
DN 1200 / 48 inch	13,200	5 T

Flange norm and pressure rating
(All sizes are not available in all pressure ratings)

to EN 1092-1

PN 10	B
PN 16	C
PN 25	D
PN 40	E

to ANSI B16.5

class 150	H
class 300	J

pipe without flanges

PN 10	P
PN 16	Q
PN 25	R
PN 40	S
Class 150	V
Class 300	W

Pipe and flange material

Carbon steel, EN 1.0345, P235GH	1
Stainless steel, EN 1.4404, AISI 316L	2

Selection and Ordering data

SITRANS F US Flowsensor SONO 3100 2-track **7ME3100-**

Transducer type and approval	
IP67 PA housing, PN 40, O-ring, 50 mm, 100 °C, no approval	1
IP68 SS housing, PN 40, O-ring, 50 mm, 200 °C, no approval	2
IP68 SS housing, PN 40, O-ring, 50 mm, 200 °C, EEx d IIC T3...T6 ¹⁾	3
IP67 PA housing, PN 40, flange, 88 mm, 100 °C, no approval	4
IP68 SS housing, PN 40, flange, 88 mm, 200 °C, no approval	5
IP68 SS housing, PN 40, flange, 88 mm, 200 °C, EEx d IIC T3...T6 ¹⁾	6

Transmitter SONO 3000

None	A
IP67 PA, 115/230 V AC, 1 current, 1 frequency/pulse, 1 relay, incl. wall mounting kit	B
IP67 PA, 24 V AC/DC, 1 current, 1 frequency/pulse, 1 relay, incl. wall mounting kit	C
IP00, 115/230 V AC, 3 current, 2 frequency/pulse, 2 relay	D
IP00, 115/230 V AC, 1 current, 1 frequency/pulse, 1 relay	E
IP00, 24 V AC/DC, 3 current, 2 frequency/pulse, 2 relay	F
IP65 PA, 24 V AC/DC, 3 current, 2 frequency/pulse, 2 relay, for wall mounting kit	G
IP65 PA, 115/230 V AC, 1 current, 1 frequency/pulse, 1 relay, for wall mounting	H
IP65 PA, 24 V AC/DC, 3 current, 2 frequency/pulse, 2 relay, for wall mounting	J
IP65 EEx de (ia/ib) IIC T5...T6, 24 V AC/DC, 1 current, 1 frequency/pulse, 1 relay, no ATEX approval, for wall mounting	M

Transducer coax cable

No cable	0
4x 15 meter, max. 70 °C	1
4x 30 meter, max. 70 °C	3
4x 60 meter, max. 70 °C	9 R 0 C
4x 100 meter, max. 70 °C	9 R 0 D
Teflon cable 4x 5 meter, max. 200 °C	9 R 1 A
Teflon cable 4x 15 meter, max. 200 °C	9 R 1 B

¹⁾ ATEX approval in progress.

Additional information	Order code
Please add „-Z“ to Order No. and specify Order code(s) and plain text.	
<u>Calibration</u>	
Production calibration DN 500 ... DN 700	D01
Production calibration DN 800 ... DN1200	D02
Theoretical calibration DN 500 ... DN 1200	D03
Matched pair 2x 5 points, DN 100 ... DN 400	D06
Matched pair 2x 5 points, DN 500 ... DN 700	D07
Matched pair 2x 5 points, DN 800 ... DN1200	D08
Accredited Siemens EN 45001 calibration DN 100 ... DN 400	D21
Accredited Siemens EN 45001 calibration DN 500 ... DN 700	D22
Accredited Siemens EN 45001 calibration DN 800 ... DN 1200	D23
Accredited DELFT EN 45001 calibration DN 100 ... DN 400	D31
Accredited DELFT EN 45001 calibration DN 500 ... DN 700	D32


Additional information	Order code
Accredited DELFT EN 45001 calibration DN 800 ... DN 1200	D33
<u>Material certificates</u>	
EN 10204-3.1.B	F10
EN 10204-3.1.B and 100% NDT on weldings, DN 100 ... DN 400	F11
EN 10204-3.1.B and 100% NDT on weldings, DN 500 ... DN 700	F12
EN 10204-3.1.B and 100% NDT on weldings, DN 800 ... DN 1200	F13
<u>Pressure certificate</u>	
EN 10204-2.3	F21
<u>Tag name plate</u>	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	Y17
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	Y18

Accessories

SONO 3100/3000


Accessories/Spare parts

Transducer SONO 3200 Complete unit

Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C]	Length [mm]	Order No.	Symbol
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20...+100	50	FDK:085B5306	
O-ring	316 SS	O-ring	PN 40	316 SS		-20...+200	50	FDK:085B5300	
O-ring	316 SS	O-ring	PN 40	316 SS	Eexd ¹⁾	-20...+200	50	FDK:085B5312	
Flange	316 SS	Graphite	PN 40	Plastic PA 6.6		-20...+100	88	FDK:085B5411	
Flange	316 SS	Graphite	PN 40	316 SS		-20...+200	88	FDK:085B5321	
Flange	316 SS	Graphite	PN 40	316 SS	EExd ¹⁾	-20...+200	88	FDK:085B5425	
Flange	316 SS	Graphite	PN 160	316 SS	EExd ¹⁾	-20...+200	88	FDK:085B5432	
Flange	316 SS	Aluminum	PN 40	316 SS	EExd ¹⁾	-200...+100	88	FDK:085B5416	

1) ATEX approval in progress

Transducer SONO 3200 Insert

Temperature range [°C]	Length [mm]	Order No.	Symbol
-20...+200	50	FDK:085B1411	
-20...+200	88	FDK:085B1459	

Transducer SONO 3200 Gasket


Type	Pressure rating	Material	Temperature range	Order No.
Gasket O-ring	PN 40	70FFKM	-20...+200	FDK:085B1089
Gasket flange	PN40/160	Graphite	-20...+200	FDK:085B1080
Gasket and 12mm bolts and nuts for flange transducers	PN 40	Graphite, 316 SS	-20...+200	FDK:085B1083
Gasket and 16mm bolts and nuts for flange transducers	PN 160	Graphite, 316 SS	-20...+200	FDK:085B1084
Gasket cryogenics	PN 40	Aluminum, O-ring	-200...+100	FDK:633L0047

SITRANS F flowmeters

SITRANS F US

SONOFLO SONO 3100/3000



Terminal housing

Type	Order No.	Symbol
<ul style="list-style-type: none"> Material: PA 6.6, Temperature range: -20 ... +100 °C 	FDK:085B1403	
<ul style="list-style-type: none"> Material: ASTM 316, Temperature range: -20 ... +200 °C 	FDK:085B1402	


Gaskets for O-ring transducer **FDK:085B1089**
 PN 40, Material: 70 FFKM,
 Temperature range:
 -20 ... +200 °C




Transducers SONO 3200 (Transducer element without terminal housing, including insert)

Transducer type	Material	Gasket	Pressure rating	Temp. range	Length mm	Order No.	Symbol
O-ring	316 SS	O-ring	PN 40	-20 ... +200 °C	50	FDK: 085B1405	
Flange	316 SS	DIN 2512	PN 40	-20 ... +200 °C	88	FDK: 085B1464	
Flange	316 SS	DIN 2512	PN 160	-20 ... +200 °C	88	FDK: 085B1706	


Submersible kit

Type/description	Order No.	Symbol
Submersible kit, IP68, 10 m w.g. rating	FDK: 085L2403	




Cables

Type/description	Order No.	Symbol
Standard 75 Ω coax cable, T _{max} = 75 °C		
• 15 m	FDK: 085B1373	
• 30 m	FDK: 085B1374	
• 60 m	FDK: 085B1375	
• 100 m	FDK: 085B1376	
Teflon 75 Ω coax cable, T _{max} = 200 °C		
• 5 m	FDK: 085B1378	
• 15 m	FDK: 085B1397	

Tools

Type/description	Order No.	Symbol
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure (hot-tap), Length of transducer:		
• 50 mm	FDK: 085B5331	
• 160 mm	FDK: 085B5333	
• 230 mm	FDK: 085B5335	

Cable connection boxes and cable glands

Type/description	Order No.	Symbol
Junction box for coax cable		
• IP68 metal box for 2 coax cables	FDK: 085B1360	
• IP68 metal box for 4 coax cables	FDK: 085B1361	
• IP68 EEx-e plastic box for 2 coax cables	FDK: 085B1362	
• IP68 EEx-e plastic box for 4 coax cables	FDK: 085B1363	
Cable gland		
• Pg 13 for one 6 mm coax cable, chrome plated brass	FDK: 085B1381	
• Pg 13 for two 6 mm coax cable, chrome plated brass	FDK: 614X6068	
• EEx, Pg 13 for one 6 mm coax cable, 316 SS	FDK: 085B1387	