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spirax sarco

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M111

Spiraflo Transducer for Steam Flowmetering

Description

The M111 Spiraflo transducer is a pipeline unit for use on dry saturated and superheated steam only, as part of a steam flowmetering system.

Cable

Each Spiraflo transducer comes complete with 2 m of heat resistant 8 core cable, for connection to the conditioning unit.

Associated equipment

M210G	Computer
M322	Conditioning unit

See other Technical Information sheets (TI's) for the general description of Spirax Sarco steam flowmeters and for details of the M1100 steam flowmetering system.

Sizes and pipe connections

DN40, DN50, DN80 and DN100.
Flanged EN 1092 PN25, BS 10 Table H, JIS/KS 10, JIS/KS 20, ANSI B 16.42 Class 150 and 300

Pressure / temperature limits

Body design conditions	PN25
Maximum design pressure	25 bar g @ 50°C
Maximum design temperature	230°C @ 17 bar g
Minimum design temperature	0°C
Maximum operating pressure for steam service	17 bar g
Maximum operating temperature	230°C
Minimum operating temperature	120°C

Maximum differential pressure - The differential pressure drop across the unit is typically 0.2 bar g at average flowrates. Less than 0.5 bar g at maximum flow.

Designed for a maximum cold hydraulic test pressure of 37.5 bar g

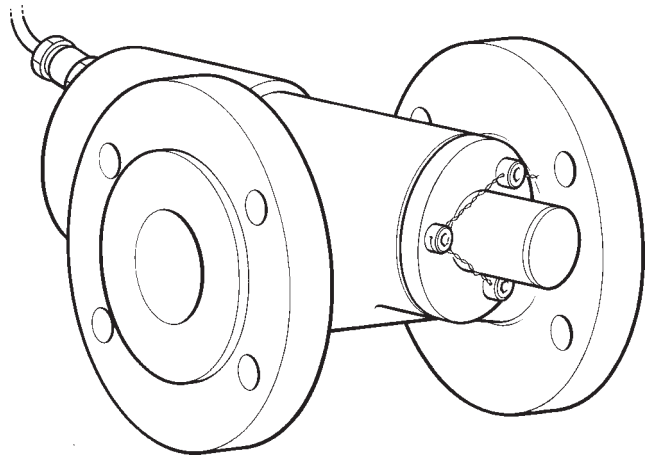
Flow range on saturated steam (see chart overleaf)

Size	Minimum flow 1 bar g	Maximum flow (at 35 m/s velocity) 17 bar g
DN40	15 kg/h	1 440 kg/h
DN50	25 kg/h	2 250 kg/h
DN80	60 kg/h	5 755 kg/h
DN100	95 kg/h	9 000 kg/h

Materials

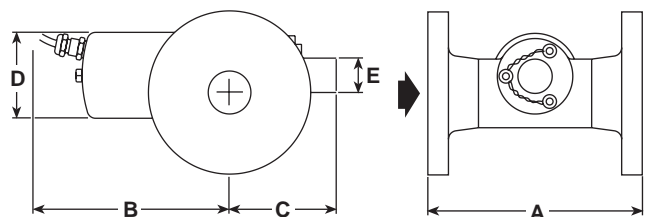
Part	Material
Body	SG iron EN-GJS-400-18LT
Internals	Stainless steel
Gaskets	Exfoliated graphite (EFG)

2 m heat resistant 8 core cable to conditioning unit (supplied by Spirax Sarco).



Dimensions/weights (approximate) in mm and kg

Size	DN40	DN50	DN80	DN100	
A	PN25	176	180	240	260
	BS 10 H	175	178	236	263
	ANSI 150	175	178	240	260
	ANSI 300	181	184	249	276
	JIS/KS 10	172	172	228	248
	JIS/KS 20	176	176	236	260
	B	180	180	220	220
C	100	100	152	152	
D	76	76	76	76	
E	28	28	76	76	
Weight	9.5	10.5	25.0	34.5	



Flow capacities for saturated steam

Size and flowrate kg/h	Steam pressure bar g																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DN40																	
a) Maximum	610	740	845	940	1020	1100	1175	1240	1300	1365	1425	1480	1530	1585	1635	1685	1730
b) At 35 m/s velocity	180	260	350	420	500	580	660	740	820	900	970	1050	1120	1200	1275	1350	1440
c) Minimum	15	18	21	23	25	27	29	31	33	34	36	37	38	40	41	42	43
DN50																	
a) Maximum	955	1155	1320	1470	1600	1720	1830	1940	2035	2130	2225	2310	2395	2475	2555	2630	2705
b) At 35 m/s velocity	280	410	540	660	790	910	1030	1150	1275	1400	1520	1640	1760	1870	1990	2100	2250
c) Minimum	25	28	33	37	40	43	46	48	51	53	56	58	60	62	64	66	68
DN80																	
a) Maximum	2445	2955	3380	3755	4095	4400	4690	4960	5215	5460	5690	5915	6130	6335	6540	6730	6920
b) At 35 m/s velocity	720	1050	1375	1695	2010	2330	2640	2945	3265	3580	3885	4195	4490	4800	5105	5415	5755
c) Minimum	60	74	84	94	102	110	117	124	130	136	142	148	153	158	163	168	172
DN100																	
a) Maximum	3820	4615	5285	5870	6395	6880	7330	7750	8150	8530	8895	9240	9575	9900	10215	10515	10815
b) At 35 m/s velocity	1125	1640	2145	2645	3140	3640	4125	4600	5100	5590	6070	6555	7020	7495	7980	8460	9000
c) Minimum	95	115	132	147	160	172	183	194	204	213	222	231	239	247	255	263	270

Notes on the above Table:-

The steam flowmeter will continue to give a reading up to the maximum value in the above Table. However, the steam flow velocities at these maximum flowrates could be extremely high (up to 120 m/s at the low pressures and up to 42 m/s at the high pressures) and could lead to serious erosion damage both to the Spiraflo transducer and to the associated pipework and fittings. It is **not** recommended that a steam flowmeter is selected to operate at flowrates continuously resulting from a velocity above 35 m/s.

Turndown of the Spiraflo transducer is defined as the maximum flow divided by the minimum flow: Using the **maximum** figures from the above Table, the turndown is 40:1 throughout the size and pressure range. However, based on the recommended maximum velocity of 35 m/s, the turndown available will vary from 12:1 at 1 bar g up to 33:1 at 17 bar g. The average continuous turndown of the flowmeter is, therefore 25:1.

Flow capacities for superheated steam

In general terms, the flow capacity for the Spiraflo transducer is calculated using the following equation:

$$q_m = \frac{A \times u}{v} \times 3600$$

Where:- q_m = Capacity in kg/h

A = Pipe cross sectional area in $m^2 = \frac{\pi D^2}{4}$ where D = pipe bore in metres

u = Flow velocity in m/s

v = Specific volume in m^3/kg

The saturated steam flow capacities in the above Table are calculated using this equation. Superheated steam flow capacities can be calculated in the same way.

Example:

What is the capacity of a DN80 Spiraflo transducer on superheated steam at 5 bar g and 200°C?

Assume maximum velocity (u) = 35 m/s, Specific volume (v) = 0.3520 m^3/kg

$$q_m = \frac{\pi \times D^2 \times u \times 3600}{4 \times v}$$

$$q_m = \frac{3.14 \times 0.08 \times 0.08 \times 35 \times 3600}{4 \times 0.3520} = 1802 \text{ kg/h}$$

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with each Spiraflo transducer. In order to get the best performance from the transducer, it is essential that installation is correctly carried out in accordance with the guidelines given in the booklet supplied with each steam flowmetering system. General guidelines are given in other TI sheets.

Maintenance note:

The Spirax Sarco Spiraflo transducer is a sealed and calibrated unit with no user serviceable parts.

Disposal:

The product is recyclable, No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

How to order

Example: 1 off Spirax Sarco DN40 M111 Spiraflo transducer having an SG iron body flanged to EN 1092 PN25.