

TVA Flowmeter for Saturated Steam Service

Description

The Spirax Sarco TVA flowmeter is designed for use on saturated steam only and operates on the target principle, by measuring the force produced on a moving cone by the fluid flow. This strain is then converted into density compensated mass flowrate and is transmitted via a single loop powered 4-20 mA and pulsed output. TVA flowmeters also incorporate a totalised flow function and RS 232 Modbus communications.

Sizes and pipe connections

2", 3" and 4"

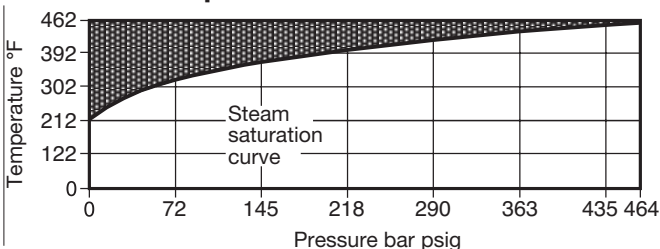
The TVA flowmeter is of wafer design, suitable for fitting between the following flanges: ASME (ANSI) B 16.5 Class 150 and Class 300

Note:

The Spirax Sarco TVA flowmeter should be installed in pipework manufactured to BS 1600 or ASME (ANSI) / ASME B 36.10 Schedule 40.

For systems with different standards/schedules, spool pieces manufactured from BS 1600 or ASME (ANSI) / ASME B 36.10 Schedule 40 pipe should be used. If this is not possible, please contact Spirax Sarco.

Pressure/temperature limits

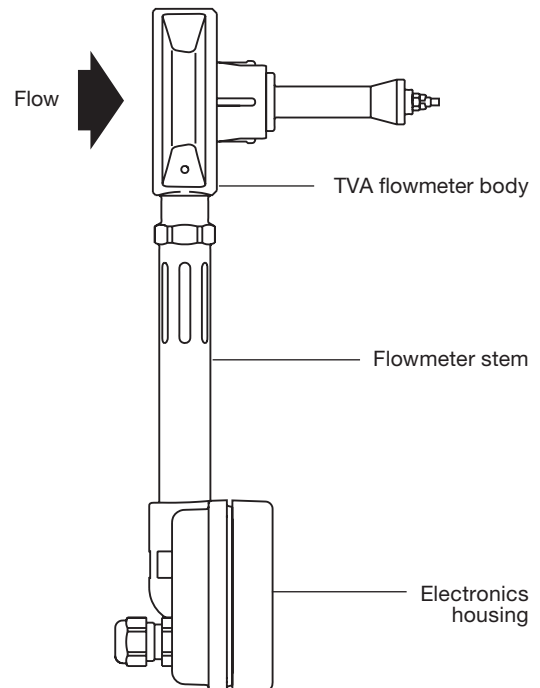


The product should not be used in this region due to software limitations.

Maximum design pressure	464 psig @ 462°F
Maximum design temperature	462°F
Minimum design temperature	32°F
Maximum operating pressure	Horizontal flow 464 psig @ 462°F Vertical flow 101 psig @ 338 F
Minimum operating pressure	9 psig
Maximum operating temperature (saturation)	462°F
Minimum operating temperature	32°F
Note: For lower operating temperatures consult Spirax Sarco	
Maximum electronics ambient temperature	131°F
Maximum electronics humidity level	90% RH (non-condensing)
Designed for a maximum cold hydraulic test pressure of	754 psig

Materials

Flowmeter body	Stainless steel S.316 1.4408 CF8M
Internals	431 S29/S303/S304/S316
Spring	Inconel X750 or equivalent
Flowmeter stem	Stainless steel 300 series
Electronics housing	Aluminium LM25



Technical data

IP rating	IP65 with correct cable glands
Power supply	Loop powered nominal 24 Vdc
Outputs	4 - 20 mA (proportional to mass flow) Pulsed output (V_{max} 28 Vdc R_{min} 10 k Ω)
Communication port	Modbus EIA 232C (RS 232)

Performance

The TVA flowmeter has inbuilt electronics which give a density compensated output. An LCD display is incorporated within the electronics head. The M750 display unit can be used to provide a remote display function if required, utilising the 4 - 20 mA output.

System uncertainty, to 95% confidence (2 STD): (in accordance with ISO 17025)

±2% of measured value from 10% to 100% of maximum rated flow.
±0.2% FSD, from 2% to 10% of maximum rated flow.

Turndown : up to 50:1

As the TVA flowmeter is a self contained unit, the uncertainty quoted is for the complete system. Many flowmeters claim a pipeline unit uncertainty and for a true system uncertainty, the individual uncertainty values of any associated equipment, such as DP cells, need to be added to the pipeline value.

Pressure drop

The pressure drop across the TVA is nominally 300 ins water gauge at maximum rated flow for the 2", and 200 inches water gauge for the 3" and 4".

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

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TVA

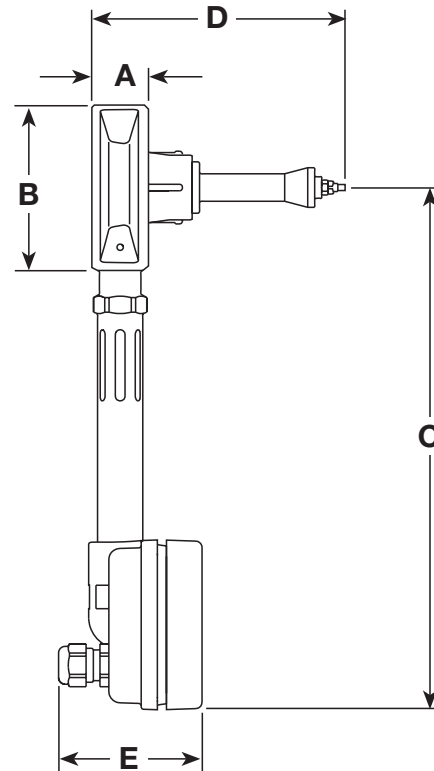
Flowmeter for Saturated Steam Service

Dimensions/weights (approximate) in inches and pounds

Size	A	B	C	D	E	Weight
2"	1.4	4.1	12.7	6.3	2.6	5.9
3"	1.8	5.4	13.1	6.3	2.6	9.7
4"	2.4	6.4	13.5	8.5	2.6	16.0

TVA flowmeter flow capacities and pressure drops

Flowmeter Type	Maximum QE US gal/min	Maximum DP Wg
2"	80	300
3"	203	200
4"	317	200



Sizing the TVA flowmeter for saturated steam (lb/hr)

(Horizontal orientation)

Maximum flowrates in lb/hr at different pressures (psig).

Notes:

- 1 - Maximum steam flowrates are calculated at maximum differential pressure.
- 2 - For vertical capacities please contact Spirax Sarco.
- 3 - The table below is a guide only.

Size	Steam pressure psig	15	44	73	102	145	174	218	290	363	435	464	psig
2"	Maximum flow	1,365	1,894	2,297	2,637	3,075	3,336	3,695	4,228	4,707	5,148	5,311	lb/hr
	Minimum flow	26	37	46	53	62	66	73	84	95	104	132	lb/hr
3"	Maximum flow	3,501	4,859	5,895	6,768	7,895	8,565	9,482	10,851	12,081	13,215	13,633	lb/hr
	Minimum flow	71	97	117	134	159	172	190	216	243	265	284	lb/hr
4"	Maximum flow	5,456	7,573	9,187	10,547	12,304	13,347	14,778	16,912	18,827	20,593	21,246	lb/hr
	Minimum flow	108	152	183	212	247	267	295	337	377	412	425	lb/hr

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P337-51 and IM-P337-52) supplied with the product.

The following main points are given for guidance only:

1. The TVA flowmeter should be mounted with a minimum of 6 straight pipe diameters upstream and 3 downstream. No valves, fittings or cross sectional changes are permitted within these pipe lengths. Where an increase in nominal pipe diameter is required, upstream of the flowmeter, the length of straight pipe should be increased to 12 diameters. Similarly, where a Spirax Sarco TVA is installed downstream of two 90 degree bends in two planes, a pressure reducing valve or a partly open valve, 12 upstream pipe diameters should be allowed.
2. It is important that the internal upstream and downstream diameters of pipe are smooth. Ideally seamless pipes should be used and there should be no intrusive weld beads on the internal diameter. It is also recommended that slip-on flanges are used to avoid this.
3. Care should be taken to install the TVA flowmeter concentrically in the line. If this is not done, flow measurement errors may occur.
4. The TVA flowmeter can be installed in any orientation up to a line pressure of 101 psig.
5. As for all steam flowmetering installations, good basic steam engineering practices should be followed:
 - Correct line drainage through adequate trapping.
 - Good alignment and support of associated pipework.
 - Line size changes achieved by the use of eccentric reducers.
 - Do not lag (insulate) the TVA body or the mating flanges.

How to order

Example: 1 off Spirax Sarco 4" TVA flowmeter for installation between ASME (ANSI) B 16.5 Class 150 flanges for use on saturated steam at 145 psig - Maximum flow 12,304 lb/hr.

Note: For details of the optional remote display see the relevant Spirax Sarco M750 literature.

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