

spirax sarco

TVA

TI-P337-50
MI Issue 3



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

DN50, DN80 and DN100

The TVA flowmeter is of wafer design, suitable for fitting between the following flanges:

EN 1092 PN16, PN25 and PN40

BS 10 Table H

ASME B 16.5 Class 150 and Class 300

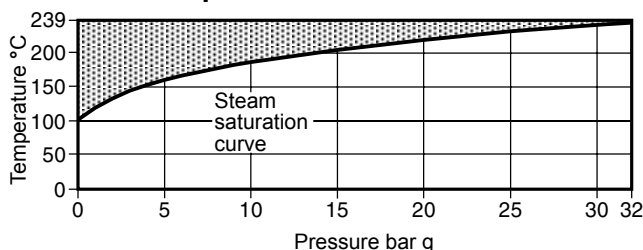
Japanese Industrial Standard JIS 20

Korean Standard KS 20

Note:

The Spirax Sarco TVA flowmeter should be installed in pipework manufactured to BS 1600, ASME B 36.10 Schedule 40 or EN 10216-2 / EN 10216-5 equivalent. For systems with different standards/schedules, please contact Spirax Sarco.

Pressure/temperature limits

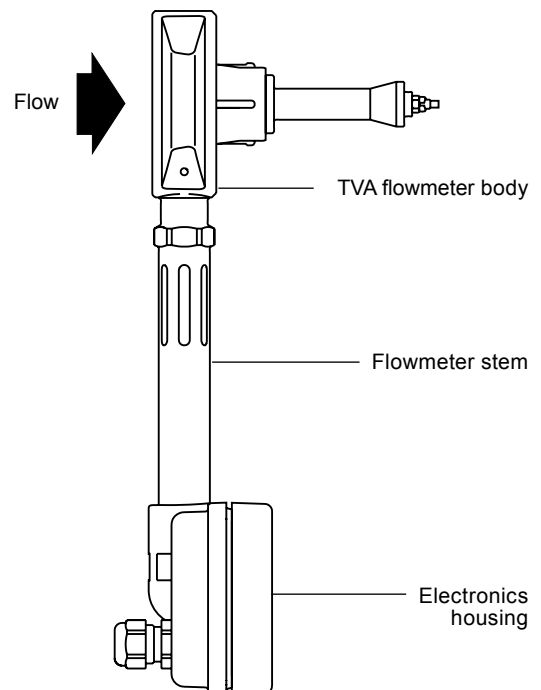


The product should not be used in this region due to software limitations.

| | |
|---|---|
| Maximum design pressure | 32 bar g @ 239°C |
| Maximum design temperature | 239°C |
| Minimum design temperature | 0°C (non-freezing) |
| Maximum operating pressure | Horizontal flow 32 bar g @ 239°C Vertical flow 7 bar g @ 170°C |
| Minimum operating pressure | 0.6 bar g |
| Maximum operating temperature (saturation) | 239°C |
| Minimum operating temperature | 0°C (non-freezing) |
| Maximum electronics ambient temperature | 55°C |
| Maximum electronics humidity level | 90% RH (non-condensing) |
| Designed for a maximum cold hydraulic test pressure of 52 bar g | |

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)

| |
|---|
| $\pm 2\%$ of measured value from 10% to 100% of maximum rated flow. |
| $\pm 0.2\%$ 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.

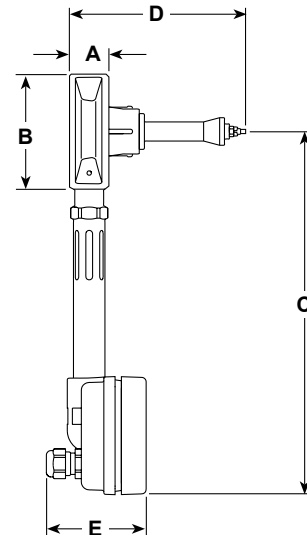
Pressure drop

The pressure drop across the TVA is nominally 750 mbar (300 ins water gauge) at maximum rated flow for the DN50, and 500 mbar (200 inches water gauge) for the DN80 and DN100.

First for Steam Solutions

Dimensions/weights (approximate) in mm and kg

| Size | A | B | C | D | E | Weight |
|-------|----|-----|-----|-----|----|--------|
| DN50 | 35 | 103 | 322 | 160 | 65 | 2.67 |
| DN80 | 45 | 138 | 334 | 160 | 65 | 4.38 |
| DN100 | 60 | 162 | 344 | 215 | 65 | 7.28 |



TVA flowmeter flow capacities and pressure drops

| Flowmeter type | Q _E litres/min | | Maximum DP | |
|----------------|---------------------------|---------|------------|-------|
| | Maximum | Minimum | Wg | m bar |
| DN50 | 300 | 3 | 300 | 750 |
| DN80 | 770 | 8 | 200 | 498 |
| DN100 | 1200 | 12 | 200 | 498 |

Sizing the TVA flowmeter for saturated steam (kg/h) (Horizontal orientation)

Maximum flowrates in kg/h at different pressures (bar g).

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 bar g | 1 | 3 | 5 | 7 | 10 | 12 | 15 | 20 | 25 | 30 | 32 | bar g | |
|-------|------------------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| DN50 | Q _E = 300 | Max. flow | 619 | 859 | 1 042 | 1 196 | 1 395 | 1 513 | 1 676 | 1 918 | 2 135 | 2 335 | 2 409 | kg/h |
| | | Min. flow | 12 | 17 | 21 | 24 | 28 | 30 | 33 | 38 | 43 | 47 | 60 | kg/h |
| DN80 | Q _E = 770 | Max. flow | 1 588 | 2 204 | 2 674 | 3 070 | 3 581 | 3 885 | 4 301 | 4 922 | 5 480 | 5 994 | 6 183 | kg/h |
| | | Min. flow | 32 | 44 | 53 | 61 | 72 | 78 | 86 | 98 | 110 | 120 | 128 | kg/h |
| DN100 | Q _E = 1 200 | Max. flow | 2 475 | 3 435 | 4 167 | 4 784 | 5 581 | 6 054 | 6 703 | 7 671 | 8 540 | 9 341 | 9 637 | kg/h |
| | | Min. flow | 49 | 69 | 83 | 96 | 112 | 121 | 134 | 153 | 171 | 187 | 192 | kg/h |

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° 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 7 bar g.
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.
6. The TVA flowmeter must not be installed outside where it can be subjected to driving rain or where it is liable to freeze.

How to order

Example: 1 off Spirax Sarco DN100 TVA flowmeter for installation between EN 1092 PN40 flanges for use on saturated steam at 10 bar g - Maximum flow 5581 kg/h.

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