



TI-P337-05
 MI Issue 15

Gilflo ILVA Flowmeter

Description

The Gilflo ILVA flowmeter operates on the spring loaded variable area principle and produces a differential pressure related to the rate of flow. It can be used with most industrial fluids, gases and both saturated and superheated steam. A general description of the ILVA flowmetering system and its associated equipment is given in a separate TI sheet.

Sizes and pipe connections

DN50, DN80, DN100, DN150, DN200. For DN250 and DN300 sizes see separate literature.

Suitable for fitting between the following flanges:

EN 1092 PN16, PN25 and PN40.

BS 10 Table H.

ASME B 16.5 Class 150, 300 and 600.

JIS 20.

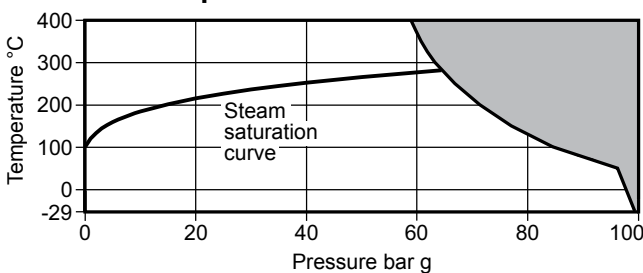
KS 20.

The Gilflo ILVA flowmeter should be installed in pipework manufactured to BS 1600 or ASME B 36.10 Schedule 40. For different pipe standards/schedules downstream spool pieces with equivalent internal diameter as in BS 1600 or ASME B 36.10 Schedule 40 should be used. If this is not possible, please contact Spirax-Sarco Limited.

Materials

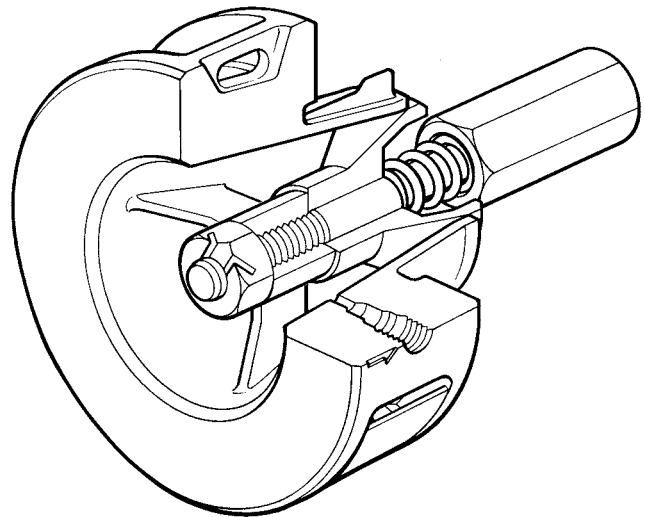
| Part | Material |
|-----------|--|
| Body | Cast stainless steel S.316 (CF8M / 1.4408) |
| Internals | 431 S29 / S303 / S304 / S316 |
| Spring | Inconel X750 |

Pressure/temperature limits



The product **must not** be used in this region.

| | |
|---|------------------|
| Body design conditions | ASME 600 |
| PMA Maximum allowable pressure | 102 bar g @ 20°C |
| TMA Maximum allowable temperature | 400°C @ 40 bar g |
| Minimum allowable temperature | -50°C |
| PMO Maximum operating pressure is dependant on the flange specification | |
| Minimum operating pressure | 0.6 bar g |
| TMO Maximum operating temperature | 400°C @ 40 bar g |
| Minimum operating temperature | -29°C |
| Note: For lower operating temperatures consult Spirax Sarco | |
| Maximum viscosity | 30 centipoise |
| ΔPMX Maximum differential pressure | 498 m bar |
| Designed for a maximum cold hydraulic test pressure of 155 bar g | |



Performance

The Gilflo ILVA is designed to be used in conjunction with linearising electronics such as the range of flow computers or M750 display unit. Alternatively the output signal linearisation can be performed on an EMS / BEMS or equivalent.

Accuracy when used with Spirax Sarco flow computers or M750: ±1% of measured value from 5% to 100% of maximum rated flow. ±0.1% FSD from 1% to 5% of maximum rated flow.

Repeatability better than 0.25%

Turndown: up to 100:1

Caution: Scanner 2000 steam mass flow transmitters are uniquely configured at the factory to work with a single, specific Gilflo ILVA flowmeter. For correct operation the configured Scanner 2000 transmitter must always be installed with its allocated flowmeter. Labels on the packaging give the serial numbers of the matched products.

Pressure drop

The maximum pressure drop across the Gilflo ILVA pipeline unit is 498 m bar (200 ins water gauge) at maximum rated flow.

Flow capacity

To determine the capacity of the Gilflo ILVA for different fluids, it is necessary to calculate the equivalent water flowrate Q_E (in l/min) as described in Step 1, under the section 'sizing the Gilflo ILVA' then selecting the appropriate size of flowmeter from the Table under Step 2 overleaf.

How to order

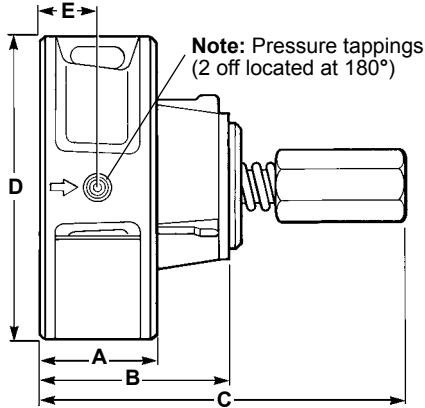
Example: 1 off Spirax Sarco DN150 Gilflo ILVA flowmeter for installation between flanges to EN 1092 PN40. Body material 316 stainless steel. Flow medium saturated steam at 10 bar g, maximum flow 8 000 kg / h.

First for Steam Solutions

Dimensions / weights (approximate) in mm and kg

| Size | A | B | C | D | E | Weight |
|-------|----|-----|-----|-----|------|--------|
| DN50 | 35 | 63 | 140 | 103 | 17.5 | 2.0 |
| DN80 | 45 | 78 | 150 | 138 | 22.5 | 3.9 |
| DN100 | 60 | 103 | 205 | 162 | 30.0 | 8.3 |
| DN150 | 75 | 134 | 300 | 218 | 37.5 | 14.2 |
| DN200 | 85 | 161 | 360 | 273 | 42.5 | 23.6 |

Note:- Pressure tappings are threaded 1/4" NPT



Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

Installation note:

The following main points are given here for guidance:

1. The Gilflo ILVA 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 Gilflo ILVA is installed downstream of two 90 degree bends in two planes, a pressure reducing valve or a partially 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. It is recommended that slip-on flanges be used to avoid any intrusive weld beads on the internal diameter of the pipe.
3. Care should be taken to install the Gilflo ILVA concentrically in the line. If this is not done, flow measurement errors may occur.
4. The Gilflo ILVA should be mounted horizontally. For vertical installations, consult Spirax Sarco.
5. For steam applications, 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.

Maintenance note:

There are no user serviceable parts in the Gilflo ILVA. A visual check together with confirmation that the orifice/cone reference dimension is within tolerance is possible.

Sizing the Gilflo ILVA for saturated steam - kg/h

Minimum and maximum flowrates in kg/h at different pressures (bar g)

Note: Maximum steam flowrates are calculated at maximum differential pressure.

| Size | | Steam pressure bar g | | | | | | | | | | |
|-------|---------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | 1 | 3 | 5 | 7 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| DN50 | Maximum | 307 | 427 | 517 | 594 | 693 | 752 | 832 | 952 | 1060 | 1160 | 1341 |
| | Minimum | 3 | 4 | 5 | 6 | 7 | 8 | 8 | 10 | 11 | 12 | 13 |
| DN80 | Maximum | 1206 | 1675 | 2032 | 2332 | 2721 | 2951 | 3268 | 3740 | 4163 | 4554 | 5265 |
| | Minimum | 12 | 17 | 20 | 23 | 27 | 30 | 33 | 37 | 42 | 46 | 53 |
| DN100 | Maximum | 2475 | 3435 | 4167 | 4784 | 5581 | 6054 | 6703 | 7671 | 8540 | 9341 | 10800 |
| | Minimum | 25 | 34 | 42 | 48 | 56 | 61 | 67 | 77 | 85 | 93 | 108 |
| DN150 | Maximum | 5981 | 8301 | 10071 | 11562 | 13487 | 14631 | 16119 | 18538 | 20639 | 22573 | 26101 |
| | Minimum | 60 | 83 | 101 | 116 | 135 | 146 | 162 | 185 | 206 | 226 | 261 |
| DN200 | Maximum | 11756 | 16317 | 19796 | 22726 | 26509 | 28757 | 31840 | 36437 | 40566 | 44368 | 51301 |
| | Minimum | 118 | 163 | 198 | 227 | 265 | 288 | 318 | 364 | 406 | 444 | 513 |

How to order example: 1 off Spirax Sarco DN50 Gilflo ILVA flowmeter suitable for fitting between EN 1092 PN40 connections.

Sizing the Gilflo ILVA flowmeter

In order to determine the flow capacity of a Gilflo ILVA pipeline unit, it is necessary to calculate the equivalent water flowrate (Q_E) based on the anticipated actual flow (see Step 1).

The Table below is used to select the appropriate unit (steam only).

Step 1. Determine equivalent water flowrate (Q_E) in l/min:-

| | Mass flow units | Volumetric units |
|---|---|---|
| Liquids | $Q_E = \frac{q_m}{\sqrt{SG}}$ | $Q_E = Q_L \sqrt{SG}$ |
| Gases and steam actual flow conditions | $Q_E = q_M \sqrt{\frac{1000}{D_F}}$ | $Q_E = Q_F \sqrt{\frac{D_F}{1000}}$ |
| Gases standard conditions | $Q_E = \frac{q_M}{\sqrt{\frac{D_s}{1000} \times \frac{P_F}{P_s} \times \frac{T_s}{T_f}}}$ | $Q_E = Q_s \sqrt{\frac{D_s}{1000} \times \frac{P_s}{P_f} \times \frac{T_f}{T_s}}$ |

Where:

- Q_E = Equivalent water flowrate (litres / min)
- q_m = Mass flowrate (kg / min)
- Q_L = Maximum liquid flowrate (litres / min)
- Q_s = Maximum gas flowrate at standard conditions (litres / min)
- Q_f = Maximum gas flowrate at actual flow conditions (litres / min)
- SG = Specific gravity
- D_s = Density of gas at standard conditions (kg / m³)
- D_f = Density of gas at actual flow conditions (kg / m³)
- P_s = Standard pressure: 1.013 bar a, 1.033 kg/cm² a, 14.70 psi a
- P_f = Actual flow pressure in same absolute units as P_s
- T_s = Standard temperature (K) = °C + 273
- T_f = Actual flow temperature (K) = °C + 273

Step 2. Using the value of Q_E as determined in Step 1, select the correct size of the Gilflo ILVA flowmeter using the Table below. In practice, it will often be the line size that determines the choice of the flowmeter.

| Flowmeter type | Q_E litres / min | | Maximum DP | |
|----------------|--------------------|---------|------------|-------|
| | Maximum | Minimum | Wg | m bar |
| DN50 | 149 | 1 | 200 | 498 |
| DN80 | 585 | 6 | 200 | 498 |
| DN100 | 1200 | 12 | 200 | 498 |
| DN150 | 2900 | 29 | 200 | 498 |
| DN200 | 5700 | 57 | 200 | 498 |

Example: Determine which Gilflo pipeline unit is required to measure the flow of compressed air when:

1: Estimated maximum rate of flow = 500 s m³/h at 7 bar g and 20°C
Note: Standard conditions = 1.013 bar a, 0°C giving a standard density of 1.29 kg / m³

2: Calculate Q_E from: $Q_E = Q_s \sqrt{\frac{D_s}{1000} \times \frac{P_s}{P_f} \times \frac{T_f}{T_s}}$

$$Q_E = (500 \times 16.667) \times \sqrt{\frac{1.29}{1000} \times \frac{1.013}{8.013} \times \frac{293}{273}}$$

$Q_E = 110$ litres / min

So a DN50 ILVA is recommended.

Note: 1 m³ / h = 16.667 litres / min