



TI-P337-59  
 MI Issue 2

# Gilflo ILVA Flowmeter with Mass Flow Transmitter and Compact Stem DN250 and DN300

## Description

The compact Gilflo ILVA flowmeter is a three element flowmeter. It operates on the spring loaded variable area principle and produces a differential pressure related to the flowrate. The ILVA pipeline element is connected to the Scanner 2000 steam mass flow transmitter via a compact stem and isolation manifold. The compact ILVA flowmeter is supplied as separate elements (calibrated) as standard, although the pipeline element (ILVA) and Scanner 2000 are a matched pair. The flowmeter can also be supplied as a fully assembled and calibrated system on request.

## Sizes and pipe connections

DN250 and DN300.  
 Suitable for fitting between the following flanges:  
 EN 1092 PN16, PN25 and PN40.  
 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 an equivalent internal diameter to BS 1600 or ASME B 36.10 Schedule 40 should be used. If this is not possible, please contact Spirax-Sarco Limited.

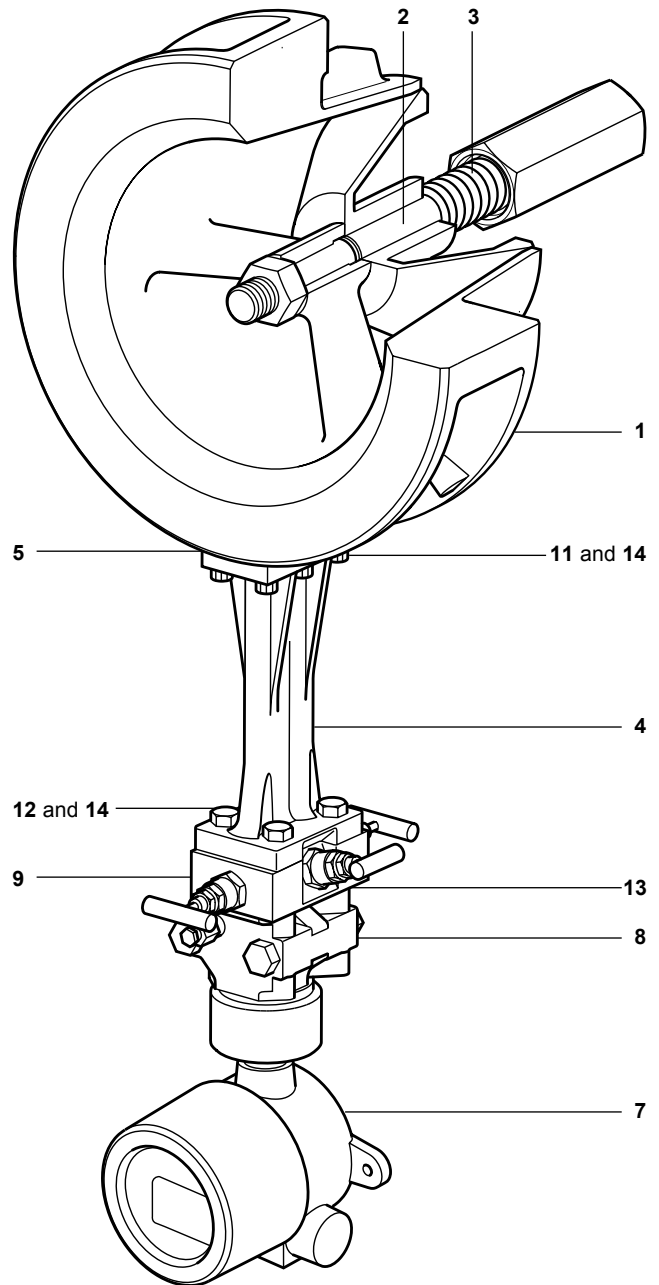
## Configuration

The Gilflo ILVA and Scanner 2000 are uniquely configured at the factory as a matched pair for a specific application. For correct operation they must be installed together. A label on the packaging gives the serial number of the matched products. The product can be configured using an RS485 equipped PC with the supplied configuration software.

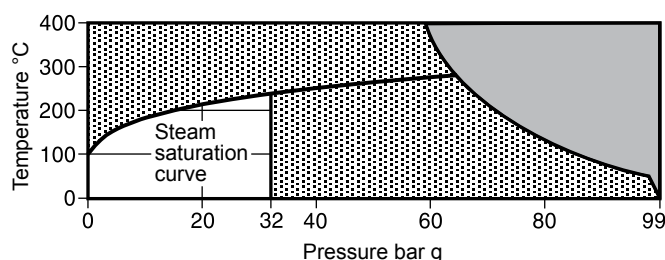
## Materials

No.	Part	Material
1	Body	Cast stainless steel S.316 (CF8M/ 1.4408)
2	Internals	431 S29 / S303 / S304 / S316
3	Spring	Inconel X750
4	Compact stem	Cast stainless steel S.316 (CF8M/ 1.4408)
5	Stem to Gilflo ILVA gasket	Corruseal - Stainless Steel Grade 321
6	Stem to manifold gasket	Grafoil
7	Enclosure	Cast aluminium (painted with epoxy and polyurethane)
8	Body	Stainless steel AISI 316
9	3-way manifold*	Stainless steel AISI 316
10	Fluid fill	Silicone oil (inside DP Cell (item 8))
11	Compact stem to ILVA screws	Stainless steel
12	Compact stem to Manifold screws	Stainless steel
13	Manifold to MVT gasket	Grafoil
14	Spring washer	Stainless steel

\* Note: 5-way manifold available as an option.



## Pressure/temperature limits



- The product **must not** be used in this region.
- The product should not be used in this region or beyond its operating range as damage to the internals may occur.

Body design conditions	ASME 600
PMA Maximum allowable pressure	99 bar g @ 38°C
TMA Maximum allowable temperature	400°C @ 59 bar g
Minimum allowable temperature	0°C
PMO Maximum operating pressure	32 bar g @ 239°C
Minimum operating pressure	0.6 bar g
TMO Maximum operating temperature	239°C @ 32 bar g
Minimum operating temperature	0°C
<b>Note:</b> For lower operating temperatures consult Spirax Sarco	
Maximum viscosity	Saturated steam
ΔPMX Maximum differential pressure	498 m bar
Designed for a maximum cold hydraulic test pressure of:	142 bar g

## Performance

The Gilflo ILVA is used in conjunction with linearising electronics such as a Spirax Sarco flow computer or M750 display unit. Alternatively the output signal linearisation can be performed on an EMS/BEMS or equivalent.

Accuracy when used with Scanner 2000 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:** The Scanner 2000 mass flow transmitters can be configured at the factory to work with a single, specific Gilflo ILVA flowmeter. For correct operation the configured 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

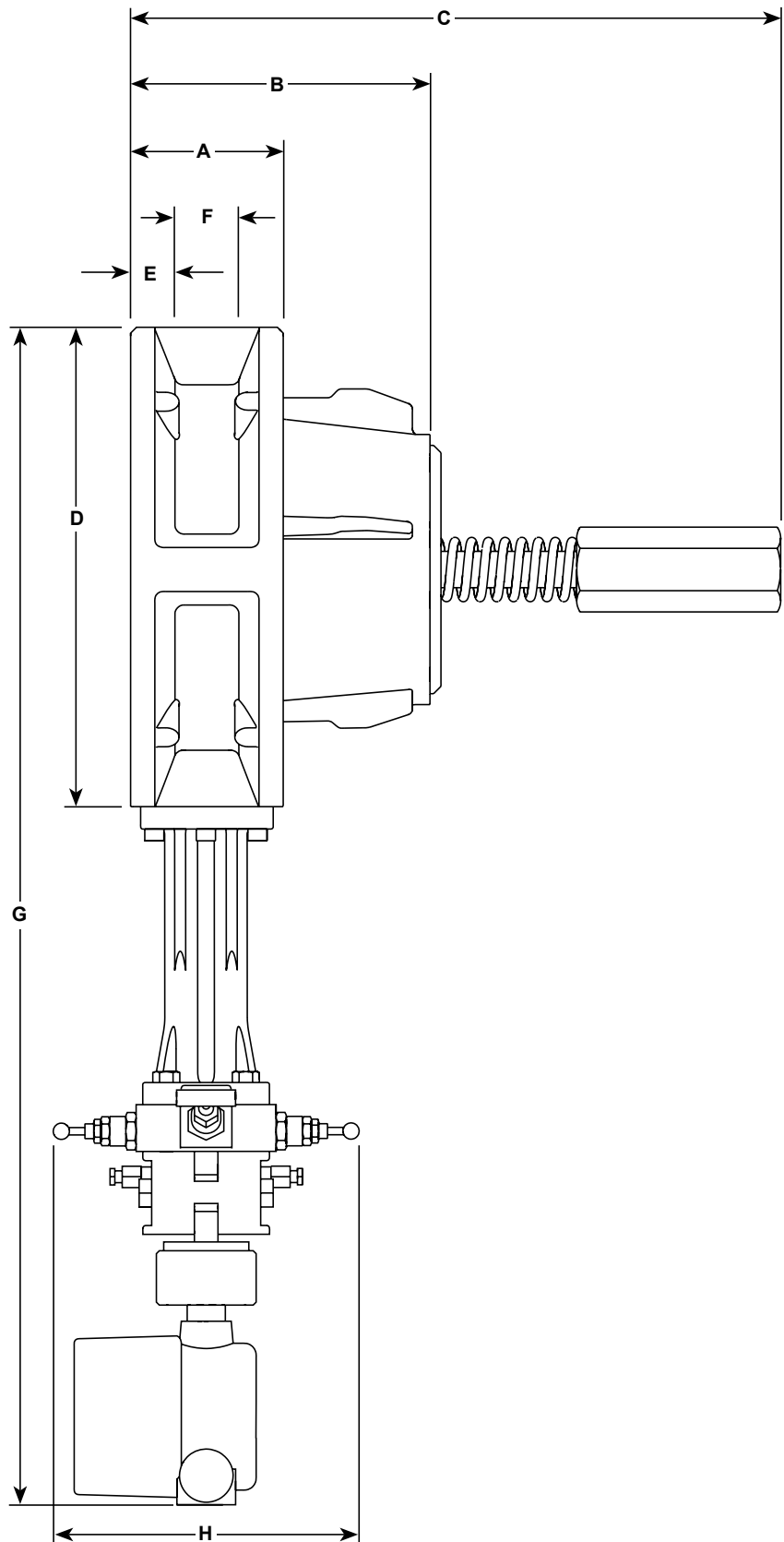
To determine the capacity of the Gilflo ILVA for different fluids, it is necessary to calculate the equivalent water flowrate  $Q_E$  (in l/min) as described in Step 1, under the section 'sizing the Gilflo ILVA' then selecting the appropriate size of flowmeter from the Table under Step 2 overleaf.

## Mass flow transmitter (Scanner 2000) - Technical data

<b>Range</b>	Minimum 2" H <sub>2</sub> O (4.98 mbar)
	Maximum 200" H <sub>2</sub> O (498 mbar)
<b>Outputs</b>	4 - 20 mA (expansion board required)
	RS485 Modbus RTU slave (baud rate 300 to 38.4 K)
<b>Power supply</b>	Solid state relay, configurable as pulse or alarm
<b>Pressure limits</b>	6 V to 30 Vdc at 31 mA
<b>Temperature limits</b>	155 bar
<b>Accuracy</b>	-40°C to 70°C (-40°F to 158°F)
	LCD contrast is reduced below -30°C (-22°F)
<b>Enclosure rating</b>	±0.05% for Spans >10% of the URL
<b>Scanner certification</b>	±0.005 (URL/SPAN) for Spans <10% of the sensor
	IEC IP68
	ATEX or CSA approved (see Scanner literature for details)

**Dimensions / weights** (approximate) in mm and kg

Size	A	B	C	D	E	F	G	H	Weight
DN250	104	204	444	330	34.5	35	640	211	51.0
DN300	120	250	530	385	42.5	35	695	211	75.0



## 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
<b>Liquids</b>	$Q_E = \frac{q_m}{\sqrt{SG}}$	$Q_E = Q_L \sqrt{SG}$
<b>Gases and steam actual flow conditions</b>	$Q_E = q_m \sqrt{\frac{1000}{D_F}}$	$Q_E = Q_F \sqrt{\frac{D_F}{1000}}$
<b>Gases standard conditions</b>	$Q_E = Q_s \sqrt{\frac{D_s}{1000} \times \frac{P_s}{P_f} \times \frac{T_f}{T_s}}$	$Q_E = Q_s \sqrt{\frac{D_s}{1000} \times \frac{P_s}{P_f} \times \frac{T_f}{T_s}}$

#### 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/m<sup>3</sup>)
- $D_f$  = Density of gas at actual flow conditions (kg/m<sup>3</sup>)
- $P_s$  = Standard pressure: 1.013 bar a, 1.033 kg/cm<sup>2</sup> 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	Max. $Q_E$ litres/min	Maximum pressure drop Wg
DN250	7750	200
DN300	10975	200

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

- 1: Estimated maximum rate of flow = 28000 s m<sup>3</sup>/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/m<sup>3</sup>

2: Calculate  $Q_E$  from:

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

$$Q_E = (28000 \times 16.667) \times \sqrt{\frac{1.29}{1000} \times \frac{1.013}{8.013} \times \frac{293}{273}}$$

$$Q_E = 6174 \text{ litres/min}$$

So a DN250 ILVA is recommended.

**Note:** 1 m<sup>3</sup>/h = 16.667 litres/min

## Sizing - Gilflo ILVA flowmeter minimum and maximum saturated steam flowrates in kg/h

#### Notes:

1. These capacities are based on a differential pressure across the flowmeter of 498 m bar H<sub>2</sub>O (200 Inches).
2. Minimum flow is 1% of maximum (100:1 turndown).
3. The table below is a guide only.

Size	$Q_E$	Steam pressure bar g											
		1	3	5	7	10	12	15	20	25	30	40	
DN250	Max.	7750	15985	22185	26915	30899	36043	39099	43292	49541	55155	60325	69758
	Min.	78	160	222	269	309	433	391	433	495	552	603	698
DN300	Max.	10975	22637	31417	38115	43758	51042	55369	61307	70157	78107	85428	98778
	Min.	110	226	314	381	438	510	554	613	702	781	854	988

## 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:

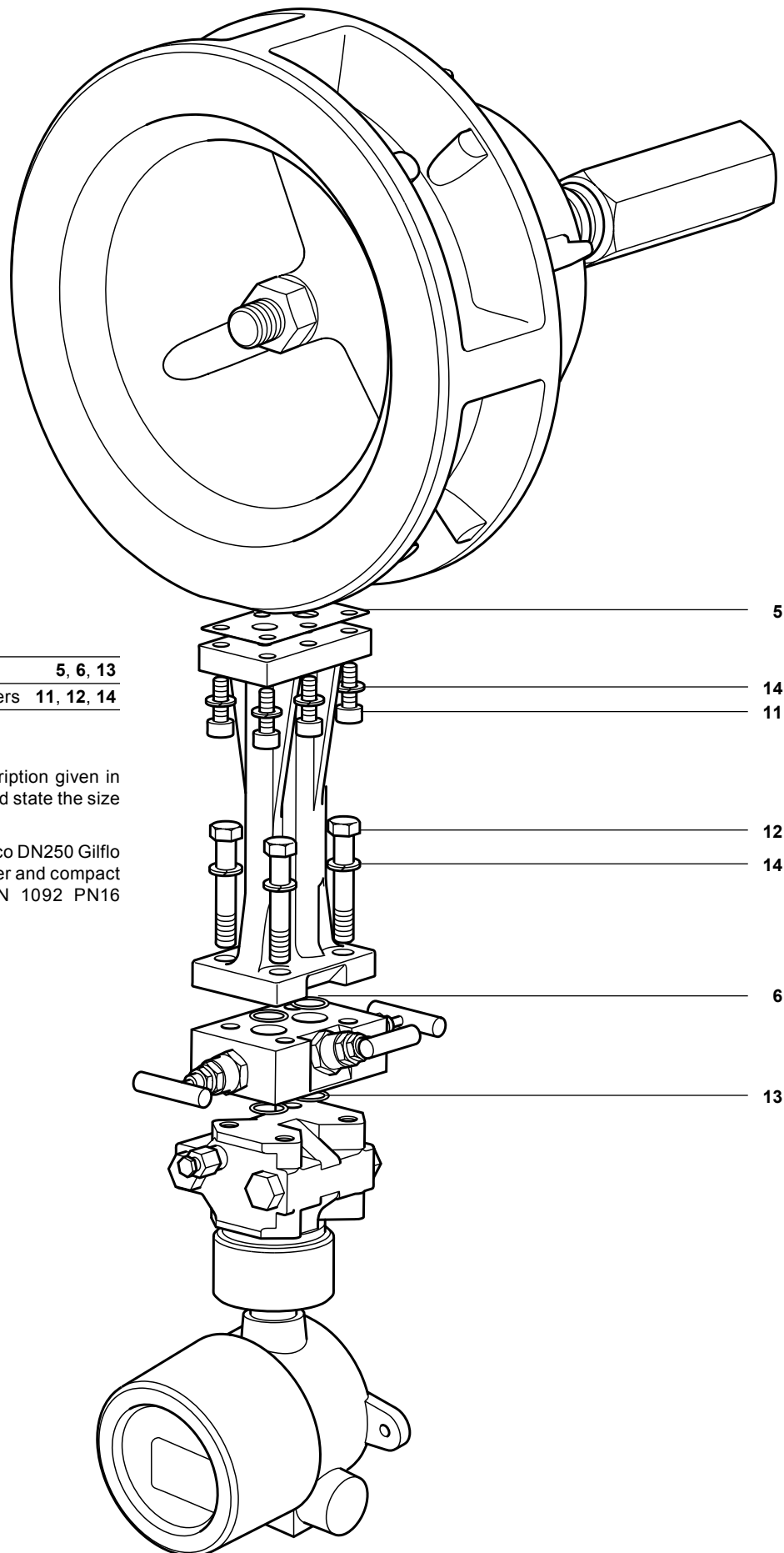
1. The Gilflo ILVA should be mounted with a minimum of 6 straight pipe diameters upstream and 3 downstream. No valves, fittings or cross sectional changes are permitted within these pipe lengths. Where an increase in nominal pipe diameter is required upstream of the flowmeter, the length of straight pipe should be increased to 12 diameters. Similarly, where a Gilflo ILVA is installed downstream of two 90° 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.
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.

### How to order example

1 off Spirax Sarco DN250 Gilflo ILVA flowmeter with compact stem, three way isolation manifold and saturated steam mass flow transmitter with ANALOG OUTPUT (4 - 20 mA) ATEX II 2 GD Ex d IIC T6 approved for installation between EN 1092 PN40 flanges. The body material is to be 316 stainless steel. The flow medium will be saturated steam at 10 bar g and the maximum flow will be 36 000 kg/h.

## Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.



### Available spares

Gasket set	5, 6, 13
Compact stem screws and spring washers	11, 12, 14

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of equipment.

**Example:** 1 - Gasket set for a Spirax Sarco DN250 Gilflo ILVA flowmeter with mass flow transmitter and compact stem suitable for fitting between EN 1092 PN16 connections.