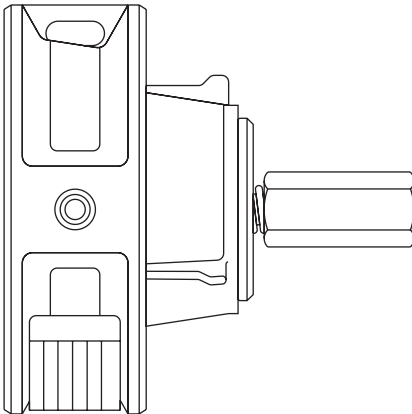


Gilflo ILVA
Flowmetering Systems
Installation and Maintenance Instructions



- 1. Safety information*
- 2. General system information*
- 3. General product information*
- 4. Mechanical installation of Gilflo ILVA pipeline unit*
- 5. Impulse lines*
- 6. Initial start-up*
- 7. Maintenance*
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1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products listed below comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the CE mark when so required. The products fall within the following Pressure Equipment Directive categories:

Product	Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
Gilflo ILVA Pipeline Unit, DN50 - DN100	2	1	2	SEP
Gilflo ILVA Pipeline Unit, DN150 - DN200	3	2	2	SEP

- i) The products have been specifically designed for use on steam, air or condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. It can also be used on propane or methane gases which are in Group 1 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections before installation.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 450°C (842°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General system information —

2.1 Introduction

This booklet gives full details of the recommended procedures for the installation and maintenance of the Spirax Sarco Gilflo ILVA flowmeter. Abbreviated details of how to install the M610 or M640 transmitter assembly, EL2600 pressure transmitter and EL2271 temperature transmitter are also given. (Full details are supplied with the equipment)

Initial start-up procedures as well as fault finding guidelines are also included.

2.2 The Spirax Sarco Gilflo ILVA flowmetering system consists of 3 major parts:

2.2.1 The Gilflo ILVA pipeline unit

This is installed in the line where the flow is to be measured. Using impulse pipework, this is connected to:

2.2.2 The M610 or M640 transmitter assemblies

The M610 measures the differential pressure across the Gilflo ILVA pipeline unit and converts it to a 4 - 20 mA output signal for onward transmission to other equipment.

The M640 measures the differential pressure and static pressure across the Gilflo ILVA pipeline unit and converts this to a 4-20 mA output signal proportional to mass flow.

2.2.3 Readout equipment

This can be either an M800 flow computer (steam), M250G flow computer (gases) or an M700 display unit for non density compensated applications on steam, liquids or gases. Note that all these items of equipment are used to linearise the output signal from the Gilflo ILVA pipeline unit.

Caution: M640 steam mass flow transmitters are uniquely configured at the factory to work with a single, specific ILVA flowmeter. For correct operation the configured M640 transmitter must always be installed with its allocated flowmeter. Labels on the packaging give the serial numbers of the matched products.

Caution: M700 display units can be uniquely configured at the factory to work with a single, specific ILVA flowmeter. For correct operation a configured M700 display must always be installed with its allocated flowmeter. Labels on the packaging give the serial numbers of the matched products.

2.4 Additional equipment

2.4.1 F50C isolation valves which are installed close to the Gilflo ILVA unit to provide primary isolation.

2.4.2 EL2600 pressure transmitter which is connected to the impulse lines using a 'T' piece in the high pressure (upstream) impulse line. This gives a 4 - 20 mA output signal proportional to line pressure and is used where density compensation based on pressure is required.

2.4.3 EL2271 temperature transmitter which is installed directly in the pipework upstream of the Gilflo ILVA pipeline unit. This gives a 4 - 20 mA signal proportional to line temperature and is used where density compensation based on temperature is required.

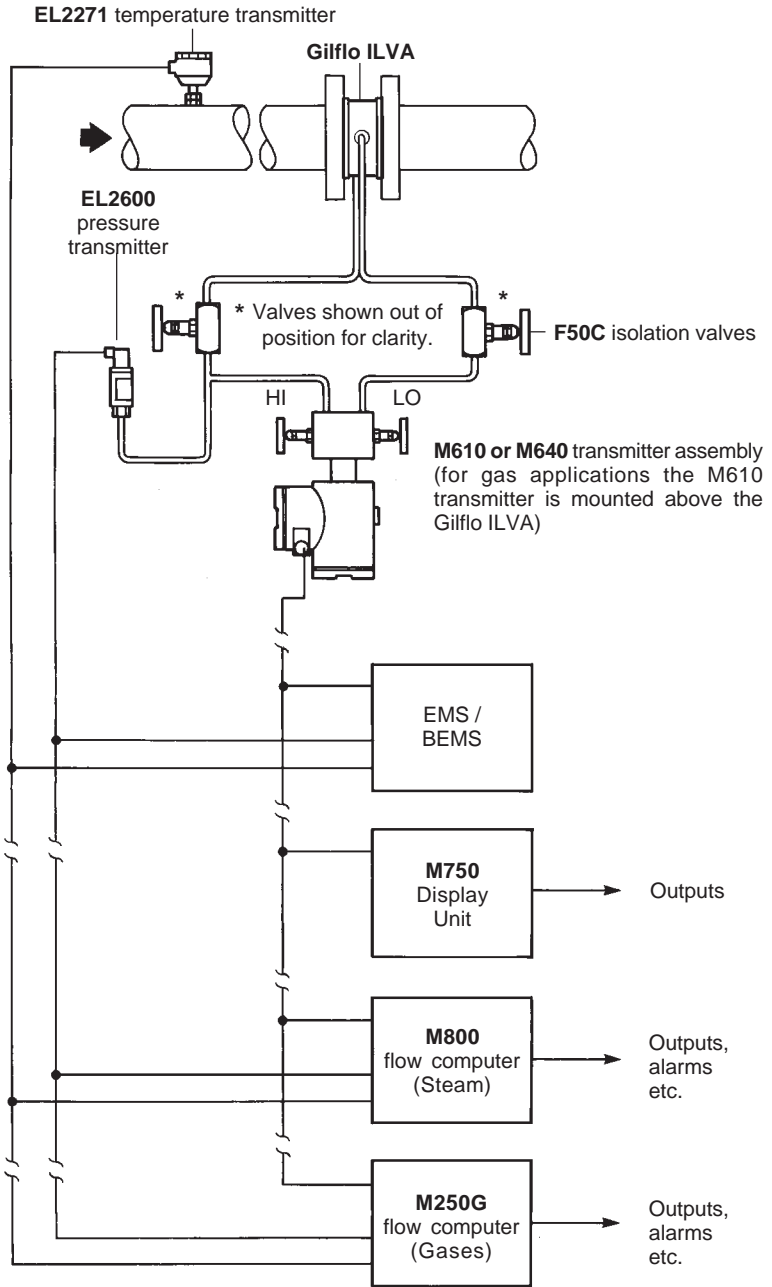


Fig. 1 (Schematic only) See Figure 10 for details.

— 3. General product information —

3.1 Description

The Gilflo ILVA flowmeter operates on the spring loaded variable area principle and produces a differential pressure proportional to the instantaneous rate of flow. It can be used with most industrial fluids, gases and both saturated and superheated steam.

3.2 Sizes and pipe connections

DN50, DN80, DN100, DN150 and DN200.

Suitable for fitting between the following flanges:

EN 1092 PN16, PN25, and PN40.

BS 10 Table H.

ANSI B 16.5 class 150, 300 and 600.

Japanese Industrial Standard JIS 20.

Korean Standard KS 20.

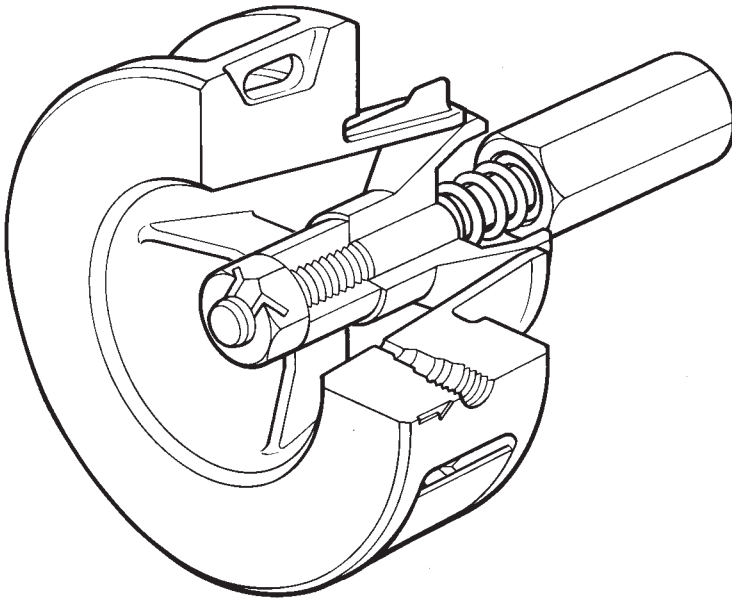
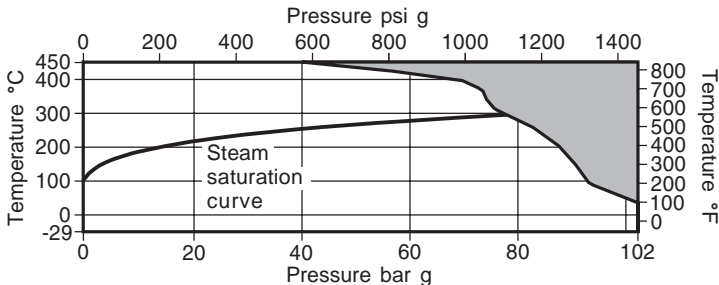


Fig. 2 Gilflo ILVA

3.3 Materials

Body	Austenitic stainless steel S316
Internals	431 S29/S303/S304/S316
Spring	Inconel X750 or equivalent

3.4 Pressure/temperature limits



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

Body design conditions		ANSI 600
PMA	Maximum allowable pressure	102 bar g @ 20°C (1480 psi g @ 68°F)
TMA	Maximum allowable temperature	450°C @ 40 bar g (842°F @ 580 psi g)
Minimum allowable temperature		-50°C (-58°F)
PMO	Maximum operating pressure is dependant on the flange specification	
Minimum operating pressure		0.6 bar g (8.7 psi g)
TMO	Maximum operating temperature	450°C @ 40 bar g (842°F @ 580 psi g)
Minimum operating temperature		-29°C (-20°F)
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 (2248 psi g)

3.5 Pressure drop

The pressure drop across the Gilflo ILVA pipeline unit is nominally 500 m bar (200 ins water gauge) at maximum rated flow.

3.6 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	61.5	103	205	162	37.5	8.3
DN150	75	134	300	218	37.5	14.2
DN200	85	161	360	273	42.5	23.6

Note:- Pressure tapplings are threaded ¼" NPT.

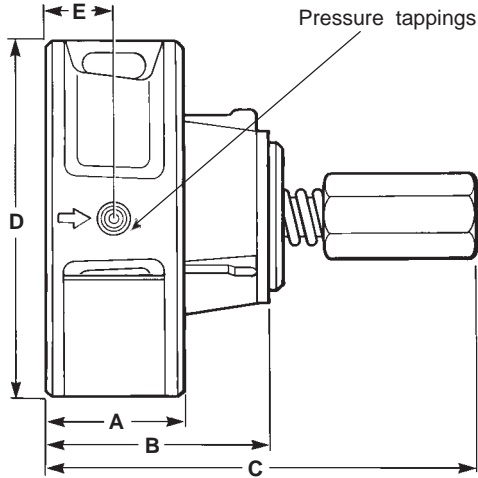


Fig. 3

4. Mechanical installation of Gilflo ILVA pipeline unit

Caution: In order for the Gilflo ILVA flowmeter to meet its specified accuracy and performance, it is essential that the following guidelines for installation are followed carefully. For steam flow measurement, good basic steam engineering practices should be followed as detailed in Section 6.1.

4.1 Orientation

The Gilflo ILVA should be installed in a horizontal line. As it has been calibrated in a horizontal attitude, mounting it in a vertical line (flow downwards) may introduce a small flow measurement error. If installation with flow vertically downwards is unavoidable, please consult Spirax Sarco for advice. The flowmeter should not be installed with flow vertically upwards.

The pressure tappings are located at 180° and should be horizontal.

The Gilflo ILVA is clearly marked with a direction of flow arrow.

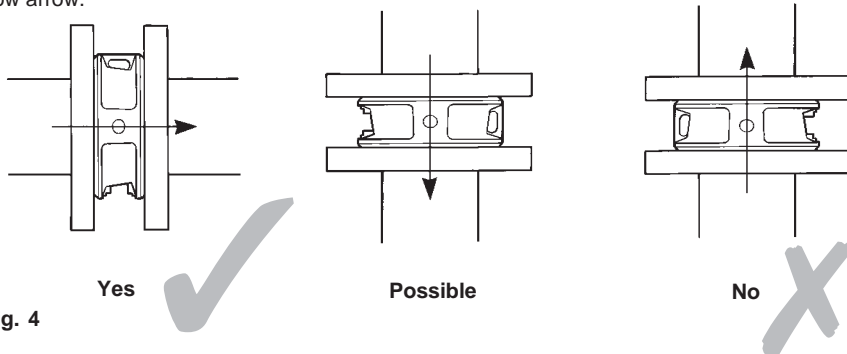
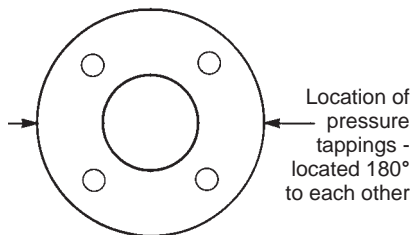


Fig. 4

4.2 Upstream / downstream pipework

The Gilflo ILVA flowmeter should be installed in pipework manufactured to BS 1600 or ANSI/ASME B 36.10 Schedule 40, which corresponds to the following pipeline internal diameters.

Nominal diameter	Nominal internal diameter
50 mm	52 mm
80 mm	77 mm
100 mm	102 mm
150 mm	154 mm
200 mm	202 mm

For different pipe standards/schedules, if the flowmeter is being operated at the extreme of its published maximum range, downstream spool pieces manufactured from BS 1600 or ANSI/ASME B 36.10 Schedule 40 should be used.

If this is not possible, please contact Spirax Sarco Ltd.

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 recommended that slip-on flanges be used to avoid any intrusive weld beads on the internal diameter of the pipe.

The Gilflo ILVA normally only requires a minimum of 6 pipe diameters upstream and 3 downstream of clear straight pipe. These dimensions assume a measurement from a single 90° bend. See Figure 5.

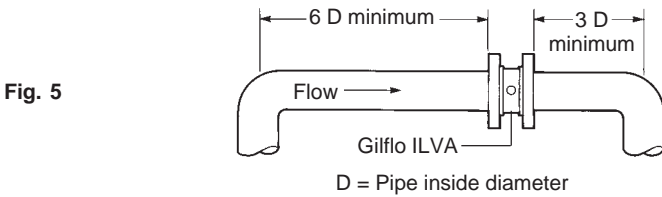


Fig. 5

If any of the following configurations are present upstream of the Gilflo ILVA, then it is recommended that the minimum upstream clear pipework is doubled to 12 diameters.

- Two right angled bends in two planes.
- Pressure reducing valve.
- Partly open valve.

Avoid installing the Gilflo ILVA flowmeter downstream of an actuated valve as rapid cycling of the valve could give rise to inaccurate results or damage the flowmeter. See Figure 6.

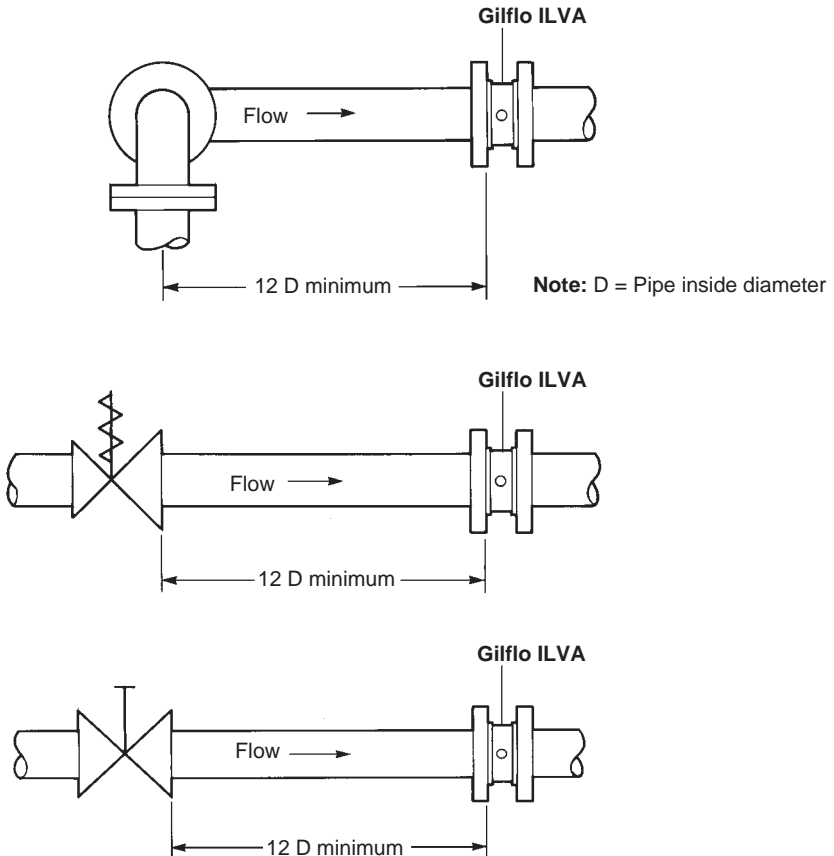


Fig. 6

We at Spirax Sarco recommend that a spool piece be used to aid installation and removal (see Figure 7).

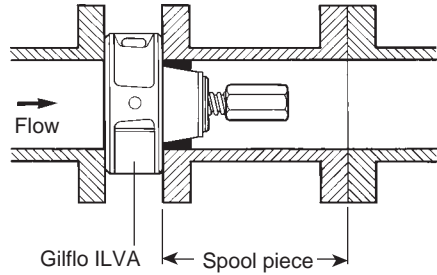


Fig. 7

4.3 Location in pipework

Bolt ring gaskets having the same internal diameter of the pipework are recommended. This will prevent possible inaccuracies being created by the gasket protruding into the pipe.

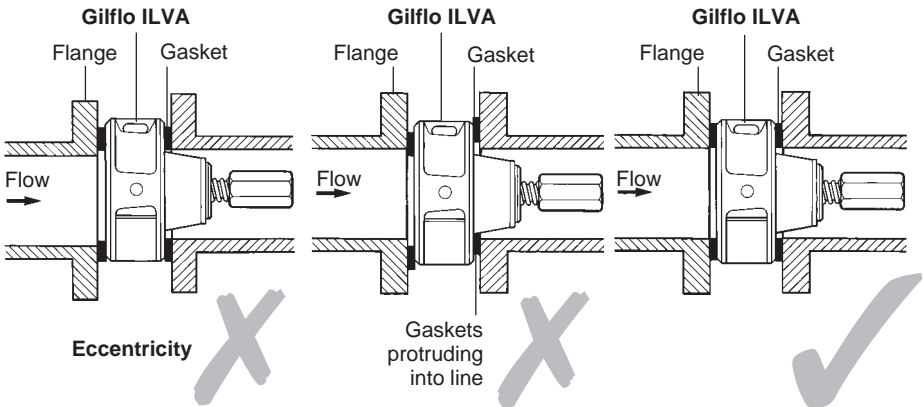


Fig. 8

It is important that the Gilflo ILVA is located centrally in the pipework as any eccentricity may cause inaccurate readings. The ILVA has been designed with integral centering webs which locate on the internal diameter of the pipework. In applications where large pipe schedule has been used, it is possible to remove some of the material from these webs to fit the pipework. This should be done with utmost care to prevent any contamination or damage to the flowmeter.

Note: material should be removed from all three webs equally to ensure that the flowmeter remains concentric to the pipe.

Centering webs to be reduced for schedule 80 pipework.

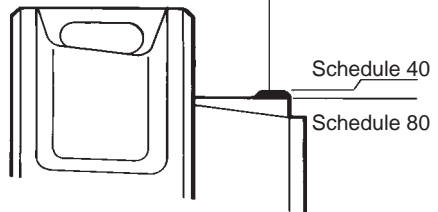


Fig. 9

4.4 Pressure tappings

The Gilflo ILVA has integral pressure tappings for connection to the M610/M640 transmitter assembly using impulse lines. These are threaded 1/4" NPT and are clearly marked HI (upstream) and LO (downstream). Care should be taken to ensure that these are correctly connected.

5. Impulse lines

- 5.1 These should be of a suitable pressure rating and be as short as possible. However, for high temperature applications they should be long enough to prevent damage to the M610 or M640 through excessive temperature (85°C (185°F) maximum).
- 5.2 Recommended minimum inside diameter is 9.5 mm (0.375").
- 5.3 Lines should run vertically downwards for steam and liquids applications and upwards for gases wherever possible but in no case should a gradient less than 1 in 12 be permitted.
- 5.4 Lines should run over the same route (preferably clipped together) to avoid temperature differentials.
- 5.5 Consideration should be given to allowing the impulse lines to be blown through or 'rodded' to remove excessive build-up of dirt or sludge.
- 5.6 If impulse lines are filled with water and may be subject to freezing, trace heating or use of antifreeze is recommended.
- 5.7 The orientation of the impulse lines and M610/M640 assembly depends on the service application. See Figures 10 to 14.

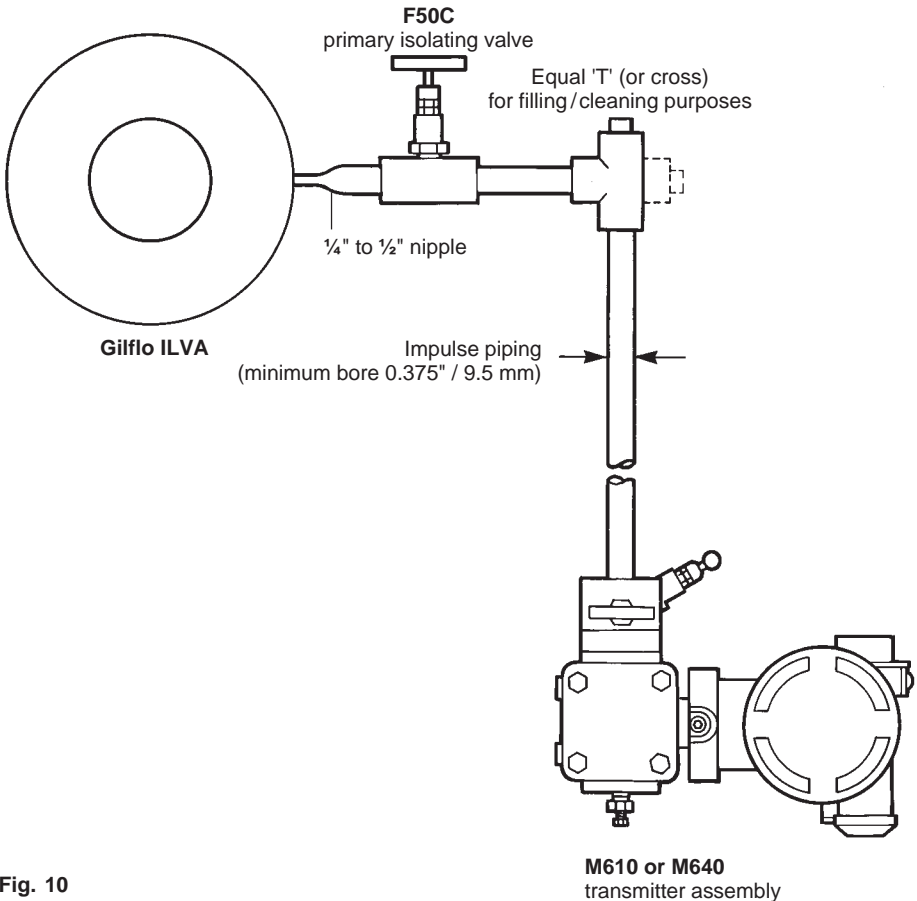


Fig. 10

Fig. 11 Liquids, vapours, steam

For liquids, vapours and steam where the Gifflo ILVA is installed in a horizontal line, the M610/M640 should be be mounted below the Gifflo as shown below.

Note: The M640 is for saturated steam applications only.

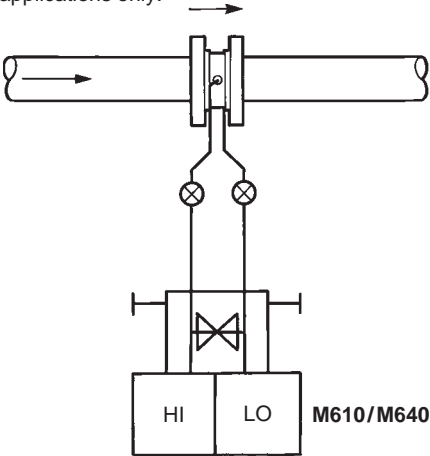


Fig. 12 Liquids, vapours, steam

If for space limitations, the configuration described in Figure 11 is not possible then the arrangement shown below should be used (with vented gas collecting chambers at A for liquids).

Note: The M640 is for saturated steam applications only.

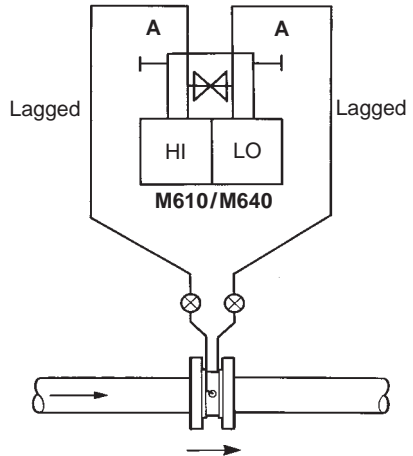


Fig. 13 Gases

For gases where the ILVA is installed in a horizontal line, the M610 should be mounted above the ILVA as shown below.

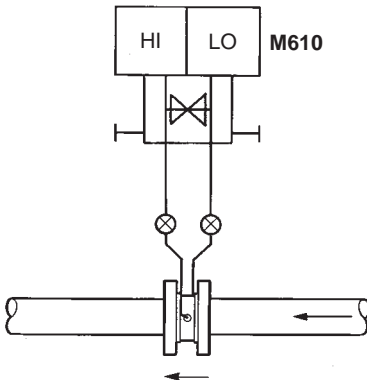
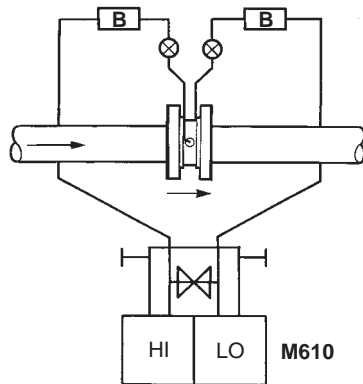


Fig. 14 Gases

If, for space limitations the configuration described in Figure 13 is not possible, then the arrangement shown below should be used. The condensate pots shown at B are only required if the gas is wet.



6. Initial start-up

After all mechanical and electrical work has been completed, the initial start-up procedures should be followed.

6.1 Steam systems, vapour systems and all applications where the impulse lines must be filled with water

- 6.1.1 Close both F50C isolation valves adjacent to the ILVA pipeline unit.
- 6.1.2 Open all the valves on the 3-way manifold on the M610/M640 assembly.
- 6.1.3 Fill both impulse lines with water (with antifreeze if required) to the same level.
- 6.1.4 Ensure that no air bubbles are trapped in the impulse lines by using the bleed screws on the M610/M640.
- 6.1.5 Where an EL2600 pressure transmitter is fitted to the system, remove the pressure transmitter and fill the vertical cooling leg with water. Refit the pressure transmitter and ensure that its isolation valve is open.
- 6.1.6 Reassemble all impulse pipework (if applicable).
- 6.1.7 Close the LO valve on the 3-way manifold.
- 6.1.8 Open both F50C isolation valves. Adjust zero on M610/M640 to read 4.00 mA (see Sections 7.2 and 7.3).
- 6.1.9 Close the central equalisation valve on the 3-way manifold.
- 6.1.10 Open LO valve on the 3-way manifold.

The system is now operational.

Note: To commission the flow computer, the 'ILVA commissioning option' should be chosen on the M800 series flow computer, and coefficients 'VWXYZ' should be used.

For flow computers without the 'ILVA commissioning option', (M200 version flow computers with software version V905 - 12.00 and below), the 'ABCDE' coefficients should be used in the 'Gilflo commissioning option'. Please refer to separate literature and the ILVA calibration pack supplied with the flowmeter.

6.2 Liquids, gases and all applications where the impulse lines are filled with the fluid/gas being metered

Note: for all applications where the working fluid is above 85°C (185°F), care should be taken to avoid subjecting the M610 to excessive temperatures as this could result in permanent damage. The impulse line configuration shown in Figure 14 is suitable.

- 6.2.1 Close both F50C isolation valves adjacent to the ILVA pipeline unit.
- 6.2.2 Close the LO valve on the 3-way manifold.
- 6.2.3 Open the central equalisation valve and HI valve on the 3-way manifold.
- 6.2.4 Open both the F50C isolation valves adjacent to the ILVA pipeline unit.
- 6.2.5 Slowly bleed the air/gases from the system using the bleed screws on the M610. Adjust zero on M610 to read 4.00 mA (see Section 7.2).
- 6.2.6 Close the central equalisation valve on the 3-way manifold.
- 6.2.7 Open the LO valve on the 3-way manifold.
- 6.2.8 Where an EL2600 pressure transmitter is being used for density compensation, ensure that its isolation valve is open.

The system is now operational.

Note: To commission the flow computer, the 'ILVA commissioning option' should be chosen on the M800 series flow computer, and coefficients 'VWXYZ' should be used.

For flow computers without the 'ILVA commissioning option', (M200 version flow computers with software version V905 - 12.00 and below), the 'ABCDE' coefficients should be used in the 'Gilflo commissioning option'. Please refer to separate literature and the ILVA calibration pack supplied with the flowmeter.

7. Maintenance

There are several basic checks that should be carried out on a regular basis:

7.1 Impulse lines

We at Spirax Sarco recommend periodic cleaning of the impulse lines to prevent excessive build-up of sludge or deposits.

7.2 M610 DP transmitter

Zero and span checks on the DP transmitter should be carried out on a regular basis (ideally every 6 months). The 3-way manifold that forms part of the M610 assembly makes this easy. The procedure for checking the DP transmitter without removing it from site or shutting down the flow is as follows:

- 7.2.1 Ensure that the DP transmitter is powered up.
- 7.2.2 Close the F50C primary isolation valves adjacent to the ILVA flowmeter.
- 7.2.3 Open all the valves on the 3-way manifold. This will allow the pressure in the two impulse lines to equalise.
- 7.2.4 Using a suitable milliammeter, check that the output of the DP transmitter is 4.00 mA across terminals CK+ and CK- as shown in Figure 15. (If a flow display is being used, it should read zero.) Set the mode switch (SW1) to the 'zero' position and adjust the zero output using the output adjustment until a value of exactly 4.00 mA is achieved.

Fig. 15

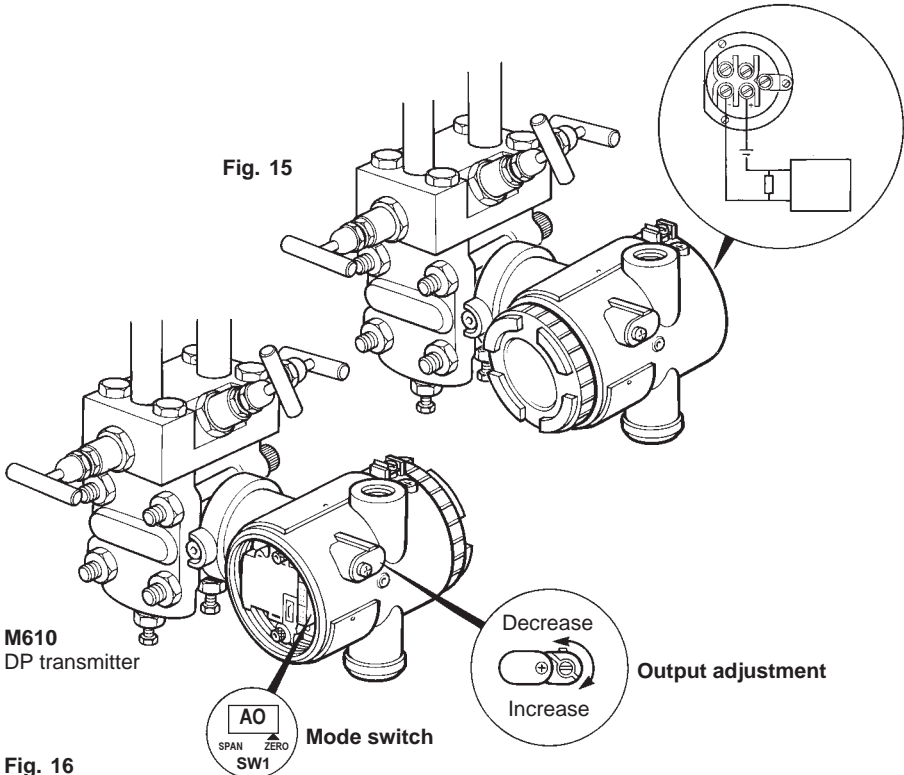


Fig. 16

- 7.2.5 Open central equalisation valve on 3-way manifold.
- 7.2.6 Remove both bleed plug assemblies on the DP transmitter.
- 7.2.7 Close central equalisation valve on 3-way manifold.
- 7.2.8 Using a suitable precision pressure source attached to the HI pressure port of the DP transmitter as shown in Figure 17, apply a pressure corresponding to the set pressure of the unit. (For ILVA flowmeters, this is normally factory set to 498 mbar/200 inches water gauge).
- 7.2.9 Set the mode switch (SW1) to the 'span' position and adjust the span output using the output adjustment until a value of exactly 20.00 mA is achieved.
- 7.2.10 Remove pressure source, open the central equalisation valve and then refit and tighten the bleed plug assemblies.
- 7.2.11 Close the LO valve on the 3-way manifold.
- 7.2.12 Open both the F50C isolation valves adjacent to the ILVA pipeline unit.
- 7.2.13 Close the central equalisation valve on the 3-way manifold.
- 7.2.14 Open the LO valve on the 3-way manifold.
- 7.2.15 Where an EL2600 pressure transmitter is being used for density compensation, ensure that its isolation valve is open.
- 7.2.16 Remove test leads and replace all covers on the M610 transmitter.

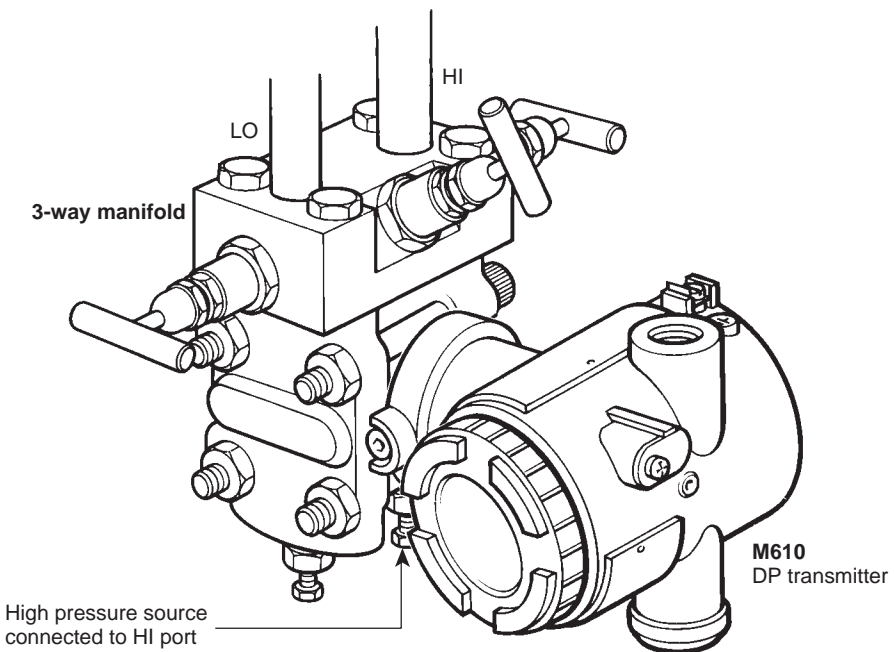


Fig. 17

7.3 M640 mass flow transmitter

Zero and span checks on the transmitter should be carried out on a regular basis (ideally every 6 months). The 3-way manifold that forms part of the M640 assembly makes this easy. The procedure for checking the transmitter without removing it from site or shutting down the flow as is follows:

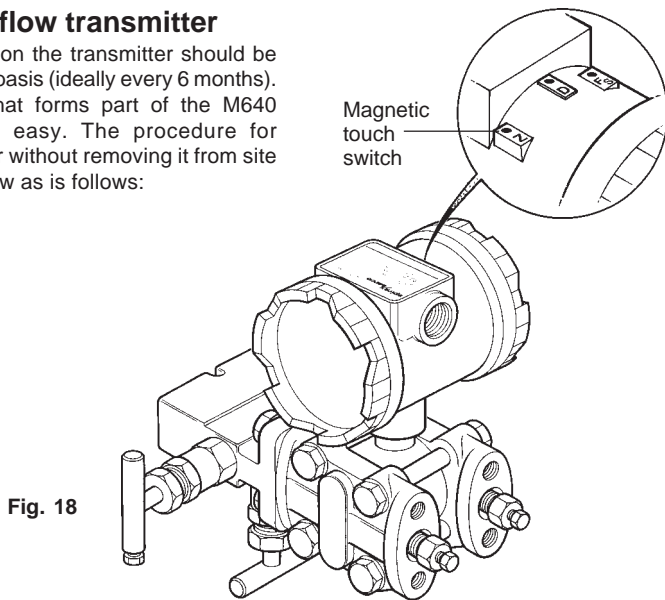


Fig. 18

7.3.1 Adjusting zero (4 mA)

1. Close both F50C isolation valves adjacent to the pipeline unit.
2. Open all three valves on the 3-way valve manifold.
3. Depressurise the transmitter using the bleed valves.
4. Remove the plugs at the top of the impulse lines.
5. Fill the impulse lines with clean water.
6. Close the equalising valve on the 3-way valve manifold.
7. Check that no air is trapped in the impulse pipework and that the impulse lines are full of water.
8. Hold the magnetic end of the screwdriver on the 'Z' switch for at least 8 seconds. (This activates the zero setting mode).
9. Set the zero value by momentarily pressing the magnetic end of the screwdriver on the 'Z' switch for a second time. (Any differential pressure that is applied to the transmitter has now been stored as the 4 mA point).
10. Replace the plugs at the top of the impulse lines.
11. Open both F50C isolation valves.
12. The zero adjustment is now complete.

Notes:

1. The zero setting mode times-out after one minute of inactivity. If the zero is not set within this time the procedure will need to be repeated from Step 8.
2. Zero setting mode can be cancelled by momentarily holding the magnetic screwdriver on the 'D' switch or by waiting one minute for the automatic time-out to occur.
3. When a new zero value is set, the transmitters will shift the full-scale value to maintain the original span. If the process is out of range of the transmitter, then no new zero value is stored.
4. If the new zero value would shift the full-scale past the sensor limit, the new full-scale value is automatically set to the appropriate sensor limit (except when this would produce a span that is too small, in which case neither zero nor full-scale value are stored).

7.3.2 Set local full-scale

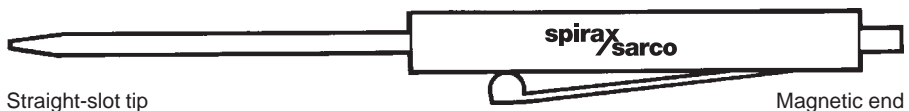
1. Close both F50C isolation valves adjacent to the pipeline unit.
2. Close the high pressure isolating valve on the 3-way valve manifold.
3. Equalise the differential pressure by opening the equalising valve on the 3-way valve manifold.
4. Isolate the transmitter by closing the low pressure valve on the 3-way valve manifold.
5. Depressurise the transmitter using bleed valves.
6. Remove both the bleed valves.
7. Connect a pressure pump to the high pressure bleed tapping.
8. Close the equalising valve.
9. Adjust the pump pressure to full-scale value differential.
10. Hold the magnetic end of the screwdriver on the 'FS' switch for 7 or 8 seconds. (This activates the full-scale setting mode).
11. Set the full-scale value by momentarily pressing the magnetic end of the screwdriver on the 'FS' switch for a second time. (Any differential pressure that is applied to the transmitter has now been stored as the 20 mA point).
12. Disconnect the pressure pump and replace the bleed screws.
13. Open the equalising valve on the 3-way valve manifold.
14. Open the high pressure isolating valve on the 3-way valve manifold.
15. Open the high pressure F50C.
16. Close the equalising valve on the 3-way valve manifold.
17. Open the low pressure isolating valve on the 3-way valve manifold.
18. Open the low pressure F50C.
19. The full-scale setting is now complete.

Notes:

1. The damping setting mode times-out after 1 minute of inactivity. If the damping is not set within this time, the procedure will need to be repeated from Step 1.
2. Change to a new damping valve by momentarily touching the 'FS' switch 'N' times to step to the value nearest the desired damping value (DV, in seconds) as shown above. If the desired damping value is exceeded, lower the damping value by momentarily touching the magnetic screwdriver to the 'Z' switch for each step.

WARNING:

If the M640 is connected to a control system, valves should be disconnected to prevent possible hazards during the adjustment.



IMPORTANT

**Use only the Spirax Sarco magnetic screwdriver to actuate the magnetic switches.
Other magnets can cause inconsistent behaviour of one or more switches.**

Fig. 19

7.4 Gilflo ILVA pipeline unit

It is also possible to carry out some simple checks on the ILVA flowmeter on site to confirm its correct operation. To do this, it is necessary to remove the unit from the line.

Checks possible:

1. Cone free to move on shaft.
2. Reference dimensional check.
3. DP tappings clear.

7.4.1 Cone free on shaft

With the ILVA positioned vertically as shown in Figure 20, check that the cone is free to move up and down the shaft against the resistance of the spring.

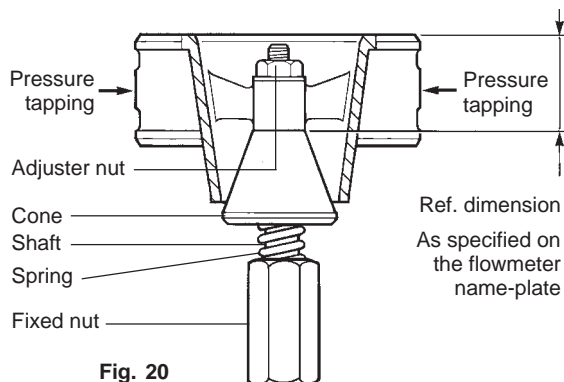


Fig. 20

7.4.2 Reference dimensional check.

Having confirmed that the cone is free to move on the shaft, it is possible to check the initial production setting of the flowmeter. The 'Ref. dimension' referred to in the diagram (Figure 20) above (and specified on the name-plate) is the machined dimension to the back of the body centre boss - which acts as the cone forward travel stop. All ILVA flowmeters are factory set to have little to no free travel or pre-load on this stop when the flowmeter is in the vertical orientation shown (that is, with the cone compressing the spring under gravity).

To check the setting:

Position the flowmeter vertically as indicated in Figure 20. Try lifting the cone against gravity and there should be little to no free perceptible movement of the cone.

If there is perceptible movement:

- Within 1% of the 'Ref. dimension' - no adjustment is necessary.
- Within 3% of the 'Ref. dimension' - readjust to remove the free travel.
- Greater than 3% of the 'Ref. dimension' - please consult Spirax Sarco.

To adjust the cone setting:

1. Loosen the adjuster nut on the front of the Gilflo ILVA.
2. Rotate the shaft clockwise $\frac{1}{8}$ of a turn at a time using the fixed nut at the rear of the flowmeter.
3. Retighten the adjuster nut to the correct torque (see Table 1 below).
4. Recheck free travel/pre-load.
5. If necessary, repeat steps (1) to (4) until the correct setting is obtained.

Important: Ensure that the adjuster nut is correctly torqued after completion of the adjustment.

7.4.3 DP tappings clear

Check that the DP tappings are not blocked. The ILVA is now ready to be reinstalled in the line.

Table 1 Adjuster nut minimum tightening torques

Size	Torque	
	N m	lbf ft
DN50	7.0	5.2
DN80	30.0	22.1
DN100	114.0	84.0
DN150	373.0	275.0
DN200	373.0	275.0

8. *Fault finding*

Symptom	Possible cause	Action
1. With flow in line, system reads zero.	Primary isolation valves adjacent to ILVA closed	Commission system (see Section 6)
	Isolation valves on 3-way manifold closed	Commission system (see Section 6)
	Equalisation valve on 3-way manifold open	Commission system (see Section 6)
	M610/M640 incorrectly wired	Check wiring (see flow computer IMI)
	Impulse line(s) blocked	Clear lines and commission system (see Section 6)
	Impulse lines reversed (HI to LO, LO to HI)	Rectify and commission system (see Section 6)
	ILVA unit fitted the wrong way round	Reinstall and commission system (see Section 6)
2. With no flow in line, system does not read zero.	M610/M640 out of calibration.	See Section 7
	Zero drift on M610/M640.	See Section 7
	Dirt / air in impulse lines	Clear lines and commission system (see Section 6)
	Impulse lines blocked	Clear lines and commission system (see Section 6)
3. System appears to read incorrectly.	Any one or combination of the above causes.	See relevant actions above
	Damaged / jammed ILVA pipeline unit	Remove and check (see Section 7)

