



THE LF-240 SERIES

Operating and Service Manual

Series includes all variants of LF-240

Issue A
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1. Description

The LF240 is a single-stage low-flow & low-pressure forward reducing pressure regulator. It features large PTFE lined sensitive elastomeric diaphragm for accurate pressure control which is secured in place by a bolted flanged bonnet. In addition, regulator upper section incorporates metric thread allowing it to be panel mounted. LF240 is a perfect solution for customers looking for a regulator with good pressure control.

2. Installation

Before system start-up, it is recommended that all lines should be free from any form of contaminations, as those can affect regulator performance and functionality. All systems be pressure tested, leak tested and purged with an inert gas such as nitrogen.

Prior to placing into service ensure that the regulator is in the fully closed position, with the adjusting mechanism turned completely anticlockwise.

Check the model number reference to ensure that the pressure range complies with the installation requirements.

Visually inspect the regulator for any signs of damage or contamination. If any foreign materials are present and cannot be removed from the regulator, or if the threads on the regulator appear to be damaged, please *contact the office immediately to arrange for the regulator to be returned for service.

***Note:** *Please refer to 'section 8' for company contact details*

The Inlet and Outlet ports are clearly marked. Select the correct size and type of connection fittings for these ports which are indicated in the regulators part number. Both British Standard Pipe (BSPP) 'B' and National Pipe Thread (NPT) 'N' options are available on this regulator. Use the correct dowty or bonded seal for BSPP connections, self-centring seals are recommended. For NPT threads, ensure that PTFE tape is applied correctly to the fittings, applying two overlapping layers in the direction of the thread, taking care that the tape does not come into contact with the first thread. Any gauge ports on the regulator will be 1/4" NPT unless otherwise stated. If any gauge port is not required, ensure that the port is plugged prior to installation.

The media supplied to the regulator must be clean. Contamination can damage the seat which may cause the regulator to fail. Filtration suited to the application is recommended upstream of the regulator. Should further assistance or information be required in relation to installation of any Pressure Tech regulator please contact the office, giving reference to the regulators part number and/or serial number.

3. Operation

Turning the adjusting mechanism clockwise compresses the spring, which in turn opens the main valve and allows the inlet pressure to pass through the seat orifice until the outlet pressure is equivalent to the loading forces set by the compressed spring. Increase the outlet pressure in this way until the desired pressure is achieved.

To reduce the outlet pressure, the adjusting mechanism should be turned anti-clockwise whilst the media is flowing, or whilst venting downstream of the regulator.

The desired outlet pressure should be set whilst increasing the pressure. Do not exceed the maximum inlet and outlet pressures of the regulator which are indicated on the regulator label.

4. Special Conditions for Safe Use

The LF-240 series are non-venting type regulators and are NOT to be used as an isolation valve; therefore, outlet pressure shall be reduced by venting downstream of the regulator whilst simultaneously turning the adjusting mechanism anticlockwise.

Sudden dynamic high-pressure inlet pressures should be avoided, and preferably be gradually increased to protect against damage to the regulator.

The LF-240 series of regulators are classed as Pressure Accessories and not Safety Accessories under the European Directive 2014-68-EC, and as such, should be installed with a downstream pressure relief valve to protect the user's system from over pressurisation.

5. Hazardous Location Usage

This equipment has not been manufactured specifically for use in potentially explosive atmospheres and as such an ignition hazard assessment has not been carried out on this product. If the user should wish to use this product in such an environment where there may be a potentially explosive atmosphere, then it is the responsibility of the user to conduct an ignition hazard assessment against 99/92/EC.

6. Servicing and Maintenance

Servicing and maintenance work on the LF-240 regulators should only be performed after fully reading and understanding the Operating and Servicing Manual. Due to the typical nature of the gases the regulator can be used with, the operator should not endanger himself/herself or others by working on this regulator without prior knowledge on the Health and Safety concerns relating to handling of technical gases. Any uncertainty should be clarified with Pressure Tech before working on the regulator.

Pressure Tech Ltd recommends the use of the following Lubricants/Adhesives (or equivalent) during servicing:

- **Krytox GPL 205 lubricant:** For the O-rings.
- **Molykote 1000 paste:** For the adjusting screw.
- **Loctite 638:** For section 6.1.1 (step: iii. e)
- **Loctite 243 Thread Locker:** For section 6.1.2 (Step: xv)

Prior to commencing service, please ensure that:

- The equipment has been de-pressurised
- The load spring has been de-compressed by turning the adjusting mechanism fully anti-clockwise
- Applications involving toxic, flammable or corrosive media have been fully purged and decontaminated sufficiently for safe service.

To ensure the best possible results from servicing, when re-assembling the regulator and any assemblies within it, ensure that all areas of the components and the regulator body are cleaned and free from contaminants which may result in failure of the regulator.

6.1. Servicing the LF-240

**Note: Fig 1 should be used as a reference for the following set of instructions*

6.1.1. Accessing the Main Valve Assembly

To access the Main Valve Assembly (MVA):

- i. Secure the Regulator Body (25) in a vice and use a 3mm Allen key to remove* the 6x M4 cap screws (5) from the regulator body.
**NOTE: It is recommended to loosen one screw, followed by the screw directly opposite and then proceed in either clockwise or anticlockwise direction until all screws have been loosened before completely removing the screws.*
- ii. Remove the Spring Housing Assembly (4,7,13,19-22), Load Spring (17), Upper Spring Rest (18) and Ball Bearing (1) from the assembly.
- iii. The diaphragm assembly (10,11,12,24) can then be removed from the Regulator Body. Visually inspect for signs of damage or tearing. Replace diaphragms (11,12) as required, as per the following:
 - a. To disassemble the Diaphragm Assembly, secure gently the flats of the Diaphragm Support Plate (10), in a vice (paying attention to not deform it) and remove the Bolt Connector (24) using an 8mm open ended spanner (or adjustable).
**NOTE: It is recommended to leave the Diaphragm Support Plate within the vice during this assembly.*
 - b. Remove and visually inspect the Both diaphragms for any damage and replace as required.
 - c. With the Diaphragm Support Plate (10) still in the vice (with the flat side facing upwards), Place the elastomeric Diaphragm (11), onto the Spring rest.
 - d. Place the PTFE Diaphragm Lining (12), onto the elastomeric Diaphragm (11) and ensure that the holes of the PCD are all correctly aligned.
 - e. Apply a droplet of Loctite 638 to the thread of the Bolt Connector (24).
 - f. Guide the thread of the Bolt Connector (24), through the central holes of both diaphragms (11,12) and screw into the thread of the Diaphragm Support Plate (9).
 - g. Use an 8mm open ended Spanner (or adjustable) and tighten the Bolt Connector (24) to the Diaphragm Support Plate (9).
**IMPORTANT: When tightening the Bolt Connector (24), ensure that that the PCD holes of the diaphragms are aligned correctly.*
- iv. The Seat Retainer (16) can then be removed, from the Regulator Body (25) using a 12mm socket.
- v. Remove the Main Valve/Soft Seat (14, 23) and Main Valve Spring (15) from the Regulator body (25).
- vi. Visually inspect the Seat Retainer (16) and Soft Seat (23) for damage under a microscope.
- vii. Place the Main Valve Spring (15), over the lower stem Main Valve (14) and place both parts into the regulator body (25).

- viii. Guide the Soft Seat* (23) over the upper stem of the Main Valve (14) and into the regulator body (25).
*NOTE: Taking care not to damage its sealing face against the tip of the valve.
- ix. Place the 6x1 O-ring (8) onto the O-ring groove of the Soft Seat (23).
- x. Place the 9x1 O-ring (9) onto the O-ring groove of the Regulator Body (25).
- xi. Guide the Seat Retainer (16), over the upper stem of the Main Valve (14) and screw/tighten* into the regulator body (25), using a 12mm socket and torque to 17Nm.
***IMPORTANT:** *care must be taken, not to damage the sealing face of the Seat Retainer (16), as the Main Valve (14) passes through.*
- xii. Place the diaphragm assembly (10,11,12,24), *onto the Regulator Body (23) and rotate until the PCD holes are correctly aligned.
***NOTE:** *Ensure PTFE diaphragm faces body and body rim is free from any scratches and contaminations allowing positive seal.*
- xiii. Place the Load Spring (17) onto the Upper Spring Rest (18) and Ball Bearing (1) onto the Diaphragm Support Plate (10).
 - i. Then place the Spring Housing assembly (4,7,13,19-22) back onto the Regulator Body (25) and rotate until the PCD holes is correctly aligned with the diaphragm assembly (10,11,12,24) and Regulator body (25).
 - ii. Locate the 6x M4 cap screws/Spring Washers (5,6) through the PCD holes on Spring Housing (13) into the regulator body (25) and screw until finger tight. Proceed to tighten the screws using 3mm Allen key and the correct pattern*.
*Tighten one screw followed by the screw directly opposite. Then tighten the next screw over in either a clockwise or anti-clockwise direction, then followed by the screw directly opposite to it. Continue until all screws are tightened. It is advisable to perform this tightening procedure two times to ensure correct engagement. Use 4Nm when tightening.

It is recommended that all parts in the repair kits are used. Any defect parts removed during the service should be disposed of. Parts should be kept clean in line with media requirements. Following re-assembly of the regulator, pressure tests should be made to both the inlet and outlet side of the regulator, to ensure there is no internal or external leakage across the regulator.

To ensure that the main valve assembly has been correctly and effectively installed it may be required to perform the appropriate seat leak test as per ANSI/FCI 70-3.

6.1.2. Adjusting the Set Point

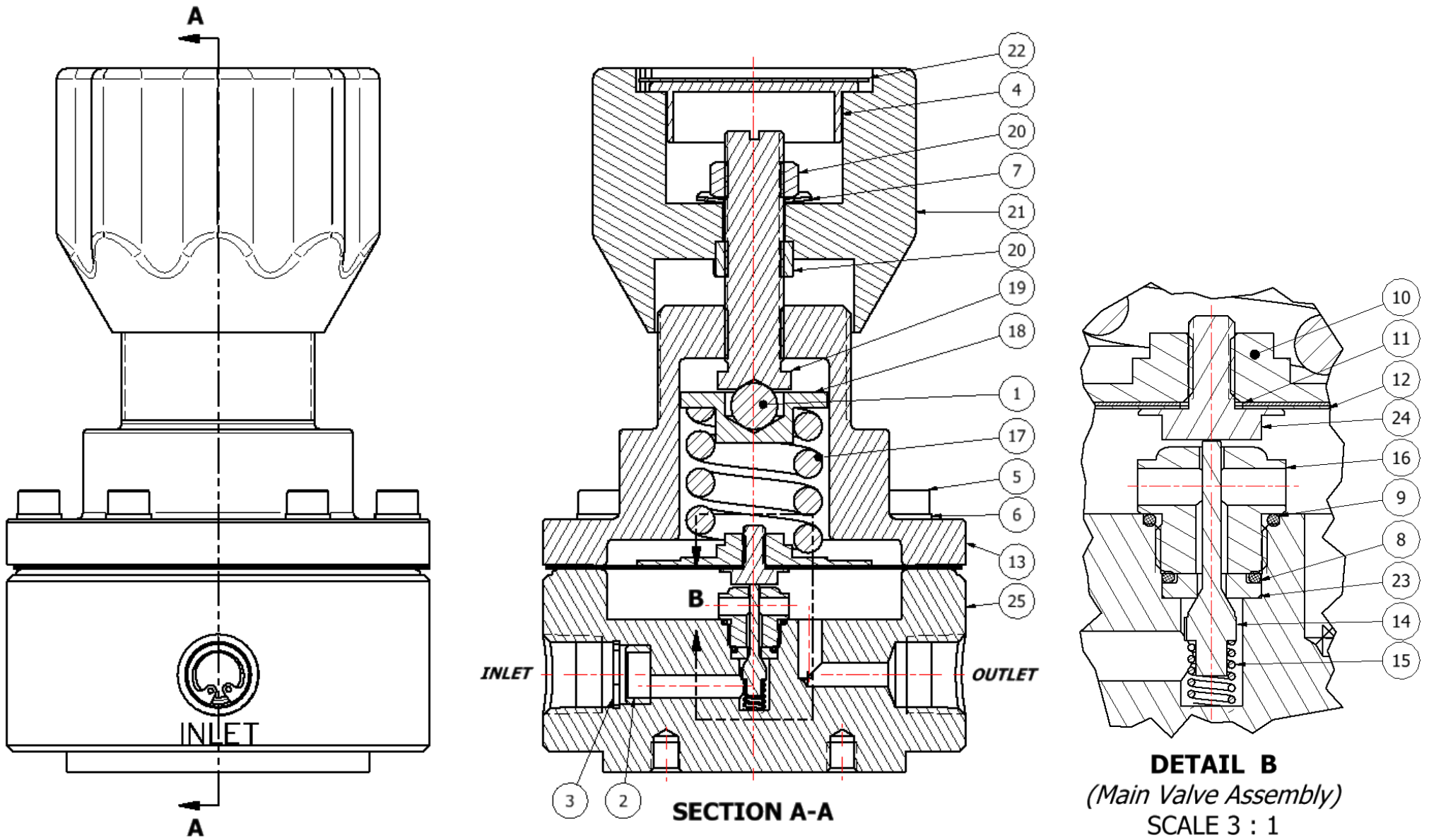
It is not recommended (or necessary) to remove the Hand Wheel during service as this will affect the set point of the regulator. Should it be required to adjust the set point, a supply pressure from a test pressure regulator will be required to gradually increase the inlet pressure until the required set point is reached. Please follow the instructions below:

- i. Remove the Nameplate (22) and Cap (4) from the Hand Wheel (21) and loosen the upper Lock Nut (20), such that the Hand Wheel can spin freely on the Adjusting Screw (19).
- ii. Connect the test regulator to the inlet of the LF240 via connecting pipework. Ensure that any gauge ports are either plugged or that the correct gauge is fitted to the inlet gauge port to measure the supply pressure. If an inlet gauge is not fitted on the regulator, a pressure gauge is required to measure the supply pressure to the regulator.
- iii. Connect a compression fitting adaptor to the outlet of the regulator and a small piece of pipework which can be positioned in a container of water to check for leaks.
- iv. Turn the adjusting screw one full turn to prove initial shut off on the LF240 regulator. Increase the inlet pressure from the test regulator until there is leakage across the seat (detected when bubbles appear from the pipework on the outlet placed in the container of water). Monitor the pressure gauge on the inlet to determine the pressure at which the regulator starts to relieve.
- v. Using a slotted screwdriver, turn the Adjusting Screw (19) clockwise until the desired set point has been reached. This will require frequent adjustments between the test regulator to simulate the required relieving pressure and the Adjusting Screw on the LF240 regulator.
- vi. With the inlet pressure set, screw the lower Lock Nut (20) to the base of the Adjusting Screw (19) against the Bonnet (13).
- vii. Position the Hand Wheel (21) onto the lower Lock Nut (20). Ensure that the Lock Nut and Hand Wheel become engaged.
- viii. Fasten the upper Lock Nut (20) against the Hand Wheel (21) and gently begin to tighten using a 13mm socket until it begins to secure itself.
- ix. At this point, whilst holding the Hand Wheel (21) securely continue to tighten whilst simultaneously turning slightly anticlockwise to prevent it from locking against the Bonnet (13).
- x. Ensure that the upper Lock Nut (20) is sufficiently tightened, taking care not to adjust the set point.
- xi. Turning of the Hand Wheel (21) should now also turn the Adjusting Screw (19) which will control the pressure.
- xii. Turn the Hand Wheel (21) clockwise until it reaches its set point and check to make sure that the desired outlet pressure is correct by increasing the pressure on the test regulator and reading the pressure on the inlet pressure gauge.
- xiii. If the set point is not correct, repeat steps v. to xiii.
- xiv. Reduce the pressure downstream by venting the pressure through ball/needle valve and then turning the Hand Wheel anti-clockwise until the regulator closes.

- xv. Apply a small amount of Loctite 243 Thread Locker, all around the top diameter of the upper lock nut (20), so that the Loctite penetrates the thread, where the nut makes contact with the adjusting screw (19).
- xvi. The Cap (4) and Nameplate (22) can now be placed into the Hand Wheel (21). Ensure that the information stated on the Nameplate is in accordance with the set pressure of the regulator

Should any assistance be required during a service please do not hesitate to contact the office.

6.1.3. Figure 1 – Sectional View of the LF-240



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	BALL-008-SS-316	BALL BEARING - 8mm
2	1	FILT-SCRM7101040S	SCREEN FILTER - 10mm
3	1	FIT-472011-SS-CIRCLIP	INTERNAL CIRCLIP - 11mm
4	1	FIT-CAP-4343092	NAMEPLATE CAP
5	6	FIT-M4-14-A4-70.0-SKT-CAP	SOCKET HEAD CAP SCREW - M4 x 14mm
6	6	FIT-M4-A4-SPR-WASHER	SPRING WASHER - M4
7	1	FIT-M10-A2-CRI-WASHER	CRINKLE WASHER - M10
8	1	OR-0060-10	O' RING STD
9	1	OR-0090-10	O' RING STD
10	1	PT-BP-010-002	DIAPHRAGM SUPPORT PLATE
11	1	PT-BP-010-003	BP010/LF240 DIAPHRAGM
12	1	PT-BP-010-004	PTFE DIAPHRAGM LINING
13	1	PT-BP-010-005-001	LF240 SPRING HOUSING
14	1	PT-C-001-023	LF310/311 SOLID MAIN VALVE - Cv 0.06 & Cv 0.1
15	1	PT-C-006-002	MAIN VALVE SPRING
16	1	PT-C-007-015	SEAT RETAINER
17	1	PT-C-011-001	MAIN LOAD SPRING 295KG
18	1	PT-C-017	UPPER SPRING REST
19	1	PT-C-019-003	ADJUSTING SCREW
20	2	PT-C-020	LOCKNUT
21	1	PT-C-021	SMALL HANDWHEEL
22	1	PT-C-022	NAMEPLATE - 39mm - PRESSURE TECH
23	1	PT-C-205-002	PCTFE SEAT
24	1	PT-LF-240-002	LF240 BOLT CONNECTOR
25	1	PT-LF-240-01-SS-02N-N	LF240 BODY - 'N' PORTING - 1/4" NPT

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7. Technical Data

Fluid Media:	All gases and liquids compatible with materials of construction
Max Inlet Pressure*:	414 bar (6,000 Psi) (with PEEK Seat) 300 bar (4350 Psi) (with PCTFE Seat)
Outlet Pressure Range:	0-10 bar
Operating Temperature:	-20°C to +80°C
Materials:	Body and Trim: 316 SS (Other Materials available) Diaphragm: PTFE Seat: PCTFE / PEEK® / PTFE / FEP
Flow Capacity (Cv):	0.06 (also available in 0.15 see 'Annex A')
Leakage:	Gas: Bubble tight

*Max Inlet Pressure determined by seat material and Cv of regulator.

8. Warranty Statement and Company Contact Details

Pressure Tech Ltd guarantee all products correspond with their specification at the time of delivery and, with exception to wear and tear, wilful damage, negligence, and abnormal working conditions, will be free from defects for a period of 12 months from date of delivery.

Pressure Tech (Head Office and Registered Office):

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Annex A. LF-240 – ‘Compression Seat’ Main Valve Design

A.1. Description

The ‘Compression Seat’ type main valve assembly was introduced as an alternative to combat the need for applications, where O-rings aren’t suitable. This option only allows for a Maximum Working Pressure of 50 Bar (725 Psi) and a Cv of 0.15

A.2. Servicing

Note: figure 2 should be used as a reference for the following set of instructions

The servicing of the LF-240 regulator should be performed in line with the service instructions as defined in Section 6 of this manual, taking account for the difference in valve assembly. The figures below detail the alternate main valve assembly for reference purposes only.

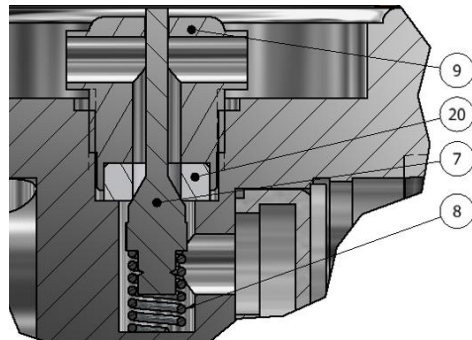
Disassembly

- i. The Seat Retainer (9) can then be removed using a 12mm socket.
- ii. Remove the Compression Seat (20) from the *Seat Retainer (9).
**NOTE: visually inspect the sealing face of the Seat Retainer (9) for any protentional contamination or damage. Replace where necessary.*
- iii. Lift/remove the Main Valve (7), along with the Main Valve Spring (8), away from the regulator body (25).
- iv. Visually inspect the Main Valve (7) sealing face (cone), for any protentional contamination or damage and replace where necessary.

Reassembly

- v. Place the Main Valve Spring (8), over the lower stem Main Valve (7) and place both parts into the regulator body (25).
- vi. Guide the Soft Seat (20) into the seat Retainer (9), with the external chamfer leading into the seat nut.
- vii. Guide both the Soft Seat* (20) and seat Retainer (9) over the upper stem of the Main Valve (7) and screw/tighten into the regulator body (25), using a 12mm socket and torque to 17Nm.
**NOTE: Taking care not to damage its sealing face against the tip of the valve.*

A.2.1. Figure 2 – Detail A: LF-240 ‘Compression Seat’ MVA (sectional)



A.2.2. Figure 3 – Exploded View of LF-240 ‘Compression Seat’ MVA

