PRESSURE TECH

THE LF-300 SERIES

Operating and Service Manual

Series includes all variants of LF-300/310 and CYL-300/310

Issue B
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1. Description

The LF-300 series has been designed with quality and reliability in mind, with genuinely unique features designed into this single stage regulator. Finite Element Analysis, combined with physical cycle tests, created an Inconel X750 diaphragm that lasts 50% longer than typical stainless steel designs. The metal diaphragm means that leak integrity is maintained, and that no sample media is absorbed by the sensing element - reducing purge times between sample analyses. A Brass machined Washer also ensures no torsional load is applied to the diaphragm during assembly. The unique soft seat design ensures particles flow over its surface, rather than perpendicular to it, which helps minimise damage from potential particles in the system.

The LF-300 allows a Maximum Working Pressure of 210 bar (3000 Psi) or 300 bar (4350 Psi) when fitted with a PEEK seat and is capable of accurately controlling outlet pressures of up to 35 bar (510 Psi).

2. Installation

Before system start-up, it is recommended that 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 anti-clockwise.

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.

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 centering 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 whist 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-300 series are non-venting type regulators, therefore the outlet pressure shall be reduced by venting downstream of the regulator whilst simultaneously turning the adjusting mechanism anti-clockwise.

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-300 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 Krytox GPL 205 during servicing.

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

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-300

*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. With the flats of the Regulator Body (1) secured in a vice, loosen the Bonnet (15) using a 47mm wrench ensuring that the Hand Wheel (17) is fully wound anti clock wise *(*Ref. 6.1.2)*
ii. Remove the Upper Spring Rest (9), 10mm Ball Bearing (13), Load Spring (14), Diaphragm Washer (3), Lower Spring Rest (10) and Diaphragm (2) from the assembly
iii. The Seat Nut (6) can then be removed using a 12mm socket
iv. Remove the Main Valve (5, 7) and Main Valve Spring (4) from the assembly
v. Visually inspect the seat nut and soft seat (7) for damage under a microscope
vi. Replace the Main Valve Spring (4) and Main Valve (5, 7) and place into the Regulator Body (1)
vii. Replace Seat Nut (6) fitted with new 5x1 mm O-ring (8) taking care not to damage its sealing face against the tip of the valve
viii. To ensure positive sealing, it is recommended that a new Diaphragm (2) is placed centrally into Regulator Body (1) ensuring that the outermost convolutions are facing towards the Bonnet (15)
ix. Replace the 21x1 mm O-ring (12) on the Lower Spring Rest (10), insert into the Diaphragm Washer (3) and place on top of the Diaphragm (2)
x. Place the Load Spring (14), Upper Spring Rest (9) and 10mm Ball Bearing (13) to the assembly
xi. Screw the Bonnet (15) onto the assembly and using a torque wrench with a 47mm open ended attachment, tighten to 160Nm

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.

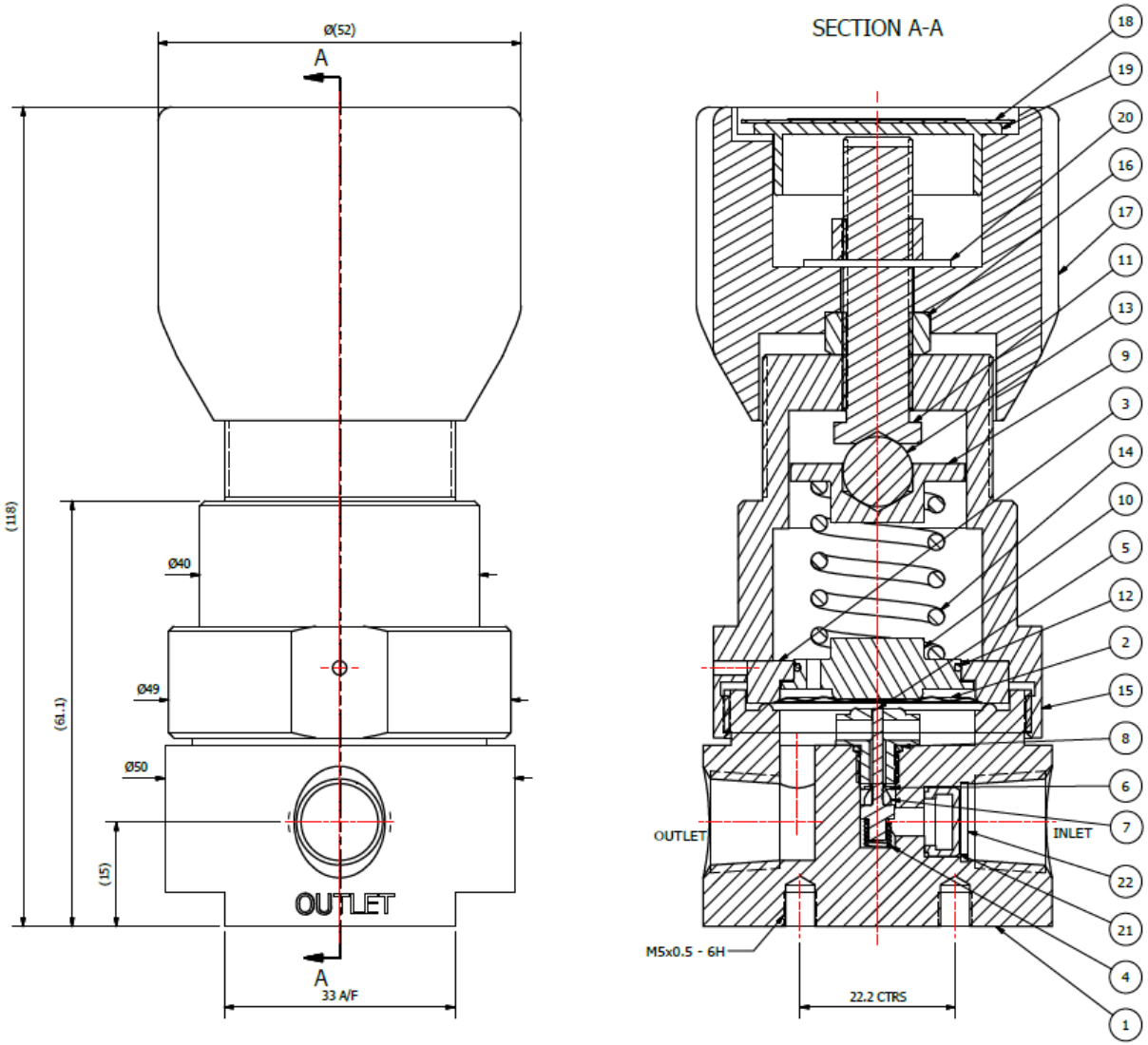
To ensure that the main valve assembly has been correctly and effectively installed it may be required to perform the appropriate seat leak test as per ANSI/FCI 70-2.

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 please follow the instructions below:

i. Remove the Nameplate (18) and Cap (19) from the Hand Wheel (17) and loosen the Lock Nut (16) such that the Hand Wheel is able to spin freely on the Adjusting Screw (11)
ii. Connect the correct fittings to the Inlet and Outlet ports of the regulator. Ensure that any gauge ports are plugged or that the correct gauge is fitted
iii. With the Regulator Body (1) secured in a vice apply the Maximum Working Pressure (MWP) to the Inlet of the regulator
iv. Connect the Outlet port to a calibrated pressure test gauge appropriate to the required set pressure. As the regulator is non-venting, ensure that a ball/needle valve is fitted to allow pressure to be relieved downstream of the regulator
v. Using a slotted screwdriver, turn the Adjusting Screw (11) clockwise until the desired set point has been reached
vi. Ensure repeatability by allowing flow through the regulator using the ball/needle valve
vii. With the outlet pressure set, screw the first Lock Nut (16) to the base of the Adjusting Screw (11) against the Bonnet (15)
viii. Position the Hand Wheel (17) onto the Lock Nut (16). Ensure that the Lock Nut and Hand Wheel become engaged
ix. Fasten the second Lock Nut (16) against the Hand Wheel (15) and gently begin to tighten using a 13mm socket until it begins to secure itself
x. At this point, whilst holding the Hand Wheel (15) continue to tighten whilst simultaneously turning slightly anti-clockwise to prevent it from locking against the Bonnet (16)
xi. Ensure that the Lock Nut (16) is sufficiently tightened, taking care not to adjust the set point
xii. Turning of the Hand Wheel (17) should now also turn the Adjusting Screw (16) which will control the pressure
xiii. Turn the Hand Wheel clockwise until it reaches its set point and check to make sure that the desired outlet pressure is correct.
xiv. If the set point is not correct, repeat steps v. to xiii.
xv. Reduce the pressure downstream by venting the pressure through ball/needle valve and then turning the Hand Wheel anti-clockwise until the regulator closes
xvi. The Cap (19) and Nameplate (18) can now be placed into the Hand Wheel (17). Ensure that the information stated on the Nameplate is in accordance with the set pressure of the regulator

6.1.3. Figure 1 – Sectional View of the LF-300



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-50-N-SS	BODY - 'N' PORTING
2	PT-C-010-002	DIAPHRAGM
3	PT-C-016	DIAPHRAGM WASHER
4	PT-C-006-002	MV COMPRESSION SPRING
5	PT-C-001-013	MAIN VALVE WITH SQUARE
6	PT-C-007-002	SEAT Cv 0.06
7	PT-C-002-006	TEFLON SEAT
8	OR-0050-10	O' RING STD
9	PT-C-017	UPPER SPRING REST
10	PT-C-018-002	BOTTOM SPRING REST
11	PT-C-019-003	ADJUSTING SCREW
12	OR-0210-10	O' RING STD
13	BALL-010-SS-316	10MM BALL BEARING
14	PT-C-011-010	17KG LOAD SPRING
15	PT-C-015	BONNET
16	PT-C-020	LOCKNUTS
17	PT-C-021	SMALL HANDWHEEL
18	PT-C-022	NAMEPLATE
19	FIT-CAP-4343092	NAMEPLATE CAP
20	FIT-M10-AS-CRI-WASHER	CRINKLE WASHER
21	FILT-SCRM31040405-A	10MM DIA SCREEN FILTER
22	FIT-472011-SS-CIRCLIP	CIRCLIP

7. Technical Data

Fluid Media:	All gases and liquids compatible with materials of construction
Max Inlet Pressure*:	300 bar (4350 Psi) (with PEEK Seat) 210 bar (3000 Psi) (with PCTFE Seat)
Outlet Pressure Range:	0-35 bar
Operating Temperature:	-20°C to +80°C
Materials:	Body and Trim: 316 SS Diaphragm: Inconel X750 Seat: PCTFE / PEEK® / PTFE / FEP
Flow Capacity (Cv):	0.06 (also available in 0.03 and 0.15)
Leakage:	Gas: Bubble tight Liquid: Zero drops of water at max inlet

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

8. Warranty Statement

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.

Annex A. LF-310 – 'Solid Disk' Main Valve Design

A.1. Description

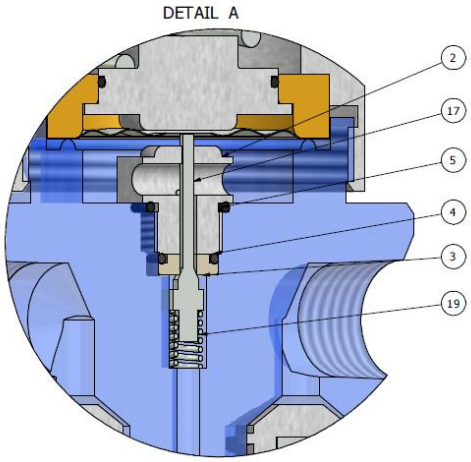
The 'solid disk' type main valve assembly was introduced as an alternative to the unique 'cone type' assembly and could be applied where greater resistance to both temperature and pressure were required. The new disk design allows for a wider range of seat material options as well as increased Cv and Pressure combinations.

The model number 'LF-310' was assigned to denote the requirement for the new disk type main valve arrangement. The LF-310 'solid disk' option allows for a Maximum Working Pressure of 300 Bar (4350 Psi) or 414 bar (6000 Psi) when fitted with a PEEK seat. The LF-310 is capable of accurately controlling pressures of up to 35 bar (510 Psi).

A.2. Servicing

The servicing of the LF-310 regulator should be performed in line with the service instructions for the LF-300 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.

A.2.1. Figure 2 – Detail A: LF-310 'Solid Disk' MVA (sectional)



A.2.2. Figure 3 – Exploded View of LF-310 'Solid Disk' MVA