



# THE LF-540 SERIES

Operating and Service Manual

Series includes all variants of LF-540

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## TABLE OF CONTENTS

1. Description .....	3
2. Installation .....	3
3. Operation .....	3
4. Special Conditions for Safe Use .....	4
5. Hazardous Location Usage .....	4
6. Servicing and Maintenance.....	4
6.1. Servicing the LF-540 – Cv 0.2 Self Venting.....	4
6.1.1. Accessing the Main Valve Assembly .....	5
6.1.2. Accessing the Vent Seat .....	5
6.1.3. Reassembly – Sensor Assembly .....	6
6.1.4. Reassembly – Regulator.....	7
6.1.5. Figure 1 – Sectional View of the LF-540 – Self Venting .....	8
7. Technical Data.....	9
8. Warranty Statement .....	9

## **1. Description**

The LF-540 series are compact and economical high pressure regulators with precision machined sensing elements to allow fine pressure control on pressures up to 414bar. The LF-540 can be supplied as either non-venting or self venting (non captured / non adjustable).

## **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. 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.

Self venting regulators can reduce the outlet pressure, by turning the hand wheel anti-clockwise, thereby venting the excess pressure through the vent port on the regulator. The vent on the LF540 exhausts to atmosphere.

#### **4. Special Conditions for Safe Use**

Turning the hand wheel anti-clockwise (with pressure on the outlet) should be refrained on non-venting regulators. Pressure should be reduced in this case by venting downstream of the regulator, and turning the hand wheel simultaneously anti-clockwise.

For safety and to avoid the risk of venting unwanted fluids to atmosphere, the LF540 self venting option should not be used on toxic or liquid media.

#### **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-540 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-540 – Cv 0.2 Self Venting**

\*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. Remove the securing M3 grub screw (26) from the regulator body (22).
- ii. Unscrew the M3 button screw (27) and remove the name plate (4) from the hand wheel (5).
- iii. Unscrew the locknut (2) using a 24mm socket and remove the hand wheel (5) from the adjusting screw (8).
- iv. With the regulator secured up-right in a vice, remove the bonnet (10) by using a torque wrench or equivalent with 47mm open end.
- v. Un-screw and lift the top works from the assembly, inclusive of the bonnet (10), load spring (9) and adjusting mechanism (6, 7, 8, 30).
- vi. The sensor assembly can be removed from the body by using pliers or mole grips against the flats of the spring rest (11).
- vii. Use a 17mm open ended spanner to locate vertically over the seat nut (21), then use an adjustable spanner to grip the 17mm spanner and loosen the seat nut (21) until removed.
- viii. The connector pin (20) can be removed after taking the wire retaining clip (19) from the seat nut (21).
- ix. Remove the soft seat (18), main valve (17) and main valve spring (16) from the regulator body (22). It may be required to turn the body over and tap the base to remove these parts.  
NOTE: Cv 0.1 and Cv 0.3 models will contain a 9x1mm o-ring (not shown) below the soft seat.
- x. Inspect the main valve (17) and soft seat (18) for damage and replace as required.

### 6.1.2. Accessing the Vent Seat

It is recommended that the vent seat is only accessed in the event of failure or suspected failure. This is often noticed as a leak to atmosphere whilst controlling downstream pressure.

**IMPORTANT:** Due to its compression securing method, the vent seat will require replacing if removed from the sensor. Ensure that all required parts are available prior to removal.

- i. To access the vent seat (13), secure the spring rest (11) in a vice and unscrew the sensor (14) using a slotted screwdriver. Alternatively, a steel rule (or equivalent) may be secured in a vice and used to accommodate the slot in the sensor (14).
- ii. A 17mm open ended spanner or adjustable can then be used to remove the spring rest (11).
- iii. Remove the sensor (14) from the sensor holder (15).
- iv. Remove all o-rings (1, 3, 23, 24) from the sensor assembly and replace as required.
- v. The vent seat (13) can be removed from the sensor using a 4mm drift punch. To do so, secure the sensor (14) with the slotted side up and place the drift in the 4mm bore. Then lightly tap until the vent is released.
- vi. The o-ring (25) and vent seat (14) can then be replaced.

### 6.1.3. Reassembly – Sensor Assembly

- i. Place the o-ring (25) into the sensor (14) and position to the lower face below the thread.
- ii. Then, place the vent seat (13) into the sensor (14) with the o-ring groove facing downwards.
- iii. Place the respective o-ring (23, 24) and back up (1, 3) over the sensor holder (15) and sensor (14).  
NOTE: Back up (1) may need to be cut.
- iv. Ensuring that the o-ring (24) around the sensor (14) is well lubricated, push the sensor (14) into the sensor holder (15).  
NOTE: The outer diameter of the sensor should locate into the lower bore of the sensor holder.
- v. Screw the spring rest (11) into the sensor (14).
- vi. The assembly can be secured by gripping the flats of the spring rest (11) in a vice and using a slotted screwdriver to tighten the sensor (14). Alternatively, a steel rule (or equivalent) may be secured in a vice and used to accommodate the slot in the sensor whilst the spring rest is tightened using a 17mm open ended spanner or adjustable.

**IMPORTANT:** Do not over compress the vent seat when tightening. A visible gap of ~1mm should be left between the sensor and spring rest. Half a turn past the point at which the spring rest comes into contact with the vent seat should be sufficient. It is also recommended to use Loctite to prevent the spring rest from working loose in operation.

#### 6.1.4. Reassembly – Regulator

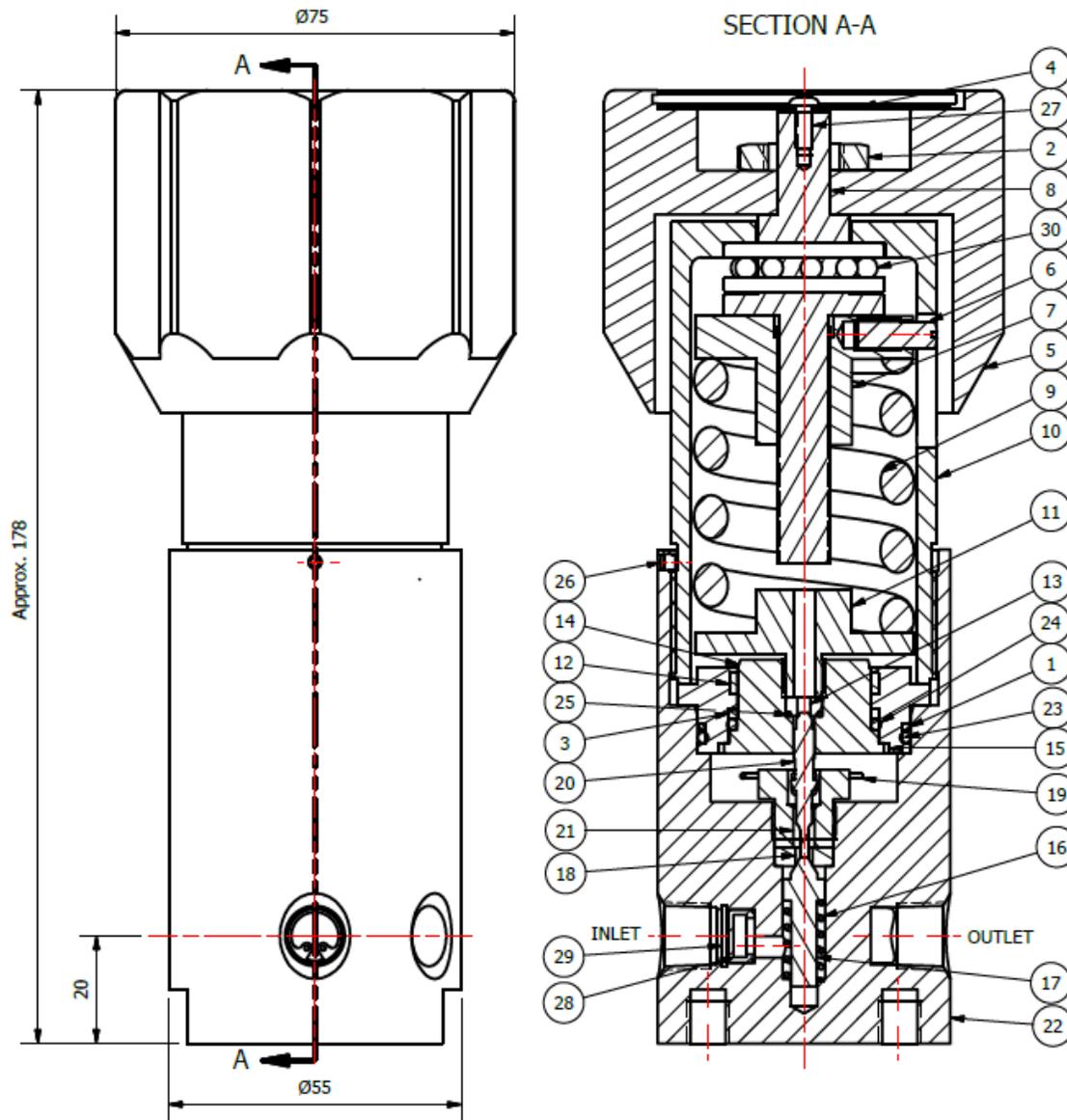
Ensure that the sensor assembly has been correctly assembled as per 6.1.3 prior to following the instruction below.

- i. With the regulator body (22) upright and secured in a vice, place the main valve spring (16) and main valve (17) into the lower bore.
- ii. Place the soft seat (18) into the bore, with the outer edge chamfer facing downwards.  
NOTE: on Cv 0.1 and Cv 0.3 models, ensure that the 9x1mm o-ring (not shown) is placed into the body and the soft seat is placed with outer o-ring groove is facing down.
- iii. Place the connector pin (20) into the seat nut (21), ensuring that the chamfered sealing face is facing upwards.
- iv. Locate the wire retaining clip (19) into the seat nut (21) and push firmly in place.
- v. Screw the seat nut (21) into the regulator body (22).
- vi. Use a 17mm open ended spanner to locate vertically over the seat nut (21), then use an adjustable spanner to grip the 17mm spanner and tighten the seat nut (21) securely to compress the soft seat (18).
- vii. The sensor assembly may then be placed into the regulator body (22).
- viii. Place the load spring (9) onto the spring rest (11) and locate the adjusting mechanism (6, 7, 8, 30) into the load spring and screw the bonnet (10) onto the body (22).
- ix. Torque the bonnet to approximately 90 – 100 Nm and secure by tightening the M3 grub screw (26) located at the top of the regulator body (22).
- x. Place the hand wheel (5) onto the adjusting screw (8) and tighten the lock nut (25).
- xi. Secure the nameplate (4) with the M3 pan screw (27).

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.

6.1.5. Figure 1 – Sectional View of the LF-540 – Self Venting



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	ORB-PT-C-178	PTFE BACK UP
2	PT-C-132	LOCK NUT
3	ORB-PT-C-052	PTFE BACK UP
4	PT-C-049	NAMEPLATE
5	PT-C-048-001	LARGE HAND WHEEL
6	PT-C-046	SLOT SCREW
7	PT-C-045	ADJUSTING NUT
8	PT-C-043-004	ADJUSTING SCREW
9	PT-C-042	LOAD SPRING (500KG)
10	PT-C-040-002	BONNET
11	PT-C-039	SPRING REST
12	PT-C-038	SLIDE RING
13	PT-C-036	VENT SEAT
14	PT-C-035	25MM SENSOR
15	PT-C-033-003	SENSOR HOLDER
16	PT-C-031	MAIN VALVE SPRING
17	PT-C-030	MAIN VALVE
18	PT-C-029	PEEK SEAT Cv 0.2
19	PT-550-009	RETAINING WIRE CLIP
20	PT-550-008-001	CONNECTOR PIN
21	PT-550-006	SEAT NUT
22	PT-540-A-LF	BODY 'A' PORTING
23	OR-0360-20	O'RING STD
24	OR-0250-20	O'RING STD
25	OR-0050-10	O'RING STD
26	FIT-M3x4MM-SS-316-GRUBSCRW	M3 GRUB SCREW
27	FIT-M3-08-A4-70.0-SKT-BTN	M3 BUTTON SCREW
28	FILT-SCRM31040405-A	10MM SCREEN FILTER
29	FIT-472011-SS-CIRCLIP	11MM CIRCLIP
30	BEAR-51103-SS	SS BEARING

## 7. Technical Data

Fluid Media:	All gases and liquids compatible with materials of construction
Max Inlet Pressure*:	550 bar (8000 Psi)
Outlet Pressure Range:	0-414 bar (6000 Psi)
Operating Temperature:	-20°C to +80°C (Nominal)
Materials:	Body and Trim: 316 SS Seat: PCTFE / PEEK® / Ceramic
Flow Capacity (Cv):	0.1 / 0.2 / 0.3
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.