



THE MF-301 SERIES

Operating and Service Manual

Series includes all variants of MF-301

Issue A
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1. Description

The MF-301 is a medium flow piston sensed pressure reducing regulator, which incorporates a balanced main valve to provide stable control under varying inlet pressures. The regulator has a PCTFE seat for excellent shut off and control on gas service. The MF-301 can also be offered with an unbalanced main valve.

The MF-301 can be supplied as either non-venting or self venting (non captured / non adjustable). A combination of sensors and spring ranges provide a range of pressure control options with minimal torque adjustment and accurate control.

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 MF-301 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 MF-301 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 MF-301 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 MF-301 Self Venting Model

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

6.1.1. Accessing the Main Valve Assembly

The Main Valve Assembly (MVA) can be directly accessed via the bottom nut:

- i. Secure the regulator body (1) upside down in a vice with soft jaws.
- ii. Use a 30mm socket or open ended spanner (or adjustable) to loosen and remove the bottom nut (5).
- iii. The main valve spring (8) and valve assembly (3, 4, 6) can be removed from the regulator body (1).
*Note: the connector pin (22) can also be removed at this stage.
- iv. The flats of the lower main valve (6) can be secured in a vice and the seat retainer (3) can be removed using a slotted screwdriver.
- v. Inspect and replace the soft seat (4) and o-ring (7).
- vi. With the lower main valve (6) secured in a vice, insert the o-ring (7) and soft seat (4) and then screw the seat retainer (3) in place.
- vii. The o-ring (9) and back up (10) around the lower main valve can be replaced as required.
- viii. The valve assembly (3, 4, 6) can be placed into the regulator body (1).
IMPORTANT: Ensure that the connector pin (22) is first repositioned into the seat nut (2) if removed during step iii.
- ix. Then place the main valve spring (8) over the lower main valve (6).
- x. The o-ring (11) around the bottom nut (5) can be replaced as required.
- xi. The bottom nut (5) can then be screwed in place and tightened securely using a 30mm socket or open ended spanner.

6.1.2. Accessing the Sensor Assembly and Seat Nut

- i. Remove the securing M3 grub screw (33) from the regulator body (1).
- ii. Unscrew the M3 button screw (32) and remove the name plate (25) from the hand wheel (26).
- iii. Unscrew the locknut (24) using a 24mm socket and remove the hand wheel (26) from the assembly.
- iv. With the regulator secured up-right in a vice, remove the bonnet (30) by using a torque wrench or equivalent with 46mm open end.
- v. Un-screw and lift the top works from the assembly, inclusive of the bonnet (30), load spring (23) and adjusting mechanism (27, 28, 29, 31).
- vi. The sensor assembly can be removed from the body by using pliers or mole grips against the flats of the spring rest (16).
- vii. The seat nut (2) is now accessible and can be removed using a 24mm socket.
- viii. The self venting connector pin (22) can be removed using pliers and replaced as required.

*Note: The main valve assembly can now also be accessed if required

6.1.3. 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 (14), secure the spring rest (16) in a vice and unscrew the sensor (13) 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 (13).
- ii. A 17mm open ended spanner or adjustable can then be used to remove the spring rest (16).
- iii. Remove the sensor (13) from the sensor holder (12).
- iv. Remove all o-rings (18, 19, 20, 21) from the sensor assembly and replace as required.
- v. The vent seat (14) can be removed from the sensor using a 4mm drift punch. To do so, secure the sensor (13) 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 (17) and vent seat (14) can then be replaced.

6.1.4. Reassembly – Sensor Assembly

- i. Place the o-ring (17) into the sensor (13) and position to the lower face below the thread.
- ii. Then, place the vent seat (14) into the sensor (13) with the o-ring groove facing downwards.
- iii. Place the respective o-ring (18, 19) and back up (20, 21) over the sensor holder (12) and sensor (13).
*Note: Back up (21) may need to be cut.
- iv. Ensuring that the o-ring (18) around the sensor (13) is well lubricated, push the sensor (13) into the sensor holder (12).
*Note: The outer diameter of the sensor should locate into the lower bore of the sensor holder.
- v. Screw the spring rest (16) into the sensor (13).
- vi. The assembly can be secured by gripping the flats of the spring rest (16) in a vice and using a slotted screwdriver to tighten the sensor (13). 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.

6.1.5. Reassembly – Regulator

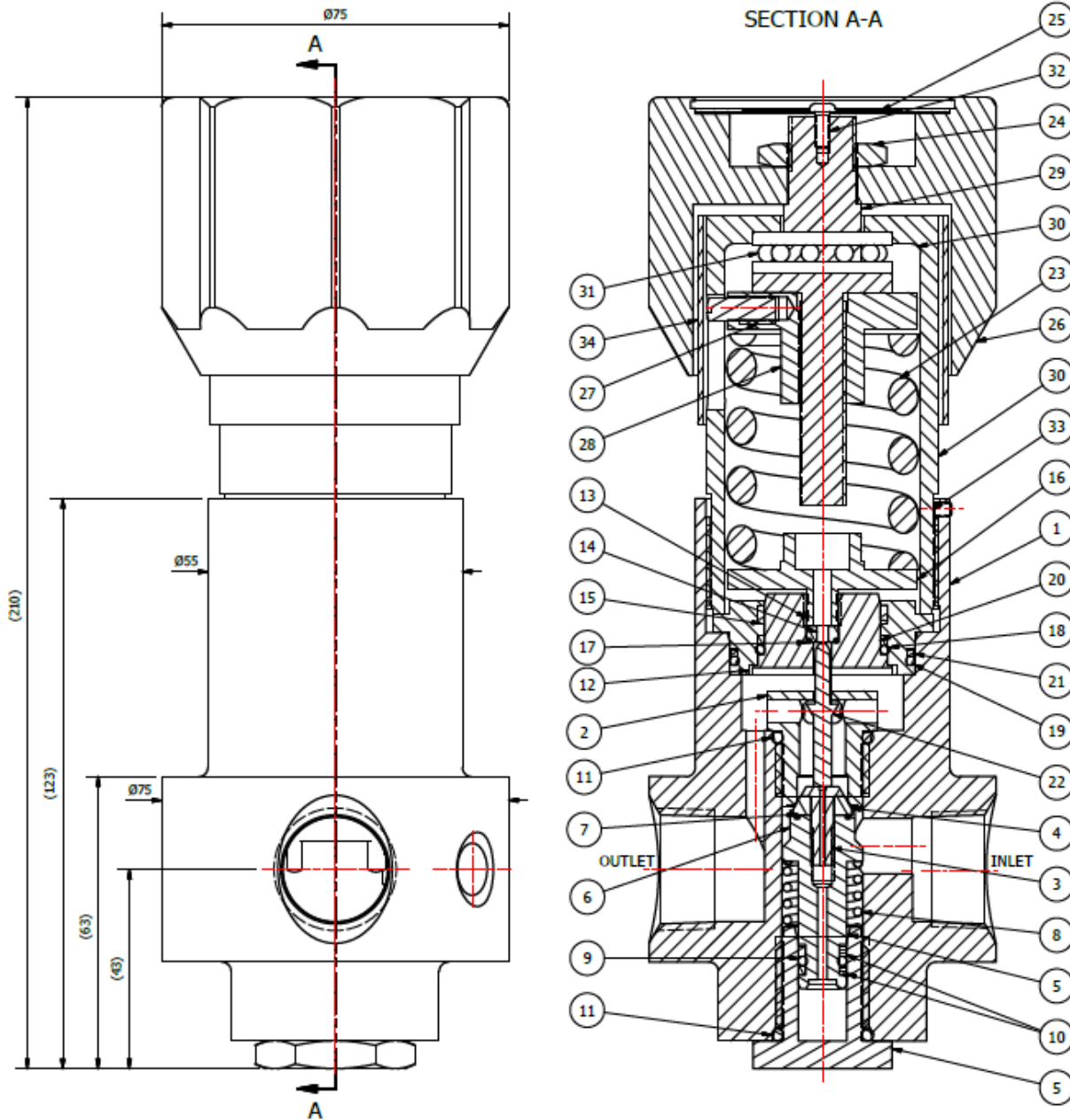
Ensure that the sensor assembly has been correctly assembled as per 6.1.4, prior to following the instruction below.

- i. Place the self venting connector pin (22) into the seat nut (2) from underneath, ensuring that the chamfered sealing face is facing upwards.
- ii. *Note: lifting the connector pin will lift the seat nut if installed correctly
- iii. Holding the connector pin (22) at the top, lower the seat nut (2) into the regulator body (1) and then screw the seat nut (2) into place.
- iv. Use a 24mm socket to secure the seat nut (2).
- v. The sensor assembly may then be placed into the regulator body (1).
- vi. Place the load spring (23) onto the spring rest (16) and locate the adjusting mechanism (26, 27, 28, 31) into the load spring and screw the bonnet (30) onto the body (1).
- vii. Torque the bonnet to approximately 90 – 100 Nm and secure by tightening the M3 grub screw (33) located at the top of the regulator body (1).
- viii. Place the hand wheel (26) onto the adjusting screw (29) and tighten the lock nut (24).
- ix. Secure the nameplate (25) into the hand wheel (26) with the M3 button screw (32).

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.

6.1.6. Figure 1 – Sectional View of the MF-301 – Self Venting



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-MF-301-X-BR-06N	BODY 'X' PORTING
2	PT-C-007-006-001	SEAT NUT
3	PT-550-012	SEAT RETAINER
4	PT-C-002-015	PCTFE SEAT
5	PT-550-014-004	BOTTOM NUT
6	PT-550-010-003	LOWER MAIN VALVE
7	OR-0100-10	O'RING STD
8	PT-C-006-005	MAIN VALVE SPRING
9	OR-0065-20	O'RING STD
10	ORB-PT-C-109	PTFE BACK UP
11	OR-0170-25	O'RING STD
12	PT-C-033-003	SENSOR HOLDER
13	PT-C-035	25MM SENSOR
14	PT-C-036	VENT SEAT
15	PT-C-038	SLIDE RING
16	PT-C-039	SPRING REST
17	OR-0050-10	O'RING STD
18	OR-0250-20	O'RING STD
19	OR-0360-20	O'RING STD
20	ORB-PT-C-052	PTFE BACK UP
21	ORB-PT-C-178	PTFE BACK UP
22	PT-550-015	SV CONNECTING PIN
23	PT-C-042	LOAD SPRING (500KG)
24	PT-C-132	LOCK NUT
25	PT-C-049	NAMEPLATE
26	PT-C-048-001	LARGE HAND WHEEL
27	PT-C-046	SLOT SCREW
28	PT-C-045	ADJUSTING NUT
29	PT-C-043-004	ADJUSTING SCREW
30	PT-C-040-002-002	BONNET
31	BEAR-51103-SS	SS BEARING
32	FIT-M3-08-A4-70.0-SKT-BTN	M3 BUTTON SCREW
33	FIT-M3x4MM-SS-316-GRUBSCRW	M3 GRUB SCREW
34	PT-C-180-001	PROTECTIVE SLEEVE

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6.2. Servicing the MF-301 Non Venting Model

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

6.2.1. Accessing the Main Valve Assembly

The Main Valve Assembly (MVA) can be directly accessed via the bottom nut:

- i. Secure the regulator body (33) upside down in a vice with soft jaws.
- ii. Use a 30mm socket or open ended spanner (or adjustable) to loosen and remove the bottom nut (3).
- iii. The main valve spring (7) and valve assembly (2, 4, 5) can be removed from the regulator body (33).
*Note: the connector pin (20) can also be removed at this stage.
- iv. The flats of the lower main valve (4) can be secured in a vice and the seat retainer (5) can be removed using a slotted screwdriver.
- v. Inspect and replace the soft seat (2) and o-ring (6).
- vi. With the lower main valve (4) secured in a vice, insert the o-ring (6) and soft seat (2) and then screw the seat retainer (5) in place.
- vii. The o-ring (7) and back up (9) around the lower main valve (4) can be replaced as required.
- viii. The valve assembly (2, 4, 5) can be placed into the regulator body (33).
IMPORTANT: Ensure that the connector pin (20) is first repositioned into the seat nut (1) if removed during step iii.
- ix. Then place the main valve spring (7) over the lower main valve (4).
- x. The o-ring (10) around the bottom nut (3) can be replaced as required.
- xi. The bottom nut (3) can then be screwed in place and tightened securely using a 30mm socket or open ended spanner.

6.2.2. Accessing the Sensor Assembly and Seat Nut

- i. Remove the securing M3 grub screw (31) from the regulator body (33).
- ii. Unscrew the M3 button screw (30) and remove the name plate (28) from the hand wheel (27).
- iii. Unscrew the locknut (29) using a 24mm socket and remove the hand wheel (27) from the assembly.
- iv. With the regulator secured up-right in a vice, remove the bonnet (23) by using a torque wrench or equivalent with 46mm open end.
- v. Un-screw and lift the top works from the assembly, inclusive of the bonnet (23), load spring (21) and adjusting mechanism (22, 24, 25, 26).
- vi. The sensor assembly can be removed from the body by using pliers or mole grips against the flats of the spring rest (19).
- vii. The seat nut (1) is now accessible and can be removed using a 24mm socket.
- viii. The non venting connector pin (20) can be removed using pliers and replaced as required.

*Note: The main valve assembly can now also be accessed if required

6.2.3. Reassembly – Regulator

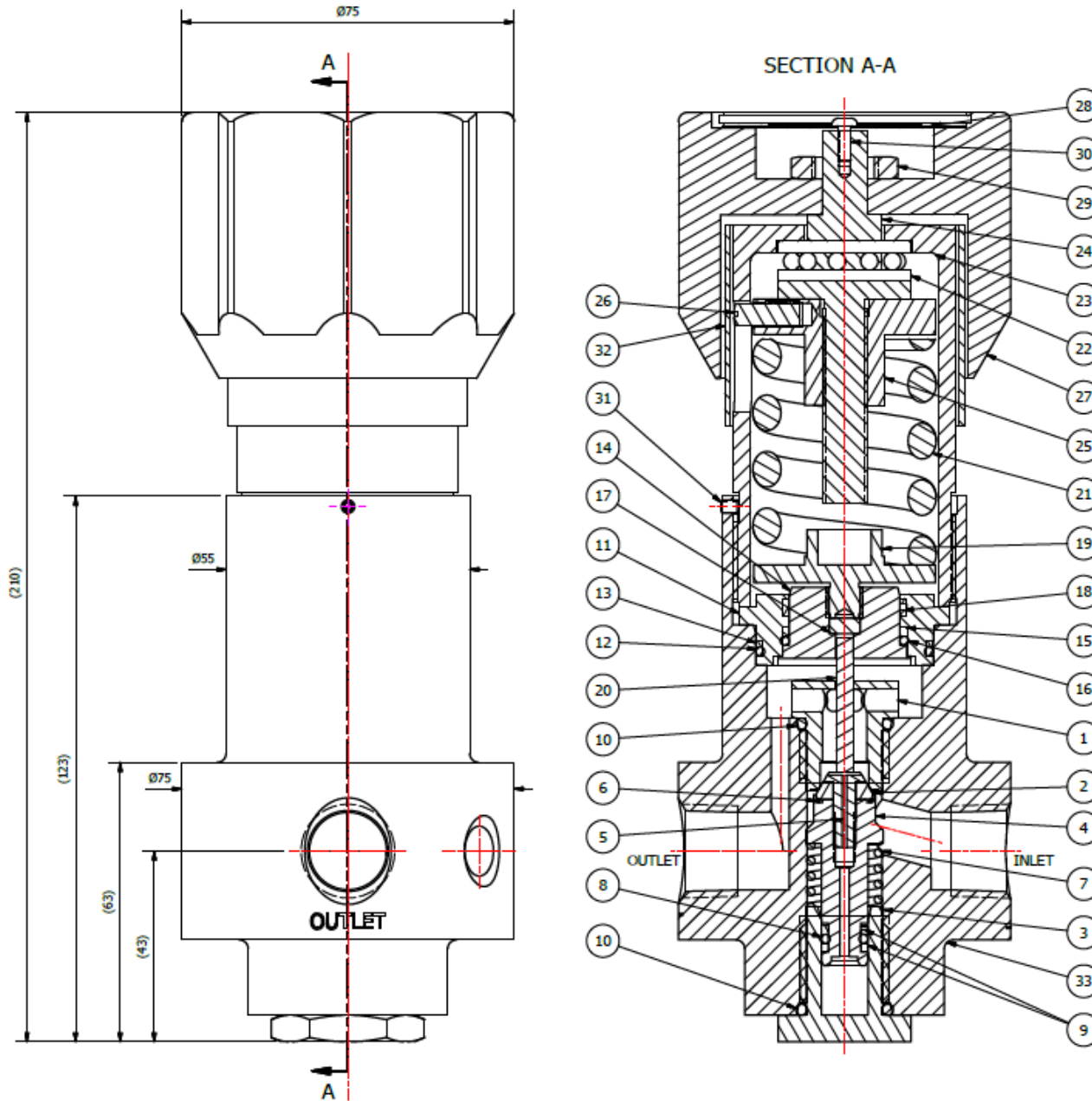
Ensure that the sensor assembly has been correctly assembled as per 6.1.4, prior to following the instruction below.

- i. Lower the seat nut (1) into the regulator body (33) and then screw into place.
- ii. Use a 24mm socket to secure the seat nut (1).
- iii. Place the non venting connector pin (20) into the seat nut (1).
- iv. The sensor assembly may then be placed into the regulator body (33).
- v. Place the load spring (21) onto the spring rest (19) and locate the adjusting mechanism (22, 24, 25, 26) into the load spring and screw the bonnet (23) onto the body (33).
- vi. Torque the bonnet to approximately 90 – 100 Nm and secure by tightening the M3 grub screw (31) located at the top of the regulator body (33).
- vii. Place the hand wheel (27) onto the adjusting screw (24) and tighten the lock nut (29).
- viii. Secure the nameplate (28) into the hand wheel (27) with the M3 button screw (30).

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.

6.2.4. Figure 2 – Sectional View of the MF-301 – Non Venting



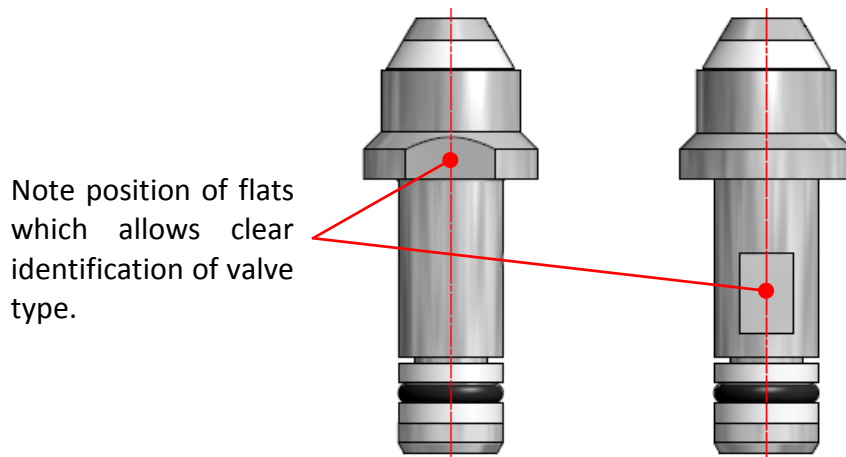
PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-C-007-006-001	SEAT NUT
2	PT-C-002-015	PCTFE SEAT
3	PT-550-014-004	BOTTOM NUT
4	PT-550-010-003	LOWER MAIN VALVE
5	PT-550-012	SEAT RETAINER
6	OR-0100-10	O'RING STD
7	PT-C-006-005	MAIN VALVE SPRING
8	OR-0065-20	O'RING STD
9	ORB-PT-C-109	PTFE BACK UP
10	OR-0170-25	O'RING STD
11	PT-C-033-003	SENSOR HOLDER
12	OR-0360-20	O'RING STD
13	ORB-PT-C-178	PTFE BACK UP
14	PT-C-035	25MM SENSOR
15	ORB-PT-C-052	PTFE BACK UP
16	OR-0250-20	O'RING STD
17	PT-C-084	DUMMY VENT SEAT
18	PT-C-038	SLIDE RING
19	PT-C-063	SPRING REST
20	PT-550-013	CONNECTING PIN
21	PT-C-042	LOAD SPRING (500KG)
22	BEAR-51103-SS	SS BEARING
23	PT-C-040-002-002	BONNET
24	PT-C-043-004	ADJUSTING SCREW
25	PT-C-045	ADJUSTING NUT
26	PT-C-046	SLOT SCREW
27	PT-C-048-001	LARGE HAND WHEEL
28	PT-C-049	NAMEPLATE
29	PT-C-132	LOCK NUT
30	FIT-M3-08-A4-70.0-SKT-BTN	M3 BUTTON SCREW
31	FIT-M3x4MM-SS-316-GRUBSCRW	M3 GRUB SCREW
32	PT-C-180-001	PROTECTIVE SLEEVE
33	PT-MF-301-V-BR-04N	BODY 'V' PORTING

6.3. The Unbalanced Main Valve

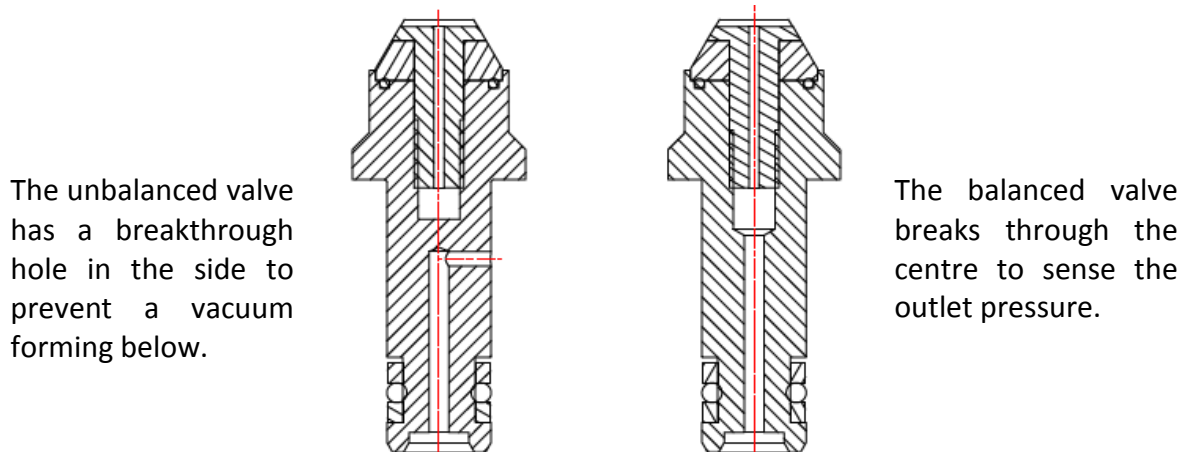
The MF301 regulator is offered with a balanced main valve as standard. However, an unbalanced main valve is also available. The unbalanced main valve offers improved seat tightness at lower inlet pressures and has a maximum working pressure of 50 bar (725 Psi).

Servicing of the unbalanced MF301 regulator can be done in accordance with 6.1 and 6.2. The only difference between the balanced and unbalanced option is the lower main valve. These differences can be seen below.

6.3.1 Figure 3 – 3D View of Unbalanced (L) and Balanced (R) Main Valve



6.3.2 Figure 4 – Section View of Unbalanced (L) and Balanced (R) Main Valve



7. Technical Data

Fluid Media: All gases and liquids compatible with materials of construction

Max Inlet Pressure:	Valve Assembly	Seat Material	Pressure
	Balanced	PCTFE	300 bar (4350Psi)
	Balanced	PEEK®	414 bar (6000 Psi)
	Unbalanced	PCTFE	50 bar (750 Psi)

Outlet Pressure Range:	Valve Assembly	Pressure
	Balanced	0-300 bar (4350Psi)
	Unbalanced	0-50 bar (750 Psi)

Operating Temperature: -20°C to +80°C Nominal

Materials:	Body / Trim	HT Brass 316 SS
	Seat	PCTFE PEEK®

Flow Capacity (Cv): 2.0

Leakage:	Gas	Bubble tight
	Liquid	Zero drops of water at max inlet

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.