



# THE MF-101 SERIES

Operating and Service Manual

Series includes all variants of MF-101

**Issue C**  
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## 1. Description

The MF-101 is a single stage piston sensed pressure regulator with a large precision machined sensing element that provides excellent downstream pressure control up to a maximum of 35bar. The regulator has an unbalanced main valve and non-venting sensor assembly as standard, with a maximum working pressure of 100bar. A balanced model is also available, which accommodates a maximum working pressure of 414bar and is available with both venting and non-venting options. Each valve design will create a positive shut off on gas or liquid applications.

### Pressure Equipment Directive (PED) 2014/68/EC Declaration

This equipment is designed and manufactured in accordance with Sound Engineering Practice (SEP) Article 4, Paragraph 3 of the directive 2014/68/EC. As such, CE marking must not be applied. The equipment is marked under section 3.3 of Essential Safety Requirements of the directive.

## 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 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

On the MF-101 series of non-venting type regulators, 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 MF-101 regulators should only be performed after fully reading and understanding the Operating and Servicing Manual. Due to the compressibility of gases, the operator should not endanger themselves or others by working on this regulator without prior knowledge of the Health and Safety risks 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 and adhesives during servicing:

- **Krytox GPL 205 lubricant:** For the O-rings.
- **Molykote 1000 paste:** For the adjusting screw.
- **Loctite 243 Thread Locker:** For section 6.1.2 & 6.2.2 (Step: xvi & xvii)

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-101 (Unbalanced Non-venting Design)**

\*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 and remove the Bonnet (6) using a 47mm wrench ensuring that the Hand Wheel (10) is fully wound anti clock wise (*\*Ref. 6.1.2*)  
\*NOTE: Soft vice jaws must be used, when securing the body within the vice against flats. (as without may cause damage to sealing surface for BSP O ring) Due to the position of the flats it may be necessary to angle the body in the vice with the bottom nut upright for access.
- ii. Remove the 8mm Ball Bearing (2), Upper Spring Rest (7) and Load Spring (18)
- iii. Using needle nosed pliers, remove the Sensor Assembly (3, 4, 13)
- iv. The Seat Retainer (12) can then be removed using a 13mm socket  
Note: As the seat is a compression fit, it is likely that the soft seat (14) will be secure in the retainer. As such it is always recommended to replace both the retainer and the \*soft seat during service.  
\*Note: when replacing the soft seat (14), guide the seat with the external chamfer leading into the retainer (12).
- v. Remove the Main Valve (5) and Main Valve Spring (15) from the assembly
- vi. Visually inspect the Main Valve (5) and Soft Seat (14) for damage under a microscope and replace as required
- vii. Place a new Main Valve Spring (15) and Main Valve (5) into the Regulator Body (1)
- viii. Replace the O-rings (16, 17) around the Sensor Holder (13)
- ix. Position the Sensor (3) into the Sensor Holder (13)  
IMPORTANT: Ensure that the Sensor Holder is correctly oriented, such that the counter bore is upright to accommodate the Lower Spring Rest (4) (*\*Ref. 6.1.3*)
- x. Screw the Lower Spring Rest (4) into the Sensor (3). To secure, grip the spring rest in a vice and use a 21mm open ended spanner or adjustable to tighten the sensor
- xi. Place the sensor assembly into the Regulator Body (1)

- xii. Position the Load Spring (18) on to the Lower Spring Rest (4) and place the Upper Spring Rest (7) and 8mm Ball Bearing (2) to the assembly
- xiii. Screw the Bonnet (6) onto the assembly and using a torque wrench with a 47mm open ended attachment, tighten to 90Nm

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.

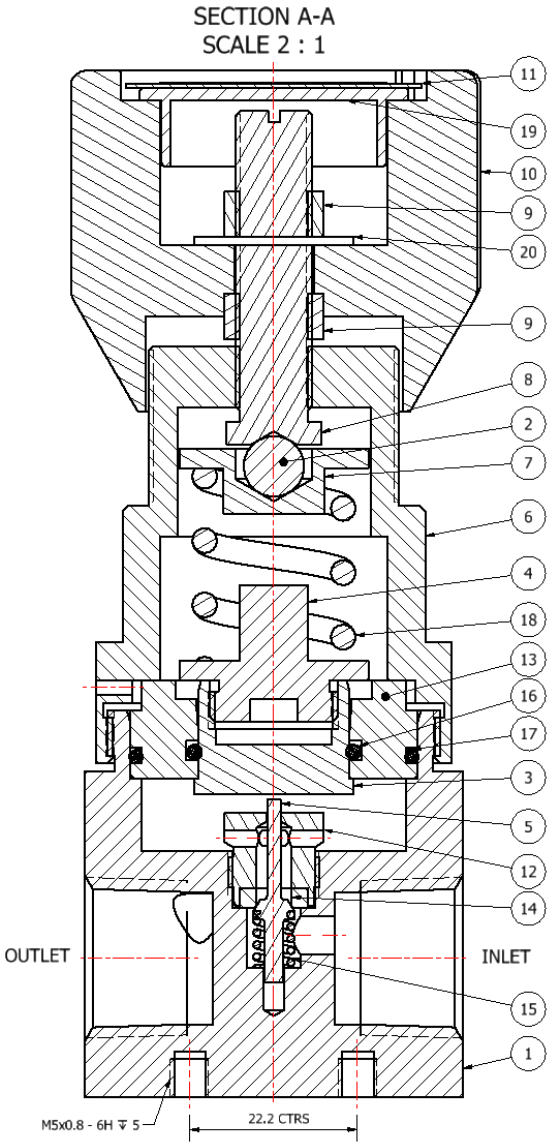
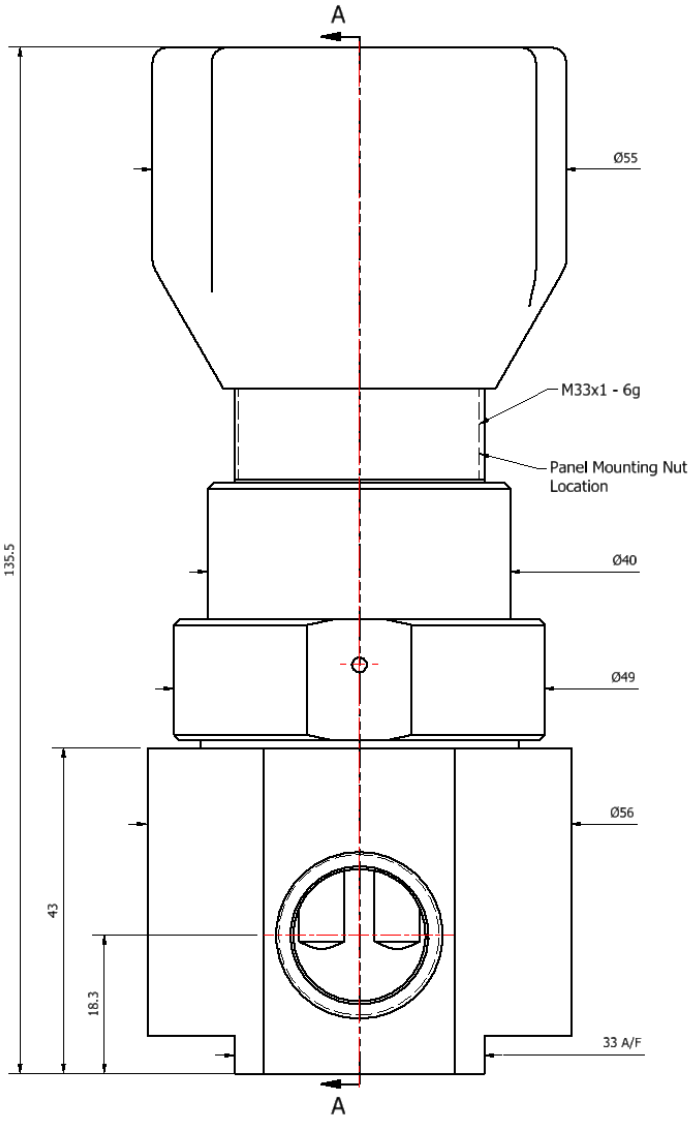
## 6.1.2. Adjusting the Set Point

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 (11) and Cap (19) from the Hand Wheel (10) and loosen the Lock Nut (9)/Washer (20) such that the Hand Wheel is able to spin freely on the Adjusting Screw (8)
- 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 (8) 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 (9) to the base of the Adjusting Screw (8) against the Bonnet (6)
- viii. Position the Hand Wheel (10) onto the Lock Nut (9). Ensure that the Lock Nut and Hand Wheel become engaged
- ix. Fasten the second Lock Nut (9) against the top of the Hand Wheel (10)/Washer (20) and gently begin to tighten using a 13mm socket until it begins to secure itself.
- x. At this point, whilst holding the Hand Wheel (10) continue to tighten whilst simultaneously turning slightly anti-clockwise to prevent it from locking against the Bonnet (6)
- xi. Ensure that the Lock Nut (9) is sufficiently tightened, taking care not to adjust the set point
- xii. Turning of the Hand Wheel (10) should now also turn the Adjusting Screw (8) 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. Apply a small amount of Loctite 243 Thread Locker, all around the top diameter of the upper lock nut (9), so that the Loctite penetrates the thread, where the nut makes contact with the adjusting screw (8).
- xvii. The Cap (19) and Nameplate (11) can now be placed into the Hand Wheel (10). 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 MF-101 Unbalanced Design

\* ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE STATED.



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-101-MF-X-SS-04N	REGULATOR BODY
2	BALL-008-SS-316	8MM BALL BEARING
3	PT-101-001	SENSOR
4	PT-BP-301-003	LOWER SPRING REST
5	PT-C-001-009	MAIN VALVE
6	PT-C-015	BONNET
7	PT-C-017	UPPER SPRING REST
8	PT-C-019-003	ADJUSTING SCREW
9	PT-C-020	LOCKNUT
10	PT-C-021	SMALL HAND WHEEL
11	PT-C-022	NAMEPLATE
12	PT-C-080	SEAT RETAINER
13	PT-BP-301-001	SENSOR HOLDER
14	PT-C-081-XXX	SOFT SEAT VARIOUS
15	PT-C-006-007	MAIN VALVE SPRING
16	OR-0190-20	O-RING STD
17	OR-BS028	O-RING STD
18	PT-C-011-XXX	LOAD SPRING VARIOUS
19	FIT-CAP-4343092	FIT-CAP
20	FIT-M10-A2-CRI-WASHER	M10 Crinkle Washer



## 6.2. Servicing the MF-101 (Balanced Self Venting Design)

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

### 6.2.1. 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 and remove the Bonnet (13) using a 47mm wrench ensuring that the Hand Wheel (22) is fully wound anti clock wise (*\*Ref. 6.2.2*).  
\*NOTE: Soft vice jaws must be used, when securing the body within the vice against flats. (as without may cause damage to sealing surface for BSP O ring) Due to the position of the flats it may be necessary to angle the body in the vice with the bottom nut upright for access.
- ii. Remove the 8mm Ball Bearing (20), Upper Spring Rest (12) and Load Spring (19).
- iii. Using needle nosed pliers, remove the Sensor Assembly (8,10,11).
- iv. The Seat Retainer (3) can then be removed using a 13mm socket.  
Note: As the seat is a compression fit, it is likely that the soft seat (4) will be secured in the retainer (3). As such it is always recommended to replace both the retainer and the \*soft seat during service.  
\*Note: when replacing the soft seat (4), guide the seat with the external chamfer leading into the retainer (4).
- v. Carefully remove the Main Valve (5) from the assembly, taking care not to damage the domed sealing face.
- vi. Visually inspect the Main Valve (5) and Soft Seat (4) for damage under a microscope and replace as required.
- vii. Replace the Main Valve Spring (2), O-ring (15) and Back Up Ring (7) in the Regulator Body (1) as required.
- viii. Secure the Lower Spring Rest (11) into a vice and use a 21mm open ended spanner or adjustable to remove the Sensor (8).
- ix. Place/tighten the flats of sensor (8) into a vice, with the vent seat (9) facing upwards.
- x. Using a flat headed screw driver, remove/replace the vent seat (9) and 5x1 O-ring (16), from the sensor (8).
- xi. Remove/replace the O-rings (17,18) around the Sensor Holder (10).
- xii. Position the Sensor (8) into the Sensor Holder (10).  
IMPORTANT: Ensure that the Sensor Holder (10) is correctly oriented, such that the counter bore is upright to accommodate the Lower Spring Rest (11) (*\*Ref. 6.2.3*)
- xiii. Screw the Lower Spring Rest (11) into the Sensor (8). To secure, grip the lower spring rest (11) into a vice and use a 21mm open ended spanner or adjustable to tighten against the Sensor (8)
- xiv. Place the sensor assembly (8,10,11) into the Regulator Body (1)
- xv. Position the Load Spring (19) on to the Lower Spring Rest (11) and place the Upper Spring Rest (12) and 10mm Ball Bearing (20) to the assembly

- xvi. Screw the Bonnet (13) onto the assembly and using a torque wrench with a 47mm open ended attachment, tighten to 90Nm

### 6.2.2. Adjusting the Set Point

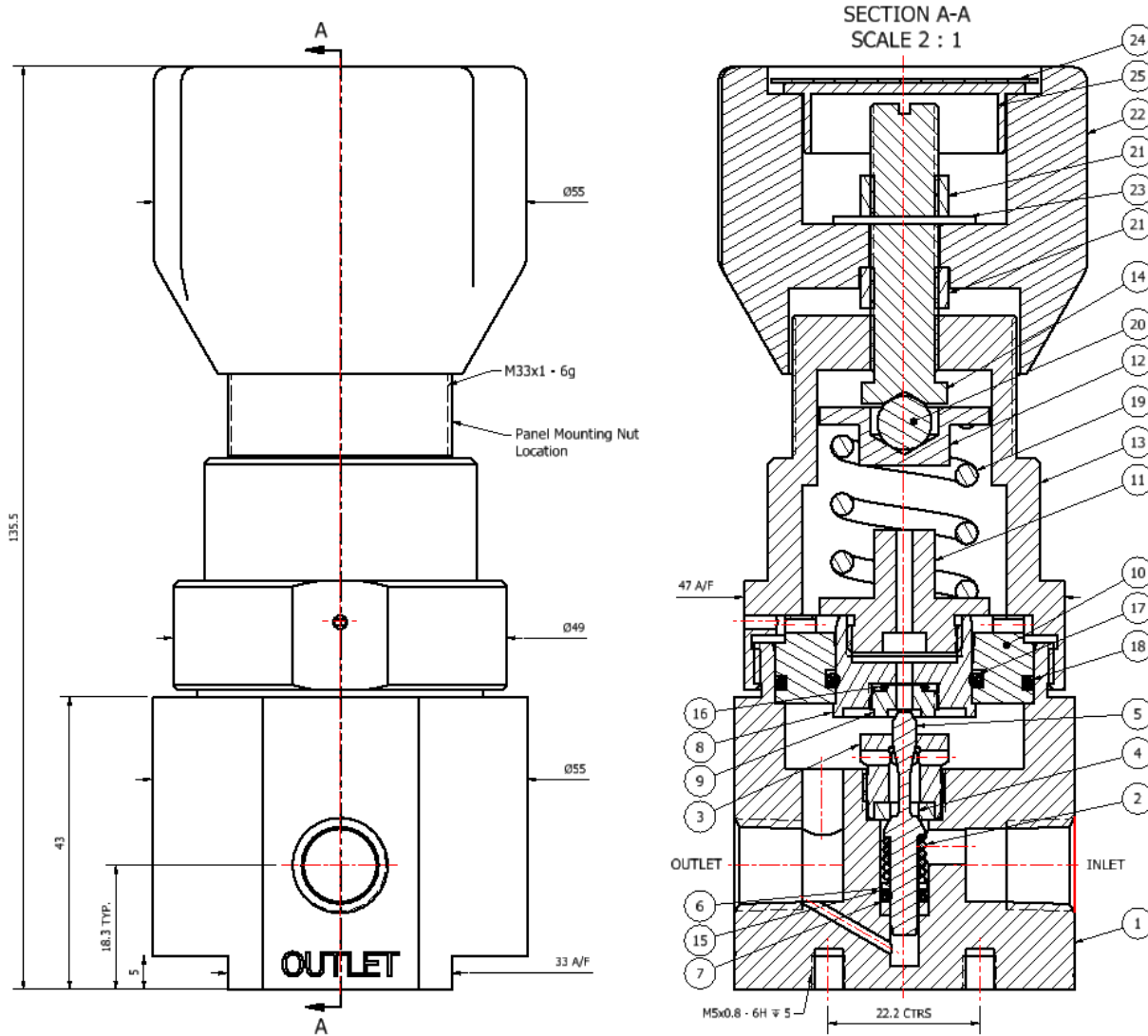
It is not recommended (or necessary) to remove the Hand Wheel during service as this will affect the set point of the regulator. Should it be required to adjust the set point please follow the instructions below:

- i. Remove the Nameplate (24) and Cap (25) from the Hand Wheel (22) and loosen the Lock Nut (21)/Washer (23) such that the Hand Wheel is able to spin freely on the Adjusting Screw (14)
- 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.
- v. Using a flat headed screwdriver, turn the Adjusting Screw (14) 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 (21) to the base of the Adjusting Screw (14) against the Bonnet (13)
- viii. Position the Hand Wheel (22) onto the Lock Nut (21). Ensure that the Lock Nut and Hand Wheel become engaged
- ix. Fasten the second Lock Nut (21) against the top of the Hand Wheel (22)/Washer (23) and gently begin to tighten using a 13mm socket until it begins to secure itself.
- x. At this point, whilst holding the Hand Wheel (22) continue to tighten whilst simultaneously turning slightly anti-clockwise to prevent it from locking against the Bonnet (13)
- xi. Ensure that the Lock Nut (21) is sufficiently tightened, taking care not to adjust the set point
- xii. Turning of the Hand Wheel (21) should now also turn the Adjusting Screw (14) 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 all the pressure downstream, by turning the Hand Wheel anti-clockwise until the regulator starts to vent through the bonnet.
- xvi. Reduce all the supply pressure, by venting the pressure through ball/needle valve and then turning the Hand Wheel anti-clockwise until the regulator closes
- xvii. Apply a small amount of Loctite 243 Thread Locker, all around the top diameter of the upper lock nut (21), so that the Loctite penetrates the thread, where the nut makes contact with the adjusting screw (14).

- xviii. The Cap (25) and Nameplate (24) can now be placed into the Hand Wheel (22). Ensure that the information stated on the Nameplate is in accordance with the set pressure of the regulator.

6.2.3. Figure 2 – Sectional View of the MF-101 Balanced Design

\* ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE STATED.



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	PT-101-MF-N-SS-02N-002	'N' PORTING BODY - 1/4" NPT - BALANCED
2	1	PT-C-006-009-001	MAIN VALVE SPRING
3	1	PT-C-080-005	SEAT RETAINER - SV
4	1	PT-C-081-008	SEAT
5	1	PT-LCR-414-001-002	BALANCED MAIN VALVE
6	1	PT-LCR-414-002	FRONT BACK UP
7	1	PT-LCR-414-003	PTFE BACK UP RING
8	1	PT-101-001-001	20MM SENSOR
9	1	PT-690-016-003	PCTFE VENT SEAT
10	1	PT-BP-301-001-002	20MM SENSOR HOLDER
11	1	PT-BP-301-003-002	LOWER SPRING REST
12	1	PT-C-017	UPPER SPRING REST
13	1	PT-C-015	BONNET
14	1	PT-C-019-003	ADJUSTING SCREW
15	1	OR-BS007	O' RING STD
16	1	OR-0050-10	O' RING STD
17	1	OR-0190-20	O' RING STD
18	1	OR-BS028	O' RING STD
19	1	PT-C-011-XXX	LOAD SPRING
20	1	BALL-008-SS-316	BALL BEARING
21	2	PT-C-020	LOCKNUT
22	1	PT-C-021	SMALL HANDWHEEL
23	1	FIT-M10-A2-CRI-WASHER	CRINKLE WASHER
24	1	PT-C-022	NAMEPLATE
25	1	FIT-CAP-4343092	NAMEPLATE CAP

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## 7. Technical Data

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

Max Inlet Pressure:	<i>Valve Assembly</i>	<i>Seat Material</i>	<i>Pressure</i>
	Unbalanced	PCTFE	100 bar (1500 Psi)
	Balanced	PCTFE	300 bar (4350Psi)
	Balanced	PEEK®	414 bar (6000 Psi)

Outlet Pressure Range: 0-35 bar (510Psi)

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

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

Flow Capacity (Cv): 0.5

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.