



THE MF-230 SERIES

Operating and Service Manual

Series includes all variants of MF-230

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1. Description

The MF-230 is a versatile and economical medium-flow pressure regulator for gas and liquid applications with a large sensitive elastomeric diaphragm.

The MF-230 features a balanced main valve design as standard which minimises load on the seat and provides stable pressure control under decaying inlet conditions. Additionally, servicing is simplified with easy access to the seat cartridge from the base of the regulator.

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

The MF-230 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 MF-230 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-230 (Balanced 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 (20) secured in a vice*, carefully loosen and remove the bottom nut (13) using a 30mm socket or open-ended spanner.
*NOTE: 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. Lift the bottom nut (13) from the regulator body (20). The main valve (19) and main valve spring (14) will be secured by the o-ring (3) and will likely come away with the bottom nut (13), otherwise proceed to remove the main valve (19) and main valve spring (14) from the assembly.
- iii. Carefully remove the soft seat (26) and o-ring (4) from the assembly*.
*NOTE: As the main valve assembly is a compression-based design, the soft seat may be secured in the bottom nut upon its removal.
- iv. Where necessary, disassemble the soft seat (26), main valve (19) and main valve spring (14) from the bottom nut (13).
- v. Visually inspect the sealing face (chamfer) of the soft seat (26) and the main valve (19) for signs of damage and replace as required.
- vi. Remove and replace the o-rings (3, 4, 5) as required.
- vii. Install o-ring (5) around the bottom nut (13).
- viii. Place the bottom nut (13) on a flat surface and drop the main valve spring (14) into the bore.
- ix. With o-ring (3) installed and suitably lubricated, lower the main valve (19) into the bottom nut (13) through the main valve spring (14) and press down until the o-ring has engaged in the lower bore.
- x. Position the soft seat (26) over the main valve (19), taking care not to damage the sealing face as it passes the valve.
- xi. Install o-ring (4) around the soft seat (26).
- xii. Remove the regulator body (20) from the vice and whilst holding upright, insert the main valve assembly, ensuring that the main valve (19) passes through the air deflector (16) and screw in place until finger tight.
- xiii. Secure the assembly in a vice and proceed to tighten the bottom nut to 14Nm.

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. Accessing the Diaphragm

To access the Diaphragm:

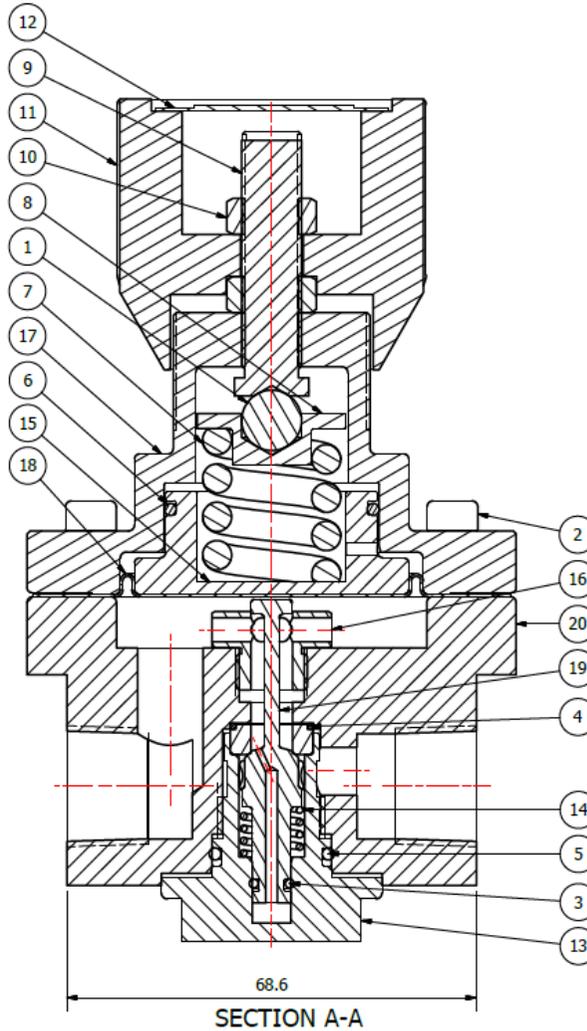
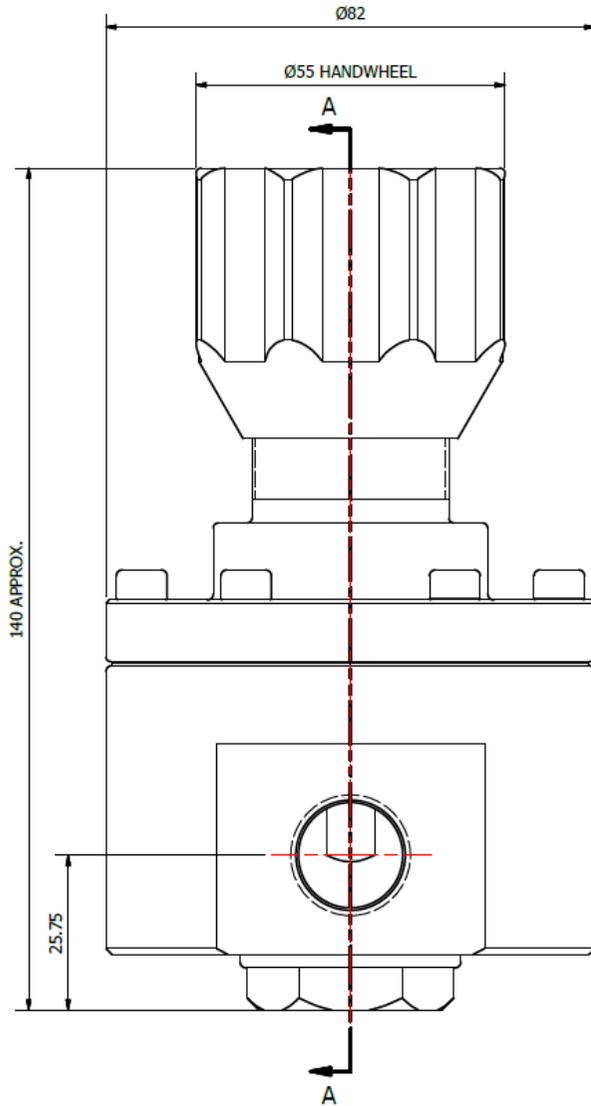
- i. Secure the regulator body (20) in a vice and use a 4mm Allen key to remove* the 6x M5 cap screws (2) from the regulator body.
- ii. *NOTE: It is recommended to loosen one screw, followed by the screw directly opposite and then proceed in either clockwise or anti-clockwise direction until all screws have been loosened before completely removing the screws.
- iii. Lift the bonnet (17) from the assembly, taking care to support the diaphragm (18) and spring rest (15).
- iv. The air deflector (16) is accessible at this point and can be removed* with a 20mm socket.
*NOTE: It is not necessary to remove the air deflector. If it is required to replace or reassemble the part, install finger tight and then tighten to 12Nm using a 20mm socket.
- v. Remove the diaphragm (18) and visually inspect for signs of damage or tearing. Replace diaphragm (18) as required.
- vi. Remove the spring rest (15) from the bonnet (17) to access the o-ring (6) and replace as required.
- vii. Install o-ring (6) around the spring rest (15) ensuring it has been suitably lubricated.
- viii. To reassemble the top works, place the spring rest (15) on a flat surface and drop the load spring (7) into the bore.
- ix. Then place the upper spring rest (8) and ball bearing (1) onto the load spring (7).
- x. The bonnet (17) can then be placed over the spring rest (15) to create the top works assembly.
- xi. Turn the assembly upside down and then locate the diaphragm (18) carefully around the spring rest (15) and rotate until the PCD is correctly oriented with the bonnet (17).
- xii. Position the complete top works assembly carefully onto the regulator body (20) ensuring the holes of the PCD are all correctly in line.
- xiii. Locate the 6x M5 cap screws (2) through the bonnet (17) into the regulator body (20) and screw until finger tight. Proceed to tighten the screws using 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 5Nm when tightening.

6.1.3. 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 (12) and Cap from the Hand Wheel (11) and loosen the Lock Nut (10) such that the Hand Wheel is able to spin freely on the Adjusting Screw (9)
- 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 (20) 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 (9) 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 (10) to the base of the Adjusting Screw (9) against the Bonnet (17)
- viii. Position the Hand Wheel (11) onto the Lock Nut (10). Ensure that the Lock Nut and Hand Wheel become engaged
- ix. Fasten the second Lock Nut (10) against the Hand Wheel (11) and gently begin to tighten using a 13mm socket until it begins to secure itself
- x. At this point, whilst holding the Hand Wheel (11) continue to tighten whilst simultaneously turning slightly anti-clockwise to prevent it from locking against the Bonnet (17)
- xi. Ensure that the Lock Nut (10) is sufficiently tightened, taking care not to adjust the set point
- xii. Turning of the Hand Wheel (11) should now also turn the Adjusting Screw (9) 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 and Nameplate (12) can now be placed into the Hand Wheel (11). Ensure that the information stated on the Nameplate is in accordance with the set pressure of the regulator

6.1.4. Figure 1 – Sectional View of the MF-230 Balanced Design



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	BALL-010-SS-316	10MM BALL BEARING
2	FIT-M5-25-ZP-CAP-SCRW-12.9	M5 x 25 ZINC PLATED CAP SCREW 12.9
3	OR-0045-15-XX	O-RING STD
4	OR-0101-16-XX	O-RING STD
5	OR-0170-20-XX	O-RING STD
6	OR-0320-20-XX	O-RING STD
7	PT-C-011-XXX	LOAD SPRING VARIOUS
8	PT-C-017	UPPER SPRING REST
9	PT-C-019-003	ADJUSTING SCREW
10	PT-C-020	LOCKNUT
11	PT-C-021	SMALL HAND WHEEL
12	PT-C-022	NAMEPLATE
13	PT-MF-230-001	BOTTOM NUT
14	PT-MF-230-003	MAIN VALVE SPRING
15	PT-MF-230-004	SPRING REST
16	PT-MF-230-005	AIR DEFLECTOR
17	PT-MF-230-007	BONNET
18	PT-MF-230-008	ELASTOMERIC DIAPHRAGM
19	PT-MF-230-009	MAIN VALVE
20	PT-MF-230-01-SS-04N-XX	REGULATOR BODY
26	PT-MF-230-006-XX	SOFT SEAT CV 1.0

7. Technical Data

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

Max Inlet Pressure:	Valve Assembly	Seat Material	Pressure
	Balanced	PCTFE	230 bar (3350 Psi)
	Balanced	PEEK®	300 bar (4350 Psi)
	Unbalanced	PCTFE	35 bar (510 Psi)

Outlet Pressure Range: 0-10 bar (145 Psi)

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

Materials:	Body / Trim	HT Brass 316 SS
	Seat	PTFE PCTFE PEEK®
Flow Capacity (Cv):	1.0	
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.