



THE MF-400 SERIES

Operating and Service Manual

Series includes all variants of MF-400/401

Issue A
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1. Description

The MF-400 series are medium flow pressure regulators with a Cv of 2.0 and are available for use on both gas or liquid applications. Diaphragm and piston sensed options are available. The MF-400 series boasts both balanced and un-balanced main valve options providing maximum rated inlet pressures of 400 bar and 50 bar respectively.

The diaphragm sensed MF-400 is capable of a maximum outlet pressure of 10 bar. The piston sensed MF-401 option is able to control pressures of up to 250 bar.

The regulator housing and 'wetted' components are precision machined from 316 Stainless Steel unless otherwise specified.

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.

The MF-400 series may be offered with pressure limiting, pressure locking or pre-set pressure options:

Pressure limited regulators are fitted with locknuts on the adjusting mechanism in order to limit the maximum allowable downstream pressure. Regulators fitted with pressure limiting locknuts will state the limited pressure on the regulator label and this will also be indicated in the part number.

Pressure locking regulators are fitted with a locking cap which may be set (when specified) to pre-determined requirements. It is secured in place by three M5 grub screws which lock against the bonnet of the regulator creating an anti-tamper device to ensure the pressure cannot be adjusted accidentally.

Pre-set pressure regulators are adjusted (factory set) to specified customer requirements within a given pressure range.

Both pressure locking and pre-set pressure regulators will be fully adjustable through a given pressure range and the maximum allowable working pressures will be indicated on the regulator label and in the part number.

*Note - A table is available on request defining allowable tolerances for set points within a given pressure range.

4. Special Conditions for Safe Use

The MF-400 series are non-venting type regulators, therefore 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-400/401 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-400

*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 regulator body (14) firmly gripped in a vice, use an adjustable or open ended wrench to loosen and remove the bottom nut (6)
- ii. The main valve (12), soft seat (13) and valve spring (25) are housed in the bottom nut (6) and can be removed by first lifting the main valve (12) from the bottom nut (6)
- iii. Removal of the main valve (12) will in turn lift the soft seat (13) from the assembly
- iv. The valve spring (25) can also then be removed

- v. Visually inspect the sealing edge of the soft seat (13) and main valve (12) for signs of damage and replace as necessary
- vi. Replace all o-rings (22, 23)
- vii. Place the valve spring (25) into the bottom nut (6) and then position the main valve (12) onto it ensuring that there is smooth movement when pressing down against it
- viii. Carefully place the soft seat (13) over the main valve (12) and guide into the bottom nut (6)
- ix. Carefully position the MVA into the regulator body
*Note – It is useful (where possible) to do this with the main valve (12) pointing upwards to prevent the soft seat (13) or o-ring (22) from moving out of position

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.

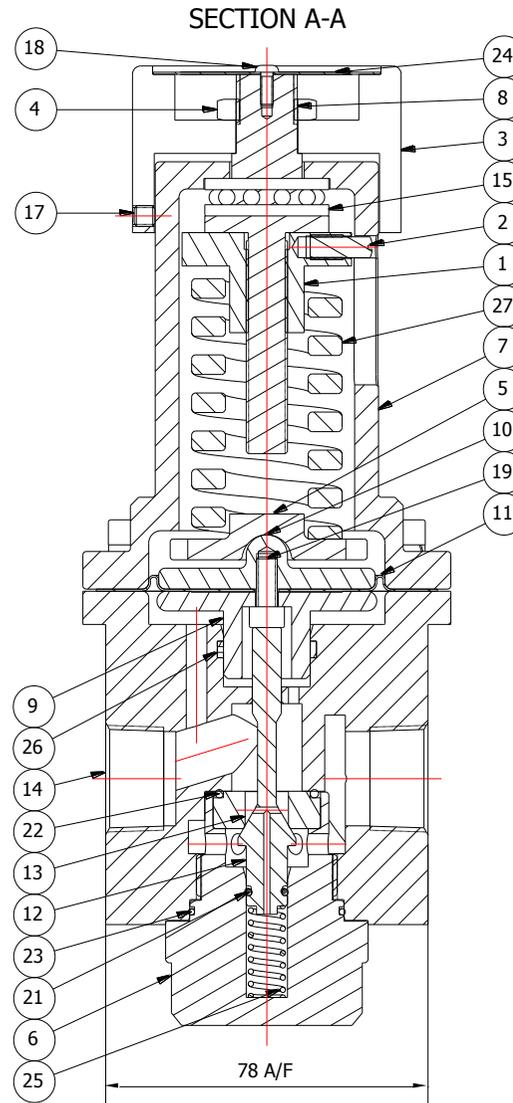
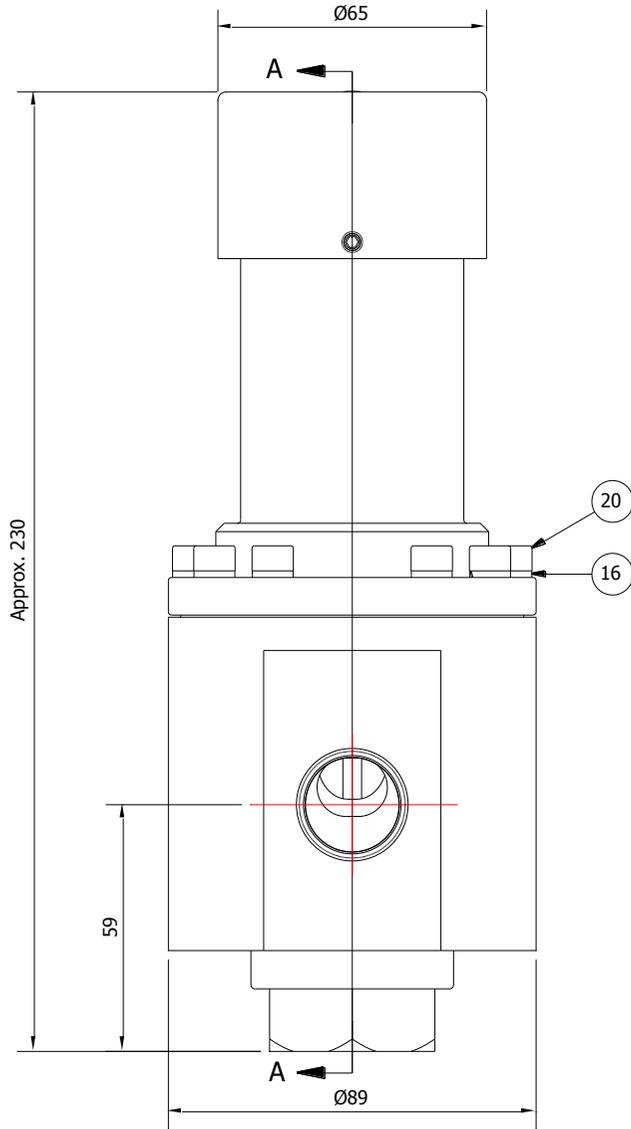
6.1.2. Accessing the Diaphragm Assembly

The loading mechanism and diaphragm assembly for the MF-400 can be accessed from the top of the regulator. Ensure that the spring is de-compressed by rotating the adjusting mechanism fully anti-clockwise and follow the instructions below:

- i. Loosen and remove the ten M6 socket head cap screws (20) which secure the bonnet (7) to the regulator body (14)
- ii. Lift the bonnet assembly (1-4, 7, 8, 15, 18, 24) and load spring (27) away from the body (14).
*Note - It is not necessary to remove the locking hand wheel (3) from the assembly unless it is believed that there is a problem with the adjusting mechanism
- iii. Remove the lower spring rest (5)
- iv. The diaphragm assembly (9, 10, 11, 19) can then be removed from the regulator body (14)
- v. To replace the diaphragm (11), secure the lower diaphragm washer (9) and remove the M5 screw (19), the upper and lower diaphragm supports (9, 10) can now be separated (discard of any used or damaged diaphragms)
- vi. Position the new diaphragm between the upper and lower diaphragm supports and secure the M5 screw in place
- vii. Locate the lower diaphragm support (9) over the main valve (12) and line the perforations of the diaphragm (11) up with the tapped holes in the regulator body (14)
- viii. Place the spring rest (5) onto the upper diaphragm support (10)
- ix. Lift the bonnet assembly whilst supporting the load spring (27) from below and guide the load spring (27) onto the spring rest (5)
- x. Then position the bonnet assembly over the regulator body (14) carefully, aligning the three sets of holes on the PCD
- xi. Secure the ten M6 socket head cap screws (20) in place and tighten securely

ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE STATED.

6.1.3. Figure 1 – Sectional View of the MF-400



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-C-045	ADJUSTING NUT
2	PT-C-046	SCREW
3	PT-C-100-003	LOCKING HAND WHEEL
4	PT-C-132	LOCK NUT
5	PT-HF-300-003	SPRING REST
6	PT-MF-400-003	BOTTOM NUT
7	PT-MF-400-004	BONNET
8	PT-MF-400-006	ADJUSTING SCREW
9	PT-MF-400-008	LOWER DIAPHRAGM WASHER
10	PT-MF-400-009	UPPER DIAPHRAGM WASHER
11	PT-MF-400-016	DIAPHRAGM
12	PT-MF-400-024	MAIN VALVE
13	PT-MF-400-025	SEAT CV 2.0
14	PT-MF-400-2-M-SS-06N	BODY 3/4" NPT - 'M' PORTING
15	BEAR-51103-SS	BALL BEARING
16	FIT-M6-A4-SPR-WASHER	SPRING WASHER
17	FIT-M5-05-A2-70.0-SKT-SET	SET GRUB SCREW
18	FIT-M3-08-A2-70.0-SKT-BTN	HEXAGON BUTTON SCREW
19	FIT-M5-14-A2-70.0-SKT-CAP	HEXAGON CAP SCREW
20	FIT-M6-30-ZP-12.9-SKT-CAP	HEXAGON CAP SCREW
21	OR-0071-16	O' RING STD
22	OR-0210-20	O' RING STD
23	OR-0350-15	O' RING STD
24	PT-C-049	NAME PLATE
25	PT-MF-400-001	SPRING
26	PT-MF-400-007	SLIDE RING
27	SPR-B40-064	SPRING 343 KG LOAD

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6.2. Servicing the MF-401

*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 regulator body (12) firmly gripped in a vice, use an adjustable or open ended wrench to loosen and remove the bottom nut (6)
- ii. The main valve (10), soft seat (9) and valve spring (26) are housed in the bottom nut (6) and can be removed by first lifting the main valve (10) from the bottom nut (6)
- iii. Removal of the main valve (10) will in turn lift the soft seat (9) from the assembly
- iv. The valve spring (26) can also then be removed
- v. Visually inspect the sealing edge of the soft seat (9) and main valve (10) for signs of damage and replace as necessary
- vi. Replace all o-rings (20, 22)
- vii. Place the valve spring (26) into the bottom nut (6) and then position the main valve (10) onto it ensuring that there is smooth movement when pressing down against it
- viii. Carefully place the soft seat (9) over the main valve (10) and guide into the bottom nut (6)
- ix. Carefully position the MVA into the regulator body ensuring that the main valve (10) locates into the sensor (5)

*Note – It is useful (where possible) to do this with the main valve (10) pointing upwards to prevent the soft seat (9) or o-ring (20) from moving out of position

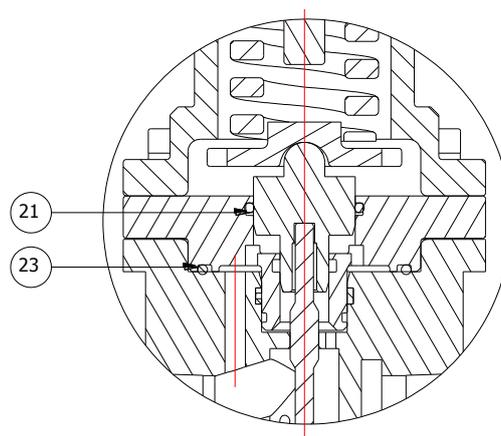
To ensure that the main valve assembly has been correctly and effectively installed it may be required to perform the appropriate seat leak test as per ANSI/FCI 70-2.

6.2.2. Accessing the Sensor Assembly

The loading mechanism and sensor assembly for the MF-401 can be accessed from the top of the regulator. Ensure that the spring is de-compressed by rotating the adjusting mechanism fully anti-clockwise and follow the instructions below:

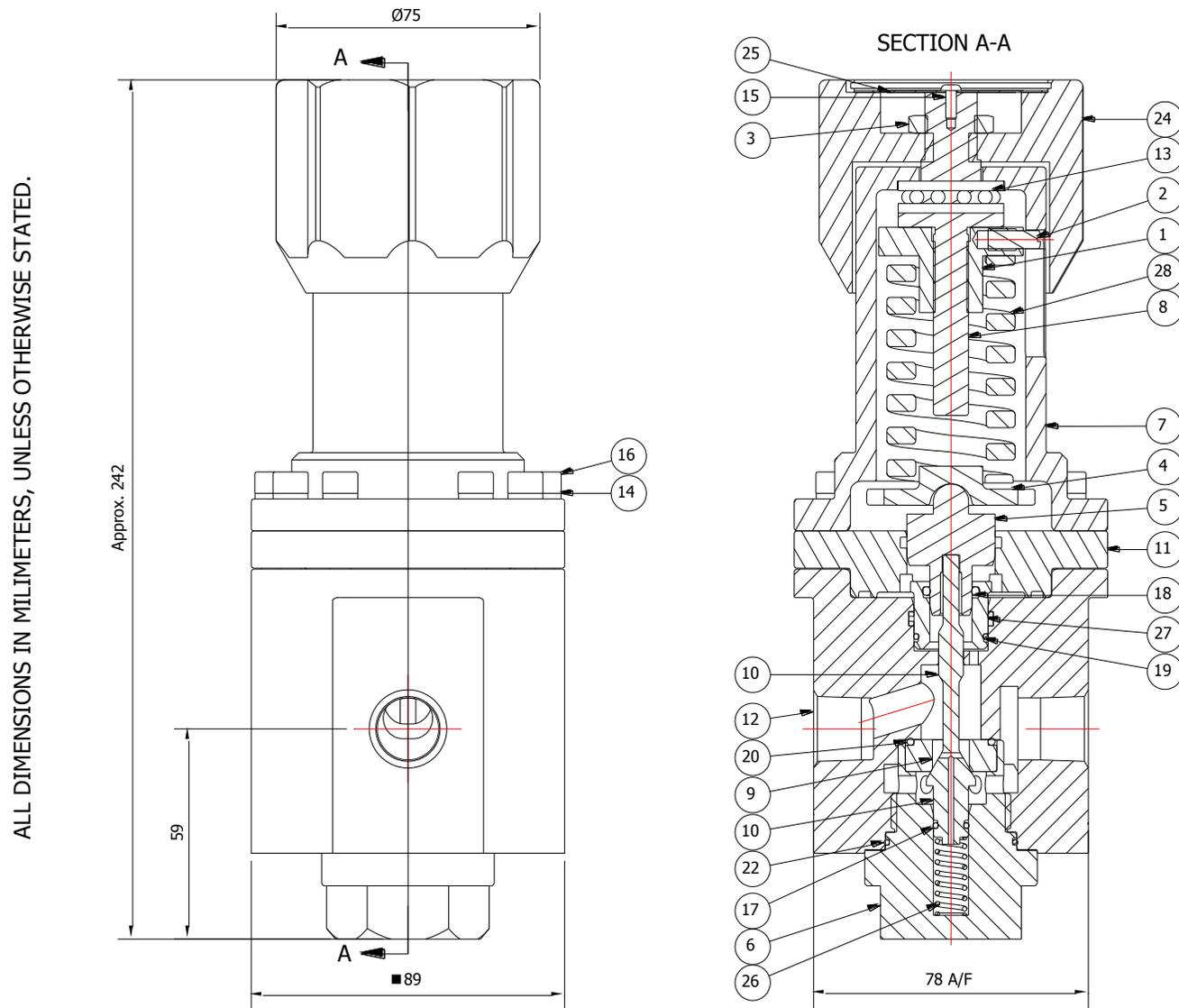
- i. Loosen and remove the ten M6 socket head cap screws (16) which secure the bonnet (7) to the regulator body (12)
- ii. Lift the bonnet assembly (1-3, 7, 8, 13, 15, 24, 25) and load spring (28) away from the body (12).
*Note - It is not necessary to remove the hand wheel (24) from the assembly unless it is believed that there is a problem with the adjusting mechanism
- iii. Remove the lower spring rest (4)
- iv. Lift the sensor assembly from the regulator body (12) and separate the sensor (5) and sensor holder (11)
- v. Replace the o-rings (18, 19) located within the sensor holder (11)
- vi. Reassemble the sensor assembly, then place into the regulator body (12) and align the holes on the PCD
- vii. Lift the bonnet assembly whilst supporting the load spring (28) from below and guide the load spring (28) onto the spring rest (4)
- viii. Then position the bonnet assembly over the regulator body (12) carefully, aligning the three sets of holes on the PCD
- ix. Secure the ten M6 socket head cap screws (16) in place and tighten securely

The sensing mechanism on the MF-401 is designed such that either 12mm or 25mm sensing may be achieved by use of differing o-rings. Items 21 (24.6 x 2.4mm) and 23 (47.6 x 2.4mm) in the sectional diagram below are the o-rings which are required to achieve the 25mm sensing option.



25mm SENSOR DETAIL

6.2.3. Figure 2 – Sectional View of the MF-401



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-C-045	ADJUSTING NUT
2	PT-C-046	SCREW
3	PT-C-132	LOCK NUT
4	PT-HF-300-003	SPRING REST
5	PT-HF-301-003	SENSOR 12MM/25MM
6	PT-MF-400-003	BOTTOM NUT
7	PT-MF-400-004	BONNET
8	PT-MF-400-006	ADJUSTING SCREW
9	PT-MF-400-025	SEAT CV 2.0
10	PT-MF-401-001	MAIN VALVE
11	PT-MF-401-002	SENSOR HOLDER
12	PT-MF-401-2-A-SS-06N	BODY 'A' PORTING 3/4" NPT
13	BEAR-51103-SS	BALL BEARING
14	FIT-M6-A4-SPR-WASHER	SPRING WASHER
15	FIT-M3-08-A2-70.0-SKT-BTN	HEXAGON BUTTON SCREW
16	FIT-M6-40-ZP-12.9-SKT-CAP	HEXAGON CAP SCREW
17	OR-0071-16	O' RING STD
18	OR-0116-24	O' RING STD
19	OR-0181-16	O' RING STD
20	OR-0210-20	O' RING STD
21	OR-0246-24	O' RING STD
22	OR-0350-15	O' RING STD
23	OR-0476-24	O' RING STD
24	PT-C-048-001	LARGE NYLON HAND WHEEL
25	PT-C-049	NAME PLATE
26	PT-MF-400-001	SPRING
27	PT-MF-400-007	SLIDE RING
28	SPR-B40-064	SPRING 343 KG LOAD

7. Technical Data

Fluid Media:	All gases and liquids compatible with materials of construction
Max Inlet Pressure:	Balanced Main Valve – 400 bar Unbalanced Main Valve – 50 bar
Outlet Pressure Range:	0-10 bar (MF-400), 0-250 bar (MF-401)
Operating Temperature:	-20°C to +80°C
Materials:	Body and Trim: 316 SS Diaphragm: Nitrile / Viton Extreme Seat: PCTFE / PEEK®
Flow Capacity (Cv):	2
Leakage:	Liquid: Zero drops of water at max inlet Gas: Bubble tight

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.