



THE HF-300 SERIES

Operating and Service Manual

Series includes all variants of HF-300/301

Issue B
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1. Description

The HF-300 series are high flow pressure regulators with a Cv of 4.0 and are available for use on both gas or liquid applications. Diaphragm and piston sensed options are available. The maximum rated inlet pressure for this series is 300 bar.

The diaphragm sensed HF-300 is capable of a maximum outlet pressure of 10 bar. The piston sensed HF-301 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

3.1. Spring Loaded

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.

3.2. Dome Loaded

Dome loaded control mechanisms require a control of pressure to a port in the regulator bonnet. An increase in pressure supplied to the dome results in an increase in the outlet pressure downstream of the regulator. A specific ratio of dome pressure to outlet pressure may apply. Please contact the office for further information.

To reduce the outlet pressure, reduce the pressure supplied to the dome whilst the media is flowing or vented downstream.

Ensure that an inlet pressure is supplied to the regulator at all times whilst dome pressure is applied. Failure to do so may result in damage to the regulator.

3.3. Pilot Dome Loaded

The pilot controlled dome loading mechanism operates in a similar way to the standard dome loading mechanism, whereby increasing pressure into the dome will result in an increase in outlet pressure downstream of the regulator.

The pilot regulator feeds off the same supply as the regulator itself and can be monitored on the inlet pressure gauge connected to the pilot regulator. Turning the hand wheel clockwise on the pilot regulator allows pressure to increase in the dome. The dome pressure can be monitored on the outlet pressure gauge connected to the pilot regulator.

The pilot regulator is 'self venting' and pressure in the dome may be reduced by turning the hand wheel on the pilot regulator anti-clockwise. The outlet pressure of the regulator will then be reduced provided that the media is flowing or vented downstream.

4. Special Conditions for Safe Use

The HF-300 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 HF-300/301 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 will be used on, 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 HF-300

*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 (17) firmly gripped in a vice, use an adjustable or open ended wrench to loosen and remove the bottom nut (19)
- ii. The main valve (22), seat holder (21), soft seat (23), valve spring (20) and o-rings (25, 26, 27) can then be removed from the assembly
- iii. Remove the body seat (18) and o-ring (24) from the regulator body
- iv. To disassemble the main valve, grip the flats of the seat holder (21) in a vice and remove the main valve (22) using a 7mm open ended spanner. The soft seat (23) and o-ring (25) can then be removed
- v. Visually inspect the body seat (18) and soft seat (23) and seals (24, 25, 26) for signs of damage or contamination and replace as necessary

Re-assembly:

- vi. Place the o-ring (24) into the groove of the body seat (18) and then screw into the regulator body (17) and tighten securely
*Note – It is useful to use lubricant to maintain the position of this o-ring
- vii. Place the o-ring (25) into the groove in the top of the seat holder (21) and then locate the soft seat (23) into the holder
- viii. Screw the main valve (22) into the seat holder (21) and tighten using a 7mm open ended spanner with the flats of the seat holder secured in a vice
- ix. Place the o-ring (27) into the groove of the bottom nut ()
*Note – It is useful to use lubricant to maintain the position of this o-ring
- x. Use an appropriate lubricant for the o-ring (26) on the seat holder (21) and then, with the regulator body secured upside down, position the valve assembly (21, 22, 23) into the regulator body (17) ensuring that the main valve (22) locates into the pin holder (3)
- xi. Position the valve spring (20) around the step at the base of the seat holder (21)
- xii. Position the bottom nut (19), ensuring that the valve spring (20) locates into its bore and then screw into the regulator body (17) tightening securely

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

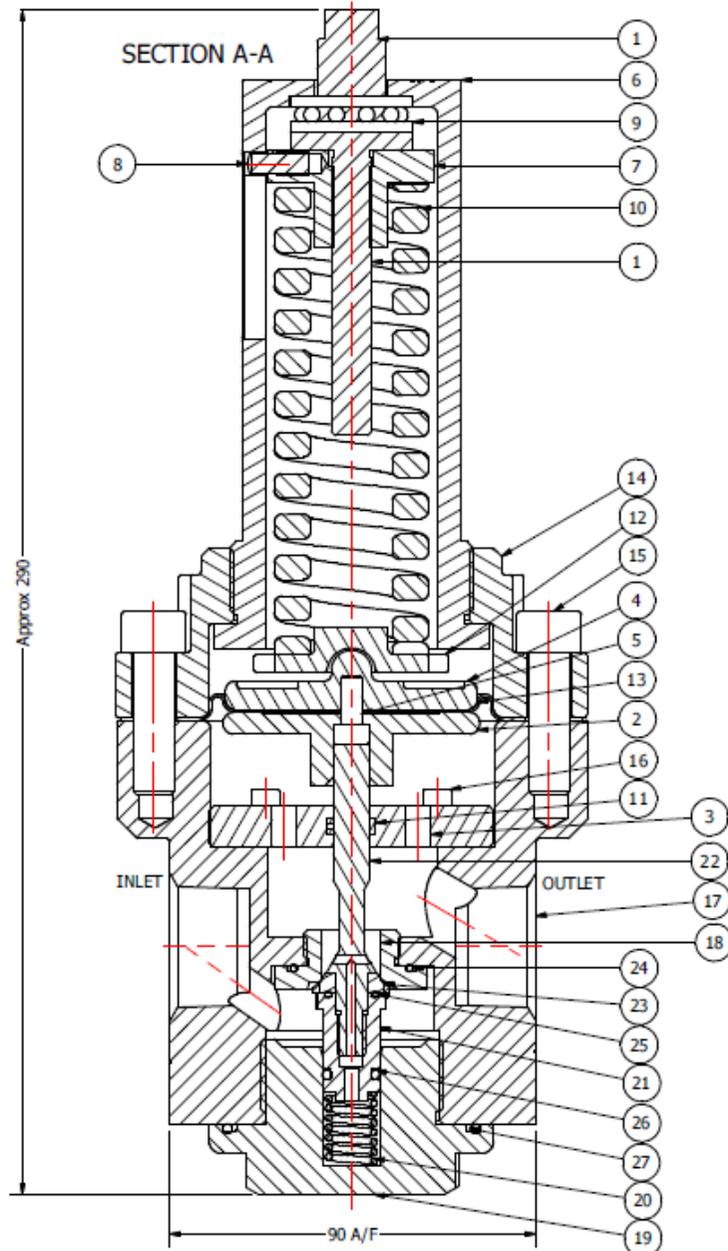
The loading mechanism and diaphragm assembly for the HF-300 can be accessed from the top of the regulator. Ensure that the spring is de-compressed by rotating the adjusting mechanism fully anti-clockwise and follow the instructions below:

- i. Loosen and remove the eight M10 socket head cap screws (15) which secure the bonnet (6, 14) to the regulator body (17)
- ii. Lift the bonnet assembly away from the body (17) and place upside down
*Note – It is advisable to tilt the bonnet assembly to the side until the spring may be supported from underneath. This allows the adjusting mechanism to remain secured inside the upper bonnet during removal
- iii. Remove the lower spring rest (15)
- iv. The diaphragm assembly (2, 4, 5, 13) can then be removed from the regulator body (17)
- v. To replace the diaphragm (13), secure the lower diaphragm washer (2) and remove the M5 screw (5), the upper and lower diaphragm supports (2, 4) can now be separated (discard of any used or damaged diaphragms)

Re-assembly:

- vi. Position the new diaphragm (13) between the upper and lower diaphragm supports (2, 4) and secure the M5 screw (5) in place
- vii. Locate the lower diaphragm support (2) over the main valve (22) and line the perforations of the diaphragm (13) up with the tapped holes in the regulator body (17)
- viii. Place the spring rest (12) onto the upper diaphragm support (4)
- ix. Hold the bonnet assembly whilst supporting the load spring (10) from below, this is to ensure that the adjusting mechanism within remains in place
- x. Guide the load spring (10) onto the spring rest (12) and then position the bonnet assembly over the regulator body (17) carefully, aligning the three sets of holes on the PCD
- xi. Secure the eight M10 socket head cap screws (15) in place and tighten securely

6.1.3. Figure 1 – Sectional View of the HF-300



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-HF-300-011	ADJUSTING SCREW
2	PT-HF-300-012	LOWER DIAPHRAGM WASHER
3	PT-HF-300-008	PIN HOLDER
4	PT-HF-300-013	UPPER DIAPHRAGM WASHER
5	FIT-M5-12-A4-70.0-SKT-CAP	M5x15MM SOCKET CAP SCREW
6	PT-HF-300-006	UPPER BONNET
7	PT-C-045	ADJUSTING NUT
8	PT-C-046	ADJUSTING NUT SCREW
9	BEAR-51103-SS	SS BEARING
10	SPR-R40X115	LOAD SPRING
11	PT-C-097	SLIDE RING
12	PT-HF-300-003	SPRING REST
13	PT-HF-300-014-002	DIAPHRAGM (NBR)
14	PT-HF-300-005	LOWER BONNET
15	FIT-M10X35-ZP-CAP-SCRW-12.9	M10x35MM SOCKET CAP SCREW
16	FIT-M4-20-A4-70.0-SKT-CAP	M4x20MM SOCKET CAP SCREW
17	PT-HF-300-4-N-SS-XXX	BODY – N PORTING
18	PT-HF-300-002	SEAT
19	PT-HF-300-004	BOTTOM NUT
20	PT-HF-300-001	VALVE SPRING
21	PT-HF-300-010	SEAT HOLDER
22	PT-HF-300-007	MAIN VALVE
23	PT-HF-300-009	SOFT SEAT (PEEK)
24	OR-BS1806-023	BS023 O-RING
25	OR-BS4518-0091-16	9.1MMx1.6MM O-RING
26	OR-BS4518-0096-24	9.6MMx2.4MM O-RING
27	OR-BS4518-0586-24	58.6MMx2.4MM O-RING

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6.2. Servicing the HF-301

*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 (17) firmly gripped in a vice, use an adjustable or open ended wrench to loosen and remove the bottom nut (16)
- ii. The main valve (23), seat holder (20), soft seat (19), valve spring (13) and o-rings (5, 7, 10) can then be removed from the assembly
- iii. Remove the body seat (14) and o-ring (6) from the regulator body (17)
- iv. To disassemble the main valve, grip the flats of the seat holder (20) in a vice and remove the main valve (23) using a 7mm open ended spanner. The soft seat (19) and o-ring (7) can then be removed
- v. Visually inspect the body seat (14) and soft seat (19) and seals (5, 6, 7) for signs of damage or contamination and replace as necessary

Re-assembly:

- i. Place the o-ring (6) into the groove of the body seat (14) and then screw into the regulator body (17) and tighten securely
*Note – It is useful to use lubricant to maintain the position of this o-ring
- ii. Place the o-ring (7) into the groove in the top of the seat holder (20) and then locate the soft seat (19) into the holder
- iii. Screw the main valve (23) into the seat holder (20) and tighten using a 7mm open ended spanner with the flats of the seat holder secured in a vice
- iv. Place the o-ring (10) into the groove of the bottom nut (16)
*Note – It is useful to use lubricant to maintain the position of this o-ring
- v. Use an appropriate lubricant for the o-ring (5) on the seat holder (20) and then, with the regulator body secured upside down, position the valve assembly (19, 20, 23) into the regulator body (17) ensuring that the main valve (23) locates into the sensor holder (25)
- vi. Position the valve spring (13) around the step at the base of the seat holder (20)
- vii. Position the bottom nut (16), ensuring that the valve spring (13) locates into its bore and then screw into the regulator body (17) tightening securely

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

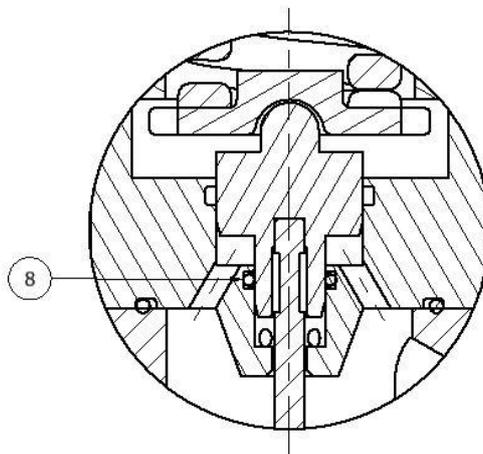
The loading mechanism and sensor assembly for the HF-301 can be accessed from the top of the regulator. Ensure that the spring is de-compressed by rotating the adjusting mechanism fully anti-clockwise and follow the instructions below:

- i. Loosen and remove the eight M10 socket head cap screws (2) which secure the bonnet (18, 22) to the regulator body (17)
- ii. Lift the bonnet assembly away from the body (17) and place upside down
*Note – It is advisable to tilt the bonnet assembly to the side until the spring may be supported from underneath. This allows the adjusting mechanism to remain secured inside the upper bonnet during removal
- iii. Remove the lower spring rest (15)
- iv. The sensor assembly (24, 25) can now be removed from the regulator body (17) and the sensor (24) and sensor holder (25) can be separated
- v. Check and replace all o-ring seals* (8, 9)

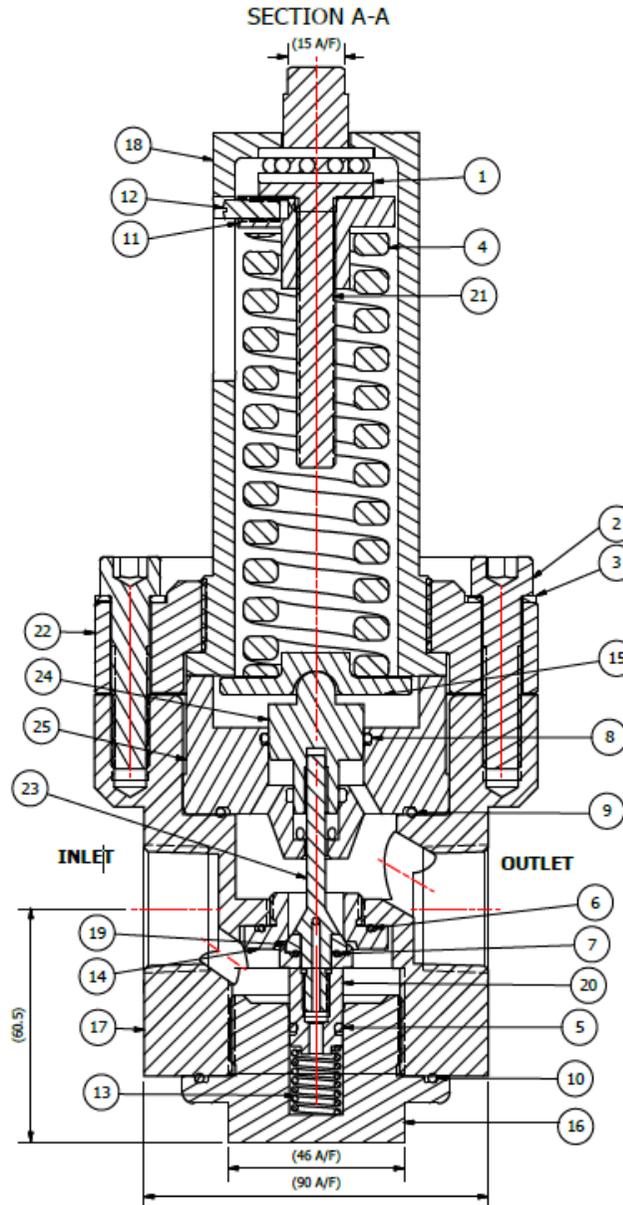
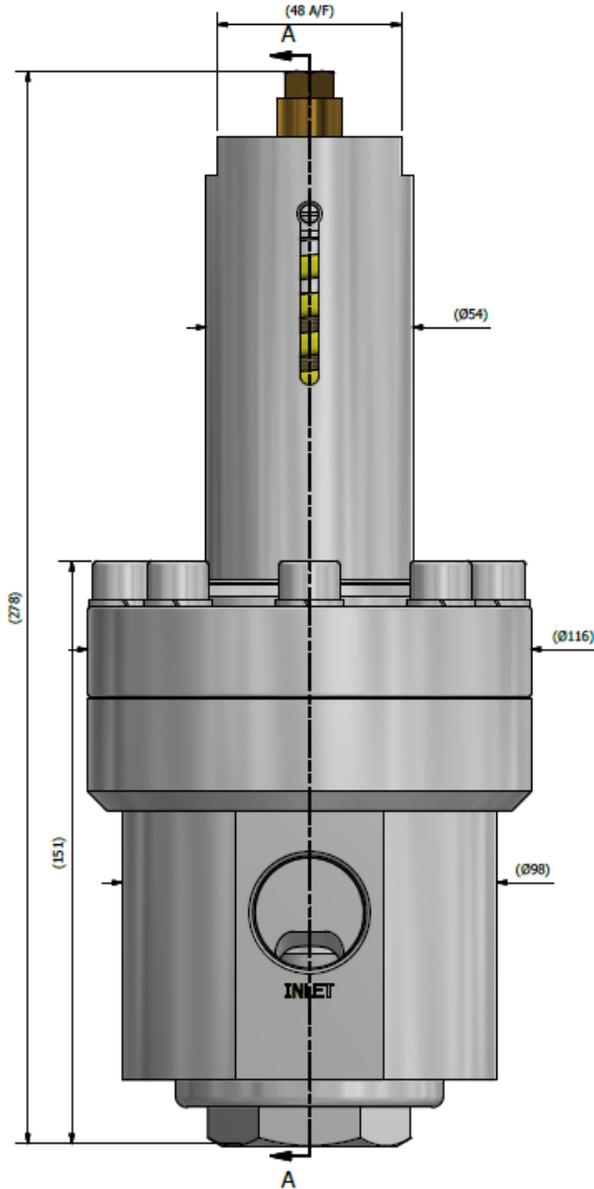
Re-assembly:

- vi. Place o-ring (8) into the sensor holder
- vii. Place o-ring (9) in the face groove of the sensor holder (25)
*Note – It is useful to use lubricant to maintain the position of this o-ring
- viii. Position the sensor holder (25) into the regulator body (17) and insert the sensor (24)
- ix. Place the spring rest (15) onto the sensor (24)
- x. Hold the bonnet assembly whilst supporting the load spring (10) from below, this is to ensure that the adjusting mechanism within remains in place
- xi. Guide the load spring (10) onto the spring rest (12) and then position the bonnet assembly over the regulator body (17) carefully, aligning the three sets of holes on the PCD
- xii. Secure the eight M10 socket head cap screws (15) in place and tighten securely

*The sensing mechanism on the HF-301 is designed such that either 12mm or 25mm sensing may be achieved by use of different o-rings. For regulators with outlet pressures exceeding 100bar, the o-ring (8) will be located around the 12mm diameter of the sensor (24) as shown in sectional diagram below.



6.2.3. Figure 2 – Sectional View of the HF-301



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	BEAR-51103-SS	SS BEARING
2	FIT-M10X45-ZP-CAP-SCRW-12.9	M10x45MM SOCKET CAP SCREW
3	FIT-M10-A4-SPR-WASHER	M10 SPRING WASHER
4	SPR-G40X115	LOAD SPRING
5	OR-BS4518-0096-24	9.6MMx2.4MM O-RING
6	OR-BS1806-023	BS023 O-RING
7	OR-BS4518-0091-16	9.1MMx1.6MM O-RING
8	OR-BS4518-0246-24	24.6MMx2.4MM O-RING
9	OR-BS4518-0476-24	47.6MMx2.4MM O-RING
10	OR-BS4518-0586-24	58.6MMx2.4MM O-RING
11	PT-C-045	ADJUSTING NUT
12	PT-C-046	ADJUSTING NUT SCREW
13	PT-HF-300-001	VALVE SPRING
14	PT-HF-300-002	SEAT
15	PT-HF-300-003	SPRING REST
16	PT-HF-300-004	BOTTOM NUT
17	PT-HF-300-4-N-SS-XXX	BODY – N PORTING
18	PT-HF-300-006	UPPER BONNET
19	PT-HF-300-009	SOFT SEAT (PEEK)
20	PT-HF-300-010	SEAT HOLDER
21	PT-HF-300-011	ADJUSTING SCREW
22	PT-HF-300-001	LOWER BONNET
23	PT-HF-300-002	MAIN VALVE
24	PT-HF-300-003	SENSOR 12MM/25MM
25	PT-HF-300-004-002	SENSOR HOLDER

ALL DIMENSIONS IN MM, UNLESS OTHERWISE STATED

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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>Pressure</i>	
	Balanced Unbalanced	300 bar (4350Psi) 50 bar (750 Psi)	
Outlet Pressure Range:	<i>Valve Assembly</i>	<i>Pressure</i>	
	Balanced Unbalanced	0-10 bar (145 Psi) 0-10 bar (145 Psi)	
Operating Temperature:	-20°C to +80°C Nominal		
Materials:	<i>Body / Trim</i>	<i>Seat Material</i>	<i>Diaphragm</i>
	S31600/S31603	PCTFE PEEK™ VESPEL®	NBR FPM / FKM
Flow Capacity (Cv):	4.0		
Leakage:	<i>Gas</i>	<i>Liquid</i>	
	Bubble tight	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.