PRESSURE TECH

THE HYD-690 SERIES

Operating and Service Manual

Series includes all variants of HYD-690 / HYD-691

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1. Description

The HYD-690/691 is a single stage piston sensed pressure regulator, capable of a maximum 690bar inlet pressure which can then be reduced down to a maximum 690bar outlet pressure.

The HYD-691 incorporates a ceramic seating arrangement which provides ultimate protection against the harsh service encountered on hydraulic systems.

The HYD-690/691 will not provide a positive shut off on gas media.

The housing has been machined from all 316 stainless steel to ensure maximum protection against the media on which it will be used, and the environment in which it will be placed.

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 medium pressure type (MP) ‘A’ and National Pipe Thread (NPT) ‘N’ options are available on this regulator. 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 hand wheel clockwise compresses the load spring, which in turn opens the main valve, and allows the inlet pressure to pass through the orifice until the outlet pressure is equivalent to the loading forces set by the compressed spring.

The HYD-690 incorporates a segregated captured vent, which allows the outlet pressure to be reduced whilst turning the hand wheel anti-clockwise. Excess pressure is vented off through the 'Vent' port marked at the bottom of the regulator. This port should not be plugged or blocked at any time.

The HYD-690 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

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.

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 HYD-690 regulators should only be performed after fully reading and understanding the Operating and Servicing Manual. 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 HYD-690

*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. Remove the securing M3 grub screw (3) from the regulator body (14).
ii. Unscrew the M3 pan screw (2) and remove the name plate (21) from the hand wheel (20).
iii. Unscrew the locknut (25) using a 24mm socket and remove the hand wheel (20) from the adjusting screw (17).
iv. With the regulator secured up-right in a vice, remove the bonnet (15) by using a torque wrench or equivalent with 47mm open end.
v. Un-screw and lift the top works from the assembly, inclusive of the bonnet (15), load spring (16) and adjusting mechanism (1, 17, 18, 19).
vi. The sensor assembly (12, 23, 24, 26, 27) can be removed from the body by using pliers or mole grips against the flats of the spring rest (23).
vii. Grip the flats of the lower spring rest (23) in a vice so that the vent seat (12) is facing.
viii. The vent seat (12) can be removed from the sensor (27) along with the 5mm x 1mm ‘O’ ring (4) using a slotted screwdriver.
ix. Inspect the vent seat (12) for damage and replace as required, being careful not to damage the sealing face during installation.
x. To access the sensor ‘O’ rings, secure the flats of the spring rest (23) in a vice and using an 18mm open ended spanner or adjustable and the sensor (27) can then be removed from the sensor holder (26).

xi. Replace all ‘O’ rings (5, 6, 8, 9, 10, 11) located on the sensor (27) and sensor holder (26) prior to reassembly, ensuring adequate lubrication is used.
xii. Insert the sensor (27) into the sensor holder (26) and screw the lower spring rest (23) in place.
xiii. Grip the flats of the lower spring rest (23) in a vice and tighten the sensor (27) against it using the flats at the base of the sensor.
xiv. With the sensor assembly removed, it is possible to remove the connector pin (13) and baffle plate (22) from the body. Use needle nosed pliers to carefully grip the connector pin and lift out of the body. Alternatively the body may be turned upside down and the baffle plate and connector will drop out.
xv. Visually inspect the connector pin for signs of damage and replace as required.
xvi. The main valve assembly can now be accessed. Using a 19mm socket, loosen and remove the seat cartridge (29) from the body, the main valve (28) and valve spring (30) should also be removed at this stage.
xvii. The sealing edge of the main valve (28) and the seat cartridge (29) should be inspected for damage and replaced as required. Inspections should be performed under a microscope to detect any scratches or damage. Where this is not possible it is recommended to replace both components.
xviii. Replace the 12.6 x 2.4mm ‘O’ ring (7) around the seat cartridge.

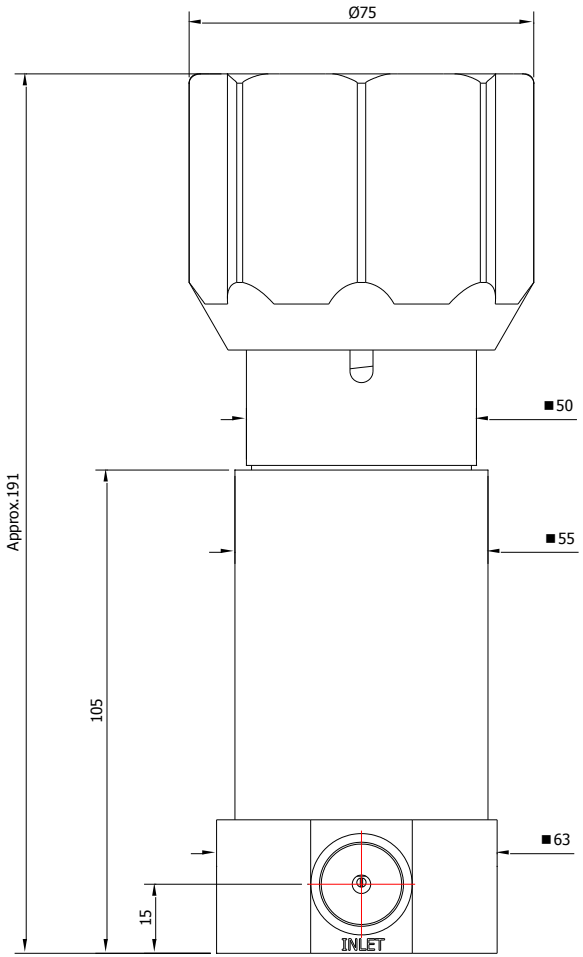
6.1.2. Reassembly

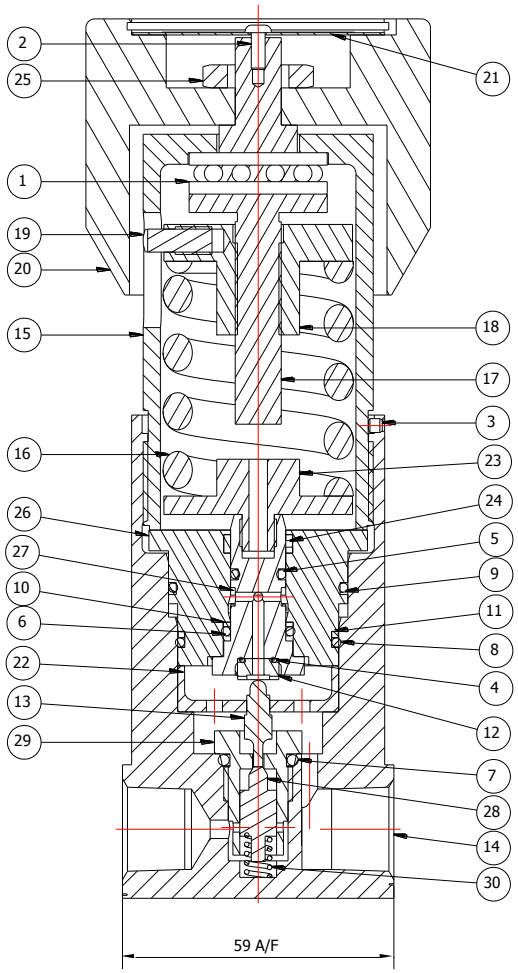
i. To reassemble, place the seat cartridge with the hex down on a flat surface. Place the main valve (28) into the cartridge (29) and place the main valve spring (30) onto the main valve (28).
ii. Holding the body upside down insert the main valve assembly into the body and screw until finger tight.
iii. Turn the body the right way up and then secure the seat cartridge using a 19mm socket.
iv. Once the main valve assembly has been installed, the baffle plate (22) and connector pin (13) can be placed into the body. Position the connector pin (13) into the baffle (22) and grip the top of the connector pin such that the two components may be carefully placed into the bore within the regulator body (14).
v. The sensor assembly (12, 23, 24, 26, 27) may then be placed into the regulator body (14).
vi. Place the load spring (16) onto the spring rest (23) and locate the adjusting mechanism (1, 17, 18, 19) onto the load spring and screw the bonnet (15) onto the body (14).
vii. Torque the bonnet to approximately 90 – 100 Nm and tighten the M3 grub screw to secure the bonnet (15).
viii. Place the hand wheel (20) onto the adjusting screw (17) and screw and tighten the lock nut (25).
ix. Secure the nameplate (21) with the M3 pan screw (2).

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.

6.1.3. Figure 1 – Sectional View of the HYD-690

ALL DIMENSIONS IN MM, UNLESS OTHERWISE STATED





PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	51103-SS	THRUST BALL BEARING
2	FIT-M3-08-A4-70.0-SKT-BTN	SCREW
3	FIT-M3x3	GRUB SCREW
4	OR-0050-10	O' RING STD
5	OR-0080-20	O' RING STD
6	OR-0120-20	O' RING STD
7	OR-0126-24	O' RING STD
8	OR-0320-20	O' RING STD
9	OR-0350-20	O' RING STD
10	PT-C-051-001	PTFE BACK UP RING
11	ORB-PT-C-177	PTFE BACK UP RING
12	PT-690-016-002	VENT SEAT
13	PT-690-015	CONNECTOR PIN
14	PT-690-B-LF-HYD-04N	HYD690 BODY - B PORTING
15	PT-C-040-002	BONNET
16	PT-C-042	500KG LOAD SPRING
17	PT-C-043-004	ADJUSTING SCREW
18	PT-C-045	ADJUSTING NUT
19	PT-C-046	SET SCREW
20	PT-C-048-001	LARGE NYLON HAND WHEEL
21	PT-C-049	NAMEPLATE
22	PT-C-072-001	BAFFLE PLATE
23	PT-C-039	BOTTOM SPRING REST
24	PT-C-037	SLIDE RING
25	PT-C-132	LOCK NUT
26	PT-C-143	SENSOR HOLDER
27	PT-C-144	SENSOR
28	PT-C-088-005-005	MAIN VALVE
29	PT-C-089-005-005	SEAT CARTRIDGE
30	PT-BP-550-004	VALVE SPRING

6.2. Servicing the HYD-691

*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. Remove the securing M3 grub screw (3) from the regulator body (14).
ii. Unscrew the M3 pan screw (2) and remove the name plate (21) from the hand wheel (20).
iii. Unscrew the locknut (25) using a 24mm socket and remove the hand wheel (20) from the adjusting screw (17).
iv. With the regulator secured up-right in a vice, remove the bonnet (15) by using a torque wrench or equivalent with 47mm open end.
v. Un-screw and lift the top works from the assembly, inclusive of the bonnet (15), load spring (16), adjusting mechanism (1, 17, 18, 19) and lower spring rest (23).
vi. Screw an M5 bolt (supplied with kit) into the sensor holder (26) and using pliers, remove the sensor assembly (12, 26, 27) (this is to prevent damage from occurring to the sensor). If the M5 bolt is not available then the dome of the sensor (27) can be used for grip – care must be taken if the removal of the assembly is performed in this manner.
vii. The sensor (27) and sensor holder (26) can now be separated.
viii. After removing from the sensor holder (26), grip the flats of the sensor (27) in a vice so that the vent seat (12) is facing.
ix. The vent seat (12) can be removed from the sensor (27) along with the 5mm x 1mm ‘O’ ring (4) using a slotted screwdriver.
x. Inspect the vent seat (12) for damage and replace as required, being careful not to damage the sealing face of the vent seat during installation.
xi. Replace all ‘O’ rings (5, 6, 8, 9, 10, 11) located on the sensor (27) and sensor holder (26) prior to reassembly, ensuring adequate lubrication is used.
xix. With the sensor assembly removed, it is possible to remove the connector pin (13) and baffle plate (22) from the body. Use needle nosed pliers to carefully grip the connector pin and lift out of the body. Alternatively the body may be turned upside down and the baffle plate and connector will drop out.
xx. Visually inspect the connector pin (13) for signs of damage and replace as required.
xii. The main valve cartridge (28) (housing the main valve assembly) can now be accessed. Using a 19mm socket, loosen and remove the main valve cartridge from the body.

6.2.2. Reassembly

i. Insert the new main valve cartridge (28) into the body (14) and secure with a 19mm socket.

ii. Once the main valve cartridge (28) has been installed, the baffle plate (22) and connector pin (13) can be placed into the body. Position the connector pin (13) into the baffle (22) and grip the top of the connector pin such that the two components may be carefully placed into the bore within the regulator body (14).

iii. The sensor assembly (12, 26, 27) may then be placed into the regulator body (14).

iv. Place the load spring (16) onto the spring rest and locate the adjusting mechanism (1, 17, 18, 19) onto the load spring and screw the bonnet (15) onto the body (14).

v. Torque the bonnet to approximately 90 – 100 Nm and tighten the M3 grub screw (3) to secure the bonnet (15).

vi. Place the hand wheel (20) onto the adjusting screw (17) and tighten the lock nut (25).

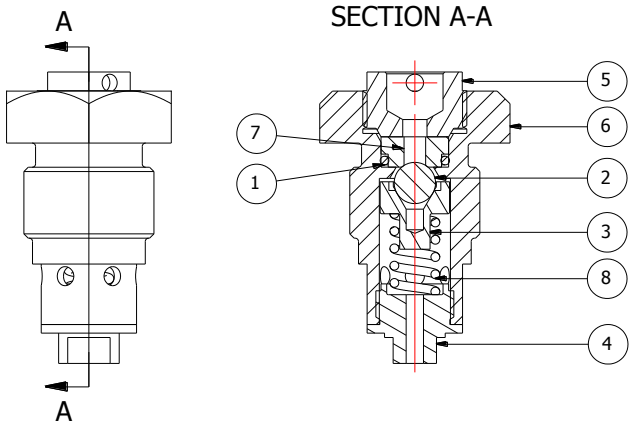
vii. Secure the nameplate (21) with the M3 pan screw (2).

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.

6.2.3. The HYD-691 Main Valve Cartridge

The HYD-691 incorporates a unique main valve cartridge which houses the ceramic components. Standard repair kits for this regulator include a fully assembled cartridge allowing for fast and simple servicing of the regulator.

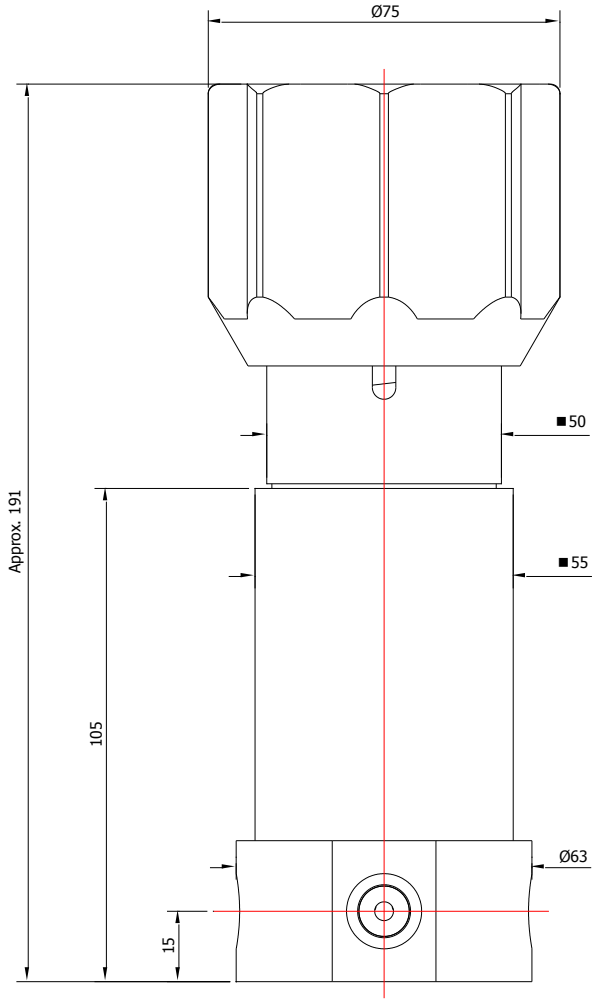
The drawing below illustrates the main valve cartridge assembly (No. 28 from HYD-691 GA)

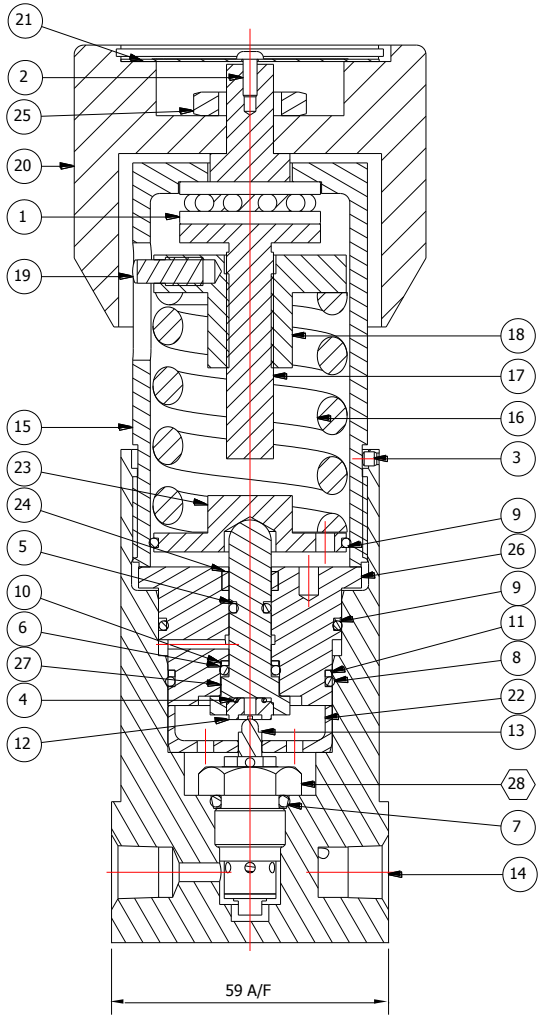


PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	OR-0060-10	O' RING STD
2	PT-690-017-001	CERAMIC BALL
3	PT-690-035	BALL RETAINER
4	PT-690-036	CARTRIDGE NUT
5	PT-690-037	SEAT NUT
6	PT-690-038	CARTRIDGE
7	PT-690-039	CERAMIC SEAT
8	PT-BP-550-004	VALVE SPRING

6.2.4. Figure 2 – Sectional View of the HYD-691

* ALL DIMENSION IN MILIMETERS, UNLESS OTHERWISE STATED





PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	51103-SS	THRUST BALL BEARING
2	FIT-M3-08-A4-70.0-SKT-BTN	SCREW
3	FIT-M3x3	GRUB SCREW
4	OR-0050-10	O' RING STD
5	OR-0050-20	O' RING STD
6	OR-0090-20	O' RING STD
7	OR-0120-25	O' RING STD
8	OR-0320-20	O' RING STD
9	OR-0350-20	O' RING STD
10	ORB-PT-C-098-002	PTFE BACK UP RING
11	ORB-PT-C-177	PTFE BACK UP RING
12	PT-690-016-002	VENT SEAT
13	PT-690-034	CONNECTOR
14	PT-690-C-LF-HYD-02N	HYD690 BODY - C PORTING
15	PT-C-040-002	BONNET
16	PT-C-042	500KG LOAD SPRING
17	PT-C-043-004	ADJUSTING SCREW
18	PT-C-045	ADJUSTING NUT
19	PT-C-046	SET SCREW
20	PT-C-048-001	LARGE NYLON HAND WHEEL
21	PT-C-049	NAMEPLATE
22	PT-C-072-001	BAFFLE PLATE
23	PT-C-095-001	SPRING REST - DOME
24	PT-C-097	SLIDE RING
25	PT-C-132	LOCK NUT
26	PT-C-145	9MM SENSOR HOLDER
27	PT-C-146-001	9MM SENSOR
28	HYD-691-MVA	CARTRIDGE ASSEMBLY

7. Technical Data

Fluid Media:	All gases and liquids compatible with materials of construction
Max Inlet Pressure:	690 bar
Outlet Pressure Range:	0-690 bar
Operating Temperature:	-20°C to +80°C
Materials:	Body and Trim: 316 SS Seat: 316 SS (HYD-690) / Ceramic (HYD-691)
Flow Capacity (Cv):	0.06
Leakage:	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.