PRESSURE TECH

# THE RF1034 SERIES

## Operating and Service Manual

Series includes all variants of RF1034

**Issue A**
**June 2023**

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## 1. Description

The RF1034 is a single stage piston-sensed pressure regulator designed for high pressure hydrogen refuelling applications up to 1,034 bar (15,000 psi). It is offered under four main versions:

- Pneumatically actuated version.
- Pneumatically actuated version with electropneumatic controller.
- Electrically actuated version.
- Manually operated version.

## 2. Specification

**Maximum Inlet Pressure:** 15,000 psig / 1,034 bar
**Maximum Outlet Pressure:** 15,000 psig / 1,034 bar
**Proof Pressure:** 150% Maximum working pressure
**Body Material:**

- ASTM A479 316 Stainless Steel UNS S31600
- ASTM A638/ A368M 660 TYPE 1 Stainless Steel UNS S66286

**Seat Leakage:** In accordance with ANSI/ FCI 70-3
**Seat Material:**

- Vespel®
- Tecasint® 2011 (*Standard)
- Acetal-C
- Tecapeek®
- Polyamide Imide (PAI)
- PSU (700 bar)

**Weight:**

- Pneumatic actuated Version –11.4 kg
- Electric actuated Version – 12 kg
- Manually operated Version – 7 kg

**O-Rings:**

- Viton AED

**Filter:** 30µm as standard. 10µm available on request
**Main Valve Material:** ASTM A479 316 Stainless Steel UNS S31600
**Main Valve Pin:** Inconel® 718 (UNS N07718)
**Main Valve Spring:** Elgiloy® / Phynox®
**Sensor Material:** ASTM A479 316 Stainless Steel UNS S31600
**Flow Capacity:** CV = 0.50 & 1.0

## 3. Installation


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.

It is common to find debris such as thread sealing tape or other foreign material within pipework that is being commissioned for the first time. Although the RF1034 pressure regulator is fitted with a filter, it is important that the line be flushed prior to installation to avoid debris clogging up the regulator.

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.

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.

The RF1034 incorporates a segregated captured vent (1/4" NPT) as a conduit by which media can be vented. This also allows the outlet pressure to be reduced whilst either the electric actuator or hand wheel is turned anti-clockwise or pressure from the pneumatic actuator is being reduced. Excess pressure is exhausted via the 'Vent' port and piped to tank or other facility. Note that safe, inert gases may vent to atmosphere if required. For Non-venting (NV) regulators, the excess pressure will not vent through the 'Vent' Port and should be vented downstream of the regulator.
Important: The vent port should not be plugged or blocked at any time.

Before system start-up, it is recommended that all systems be pressure tested, leak tested and purged with an inert gas such as nitrogen.

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.

## 3.1 Mounting Options

As standard, all versions of the RF1034 are equipped with mounting holes at the base of the regulator shown below:

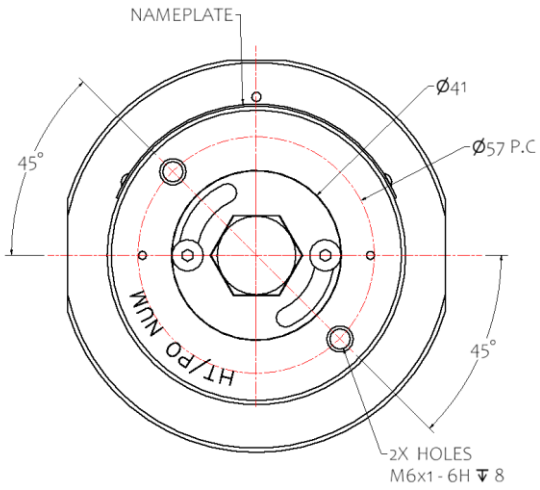



*Figure 1*

# 4. Operation

## 4.1 Adjusting the Regulator

**Manually Operated Version:** Gradually 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.

**Pneumatic Actuated Version:** Gradually increasing gas supply to the pneumatic actuator, applies pressure across the diaphragm, 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 pneumatic actuator.

**Pneumatic Actuated Version with Electropneumatic controller:**
For the pneumatic actuated version fitted with electropneumatic controller, a pilot pressure of 100 psi is supplied to the controller as per the figure below. An analog 4-20mA input signal is also fed to the controller and is calibrated to represent the desired outlet pressure of the RF1034. See additional supplied electropneumatic controller datasheet for more information.

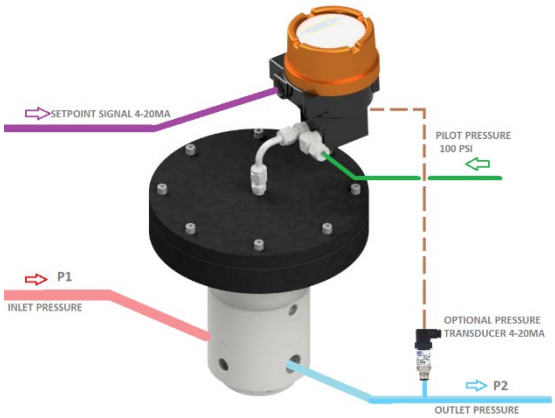



*Figure 2*

**Electric Actuated Version:** The electric actuated version requires electrical signal input to the electric actuator from a signal source which in turn, is used to rotate an adjusting screw clockwise or counter-clockwise in order to increase or decrease the outlet pressure of the regulator respectively. See additional supplied electric actuator datasheet for more information.

## 5. Servicing and Maintenance

The product supplied may vary from the examples covered by this manual. Should any assistance be required then please do not hesitate to contact the office.

Servicing and maintenance work on the RF-1034 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 himself/herself or others by working on this regulator without prior knowledge of the Health and Safety risks relating to handling of flammable gases. Any uncertainty should be clarified with Pressure Tech before working on the regulator.

Pressure Tech Ltd recommends the use of Krytox GPL 205, as a lubricant for O-rings and Molykote 1000 paste for the adjusting screw, 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
- The air actuator bonnet has been de-pressurised
- 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.

| REFERENCE: FIGURE 3 | | | |
|---|---|---|---|
| TEM | QTY | PART NUMBER | DESCRIPTION |
| 1 | 2 | FIT-2x3/16"-SS-A2-RIVET | HAMMER DRIVE PIN - No.2 x 3/16" |
| 2 | 1 | FIT-M3x6MM-SS-316-GRUBSCRW | M3 X 6mm GRUB SCREW |
| 3 | 2 | FIT-M4-10-A4-70.0-SKT-BTN | HEXAGON SOCKET BUTTON HEAD SCREW |
| 4 | 1 | OR-0090-10 | O' RING STD |
| 5 | 2 | OR-0090-20 | O' RING STD |
| 6 | 1 | OR-0420-20 | O' RING STD |
| 7 | 1 | OR-0460-20 | O' RING STD |
| 8 | 2 | ORB-PT-C-098-005 | BACK UP RING |
| 9 | 1 | ORB-PT-C-139 | BACK UP RING |
| 10 | 1 | P-AIRACT-203-001 | 203MM AIR ACTUATOR |
| 11 | 1 | P-RF1034-CART-001-001 | RF1034 CARTRIDGE - 0.5 CV - TECASINT |
| 12 | 1 | PT-A438-021 | RETAINER |
| 13 | 1 | PT-A438-023 | ISOLATOR |
| 14 | 1 | PT-C-029-013 | PEEK VENT SEAT GF30 |
| 15 | 1 | PT-C-086 | LF690 BAFFLE PLATE |
| 16 | 1 | PT-C-091 | VENT SEAT NUT |
| 17 | 1 | PT-C-093-002-002 | SENSOR HOLDER - 9mm |
| 18 | 1 | PT-C-094-001 | SENSOR - 9mm - 1:1 RATIO |
| 19 | 1 | PT-RF-1034-007-001 | RF1034 CONNECTOR PIN |
| 20 | 1 | PT-RF-1034-018-001 | PRODUCT NAMEPLATE |
| 21 | 1 | PT-RF1034-B-04H-002-004 | RF1034 BODY - 'B' PORTING - 9/16" HP |

| REFERENCE: FIGURE 4 | | | |
|---|---|---|---|
| ITEM | QTY | PART NUMBER | DESCRIPTION |
| 50 | 1 | FILT-RF1034-001 | FILTER ELEMENT 30µm |
| 51 | 1 | OR-0036-24 | O' RING STD |
| 52 | 1 | OR-0150-20 | O' RING STD |
| 53 | 1 | ORB-0150-20 | PTFE BACK-UP RING |
| 54 | 2 | ORB-PT-RF1034-003 | BACK UP RING |
| 55 | 1 | OR-BS806 | O' RING STD |
| 56 | 1 | PT-690-004-002 | MAIN VALVE COMPRESSION SPRING |
| 57 | 1 | PT-RF-1034-002-001-002 | CARTRIDGE BODY |
| 58 | 1 | PT-RF-1034-003-008-001 | RF1034 MAIN VALVE - BALANCED, EQUAL PERCENTAGE |
| 59 | 1 | PT-RF-1034-005-002 | RF1034 SEAT RETAINER |
| 60 | 1 | PT-RF-1034-006-001 | RF1034 SEAT 0.5 CV |
| 61 | 1 | PT-RF1034-009 | MAIN VALVE SPRING WASHER |

## 5.1 Servicing the RF-1034 (Pneumatic Actuated Version)

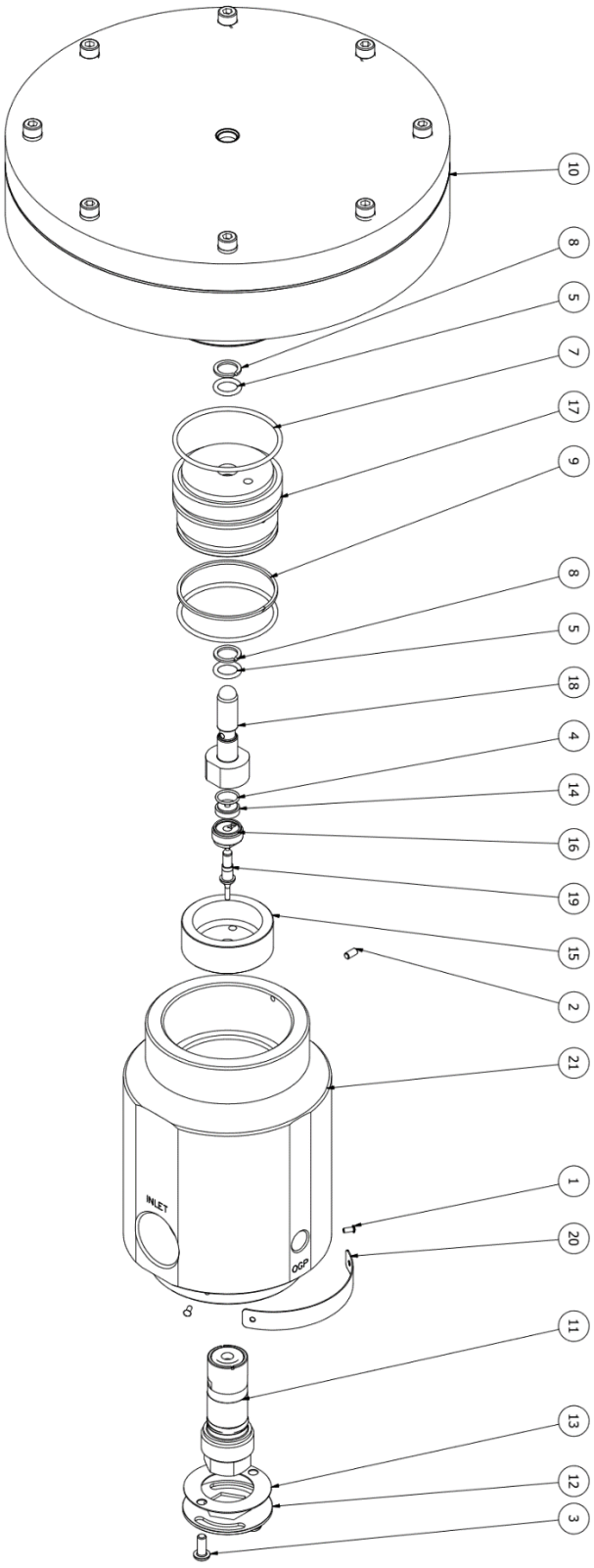
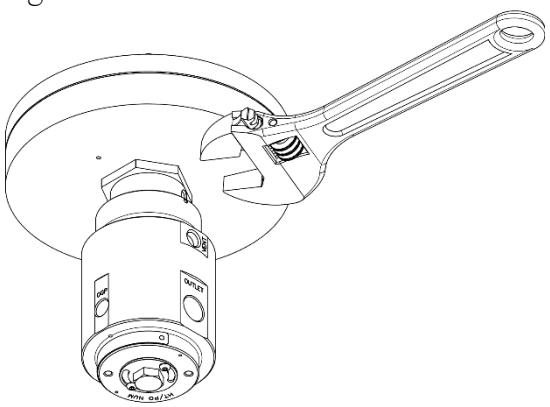


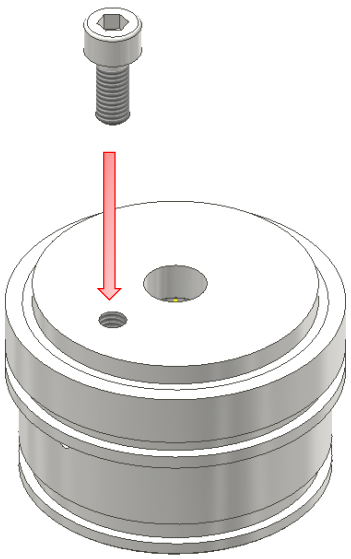

*Figure 3*

To Disassemble the RF-1034 Pneumatic actuated version, follow the steps below:

1. Firmly grip the body of the regulator on a suitable workbench using soft jaws.
2. Undo grub screw (2) using a 1.5mm Hexagon socket key.
3. Place an adjustable wrench, over the hex at the bottom of the actuator shown below and firmly undo (counterclockwise) to unscrew the actuator assembly (10) from the regulator.



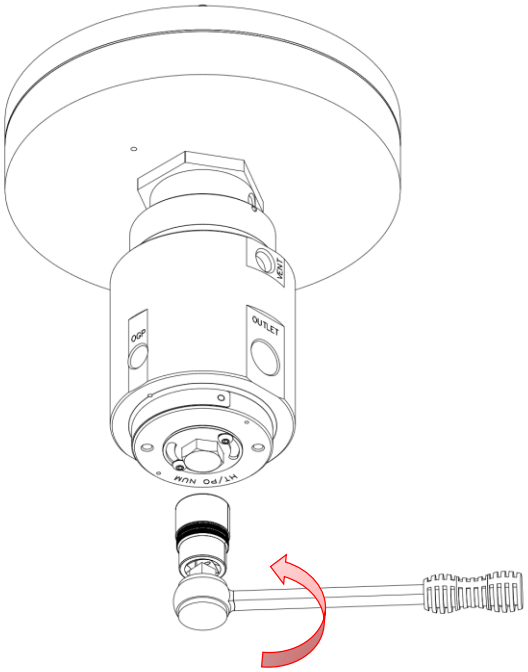
4. When the actuator (10) has been unscrewed, insert an M5 screw into the extractor hole shown below to extract the sensor assembly.



The sensor assembly comprising 2x backup rings (8), 2x o-rings (5), 1x o-ring (7), 1x sensor holder (17), 1x backup ring (9), 1x o-ring (6), 1x sensor (18), 1x o-ring (4), 1x vent seat (14) and 1x vent seat nut (16) can then be extracted as per Figure 3.

5. Extract the main valve pin (19) and baffle plate (15).

## 5.2 Servicing the Main Valve Assembly



Procedure for accessing the main valve cartridge is the same regardless of the means of actuation of the regulator. To access the main valve cartridge, follow the steps below:

1. Using a 2.5mm Hexagon socket key undo 2x screws (3), and then remove retainer (12) and isolator (13).
2. With a suitable torque wrench fitted with a 19mm socket, undo main valve cartridge assembly (11).
3. Once the main valve cartridge has been removed, refer to figure 4 on the order for disassembly of cartridge assembly.

CAUTION: Care should be taken to avoid damaging any sealing surfaces especially relating to seat (5) and main valve (2).

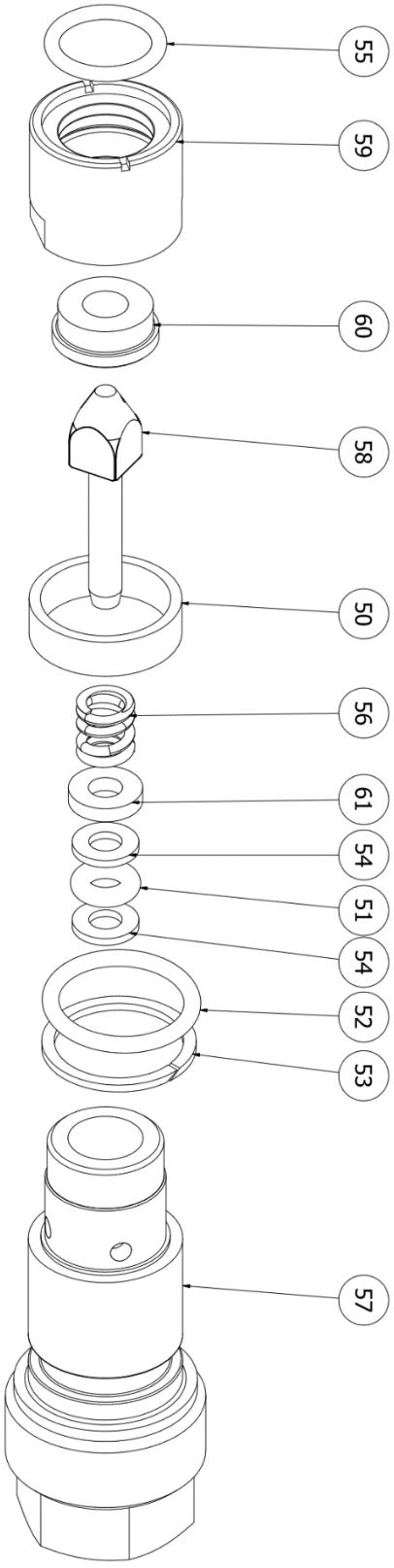



*Figure 4*

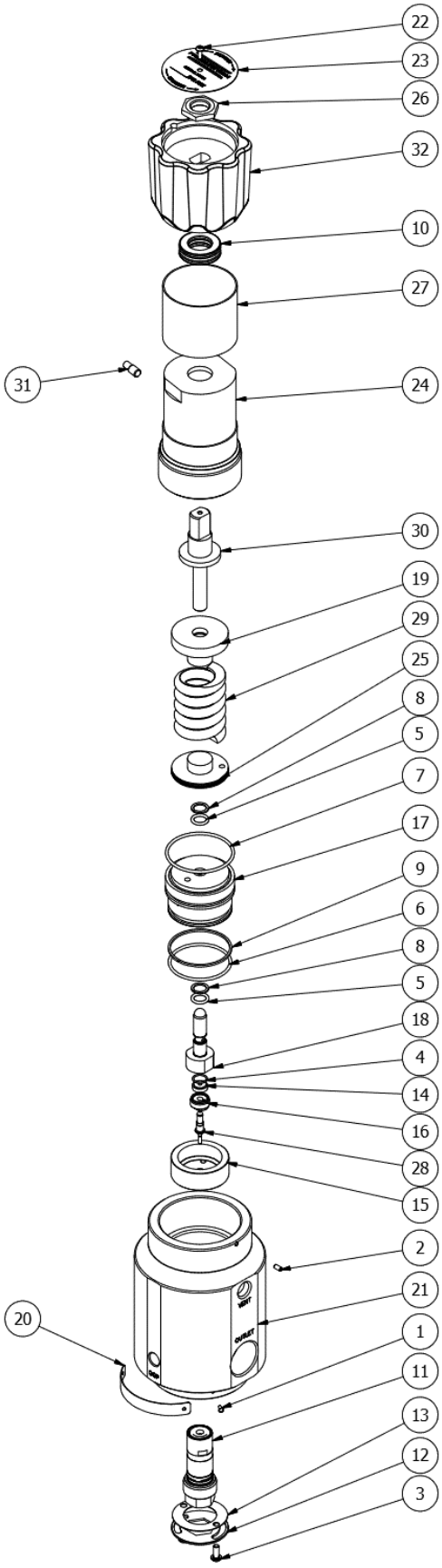



*Figure 5*

| REFERENCE: FIGURE 5 | | | |
|---|---|---|---|
| ITEM | QTY | PART NUMBER | DESCRIPTION |
| 1 | 2 | FIT-2x3/16"-SS-A2-RIVET | HAMMER DRIVE PIN - No.2 x 3/16" |
| 2 | 1 | FIT-M3x6MM-SS-316-GRUBSCRW | M3 X 6mm GRUB SCREW |
| 3 | 2 | FIT-M4-10-A4-70.0-SKT-BTN | HEXAGON SOCKET BUTTON HEAD SCREW |
| 4 | 1 | OR-0090-10 | O' RING STD |
| 5 | 2 | OR-0090-20 | O' RING STD |
| 6 | 1 | OR-0420-20 | O' RING STD |
| 7 | 1 | OR-0460-20 | O' RING STD |
| 8 | 2 | ORB-PT-C-098-005 | BACK UP RING |
| 9 | 1 | ORB-PT-C-139 | BACK UP RING |
| 10 | 1 | BEAR-S51103CTN | THRUST BALL BEARING |
| 11 | 1 | P-RF1034-CART-001-001 | RF1034 CARTRIDGE - 0.5 CV - TECASINT |
| 12 | 1 | PT-A438-021 | RETAINER |
| 13 | 1 | PT-A438-023 | ISOLATOR |
| 14 | 1 | PT-C-029-013 | PEEK VENT SEAT GF30 |
| 15 | 1 | PT-C-086 | LF690 BAFFLE PLATE |
| 16 | 1 | PT-C-091 | VENT SEAT NUT |
| 17 | 1 | PT-C-093-002-002 | SENSOR HOLDER - 9mm |
| 18 | 1 | PT-C-094-001 | SENSOR - 9mm - 1:1 RATIO |
| 19 | 1 | PT-C-045-005 | ADJUSTING NUT |
| 20 | 1 | PT-RF-1034-018-001 | PRODUCT NAMEPLATE |
| 21 | 1 | PT-RF1034-B-04H-002-004 | RF1034 BODY - 'B' PORTING - 9/16" HP |
| 22 | 1 | FIT-M3-08-A4-70.0-SKT-BTN | SOCKET BUTTON SCREW - M3 x 8mm |
| 23 | 1 | PT-C-049 | NAMEPLATE - 55mm - PRESSURE TECH |
| 24 | 1 | PT-C-040-021 | BONNET - M60 |
| 25 | 1 | PT-C-095-001 | SPRING REST - DOME |
| 26 | 1 | PT-C-132 | LOCK NUT |
| 27 | 1 | PT-C-180 | PROTECTIVE SLEEVE |
| 28 | 1 | PT-RF-1034-007-001 | RF1034 CONNECTOR PIN |
| 29 | 1 | PT-C-042 | MAIN LOAD SPRING 500KG |
| 30 | 1 | PT-C-043-004 | ADJUSTING SCREW |
| 31 | 1 | PT-C-046-001 | ADJUSTING NUT SCREW |
| 32 | 1 | PT-C-048-001 | LARGE NYLON HAND WHEEL |

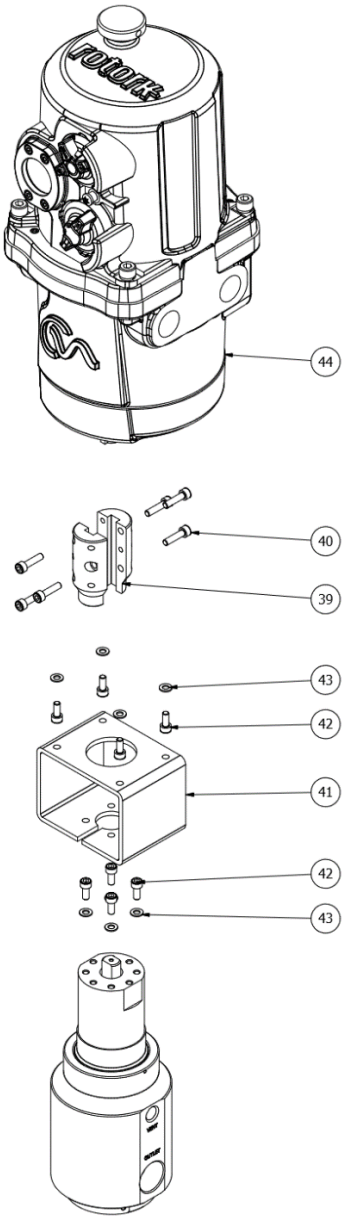



*Figure 6*

| REFERENCE: FIGURE 6 | | | |
|---|---|---|---|
| ITEM | QTY | PART NUMBER | DESCRIPTION |
| 39 | 2 | PT-SS-690-011 | SHAFT COUPLING |
| 40 | 6 | FIT-M5-20-A4-70.0-SKT-CAP | SOCKET HEAD CAP SCREW - M5 x 20mm |
| 41 | 1 | ACT-CON-001 | ACTUATOR MOUNT |
| 42 | 8 | FIT-M5-12-A4-70.0-SKT-CAP | BOLT - M5 x 12 - SOCKET HEAD CAP SCREW |
| 43 | 8 | FIT-M5-A4-FLT-WASHER | FLAT WASHER - M5 |
| 44 | 1 | ELECTRIC ACTUATOR | ELECTRIC ACTUATOR |
| 45 | 1 | PT-RF-1034-022 | RF1034 MAIN VALVE SPRING |
| 46 | 1 | PT-RF-1034-018-001 | PT-RF-1034-018-001 (FORMED) |

## 5.3 Servicing the RF-1034 (Manual Operated Version)

Refer to Figure 5.

The item numbers below make up the topworks sub-assembly: (22), (23), (26), (32), (10), (27), (24), (30) (19), (29), & (25).

To remove the regulator topworks sub-assembly from the body of the regulator, follow the steps below:

1. Firmly grip the body of the regulator on a suitable workbench using soft jaws.
2. Undo grub screw (2) using a 1.5mm Hexagon socket key.
3. Unscrew the bonnet (24) counter-clockwise to release the topworks from the body of the regulator

To disassemble the rest of the regulator, follow steps described under chapter 5.1

To disassemble the topworks sub-assembly, follow the steps below:

4. Using a 2mm Hexagon socket key undo the M3 screw (22) and then remove the name plate (23).
5. Using a 24mm socket wrench, remove the locknut (24) and then remove the handwheel (32).
6. Once the handwheel has been removed, remove the adjusting nut screw (31) with a slot-head screwdriver to release the adjusting screw (30) and adjusting screw nut (19) from the bonnet (24).
7. During re-assembly, ensure that there is lubricant applied between the adjusting screw (30) and adjusting screw nut (19).

CAUTION: Care should be taken to avoid damaging any sealing surfaces especially relating to seat (5) and main valve (2).

## 5.3 Servicing the RF-1034 (Electric Actuated Version)

Refer to Figure 6. The regulator body of the electric actuated RF1034 is disassembled in the same way as any other version. Please refer to instructions above relating to disassembly of the pneumatic version.

To remove the electric actuator, follow the steps below:

1. Using a 4mm Hexagon socket key undo 6x screws (40) in order to release the coupling (39) in two halves.
2. Once the 6x screws (40) have been removed, use a 4mm Hexagon socket key undo 4x screws (42) along with 4x M5 flat washers (43).
3. The Actuator Assembly can now be lifted off the regulator bonnet.
4. Before reassembling the actuator, it is advisable to set both the regulator and actuator to "zero" position prior to attaching the actuator onto the regulator.
5. To zero the regulator, fully rotate the adjusting screw counter-clockwise until it reaches a hard stop, then make one full revolution clockwise.
6. To zero the actuator, follow the instructions in the actuator user manual.
7. Once both actuator and regulator have been zeroed, follow steps 1 – 3 in reverse to mount the actuator on to the regulator.

CAUTION: Care should be taken to avoid damaging any sealing surfaces especially relating to seat (5) and main valve (2).

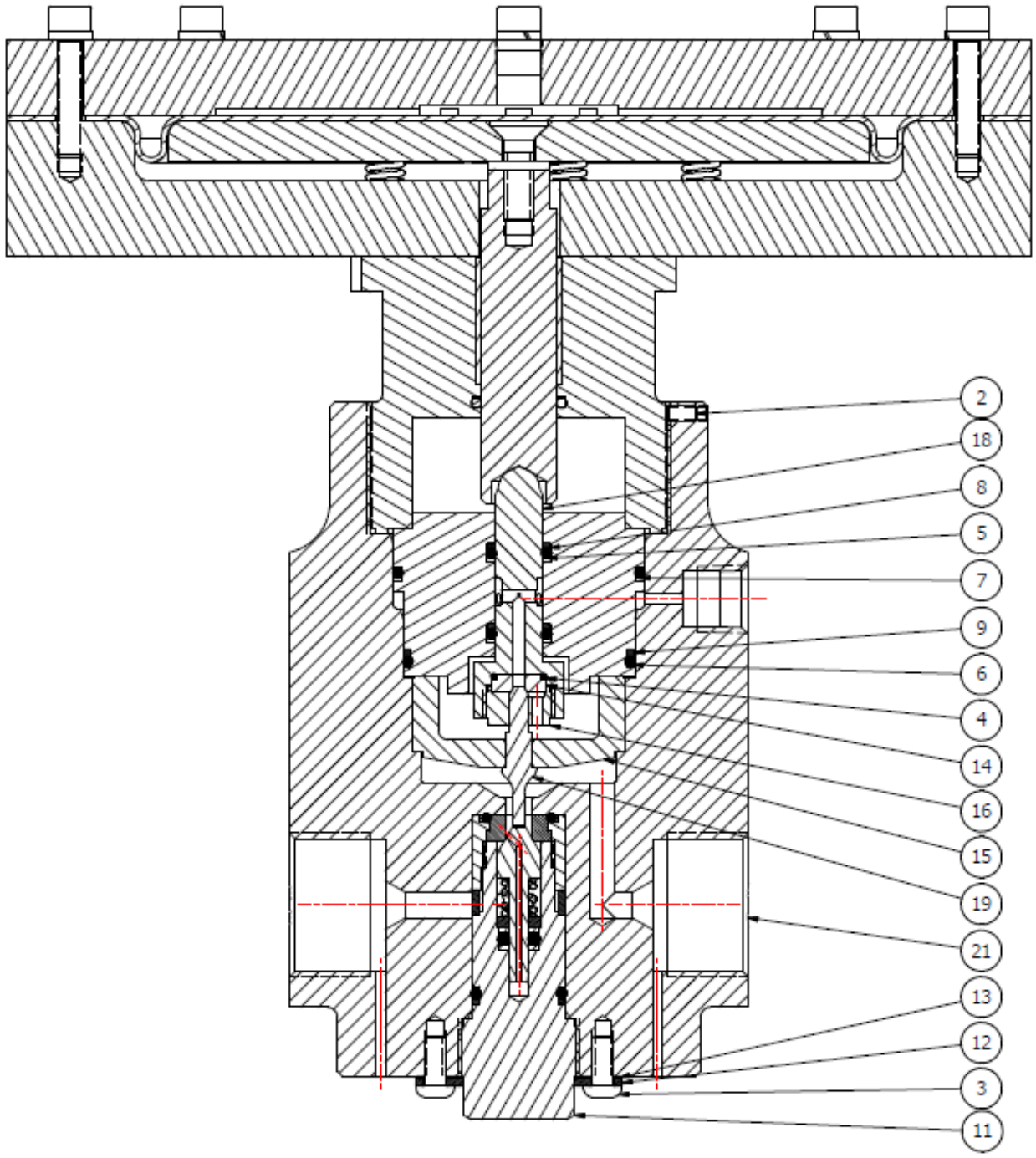



*Figure 7*

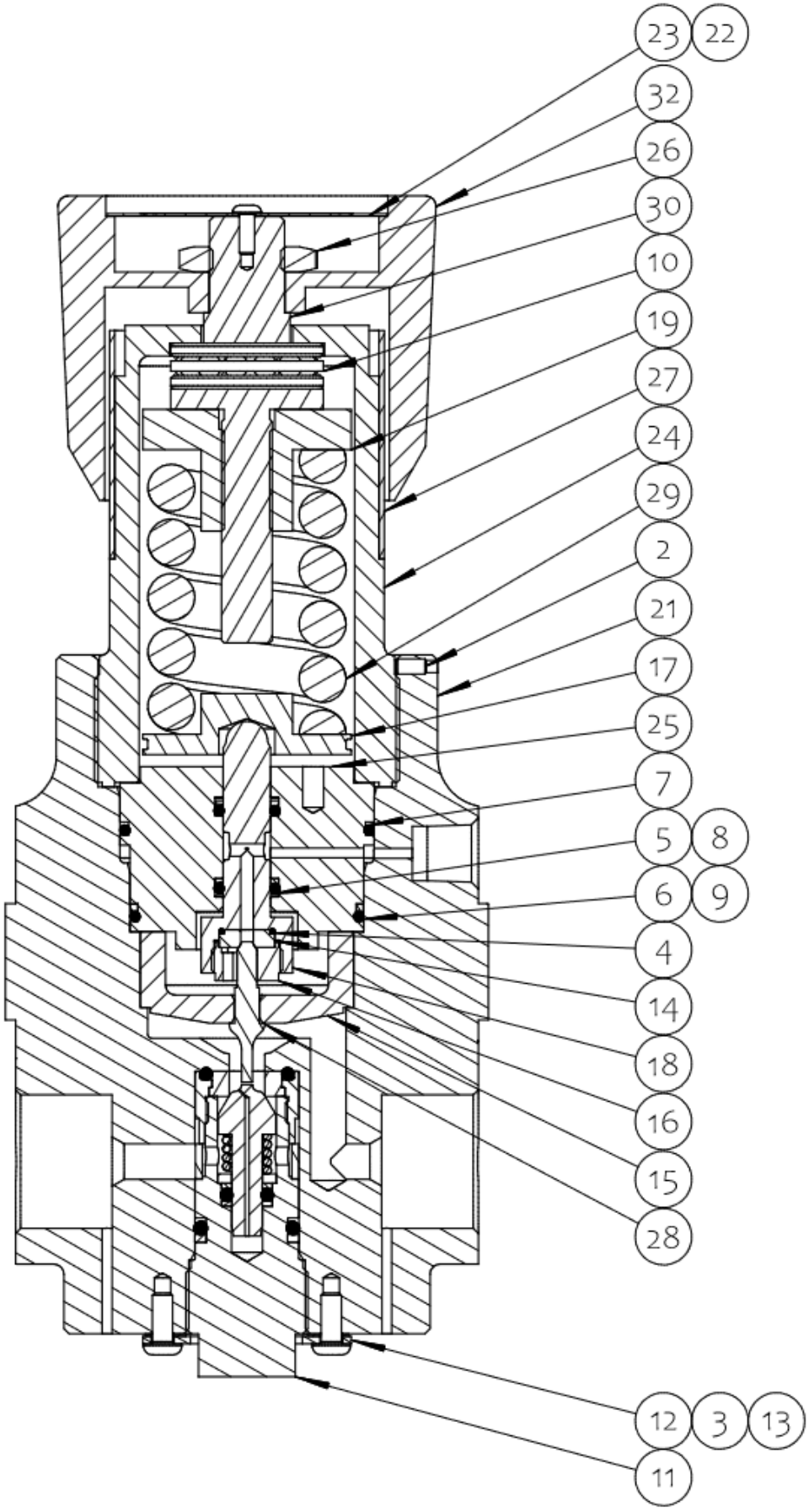

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*Figure 8*

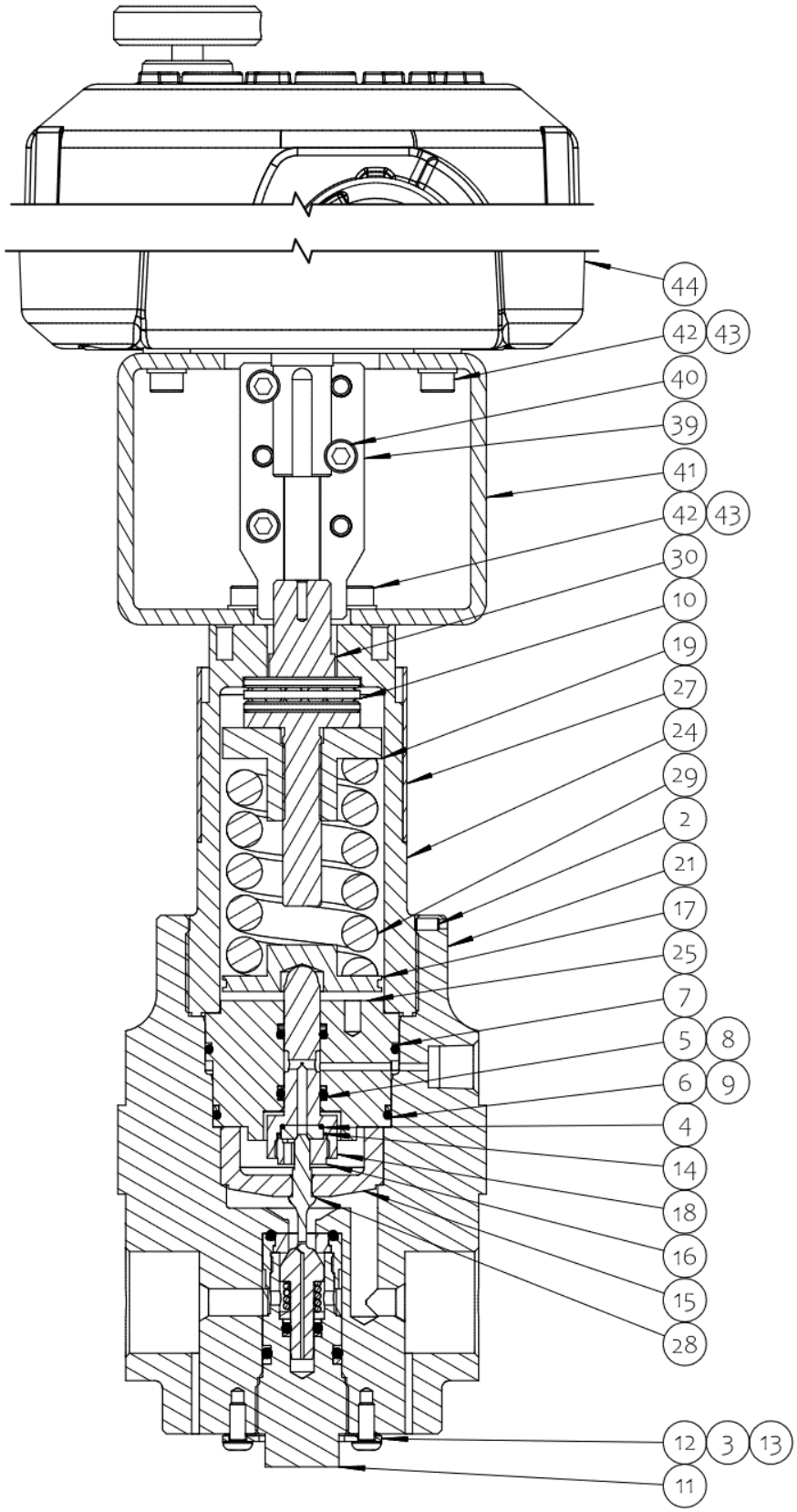
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*Figure 9*

## 8. Standard Service Kit (0.5 CV)

Pressure Tech Ltd recommends the use of Krytox GPL 205 during servicing. Refer to Figures 4 & 8 for Item numbers. The standard service kit shown below is for a manual regulator fitted with 7mm self-venting sensor. Other service kit configurations available on request.

| ITEM NUMBER | PART NUMBER | DESCRIPTION | MATERIAL | QTY | IMAGE |
|---|---|---|---|---|---|
| 60 | PT-RF-1034-006-001 | Seat Cv 0.5 | Tecasint | 1 |  |
| 58 | PT-RF-1034-003-005 | Main Valve | Inconel 718 | 1 |  |
| 56 | PT-690-004-002 | Main Valve Spring | Elgiloy | 1 |  |
| 50 | FILT-RF1034-001 | Filter Element | SM30-2 316L | 1 |  |
| 61 | PT-RF1034-009 | Main Valve Washer | Ali Bronze | 1 |  |
| 51 | OR-0036-24-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 4 | OR-0090-10-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 5 | OR-0090-20-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 2 |  |
| 14 | PT-C-029-013 | Vent Seat | Peek | 1 |  |
| 52 | OR-0150-20-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 6 | OR-0420-20-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 7 | OR-0460-20-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 55 | OR-BS806-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 12 | OR-BS1806-023-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 2 |  |
| 53 | ORB-0150-20 | Back Up Ring | PTFE | 1 |  |
| 8 | ORB-PT-C-098-005 | Back Up Ring | PTFE | 2 |  |
| 9 | ORB-PT-C-139 | Back Up Ring | PTFE | 1 |  |
| 54 | ORB-PT-RF1034-003 | Back Up Ring | PEEK | 2 |  |

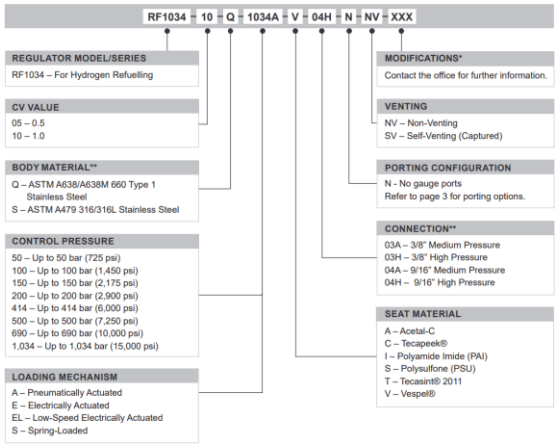
## 9. Standard Service Kit (1.0 CV)

Pressure Tech Ltd recommends the use of Krytox GPL 205 during servicing. Refer to Figures 4 & 8 for Item numbers. The standard service kit shown below is for a manual regulator fitted with 7mm self-venting sensor. Other service kit configurations available on request.

| ITEM NUMBER | PART NUMBER | DESCRIPTION | MATERIAL | QTY | IMAGE |
|---|---|---|---|---|---|
| 60 | PT-RF-1034-006-002 | Seat Cv 0.5 | Tecasint | 1 |  |
| 58 | PT-RF-1034-003-007 | Main Valve | Inconel 718 | 1 |  |
| 56 | PT-RF-1034-022 | Main Valve Spring | Elgiloy | 1 |  |
| 50 | FILT-RF1034-001-001 | Filter Element | SM30-2 316L | 1 |  |
| 61 | PT-RF1034-009-001 | Main Valve Washer | Ali Bronze | 1 |  |
| 51 | OR-BS4518-0056-24-FKM-90-LT-AE | O-Ring | Low-Temp & AED FKM | 1 |  |
| 4 | OR-0090-10-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 5 | OR-0090-20-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 2 |  |
| 14 | PT-C-029-013 | Vent Seat | Peek | 1 |  |
| 52 | OR-BS1806-114-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 6 | OR-0420-20-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 7 | OR-0460-20-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 1 |  |
| 55 | OR-BS4518-0136-24-FPM-90-LT-AE | O-Ring | Low-Temp & AED FKM | 1 |  |
| 12 | OR-BS1806-023-FKM-90-LT-AED | O-Ring | Low-Temp & AED FKM | 2 |  |
| 53 | ORB-BS1806-144 | Back Up Ring | PTFE | 1 |  |
| 8 | ORB-PT-C-098-005 | Back Up Ring | PTFE | 2 |  |
| 9 | ORB-PT-C-139 | Back Up Ring | PTFE | 1 |  |
| 54 | ORB-PT-RF1034-004 | Back Up Ring | PEEK | 2 |  |

## 10. Ordering Information

To build a Pressure Tech part number, simply combine the characters identified below in sequence:




## 11. 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.

## 12. Sales & Technical Support

For sales or technical support, please see relevant information below:

Sales:
Telephone: +44 (0)1457 899 307
Facsimile: +44 (0)1457 899 308
E-mail: sales@pressure-tech.com

Technical:
Telephone: +44 (0)1457 381 567
Facsimile: +44 (0)1457 899 308
E-mail: Engineering@pressure-tech.com

## 13. Authorised Resellers

Australia
CAC Gas & Instrumentation
Telephone: +61 286 766 500
E-mail: pfry@cacgas.com.au

Australia
Haldatec Pty Ltd
Telephone: +61 3 9872 5822
E-mail: cameron.seymour@haldatec.com.au

Brazil
Flutrol
Telephone: +55 11 2940 9053
E-mail: manuel@flutrol.com.br

China
MLT (Beijing) Instrumentation Technologies co.,ltd
Telephone: +86 10 8010 8122
E-mail: wang.yl@MLTit.com

China
Glotex Solutions Pvt. Ltd
Telephone: +91 972 645 6839
E-mail: sales@glotexinc.com

Colombia
Tech Pro Service SAS
Telephone: +573185148950
E-mail: Info@tpss.co

Czech Republic
Ventile & Fittings Praha
Telephone: +420 283 980 896
E-mail: kfeltl@ventile.cz

Denmark
PG Flowteknik Scandinavia ApS
Telephone: +45 738 412 30
E-mail: tommy@pgflowteknik.dk

England
FTI Limited
Telephone: +44 1892 669 939
E-mail: andrew@ftipv.com

France
Denouette Distribution
Telephone: +33 235 533 360
E-mail: commercial@denouettedistribution.com

Germany
HPS Solutions
Telephone: +49 89 744926 57
E-mail: daniel.bazzanella@hps-solutions.de

Hungary Scabex Kft.
Telephone: +36 705 790 393
E-mail: info@scabex.hu

Indonesia
Instrumindo Prima Sentosa
Telephone: +62 21 5503953
E-mail: instrumindo@instrumindo.co.id

Italy
GIS Europe SE
Telephone: +39 055 882 6232 ext. 222
E-mail: lcavallini@gisinternational.net

Malasia
Controladores Industriales, SA de CV
Telephone: +60 32 181 3145
E-mail: hafiz@enegroup.com.my

Mexico
Controladores Industriales, SA de CV
Telephone: +52 818 344 1142
E-mail: ricardo@coindsa.com.mx

Netherlands
De Groot Instruments
Telephone: +31 33 230 0039
E-mail: degroot@degrootinstruments.nl

Norway
Hydraserv AS
Telephone: +47 91 135 785
E-mail: ew@hydraserv.no

Republic of Korea
ENPOS (Korea Hydraulic Co.)
Telephone: +82 51 832 1110
E-mail: enpos@enpos.co.kr

Scotland
TIS Hydraulics Ltd
Telephone: +44 1224 727664
E-mail: keith.smith@tis-hydraulics.com

Singapore
Sea and Land Technologies PTE Ltd Telephone: +65 67 160 777
E-mail: enquiry@sea-landtech.com

South Africa
Fluidline Products
Telephone: +27 113 129 339
E-mail: brett@fluidline.co.za

Spain Arcamo, S.A.
Telephone: +34 916 794 286
E-mail: s.vidal@arcamo.com

Thailand Syntex Energy
Co., Ltd.
Telephone: +66 27 517 766
E-mail: sales@syntex-energy.co

Sweden
Curt Nyberg AB
Telephone: +46 874 700 05
E-mail: christer@curt-nyberg.s

United Kingdom
Triton Grey Ltd
Telephone: +44 7767 365 7265
E-mail: rob@triton-grey.co.uk

United Arab Emirates
MONILEK Oilfield Enterprises
Telephone: +971 4 881 8800
E-mail: import@monilek.com

United States
American Tube Products, Inc
Telephone: (713) 910 9052
E-mail: pressure-tech@atptx.com

United States
SilPac
Telephone: 408492-0011
E-mail: markt@silpac.net


Unit 24 Graphite Way,
Hadfield,
Glossop
SK13 1QH,
United Kingdom