A17 - 400 BAR PROPORTIONAL REGULATOR

Installation, Operation and Maintenance Instructions

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400 bar PROPORTIONAL REGULATOR – TYPE A17

CONTENTS

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PRODUCT DESCRIPTION

Thompson Valves has developed a 500 bar inlet 0-400 bar outlet proportional regulator. The valve consists of three main constituents, namely: control electronics, proportional solenoid, 3/2 regulator valve. The valve is designed to match a controlled pressure output with an electronic signal input. The input can be used to define pressure steps, ramps and curves, both up and down, in the range 0-400 bar.

SPECIFICATION

- 400-500 bar input – clean inert gaseous media. 0-400 bar output.
- 3/2 valve design - bubble tight main seat – 60 bubbles/min vent seat in steady state mode.
- Materials: Al-bronze main valve, stainless steel poppet, polymer seats.
- Standard seal materials: Hi-nitrile (or Viton) and PTFE.
- Weight 2.8 Kg each valve.
- Flow capability (Nom 3 mm dia orifice main valve and vent).
- Self contained closed loop active feedback control.
- Closed Volume Steady State Error < 1.% Full scale @ 20^{o}C.
- Operational Ambient Temperature range 0-45^{o}C.
- Sensor accuracy thermal drift < 0.02% / ^{o}C.
- Response Time: within < 0.5 seconds to within 10%, & < 2.0 seconds to within 2%.
- Maximum overshoot 20bar.
- Accuracy for Closed Volume Customer specific special profile: Steady State Error <0.5%.
- Repeatability cycle on cycle <1bar.
- Duty cycle 50%, max steady or rising pressure regulation “on” time 30mins. (vent cycles = “off” time)
- The maximum temperature of the valve must not exceed 60C
- Nominal 24V supply (20-27V).
- Normal operation 1amp - Peak 4amps.
- Galvanic isolation between input and power supply.
- 2 seconds safety power cut-back feature for input pressure failure.
- Factory-set signal input 0-10V (input resistance >1M Ohm) or 4-20mA (input resistance <100 Ohm)
- Output 0-10V. Output resistance at device terminals <200 Ohm.
- CE marked – conforms to all appropriate EU directives inc. EMC (EN50081/82).

INSTALLATION AND OPERATIONAL PRECAUTIONS

THERMAL ISSUES - The uses for this valve should be limited in ambient and duty cycle so the valve body temperature **does not exceed 60C** in normal use. Operating the valve above 60C will shorten its life considerably.
If the valve is used in a **hot gas application** then a cooling mechanism needs to be considered.
If the valve is used in a **high duty application** (see max duty cycle below) then cooling mechanism needs to be considered.
If in doubt contact Thompson Valves for advice.

DUTY CYCLE - The valve has standard a **maximum duty cycle of 50%** - with 30 mins max "on" time. Steady or rising pressures = "on" time, venting or power off = "off" time. If used on a high flow application this duty cycle can be increased as the gas flow through the regulator has an important cooling effect on the valve.

OFF TIME – Off time is when the valve is completely de-energised. In order to de-energise the valve fully it is recommended that instead of 0 being used for the input that a –ve negative value is used e.g. -1V. This is because a small error in the output from the input card or the zero point setting can result in the valve still being "on" and drawing up to 1.5A which will heat the valve.

TRANSDUCER OUTPUT – The output does not go through zero. Below zero small errors in the signal output if it is not adjusted perfectly. Therefore may give an indication of 1 or 2 bar in the system when there is no pressure. This output cannot be used for mould pressure alarms for small residual pressures.

POWER SUPPLY – The power supply should be rated for 24VDC and a minimum of 4A

INLET PRESSURE FAILURE - If for any reason the inlet supply is closed off or reduced below the output demand – the valve 24v power supply must be turned off within 30 mins.
The primary objective of these precautions is to result in operationally acceptable temperatures. This can be checked by measuring the temperature of the electronics housing at <70C.

INSTALLATION - Prior to installing or operating this product, read and fully understand the information provided here. All possible hazards and precautions cannot be covered here. This product must be installed and maintained by trained personnel, familiar with all the appropriate safety regulations. Improper application and operation can result in damage to equipment or severe personnel injury.

MEDIA COMPATIBILITY AND FILTRATION - The product is design to function with clean and dry media. Integral Inlet and Outlet filters are fitted to the unit as standard. These should be inspected and cleaned regularly.

The product is designed for service with **INERT GASEOUS MEDIA**. Use with aggressive or corrosive gases will impair the function of this product. Thompson Valves does not guarantee materials to be compatible with specific or contaminated media – **THIS IS THE RESPONSIBILITY OF THE USER**!
Thompson Valves will advise on materials of construction but users must test under operating conditions to determine suitability of materials in an application.

VENT SILENCER - This product does not include a vent silencer. In normal working the vent operation is very loud >100db. It is at the customers discretion to fit a silencer. Sintered plugs are commonly used but if blocked can be a hazard. Contact Thompson Valves for advice.

PRESSURE RATING - Verify the designed pressure rating of the equipment. This high-pressure valve product must be installed using connectors, pipes, gauges etc, rated adequate for the supply and operating pressure. Ensure no PTFE or other thread sealants can enter the valve internals.

MAINTENANCE PEROIDS - Periodic inspection and maintenance is essential for continued safe and satisfactory operation. Maintenance periods will vary dependent on the application.

REPAIR / **SERVICE** - The product in need of service should be returned to Thompson Valves for evaluation and prompt refurbishment. If repairable, the valve will be restored to the original factory specification and associated warranty period reinstated. For warranty details see conditions of sale.

STORAGE AND HANDLING - The valve should not be stored in a corrosive environment. All ports should remain sealed and the valve markings made visible. Due attention should be paid to personal protection during handling.

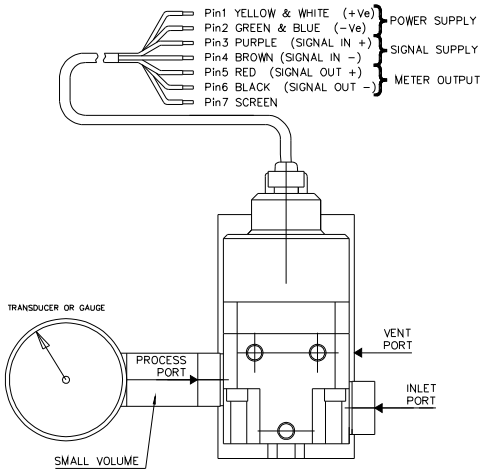
MOUNTING - 3 x M8 mounting holes are provided for valve mounting. The valve will function satisfactorily when mounted inclined from the vertical. However for maximum life and efficiency mount vertically. Do not invert.

CALIBRATION PROCEDURE

1. Mount valve firmly. Connect to pressure ports and make electrical connections as shown below.

WARNING. This unit operates under high pressure. Take appropriate precautions.

2. Ensure auxiliary transducer port is blanked. (The inlet port and transducer port may be interchanged if required, but check that the fittings used have the correct threads for each.)



3. Remove lid for access to electronics.

WARNING. Static sensitive components are fitted - Take appropriate precautions.

4. Slowly apply 400 bar (nom.) air supply to inlet.

5. Apply 24vdc (nom.) power. For best results, allow 1 minute or more for transducer stabilisation.

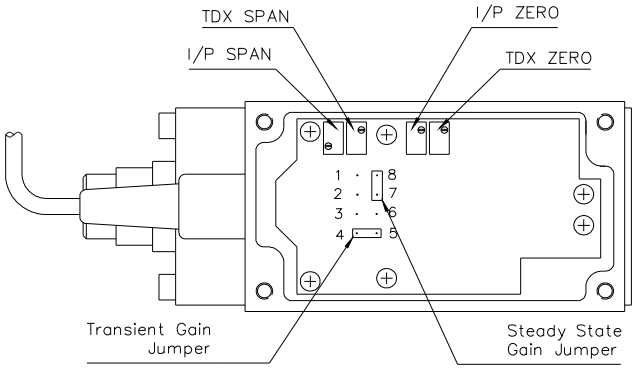
6. Connect a Voltmeter to the 0-10V output. Connect an adjustable, stable voltage source to the input.

7. Apply 0V to the input. Check for 0V (+/- 0.02V) at the output. If necessary adjust the I/P Zero control to obtain 0V at output, but before doing so, turn the TDX Zero control up so that 1 to 20bar is present at the outlet. (Ie. Only adjust the I/P Zero control with the valve in full control of the outlet pressure)

8. Adjust TDX Zero control up until pressure starts to rise at the outlet. (Omit this step if pressure is already present at outlet).

9. Reduce the TDX Zero control slowly until the pressure drops to atmospheric and the valve just de-energises (and supply current drops to < 80mA). The zero is then set.

10. Span Calibration should be at as high a pressure as possible, but remaining at least 20bar below the inlet pressure. If the inlet pressure is below 420bar, perform the steps below at a lower pressure than 400bar, and reduce the 10v at input and output pro-rata.



11. Raise the input voltage to 10V (or as determined in step 10). Verify that there are no leaks in the outlet system. Verify that output signal is the same as the input signal (+/- 0.02V). If necessary adjust the I/P Span control to obtain this.

12. Verify that output pressure is 400bar (+/- 2Bar) (or as determined in step 10). It may take the valve a few seconds to reach optimum stability. If necessary adjust the TDX Span control to obtain the correct pressure.

13. Replace the lid, turn off the power, de-pressurise the inlet, and remove the valve. Calibration is now complete.

PROBLEM SOLVING

If you are not sure about any application, maintenance or technical issue, contact Maxseal – IVP Sales for advice.

PROBLEM	SOLUTION
Leak – De-energised	**Main seat or seal damage – Strip main seat cartridge and replace damaged parts**
Leak – Energised	**Main or Vent seat or seal damage – Strip valve and replace damaged parts**
O point pressure offset	**Check and adjust zero point.**
Calibration error	**Check input calibration** **Follow calibration routine**
Exessive overshoot	**Reduce transient gain** **Maintain Valve**
Instability or Hunting at constant pressure setting	**Reduce / adjust steady state gain**

GAIN SETTING TABLE

Gain	Jumper Setting	Level
Transient Gain	3-4 (or not fitted)	Low
Transient Gain	5-6	Med
Transient Gain	5-4	High
Transient Gain	3-6	Permanent High Gain (no switching)
Steady State Gain	2-7 (or not fitted)	Low
Steady State Gain	1-2	Medium Low
Steady State Gain	1-8	Med High
Steady State Gain	8-7	High

If you are not sure about any application, maintenance or technical issue, contact IVP Sales for advice.

SPARES KITS – Contact Sales Team

A17AS* – COMPLETE SPARES KIT

* TO BE FILLED WITH **'H'** FOR NITRILE OR **'V'** FOR FLUROCARBON ELASTOMERS.

MAINTENANCE

A typical maintenance service period is 1 year or 200,000 cycles. This may be reduced for critical or arduous applications. Service IVP Valves in a clean and dry environment.

REMOVING AN EXISTING VALVE

1. Isolate valve from all pipeline and electrical supplies.
2. Disconnect supply cable and remove.
3. Unscrew the valve mounting bolts and remove the valve from the manifold.

Part A. Disassembling a valve (See Drawings)

1. Remove main valve cartridge.
2. Strip main valve cartridge.
3. Remove 4 solenoid retaining bolts. Move solenoid to one side (90^{o}) and re-secure using one bolt. Ensure the solenoid wires are not stressed or damaged.
4. Remove vent valve parts
5. Separate all valve assembly components, noting orientation, sequence and position of parts,

Part B. Examining a valve's components

Examine and replace all worn or damaged parts.
Replace all seals and operating springs with TV spare parts kit. All seals should be lubricated and have no deformation. All seating and sealing faces should be free from contaminant, marks, scratches, etc.

INSTALLING A VALVE

- Pipe work and media must be clean.
- Inlet filters are essential.
- Prevent pipe sealant from entering the system.
- Use only correct tools.

1. Make connections to the valve ports as required. DO NOT OVERTIGHTEN.
2. Make Cable terminal connections as labelled. All terminals must be tightened before commissioning.
3. Raise pressure slowly and check for leaks. Do not wet the electronic enclosure with liquid based leak detector fluid.

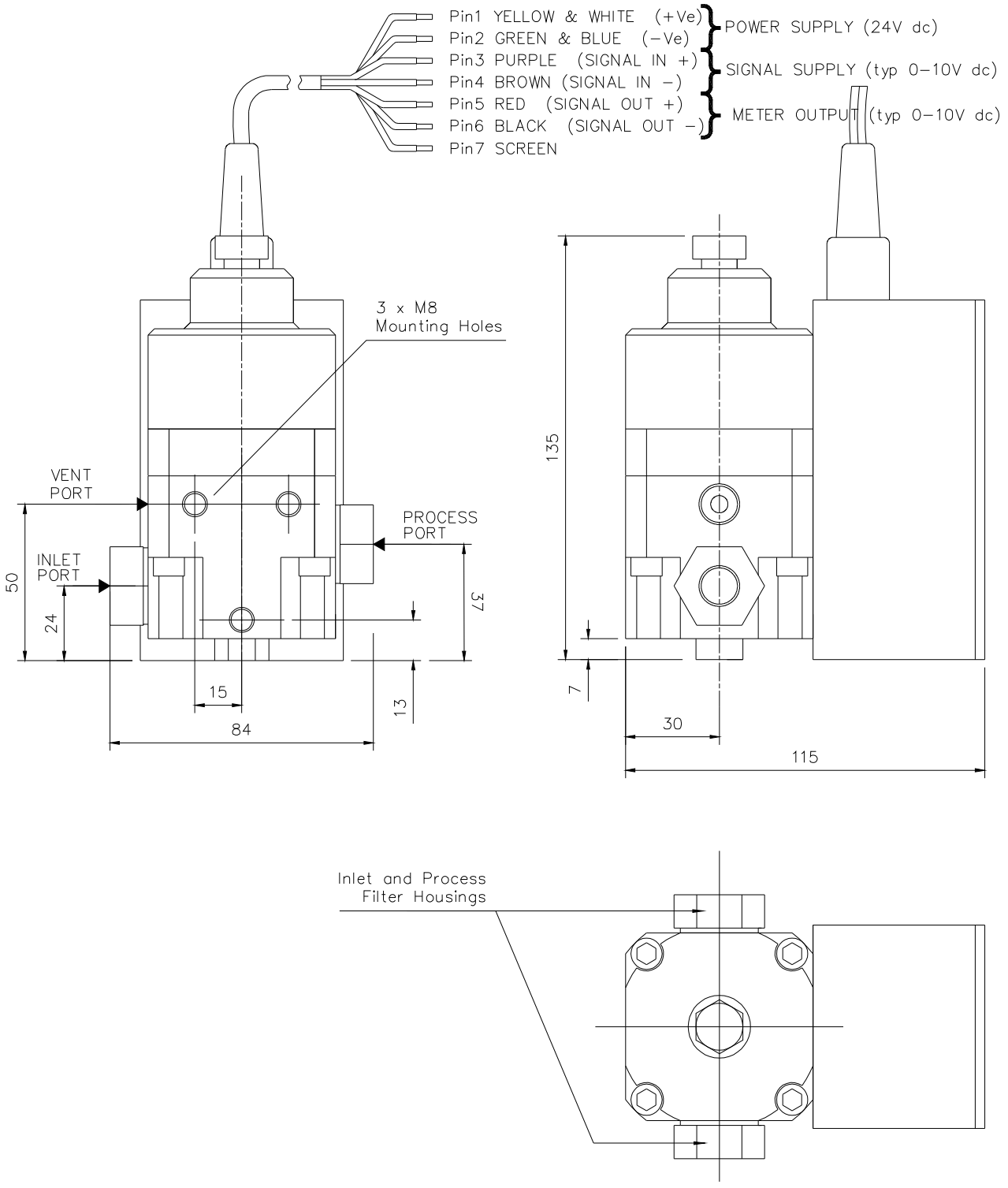
Part C. Assembling a valve

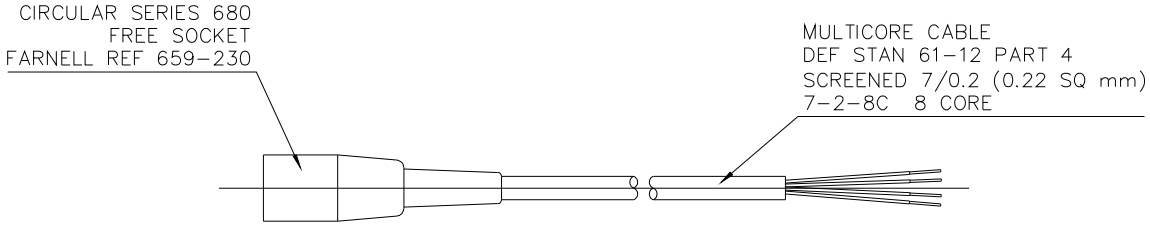
Smear all seals with recommended grease (Molycote 33 or 55, or equivalent) where shown. Build assemblies in reverse order shown in part A. Main valve mounting bolt torque = 4 Nm. Solenoid mounting bolt torque = 8 Nm.

Part D. Adjusting & testing a valve

1. Bolt the valve to the manifold. Or make connections to valve ports as per installation.
2. Check valve function using Calibration Procedure.
3. If the Proportional valve does not function as intended, do not install valve. Repeat the maintenance procedures Parts A to D. If the problem persists contact IVP Sales.

VALVE LAYOUT AND MOUNTING





CUT CABLE TO 2100 mm
PLUG END
STRIP 25 OF SHEATH
TWIST AND TIN SCREEN AND CUT TO 12 LONG
CONNECT TO PLUG

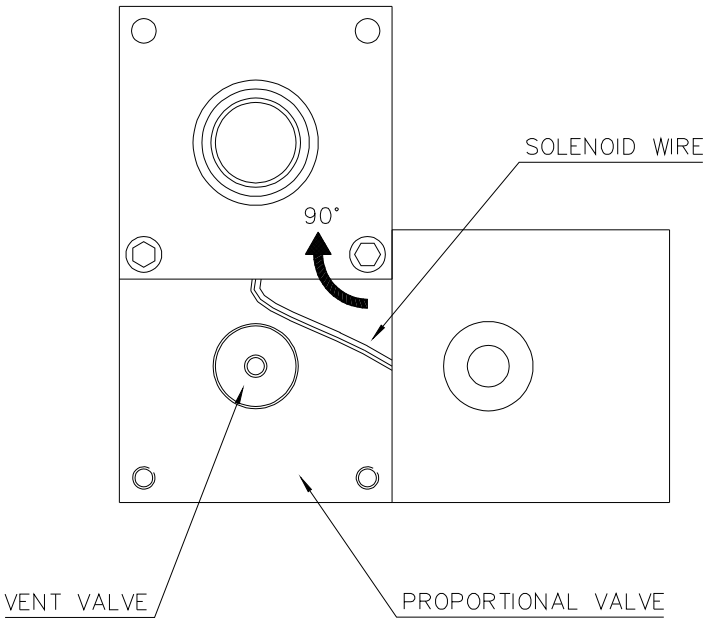
PIN 1	YELLOW & WHITE	+ POWER
PIN 2	GREEN & BLUE	− POWER
PIN 3	PURPLE	+ V IN
PIN 4	BROWN	− V IN
PIN 5	RED	+ V OUT
PIN 6	BLACK	− V OUT
PIN 7	SCREEN	SCREEN

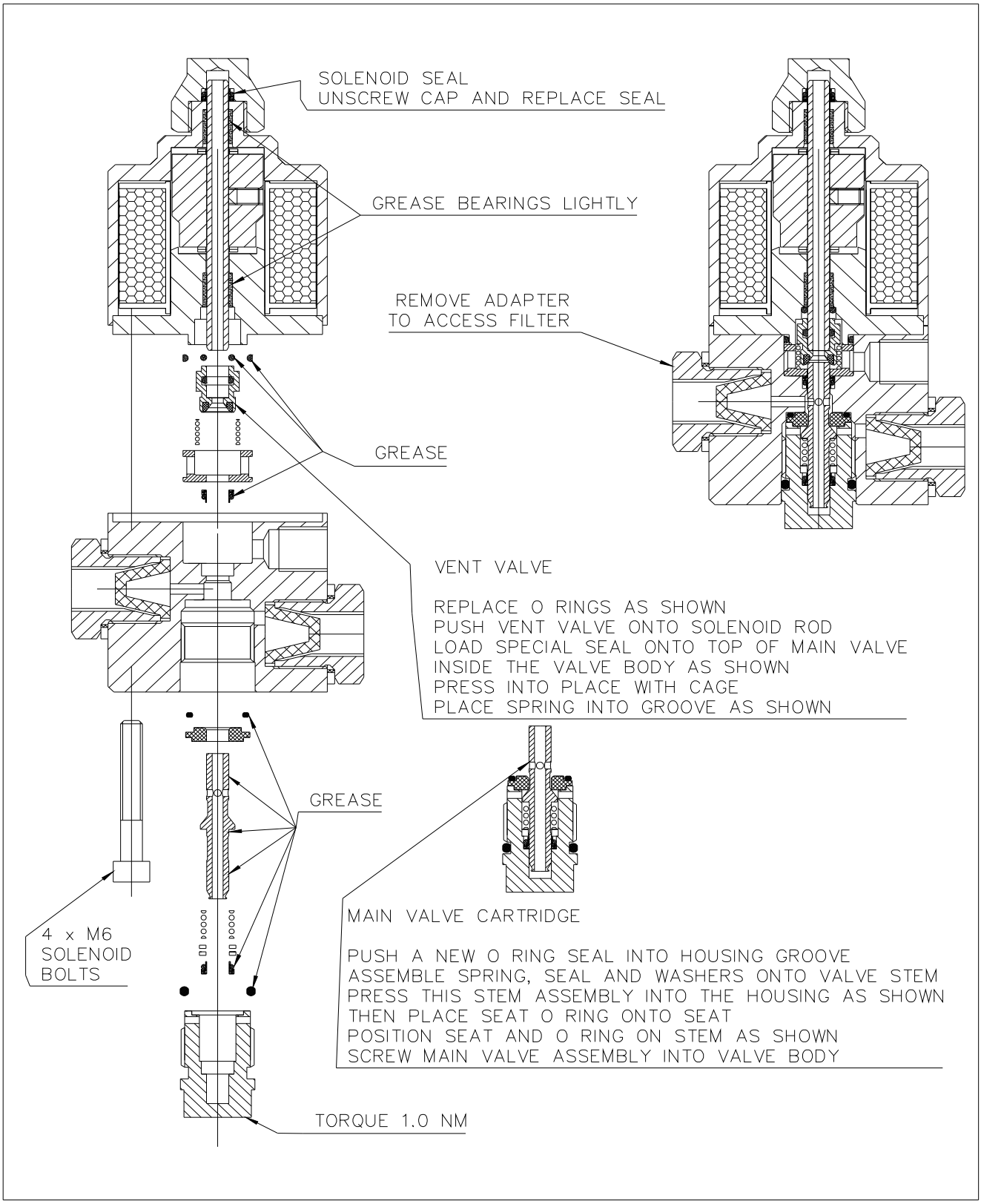
OTHER END
STRIP 40 OF SHEATH
TWIST AND TIN

ACCESSING VENT VALVE ASSEMBLY

REMOVE 4 x M6 BOLTS

ROTATE PROPORTIONAL SOLENOID THROUGH 90°,
(DO NOT OVER STRESS SOLENOID WIRING).
RELACE ONE M6 SCREW TO SUPPORT SOLENOID.
YOU CAN NOW SERVICE THE VENT VALVE.




SOLENOID SEAL
UNSCREW CAP AND REPLACE SEAL
GREASE BEARINGS LIGHTLY
REMOVE ADAPTER
TO ACCESS FILTER
GREASE
VENT VALVE
REPLACE O RINGS AS SHOWN
PUSH VENT VALVE ONTO SOLENOID ROD
LOAD SPECIAL SEAL ONTO TOP OF MAIN VALVE
INSIDE THE VALVE BODY AS SHOWN
PRESS INTO PLACE WITH CAGE
PLACE SPRING INTO GROOVE AS SHOWN
GREASE
4 x M6
SOLENOID
BOLTS
MAIN VALVE CARTRIDGE
PUSH A NEW O RING SEAL INTO HOUSING GROOVE
ASSEMBLE SPRING, SEAL AND WASHERS ONTO VALVE STEM
PRESS THIS STEM ASSEMBLY INTO THE HOUSING AS SHOWN
THEN PLACE SEAT O RING ONTO SEAT
POSITION SEAT AND O RING ON STEM AS SHOWN
SCREW MAIN VALVE ASSEMBLY INTO VALVE BODY
TORQUE 1.0 NM