HEWLAND
ENGINEERING LIMITED

Assembly & Servicing Manual for PNU-060-_ & PNU-117-_ Valve Block Assemblies

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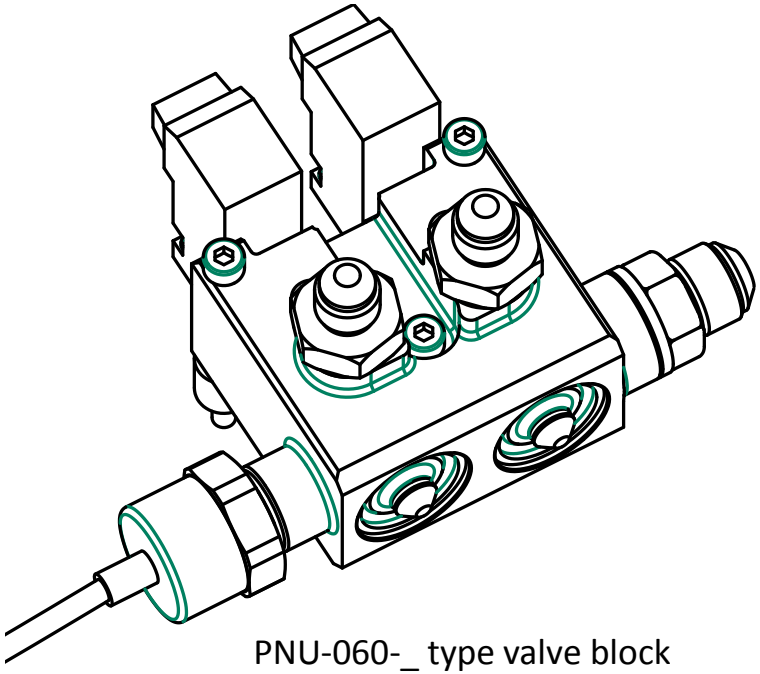
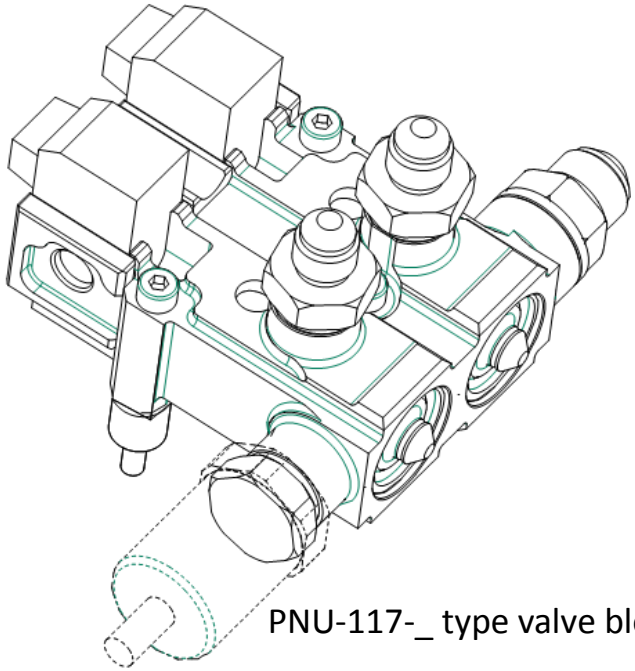
This manual contains assembly instructions for both the PNU-060– & PNU-117- ranges of valve block assemblies.
The internal components within each port on the valve block (i.e. the spool assemblies) are common throughout these ranges as is the overall assembly, testing and service procedures.

The differences between PNU-060- & PNU-117– are the block design itself (the later being lightweight & robust version with addition clamp plate to offer improved pilot valve support & protection).

Note that some bespoke variants (such as PNU-060-2PSF-AS) use special wired pilot valve parts and the orientation of these connections is important. Specific details of special variants are show at the back of this manual.

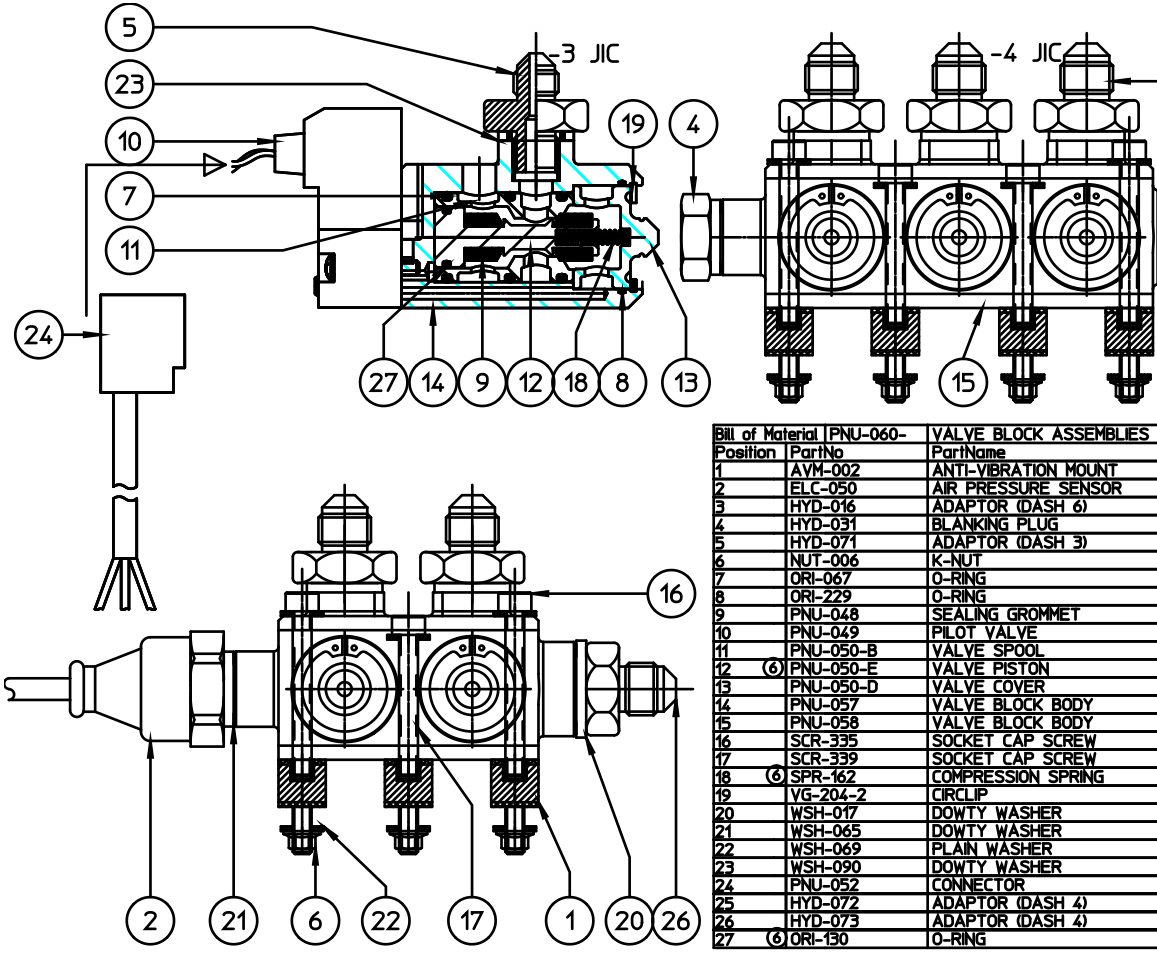


PNU-060-_ type valve block



PNU-117-_ type valve block

PNU-060– range - Bill Of Materials



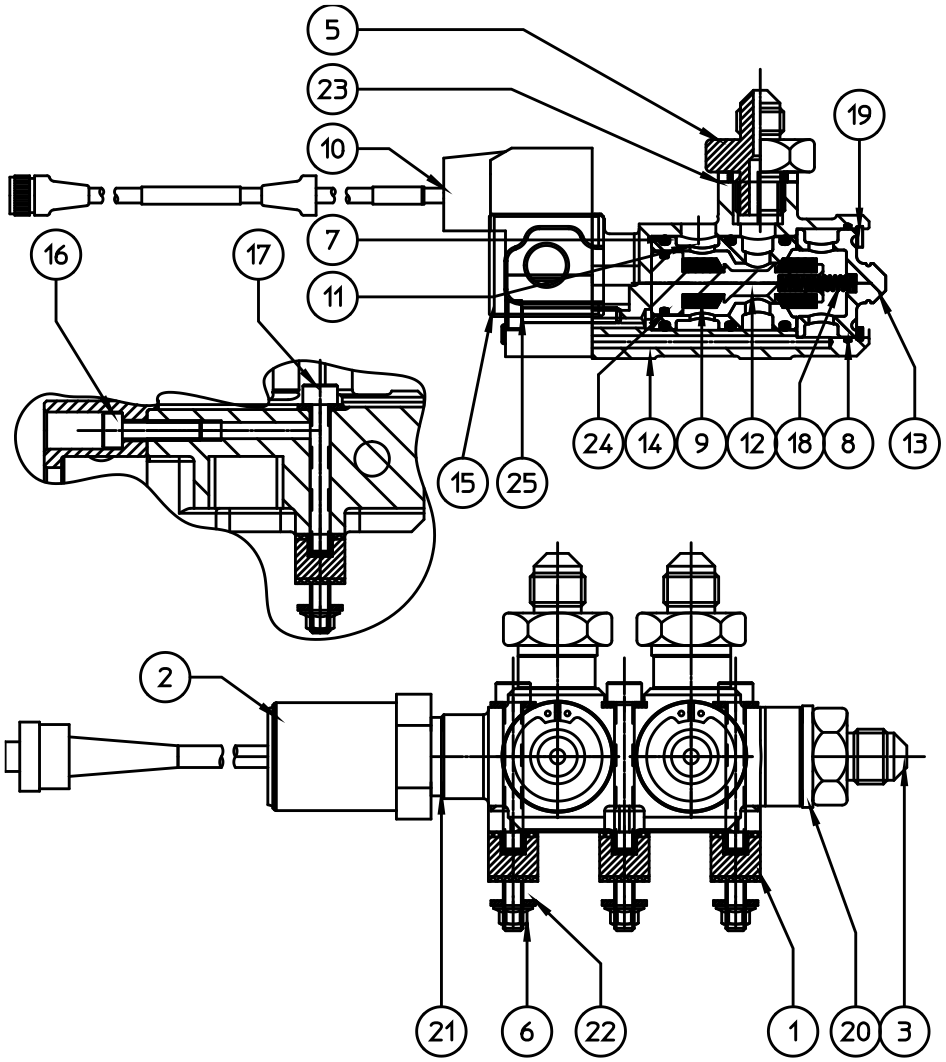
Bill of Material	PNU-060-	VALVE BLOCK ASSEMBLIES	PNU-060-2	PNU-060-2PS	PNU-060-3	PNU-060-3PS	PNU-060-2F	PNU-060-2PSF	PNU-060-3F	PNU-060-3PSF	PNU-060-X2	PNU-060-X2PS	PNU-060-X3	PNU-060-X3PS	PNU-060-X2F	PNU-060-X2PSF	PNU-060-X3F	PNU-060-X3PSF
Position	PartNo	PartName	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty
1	AVM-002	ANTI-VIBRATION MOUNT	3	3	4	4	3	3	4	4	3	3	4	4	3	3	4	4
2	ELC-050	AIR PRESSURE SENSOR	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1
3	HYD-016	ADAPTOR (DASH 6)	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
4	HYD-031	BLANKING PLUG	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-
5	HYD-071	ADAPTOR (DASH 3)	2	2	3	3	-	-	-	-	2	2	3	3	-	-	-	-
6	NUT-006	K-NUT	3	3	4	4	3	3	4	4	3	3	4	4	3	3	4	4
7	ORI-067	O-RING	6	6	9	9	6	6	9	9	6	6	9	9	6	6	9	9
8	ORI-229	O-RING	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
9	PNU-048	SEALING GROMMET	4	4	6	6	4	4	6	6	4	4	6	6	4	4	6	6
10	PNU-049	PILOT VALVE	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
11	PNU-050-B	VALVE SPOOL	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
12	(6) PNU-050-E	VALVE PISTON	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
13	PNU-050-D	VALVE COVER	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
14	PNU-057	VALVE BLOCK BODY	1	1	-	-	1	1	-	-	1	1	-	-	1	1	-	-
15	PNU-058	VALVE BLOCK BODY	-	-	1	1	-	-	1	1	-	-	1	1	-	-	1	1
16	SCR-335	SOCKET CAP SCREW	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
17	SCR-339	SOCKET CAP SCREW	1	1	2	2	1	1	2	2	1	1	2	2	1	1	2	2
18	(6) SPR-162	COMPRESSION SPRING	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
19	VG-204-2	CIRCLIP	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
20	WSH-017	DOWTY WASHER	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	WSH-065	DOWTY WASHER	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	WSH-069	PLAIN WASHER	6	6	8	8	6	6	8	8	6	6	8	8	6	6	8	8
23	WSH-090	DOWTY WASHER	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
24	PNU-052	CONNECTOR	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
25	HYD-072	ADAPTOR (DASH 4)	-	-	-	-	2	2	3	3	-	-	-	-	2	2	3	3
26	HYD-073	ADAPTOR (DASH 4)	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1
27	(6) ORI-130	O-RING	2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3

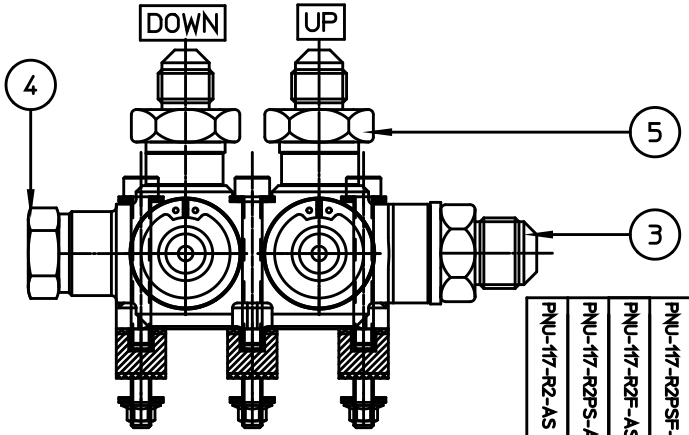
FOR VERSIONS WITH CONNECTORS RATHER THAN FLYING LEADS AN ADDITIONAL SUFFIX WILL INDICATE CONNECTOR TYPE (I.E. SUFFIX '-AS' INDICATES DEUSCH AUTOSPORT CONNECTOR USED) AND A SEPERATE DRAWING WILL BE AVAILABLE

The variations relate to the number of valves within the block (i.e. 2 or 3 valves), if the block has a pressure sensor fitted & what size fittings the outlets have (-3 or –4 JIC).

These are reflected in the suffix of the part number. The first digit of the suffix signifies the number of valves (i.e. *PNU-0602* is a block with 2 valves) if this digit is followed by the letters ***PS*** then an air pressure sensor is fitted. Output fittings are –3 JIC as standard, however if –4 JIC are required then the part number will end in F (i.e. dash **F**our). For example *PNU-060-3PSF* is a 3-valve block with pressure sensor and –4 JIC fittings.

PNU-117– range - Bill Of Materials

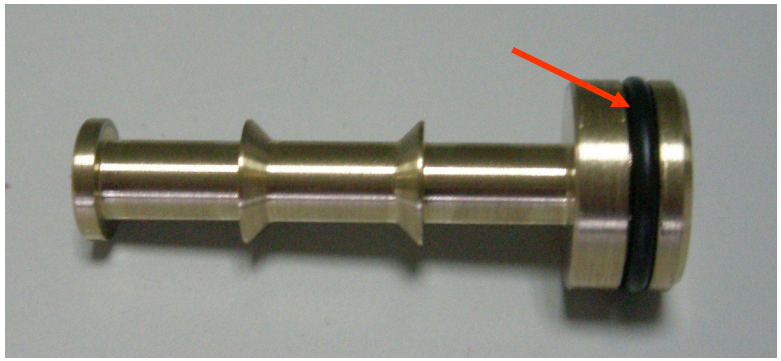




Bill of Material	PNU-117-	VALVE BLOCK ASSEMBLIES (2 VALVE, ROBUST A/S TYPES)	PNU-117-R2-AS	PNU-117-R2PS-AS	PNU-117-R2F-AS	PNU-117-R2PSF-AS	PNU-117-RX2-AS	PNU-117-RX2PS-AS	PNU-117-RX2F-AS	PNU-117-RX2PSF-AS
Position	PartNo	PartName	Qty	Qty	Qty	Qty	Qty	Qty	Qty	Qty
1	AVM-002	ANTI-VIBRATION MOUNT	3	3	3	3	3	3	3	3
2	ELC-075-AS	AIR PRESSURE SENSOR (A/S CONNECTOR TYPE)	-	1	-	1	-	1	-	1
3	HYD-016	ADAPTOR (DASH 6)	1	1	1	1	-	-	-	-
	HYD-073	ADAPTOR (DASH 4)	-	-	-	-	1	1	1	1
4	HYD-031	BLANKING PLUG	1	-	1	-	1	-	1	-
5	HYD-071	ADAPTOR (DASH 3)	2	2	-	-	2	2	-	-
	HYD-072	ADAPTOR (DASH 4)	-	-	2	2	-	-	2	2
6	NUT-006	K-NUT	3	3	3	3	3	3	3	3
7	ORI-067	O-RING	6	6	6	6	6	6	6	6
8	ORI-229	O-RING	2	2	2	2	2	2	2	2
9	PNU-048	SEALING GROMMET	4	4	4	4	4	4	4	4
10	PNU-049-AS2	PILOT VALVE ASSY (A/S CONN)	1	1	1	1	1	1	1	1
11	PNU-050-B	VALVE SPOOL	2	2	2	2	2	2	2	2
12	PNU-050-E	VALVE PISTON	2	2	2	2	2	2	2	2
13	PNU-050-D	VALVE COVER	2	2	2	2	2	2	2	2
14	PNU-116	VALVE BLOCK BODY	1	1	1	1	1	1	1	1
15	PNU-116-VRP	VALVE RETAINING PLATE	1	1	1	1	1	1	1	1
16	SCR-043	SOCKET CAP SCREW	1	1	1	1	1	1	1	1
17	SCR-339	SOCKET CAP SCREW	3	3	3	3	3	3	3	3
18	SPR-162	COMPRESSION SPRING	2	2	2	2	2	2	2	2
19	VG-204-2	CIRCLIP	2	2	2	2	2	2	2	2
20	WSH-017	DOWTY WASHER	1	1	1	1	1	1	1	1
21	WSH-065	DOWTY WASHER	1	1	1	1	1	1	1	1
22	WSH-069	PLAIN WASHER	6	6	6	6	6	6	6	6
23	WSH-090	DOWTY WASHER	2	2	2	2	2	2	2	2
24	ORI-130	O-RING	2	2	2	2	2	2	2	2
25	SCR-390	SOCKET CAP SCREW	4	4	4	4	4	4	4	4

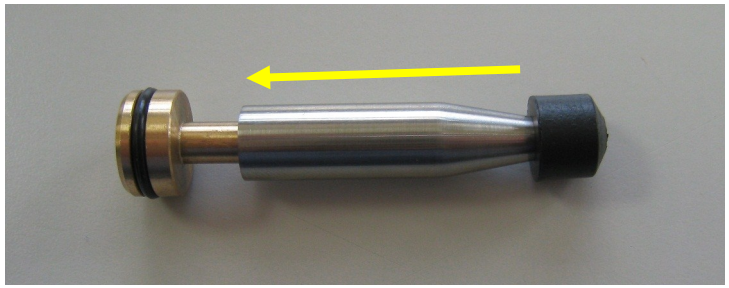
1. Fit the 3off o-rings (ORI-067) to the valve spool (PNU-050-B)

2. Fit o-ring (ORI-130) to the valve piston (PNU-050-E).



3. Slide one of the sealing grommets (PNU-048) on to the valve piston (PNU-050-E) using SK-2471 tool so that the non-tapered face is against the piston shoulder.

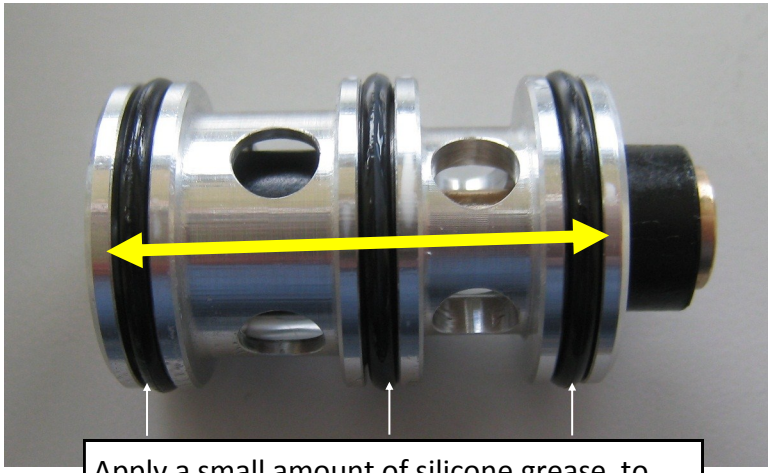
A tiny amount of P-80 Rubber lubricant can be used when sliding the grommet over the SK-2471 tool. Ensure all P-80 is cleaned off with an airline & clean cloth prior to installing the piston into the spool.



4. Apply **silicone grease** around the o-ring and slide the valve spool over the piston, ensuring that the piston is a good fit, and can cleanly and easily slide within the spool. It is important that the o-ring is greased and if a valve block (or spool assembly) is built and left unused for extended periods (>6months) then they should be re-greased (and re-tested) prior to its first use.

5. Push the piston so that the rod end protrudes out of the back of the spool as far as possible, then fit the second grommet to the piston so the tapered face is nearest to the spool.

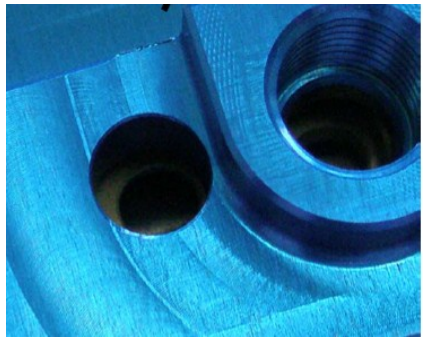
6. Ensure the piston assembly is free to slide in and out of the spool so that the tapered faces of the grommets sit against the mating tapered faces of the spool in both directions.



Apply a small amount of silicone grease to the three O-rings on the outside of the spool.

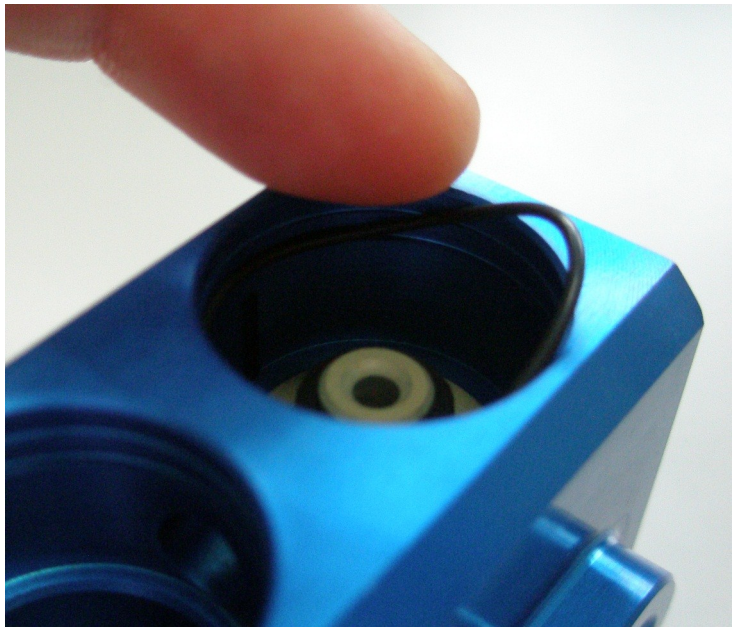
A simple test can be carried out on the spool assembly to ensure it is not sticking:-

7. Push the spool assembly into the chamber in the valve block body. Apply some pressure with your thumb to ensure it is fully home.

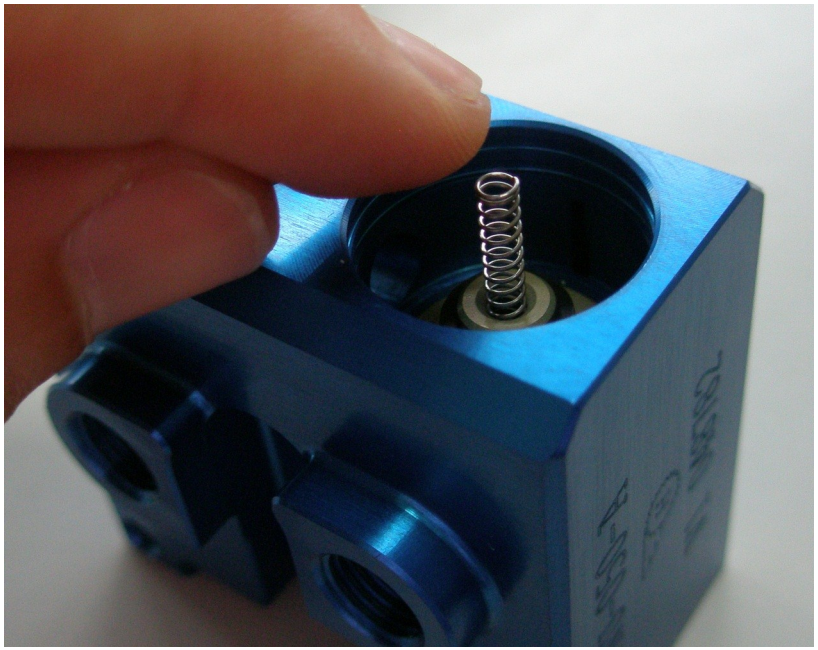


Ensure holes in spools are visually aligned to those in the valve block

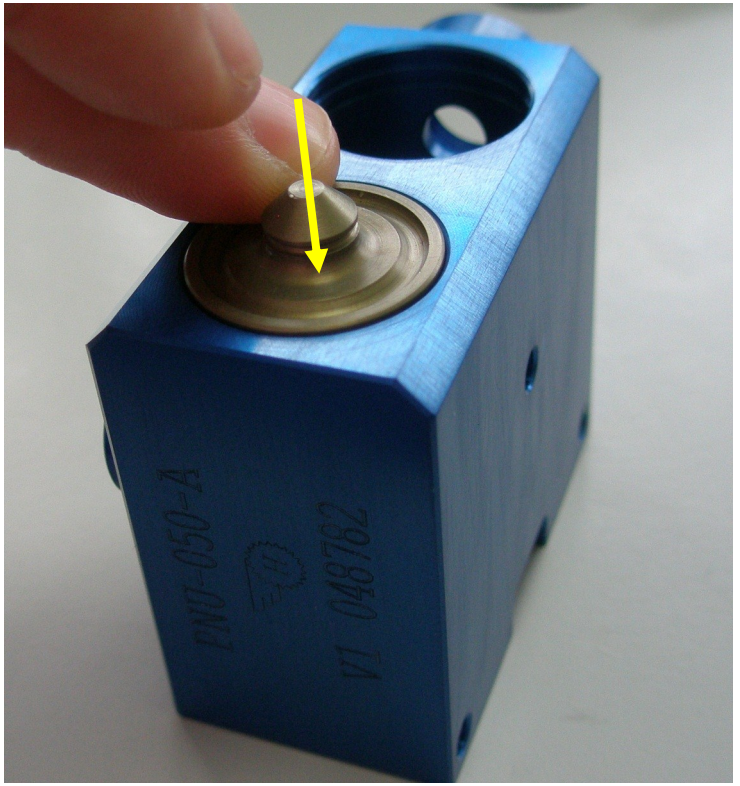
8. Fit ORI-229 into the far most groove in the valve block body chamber. Ensure the o-ring is fully seated within the internal groove and apply some silicone grease around the o-ring to aid putting the cap in place.



9. Fit the compression spring (SPR-162) into the bore within the front of the piston.

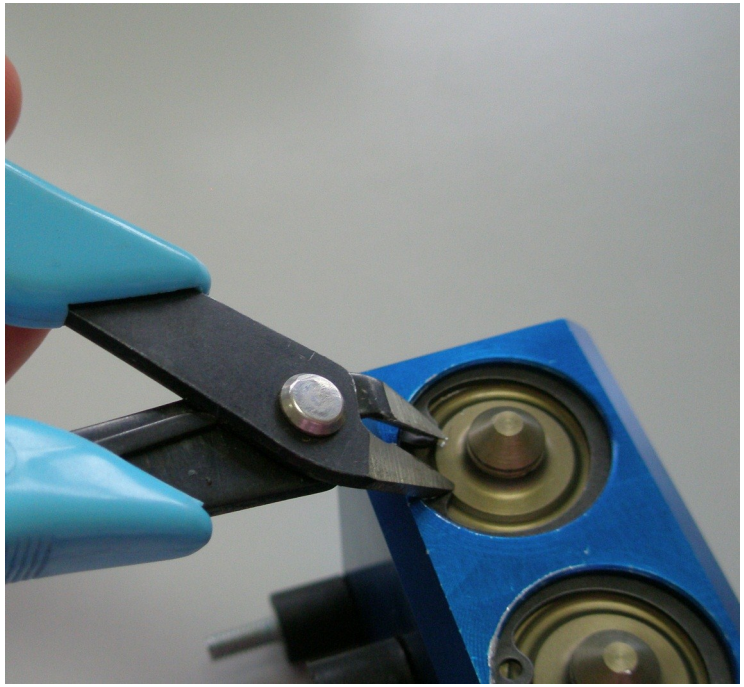


10. Fit the valve cover (PNU-050-D) into chamber in the front of the valve block body, applying firm but even pressure with the thumb ensuring that the o-ring does not get snagged. The valve cover will 'pop' into place once fully home.



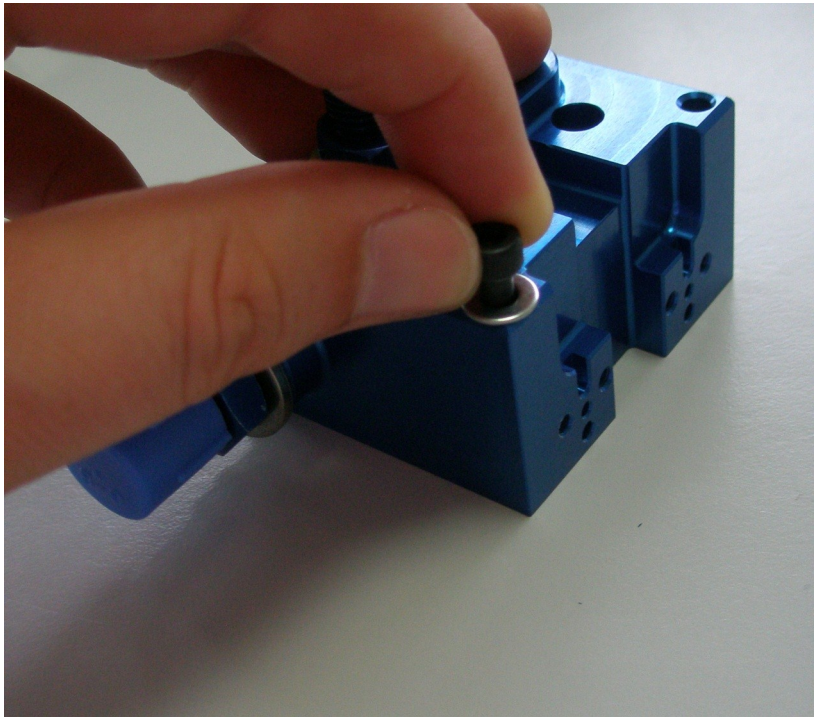
Repeat stages 1-10 for each valve position

11. Fit the circlip (VG-204-2) to hold the valve covers in place. Orientate circlip so that tangs are at the bottom.

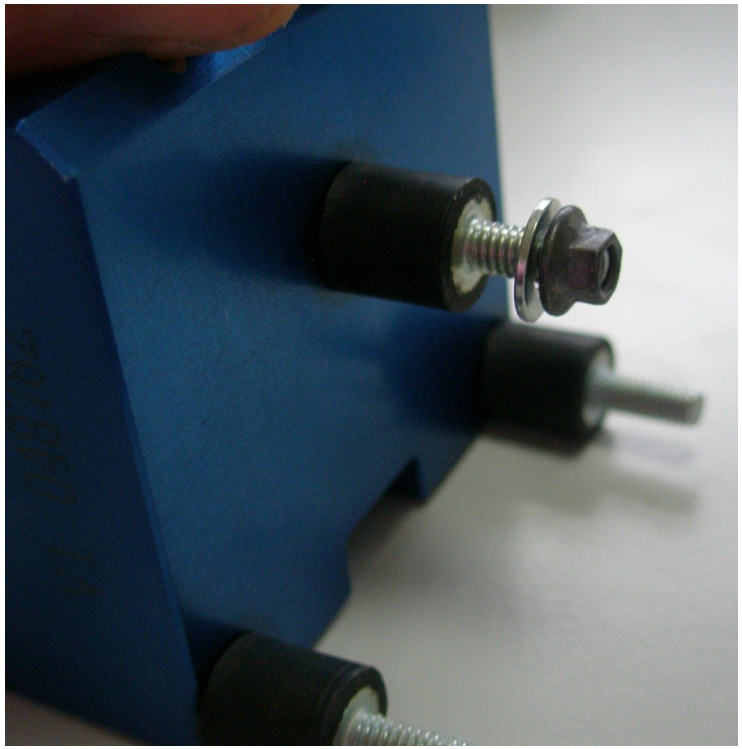


12. Fit the inlet adaptor (HYD-016) and dowty washer (WSH-017) ensuring the washer is fully clamped upon tightening.

13. Fit caphead screws (SCR-335 & SCR-339) with washers (WSH-069) and push them through the block.

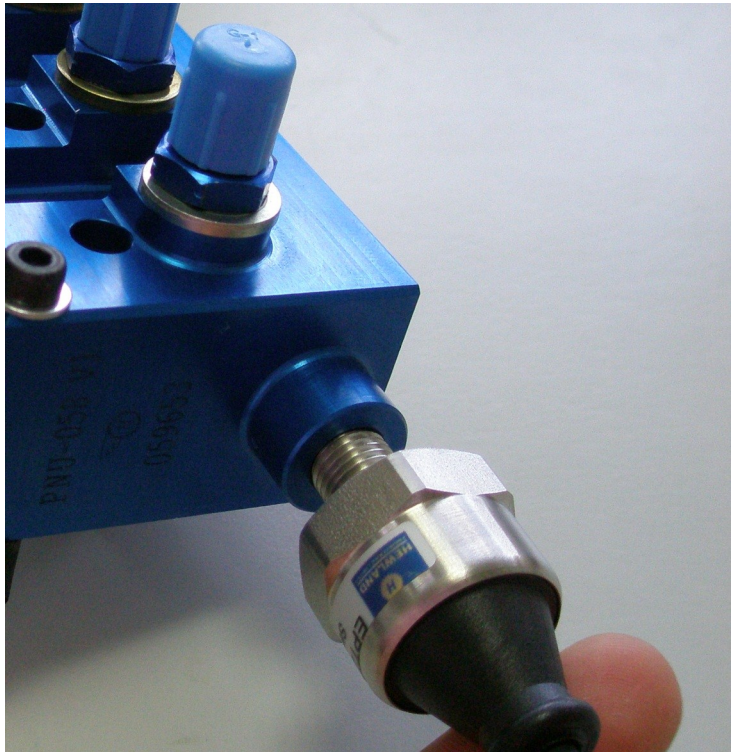


14. Fit AV mounts (AVM-002) to each of the caphead screws and tighten. Loosely fit washers (WSH-069) & k-nuts

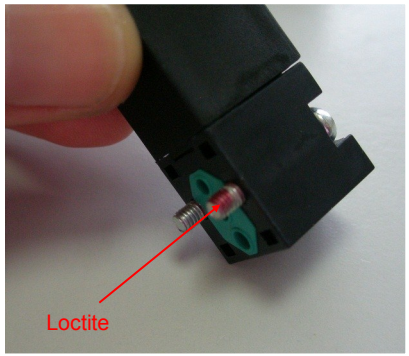


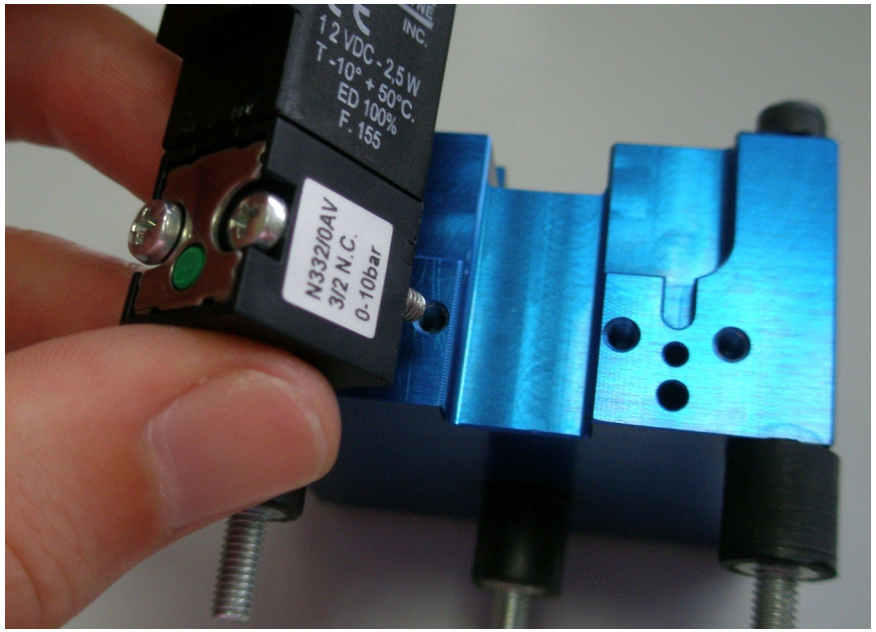
15. Fit the outlet adaptors (HYD-071 or HYD-072) along with dowty washers (WSH-090) to each of the outlet ports and tighten, ensuring the washer is fully clamped up.

16. Fit either the pressure sensor (ELC-050/075##) or blanking plug (HYD-031) along with dowty washer (WSH-065) ensuring the washer is fully clamped up-on tightening.

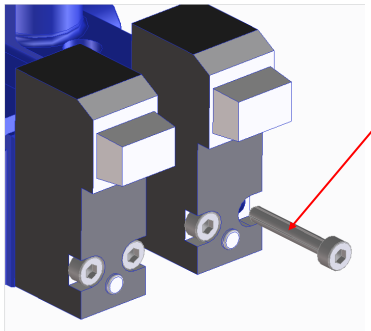


17. [PNU-060-]
Apply a tiny amount of Loctite 222 to the threads of the pilot valve (PNU-049) screws and carefully fit them on to the rear of the block ensuring Loctite doesn't go into any ports or on the seal. Tighten screws.
Repeat for each pilot valve.



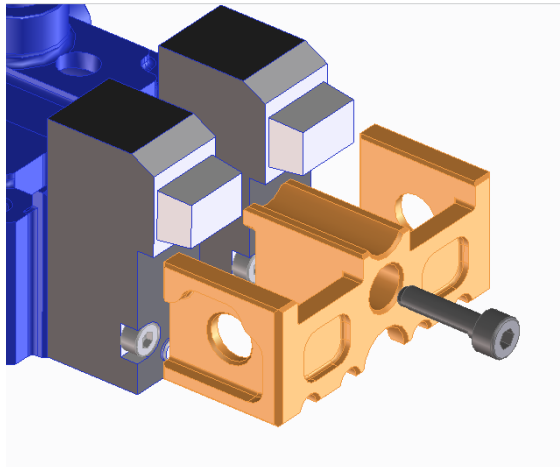


17.a [PNU-117-]
Replace the standard cross head screws (supplied with pilot valve assy) with longer socket cap screws (SCR-390) Apply a tiny amount of Loctite 222 to the threads of the screws and carefully fit them on to the rear of the block ensuring Loctite doesn't go into any ports or on the seal. Tighten each screw to 0.8Nm.
Repeat for each pilot valve screw.



The valve retaining plate fits over the two pilot valves and is held in place with a socket cap screw as shown below. [PNU-117-_ assemblies only]

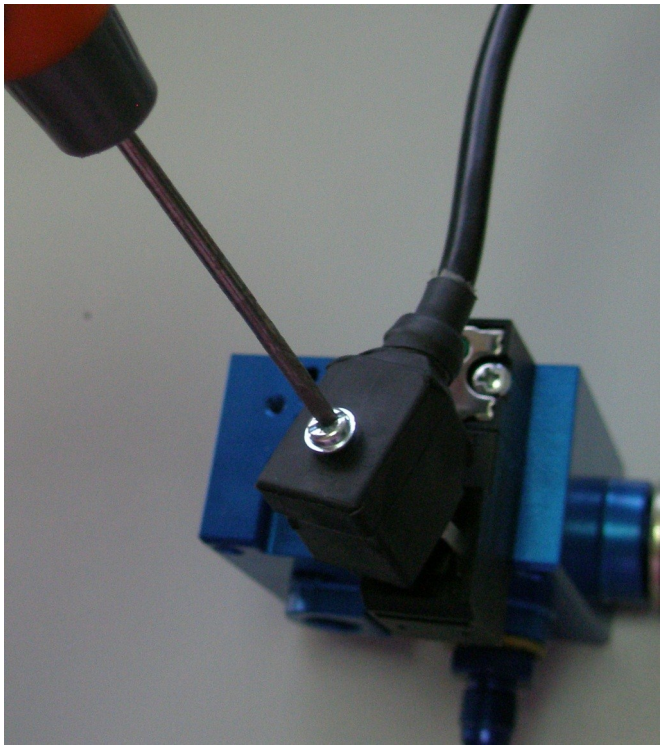
17.b [PNU-117-]
After the pilot valve assembly is fixed in place, the valve retaining plate (PNU-116-VRP) should be fitted and retained using the socket cap screw (SCR-043) Apply a tiny amount of Loctite 222 to the thread. Tighten the screw to 1.8Nm.



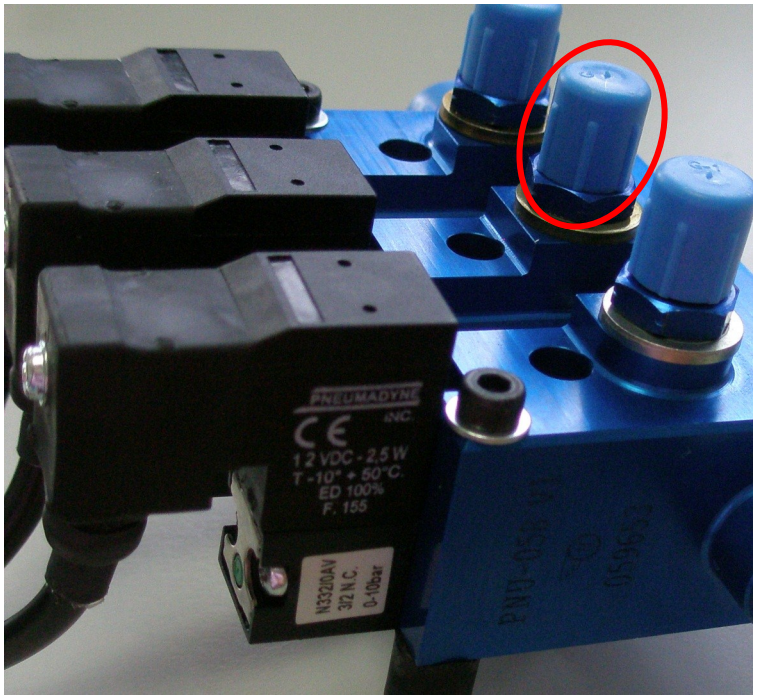
FOR SPECIAL WIRED VERSIONS OF PILOT VALVES, CHECK CORRECT ORIENTATION - SEE BACK OF THIS MANUAL

18. Note for in house assembly:
Test the unit on the rig (standard 15 cycle test)

19. (where applicable) Fit connectors (PNU-052) to terminals on back of the pilot valves so that wires exit at the bottom.

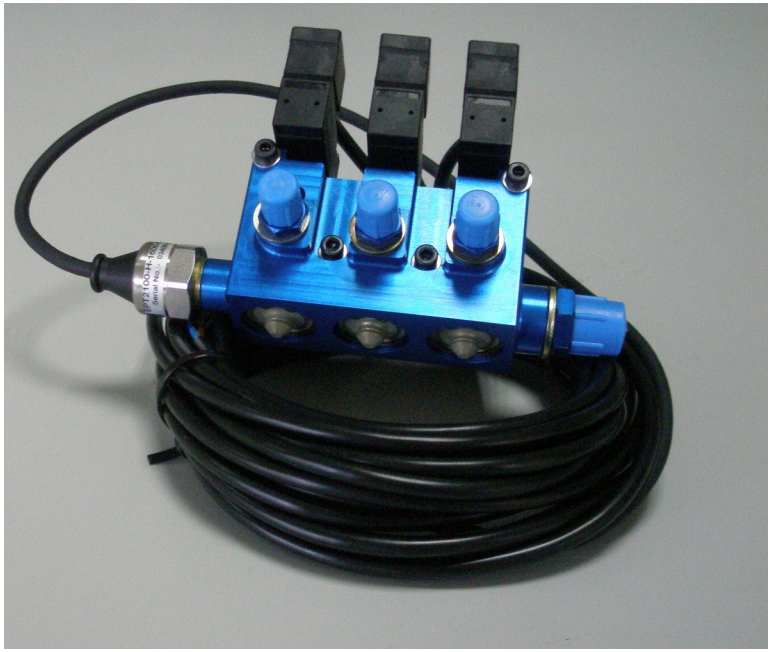


20. Fit plastic plugs over all inlet & outlet ports.



FOR SPECIAL WIRED VERSIONS OF PILOT VALVES, CHECK CORRECT ORIENTATION - SEE BACK OF THIS MANUAL

21. <u>For in house assembly:</u>
Tie-wrap cables together, fill out test date sticker, put assembly into clear plastic bag along with Silica-gel sachet. Seal bag & affix test date sticker -
Assembly is now ready for stores



Part Number: *PNU-060-3F valve block*
Test type: *Full 15 cycle (passed)* **Date:** *25/12/2011*
<u>Shelf life note:- O-rings & seals should be re-greased and assembly re-tested after 6 months if part is not used.</u>
Signed: *A. Temberlar*

Servicing

Service life can vary greatly between different applications & will be influenced by temperature, duty cycle, system supply pressure & voltage.
As a guide, we recommend the following:

Service every 4500km / 6 months
Rebuild every 9000km / 12 months

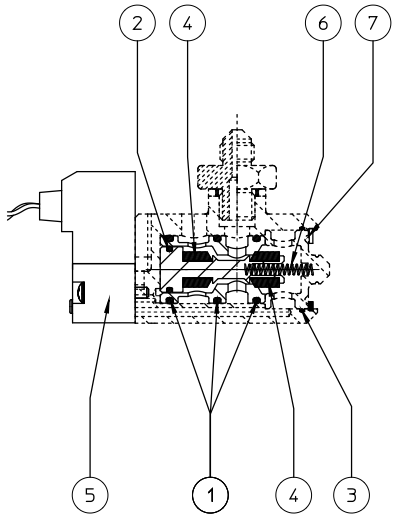
If valves/block are subjected to fuel, fire, high temperature, excessive voltage, debris ingress or over-pressurised then they should be serviced before further running.
Pneumatic system should be drained at the end of a days running to remove moisture and filters cleaned regularly.

If the valves are exposed to very wet conditions it is advisable to ensure they are stripped and dried after the event.

The following table lists all parts that should be replaced during service/rebuild as a matter of course. The condition of all other components should be checked during service/rebuild and replaced if worn or damaged.

Part No.	Description	Comment
ORI-067	O-RING	Replace during service & rebuild
ORI-130	O-RING	Replace during service & rebuild
ORI-229	O-RING	Replace during service & rebuild
PNU-048	SEALING GROMMET	Replace during service & rebuild
PNU-049 *or* *PNU-049-AS2/3* *etc.*	PILOT VALVE or WIRED ASSY	We <u>recommend</u> replacing the pilot valves (or the wired pilot valve connector assy) during service. Must be replaced during rebuild
PNU-050-B	VALVE SPOOL	Replace during rebuild
PNU-050-E	VALVE PISTON	Replace during rebuild
SPR-162	COMPRESSION SPRING	Replace during service & rebuild
VG-204-2	CIRCLIP	Replace during service & rebuild

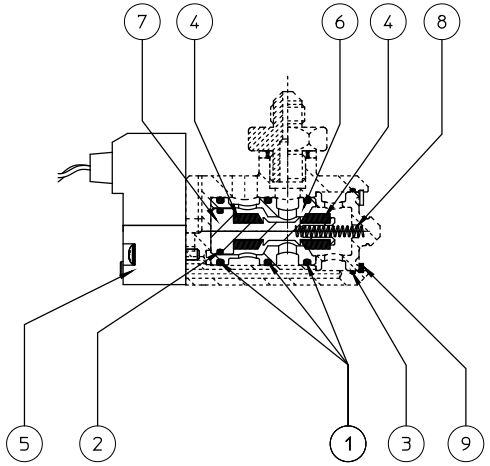
Service/Rebuild kits



Bill of Material		PNU-060-MSK	V/BLOCK SERVICE KIT
Position	Qty	PartNo	PartName
1	3	ORI-067	O-RING
2	1	ORI-130	O-RING
3	1	ORI-229	O-RING
4	2	PNU-048	SEALING GROMMET
5	1	PNU-049	PILOT VALVE
6	1	SPR-162	COMPRESSION SPRING
7	1	VG-204-2	CIRCLIP

KIT TO SERVICE 1 VALVE ASSEMBLY

I.E THEREFORE:
- PNU-060-2PSF REQUIRES 2off PNU-060-MSK
- PNU-060-3PSF REQUIRES 3off PNU-060-MSK



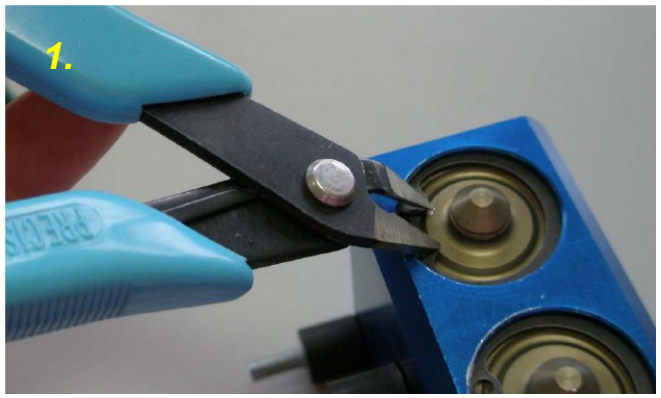
Bill of Material		PNU-060-RBK	V/BLOCK REBUILD KIT
Position	Qty	PartNo	PartName
1	3	ORI-067	O-RING
2	1	ORI-130	O-RING
3	1	ORI-229	O-RING
4	2	PNU-048	SEALING GROMMET
5	1	PNU-049	PILOT VALVE
6	1	PNU-050-B	VALVE SPOOL
7	1	PNU-050-E	VALVE PISTON
8	1	SPR-162	COMPRESSION SPRING
9	1	VG-204-2	CIRCLIP

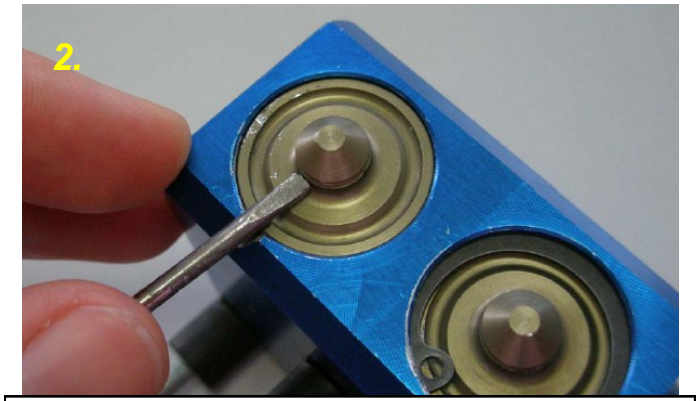
KIT TO OVERHAUL 1 VALVE ASSEMBLY

I.E THEREFORE:
- PNU-060-2PSF REQUIRES 2off PNU-060-RBK
- PNU-060-3PSF REQUIRES 3off PNU-060-RBK

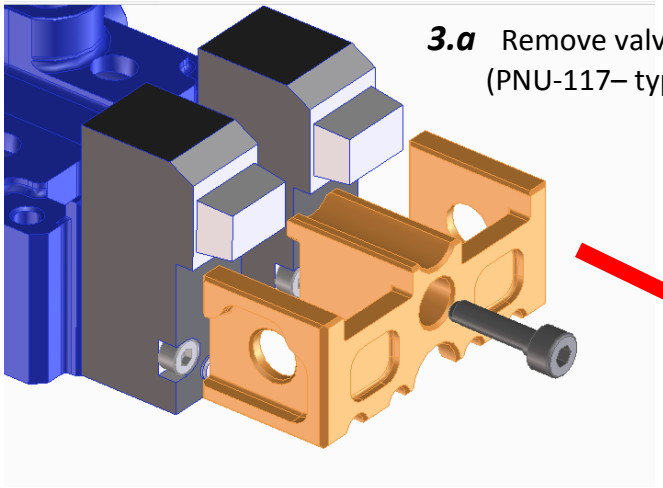
Note:- Service/Rebuild kits are not compatible with bespoke wired variants (e.g. PNU-060-2PSF-AS) as they only include standard pilot valves

Disassembly guide (for service/rebuild):-

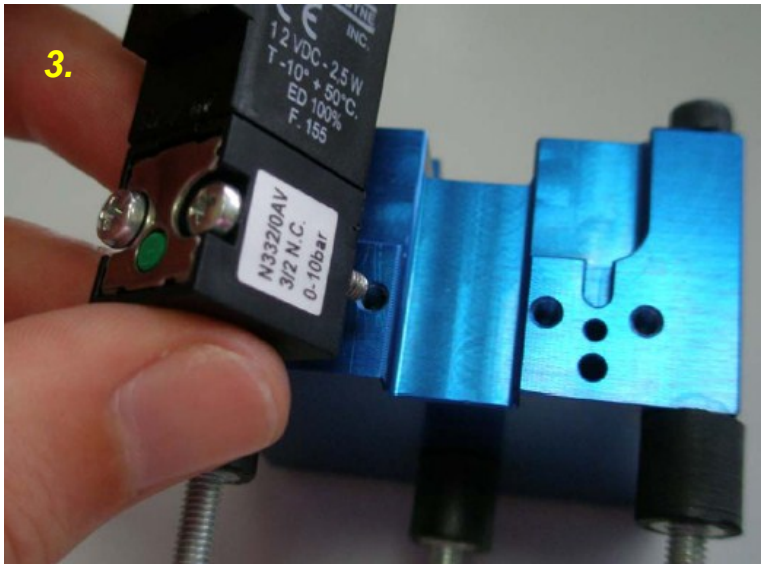




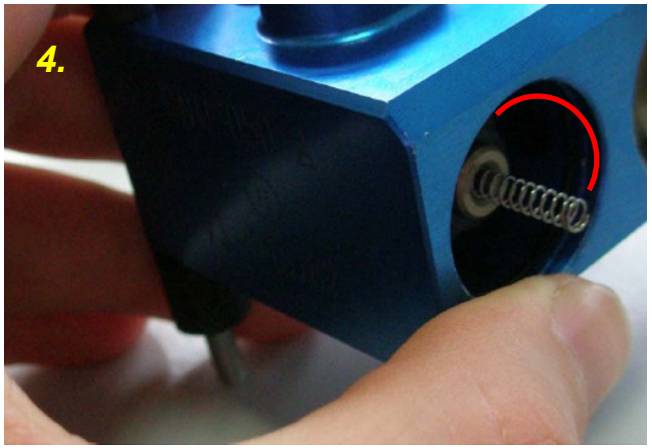
N.B. It maybe necessary to remove the pressure sensor (where fitted) in order to be able to remove the adjacent cover from some blocks.

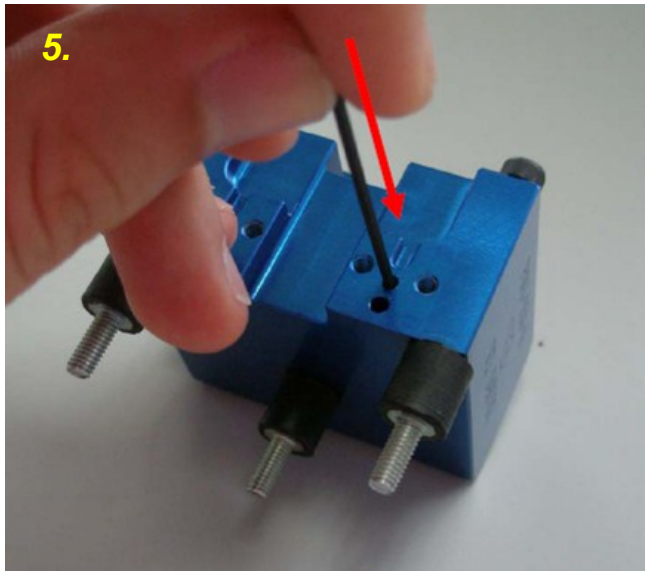


3.a Remove valve retaining plate (PNU-117– type assemblies only)



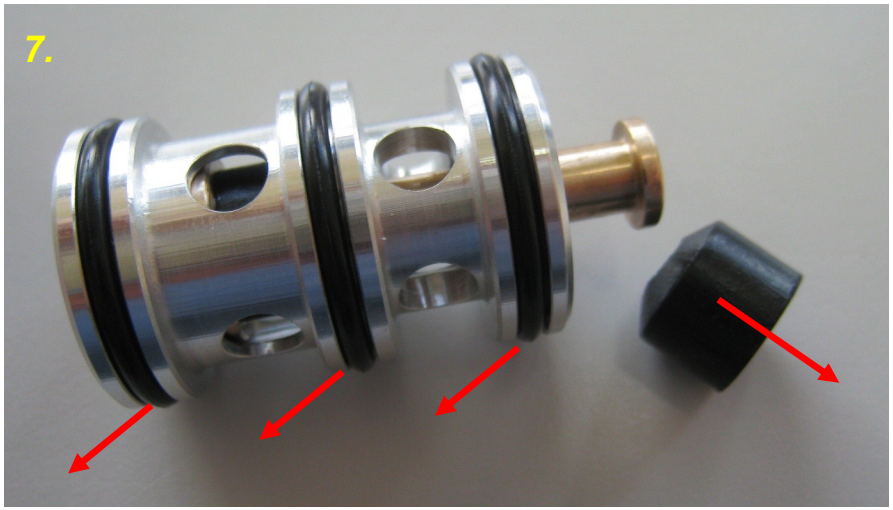
1. Remove circlip (VG-204-2)
2. Lever cover off carefully (PNU-050-D)
3. Remove pilot valves (PNU-049) or valve assembly
   [Note that for PNU-117– assemblies, you will first need to remove PNU-116-VRP plate as shown in fig 3a)



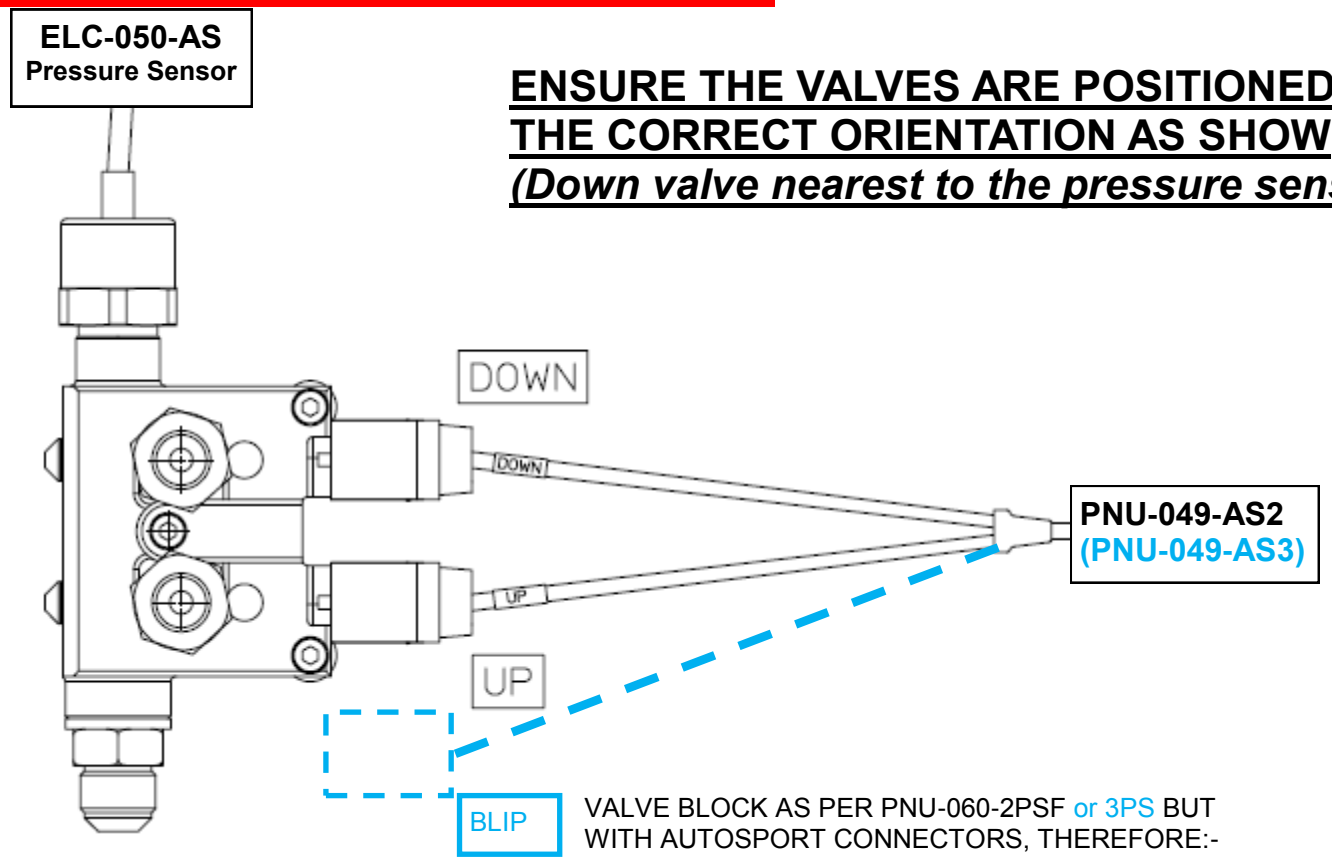


4. Remove valve return spring (SPR-162) and o-ring (ORI-229) fron the groove in the mouth of block
5. Gently push a round ended tool through the pilot pressure port
6. Spool and piston assembly should come out
7. Remove grommets (PNU-048) and o-rings (ORI-067)
8. Rebuild valve block as per the assembly instructions with new parts as described on **page 16**

Remember, it is very important that the inner o-ring (ORI-130) has silicone grease applied when fitted and if a valve block or spool assembly is built and left unused for extended periods (i.e. greater than 6months) then they should be re-greased (and re-tested) prior to it use.



SPECIAL VARIATIONS - **PNU-060-2PSF-AS (2012 DTM SPEC.)**
- **PNU-060-3PSF-AS (3 valve with AS)**



ENSURE THE VALVES ARE POSITIONED IN THE CORRECT ORIENTATION AS SHOW
(Down valve nearest to the pressure sensor)

VALVE BLOCK AS PER PNU-060-2PSF or 3PS BUT WITH AUTOSPORT CONNECTORS, THEREFORE:-

- ELC-050 REPLACED WITH ELC-050-AS
- PNU-049 (2off) & PNU-052 (2off) ARE REPLACED WITH PNU-049-AS2/PNU-049-AS3 (1off)

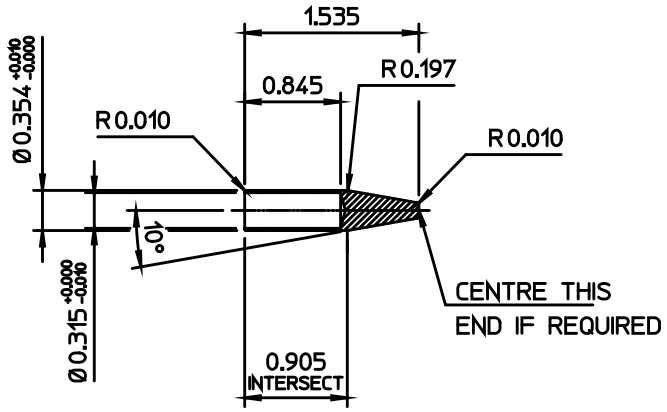
ALSO, NUT-006 (3 - 4off) & WSH-069 (3 - 4off) ARE NOT REQUIRED

DO NOT SCALE - IF IN DOUBT ASK
REMOVE SHARP EDGES

DRG. No.
SK-2471

The SK-2471 tool is designed to aid fitting the grommets on to the valve pistons. It can be purchased from Hewland Engineering Limited.

The drawing of SK-2471 is included here for customers that wish to make their own tool.



BAG MARK
TO HE-047

ISSUE	MODIFICATION	DATE

MATERIAL: STEEL BAR
HEAT TREATMENT: NONE
SHOT PEEN: NONE
FINISH: CLEAN & OIL

DRAWN: JMB 03/05/2011
APPROVED: JMB 04/05/2011
RELEASED: JMB 04/05/2011

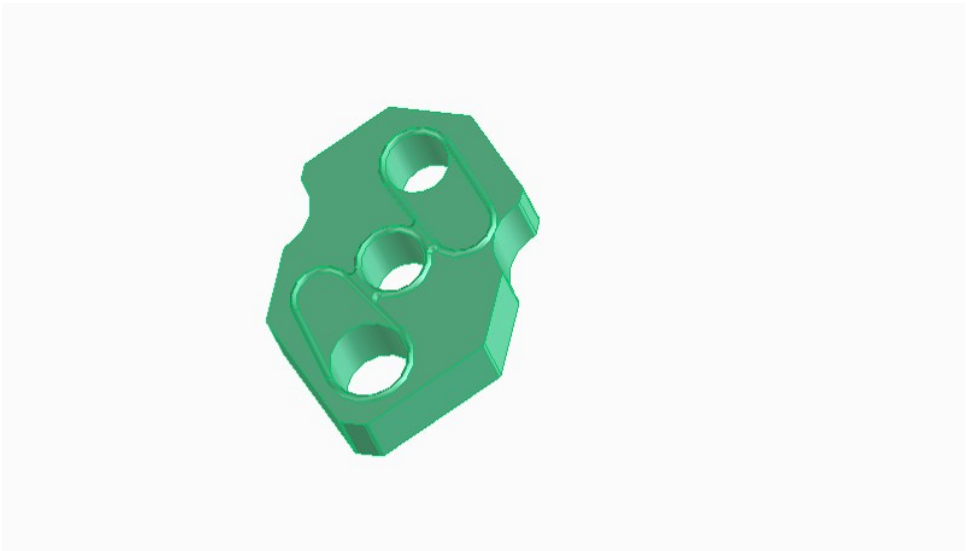
DIMENSIONS: INCHES
SCALE: 1:1

UNLESS OTHERWISE STATED, GENERAL TOLERANCE, SURFACE FINISH, SCREW THREADS AND 3D DESIGN MODEL ARE TO HEWLAND DOP-002 STANDARD

HEWLAND ENGINEERING LIMITED

TITLE: VALVE ASSY TOOL

DRG. No. SK-2471
Sheet 1 Of 1



Replacement gasket seals for the pilot valve are available, part number PNU-049-SEAL. This is intended as a spare for if the seal is damaged or lost during assembly, usually this is only replaced (within servicing schedule) along with the pilot valve (PNU-049) itself.

Note that the colour of this gasket seal has changed from green to black in recent years. The specification/rating of the seal has not been effected.

Use of P-80 Rubber Lubricant

As of January 2017 the advice regarding the use of P-80 rubber lubricant in the assembly process of the pneumatic valves has changed. This is due to an instance of excess lubricant being found trapped in the spool the resulting contamination in the spool causing the piston to stick.

The assembly procedure now clearly states that P-80 is ONLY to be used on the grommets when sliding them over the SK-2471 tool, after which all P-80 reside should be cleaned off prior to continuing to assemble the valve spool.

In other areas (such as spool O-rings) that P-80 been specified, silicone grease should be used instead.