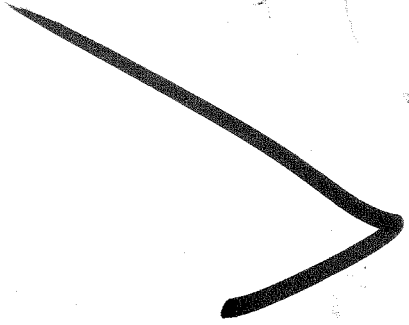


Amendment. 3.

19/7/86



2-40-UH1



Publication No. 2-40-UH1

ZEPHYR VALVE, SERIES 4

USER HANDBOOK

MZ
MACHINERY WORLD

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C 028H/01:21

NOTE TO READERS

AMENDMENTS

1. Any modifications to this publication will be dealt with by Amendment List (A.L.) action. Incorporation of an A.L. will be recorded on this Amendment Record Sheet in the Table below.

2. Except in the case of a complete revision, indication of A.L. action having been effected is shown by a vertical line in the binding margin against text, illustrations, etc. which have been amended, together with the relevant A.L. No. shown at the foot of the page. The vertical lines and the No. reference remain unchanged in subsequent printings of the manual until a further revision is made on that page.

AMENDMENT RECORD SHEET

Incorporation of an amendment in this publication should be recorded by entering the details in the appropriate columns.

A.L.	Amendment	Date
-	Initial issue	Jan. 1983
1	Incorporating small modifications to diaphragm valves	Feb. 1983
2	Main modifications are: Notes added on torque limitation on reassembly of shafts, on bursting disc in Control Unit and on orientation of tee and cross-pieces on B3 and B4 valves. Some Code numbers changed in parts list.	Sept. 1983
3	Incorporating Mk.2 air cylinders and matingshafts. Maintenance and fault finding section expanded.	Oct. 1984
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TABLES

HEALTH AND SAFETY AT WORK

1. A feature of the Zephyr Valve is the open sided mounting yoke between the air cylinder and the valve; this provides an early indication of product seepage through the product seal. However, if the temperatures or the nature of the products are such that leakage may be a hazard it is essential that a splash shield is used. These are supplied with all valves fitted with diaphragm type product seals. They are also available from the APV Company as an accessory for non-diaphragm valves sizes $1\frac{1}{2}$ - 3 inch for use on any application that the user considers may have a hazard potential.
2. The APV Zephyr Valve has been designed for a range of liquids from those above their vapourisation temperature to cold sterilising solutions. It is therefore necessary to use the correct type of seal material to suit the product (see TECHNICAL DATA section).
3. Stainless steel is subject to corrosion if sodium hypochlorite is used for sterilising. The use of sodium hypochlorite for this purpose should therefore be limited to 150 ppm (max.) for 20 minutes only up to a maximum temperature of 40°C (104°F).

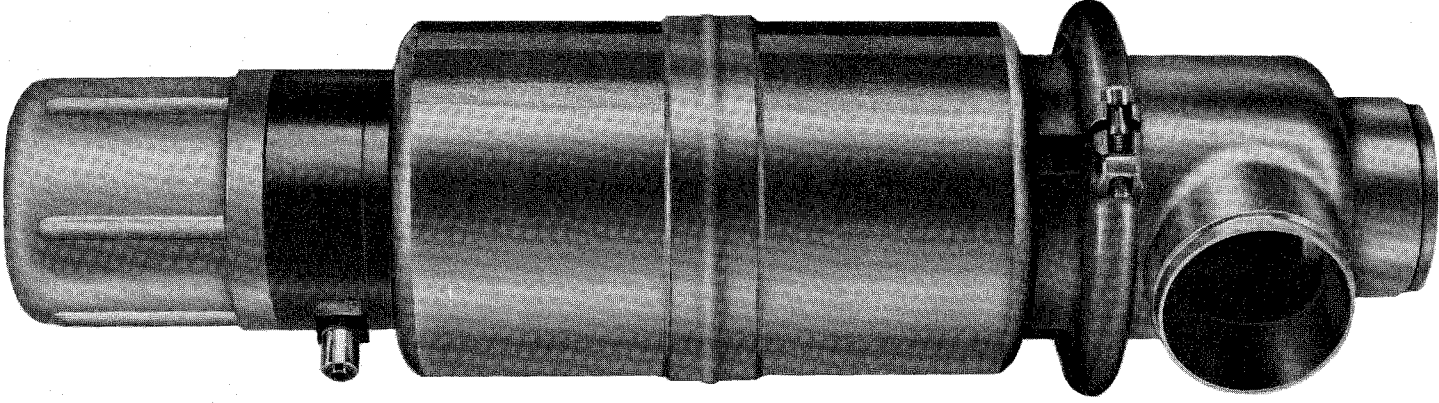


Fig. 1 3 inch Zephyr Valve Series 4, Type A2

TECHNICAL DATA

1. DIMENSIONS - See Fig. 2 overleaf2. SHUT-OFF PRESSURE

The factors which govern the shut-off capability of a valve are valve size, air cylinder spring pressure, operating air pressure and whether the product pressure assists or resists the seating of the headseal. To identify the particular application mode for any valve refer to the diagrams in Fig. 3. If an alternative arrangement is required then APV or their nearest agent can select a suitable valve on receipt of the revised circuit conditions, or data sheets can be issued covering valve selection procedure.

3. MAXIMUM PRODUCT PRESSURE

Non-diaphragm valves with air cylinder -	up to 13.8 bar (200 lbf/in ²) depending on valve size and application mode.
Non-diaphragm valves with manual actuator -	up to 6.9 bar (100 lbf/in ²) depending on valve size and application mode.
Diaphragm valves -	6.2 bar (90 lbf/in ²).

4. OPERATING TEMPERATURE

- (a) Medium nitrile lipseal or O-ring shaft seal - 100°C (145°C if shorter seal life is acceptable)
- (b) Ethylene propylene lipseal or O-ring shaft seal - 125°C
- (c) Viton O-ring shaft seal - 150°C
- (d) PTFE Diaphragm shaft seal and standard head seal - 150°C

5. MAX OPERATING AIR PRESSURE

6.9 bar (100 lbf/in²).

6. AIR QUALITY & CONSUMPTION

- (a) Clean dry air at ambient temperature, oil free and filtered down to 25 microns.
- (b) Consumption of free air per actuating stroke - Refer to Graphs, Fig. Nos. 4 and 5.

7. AIR LINE

4mm bore x 6mm outside diameter semi-rigid nylon 12 tube [APV Specification SB 0587D].

8. AIR LINE CONNECTOR. See SECTION 2 para.5.

9. ELECTRICAL CABLE SIZE

Flexible 7-core 0.5 mm² PVC covered cable is recommended for wiring to the terminal block in the Control Unit, if fitted. The cable gland will accept cable of 7 - 10 mm outside diameter.

10. ELECTRICAL RATINGS

Solenoid coil	24V d.c. 2W
Reed Switch Contacts	110V a.c. 4W
	0.75A

11. WEIGHTS (approx.)

Valve with plain ends, high pressure air cylinder and control unit.

Size inch	Type	B3
1½	A2	4.53 kg
2		12.4 kg
2½		13.3 kg
3		14.1 kg
4		17.3 kg
		5.74 kg
		14.3 kg
		16.4 kg
		18.0 kg
		26.1 kg

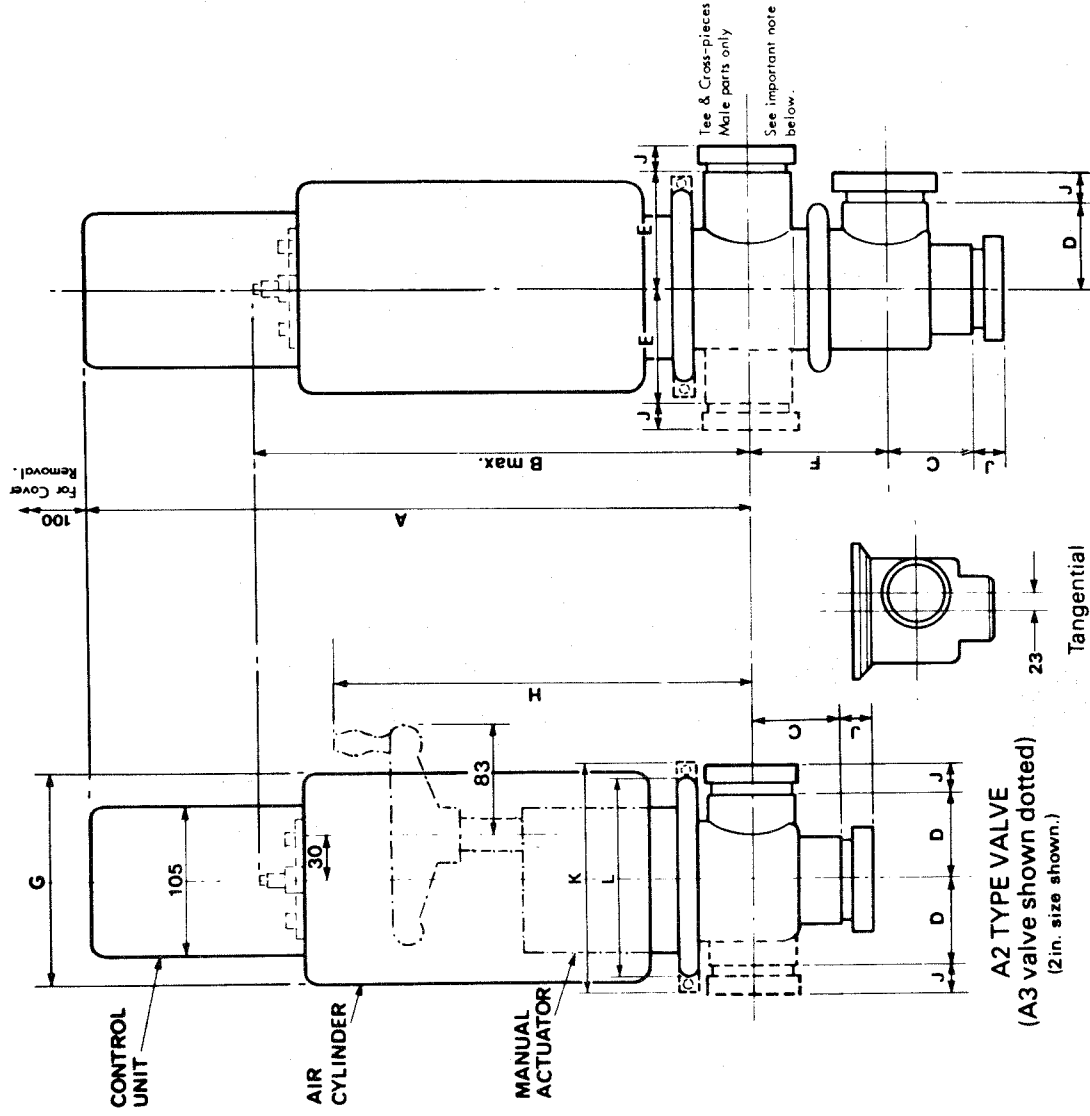
Deduct from weight above:

Deduct from weight above:

If low pressure air cylinder	- 3.0 kg (not applicable to 1½ in valve)
If control unit not fitted	- 1.27 kg (1½ in valve)
	- 1.23 kg (2 -4 in valves)
If manual actuator only fitted	- 5.5 kg (not applicable to 1½ in valve)

Fittings, each, kg

Valve size	RJT		SRJT		ISS	
	Male Part	Hex. Nut & Liner	Male Part	Nut & Liner	Male Part	Hex. Nut & Liner
1½	0.17	0.24	-		0.11	0.4
2	0.23	0.33	-		0.15	0.6
2½	0.27	0.42	-		0.21	0.78
3	0.32	0.47	-		0.23	1.06
4	0.35	0.66	0.55	0.91	-	-



Body Clamp.

Size	K	L
1½	116	95
2	150	120
2½	175	146
3	190	159
4	230	203

IMPORTANT

On B3 and B4 type valves, to avoid a clash of fittings on the side branches in certain circumstances the following rule must be followed on pipework layouts:

When the side branches are finished with ISS or any fitting other than RJT malepart or welded stub end then,

(a) On B3 valves the tee-piece must be set at 90° or 180° with respect to the lower body branch.

(b) On B4 valves the cross-piece must be set at 90° with respect to the lower body branch.

Dimension J represents the distance from end of plain branch to joint face of fitting.

Note: All dimensions are given for guidance only

Valve size in	Dimensions mm										Dimension J				
	A	B	C	D	E	F	G	H			RJT		SRJT		ISS
											Male Part	Nut & Liner	Male Part	Nut & Liner	Stub ext'n
1½	401	326	60	52	75	69	89	-			22	10	-	21	21
2	485	411	67	65	87	81	140	281			22	10	-	21	21
2½	491	417	73	78	100	94	140	288			22	10	-	21	21
3	497	423	79	84	106	107	140	294			22	10	-	21	21
4	514	440	96	133	156	139	140	310			22	13	29	16	-
															46
															43
															60
															60
															51

Fig. 3 Principal Dimensions

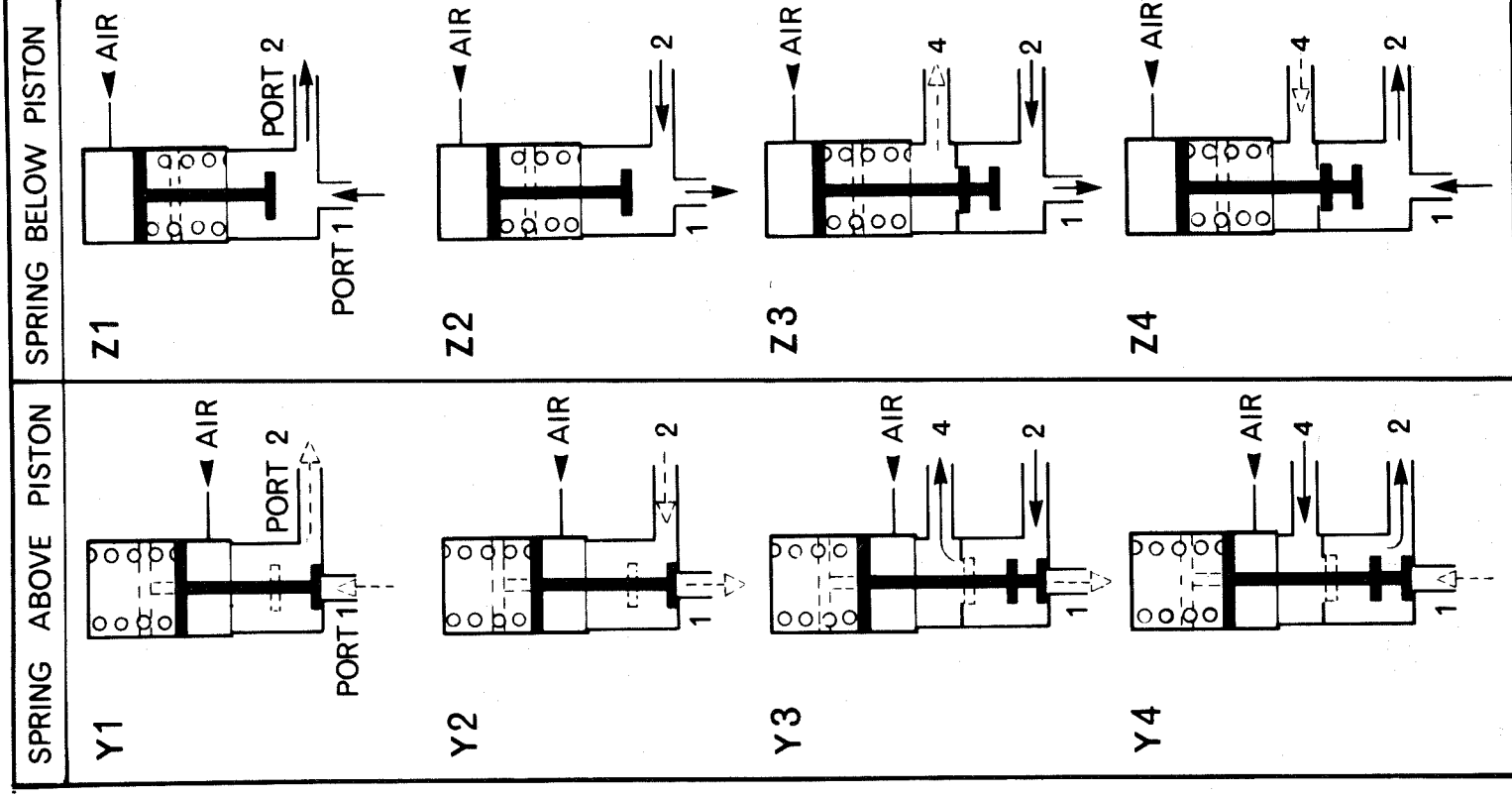
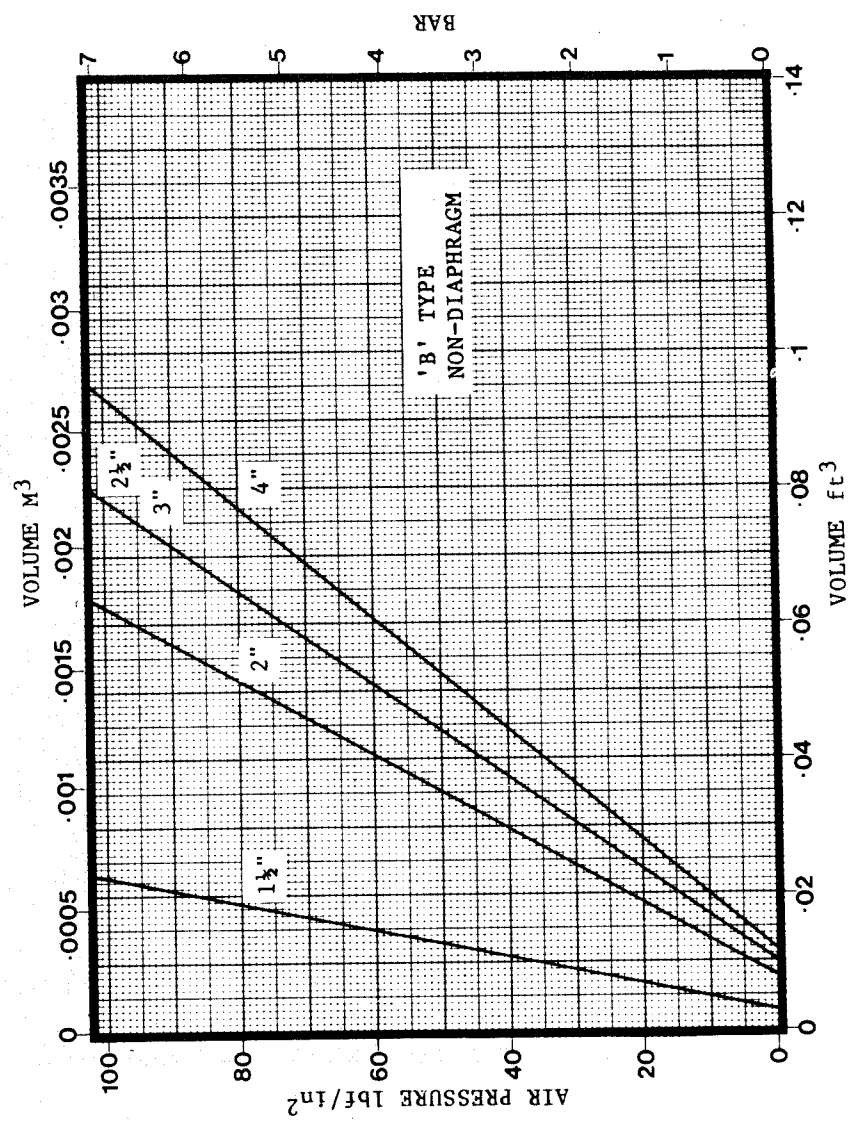
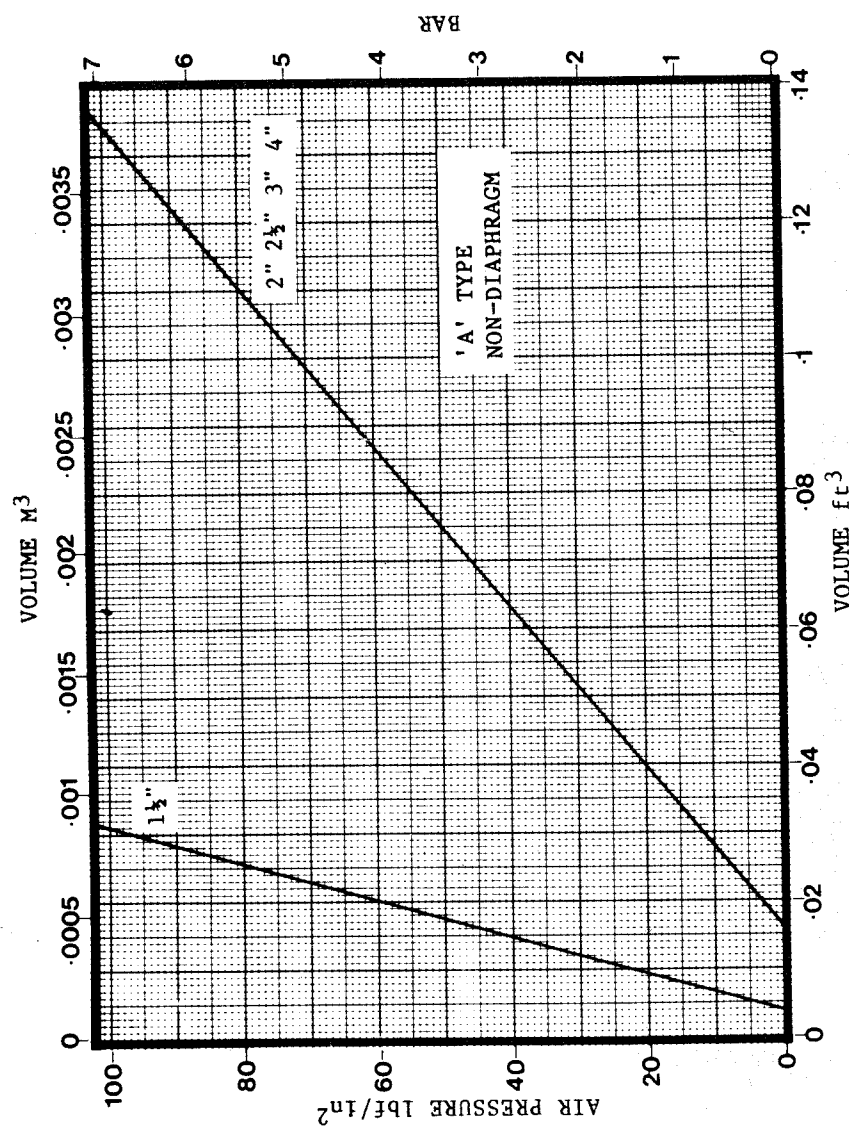
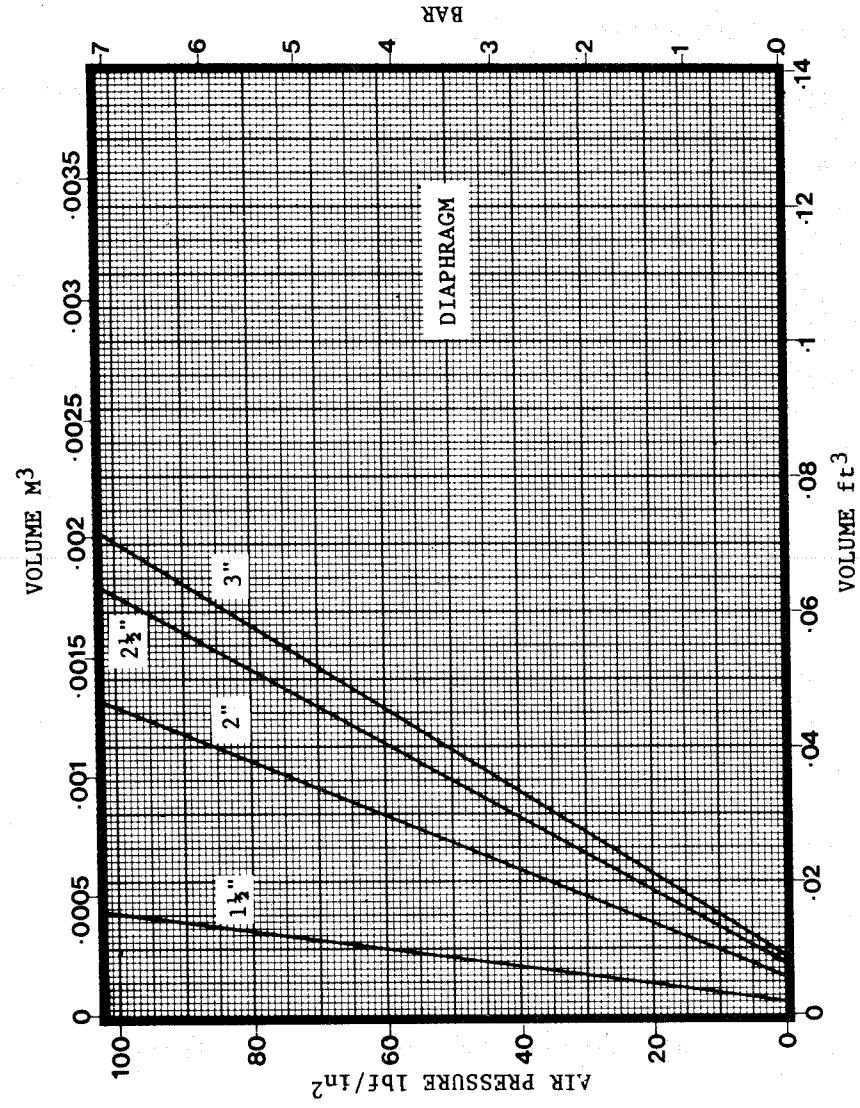


Fig. 3. Valve Application Diagrams



AIR CONSUMPTION PER ACTUATED STROKE

Fig. 4. Graph No. 1



AIR CONSUMPTION PER ACTUATED STROKE

Fig. 5. Graph No. 2

SECTION 1 - DESCRIPTION

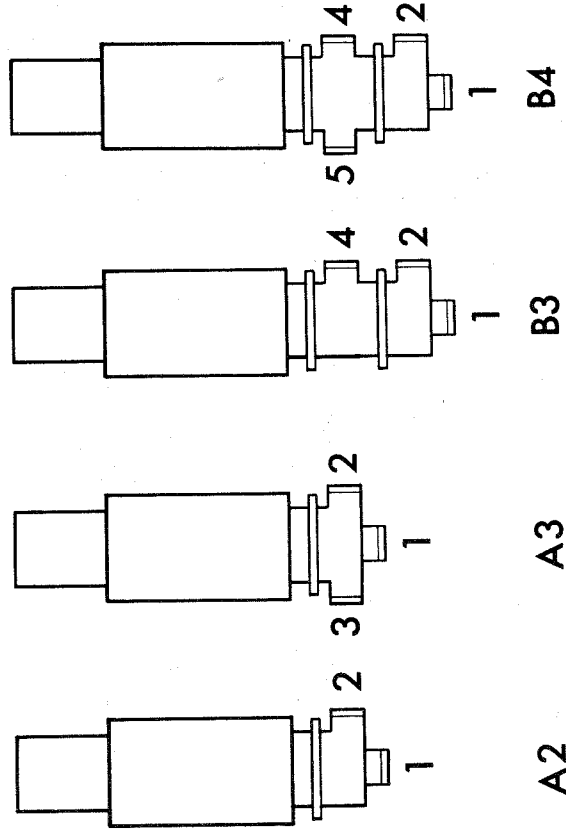
1. VALVE TYPES

Fig. 6 Valve types

The Zephyr Valve Series 4 is a process valve of hygienic design for pneumatic, or manual (not 1½ inch size), actuation. It is available in Type A (Shut-off) and Type B (Changeover) versions as shown above. Fig 8 shows the components of both types of valve.

Tangential ports. The side ports are normally positioned radially, i.e. on the body centre line, but on the 4 inch valve the side ports on the Type A bodies are placed tangentially (off centre) as standard, to allow complete drainage when installed horizontally, see sketch below. Right-hand or left-hand must be specified when ordering the two port type. See Fig. 2 for off-centre dimensions.

The tee and cross-pieces forming the upper body on B type valves are only manufactured with ports positioned radially.

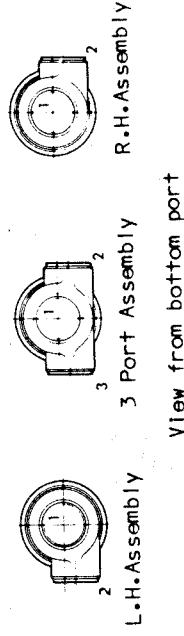


Fig. 7 Tangentially ported valve body (4in valve only)

2. PORT NUMBERING

The port numbering system used throughout APV documentation is as shown in Fig. 6. The bottom sealing port is always identified as port No. 1.

3. HEADSEALS

(1) Non-diaphragm valves (Fig. 20)
The standard headseal, single seated on the A type and double seated on the B type, consists of a replaceable PTFE seal ring clamped between the headseal shaft flange and a clamping nut. The Type A valve seat is formed by the configuration of the body shell. The Type B upper valve seat is provided by a replaceable insert plate. The upper end of the headseal shaft in both types terminates in a female thread (helicoil insert) to accept the lower end of the air cylinder (or manual actuator) shaft.

(2) Diaphragm valves (Fig. 22)
The headseal overall design is similar to that described above but the headseal shaft is jointed to accept the diaphragm shaft seal. An additional feature is that the clamping nut is extended to form a shaft so that all threads are outside the product area. The clearance area for the shaft is further guarded by an O-ring behind the PTFE seal ring as shown in the sectioned diagram of the Type A valve (Fig. 22).

4. SHAFT (PRODUCT) SEAL

This seal forms the barrier between product and atmosphere. The support plate for the seal is clamped between the valve body and the yoke. Three types of seal are available, depending on the duty:

(1) Lipseal (Fig. 21(a)). This is the standard shaft seal. It comprises a replaceable ethylene propylene or medium nitrile rubber bush. The seal material is extended to cover the whole lower (wetted) face of the support plate and form an integral gasket

(2) O-ring (Fig. 21(b)). This seal comprises an O-ring in a support plate which is interchangeable with the lipseal plate. Available in the same materials as the lipseal and also in Viton. A flat gasket forms the body/yoke seal.

(3) Diaphragm (Fig. 22). Designed for aseptic duties, this is a flexible PTFE disc secured to the headseal shaft by a clamping collar and held at its outer edge by a clamping ring. Travel is restricted in an upward direction to prevent excessive flexing of the diaphragm. (Not available on 4 inch valve).

5. CLAMPS (Fig. 19)

The body clamps consist of two identical semi-circular castings secured by two screws fitted in threaded pins which can be turned sideways on dismantling. The clamp section is an asymmetric 'V' shape, having one leg longer than the other. It is essential that the longer leg is fitted over the yoke flange to ensure that it is fully supported (Fig. 21(a)).

6. YOKE (Fig. 21)

This is a circular extension piece with side ports for inspection purposes. Fitted between the actuator and the valve body, it incorporates an oilite bush and an O-ring shaft seal. It is fixed to the valve body by means of the body clamps and bolted to the actuator, pneumatic or manual.

7. AIR CYLINDER

The air cylinders provide pneumatic actuation in one direction, with spring return.

Two sizes are fitted: Small ($3\frac{1}{2}$ in dia.) for $1\frac{1}{2}$ in valve only.
Large ($5\frac{1}{2}$ in dia.) for 2, $2\frac{1}{2}$, 3 and 4 in valves.

The small air cylinder is designated High Pressure and has a single coil spring. The large air cylinders are supplied with either single or double concentric coil springs depending on the maximum shut-off pressure required and are designated Low Pressure and High Pressure respectively.

The cylinder assemblies are sealed units with identical flush ends. Each casing contains a spring loaded piston and a removable hollow, piston rod. Either (a) a Control Unit with hollow actuator shaft or (b) a top bearing plate with short hollow extension shaft and air line connection can be mounted on top of the air cylinder. The shaft in each case is connected to the piston rod. Air feed is then via the hollow piston rod to the face of the piston (see Fig. 16).

The complete air cylinder can be inverted on the yoke if reversal of spring action is required in the field, see Section 3, para. 6 (page 24). To identify spring action, a letter 'A' stamped on one end of the air cylinder indicates, when uppermost, spring-above-piston (normally closed valve) and a letter 'B' indicates, when uppermost, spring-below-piston (normally open valve).

Note: Maximum shut-off pressure will be affected when spring action is reversed, depending on whether the product pressure is assisting or opposing the pneumatic action on closing.

See also instructions on replacement cylinders (Mk. 2) in Section 3, page 24.

8. CONTROL UNIT (Fig. 25)

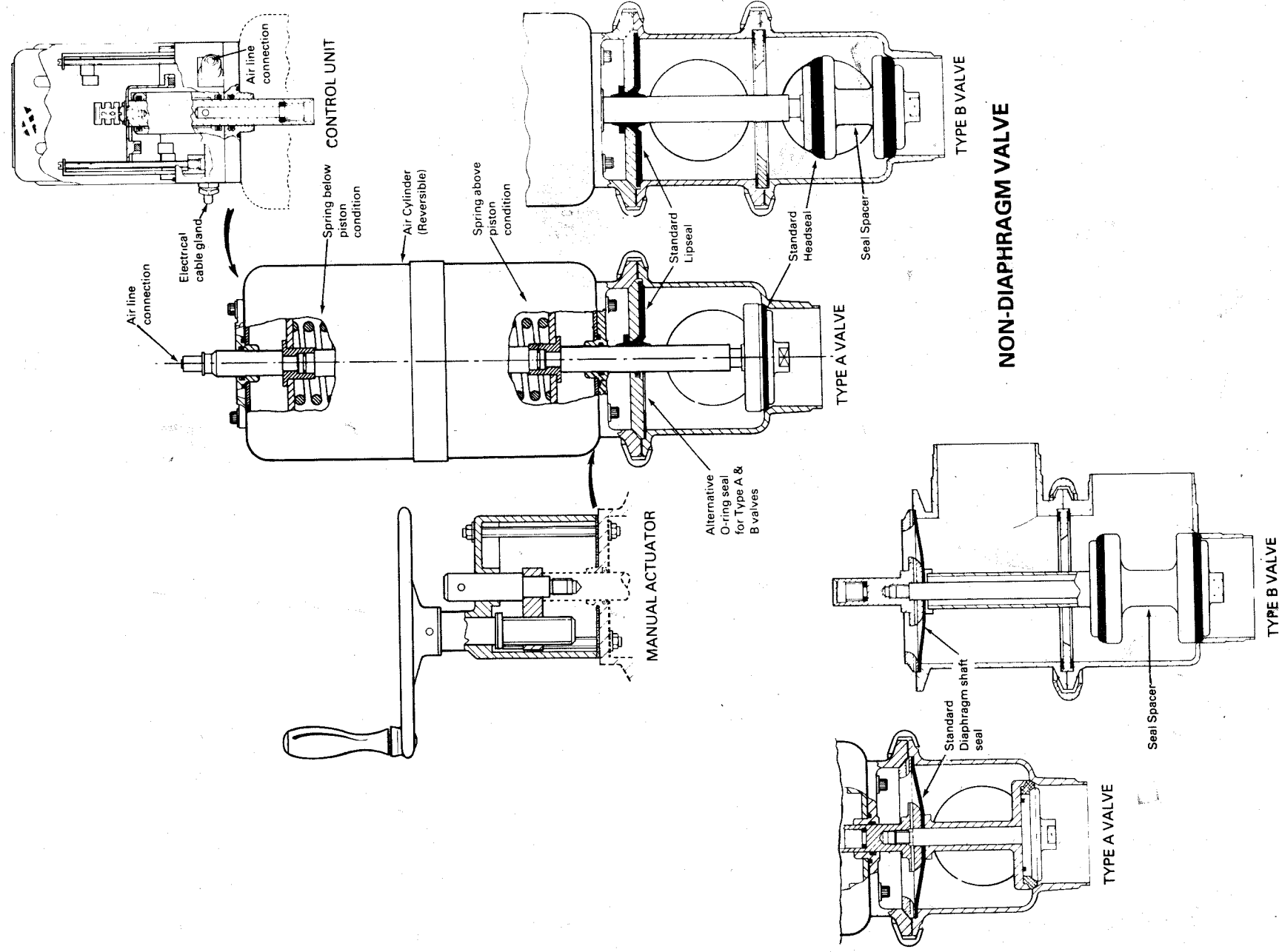
When an electrical signal indicating valve position is required, a Control Unit is mounted with an adapter plate on top of either size of air cylinder. The adapter plate acts as the upper shaft bearing (and contains an O-ring shaft seal in spring-below-piston valves). Two magnetically actuated reed switches are incorporated to provide electrical feed-back of the valve headseal position.

A single solenoid operated air valve is normally fitted and this has a manual override so that the valve can be operated without the coil being energised. The control screw for this is indicated in Fig. 9. Actuate by turning 90° to left or right of neutral position. The Control Unit can be supplied without a solenoid valve and with a blanking plate and gasket fitted instead. A valve can be fitted on site at a later date if necessary and details are given in Section 3, para. 8 (page 25).

A 'bursting disc' is fitted on the side of the base moulding above the air line connection. This is a small self-adhesive plastic disc placed over a vent hole to allow any pressurised air which may leak into the Control Unit to escape to atmosphere. In the event of a fault having occurred it therefore acts as a 'tell-tale'.

9. MANUAL ACTUATOR (Fig. 26)

(Not available on 1½ inch valve). If air operation is not required a Manual Actuator comprising a cylindrical housing with handwheel is mounted on the yoke. Manual rotation of a lay shaft within the housing causes a threaded follower engaged with an extension shaft to raise or lower the headseal shaft.

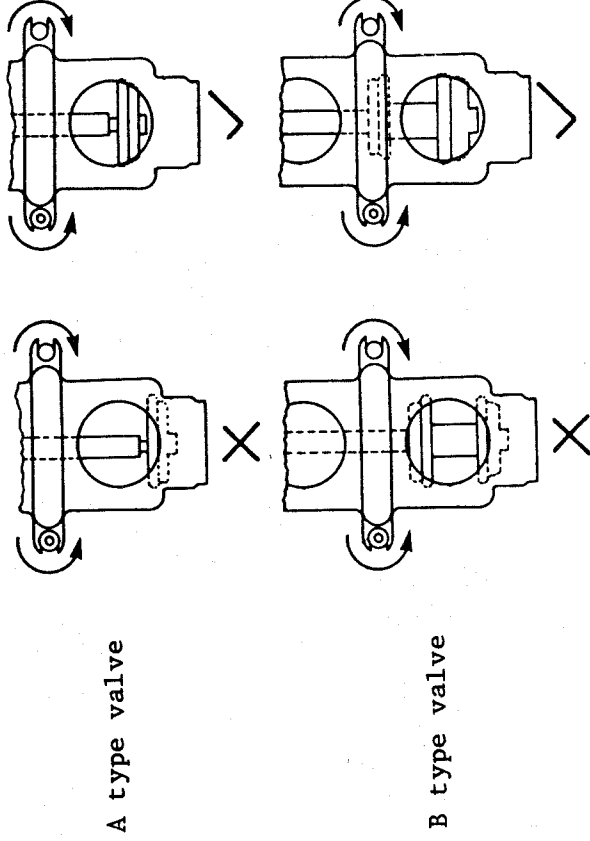


DIAPHRAGM VALVE

NON-DIAPHRAGM VALVE

Fig. 8 Valve Arrangements

SECTION 2 - INSTALLATION

1. BODY CLAMPSCAUTION

On receipt of a valve with spring above piston actuation, where the bottom port is sealed by spring pressure, DO NOT slacken the body clamps, (e.g. to orientate the Control Unit or the yoke) until air pressure has first been applied, or the valve lifting tool Fig. 10(d) used, to lift the headseal and relieve pressure on the seat.

2. MOUNTING

- (1) It is preferable to install the valve with closure taking place against the direction of flow. This cushions the action and helps prevent shock waves developing in long lengths of pipework.
- (2) The valve will operate in any position. On the 4 inch valves, the Type A bodies have tangential side ports which allow complete drainage of the body when installed horizontally (see Fig. 7).
- (3) When mounting a valve horizontally, orientate the yoke so that a side aperture is at the bottom to provide prompt visual indication of leakage (but see CAUTION note above and note on HEALTH AND SAFETY, page 5).

3. PIPEWORK

Ensure that pipes are firmly supported to relieve valve connections of undue strain.

4. SPECIAL TOOLS

Special tools available from APV International Ltd. are shown in Fig. 10.

5. AIR LINE CONNECTOR

- (1) The 'Legris' type air connection is suitable for 6 mm o.d. x 4 mm bore semi-rigid nylon 12 tubing. Cut the end of the tube clean and square then push the tube fully home into the connector. The special tool, Fig. 10 (a), is recommended for cutting tube.
- (2) When it is required to remove the air line use a special tool, Fig. 10(b), to fully depress the collet collar in the connector before pulling on the tubing.
- (3) Ensure that the air line is run clear of hot spots, without sharp bends or kinks.
- (4) The air connection can be removed, complete, by using a 4mm Allen Key, should this be necessary. The screwed portion of the connection is 1/8 in BSP parallel thread enabling it to make an airtight seal with the Nyltite seal. Taper thread fittings must NOT be used.

6. HEADSEALS

Because PTFE has a relatively low elasticity it is advisable to bed down new headseals by either:-

- (1) Leaving the headseal on its seat for twenty-four hours under either air or spring pressure or,
- (2) Applying heat by the circulation of hot water or low pressure steam and operating the valve at five minute intervals for an hour.

7. ELECTRICAL WIRING

- (1) Flexible 7-core 0.5 mm² PVC covered cable 8 mm outside diameter can be supplied for wiring to the terminal block in the Control Unit. Terminal acceptance size is 1.5 mm². Cable gland acceptance size is 7 - 10.5 mm outside diameter cable. See Fig. 9 below for wiring diagram.
- (2) Ensure that the cable gland is firmly tightened and that the external run of cable is safely secured.

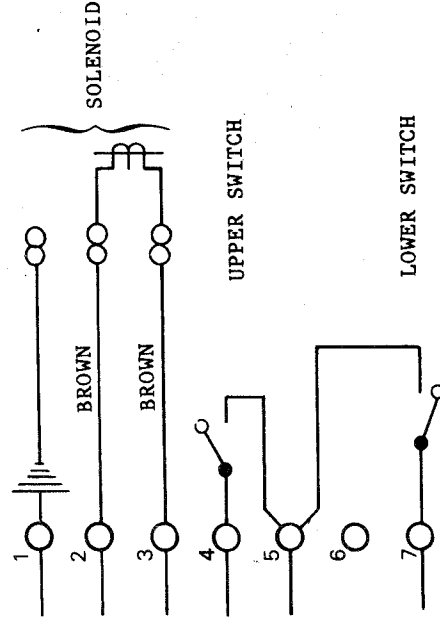
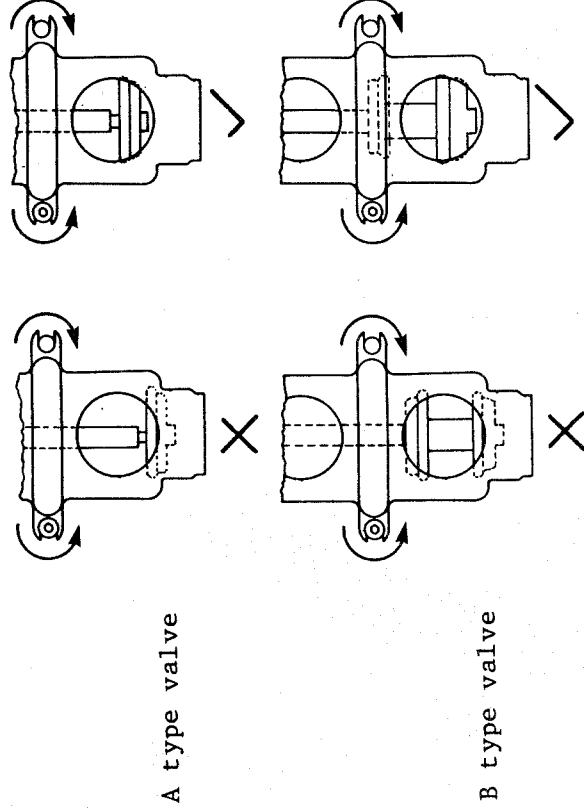


Fig. 9 Wiring diagram

SECTION 3 - MAINTENANCE

1. BODY CLAMPS

CAUTION



Before working on a valve with spring above piston actuation, where the bottom port is sealed by spring pressure, DO NOT slacken the body clamps until air pressure has first been applied, or the valve lifting tool Fig. 10(d) used, to lift the headseal and relieve pressure on the seat.

2. DISMANTLING AND REASSEMBLY PROCEDURES.

Step-by-step procedures are given in Tables 1 - 5 inclusive. Special tools available from APV are shown in Fig. 10 and listed at the end of the PARTS LISTS along with Spares Packs.

3. PTFE HEADSEALS.

If a new headseal insert is fitted during servicing it should be bedded down, as for a new installation. Refer to Section 2, para.6.

4. LIP TYPE SHAFT SEAL.

If a new lipseal is required the old seal should be removed from the stainless steel support plate by peeling back the seal and carefully cutting through the central bush. The bush can then be collapsed and pushed out of the hole, releasing the seal from the plate.

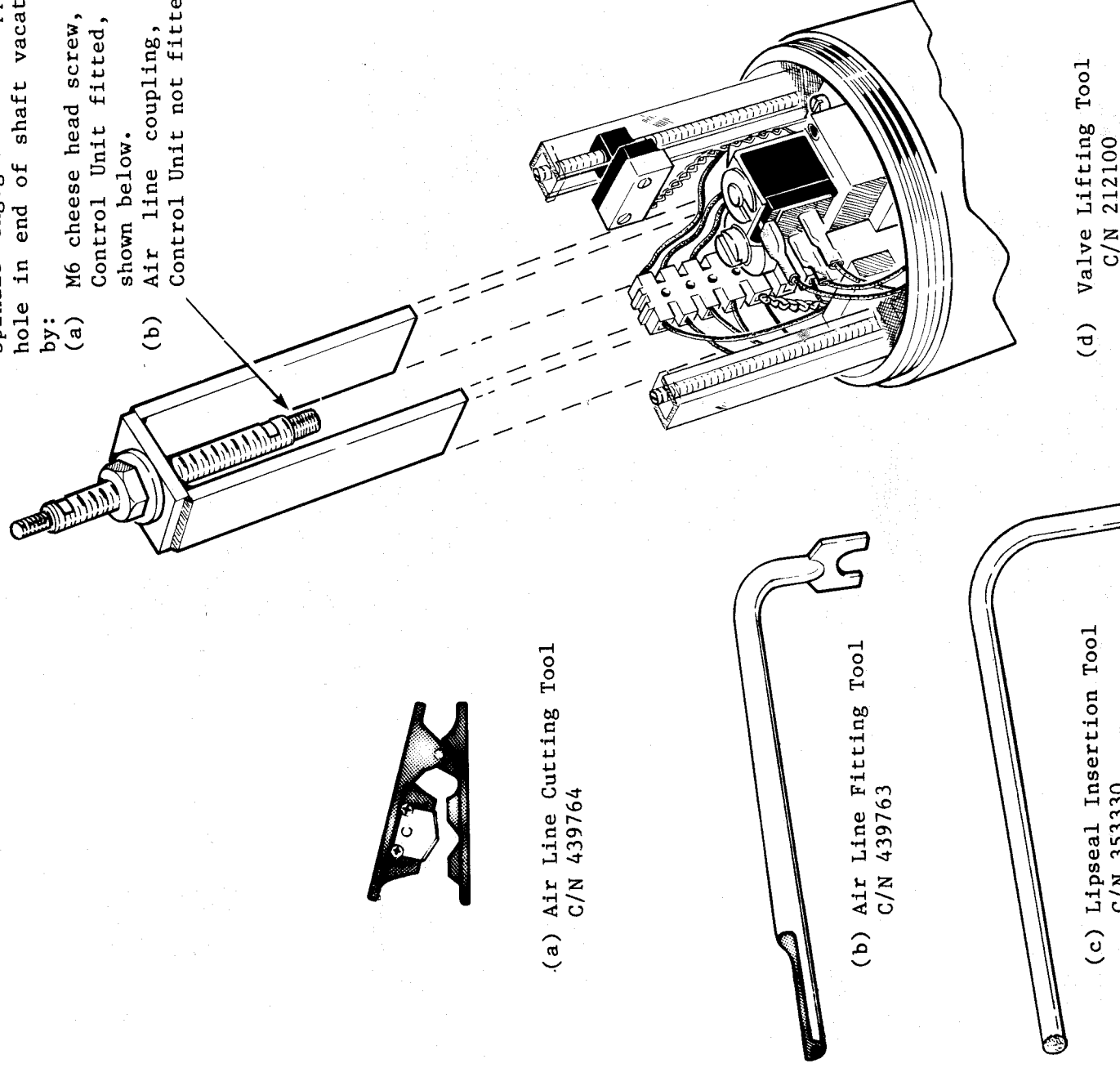
Each spare lipseal is supplied in a Spares Pack. An explanatory leaflet giving the following information is sent with the seal:

The spare seal is suitable for all valve sizes, thereby reducing stock holding, but with the exception of the 4 inch size the seal has to be trimmed to a smaller diameter using a sharp knife or scissors, and guide grooves are provided for this purpose. To fit the new seal, refer to the illustration (Fig. 11 in this Handbook). The special tool shown should be used to avoid scores or nicks being made in the seal or plate. Before proceeding further, ensure that the support plate is clean and undamaged. Small nicks should be removed with fine grade wet-or-dry carborundum paper. Insertion of the new seal will be aided by coating the central bush with soapy water. Maintain firm pressure at the back of the seal with the thumb and gradually squeeze all round the flanged bush with the tool until it is fully inserted into the plate.

Appropriate end of threaded spindle engages with tapped hole in end of shaft vacated by:

(a) M6 cheese head screw, if Control Unit fitted, as shown below.

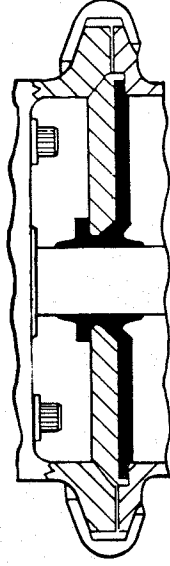
(b) Air line coupling, if Control Unit not fitted.



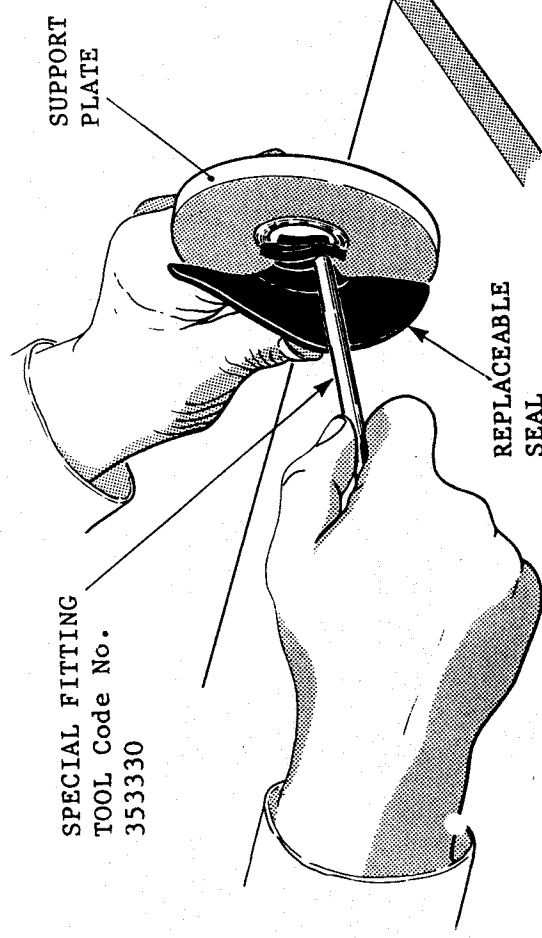
NOT TO SCALE

Refer also to additional tools listed at end of Parts List, page 65.

Fig. 10 Special Tools



(a) Sectional view - Lipseal Assembly



(b) Assembly Procedure

Fig. 11 Lipseal Replacement

5. REPLACEMENT AIR CYLINDERS AND PISTON RODS Mk. 1 and Mk. 2

(1) The air cylinder is lubricated on assembly and then sealed for life. The piston rod does not form part of a replacement cylinder and may be removed for re-use if the air cylinder is faulty. The removal does not form part of any normal routine maintenance task.

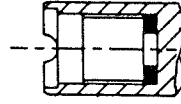
(2) On early Mk. 1 air cylinders the joint between the shoulder of the piston rod and the rear face of the piston was made airtight on Works assembly by the use of a red coloured sealant, 'Loctite' 510. This method was superseded by the use of a modified piston rod fitted with a replaceable bonded seal against the shoulder, as shown in Fig. 24(a), page 59. The earlier version is now obsolete and any piston rods issued as spares for Mk. 1 cylinder will be to the bonded seal design, see PARTS LIST on page 58. Both versions are released from the piston when the adjoining shaft is unscrewed during final dismantling.

(3) Mark 2 cylinders and piston rods in the large size ($5\frac{1}{2}$ in diameter) were introduced during the middle of 1984. Mk. 2 piston rods cannot be fitted to the Mk. 1 air cylinders and must therefore be ordered with any initial order for replacement air cylinders. Thereafter they may be withdrawn from the piston and re-used with replacement Mk. 2 cylinders in the same way as for the Mk. 1 design. Mk. 2 cylinders are stamped each end and, later, on the side, with a '2' but when removed from the valve they are more easily identified by the fact that the hole in the piston has double flats for the piston rod instead of the single flat ('D' shape) on the Mk. 1 version. See Fig. 24(b), page 59.

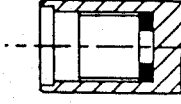
6. REPLACEMENT MATING SHAFTS

(1) Spare mating components for the piston rod, that is the headseal shaft, piston rod extension, actuator shaft and clamping collar (diaphragm valve only) are supplied for the Mk. 2 air cylinder only, i.e. the internally threaded end of these items is as shown in the right-hand sectional sketch below.

(2) If the component being replaced has a half hole cut-out in the top edge, as left-hand sketch, then the replacement component must be modified to this design before it is fitted. The cut-out provides an air passageway to the piston in the Mk. 1 version of the air cylinder and if it is not present this type of cylinder cannot be operated.



Mk. 1



Mk. 2

(3) To modify to Mk. 1 form, file a half hole cut-out in the top edge using a $3/16$ inch (4.5 mm) diameter round file. The precise size of hole is not critical but at least half the file diameter of metal should be removed, as shown in the left-hand sketch. A cut-out may be made in both edges if it is found easier to use the file flat across the top of the shaft. Finish off by removing any sharp edges, then clean out all filings from the threads and internal joint ring.

- (4) It is appreciated that any component being fitted on the spring end instead of the piston end of the piston rod need not be modified since an air passageway is not then required. However, it is recommended that all spares are treated alike to avoid any possible confusion, or non-operation of the valve if spring action were to be reversed at a later date.

7. REVERSAL OF VALVE ACTION

- (1) Valve action can be changed from normally closed to normally open or vice versa (i.e. reversal of spring action) by inverting the air cylinder as follows:
- (2) Remove all components attached to the air cylinder by the methods described in Tables 1 (or 2) and 3 until only the cylinder and piston rod remain.
- (3) If shaft seal O-ring is fitted in yoke (spring-above-piston) remove this and fit new O-ring in either Control Unit adapter plate, or top bearing plate. If O-ring is in adapter plate, or top bearing plate (spring-below-piston) remove this and fit new O-ring in yoke. NOTE. Fig. 16, page 43, gives details on the reason for this change-over.
- (4) On diaphragm valves only:
If converting from spring below to spring-above-piston, remove and discard grub screw in end of piston rod (item 12 in Fig. 23 page 59).
- If converting from spring above to spring-below-piston, obtain the grub screw (12) and fit in end of piston rod (as shown in Fig.23). NOTE. If this is not fitted, the piston cannot be driven down by air pressure during assembly in order to screw the headseal assembly to the piston rod.
- (5) Invert the air cylinder and piston rod. Refit all components as described in Table 4 or 5.

8. FEEDBACK SWITCH SETTING (Fig. 12)

IMPORTANT - IF THE SWITCHES ARE INCORRECTLY SET THEN DAMAGE MAY OCCUR WHEN THE VALVE OPERATES. THEREFORE IT IS ESSENTIAL TO CHECK THE SETTING BEFORE ACTUATING THE VALVE.

Each switch is magnetically operated and mechanical contact between switch and actuator plate (which carries the magnets) is not necessary for operation. The actual clearance will vary, depending on the characteristics of the switch and the associated magnet. Once the switches are set no further adjustment is necessary.

The position of the switches in the Control Unit is shown in the diagram. Checking for the point when each switch closes will be simplified if a test lamp or volt-meter is used, as indicated.

Lower Switch Setting

1. Rotate the adjusting screw (2) counter-clockwise to lower the switch (1) to the bottom of the guide (3).

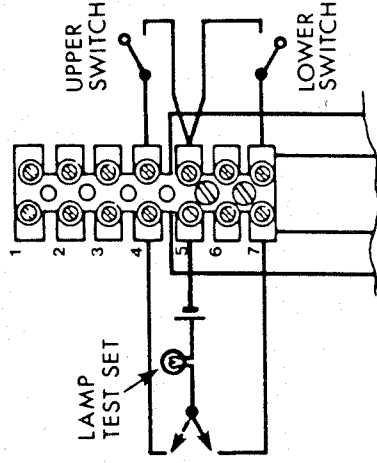
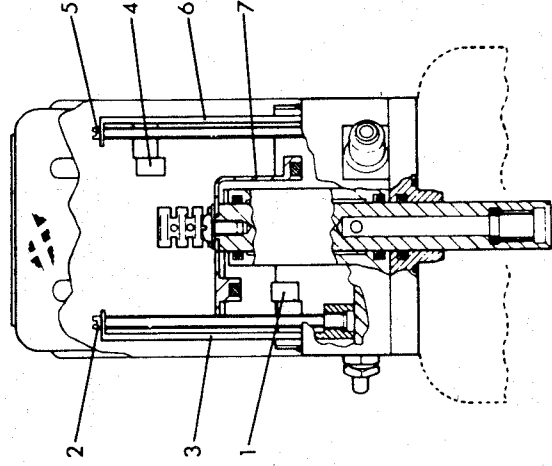


Fig. 12 Feedback switch setting

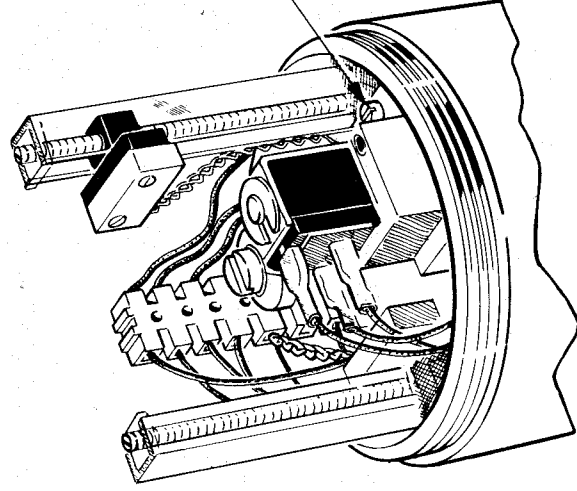


Fig. 13 Solenoid valve in position on Control Unit.
(Switch actuator plate removed for clarity)

2. With the valve shaft and actuator plate (7) in the lower position, rotate the adjusting screw (2) clockwise thus raising the switch until the switch contacts just close. (Terminal Nos. 5 & 7). Do not raise any further.

Upper Switch Setting

1. Rotate the adjusting screw (5) clockwise to raise the switch (4) to the top of the guide (6).
2. With the valve shaft and actuator plate (7) in the raised position, rotate the adjusting screw (5) counter-clockwise thus lowering the switch until the contacts close (Terminal Nos. 4 & 5).

9. FITTING A SOLENOID VALVE (Fig. 13)

To fit a solenoid valve, remove and discard blanking plate, flat gasket and 23 mm long fixing screws. Items required are solenoid valve, O-ring seals (3) and 40 mm long fixing screws, as given in Parts List and Fig. 25).

10. PREVENTIVE MAINTENANCE

On regular and normal use the valve will operate for long periods with no more than the occasional seal replacement.

The Preventive Maintenance Schedule, page 28, refers to those items which are likely to deteriorate gradually or fail over a long period when the valve is used within its design limitations. Due to the varying nature of duties and environments it is not practical to specify an actual time interval between maintenance operations. The schedule is therefore divided into short, medium and long intervals and it will be necessary for the user to establish his own real time scale. The recommendations on spares requirements will similarly have to be established in the light of experience.

PREVENTIVE MAINTENANCE SCHEDULE

Item	Service Interval	Long	Spare 1 year Recommended 2 years
Headseal	Check tightness of clamping nut - see Table 4 step 21.	-	2
Shafts	-	Check tightness with extension shafts Replace if damaged in product seal area	-
Product Seal, Lipseal or O-Ring type	Check for external leakage	-	1
Product Seal, Diaphragm type	Check for external leakage	Replace if hardened or deformed.	2
Flat Gaskets	-	Replace if hardened, deformed or cracked.	1
O-rings.	-	Replace if hardened, deformed or cracked.	-
Shaft joint rings (fitted beneath helicoil inserts)	-	Pick out and replace when hardened, deformed or cracked.	1 Spare pack 2 Spares
Control Unit	Check bursting disc See Table 6.	-	1 2

Contents of Spares Packs - See Parts List

ng w on e B

X . . . I . . X . . I . . L . . X X . . . X . . X . . X . . X . . X . . X . . X . . X . . X . . X

Fig. 14
overleaf

TABLE 1 (cont'd) NON-DIAPHRAGM VALVE

STEP No.		Spring Above Piston		Spring Below Piston	
		Valve A	Valve B	Type A	Type B
18.	Remove large O-ring from around boss of top bearing plate.	x	x	x	x
19.	Remove O-ring shaft seal from within bore of top bearing plate. NOTE: Present on spring-below-piston valves only. (See Fig. 16).	-	-	x	x
20.	The extension shaft may be left on the piston rod unless it is desired to inspect the internal joint ring.	x	x	x	x

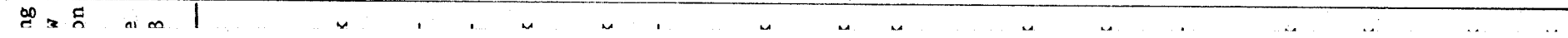


Fig. 15
overleaf

TABLE 3 - CONTROL UNIT

DISMANTLING, CHECKING AND REASSEMBLY

STEP No.	x = Action	All Types of valve
1. Turn off air supply.		x
2. Remove nylon air line from connection on base by fully depressing the collet with special tool, Fig. 10 (b), and pulling on air line.		x
3. Remove cover.		x
4. From top of actuator shaft, remove screw, washer and switch actuator plate.		x
5. From base, remove both socket head screws and washers.		x
6. Lift off Control Unit over actuator shaft.		x
7. From adapter plate, remove countersunk head screws.		x
8. Lift off adaptor plate over shaft.		x
9. The actuator shaft may be left on the piston rod unless it is desired to inspect the internal joint ring.		x
10. If it is required to change solenoid valve coil, remove spring clip from top of central stem. Do not attempt to use an AC coil on a DC stem otherwise damage will result on operation. Refer to Fig. 9 for wiring diagram. The top terminal is the earth terminal (when provided).		x
11. Check bursting disc above air line connection. If disc shows any signs of having loosened, check upper shaft seal (see Table 6 for leak detection instructions) and fit a new disc, coloured <u>red</u> , Code No. 406890. (If the valve is installed in a clean area this disc may be omitted).		x
12. Check security of slide housings and terminal screws.		x
13. Reassembly on to air cylinder may now proceed. Refer to Table 4 or 5.		x

TABLE 4 - NON-DIAPHRAGM VALVES
CHECKING, REASSEMBLY AND TESTING

STEP No.	x = Action		Spring Above Piston		Spring Below Piston	
			Valve A	B	Type A	B
1.	Inspect all components and replace if necessary. Refer to Preventive Maintenance Schedule for suggested service programme.		x	x	x	x
2.	Remove all sharp edges on shafts, including those around spanner flats. Work on a clean surface.		x	x	x	x
3.	Fit O-ring in bore of yoke. Lubricate O-ring with silicone grease; if food quality grease is preferred, then an O-ring in nitrile rubber Code No. 427587 (now standard supply) must be fitted.		x	x	-	-
4.	Fit larger O-ring around boss of yoke.		x	x	x	x
5.	Fix yoke to non-piston end of air cylinder.		-	-	x	x
6.	Fix yoke to piston end of air cylinder.		x	x	-	-
7.	On valve with Control Unit, fit O-ring in bore of adapter plate. Lubricate as stated in Step 3.		-	-	x	x
8.	On valve without Control Unit, fit O-ring in bore of top bearing plate. Lubricate as stated in Step 3.		-	-	x	x
9.	Fit larger O-ring around boss of adapter plate (or top bearing plate).		x	x	x	x
10.	Fix adapter plate (or top bearing plate) to non-piston end of cylinder.		x	x	-	-
11.	Fix adapter plate (or top bearing plate) to piston end of cylinder.		-	-	x	x
12.	Check that joint ring is in position beneath helicoil insert within the shafts.		x	x	x	x
13.	Place lipseal (or O-ring plate) in position over headseal shaft.		x	-	x	-
14.	Place lipseal (or O-ring plate), upper body and seat insert with a gasket either side in position over headseal shaft.		-	x	-	x
15.	Lubricate threads with a PTFE loaded grease and screw headseal shaft and actuator shaft (or extension shaft) to appropriate end of piston rod in cylinder. Tighten only by means of spanner flats on each shaft. DO NOT grip cylinder in a vice.		x	x	x	x

TABLE 4 (cont'd) NON-DIAPHRAGM VALVES

STEP No.		Spring Above Piston		Spring Below Piston	
		Valve A	Valve B	Type A	Type B
16.	Check body clamps and yoke flange for possible damage caused by incorrect and/or forceful removal and replacement. Lubricate clamp fastener threads. When refitting, place the longer leg of the clamp section over the yoke flange, as shown in Fig. 21(a). Later versions of clamps are marked 'TOP'. DO NOT overtighten and do not attempt to close the gap between yoke and adjoining body, if one exists, otherwise an unnecessary bending force will be applied to the yoke flange.	x	x	x	x
17.	Clamp yoke and body together.	-	x	-	x
18.	Place lipseal (or O-ring plate) in position over headseal shaft.	-	x	-	x
19.	Place PTFE headseal insert, seal spacer, second PTFE insert and clamping nut loosely on headseal shaft.	-	x	-	x
20.	Place PTFE headseal insert and clamping nut loosely on headseal shaft.	x	-	x	-
21.	Check tightness of clamping nut on headseal shaft. If it can be screwed onto shaft with less than 1 lbf ft (0.13 kgf m) torque when just nipping the headseal insert then nut should be replaced. (Loctite 'Superfast' Nutlock 241 or 242 may be used on the thread as a temporary measure).	x	x	x	x
22.	Apply air pressure to lower the headseal shaft. If short extension shaft is fitted to top of piston rod this carries an air line connection, otherwise the Control Unit must now be fitted before air can be fed to cylinder. See Steps 23 - 26.	-	-	-	x
23.	Tighten clamping nut. New PTFE headseal(s) must be pre-compressed by tightening the clamping nut to the following torque: 1½ inch valve 14 - 16 lbf ft. (1.9 - 2.2 kgf m) 2 - 4 inch valves 20 - 25 lbf ft. (2.8 - 3.5 kgf m) When a valve fitted with new PTFE headseal(s) is put back into service it is advisable to bed down the seal, see Section 2, para. 6.	x	x	x	x

TABLE 4 (cont'd) NON-DIAPHRAGM VALVES

STEP No.		Spring Above Piston		Spring Below Piston	
		Valve A	Valve B	Type A	Type B
24.	To replace Control Unit, firstly check all components and replace if necessary. Remove sharp edges on the spanner flats of the actuator shaft and file a chamfer to the top edge if not already present to assist assembly of shaft through the O-ring seals, which should be lubricated. Use silicone grease; if food quality grease is preferred, then O-rings in nitrile rubber Code No. 427587 (now standard supply) must be fitted.	x	x	x	x
25.	Fix base to adapter plate with socket head screws and washers.	x	x	x	x
26.	Reconnect air line to push-in connector on base, turn on air supply and pressurise air cylinder by turning manual override screw through 90° (see Fig. 13). Test for air leaks in cylinder at this stage. Refer to Table 6.	x	x	x	x
27.	If valve operation is satisfactory, replace the switch actuator plate on top of the actuator shaft.	x	x	x	x
28.	Apply air pressure to raise headseal shaft.	x	x	-	-
29.	Release air pressure.	-	-	-	x
30.	Clamp yoke and body together (see also Step 16).	x	-	x	-
31.	Clamp bodies together (see also Step 16). Orientate branches to suit site requirements.	-	x	-	x
32.	Release air pressure.	x	x	-	-
33.	The position of the feedback switches may now be checked (see Section 3, para. 8), or this may be left until the valve is ready for wiring into the control circuits. Replace the cover.	x	x	x	x

TABLE 5 - DIAPHRAGM VALVES
CHECKING, REASSEMBLY AND TESTING

STEP
No. x = Action

	Spring Above Piston		Spring Below Piston	
	Valve A	Valve B	Type A	Type B
1. Inspect all components and replace if necessary. Refer to Preventive Maintenance Schedule for suggested service programme.	x	x	x	x
2. Remove all sharp edges on shafts, including those around spanner flats. Work on a clean surface.	x	x	x	x
3. Fit O-ring in bore of yoke. Lubricate with silicone grease; if food quality grease is preferred, then an O-ring in nitrile rubber Code No. 427587 (now standard supply) must be fitted.	x	x	-	-
4. Fit larger O-ring around boss of yoke.	x	x	x	x
5. Fix yoke to non-piston end of air cylinder.	-	-	x	x
6. Fix yoke to piston end of air cylinder.	x	x	-	-
7. On valve with Control Unit, fit O-ring in bore of adapter plate. Lubricate as stated in Step 3.	-	-	x	x
8. On valve without Control Unit, fit O-ring in bore of top bearing plate. Lubricate as stated in Step 3.	-	-	x	x
9. Fit larger O-ring around boss of adapter plate (or top bearing plate).	x	x	x	x
10. Fix adapter plate (or top bearing plate) to non-piston end of cylinder.	x	x	-	-
11. Fix adapter plate (or top bearing plate) to piston end of cylinder.	-	-	x	x
12. Check that joint ring is in position beneath helicoil insert within the shafts.	x	x	x	x
13. Make up headseal assembly loosely with clamping collar, diaphragm, shaft guide, PTFE headseal insert, O-ring and clamping screw.	x	-	-	-
14. Make up headseal assembly loosely with clamping collar, diaphragm, shaft guide, PTFE headseal insert, seal spacer, PTFE headseal insert, O-ring and clamping screw.	-	x	-	x

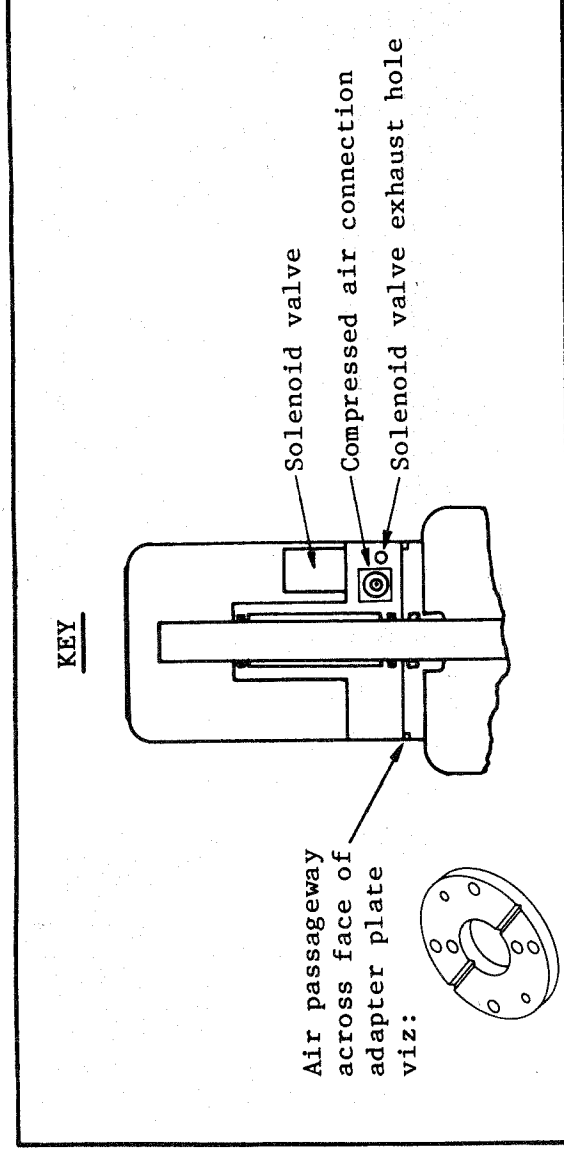
TABLE 5 (cont'd) DIAPHRAGM VALVES

STEP
No.

	Spring Above Piston	Spring Below Piston	Valve		Type	
			A	B	A	B
15. Check tightness of clamping screw into clamping collar. If it can be screwed in with less than 1 lbf ft (0.13 kgf m) torque when just nipping the PTFE insert(s) then clamping collar should be replaced ('Loctite' Superfast Nutlock 241 or 242 may be used on the thread as a temporary measure). Tighten up components to form headseal assembly. New PTFE headseal insert(s) must be pre-compressed to a torque of 14-16 lbf ft (1.9-2.2 kgf m).						
When a valve with new PTFE headseal insert(s) is put back into service it is advisable to bed down the insert(s). see Section 2 para. 6.	x		x		x	x
16. Apply air pressure to lower the piston rod. If short extension shaft is fitted to top of piston rod this carries an air line connection, otherwise the Control Unit must now be fitted before air can be fed to cylinder.	-		-		x	x
17. To replace Control Unit, firstly check all components and replace if necessary. Remove sharp edges on spanner flats of actuator shaft and file a chamfer on top edge if not already present to assist assembly of shaft through O-ring seals which should be lubricated with silicone grease; if food quality grease is preferred, then O-rings in nitrile rubber Code No. 427587 (now standard supply) must be fitted.	x		x		x	x
18. Fix base to adapter plate with socket head screws and washers.	x		x		x	x
19. Reconnect air line to push-in connector on base, turn on air supply and pressurise air cylinder by turning manual override screw through 90° (see Fig. 13). Test for air leaks in cylinder at this stage. Refer to Table 6.	x		x		x	x
20. If valve operation is satisfactory, replace the switch actuator plate on top of the actuator shaft.	x		x		x	x
21. Replace splash shield and clamping ring.	x		-		x	-
22. Replace splash shield, clamping ring, headseal assembly (loosely), upper body and seat insert with a gasket either side.	-		x		-	x

TABLE 5 (cont'd) DIAPHRAGM VALVES

STEP No.		Spring Above Piston		Spring Below Piston	
		Valve A	B	Valve A	Type B
23.	Grip spanner flats on short-extension shaft (or actuator shaft) and screw headseal assembly to piston rod by means of a spanner on the clamping collar, <u>not</u> on the clamping nut below the headseal. DO NOT exceed a tightening torque of 25 lbf ft (3.5 kgf m) and do not grip cylinder in a vice.	x	x	x	x
24.	Check body clamps and yoke flange for possible damage caused by incorrect and/or forceful removal and replacement. Lubricate clamp fastener threads. When refitting, place the longer leg of the clamp section over the yoke flange, as shown in Fig. 21(a). Later versions of clamps are marked 'TOP'. DO NOT overtighten and do not attempt to close the gap between yoke and adjoining body, if one exists, otherwise an unnecessary bending force will be applied to the yoke flange.	x	x	x	x
25.	Release air pressure and clamp body (or upper body) to yoke.	-	-	x	x
26.	Apply air pressure or valve lifting tool and clamp body (or upper body) to yoke.	x	x	-	-
27.	Clamp bodies together. Orientate branches to suit site requirements.	-	x	-	x
28.	Release air pressure.	x	x	-	-
29.	The position of the feedback switches may now be checked (see Section 3, para. 8), or this may be left until the valve is ready for wiring into the control circuits. Replace the cover.	x	x	x	x



SPRING ABOVE PISTON

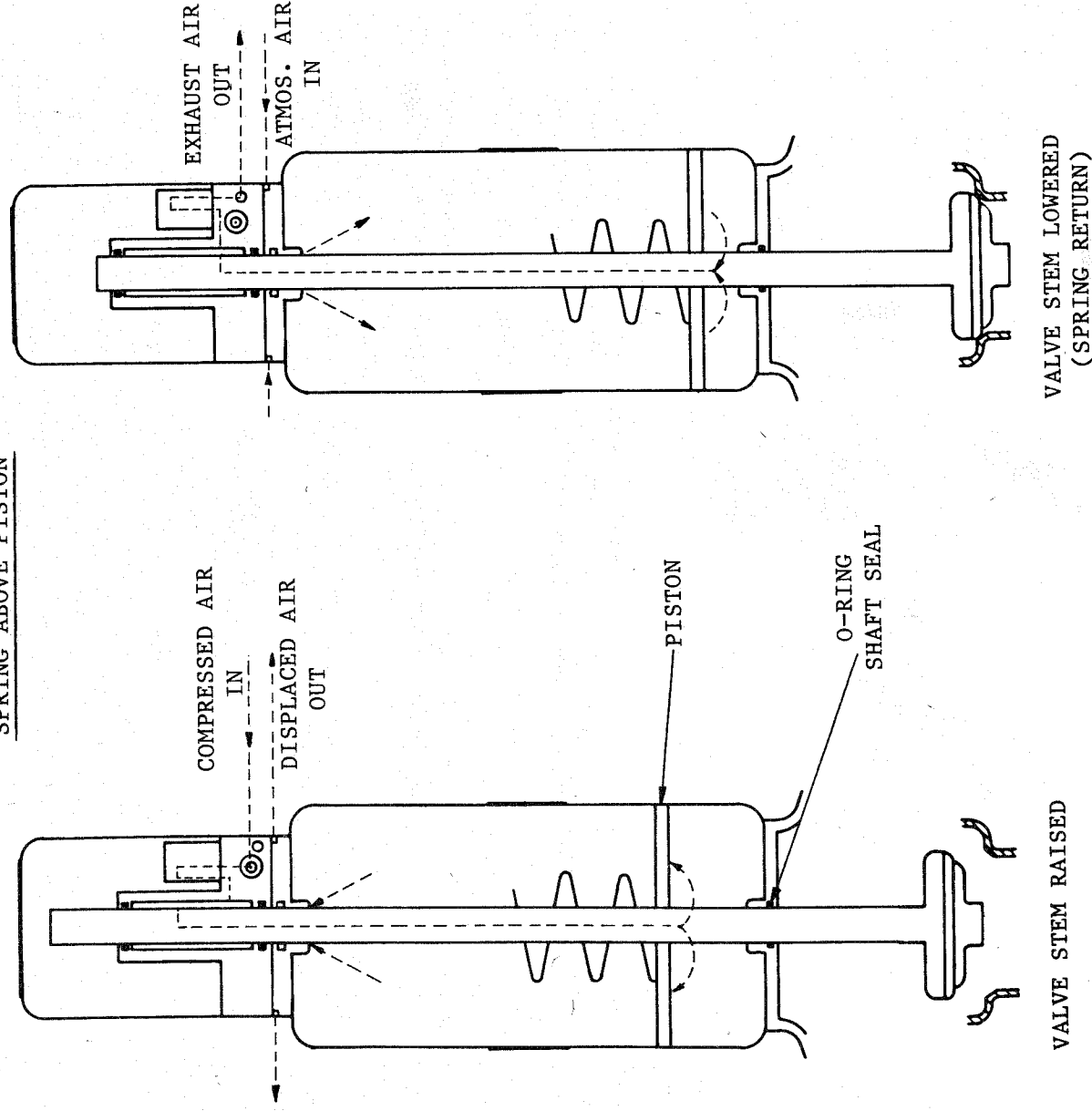
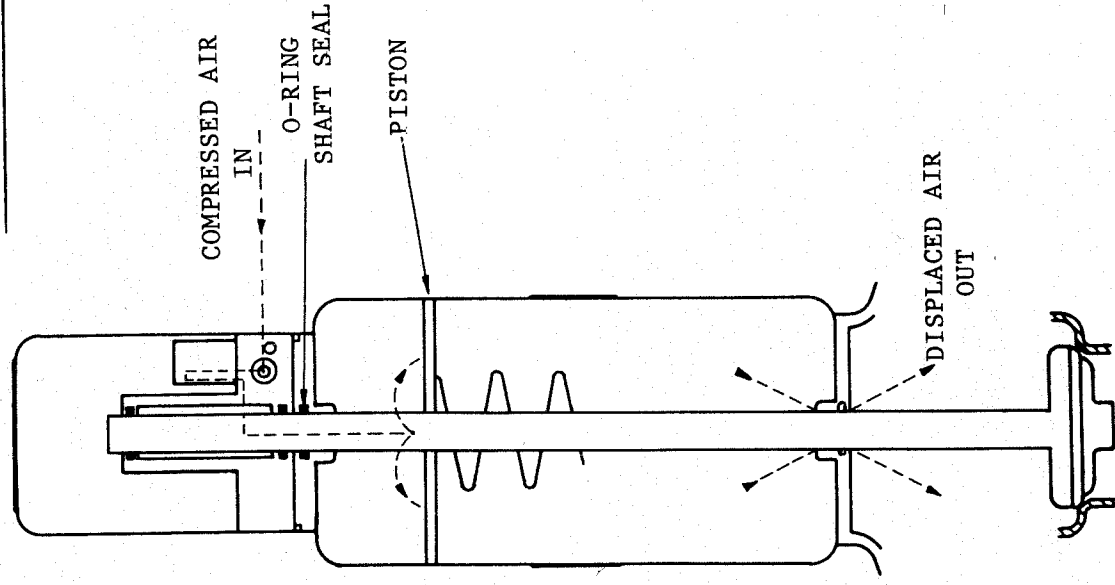
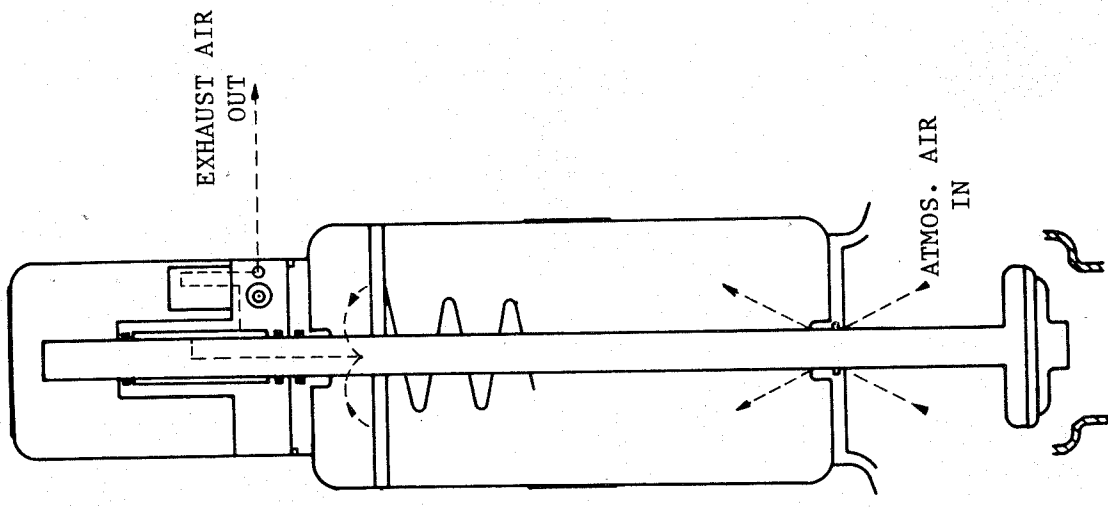


Fig. 16 Air movements during actuation

SPRING BELOW PISTON



VALVE STEM LOWERED



VALVE STEM RAISED
(SPRING RETURN)

Fig. 16 (continued) Air movements during actuation

TABLE 6 - AIR LEAKAGE DETECTION

- A. Shaft seal in yoke
 B. Adapter plate groove
 C. Bursting disc on base of Control Unit
- D. Joint between yoke/cylinder
 E. Joint between adapter plate/cylinder
 F. Solenoid valve exhaust hole

Leak detection point (see above)	Problem site	Remedy
<u>SPRING ABOVE PISTON (FIG.17a)</u>		
A	(a) Shaft seal in yoke.	Check tightness of headseal shaft (and joint ring 8) and replace O-ring in yoke, 1.
B	(a) Piston/piston rod joint. (b) Bottom shaft seal on actuator shaft. (c) Actuator shaft joint ring (d) Piston seal, 5.	Remake joint in piston, 2. Replace bottom O-ring in Control Unit base, 3. Replace joint ring, 4. Replace cylinder and piston rod with MK.2 components.
C.	Upper shaft seal on actuator shaft.	Replace O-ring, 6.
D.	Joint seal.	Replace O-ring on yoke, 7.
F.	Solenoid valve base O-rings.	If O-rings are in order, replace solenoid valve.
<u>SPRING BELOW PISTON (FIG.17b)</u>		
B.	(a) Shaft seal in adapter plate.	Check tightness of actuator shaft (and joint ring 9) and replace O-ring in adapter plate, 10.
C.	(b) Bottom shaft seal on actuator shaft. Upper shaft seal on actuator shaft.	Replace bottom O-ring in Control Unit base, 11. Replace O-ring, 12.
A.	(a) Piston/piston rod joint. (b) Headseal shaft joint ring (c) Piston seal, 15.	Remake joint in piston, 13. Replace joint ring, 14. Replace cylinder and piston rod with MK.2 components.
E.	Joint seal.	Replace O-ring under adapter plate, 16.
F.	Solenoid valve base O-rings.	If O-rings are in order, replace solenoid valve.

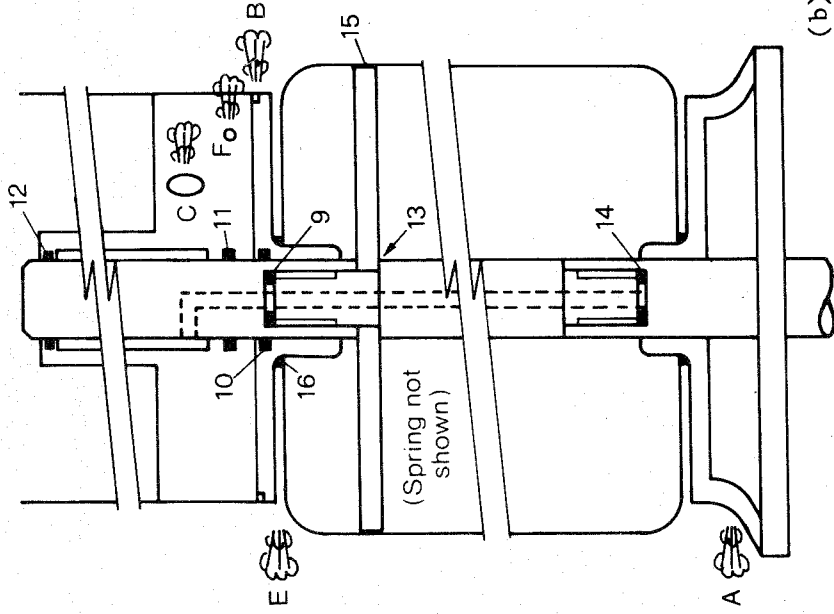
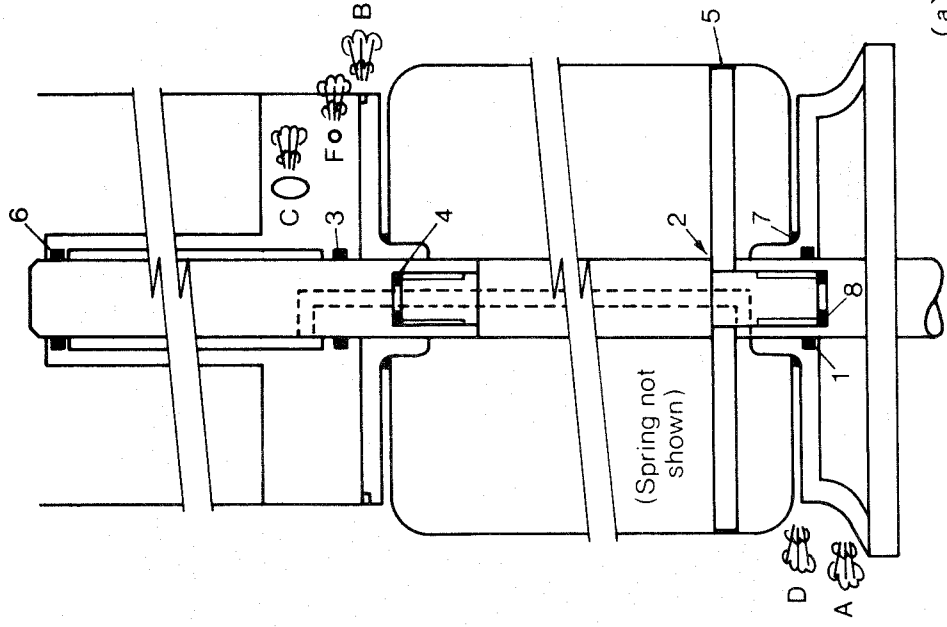


Fig. 17 Air leak detection points

SECTION 4
ILLUSTRATED PARTS LIST

Note: The use of replacement parts from unapproved suppliers can result in damage or reduce component life and will invalidate the APV guarantee.

When ordering parts, please specify Valve type, Part Code Number and Description.

Valve size in	Description	Code Numbers	
		TWO RADIAL PORTS	THREE RADIAL PORTS
1 1/2 2 2 1/2 3	VALVE BODIES Without fittings	309265 309267 309269 309271	309266 309268 309270 309272
1 1/2 2 2 1/2 3	RJT Male	225594 225590 225586 225582	225596 225592 225588 225584
1 1/2 2 2 1/2 3	RJT hex. nut	205916 205919 205922 205925	205918 205921 205924 205927
1 1/2 2 2 1/2 3	ISS male	225595 225591 225587 225583	225597 225593 225589 225585
1 1/2 2 2 1/2 3	ISS hex. nut	205917 205920 205923 205926	207150 207151 207152 207153
1 1/2 2 2 1/2 3	ISS round nut	207122 207125 207128 207131	207174 207175 207176 207177
1 1/2 2 2 1/2 3	ISS hex. nut x hex. nut x male	- - - -	205928 205930 205932 205934
1 1/2 2 2 1/2 3	ISS male x hex. nut x male	- - - -	205929 205931 205933 205935
1 1/2 2 2 1/2 3	ISS round nut x male x round nut	- - - -	207124 207127 207130 207133
1 1/2 2 2 1/2 3	ISS male x nut x round nut	- - - -	207123 207126 207129 207132

Note: Branches are specified in same order as port numbers

Valve size in	Description	Code Numbers	
		TWO RADIAL PORTS	THREE RADIAL PORTS
1½ 2 2½ 3	VALVE BODIES continued Ends extended for orbital welding	205943 205944 205945 205946	205947 205948 205949 205950
Valve size in	Description	Code Numbers TANGENTIAL 2 PORT	
4	Left hand. Without fittings	309273	
4	Left hand. RJT male	207168	
4	RJT hex. nut x male	207169	
4	RJT male x hex. nut	207170	
4	RJT hex. nut	207698	
4	Left hand. SRJT male	207171	
4	SRJT hex. nut x male	207172	
4	SRJT male x hex. nut	207173	
4	Left Hand. Ends extended for orbital welding	205957	
4	Right hand. Without fittings	309275	
4	Right hand. RJT male	207162	
4	RJT hex. nut x male	207163	
4	RJT male x hex. nut	207164	
4	RJT hex. nut	207697	
4	Right hand. SRJT male	207165	
	SRJT hex. nut x male	207166	
	SRJT male x hex. nut	207167	
4	Right hand. Ends extended for orbital welding	205958	
	Without fittings	3 PORT	
4		309274	
4		207178	
4		309274	
4	RJT male x male x hex. nut	207156	
4	RJT hex. nut x male x hex. nut	207157	
4	RJT male	207158	
4	RJT hex. nut	207699	
4	SRJT male x male x hex. nut	207159	
4	SRJT hex. nut x male x hex. nut	207160	
4	SRJT male	207161	
4	Ends extended for orbital welding	205959	

Item	Description	Code Number	
		Tees	Crosses
-	TYPE B VALVE TEE & CROSS PIECES Without fittings 1½ in 2 in 2½ in 3 in 4 in RJT male 1½ in 2 in 2½ in 3 in 4 in ISS male 1½ in 2 in 2½ in 3 in 4 in SRJT male 4 in	309251 309252 309253 309254 309255 231425 231427 231429 231431 231432 231424 231426 231428 231430 231433	309257 309258 309259 309260 309261 231437 231439 231441 231443 231444 231436 231438 231440 231442 231445
Fig.18 1	Seat Insert (type B valve only) 1½ in 2 in 2½ in 3 in 4 in	No. off 1 - - - - 2	Code No. - 325560 325561 325562 325563 325564 -
2	Flat Gasket. E.P. Rubber 1½ in 2 in 2½ in 3 in 4 in	- - - - -	413760 413761 413762 413763 413764
Fig.19	Body Clamps, complete For type A valve For type B valve	1 2 - - - - - 2	- - 226839 226840 226841 226842 226843 - 714066 714067 714068 714069 714070
1	Clamp casting 1½ in 2 in 2½ in 3 in 4 in	- - - - -	- 714066 714067 714068 714069 714070

continued

Fig.19 Item	Description	No. off	Code No.
2	Socket Setscrew 1½ in M6 x 30	2	-
	2-4 in M6 x 35	-	460627
3	Clamp Nut 1½ in M6	-	460609
	2-4 in M8	2	-
		-	314071
		-	314072
Fig.20	Headseal Assembly, Non-diaphragm valves, comprising items 1 - 5		
-	For type A valves 1½ in 2 in 2½ in 3 in 4 in	1	-
	For type B valves 1½ in 2 in 2½ in 3 in 4 in	-	231790
1	PTFE Headseal Insert. Type A valve Type B valve	-	244150
		-	244151
		-	244152
		-	244153
		1	-
		-	231795
		-	244158
		-	244159
		-	244160
		-	244161
		1	-
		2	-
		-	459601
		-	459602
		-	459603
		-	459604
		-	459619
		1	-
		1	-
2	Shaft with Helicoil insert and Joint Ring For Type A Valves 1½ in 2 in 2½ in 3 in 4 in	-	243588
		-	233105
		-	233106
		-	233107
		-	233108
		1	-
		-	233100
		-	233113
		-	233114
		-	233115
		-	233116
		1	413770
3	Joint Ring, shaft	1	-
4	Clamping Nut 1½ in 2 in 2½ in 3 in 4 in	-	213527
		-	213528
		-	213529
		-	213530
		-	213533
5	Seal Spacer (Type B valve only) 1½ in 2 in 2½ in 3 in 4 in	1	-
		-	347659
		-	347660
		-	347661
		-	347662
		-	347668

Before ordering replacement Headseal Assemblies, Headseal Shafts, Clamping Collars & Actuator Shafts, ascertain whether Air Cylinder is Mk.1 or Mk.2 see page 24, para. 5.
If Mk.1, then the instructions on page 24 para. 6 must be carried out before fitting the replacement parts.

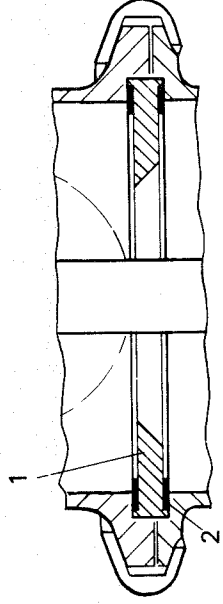


Fig. 18 Seat Insert (Type B valve)

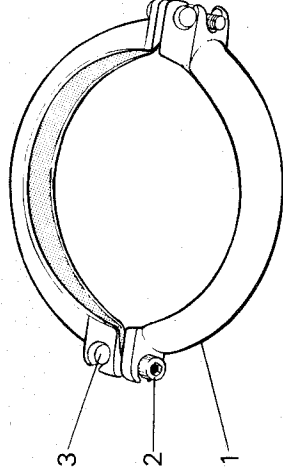


Fig. 19 Body Clamps

IMPORTANT:

When fitting a spare shaft to a piston rod in a Mk. 1 air cylinder, a half-hole must be present in the top edge thus:
See para. 3.6 page 24 for details.

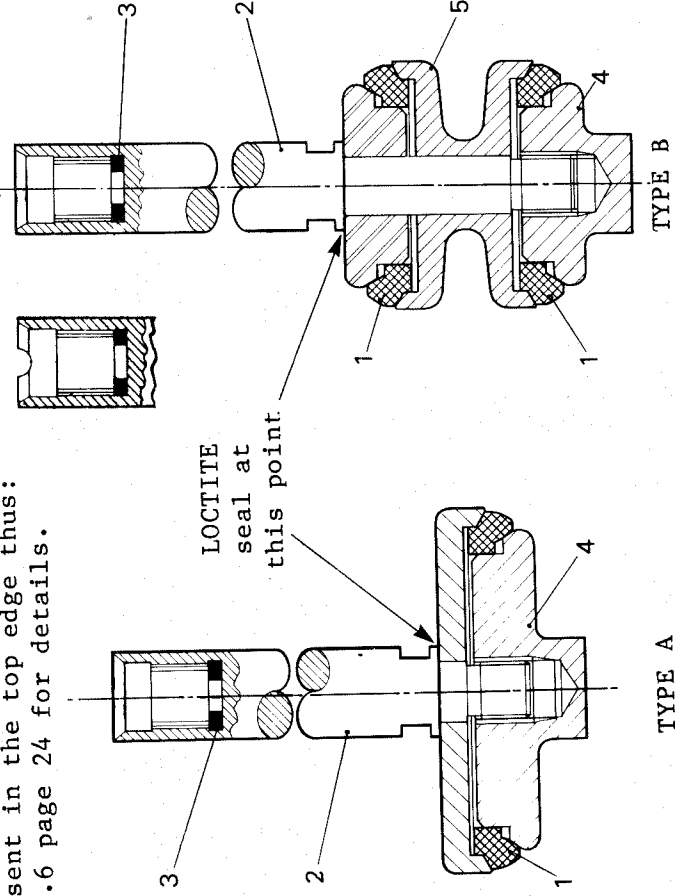
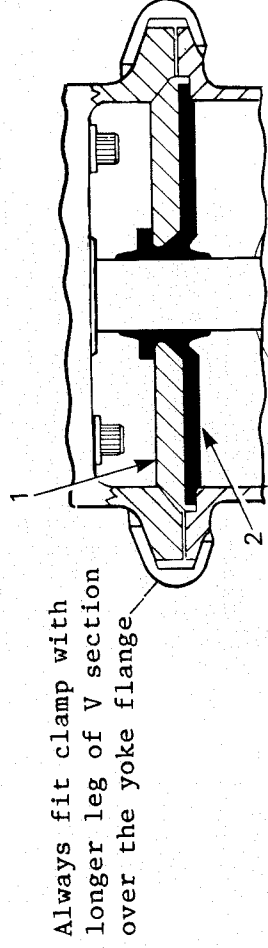
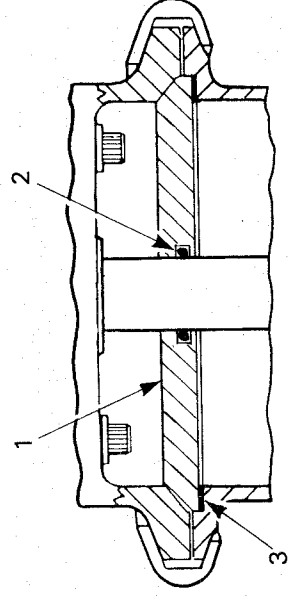


Fig. 20 Non-diaphragm valve - Headseal Assembly

Fig.21(a) Item	Description	No. off	Code No.
1	Lipseal type shaft seal, Non-diaphragm valves		
	Lipseal Plate		
	1½ in	1	-
	2 in	1	342575
	2½ in	-	342576
	3 in	-	342577
	4 in	-	342578
2	Lipseal Rubber, 1½ - 4 in valves	-	342579
	E.P. Rubber	1	-
	Nitrile Rubber	-	223356
		-	223357
Fig.21(b)	O-Ring type shaft seal, Non-diaphragm valves		
1	O-Ring Plate	1	-
	1½ in	-	342580
	2 in	-	342581
	2½ in	-	342582
	3 in	-	342583
	4 in	-	342584
2	O-Ring	1	-
	E.P. Rubber	-	427586
	Nitrile Rubber	-	427587
	Viton	-	427588
3	Flat Gasket. E.P. Rubber	1	-
	1½ in	-	413977
	2 in	-	413978
	2½ in	-	413979
	3 in	-	413980
	4 in	-	413981



(a) Lipseal type shaft seal



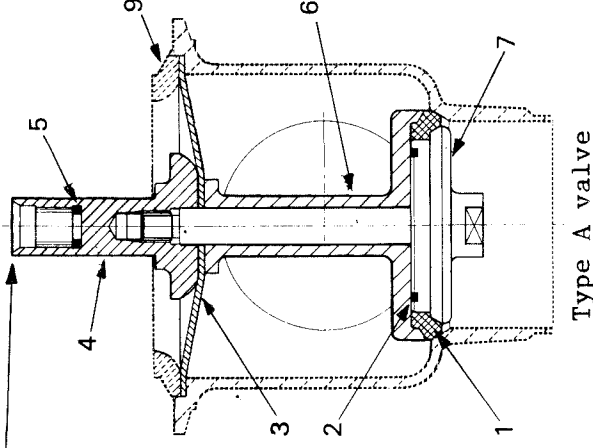
(b) O-ring type shaft seal

Fig. 21 Shaft Seals. Non-diaphragm valves

Fig.22 Item	Description	No. off	Code No.
-	Headseal Assembly, Diaphragm Valves comprising items 1 - 8 For type A valves 1½ in 2 in 2½ in 3 in For type B valves 1½ in 2 in 2½ in 3 in PTFE Headseal Insert For type A valve For type B valve For type A valve For type B valve Diaphragm shaft seal, PTFE 1½ in 2 in 2½ in 3 in O-Ring. 1½ in 2 in 2½ in 3 in Clamping Collar with Helicoil insert and Joint Ring 1½ in 2 in 2½ in 3 in Joint Ring, shaft Shaft guide For type A valve 1½ in 2 in 2½ in 3 in For type B valve 1½ in 2 in 2½ in 3 in	1 - - - - 1 - - - - - 1 2 - - - - - 1 2 - - - - - 1 - - - - 1 - - - - 1 - - - - 1 - - - - 1 - - - - 1 - - - - 1 - - - - 1 - - - - 1 - - - - 1 - - - -	- 232935 244162 244163 244164 - 232931 244165 244166 244167 - - 459601 459602 459603 459604 - - 426531 426578 426592 426571 - 406650 406651 406655 406657 - 228727 228729 228730 228731 413770 - 322854 231317 231318 231319 - 322855 231321 231322 231323

continued...

See IMPORTANT note below



IMPORTANT:

When fitting a spare clamping collar to a piston rod on a Mk. 1 air cylinder, a half-hole must be present in the top edge thus:
See para 3.6 page 24 for details.

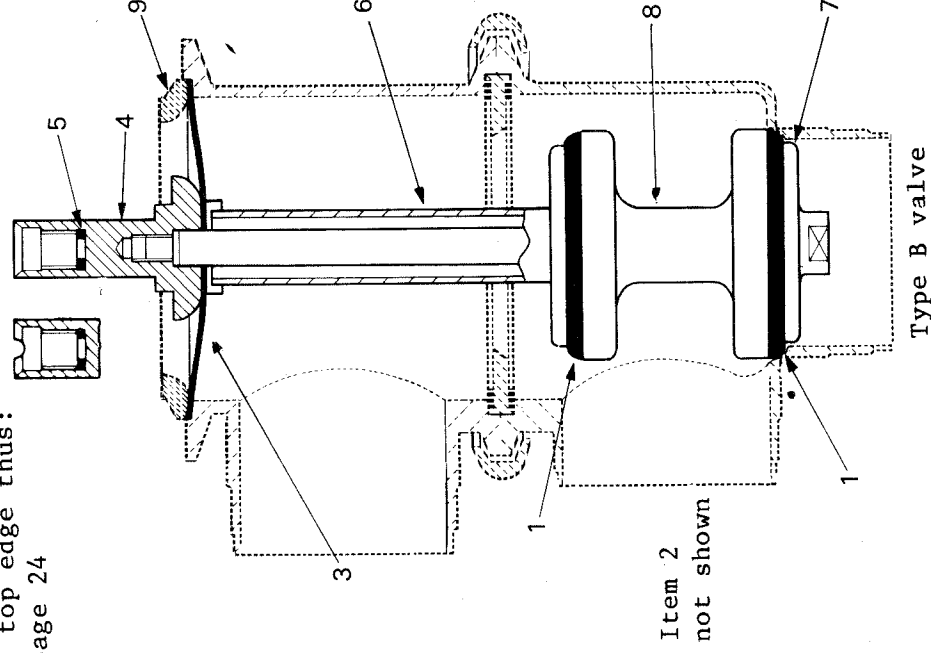


Fig. 22 Diaphragm Valve - Headseal Assembly

Fig.22 Item	Description	No.off	Code No
7	Clamping Screw	1	-
	For type A valve	-	244855
	1½ in	-	244856
	2 in	-	244857
	2½ in	-	244858
	3 in	-	-
	For type B valve	1	244859
	1½ in	-	244860
	2 in	-	244861
	2½ in	-	244862
8	3 in	-	-
	Seal Spacer (Type B valve only)	1	347676
	1½ in	-	347673
	2 in	-	347674
	2½ in	-	347675
9	3 in	-	-
	Clamping Ring	1	343445
	1½ in	-	343446
	2 in	-	343447
	2½ in	-	343448
	3 in	-	

Fig.23 Item	Description	No.off	Code No.
-	IMPORTANT: Please refer to Section 3 para. 5 (page 24) before ordering. AIR CYLINDER AND YOKE WITHOUT CONTROL UNIT Air Cylinder, (items 1-14 are not included) Small (3½ in dia. for 1½ in Valve only) Mk. 1 Large (5½ in dia.) Low pressure Mk. 2 High pressure Mk. 2	1 - - - 1 - - - 2 4 See Note 1	- 211356 211362 211363 - 457854 457855 460626 - - 427587 406320 459635 239714 458605
1	Top bearing plate		
	Small air cylinder		
2	Large air cylinder		
	Screw socket head		
	for Small air cylinder		
	for Large air cylinder		
3	O-ring, shaft seal, nitrile, Dowty 202-771-4470		
4	Air line coupling, push-in type		
5	'Nyltite' washer		
6	Piston rod extension with Helicoil insert		
7	O-ring, nitrile, Dowty 202-528-4470		
8(a)	Mk. 1 Piston rod Assy, incl. bonded seal, see Fig.24(a)	1	-
	for Small air cylinder Mk. 1		
	for Large air cylinder Mk. 1		
8(b)	Mk. 2 Piston rod (for Large air cylinder Mk. 2 only). See Fig. 24(b)	-	242530 242531
9	Yoke Assembly		
	1½ in valve	1	343614
	2 " "	1	-
	2½ " "	-	255100
	3 " "	-	255102
	4 " "	-	255103
	Washer, M6 nom., for item 2	-	255104
10	Joint ring, shaft	2 or 4	244105
11	Socket head grub screw M8 x 10 Stainless steel		460325
12	Splash shield. See Note 3	1	413770
13	1½ in valve	See Note 2	461203
	2 " "	1	-
	2½ " "	-	404842
	3 " "	-	404843
	Bonded seal. See Note 4	-	404844
14(a)	O-ring. See Note 4	-	404845
(b)		1	459699
		OR 1	458606

NOTES: 1. One shaft seal O-ring (3) is fitted as follows:

- (1) In Yoke (9) in spring-above-piston condition.
 - (2) In Top bearing plate (1) in spring-below-piston condition.
2. One grub screw is fitted in spring-below-piston diaphragm valve only, see Fig. 23.
3. Splash shield (13) is fitted as standard on diaphragm valves and is available as an accessory for non-diaphragm valves (except 4 inch)
4. The Bonded Seal, item 14(a), can only be used where one is fitted already, i.e. on a modified Piston Rod as shown in Fig. 24(a). DO NOT fit to earlier Piston Rods with a Loctite joint at this point unless shoulder is machined back 1.75 - 2.0 mm to accommodate it. Mk. 2 Piston Rod, Fig. 24(b) must only be used with Mk. 2 Air Cylinder. Order item 14(a) or 14(b) as necessary.

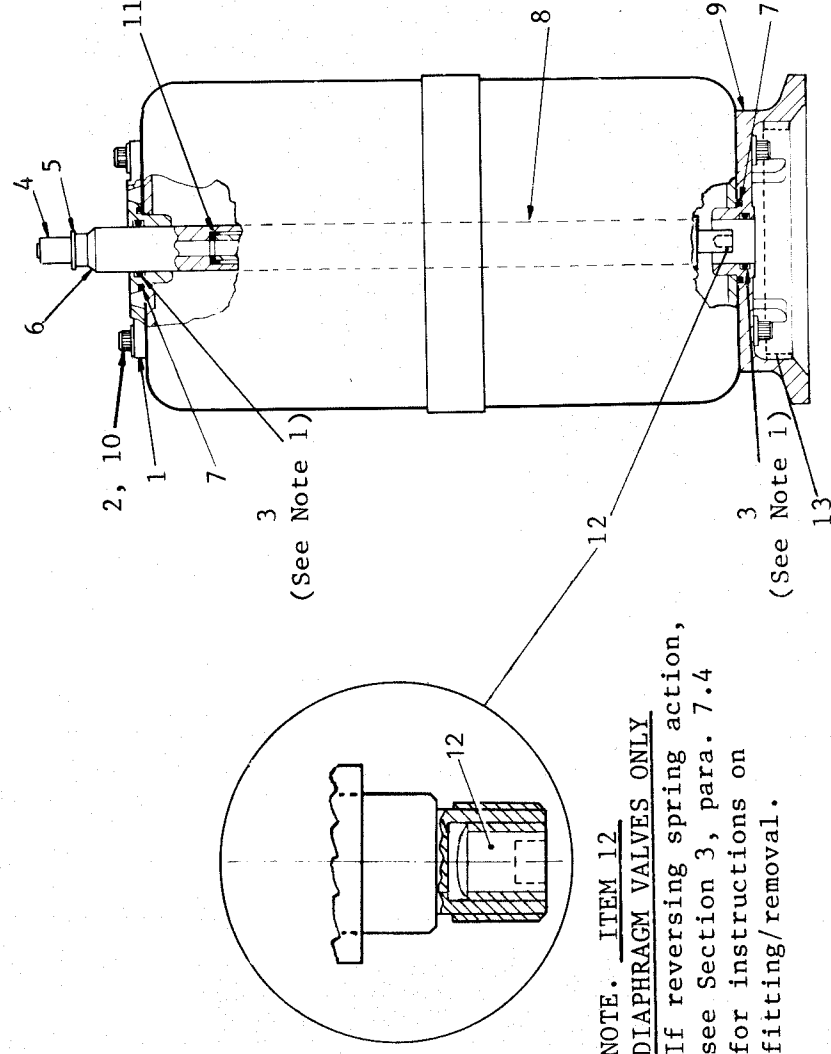


Fig. 23 Air Cylinder and Yoke

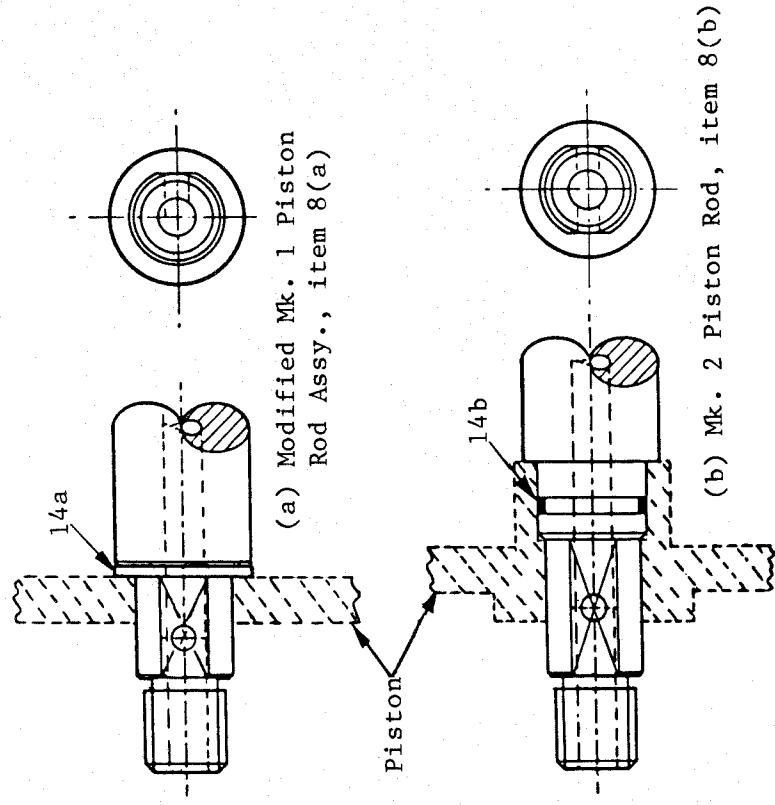
Fig. 24 Piston Rods - piston end only
 (See Note 4, Parts List, page 58)

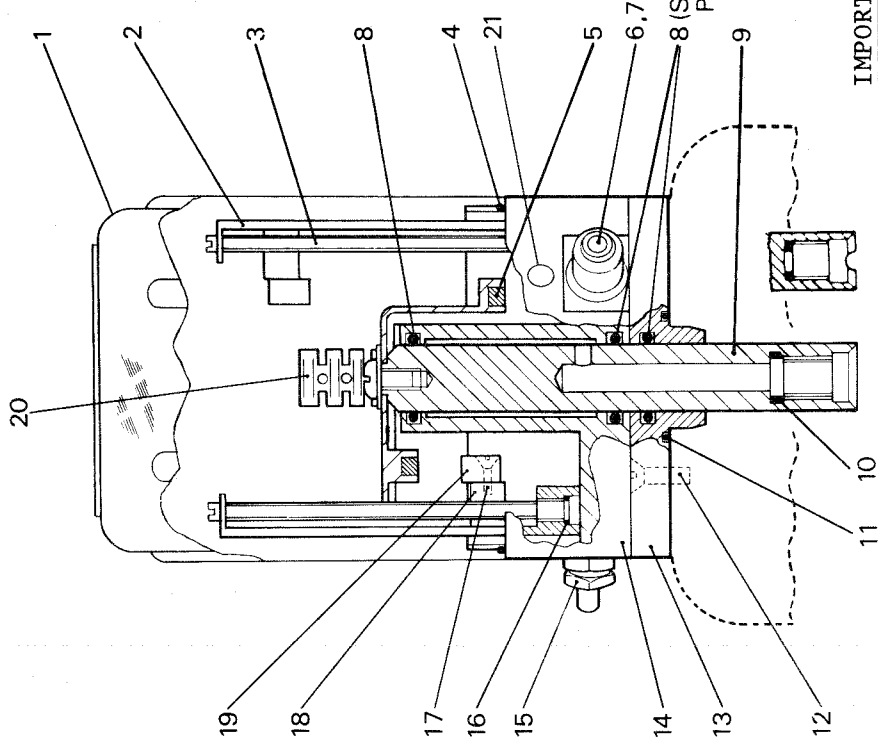
Fig.25(a) Item	Description	No.off	Code No.
-	CONTROL UNIT Control Unit complete: for large cylinder: Without solenoid valve With 110V solenoid valve With 24V solenoid valve for Small cylinder: Without solenoid valve With 110V solenoid valve With 24V solenoid valve Cover Slide housing Adjusting screw O-ring, cover. Dowty 200-538-4470 Switch actuator plate Air line coupling, push-in type M10 Nytlite washer O-ring, shaft seal, nitrile, Dowty 202-771-4470 Actuator shaft with Helicoil insert Large cylinder Small cylinder Joint ring, shaft O-ring, adapter plate, nitrile, Dowty 202-528-4470 Screw, countersunk head, M6 x 16 Adapter plate Base Cable gland O-ring, adjusting screw. Dowty 200-008-2064 Screw, countersunk head, M3 x 10 Switch carrier Reed switch, with twin lead Terminal block 7-way Bursting disc, red self-adhesive plastic, 8mm dia.	1 - - - - - - 1 2 2 1 1 1 1 3 1 - - 1 1 2 or 4 1 1 1 1 1 1 1 2 4 2 2 1 1	- 249062 249060 249061 249077 249075 249076 404838 410803 434281 427585 249972 406320 459635 427587 - 233117 243599 413770 458605 434285 438750 400607 449403 427580 460707 447907 438084 402039 406890
Fig.25(b)			
22	Screw, cheese head, M2 x 10	2	461111
#	Connector lead to solenoid	1	442013
#	Connector lead to solenoid	2	442014
23	Screw, cheese head, M6 x 8	1	434284
24	Washer, nom. M6	1	460325
25	Screw, socket head, M6 x 25	2	460625
26	M6 Nytlite washer for item 24	2	444160
27	Screw, pan head, No. 6 x $\frac{3}{8}$ inch, Phillips head	4	434311
28	Solenoid valve, with coil 24V d.c. 110V a.c.	1	-
-	Solenoid coil 24V d.c. 110V a.c.	-	442133 442132
29	Screw, cheese head. M3 x 40	1 - - 2	- 404454 404455 461112

Fig.25(a) Item	Description	No.off	Code No.
#30	Nut, hexagon, for item 29	2	460252
#31	Blanking plate if solenoid not fitted	1	402038
#32	Gasket for blanking plate if solenoid not fitted	1	449012
#33	Screw for blanking plate, M3 x 25 cheese head fitted	2	434293
Fig.25(c) 34	O-ring, solenoid valve. Dowty 206-004-2064	3	427592

= Not illustrated

*NOTE: One of the shaft seal O-rings (8) should be fitted in Adapter Plate (13) only in spring-below-piston condition (see Fig. 16).

Before ordering replacement Headseal Assemblies, Headseal Shafts, Clamping Collars & Actuator Shafts, ascertain whether Air Cylinder is Mk.1 or Mk.2 see page 24, para. 5.
If Mk.1, then the instructions on page 24 para. 6 must be carried out before fitting the replacement parts.

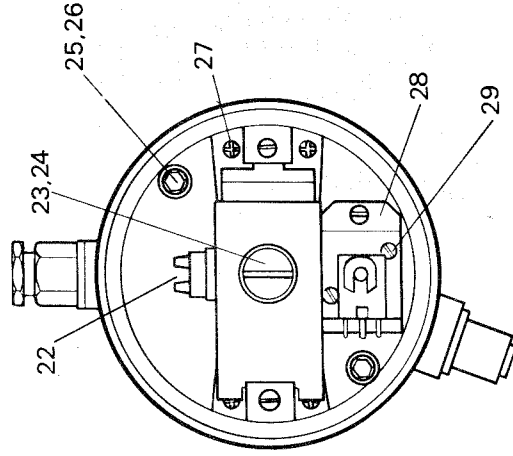


Mk. 1

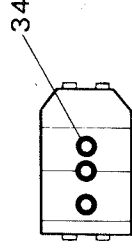
a) Sectional View

IMPORTANT:

When fitting a spare actuator shaft to a piston rod on a Mk. 1 air cylinder, a half-hole must be present in the top edge as shown. See para 3.6 page 24 for details.



(b) Control Unit with Solenoid Valve - Plan View



(c) Solenoid Valve Base

Fig. 25 Control Unit

SPARES PACKS

Item	Description	Contents No. off	Code No.
Fig.25	Spares Pack for Air Cylinder with Control Unit, containing	-	223359
-	Instruction leaflet Ref. 7-IL3	1	499805
4	O-ring, cover	1	427585
8	O-ring, shaft seal	3	427587
10	Joint ring, shaft	2	413770
11	O-ring adapter plate	2	458605
16	O-ring, adjusting screw	2	427580
32	Blanking plate gasket	1	449012
34	O-ring, solenoid valve	3	427592
-	Bonded seal for use with modified Mk. 1 piston rod (Fig.24a)	1	459699
-	O-ring for use with Mk. 2 piston rod (Fig. 24b)	1	458606
Fig.23	Spares Pack for Air Cylinder without Control Unit containing:	-	223358
-	Instruction leaflet Ref. 7-IL3	1	499805
3	O-ring, shaft seal	1	427587
7	O-ring	2	458605
11	Joint ring, shaft	2	413770
-	Bonded seal for use with modified Mk. 1 piston rod (Fig.24a)	1	459699
-	O-ring for use with Mk. 2 piston rod (Fig. 24b)	1	458606
<u>TOOLS</u>		Code No.	
Fig. 10a	Air line cutting tool	439764	
" 10b	Air line fitting tool	439763	
" 10c	Lipseal insertion tool	353330	
" 10d	Valve lifting tool for spring-above piston valves	212100	
-	Valve depression tool for spring-below piston valves	-	
-	Helicoil inserting tool, pre-wind type Helicoil extracting tool Helicoil tang break-off tool for use with notched inserts only	Non-diaphragm Valve 1/2 in BSF	Diaphragm Valve 3/8 in BSF
-		439783	439784
-		439787	439788
-		439785	439786

SERVICE

The APV Service Department is staffed and equipped to provide advice and assistance at all times. To avoid delays when making enquiries, please quote the Serial Number of your machine/equipment (where applicable) and the Item Number of any part referred to.

Telephone: CRAWLEY (0293) 27777
(ask for 'Service')

Telex: 87237

