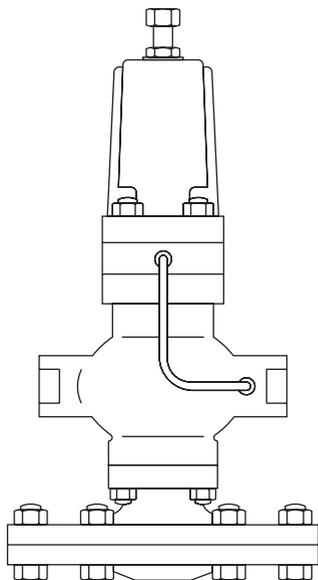

DP17, DP17E, DP17G, DP17R, DP17Y and DP27G

Pilot Operated Pressure Reducing Valves

Installation and Maintenance Instructions



1. Safety information
2. General product information
3. Installation
4. Commissioning
5. Maintenance
6. Spare parts
7. Fault finding

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products listed below comply with the requirements of the Pressure Equipment Directive (PED) and carry the  mark when so required. The products fall within the following Pressure Equipment Directive categories:

Product		Group 2 Gases
DP17, DP17E, DP17G	DN15 - DN40	SEP
DP17R, DP17Y and DP27G	DN50	1

- i) The products have been specifically designed for use on steam, air and inert industrial gases which are in Group 2 of the above mentioned Pressure Equipment Directive.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some

previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting,

pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 300 °C (572 °F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken. However, if the valve has any PTFE components, special care must be taken to avoid potential health hazards associated with decomposition/burning of this material.

PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container, do not mix it with other rubbish, and consign it to a landfill site.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

2. General product information

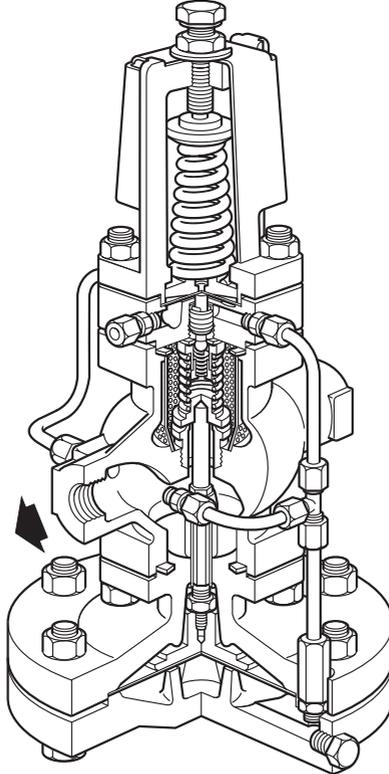
2.1 General description

These instructions apply to the **DP17** and most derivatives including the **DP17E**, **DP17G**, **DP17R**, **DP17Y** and **DP27G**.

The instructions primarily relate to the use of the **DP17** on steam but can be used as a guide when the valve is used on compressed air.

For compressed air the **DP17G** and **DP27G** are recommended which have a nitrile seal for both the main valve and pilot valve.

Note: For additional information see the relevant Technical Information Sheets.



2.2 Sizes and pipe connections - DP17, DP17G, DP17R, DP17Y and DP27G

DN15LC (not available for type DP17G), DN15, DN20, DN25, DN32, DN40 and DN50.

Screwed BSP (BS 21 parallel) or NPT (DN15 to DN25 only).

Standard flanges: **DN15 - DN50** BS 4504 PN16 and PN25

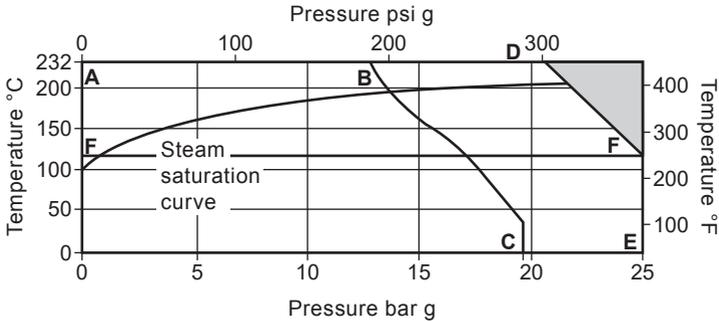
DN25 - DN50 BS 10 Table H and ANSI 300

DN15 - DN50 JIS 10, JIS 16 and ANSI 150

Available on request: **DN15 - DN20** BS 10 Table F

DN15 ANSI 300

2.3 Pressure/temperature limits - DP17, DP17G, DP17R, DP17Y and DP27G



The product **must not** be used in this region.

A-D-E Screwed and flanged BS 4504 PN25, ANSI 300, and BS 10 Table H.

A-B-C Flanged ANSI 150.

F-F The DP17G and DP27G are limited to 120 °C.

Note: **DP17, DP17G** and **DP27G** have a variable rate conical pressure adjustable spring fitted providing a downstream pressure range of 0.2 - 17 bar g.

DP17Y has a pressure spring with a range of 0.2 - 3 bar g.

DP17R Maximum downstream reduced pressure 15 bar g. The control pressure signal to the pilot diaphragm must be approximately 0.7 bar above the required reduced downstream pressure.

Body design conditions		PN25
PMA	Maximum allowable pressure @ 120 °C (248 °F)	25 bar g (362.5 psi g)
TMA	Maximum allowable temperature	232 °C (449.5 °F)
	Minimum allowable temperature	-10 °C (14 °F)
PMO	Maximum operating pressure for saturated steam service	17 bar g (246.5 psi g)
TMO	Maximum operating temperature	DP17, DP17Y and DP17R 232 °C (449.5 °F)
		DP17G and DP27G 120 °C (248 °F)
	Minimum operating temperature	0 °C (32 °F)

Note: For lower operating temperatures consult Spirax Sarco.

Δ PMX Maximum differential pressure is limited to the PMO

Designed for a maximum cold hydraulic test pressure of: 38 bar g (551 psi g)

Note: With internals fitted, test pressure must not exceed: 25 bar g (362.5 psi g)

2.4 Sizes and pipe connections - DP17E

DN15LC (not available for type DP17G), DN15, DN20, DN25, DN32, DN40 and DN50.

Screwed BSP (BS 21 parallel) or NPT (DN15 to DN25 only).

Standard flanges: **DN15 - DN50** BS 4504 PN16 and PN25

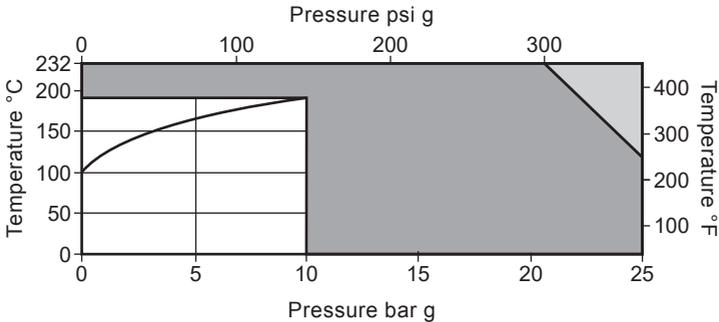
DN25 - DN50 BS 10 Table H and ANSI 300

DN15 - DN50 JIS 10, JIS 16 and ANSI 150

Available on request: **DN15 - DN20** BS 10 Table F

DN15 ANSI 300

2.5 Pressure/temperature limits - DP17E



 The product **must not** be used in this region.

 The product should not be used in this region or beyond its operating range as damage to the internals may occur.

Body design conditions	PN25
PMA Maximum allowable pressure @ 120 °C (248 °F)	25 bar g (362.5 psi g)
TMA Maximum allowable temperature	232 °C (449.5 °F)
Minimum allowable temperature	-10 °C (14 °F)
PMO Maximum operating pressure including saturated steam service	10 bar g (145 psi g)
TMO Maximum operating temperature	190 °C (248 °F)
Minimum operating temperature	0 °C (32 °F)

Note: For lower operating temperatures consult Spirax Sarco.

ΔPMX Maximum differential pressure is limited to the PMO

Designed for a maximum cold hydraulic test pressure of: 38 bar g (551 psi g)

Note: With internals fitted, test pressure must not exceed: 25 bar g (362.5 psi g)

3. Installation

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

Referring to these Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation.

3.1 Supply

DP17, DP17G and DP27G (Fig. 1)

These are supplied ready for fitting and have a variable rate conical pressure spring suitable for a downstream pressure of 0.2 - 17 bar (3 - 247 psi).

DP17Y (Fig. 1)

The DP17Y is supplied as the DP17, but has a lower rate pressure adjustment spring for a downstream pressure range of 0.2 - 3 bar (3 - 44 psi).

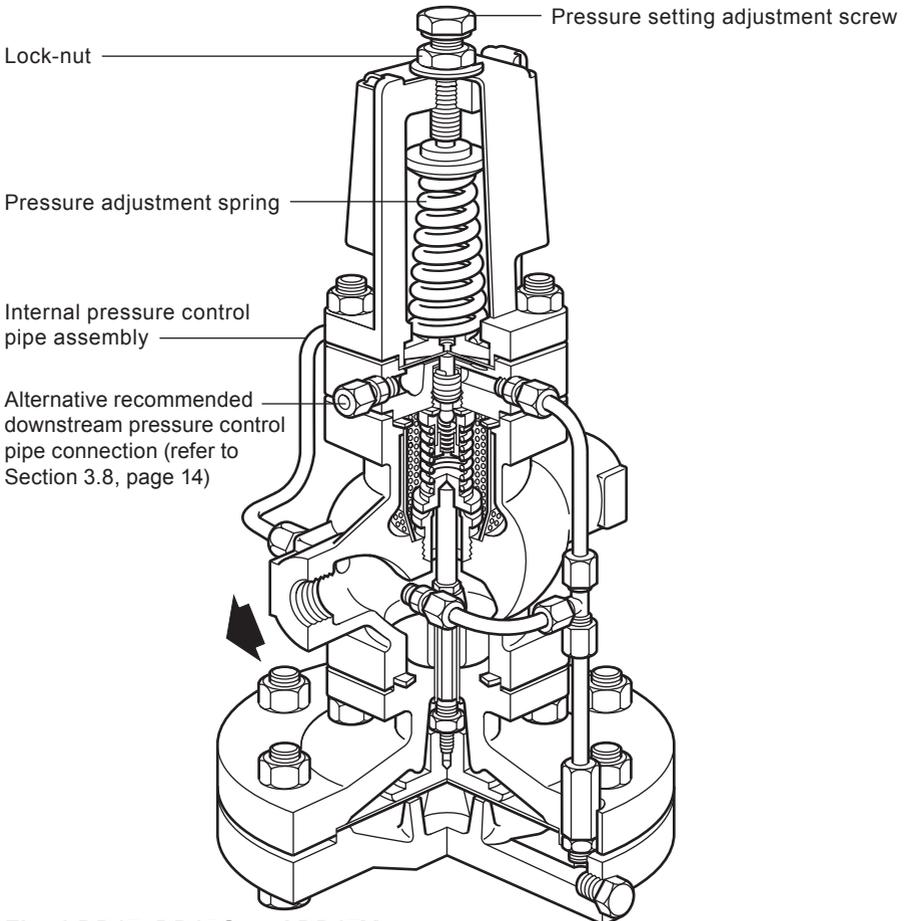


Fig. 1 DP17, DP17G and DP17Y

DP17E

The DP17E (Fig. 2) is supplied as for the DP17 with a control spring but the maximum pressure is limited to 10 bar g (145 psi g) due to the addition of the solenoid valve. A solenoid operated valve is fitted in the pipe between the pilot valve and the main diaphragm chamber and is thus in series with the normal pilot valve.

The purpose of the solenoid valve is to override the pilot valve thus causing the main valve to shut-off. It can be controlled by any device capable of interrupting the supply of current to the solenoid coil.

The solenoid is arranged to open the valve when the coil is energised so that whatever switching device is used it must be arranged to break the current to close the main valve. In this way the unit will always 'fail-safe' i.e. will close the main valve in the event of a failure in electrical supply.

Electrical supply

It is important that the solenoid is connected to the correct voltage. Therefore always check on the supply details which are stamped on the solenoid valve name-plate before attempting to connect up.

Electrical connection is by cable plug to DIN 43650. All wiring, connectors, etc. in close proximity to the valve should be of heat resisting type and comply with local and national electrical codes.

Earth

The solenoid valve should be adequately earthed.

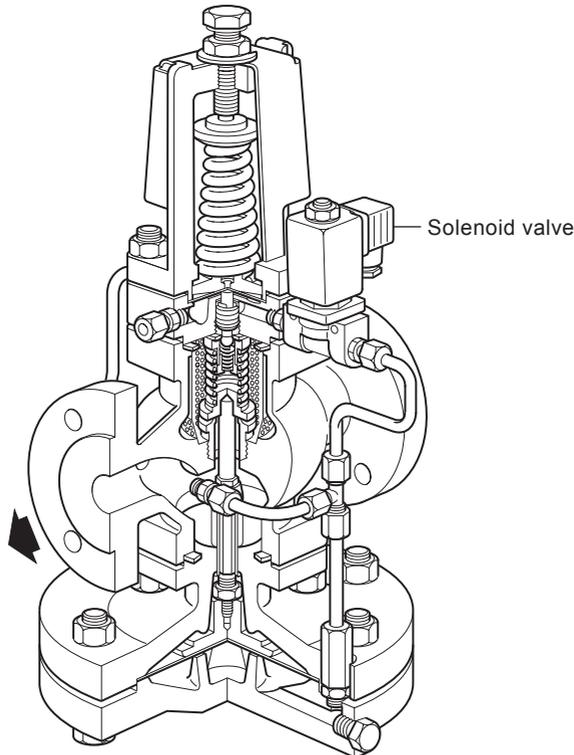


Fig. 2 DP17E

DP17R

The DP17R (see Fig. 3) is supplied ready for fitting. Downstream pressure can be adjusted remotely by a controlled air supply to the pilot diaphragm chamber. The actuating air supply must be at a pressure approximately 0.7 bar g (10 psi g) above the required downstream pressure and controlled through a metal bodied self-relieving regulator. A check valve should be fitted to prevent steam entering the air system, in the unlikely event of a failure of the pilot diaphragm. Any filter should be fitted with a metal bowl and should preferably be on the upstream side of the check valve.

The actuating air supply controlled by the regulator should be connected to the union fitting attached to the air control block as in Fig. 4. The air inlet connection is suitable for 6 mm O/D copper tube. The maximum reduced pressure available through the DP17R is 15 bar g (218 psi g). Typical installation is shown in Fig. 9, page 17.

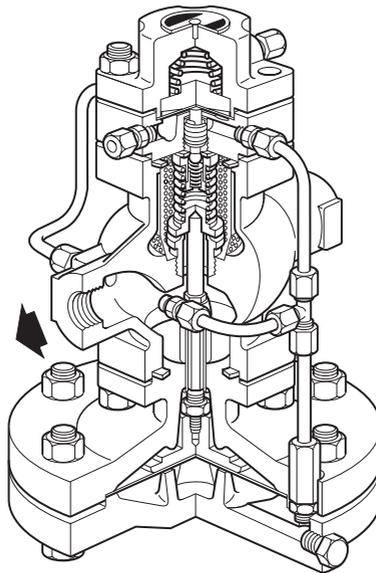


Fig. 3 DP17R

3.2 Fitting (Figs. 4, 5 and 6)

The valve should always be fitted in a horizontal pipeline with the main diaphragm chamber below the line (Fig. 4). To meet high capacities or widely varying loads, or where stand-by facility is required, two or more valves may be used in parallel (Fig. 5). For pressure shutdown in excess of 10 to 1 consideration should be given to using the two valves in series. To avoid instability pipework volume between the valves should be equivalent to at least 50 pipe diameters in length of the intermediate correctly sized pipework. To ensure adequate drainage of the space between the two reducing valves a trap set should be fitted as shown in Fig. 6.

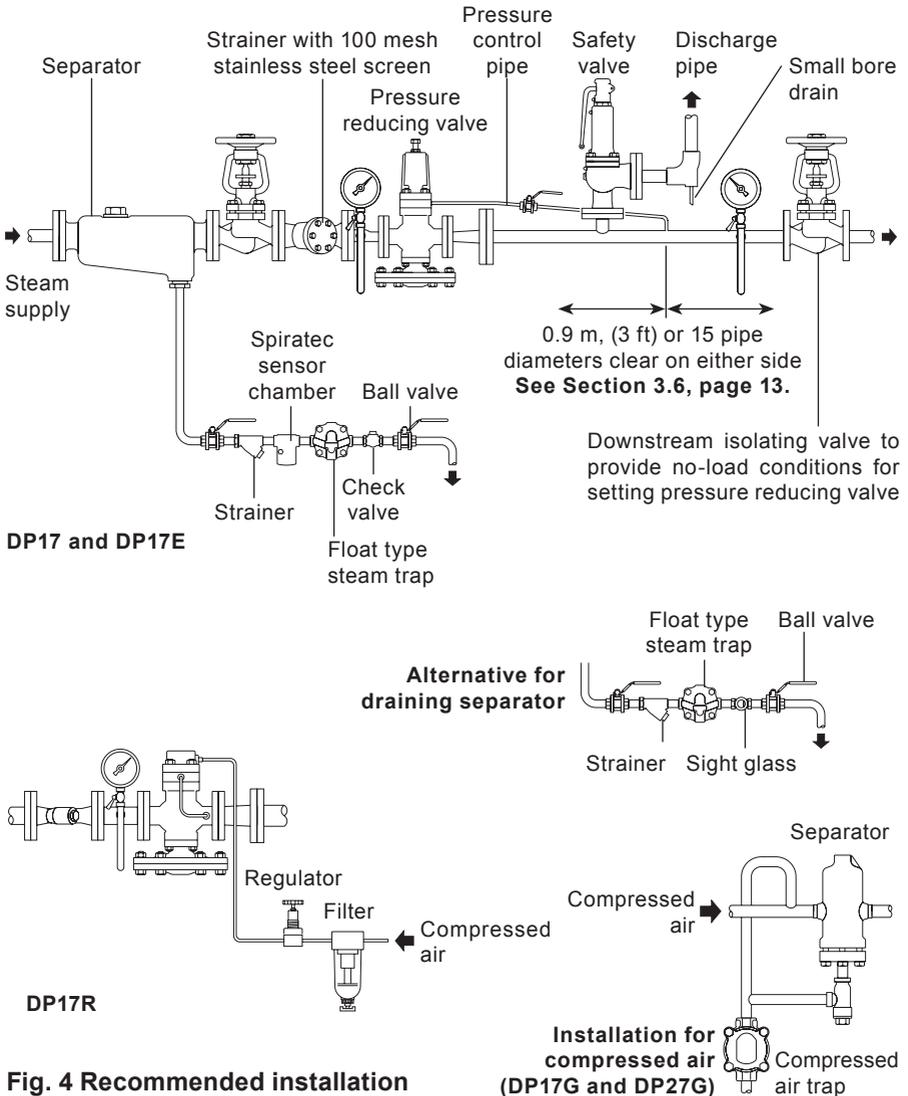
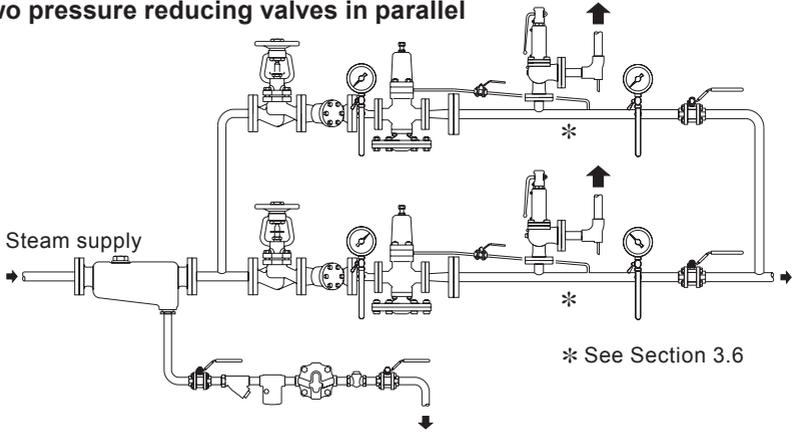


Fig. 4 Recommended installation

Fig. 5 Two pressure reducing valves in parallel



3.3 Pipeline sizing

The piping on both sides of the valve must be sized so that velocities do not exceed 30 m/s (98 ft/s). This means that a properly sized valve will often be smaller than the connecting pipework.

3.4 Pipeline stresses

Line stresses caused by expansion or inadequate support should not be imposed on the valve body.

3.5 Isolating valves

These should preferably be of the full bore type.

3.6 Removal of condensate

It is recommended that a separator with trap set is fitted upstream of the valve to ensure dry steam conditions.

If there is a rise in the low pressure line from the valve then a further drain point should be provided to keep the valve drained after shutdown.

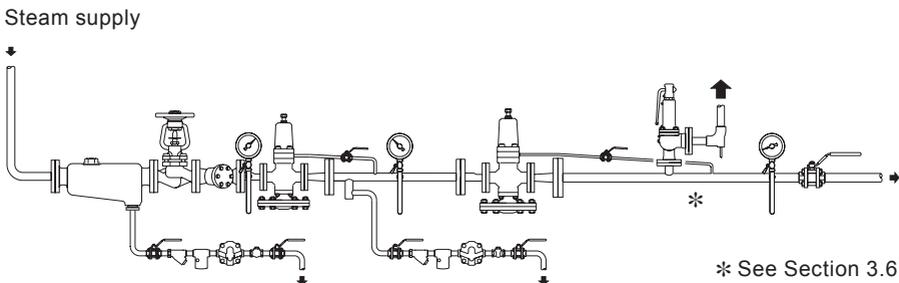


Fig. 6 Two pressure reducing valves installed in series

3.7 Protection from dirt

The valve should be protected by a pipeline strainer with 100 mesh screen. The strainer should be fitted on its side to prevent the accumulation of water. The strainer screen should be examined and cleaned at regular intervals.

3.8 Pressure control pipe

For applications that require closer control, improved stability or maximum capacity condition the internal pressure control pipe should be replaced by an external pressure control pipe as follows:

Remove the internal pressure control pipe assembly.

The resulting $\frac{1}{8}$ " BSP tapping in the side of the body should be blanked using the plug provided in the linen bag attached to the valve (which also contains the fitting instructions). The other $\frac{1}{8}$ " BSP tapping in the side of the pilot valve chamber, should be blanked off using the plug fitted in the tapping provided on the front of the pilot valve chamber. Into this latter tapping, fit the brass compression fitting with brass compression ring which is also contained in the linen bag. This is suitable for the fitting of 6 mm O/D pipe. If suitable pipe is not available the compression fitting can be removed and $\frac{1}{4}$ " nominal bore steel pipe screwed directly into the pilot valve chamber.

The pressure control pipe should be connected into the top of the reduced pressure main at a point where in either direction there is a length of straight pipe uninterrupted by fittings for at least 1 m (3 ft) or 15 pipe diameters whichever is the greater. It should be arranged with a positive fall so that any condensate can drain away from the DP17. Where the size of the reduced pressure main makes it difficult to maintain a fall when entering the top of the main, the pressure control pipe may be connected in the side of the main.

3.9 Pressure gauges

It is essential to fit a pressure gauge on the upstream and downstream side so that the valve can be properly set and monitored.

3.10 Bypass

Information regarding bypasses:

It may be necessary to ensure that primary fluid flow continues in the event of the main control failing. This is often achieved by fitting a bypass around the control valve assembly. A better option is a duplex valve assembly, installed in parallel with the main valve, as a manual bypass cannot accurately control pressure/flow/temperature without constant manual supervision. Conversely, a duplex control station will provide proper control, should the main valve ever need to be removed.

Although not recommended, if a manual bypass valve is fitted, the bypass valve flow coefficient (K_{Vs}) should be the same as, or near to that of, the control valve. This means that the manual valve and control valve could have different connection sizes. The bypass valve should also be capable of throttling not just isolating, to reduce wear on the valve when in service and to facilitate manual control.

Ideally, any bypass pipework should be arranged either above or alongside the main assembly. On steam systems, it should never be below it.

3.11 Safety valve

A safety valve should be fitted to protect the downstream equipment from excessive pressure. It should be set to lift below the safe working pressure of the downstream equipment, and will normally be sized to pass the full capacity of the PRV should the PRV fail in the fully open position. The safety valve set pressure should take account of its reseal characteristic and the 'No-load' pressure setting of the PRV. For example, the typical blowdown value (reseal differential) for a DIN type safety valve is 10% of set pressure. The minimum possible safety valve set pressure must therefore equal the no load set pressure of the reducing valve plus the blowdown value of the safety valve plus a small margin of at least 0.1 bar. If the set pressure is any lower, if whatever reason the safety valve lifts it will not shut properly and will simmer, creating a leak which is often wrongly diagnosed as a result of a leaking reducing valve.

Discharge pipework should be taken to a safe place.

3.12 Position in relation to other control valves

Line or system isolation valves (A), either remotely actuated or manual, should be installed on the upstream side of the DP17 reducing valve.

Where there is downstream control equipment (B), particularly when it is fast acting (for instance pulsed piston actuated valves) ensure the control equipment is at least 50 pipe diameters away from the DP17 to prevent pressure pulses being transmitted back causing unstable operation and premature wear or if this is impractical an intermediate vessel can provide a similar benefit.

Where a safety valve (C) is required to protect the system downstream of a DP17 and where a control valve is also being used downstream of the DP17, it is recommended that the safety valve is fitted downstream of the control valve rather than in between the DP17 and the control valve. If any slight leakage occurs this will avoid any pressure build-up causing nuisance operation of the safety valve but provide complete protection for the downstream system.

Where valves are installed downstream of the DP17 (B) the intermediate downstream pipework must be properly trapped (D) to ensure no condensate can build up on the downstream side of the DP.

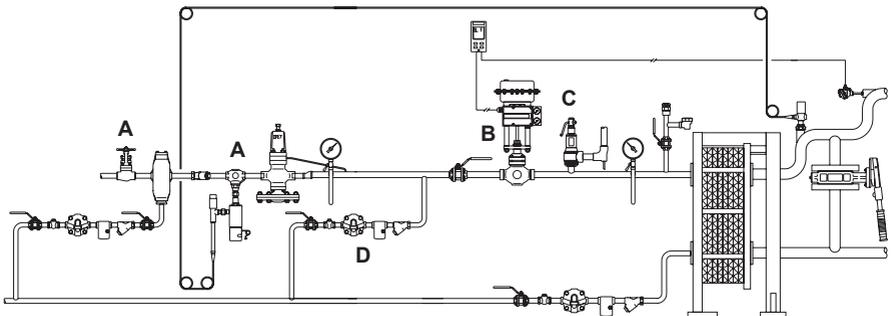


Fig. 7 DP17 position in relation to other control equipment

4. Commissioning

4.1 Setting procedure (Fig. 8 and Fig. 9)

1. Ensure that all connections are properly made and that all valves are closed.

DP17, DP17E, DP17G, DP17Y and DP27G (Fig. 8)

DP17R (Fig. 9)

2. Close all valves at reducing valve station, including valves on bypass line if fitted.
3. Check that adjustment screw is turned fully anticlockwise until spring is slack.

2. Close all valves at reducing valve station, including the valve on the bypass line, if fitted.
3. Check that the actuating air supply is off and the pressure is zero.

4. Check that the pressure gauge isolating cocks are open.
5. For correct operation of the valve it is important that the pilot and main valves are not subjected to dirt or other hard particles. Therefore, prior to bringing the valve into operation, ensure that the upstream pipework has been cleared of all loose dirt and hard particles and that the main strainer screen is examined and cleaned if necessary.
6. Slowly open the upstream isolating valve until it is fully open.

DP17, DP17E, DP17G, DP17Y and DP27G

DP17R

7. Using a 19 mm A/F spanner slowly turn adjustment screw in a clockwise direction until desired downstream pressure reading is obtained.
8. Holding the adjustment screw in position with the spanner tighten down the locknut to secure the setting of the adjustment spring, making sure that the 'C' washer stays in position.

7. Slowly admit actuating air through the pressure regulator until the desired downstream pressure is obtained.

Note : To facilitate resetting of the reducing valve it may be desirable to position the downstream pressure gauge at a viewpoint close to the air regulator. If this necessitates fitting the pressure gauge below the steam line, the interconnecting pipe should be drained at the low point otherwise the gauge will give a false reading.

9. Slowly open the downstream valve until it is fully open.

Note: After installation or maintenance ensure that the system is fully functional. Carry out tests on any alarms or protective devices.

WARNING

Direct injection systems

This product contains a rust inhibitor to protect it against corrosion during storage. To avoid any possible contamination of your product, after first blowing down the approach pipework, we recommend that the valve is blown through thoroughly in order to remove any trace of the inhibitor.

4.2 Two or more valves in parallel

When more than one reducing valve is used it is an advantage to use two valves of unequal size, the smaller one being chosen to meet the lower load requirements and the larger valve to come into operation so that both meet the normal and maximum demand.

It is necessary to commission each valve independently (one at a time) following the procedure detailed in Section 4.1 but setting the smaller valve at a pressure higher than the larger valve.

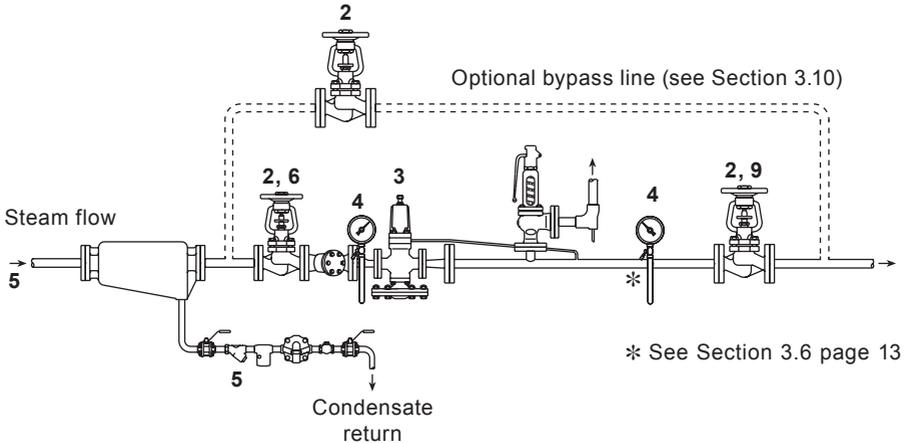


Fig. 8 Setting procedure sequence DP17, DP17E, DP17G, DP17Y and DP27G

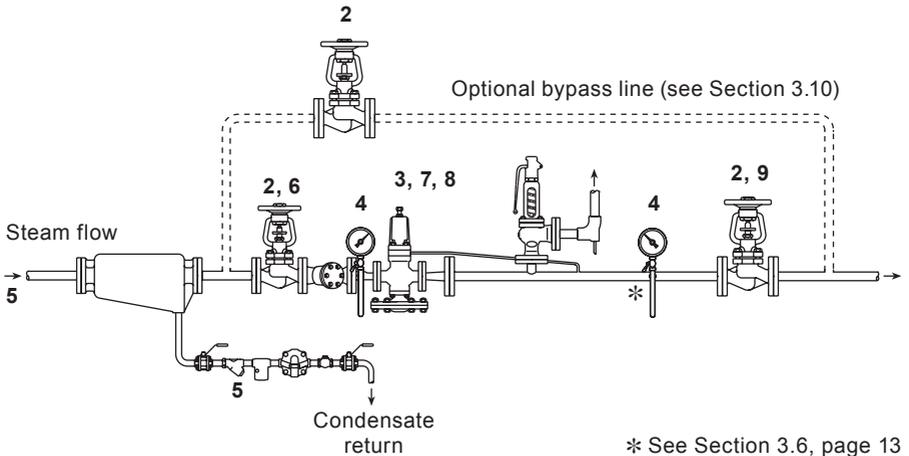


Fig. 9 Setting procedure sequence DP17R

5. Maintenance

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

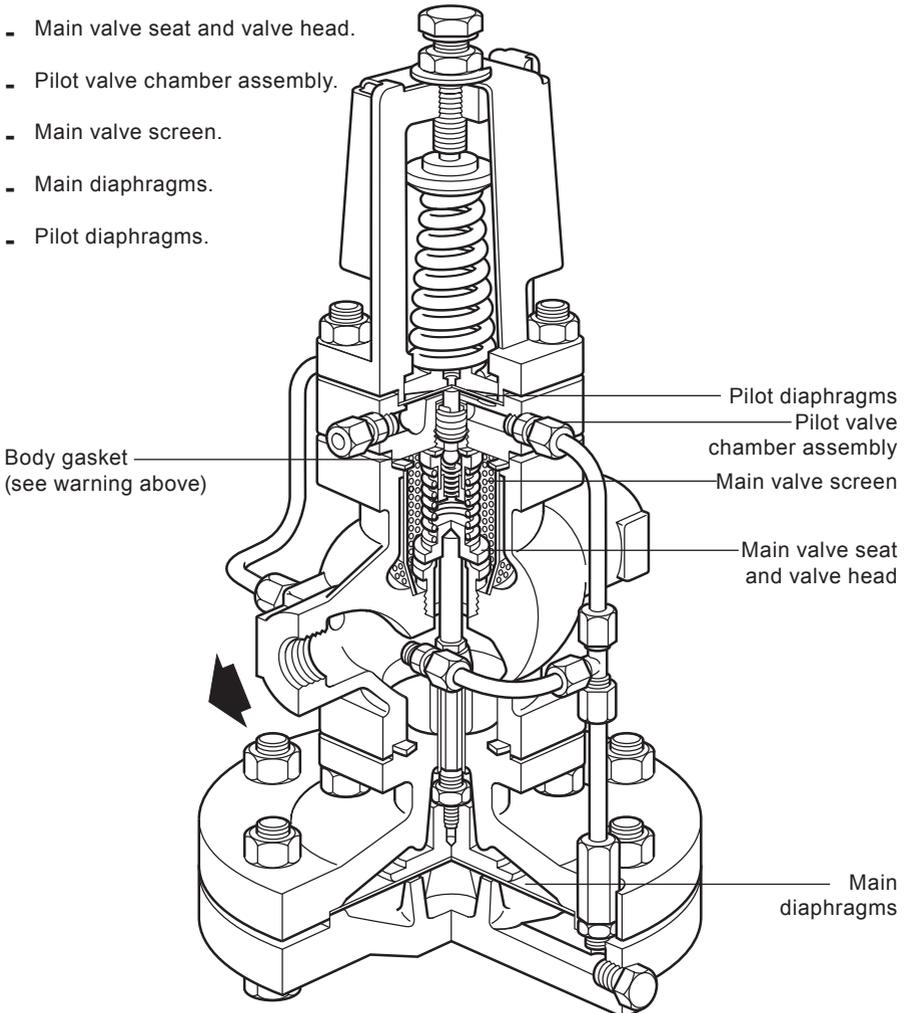
Warning:

The body gasket (all DP17 derivatives) and actuating chamber gasket (DP17R) contains a thin stainless steel support ring which may cause physical injury if not handled and disposed of correctly.

5.1 Routine maintenance

It is recommended that the valve is dismantled once every twelve to eighteen months for a complete overhaul and ideally this should be carried out with the valve removed from the line. The following parts should be inspected and refurbished or replaced as necessary:

- Main valve seat and valve head.
- Pilot valve chamber assembly.
- Main valve screen.
- Main diaphragms.
- Pilot diaphragms.

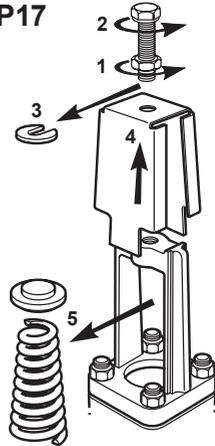


To renew or change the control spring

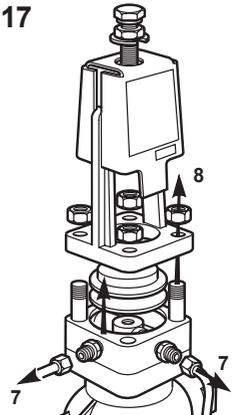
It is not necessary to isolate the valve in order to change the spring.

1. Release the lock-nut.
2. Turn the adjustment screw anticlockwise. Ensure there is no compression on the pressure adjustment spring.
3. **For the DP17 and derivatives only** - Slide out the 'C-shape' washer.
4. Remove the cover.
5. **For the DP17** - Remove the pressure adjustment spring and top plate.
For the DP27G - Firstly undo the 4 off spring housing securing nuts and remove the spring housing. Then remove the pressure adjustment spring and the top spring plate.
6. Reassemble in reverse order.

DP17



DP17



To renew the pilot valve assembly

DP17, DP17E, DP17G , DP17Y and DP27G

Isolate the pressure reducing valve and zero the pressure. Follow Steps 1 to 5 then proceed.

DP17R

Isolate the actuating air supply and zero the pressure.

7. Unscrew the unions and release the pipework.
8. **DP17, DP17E, DP17G and DP17Y**
Unscrew the spring housing nuts and remove the spring housing, bottom spring plate and diaphragms.

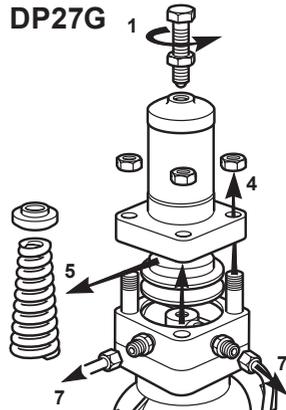
DP27G

Undo the 4 off spring housing securing nuts and remove the spring housing. Then remove the pressure adjustment spring, top spring plate, bottom spring plate and diaphragms.

DP17R

Unscrew the securing nuts and remove the air control block and diaphragms.

DP27G



9. Remove the pilot valve housing.
10. Ensure that the main valve return spring is still in position. Any trapped dirt or scale should be removed from the pilot valve assembly. If appropriate, the complete pilot valve chamber assembly can be refitted following Steps 14 to 21. If necessary, the complete pilot valve chamber assembly should be replaced as follows:

Note: The pilot valve assembly is no longer available as a standard spare. Because of the difficult process described in Step 13, it has now been discontinued. The complete pilot valve chamber assembly is the recognised spare. However for customers with pilot valves only still in stock, these can be used by following Steps 11-13. This assembly contains 2 off PTFE seals. The following handling precautions should be observed.

Handling precautions for PTFE

Within its working temperature range PTFE is a completely inert material, but when heated to its sintering temperature it gives rise to gaseous decomposition products or fumes which can produce unpleasant effects if inhaled. Fumes can be produced during processing: for example, when the material is heated to sinter it, or when brazed connections are being made to cable insulated PTFE. The inhalation of these fumes is easily prevented by applying local exhaust ventilation to atmosphere as near to their source as possible.

Smoking should be prohibited in workshops where PTFE is handled because tobacco contaminated with PTFE will during burning give rise to polymer fumes. It is therefore important to avoid contamination of clothing, especially the pockets, with PTFE and to maintain a reasonable standard or personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

11. Unscrew and remove the pilot valve assembly (22 mm A/F)
12. Screw the new pilot valve into the housing. Torque 45 - 50 N m (33 - 37 lbf ft).
13. Check that there is a very slight clearance between the top of the plunger and a straight edge placed across the diaphragm location recess. (N.B. Because of production tolerances the plunger is supplied slightly longer than is always required and it will generally be necessary to grind or machine material off the top end to give the correct length). After machining make sure the sharp edges are removed from the top of the plunger as these could damage the diaphragm.
14. Remove the screen and clean. Ensure that the gasket faces are clean.
15. Ensure that the main valve return spring is still in position.
16. Fit new gasket.
17. Replace the screen. Assemble the pilot valve housing.
18. Refit the two diaphragms making sure that they are fitted the same way round as they were removed and that all contact faces are clean. Diaphragms showing signs of wear or damage should be replaced.
19. **DP17, DP17E, DP17G, DP17Y and DP27G**
Replace bottom spring plate.

20. DP17, DP17E, DP17G, DP17Y and DP27G

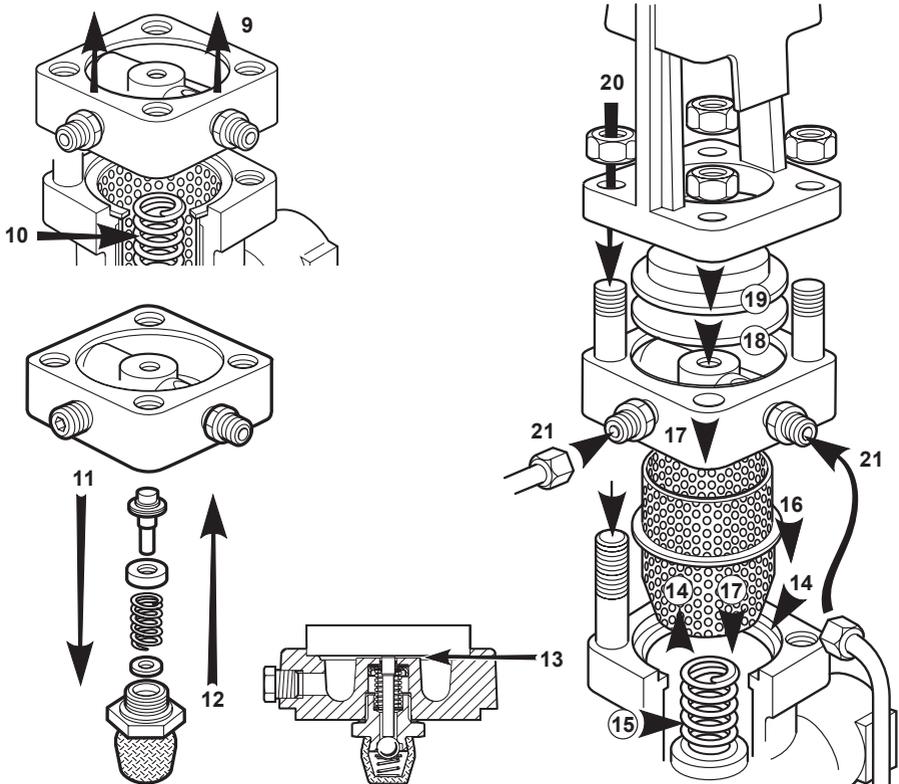
Assemble the spring housing and tighten the nuts to the recommended torques shown in Table 1, page 21.

DP17R

Assemble the air control block and tighten the nuts to the recommended torques shown in Table 1, page 21.

21. Refit the pipework and retighten the unions to ensure a steam tight seal.

Bring the valve back into commission by following as many Steps as are necessary in Section 4, page 16.



**Table 1
Recommended tightening torques for pilot valve chamber nuts**

Size of valve	Nut size	Tightening torques	
½", ¾", 1" DN15, DN20, DN25 and DN32	M10	40 - 50 N m	(30 - 37 lbf ft)
DN40 and DN50	M12	45 - 55 N m	(33 - 41 lbf ft)

To clean the strainer screen

DP17, DP17E, DP17G, DP17Y and DP27G

Isolate the pressure reducing valve and zero the pressure. Follow Steps 1 to 5 then proceed.

DP17R

Isolate the actuating air supply and zero the pressure.

- 22. Unscrew the unions and release the pipework.
- 23. Unscrew the nuts. Note that this has already been actioned under step 5 for the DP27G.
- 24. **DP17, DP17E, DP17G, DP17Y and DP27G**
Remove the pilot valve housing; complete with the spring housing assembly.

DP17R

Remove the pilot valve housing, complete with air control block.

- 25. Remove the main valve screen and clean.
- 26. Ensure that the gasket faces are clean.
- 27. Check that the main valve return spring is in position.
- 28. Fit a new gasket.
- 29. Replace the main valve screen.
- 30. **DP17, DP17E, DP17G and DP17Y**
Assemble the pilot valve housing complete with the spring housing assembly and tighten the nuts to the recommended torques shown in Table 1, page 21.

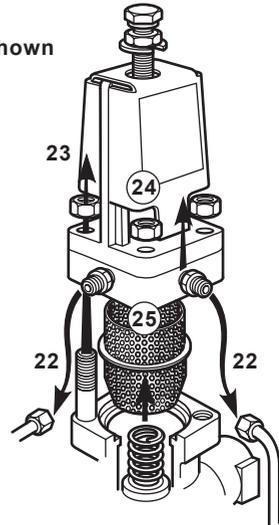
DP17R

Assemble the pilot valve housing complete with the air control block and tighten the nuts to the recommended torques shown in Table 1, page 21.

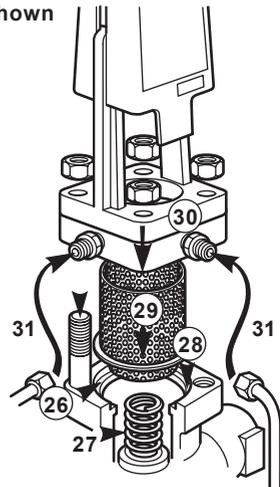
- 31. Refit the pipework and retighten the unions to ensure a tight seal.

Bring the valve back into commission by following as many steps as are necessary in Section 4, page 16.

DP17 shown



DP17 shown



To renew pilot valve diaphragms

DP17, DP17E, DP17G, DP27G and DP17Y

Isolate the pressure reducing valve and zero the pressure. Follow Steps 1 to 5 then proceed.

DP17R

Isolate the actuating air supply and zero the pressure.

32. DP17, DP17E, DP17G, DP17Y and DP27G

Unscrew the spring housing nuts and remove the spring housing, bottom spring plate and old diaphragms.

DP17R

Unscrew the securing nuts and remove the air control block and old diaphragms.

33. Ensure that all contact faces are cleaned. New diaphragms should be fitted such that the precoated sealant (which is only applied to one diaphragm) faces down contacting the sealing face of the diaphragm chamber.

34. DP17, DP17E, DP17G, DP17Y and DP27G

Replace the bottom spring plate.

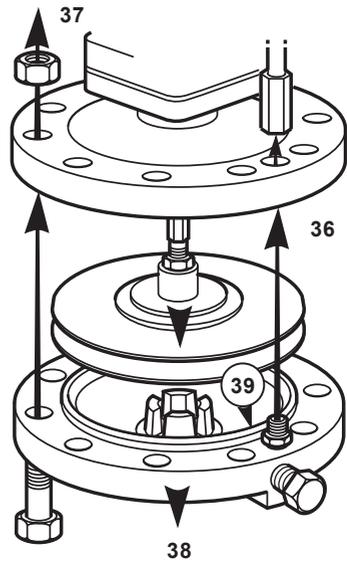
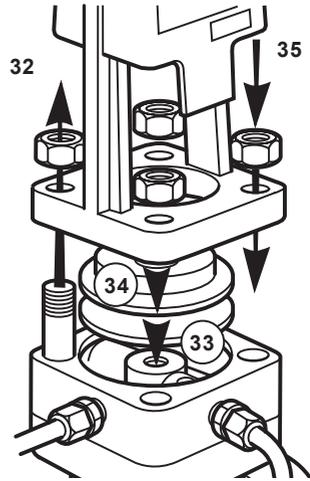
35. DP17, DP17E, DP17G, DP17Y and DP27G

Assemble the spring housing and tighten the nuts to the recommended torque shown in Table 1, page 21.

DP17R

Assemble the air control block and tighten the nuts to the recommended torques shown in Table 1, page 21.

Bring the valve back into commission by following as many Steps as are necessary in Section 4, page 16.



40. Replace the diaphragm plate and pushrod assembly and loosely fit the lower diaphragm chamber on the two bolts either side of the union connection to locate the spigot in the recess.

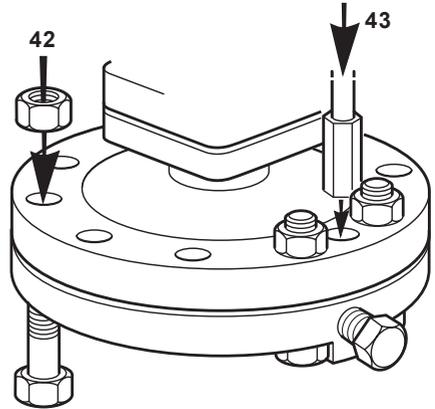
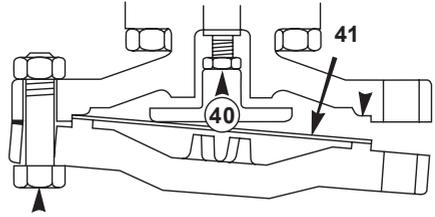
41. Bring the two new diaphragms together (where pre-coated sealant is applied this should face outwards) and slide into position.

If the diaphragms are not renewed, but cleaned only, care must be taken to replace the diaphragms in their original order.

42. Push the lower diaphragm chamber home to locate in the recess and refit the M12 nuts and bolts. Progressively and evenly tighten to a torque of 80 - 100 N m (59 - 74 lbf ft).

43. Retighten the long union nut to ensure a steam tight seal.

Bring the valve back into commission by following as many Steps as are necessary in Section 4, page 16.



To service or renew the main valve and seat

DP17, DP17E, DP17G, DP17Y and DP27G
Isolate the pressure reducing valve and zero the pressure. Follow Steps 1 to 5 then proceed.

DP17R

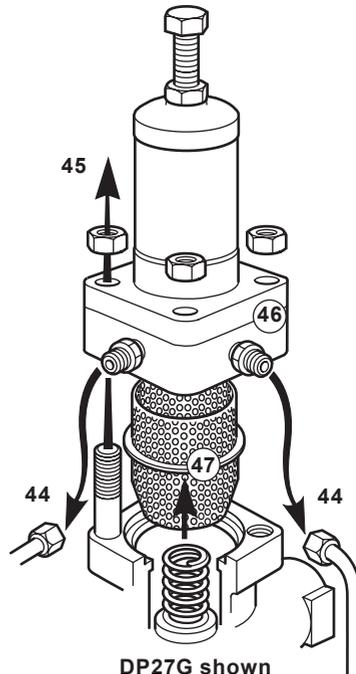
Isolate the actuating air supply and zero the pressure.

44. Unscrew the unions and release the pipework.

45. Unscrew the spring housing nuts.

46. **DP17, DP17E, DP17G, DP17Y and DP27G**

Remove the pilot valve housing, complete with the spring housing assembly.



DP17R

Remove the pilot valve housing, complete with the air control block.

47. Remove the main valve, screen and clean.

48. Remove the main valve spring and the main valve head. Clean to remove dirt or scale as is necessary.

49. Remove the main valve seat. Clean and remove dirt and scale as is necessary. Examine the faces of the main valve head and seat. If they are only slightly worn both the main valve head and main seat may be lapped on a flat plate using a fine grinding paste.

If either is badly worn or unfit for further use they will need to be replaced. Clean to remove dirt or scale as necessary.

DP17G

If there is any wear or damage to the nitrile face then the head assembly must be replaced.

50. Refit the valve seat applying jointing compound to the seating faces and tighten to the recommended torque shown in Table 2, page 26.

Where a new part has been fitted it will be necessary to reset the main valve pushrod to give the correct valve lift. To do this it is necessary to expose the main diaphragm plate and pushrod assembly.

51. Undo the long nuts and pull away.

52. Undo the M12 nuts and bolts.

53. Drop away the lower diaphragm chamber, the two diaphragms, diaphragm plate and the pushrod assembly.

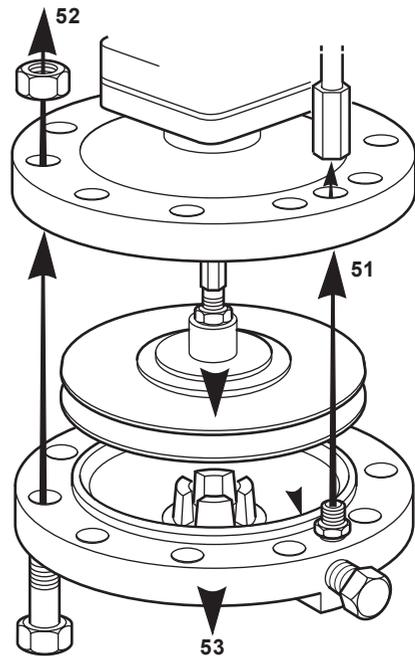
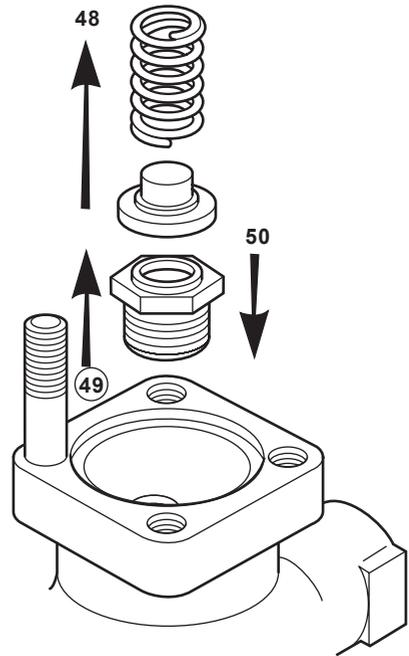


Table 2 Recommended tightening torques for the main seat

Size of valve	Width across flats	Tightening torques
½" and ½" LC DN15 and DN15LC	30 mm A/F (External)	110 - 120 N m (81 - 89 lbf ft)
¾" and DN20	36 mm A/F (External)	140 - 150 N m (103 - 111 lbf ft)
1" and DN25	19 mm A/F (Inside)	230 - 250 N m (170 - 184 lbf ft)
DN32	24 mm A/F (Inside)	300 - 330 N m (221 - 243 lbf ft)
DN40	30 mm A/F (Inside)	450 - 490 N m (332 - 361 lbf ft)
DN50	41 mm A/F (Inside)	620 - 680 N m (456 - 502 lbf ft)

54. Refit the pushrod assembly.

55. Refit the main valve head, making sure that the valve locates on the seat.

56. Check the valve lift shown in Table 3 using a depth gauge.

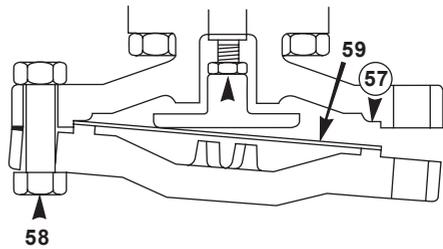
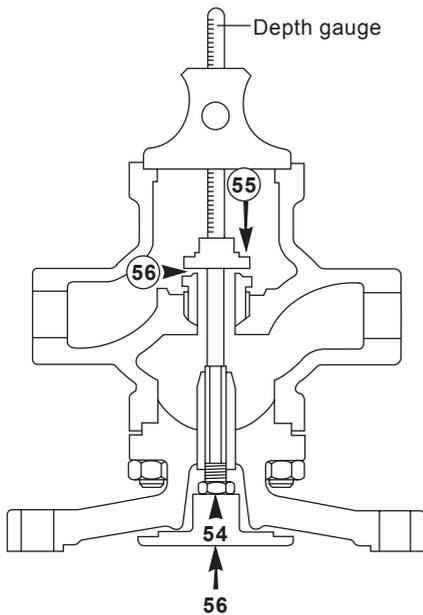


Table 3

Size of valve	Valve lift
DN15LC and ½" LC	2.5 mm (0.098")
DN15 and ½"	2.5 mm (0.098")
DN20 and ¾"	2.5 mm (0.098")
DN25 and 1"	3.0 mm (0.118")
DN32	3.5 mm (0.138")
DN40	4.5 mm (0.177")
DN50	5.0 mm (0.197")

Adjust if necessary by screwing the pushrod in or out of the diaphragm plate.

57. Thoroughly clean the lower diaphragm chamber making sure that the contact faces are clean.

58. Replace the diaphragm plate and pushrod assembly and loosely fit the lower diaphragm chamber on to the two bolts either side of the union connection to locate the spigot in the recess.

59. Refit the diaphragms in exactly the same way as when dismantled.

60. Push the lower diaphragm chamber home to locate in the recess and refit the M12 nuts and bolts. Progressively and evenly tighten to a torque of 75 N m.

61. Retighten the long union nut to ensure a steam tight seal.

62. Refit the main valve head.

63. Replace the main valve return spring.

64. Fit a new gasket.

65. Replace the screen.

66. DP17, DP17E, DP17G, DP17Y and DP27G

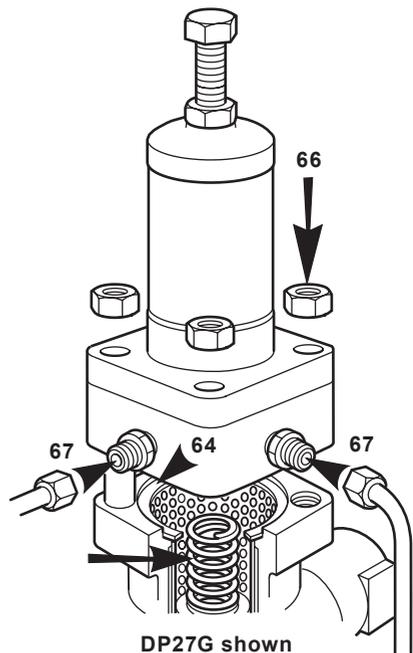
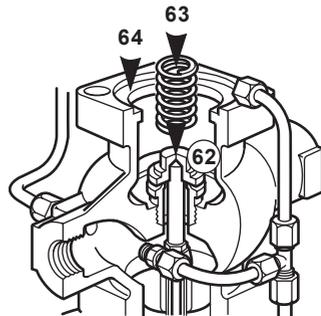
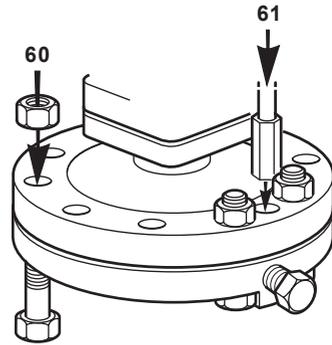
Assemble the pilot valve housing complete with the spring housing assembly and tighten the nuts to the recommended torques shown in Table 1, page 21.

DP17R

Assemble the pilot valve housing complete with the air control block and tighten the nuts to the recommended torques shown in Table 1, page 21.

67. Refit the pipework and retighten the unions to ensure a tight seal.

Bring the valve back into commission by following as many Steps as necessary in Section 4, page 16.

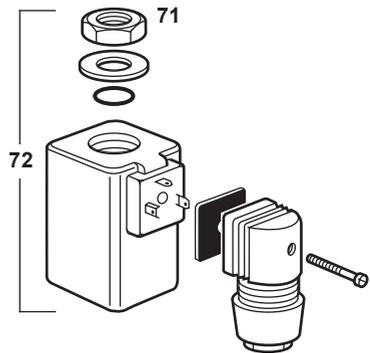
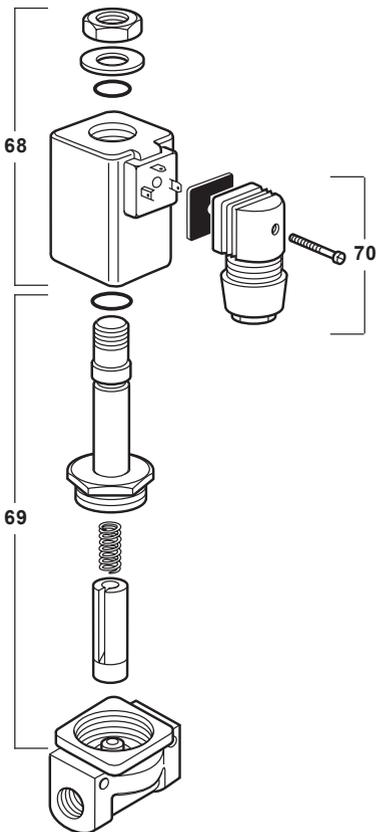


To service or renew solenoid valve

DP17E

Depressurize the valve and turn off the electrical power supply.

68. Undo the retaining nut and slip the entire solenoid enclosure off the solenoid base and sub-assembly or plugnut/core tube sub-assembly.
69. Unscrew the bonnet or solenoid base sub-assembly and remove the core spring, core assembly and body gasket.
All the parts are now accessible for cleaning or replacement. Replace worn or damaged parts with a complete Spare parts kit (item 'W', pages 30 and 31) for best results.
70. Reassemble in reverse order paying careful attention to exploded views provided.



CAUTION

The solenoid must be fully reassembled as the housing is part of, and completes the magnetic circuit.

Coil replacement

Switch off the electrical power supply and disconnect the coil lead wires.

71. Undo the retaining nut.
72. Slip the washer, insulating washers and coil off the solenoid base sub-assembly. Reassemble in reverse order (see the **CAUTION** above).

6. Spare parts

Interchangeability of spares

The following table shows how in certain sizes some parts are interchangeable. For example in the line headed 'Main diaphragm' the diaphragm used in the screwed valves ½" and ¾" is common to these sizes by the letter 'a', the letter 'c' indicates that one diaphragm is common to the DN40 and DN50 valves. All spares are interchangeable with the DP17T and where marked † are interchangeable with the 37D temperature control.**

** **Note:** This does not apply to DP17G soft seat pilot valve or main valve assemblies.

Size DN	Screwed ***				Flanged ***						
	½"LC	½"	¾"	1"	15LC	15	20	25	32	40	50
Maintenance kit	a	a	a	b	f	f	a	b	c	d	e
Main diaphragm	a	a	a	b	a	a	a	b	b	c	c
Pilot diaphragms	†	a	a	a	a	a	a	a	a	a	a
Pilot valve chamber assembly		a	a	a	a	a	a	a	a	b	b
PTFE seals		a	a	a	a	a	a	a	a	a	a
Main valve assembly	†	a	b	c	d	a	b	c	d	e	f
Internal strainer	†	a	a	a	b	f	f	a	b	c	d
Main valve return spring	†	a	a	a	a	a	a	a	a	c	c
Pressure adjustment spring		a	a	a	a	a	a	a	a	a	a
Control pipe assembly	†	a	a	a	b	f	f	a	b	c	d
Balance pipe assembly		a	a	a	b	f	f	a	b	c	d
Body gasket	†	a	a	a	a	a	a	a	a	b	b
Set of spring housing securing studs and nuts		a	a	a	a	a	a	a	a	b	b
Set of main body studs and nuts	†	a	a	a	a	a	a	a	a	b	b
Set of diaphragm securing bolts and nuts	†	a	a	a	a	a	a	a	a	b	b
Pushrod and main diaphragm plate assembly		a	a	a	b	a	a	a	b	b	c

*** Not available for DP17G

Spare parts

The spare parts available are shown in solid outline. Parts drawn in a grey line are not available as spares.

Available spares

Maintenance kit

A stand-by set of spares for general maintenance purposes and covers all spares marked *

Main diaphragm (2 off) *			A
Pilot diaphragm (2 off) *			B
Pilot valve chamber assembly (8 pieces) *			C, C1
Main valve assembly			K, L
Internal strainer *			M
Main valve return spring *			N
Pressure adjustment spring (Not required for DP17R)	DP17, DP17E, DP17G and DP27G	0.2 to 17 bar (3 to 247 psi)	O
	DP17Y	0.2 - 3 bar (3 - 44 psi)	
Control pipe assembly			P
Balance pipe assembly *			Q
Body gasket (3 off) *			R
Set of spring housing/actuating chamber cover securing studs and nuts (set of 4)			S
Set of main body studs and nuts (set of 4)			T
Set of diaphragm securing bolts and nuts	Valve sizes	½" - DN32 (set of 10)	V
		DN40 and DN50 (set of 12)	
Pushrod and main diaphragm plate assembly			Y

Type DP17E only

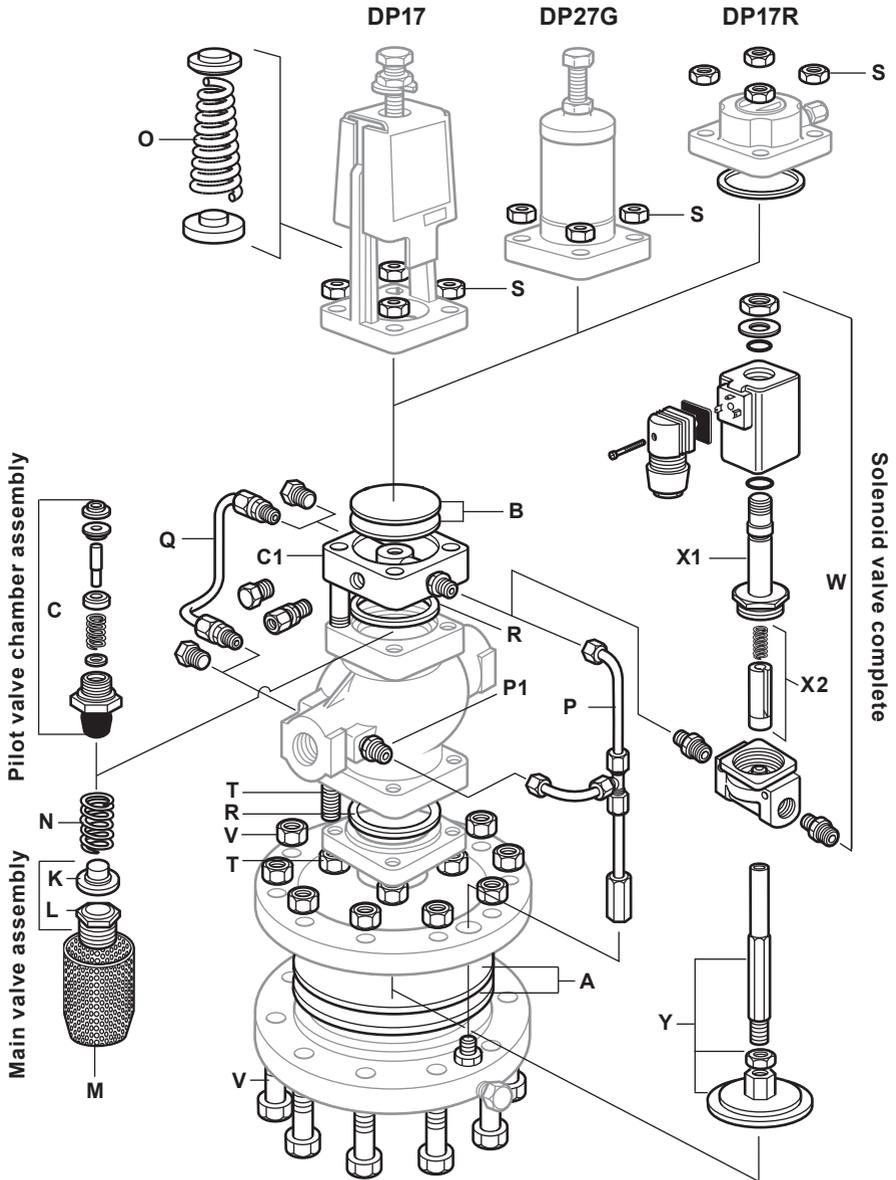
Solenoid valve complete			W
Replacement coil			X1
Valve seat and core assembly			X2

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of the pressure reducing valve.

Example:

1 - Main valve assembly for a Spirax Sarco 1" DP17 pilot operated pressure reducing valve.



7. Fault finding

7.1 Preliminary procedure

Before undertaking the following fault finding procedure, ensure that the valve has been isolated and that upstream and downstream pressures are zero. Possible fault checks are given in a logical order below.

7.2 Downstream pressure zero or too low

If downstream pressure drops below set pressure or is zero, check the following:

1. No high pressure steam reaching the pressure reducing valve. Check that steam is turned on and that the strainer is clear. (To assist with commissioning and fault finding it is recommended to fit an upstream pressure gauge).
2. Pressure adjustment spring broken.
3. Pipe assembly (Item 'P' on page 31) blocked. Remove by uncoupling the union nuts and blow through to clear obstruction.
4. Control orifice blocked. Unscrew from the outlet port and clear out obstruction. For identification this coupling has a groove around the hex.
5. Main diaphragms fractured. Replace the diaphragms following Steps 36 to 43.
6. Pilot valve plunger too short. Check as Section 5 Step 13.
7. Valve capacity insufficient for downstream conditions.
 - a) Check that the upstream pressure is correct. If it is low, the capacity of the valve will be reduced.
 - b) Ensure that the pressure control pipe is fitted as recommended in Section 3.8 and if necessary fit an external pressure control pipe as described. If the downstream pressure is still too low, then a larger valve with more capacity is required.

7.3 Downstream pressure too high

If the pressure on the downstream side of the pressure reducing valve has risen above the required set pressure check the following:

1. Downstream pressure control pipe blocked. Dismantle and blow through.
2. Control orifice (item 'P1' on page 31) blocked. Unscrew the pipework from the side of the body and clean out. For identification this coupling has a groove around the hex.
3. Pilot valve diaphragms fractured. Check and replace (see page 31).
4. Pilot valve or pilot valve plunger is sticking. Follow Steps 7 to 11.
5. Main valve not seating. Check as page 31.
6. Main valve pushrod sticking. Follow Steps 36 to 43.
7. Pilot valve plunger too long. Check as Section 5 Step 13.
8. Pilot valve not seating. Refer to procedure on page 31.

7.4 Hunting

Hunting may coincide with variations in steam load. If this is the case, the following checks should be made before dismantling the valve:

1. Check that the upstream pressure is stable. If the pressure drops during full-load conditions, it is possible that there is a partial blockage upstream, or that the upstream pipework is undersized. If the upstream pressure is low, the effect will be to reduce the capacity of the valve with the possibility of not maintaining the downstream pressure during full-load conditions.
2. If the upstream pressure is correct, and stable, set the valve on dead-end conditions. Apply full-load to the valve. If the downstream pressure drops excessively during full-load condition, it is likely that the valve is undersized, in which case it should be replaced. Once it has been determined that the upstream pressure is correct and stable, and that the valve is correctly sized, the following check should be carried out on the valve:
3. Steam is very wet. Ensure the valve installation is as recommended in Fig. 4, page 12.
4. The point at which the external pressure control pipe is tapped into the main is in a turbulent area. Refer to Section 3.8 for guidance.
5. Loose dirt in the pipe assembly (Item 'P' on page 31). Remove the pipe assembly. Blow through to clear.
6. Pilot valve or pilot valve plunger is sticking. Follow Steps 7 to 11.
7. Main valve pushrod sticking. Follow Steps 36 to 43.
8. Pilot diaphragms or main diaphragms overstretched. To replace, see page 31.

