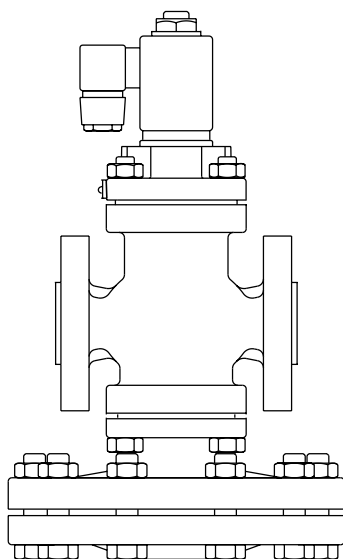


**HL17**

## **High Limit Cut-out**

### **Installation and Maintenance Instructions**

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1. *Safety information*
2. *Installation*
3. *Start-up*
4. *Maintenance*
5. *Spare parts*

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# 1. Safety information

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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, page 3) 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 European Pressure Equipment Directive 97/23/EC and carry the CE mark when so required. The products fall within the following Pressure Equipment Directive categories:

| Product                 | Group 2<br>Gases |
|-------------------------|------------------|
| HL17, sizes DN15 - 40   | SEP              |
| HL17, sizes DN50 and 80 | 1                |

- i) The products have been specifically designed for use on steam which is in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- 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 before installation.

## 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.

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## **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.

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### **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.

### **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.

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## ***2. Installation***

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### **2.1 General information**

The purpose of the solenoid valve is to shut-off the main valve. It can be controlled by any device capable of interrupting the supply of current to the solenoid coil, such as a thermostat. The solenoid is arranged to open the valve when the coil is energised to 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.

### **2.2 Electrical supply**

It is important that the solenoid is connected to the correct voltage. The standard unit is suitable for 110 Vac or 230/250 Vac 50 Hz supply, but units for other ac voltages may be supplied to special order, 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. Remember that the valve is on a steam supply line and in use will get hot. All wiring, connectors, etc. in close proximity to the valve should therefore be of heat resisting type.

#### **Earth**

The solenoid valve should be adequately earthed.

### **2.3 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.

### **2.4 Pipeline stresses**

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

### **2.5 Isolating valves**

These should preferably be of the fullway type.

### **2.6 Preventing 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.

### **2.7 Testing**

The HL17 is an emergency safety device and as such, it is essential that it be frequently tested for satisfactory operation. To test that the valve will close, either temporarily raise the system temperature or disconnect the power supply to the solenoid valve. After the test has been successfully carried out, ensure that the system temperature has returned to normal and that the power supply to the solenoid has been reconnected.

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### ***3. Start-up***

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In most new installations dirt collects in the steam line during construction. It is always advisable to blow this out on initial start-up.

Remove the cap on the strainer before the steam trap, crack open the steam supply blowdown to clear dirt, shut-off and replace cap.

It is essential that the screen in the main line strainer is not removed during this operation.

If a blowdown cock is fitted to the strainer cap it can be opened to blow out the dirt without removing the cap.

#### **Important 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.**

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## 4. Maintenance

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### 4.1 Routine maintenance

It is recommended that the valve is occasionally given a complete overhaul and ideally this should be carried out with the valve removed from the line.

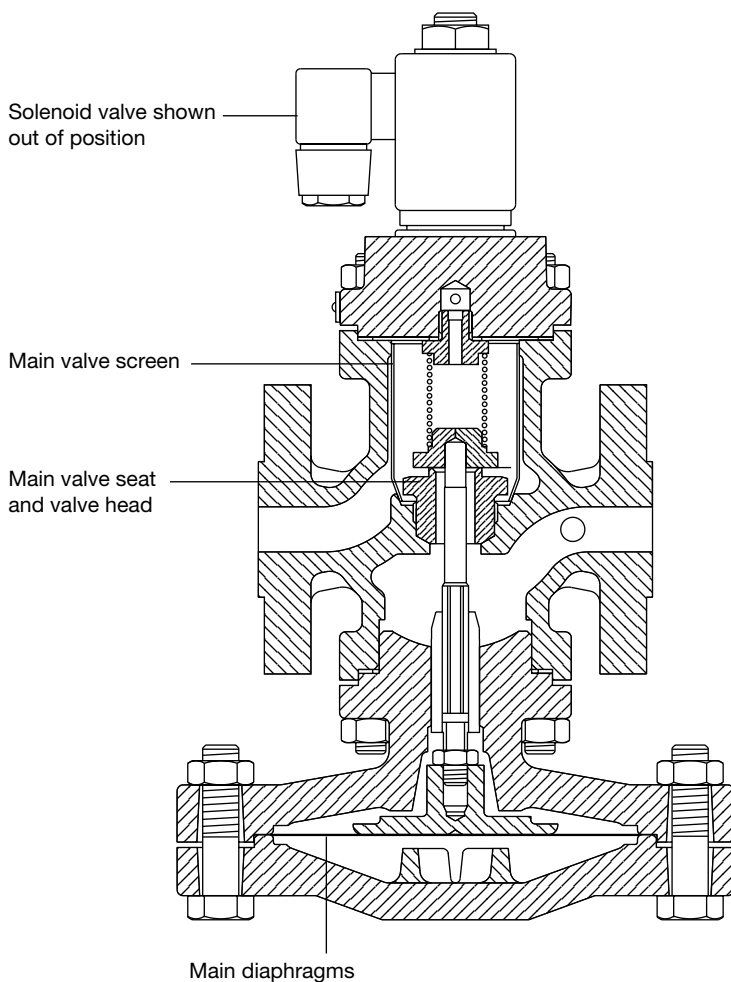
**The parts that may require replacing or refurbishing are listed below:**

- Main valve seat and valve head.
- Main valve screen.
- Main diaphragms.

**Important** - It is required to periodically check the external pipework and fittings and remove any debris which might affect the performance of the valve.

### Safety warning:

The body gasket contains a thin stainless steel support ring which may cause physical injury if not handled and disposed of carefully.



## 4.2 To clean the strainer and replace the gasket

Isolate the valve and zero the pressure.

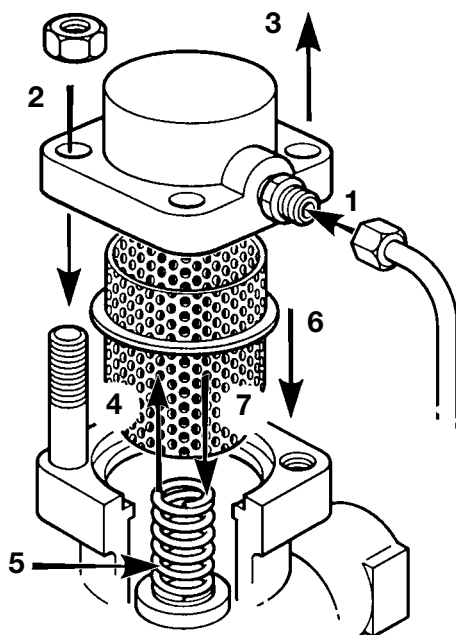
1. Unscrew the unions and release pipework.
2. Unscrew the nuts.
3. Remove the top housing complete with the solenoid valve.
4. Remove the screen and clean (or replace if necessary).
5. Ensure the main valve return spring is still in position.
6. Fit the new gasket.
7. Replace the screen.

Assemble the top housing and tighten the nuts to the torques shown in Table 1.

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

Refit the solenoid valve.

Bring the valve back into commission.



**Table 1 Recommended tightening torques**

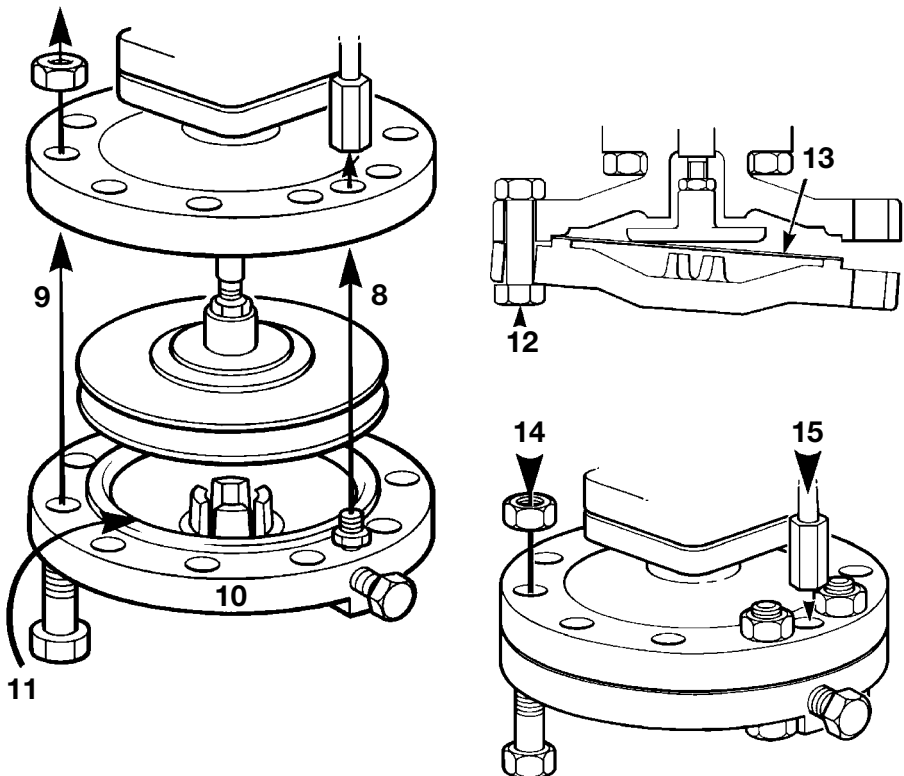
| Size of valve                              | Nut size | Tightening torques |
|--|----------|--------------------|
| ½", ¾" and 1"<br>DN15, DN20, DN25 and DN32 | M10      | 40 N m (30 lbf ft) |
| DN40 and DN50                              | M12      | 45 N m (33 lbf ft) |
| DN80                                       | M12      | 80 N m (59 lbf ft) |



### 4.3 To renew or clean the main diaphragms

Isolate the valve and zero the pressure.

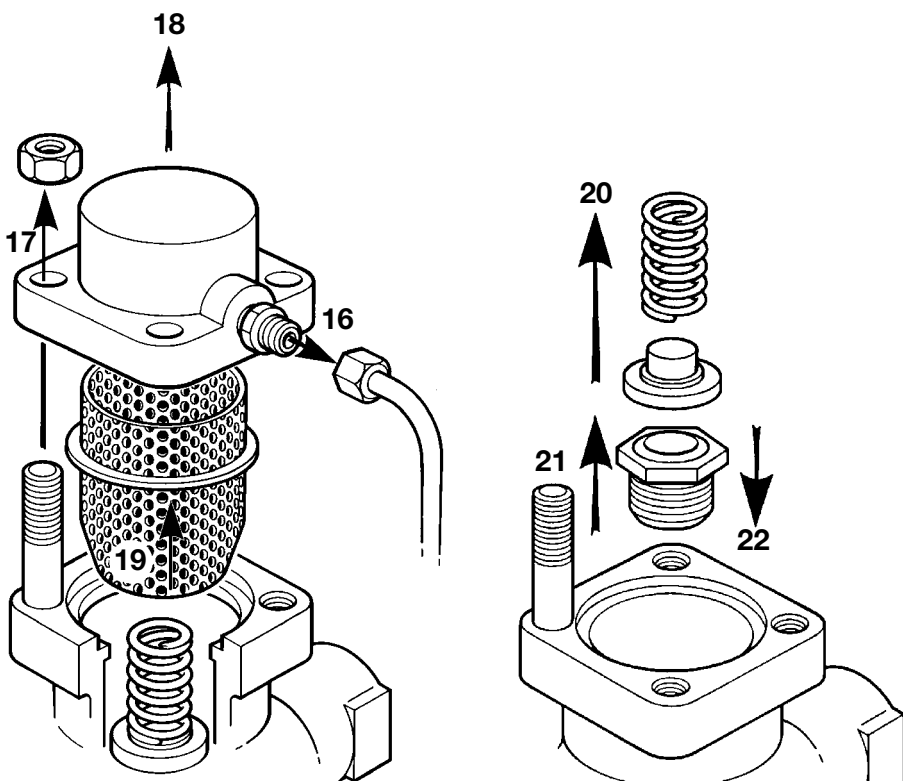
8. Undo the long union nut and pull away.
9. Undo the M12 nuts and bolts.
10. Drop away the lower diaphragm chamber, the two diaphragms, diaphragm plate and pushrod assembly.
11. Thoroughly clean the lower diaphragm chamber making sure the contact faces are clean.
12. Replace the diaphragm plate and pushrod assembly and loosely fit the lower diaphragm chamber on two bolts either side of the union connection to locate spigot in recess.
13. Bring the two new diaphragms together (where precoated sealant is applied this should face outwards) and slide into position. If diaphragms are not renewed, but cleaned only care must be taken to replace diaphragms in the original order.
14. Push the lower diaphragm chamber home to locate in the recess and refit M12 nuts and bolts. Progressively and evenly tighten to a torque of 80 - 100 N m (59 - 74 lbf ft).
15. Retighten the long union nut to ensure a steam tight seal. Bring the valve back into commission.



## 4.4 To service or renew the main valve and seat

Isolate the valve and zero the pressure.

16. Unscrew the unions and release pipework.
17. Unscrew the nuts.
18. Remove the top housing.
19. Remove the screen and clean.
20. Remove the main valve spring and the main valve head.
21. Remove the main valve seat. 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.
22. Refit the valve seat and tighten to the recommended torque shown in Table 2. 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.



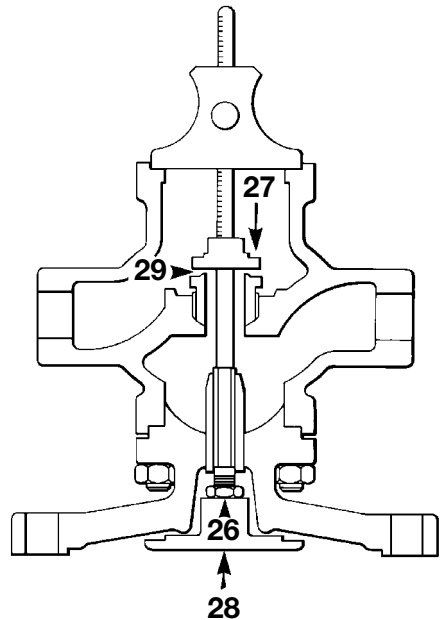
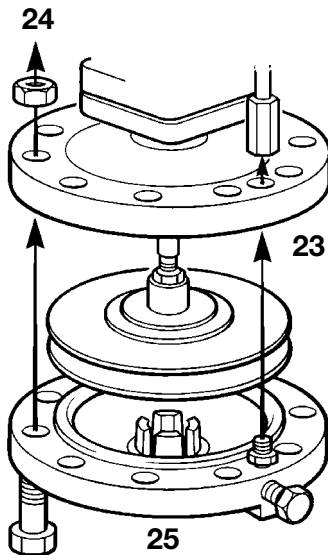
**Table 2 Recommended tightening torques for main seat**

| Size of valve            | Width across flats       | Tightening torque                |
|--------------------------|--------------------------|----------------------------------|
| ½", ½" LC, DN15 & DN15LC | 30 mm (1.18") (external) | 110 - 120 N m (81 - 89 lbf ft)   |
| ¾" & DN20                | 36 mm (1.42") (external) | 140 - 150 N m (103 - 111 lbf ft) |
| 1" & DN25                | 19 mm (0.75") (inside)   | 170 - 180 N m (125 - 133 lbf ft) |
| DN32                     | 24 mm (0.94") (inside)   | 200 - 210 N m (148 - 155 lbf ft) |
| DN40                     | 30 mm (1.18") (inside)   | 230 - 240 N m (170 - 177 lbf ft) |
| DN50                     | 41 mm (1.61") (inside)   | 270 - 280 N m (199 - 207 lbf ft) |
| DN80                     | (N/A)                    | 600 - 700 N m (443 - 516 lbf ft) |

23. Undo the long nuts and pull away.

24. Undo the M12 nuts and bolts.

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



26. Refit the pushrod assembly.

27. Refit the main valve head, make sure the valve locates on seat.

28. Open the valve by pushing onto the diaphragm plate until it comes up against the stop of the body.

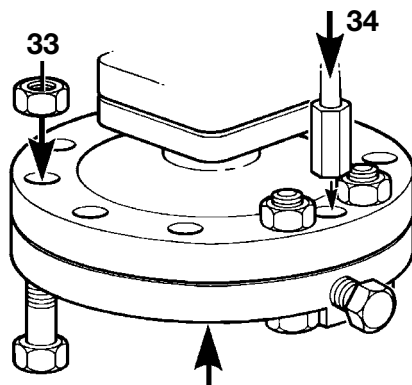
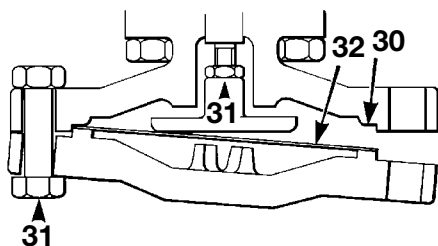
29. Check the valve lift (shown in Table 3) using a depth gauge.

**Table 3 Valve lift**

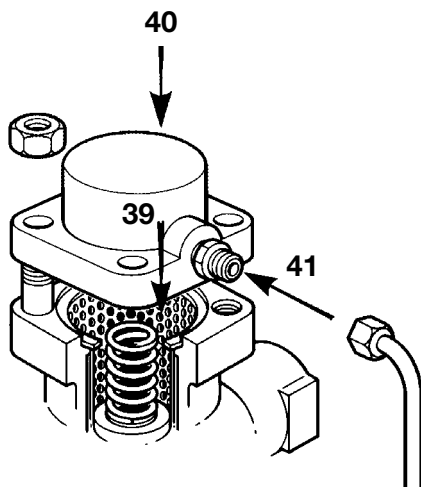
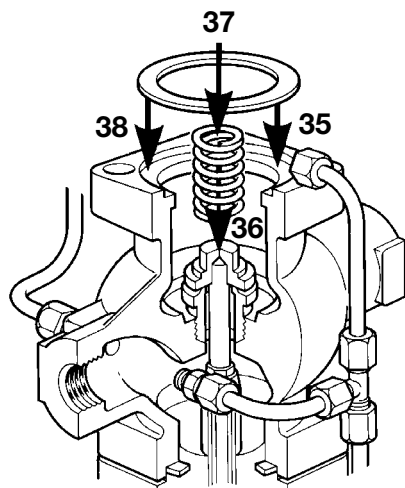
| Size of valve | DN15LC            | DN15              | DN20              | DN25              | DN32              | DN40              | DN50              | DN80               |
|---------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| Lift          | 3.6 mm<br>(0.14") | 3.6 mm<br>(0.14") | 2.9 mm<br>(0.11") | 3.7 mm<br>(0.15") | 4.7 mm<br>(0.19") | 5.5 mm<br>(0.22") | 6.4 mm<br>(0.25") | 12.5 mm<br>(0.49") |

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

30. Thoroughly clean the lower diaphragm chamber making sure the contact faces are clean.
31. Replace diaphragm plate and pushrod assembly and loosely fit the lower diaphragm chamber on two bolts either side of the union connection to locate the spigot in the recess.
32. Refit the diaphragms in exactly the same way as when dismantled.
33. 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).
34. Retighten the long union nut to ensure a steam tight seal.

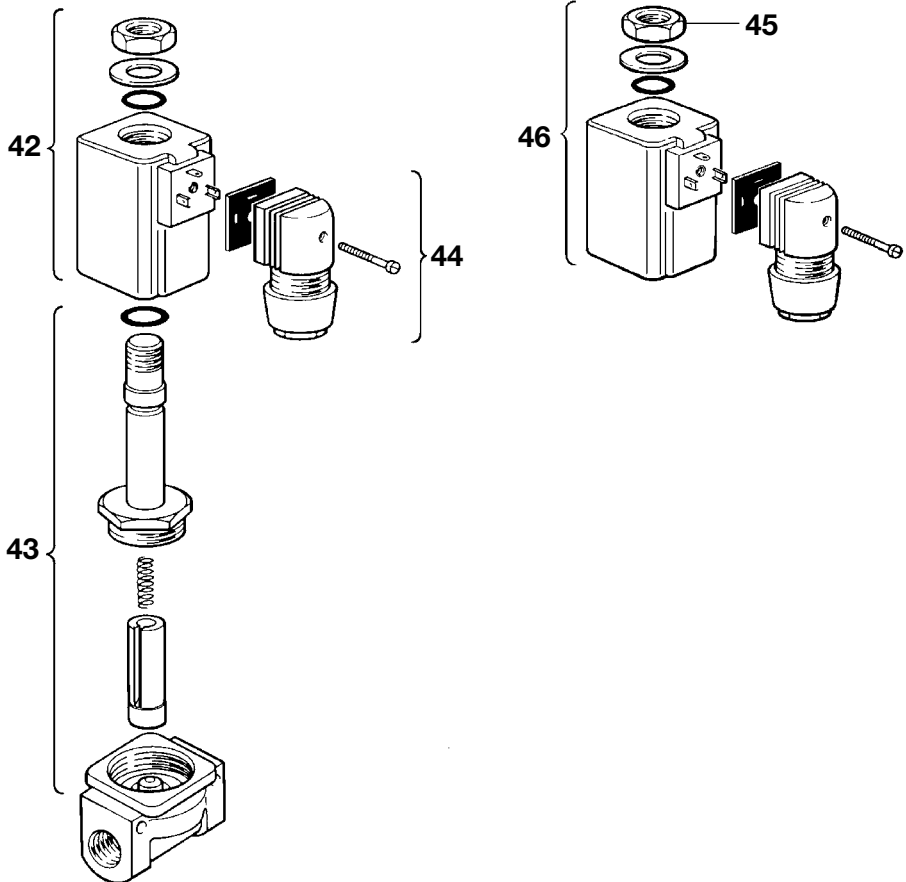


35. Ensure the gasket faces are clean.
36. Refit the main valve head.
37. Replace the main valve return spring.
38. Fit a new gasket.
39. Replace the screen.
40. Assemble the top housing complete with the spring housing assembly and tighten the nuts to the recommended torques shown in Table 1, page 8.
41. Refit the pipework and retighten the unions to ensure a tight seal. Bring the valve back into commission.



## 4.5 To service or renew solenoid valve

42. Remove the retaining nut, washer and seal and slip the entire solenoid enclosure off the solenoid base and sub-assembly or plugnut / core tube sub-assembly.
43. Unscrew the bonnet or solenoid base sub-assembly and remove the core spring, core assembly and body gasket. All parts are now accessible for cleaning replacement. Replace worn or damaged parts with a complete Spare parts kit (item **W**, page 14) for best results.
44. Reassemble in reverse order paying careful attention to the exploded views provided.



## 4.6 Coil replacement

Switch off electrical power supply and disconnect coil lead wires.

45. Undo retaining nut.
46. Slip washer, insulating washers and coil off solenoid base sub-assembly. Reassemble in reverse order.

### CAUTION

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

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## 5. Spare parts

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### Available spares

Spare parts are available as indicated. No other parts are supplied as spares.

Maintenance kit

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

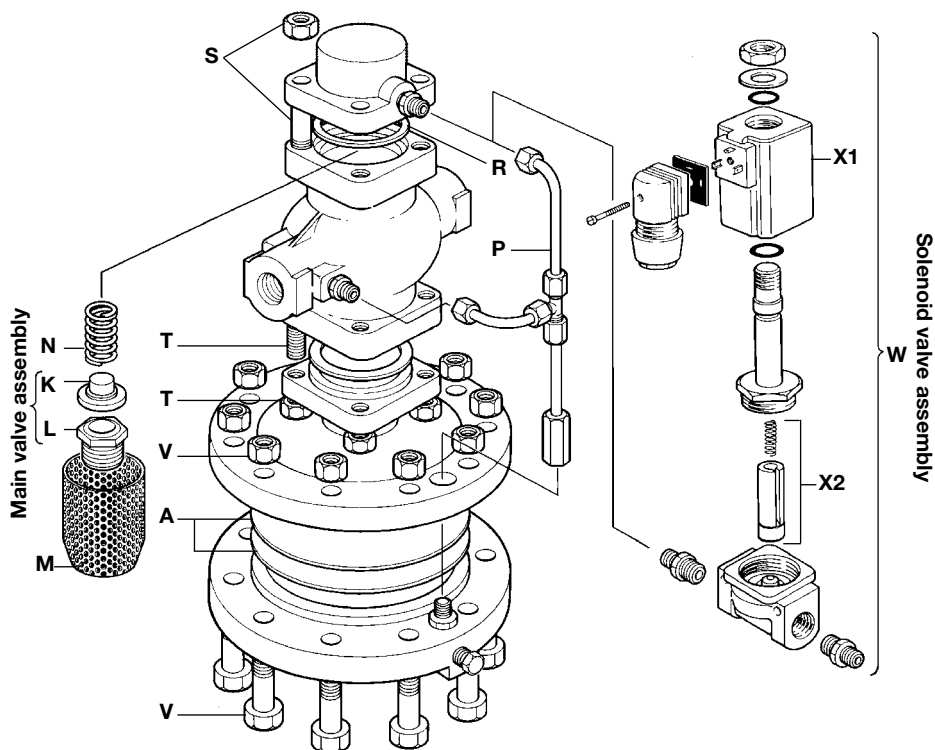
|  |                         |             |
|--|-------------------------|-------------|
| * Main diaphragm                         | (2 off)                 | <b>A</b>    |
| Main valve assembly                      |                         | <b>K, L</b> |
| * Internal strainer                      |                         | <b>M</b>    |
| * Main valve return spring               |                         | <b>N</b>    |
| * Control pipe assembly                  |                         | <b>P</b>    |
| * Gasket set                             | (3 off)                 | <b>R</b>    |
| Set of top securing stud and nuts        | (set of 4)              | <b>S</b>    |
| Set of main body studs and nuts          | (set of 4)              | <b>T</b>    |
| Set of diaphragm securing bolts and nuts | Valve sizes DN15 - DN32 | (set of 10) |
|  | DN40 and DN50           | (set of 12) |
|  | DN80                    | (set of 20) |
| Solenoid valve complete                  |                         | <b>W</b>    |
| Replacement coil                         |                         | <b>X1</b>   |
| Valve seat and core assembly             |                         | <b>X2</b>   |

### 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 valve and whether it is screwed or flanged.

**Example:** 1 - Main valve assembly for a Spirax Sarco DN25 HL17 High limit cut-out valve.

**Note:** To provide a stand-by set of spares for general maintenance purposes, an order for 1 maintenance kit will cover all spares marked\*.



## 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 marked † are interchangeable with the DP17 pressure reducing valve.

| Size DN                                    | Screwed |    |    | Flanged |    |    |    |    |    |    |
|--|---------|----|----|---------|----|----|----|----|----|----|
|  | ½"      | ¾" | 1" | 15      | 20 | 25 | 32 | 40 | 50 | 80 |
| Maintenance kit                            | a       | a  | b  | f       | a  | b  | c  | d  | e  | g  |
| † Main diaphragm                           | a       | a  | b  | a       | a  | b  | b  | c  | c  | d  |
| † Main valve assembly                      | b       | c  | d  | b       | c  | d  | e  | f  | g  | h  |
| † Internal strainer                        | a       | a  | b  | f       | a  | b  | c  | d  | e  | g  |
| † Main valve return spring                 | a       | a  | a  | a       | a  | a  | a  | c  | c  | b  |
| † Control pipe assembly                    | a       | a  | b  | f       | a  | b  | c  | d  | e  | g  |
| † Gasket set                               | a       | a  | a  | a       | a  | a  | a  | b  | b  | c  |
| Set of top housing securing studs and nuts | a       | a  | a  | a       | a  | a  | a  | b  | b  | c  |
| † Set of main body studs and nuts          | a       | a  | a  | a       | a  | a  | a  | b  | b  | c  |
| † Set of diaphragm securing bolts and nuts | a       | a  | a  | a       | a  | a  | a  | b  | b  | c  |

