



TI-P470-08  
CTLS Issue 4

DP27T and DP27TE

Pilot Operated Pressure/Temperature  
Control Valves with SG Iron Bodies

Description

The DP27T and DP27TE are combined pressure/temperature control valves for use on steam applications. They are designed to be used in conjunction with a 2 m length of capillary which is available separately (other lengths are available on request - see 'Optional extras'). They combine a temperature and pressure pilot valve in one unit. This controls the main valve so that the temperature is maintained while the maximum steam pressure is limited. A variable rate conical pressure adjustment spring is fitted providing a downstream pressure range of 0.2 - 17 bar g.

Notes:

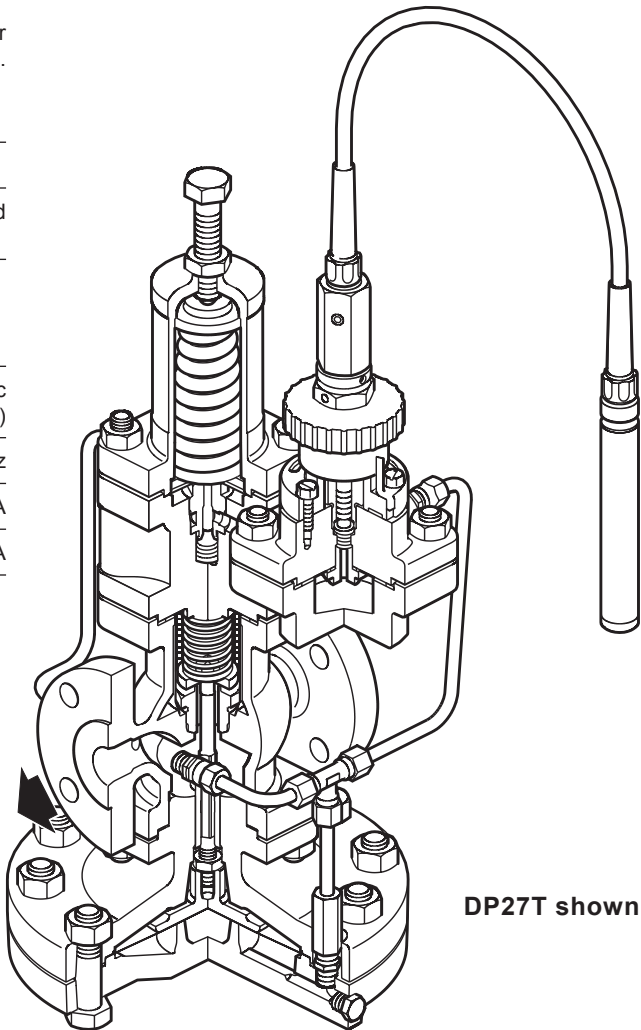
1. The valve can be supplied with a blank undrilled flange if required.
2. The sensor of the control system will need to be mounted by either a union kit, pocket or wall mounting bracket - see 'Optional extras'.

Available types of valve

DP27T	Pressure/temperature control
DT27TE	Pressure/temperature control with electrically operated solenoid valve

Technical data (Solenoid valve)

Voltages available	230 ±10% Vac or 115 ±10% Vac (others available on request)	
Frequency	50/60 Hz	
Power consumption	Inrush	45 VA
	Holding	23 VA



4.6

139

For 'Optional extras' - go to page 5

Control systems

Pressure reducing/surplussing valves

Temperature ranges

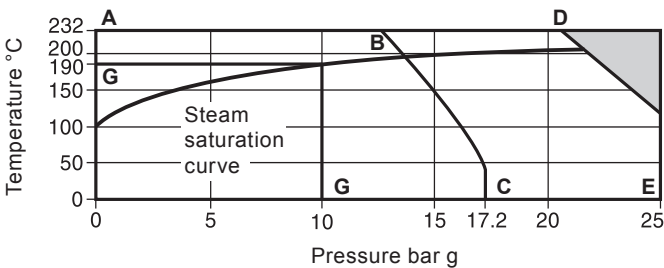
Range A	Range B	Range C	Range D	Range E
16 °C to 49 °C	38 °C to 71 °C	49 °C to 82 °C	71 °C to 104 °C	93 °C to 127 °C

Sizes and pipe connections

DN15LC - Low Capacity version, DN15, DN20, DN25, DN32, DN40 and DN50 screwed BSP (BS 21 parallel) or NPT (DN15 to DN25 only).

Standard flanges:	DN15 - DN50 EN 1092 PN25	DN25 - DN50 BS 10 Table H and ANSI 300
Available on request:	DN15 - DN50 JIS 10, JIS 16 and ANSI 150	DN15 - DN20 BS 10 Table F DN15 ANSI 300

Pressure/temperature limits



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

**A-D-E** Screwed and flanged EN 1092 PN25, ANSI 300, and BS 10 Table H.

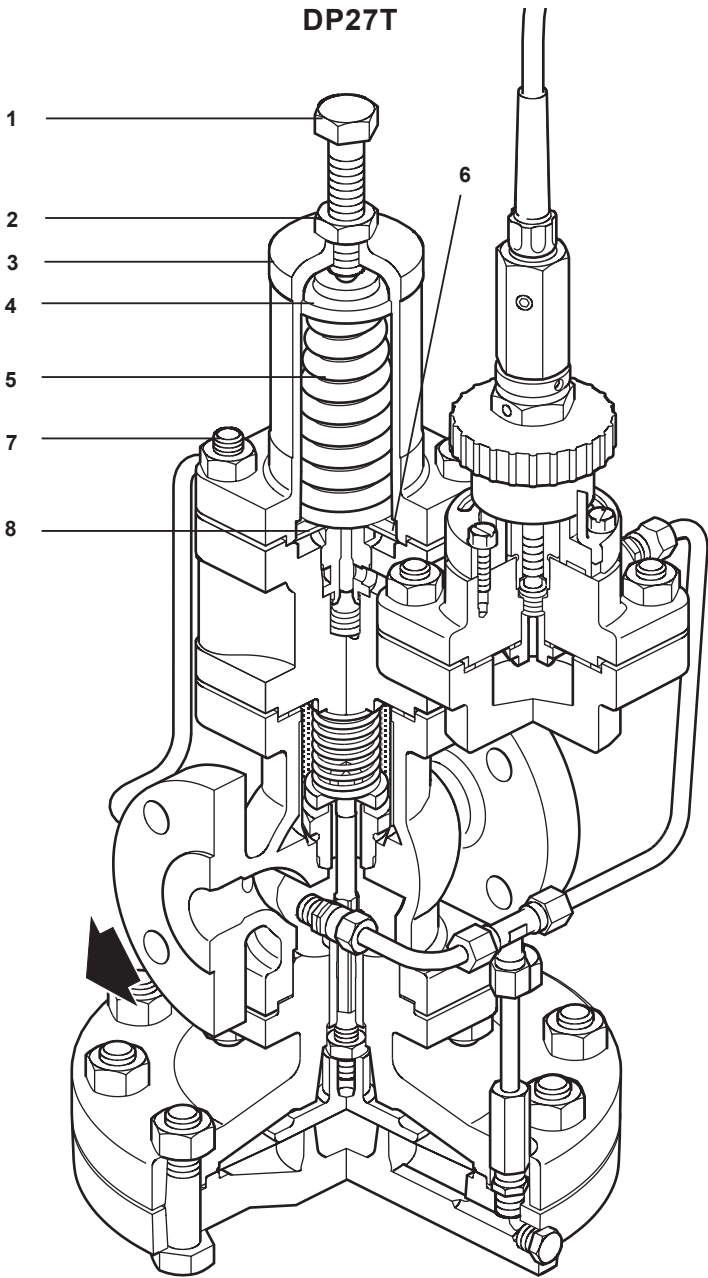
**A-B-C** Flanged ANSI 150.

**G-G** The DP27TE is limited to 10 bar g @ 190 °C.

Body design conditions	PN25	
Maximum design pressure	A-D-E	25 bar g @ 120 °C
	A-B-C	17.2 bar g @ 40 °C
Maximum design temperature	232 °C @ 21 bar g	
Minimum design temperature	-10 °C	
Maximum upstream pressure for saturated steam service	DP27T	17 bar g
	DP27TE	10 bar g
Maximum operating temperature	DP27T	232 °C @ 17 bar g
	DP27TE	190 °C @ 10 bar g
Minimum operating temperature	0 °C	
Note: For lower operating temperatures consult Spirax Sarco		
Maximum differential pressure	DP27T	17 bar
	DP27TE	10 bar
Designed for a maximum cold hydraulic test pressure of:	38 bar g	
Note: With internals fitted, test pressure must not exceed:	25 bar g	

Materials

No.	Part	Material	
1	Adjustment screw	Steel	BS 3692 Gr. 8.8
2	Adjustment lock-nut	Steel	BS 3692 Gr. 8
3	Spring housing	SG iron	DIN1693 GGG 40.3
4	Top spring plate	Stainless steel	ASTM A351/A351M CF8M
5	Pressure adjustment spring	Stainless steel	BS 2056 302 S 25
6	Bottom spring plate	Hot brass stamping	BS EN 12165 CW617N
7	Spring housing	Securing nuts	Steel BS 3692 Gr. 8
			Steel
		Securing studs	DN15 to DN32 M10 x 95 mm BS 4439 Gr. 8.8
			DN40 and DN50 M12 x 95 mm
8	Pilot diaphragms	Phosphor bronze	BS 2870 PB102 1980



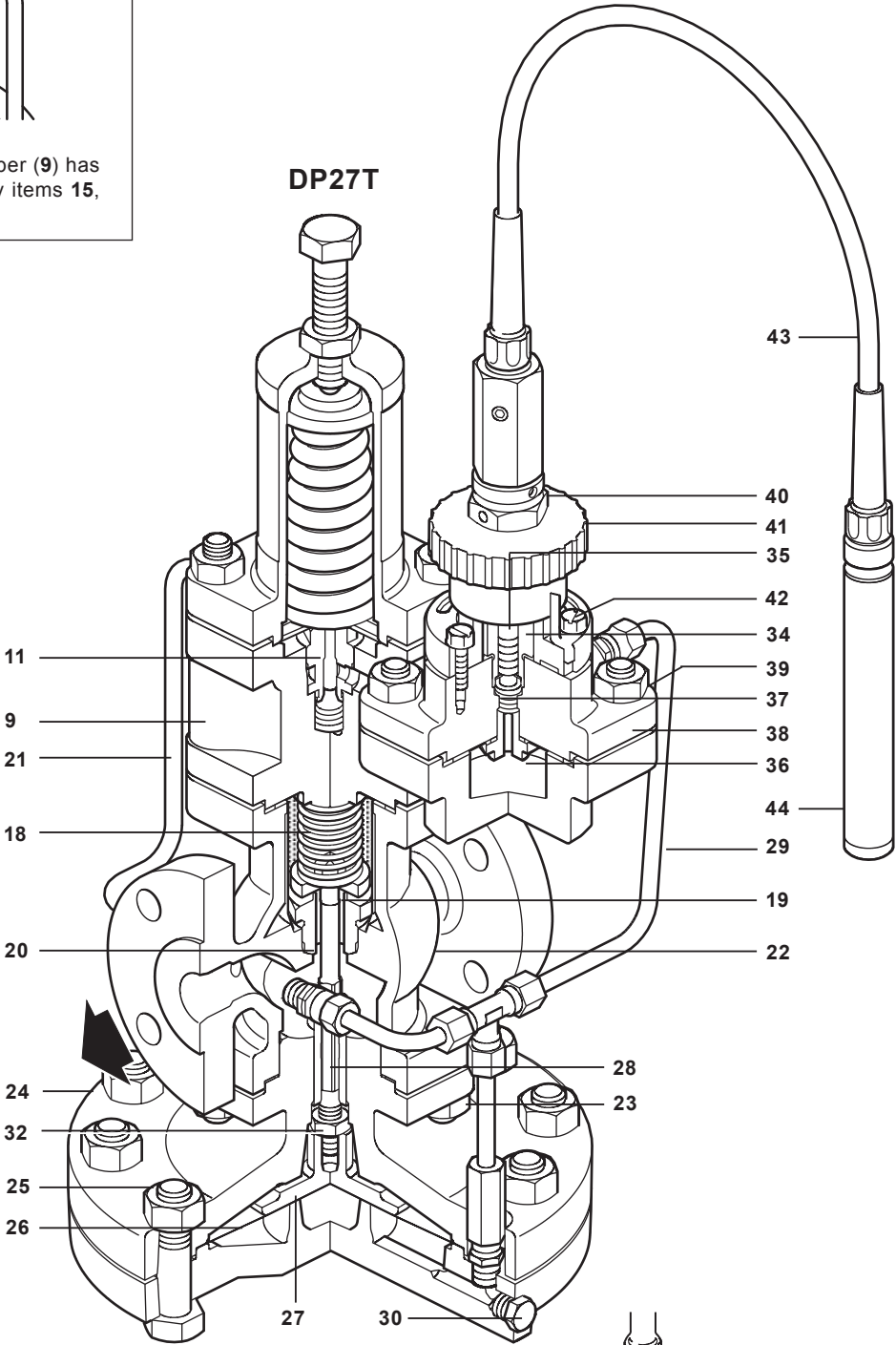
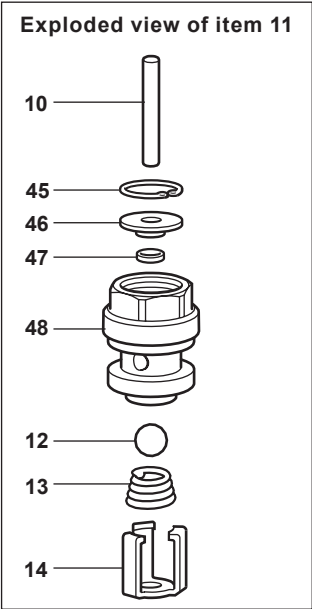
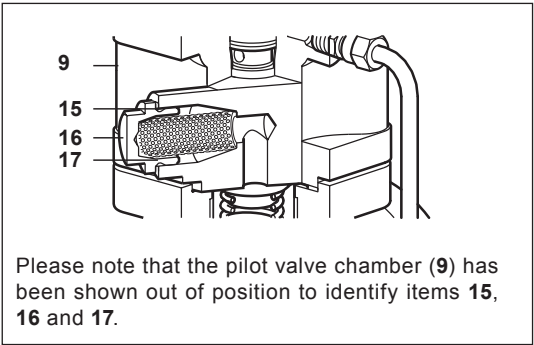
For items 9 to 44,  
go to page 4

# Control systems

## Pressure reducing/surplussing valves

### Materials (cont'd)

No.	Part	Material	
9	Pilot valve chamber	SG iron	DIN 1693 GGG 40.3
10	Pilot valve plunger	Stainless steel	BS 970 431 S 29
11	Pilot valve seat with integral seal	Stainless steel + PTFE	BS 970 431 S 29
12	Pilot valve ball	Stainless steel	AISI 420
13	Pilot valve spring	Stainless steel	BS 2057 302 S 25
14	Pilot valve clip	Stainless steel	BS 1449 301 S 21
15	Pilot filter cap gasket	Stainless steel	BS 1449 316 S 11
16	Pilot filter cap	Stainless steel	BS 970 431 S 29
17	Pilot filter element	Brass	
18	Main valve return spring	Stainless steel	BS 2056 302 S 25
19	Main valve	Stainless steel	BS 970 431 S 29
20	Main valve seat	Stainless steel	BS 970 431 S 29
21	Balance pipe assembly	Copper	BS 2871 C 106 ½H
22	Main valve body	SG iron	DIN 1693 GGG 40.3
23	Main body	Securing nuts	Steel BS 3692 Gr. 8
		Securing studs	Steel
			DN15 to DN32 M10 x 25 mm BS 4439 Gr. 8.8
			DN40 and DN50 M12 x 30 mm
24	Main diaphragm chamber	SG iron	DIN 1693 GGG 40.3
25	Main diaphragm	Securing nuts	Steel BS 3692 Gr. 8
		Securing studs	Steel BS 3692 Gr. 8.8
			DN15 to DN32 M12 x 50 mm
			DN40 and DN50 M12 x 55 mm
26	Main diaphragms	Phosphor bronze	BS 2870 PB 102
27	Main diaphragm plate	Hot brass stamping	BS EN 12165 CW617N
28	Pushrod	Stainless steel	BS 970 431 S 29
29	Control pipe assembly	Brass and copper	
30	Plug 1/8" BSP	Steel	
32	Lock-nut	Steel	BS 3692 Gr. 8
33	Solenoid valve		
34	Packless gland housing	Brass	BS 2874 CZ 121
35	Pilot valve plunger	Phenolic resin	ISO (BS) PF2C3
36	Pilot valve seat ring	Stainless steel	BS 970 431 S 29
37	Pilot valve closure member	Stainless steel	AISI 440 B
38	Pilot valve housing	SG iron	DIN 1693 GGG 40.3
39	Pilot valve housing	Securing nuts	Steel BS 3692 Gr. 8
		Securing studs	Steel
			DN15 to DN50 M10 x 25 mm BS 4439 Gr. 8.8
40	Locking ring	Brass	BS 2874 CZ 122
41	Adjustment head	Phenolic resin	ISO (BS) PF2C3
42	Adjustment head securing screws	Cadium plated	2 BA x ¾"
43	Capillary tube	Copper PVC covered	
44	Sensor	Brass	EN 12451 CW707R H130/170



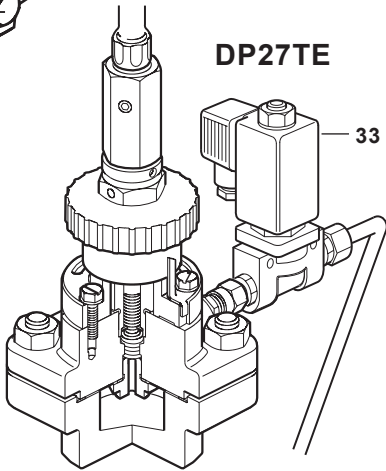
4.6

143

Materials - DP27T/TE

See DP27 items list on pages 3 and 4 for common components

No. Part	Material		
43	Pilot valve assembly with integral seal		
44	Pipe assembly Brass and copper		
45	Circlip	Stainless steel	1.4116
46	Retainer	Stainless steel	BS 970 431 S 29
47	Variseal	Composite elastomer/stainless steel	Turcon T40/AQISI 302
48	Pilot seat	Stainless steel + PTFE	BS 970 431 S 29



Control systems

Pressure reducing/surplussing valves

Pressure sensing pipe

The DP27 controls by sensing the downstream pressure through a pressure sensing pipe taken from the union (31) or through the internal balance pipe (21) provided. Fitting is described in the Installation and Maintenance Instructions supplied with the valve.

Optional extras

**Capillary tubes:** Available in multiples of 2 m up to a maximum of 14 m.

**Conversion kit:** Comprising of a solenoid valve and the necessary pipe and fittings for converting an existing DP27T to DP27TE.

**Union kit:** Comprising of union nipple (U), compression ring (V) and a gland nut (W). The union nipple is screwed 3/4" BSP.

**Pockets:** Are available in copper with brass union nipple, mild steel or stainless steel. Union nipple U forms the top of the pocket and carries compression ring V and gland nut W. The union nipple is screwed 3/4" BSP.

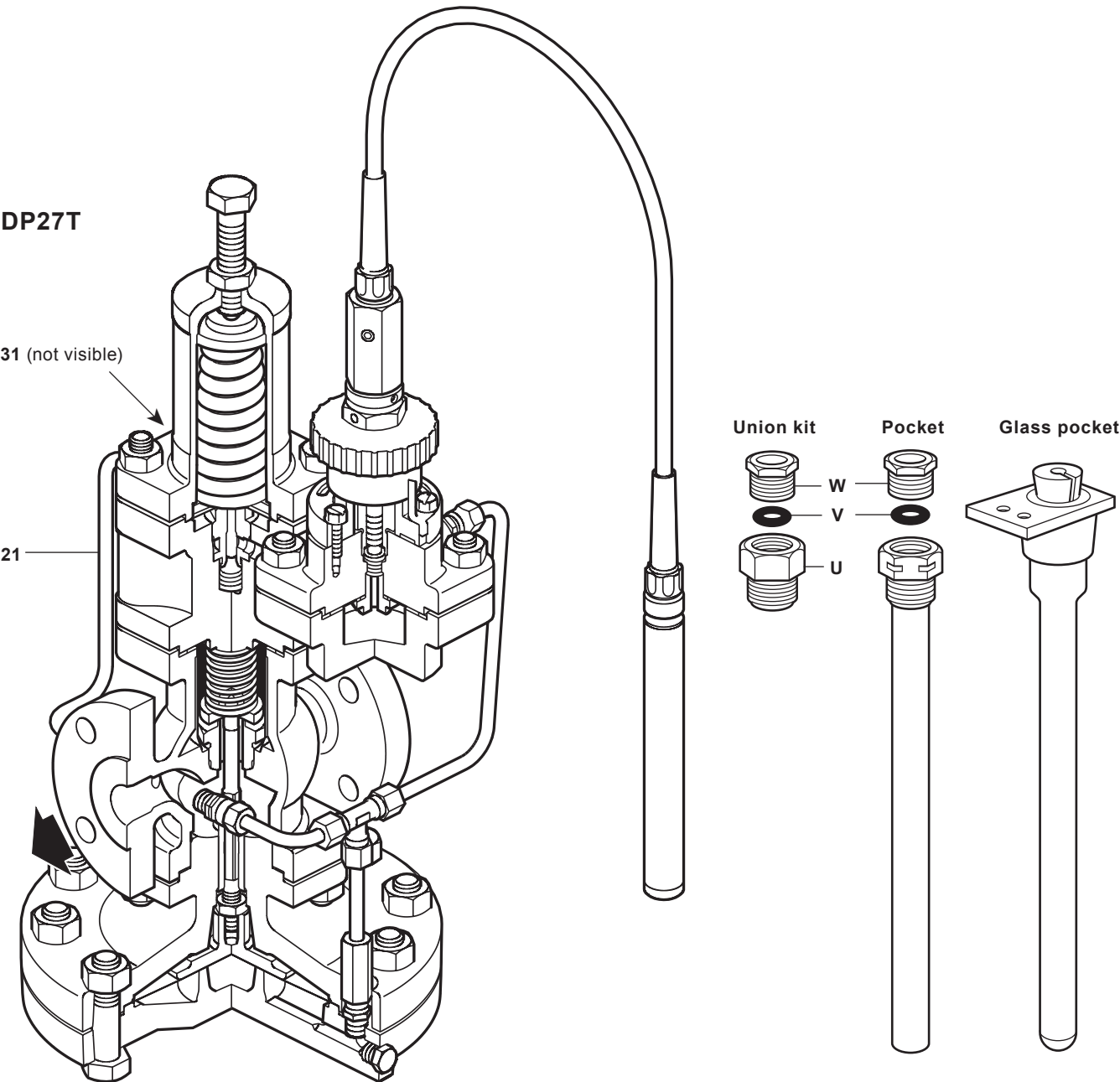
Special long pockets are available having minimum length of 0.5 m and a maximum of 1 m. They are sealed at the top by a rubber bung. Glass pockets are also available complete with bracket and sealed by a rubber bung.

**Wall mounting bracket:** inclusive of cover.

4.6

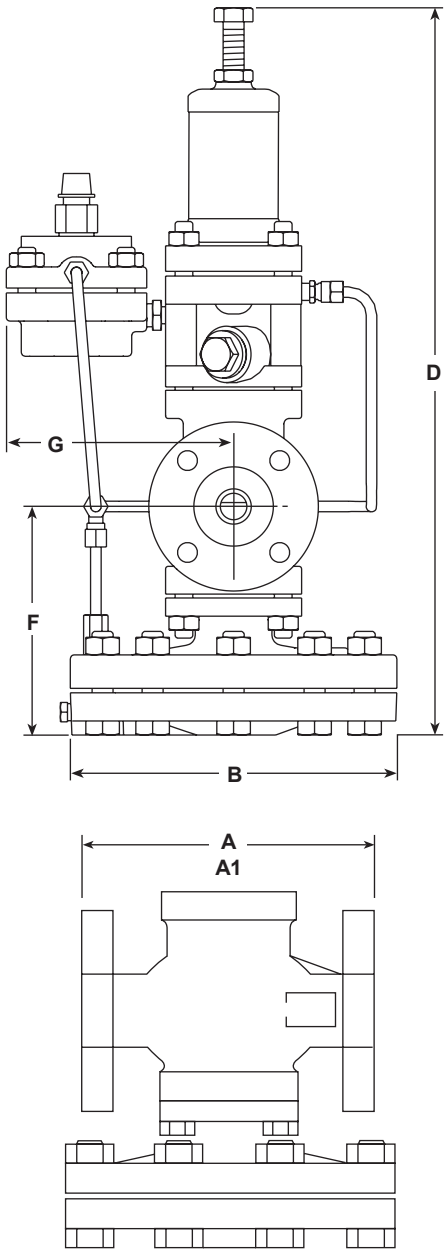
144

DP27T

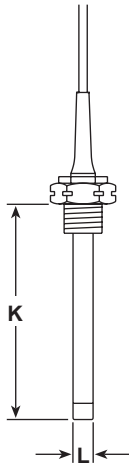


Dimensions/weights (approximate) in mm and kg

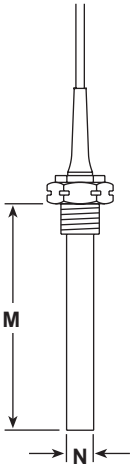
Size		Flanged										Weight	
	Screwed	BS 10 H	PN25	ANSI 300	BS 10 F	ANSI 150	JIS 10/16					Screwed	Flanged
	A	A1	A1	A1	A1	A1	A1	B	D	F	G		
DN15LC	160	-	130	126.6	117	120.2	122	185	404	130	130	15.7	16.5
DN15	160	-	130	126.6	117	120.2	122	185	404	130	130	15.7	16.5
DN20	160	-	150	-	133	139.4	142	185	404	130	130	15.7	17.4
DN25	180	160	160	160.0	-	160.0	152	207	428	148	130	17.2	19.7
DN32	-	180	180	180.0	-	176.0	176	207	428	148	130	-	20.7
DN40	-	200	200	200.0	-	199.0	196	255	473	178	139	-	32.2
DN50	-	230	230	230.0	-	228.0	222	255	473	178	139	-	35.2



Union kit

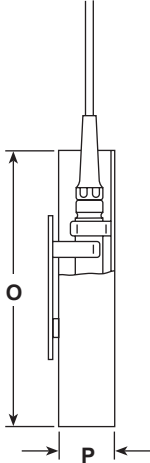


Metal pocket



Union kit		Metal pocket	
K	L	M	N
142	17.5	150	22.3

Wall mounting

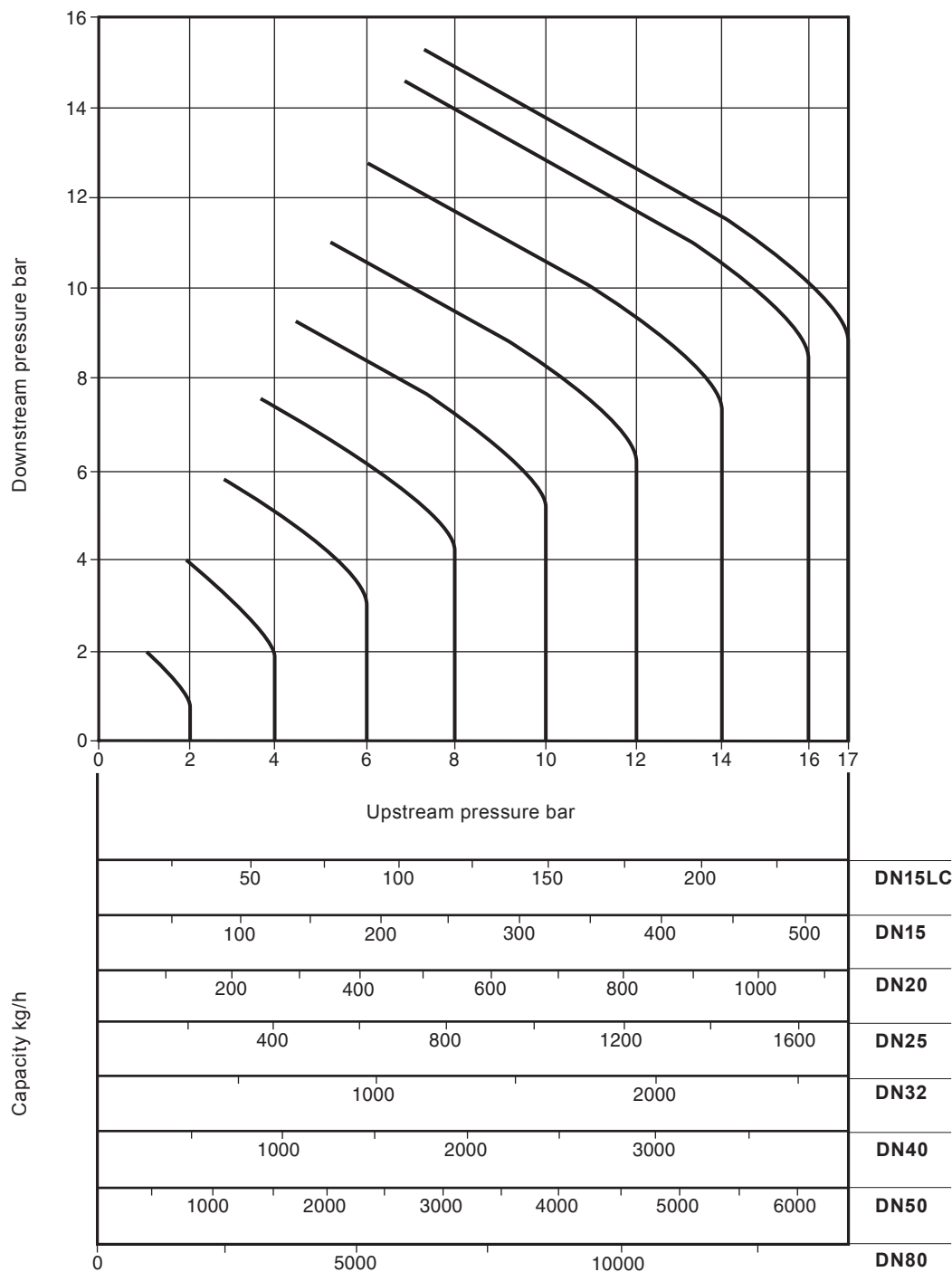


Glass pocket



Wall mounting		Glass pocket	
O	P	V	W
195	35	575	117

Steam capacities chart



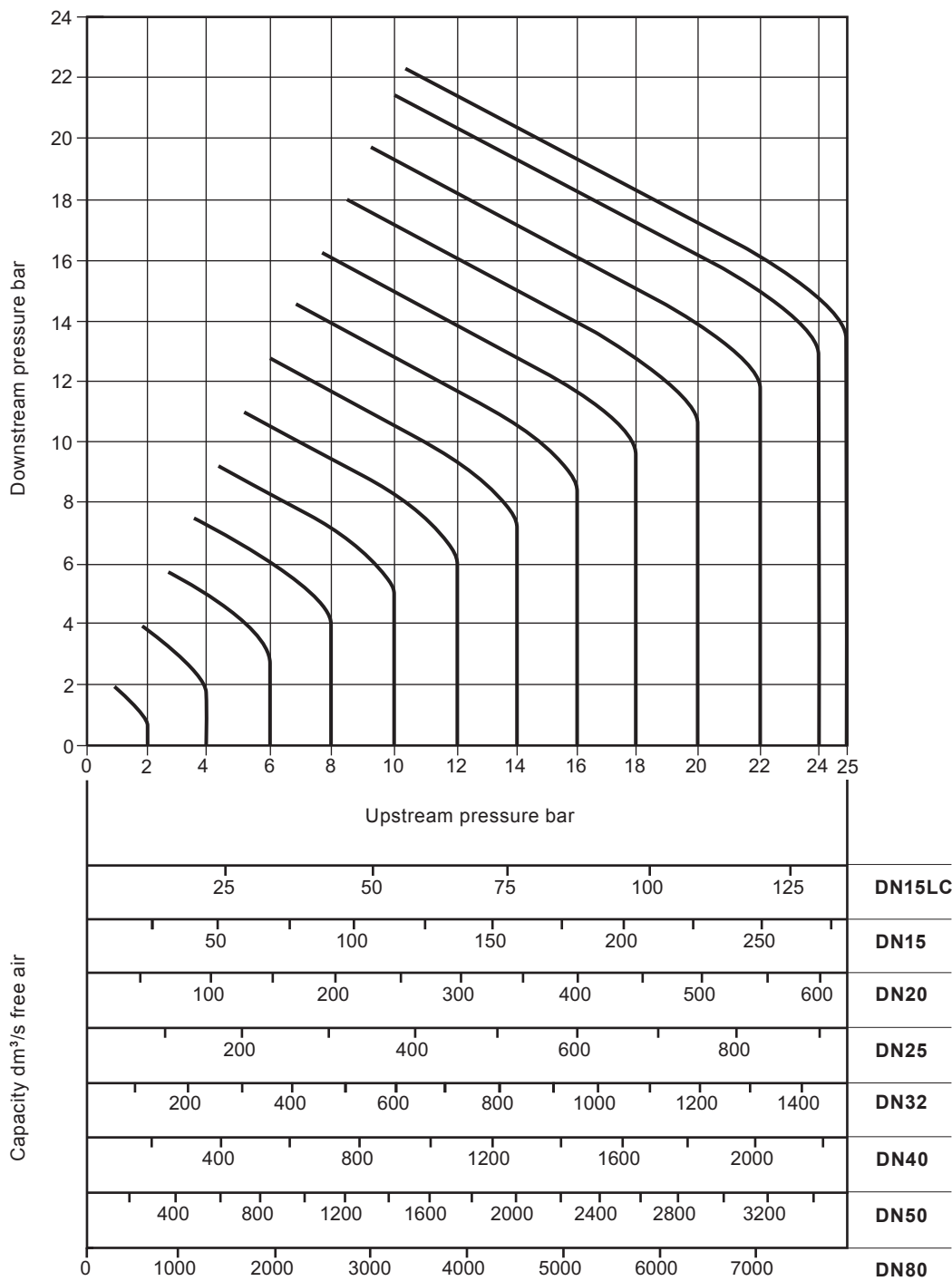
**Note**  
The capacities quoted above are based on valves fitted with an external pressure sensing pipe. Reliance on the internal balance pipe will mean that capacities may be reduced. In the case of low downstream pressure this reduction could be up to 30% of the valve capacity.

How to use the chart

**Saturated steam**  
A valve is required to pass 600 kg/h reducing from 6 bar to 4 bar. Find the point at which the curved 6 bar upstream pressure line crosses the horizontal 4 bar downstream pressure line. A perpendicular dropped from this point gives the capacities of all DP sizes under these conditions. A DN32 valve, is the smallest size which will carry the required load.

**Superheated steam**  
Because of the higher specific volume of superheated steam a correction factor must be applied to the figure obtained from the chart above. For 55 °C of superheat the factor is 0.95 and for 100 °C of superheat the factor is 0.9.  
Using the example given for saturated steam, the DN32 valve would pass  $740 \times 0.95 = 703$  kg/h if the steam had 55 °C of superheat. It is still big enough to pass the required load of 600 kg/h.

Compressed air capacities chart



4.6

147

How to use the chart

Capacities are given in cubic decimetres of free air per second ( $\text{dm}^3/\text{s}$ ). The use of the capacity chart can be best explained by an example. Required, a valve to pass 100  $\text{dm}^3/\text{s}$  of free air reducing from 12 bar to 8 bar. Find the point at which the curved 12 bar upstream pressure line crosses the horizontal 8 bar downstream pressure line. A perpendicular dropped from this point shows that whereas a DN15LC valve will only pass 57  $\text{dm}^3/\text{s}$  and is therefore not large enough, a DN15 valve will pass approximately 120  $\text{dm}^3/\text{s}$  under these conditions and is the correct valve size to choose.

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P470-09) supplied with the product.

Installation note:

The valve should be installed in a horizontal pipeline with the direction of flow as indicated by the arrow on the valve body.

How to order

**Example:** 1 off Spirax Sarco DN20 DP27T pilot operated pressure/temperature control valve having flanged EN 1092 PN25 connections and a temperature range A.

4

Control systems  
Pressure reducing/surplussing valves  
Spare parts

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 diaphragms *	(2 off)	B
Pilot valve assembly *		C, C1
Pilot valve filter and gasket	(packet of 3 of each)	E, F
Pilot valve assembly for temperature control unit		B2, C2, D2, E2
Pilot valve packless gland set *		H2, J2
Main valve assembly	DN15 to DN50	K, L
Pushrod and main diaphragm plate assembly		G
Internal strainer *		M
Main valve return spring *		N
Pressure adjustment spring	0.2 - 17 bar	O
Control head (3 pieces)	Range A 16 °C to 49 °C	Y, Z
	Range B 38 °C to 71 °C	
	Range C 49 °C to 82 °C	
	Range D 71 °C to 104 °C	
	Range E 93 °C to 127 °C	
When ordering state range and length of capillary tube. Normally stocked in capillary lengths of 2 m. Available in multiples of 2 m up to a maximum of 14 m (at extra cost).		
Union sub assembly (3 pieces)		U
Control pipe assembly *		P
Balance pipe assembly		Q
Body gasket set *	(3 off)	R
Pilot valve block gasket temperature control unit (3 pieces) *		R1
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: DN15 to DN32 (set of 10)	V
	DN40 to DN50 (set of 12)	
Set of temperature pilot valve housing securing studs and nuts	(set of 4)	S1
Set of adjustment head securing screws	(set of 3)	Y
Type DP27TE only	Solenoid valve complete	W
	Replacement coil	X1
	Valve seat and core assembly	X2

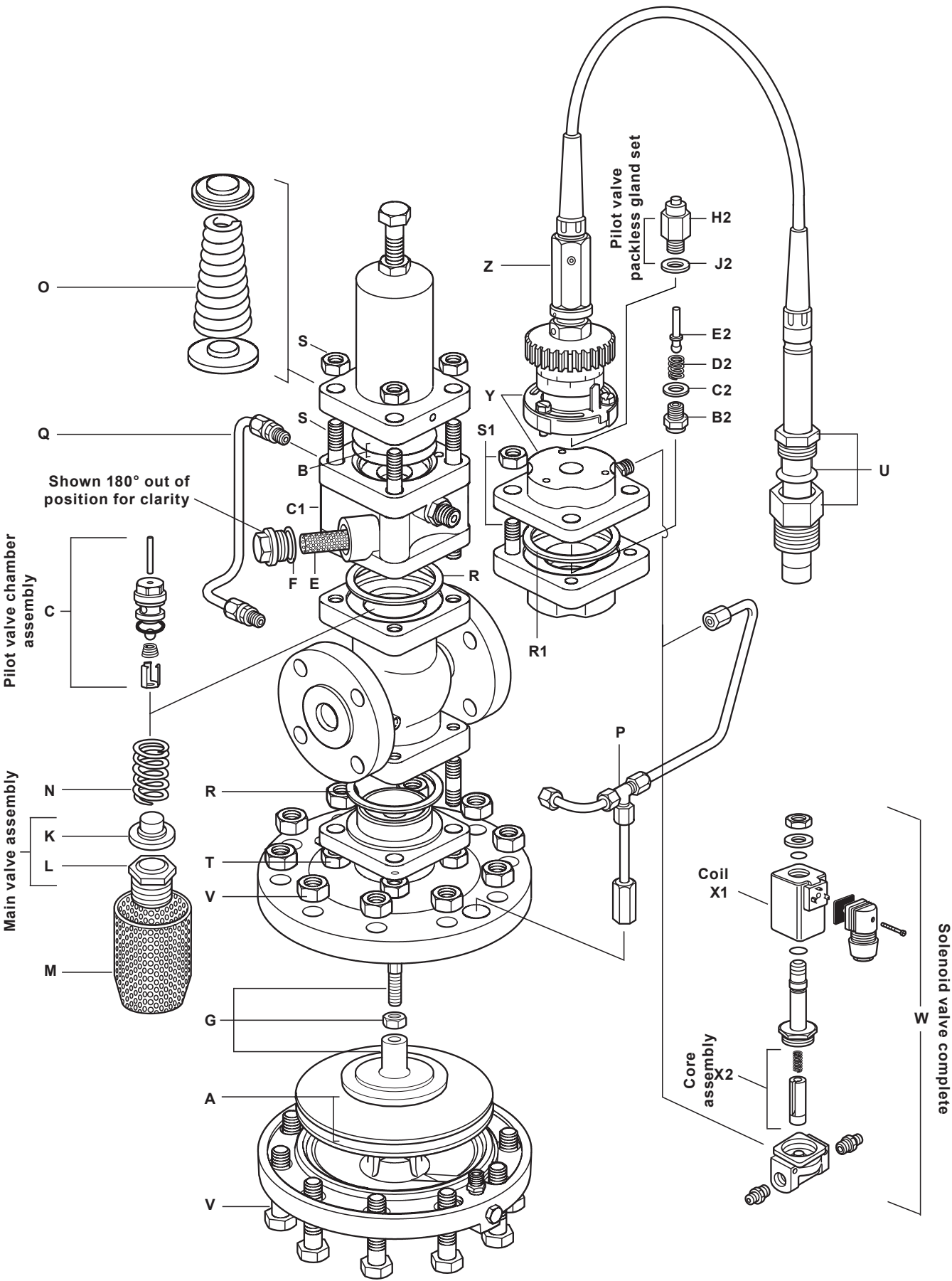
How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of the pilot operated pressure/temperature control valve.

**Example:** 1 - Main valve assembly for a Spirax Sarco DN15 Type DP27T pilot operated pressure/temperature control valve.

**How to fit:** See the Installation and Maintenance Instructions supplied with the product. Further copies are available on request.

For 'Interchangeability of spares' go to page 8.



4.6

149

4

Control systems

Pressure reducing/surplussing valves

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. Spares which are marked † are interchangeable with the DP17 and DP27 pressure reducing valves. Spares marked 'o' are interchangeable with the 37D temperature control valve.

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	† o	a	a	a	b	a	a	a	b	b	c	c
Pilot diaphragm	† o	a	a	a	a	a	a	a	a	a	a	a
Pilot valve assembly for pressure control unit	† o	a	a	a	a	a	a	a	a	a	a	a
Pilot valve filter and gasket		a	a	a	a	a	a	a	a	a	a	a
Pilot valve assembly for temperature control unit	o	a	a	a	a	a	a	a	a	a	a	a
Pilot valve packless gland set	o	a	a	a	a	a	a	a	a	a	a	a
Main valve assembly	† o	a	b	c	d	a	b	c	d	e	f	g
Internal strainer	† o	a	a	a	b	f	f	a	b	c	d	e
Main valve return spring	† o	a	a	a	b	a	a	a	b	b	c	c
Pressure adjustment spring	†	a	a	a	a	a	a	a	a	a	a	a
Control head	o	a	a	a	a	a	a	a	a	a	a	a
'O' ring for sensor bulb adaptor	o	a	a	a	a	a	a	a	a	a	a	a
Control pipe assembly		a	a	a	b	f	f	a	b	d	e	f
Balance pipe assembly	†	a	a	a	b	f	f	a	b	c	d	e
Gasket set	†	a	a	a	a	a	a	a	a	a	b	b
Pilot valve block gasket		a	a	a	a	a	a	a	a	a	a	a
Set of spring housing securing studs and nuts	†	a	a	a	a	a	a	a	a	a	b	b
Set of main body studs and nuts	† o	a	a	a	a	a	a	a	a	a	b	b
Set of diaphragm securing bolts and nuts	† o	a	a	a	a	a	a	a	a	a	b	b
Set of temperature pilot valve housing												
Securing studs and nuts		a	a	a	a	a	a	a	a	a	a	a
Set of adjustment head securing screws	o	a	a	a	a	a	a	a	a	a	a	a