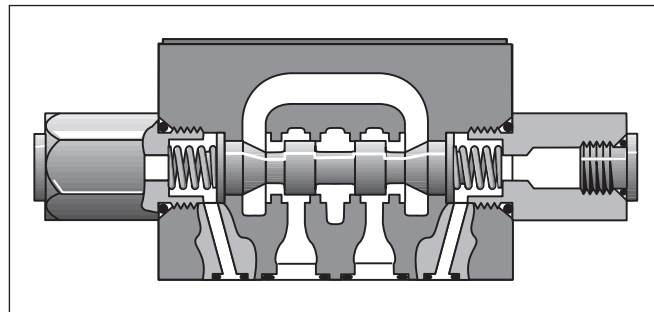
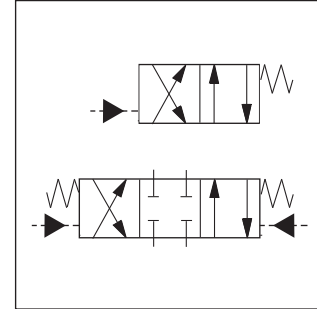
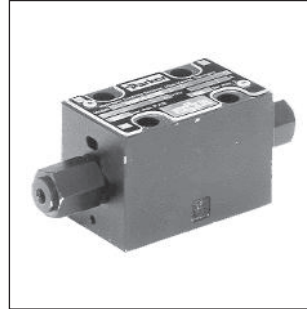


The D1VP is a hydraulically controlled 4/3 or 4/2 way directional control valve. The valve can be operated either by the pilot ports X and Y via the subplate or by the connection of an external pilot pipe direct on the valve body.

The D3DP, D4P, D9P and D11P are hydraulically controlled 4/3 or 4/2 way directional control valves. The valves are operated by the pilot ports X and Y via the subplate.

Pressure and flow of the pilot oil have a significant influence on the response time of the spool.

The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

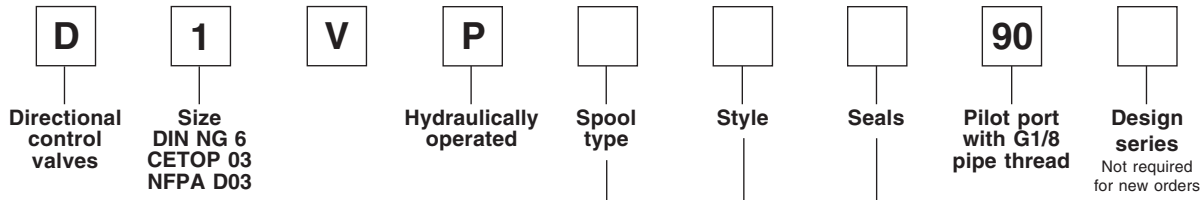


2

Technical data

General		Directional spool valve				
Design		Hydraulic				
Actuation						
Series		D1VP	D3DP	D4P	D9P	D11P
Size		NG06	NG10	NG16	NG25	NG32
Weight		[kg] 1.3	3.7	9.0	17.0	66.0
Mounting interface		DIN 24340 A06 ISO 4401 NFPA D03	DIN 24340 A10 ISO 4401 NFPA D05	DIN 24340 A16 ISO 4401 NFPA D07	DIN 24340 A25 ISO 4401 NFPA D08	DIN 24340 A32 ISO 4401 NFPA D10
		CETOP RP 121-H				
Mounting position		Unrestricted, preferably horizontal				
Ambient temperature		[°C] -25...+50				
Hydraulic						
Max. operating pressure		[bar] P, A B, T: 350; X, Y: 210	P, A B, T: 350; X, Y: 210	P, A B, T: 350; X, Y: 350 ¹⁾	P, A B, T: 350; X, Y: 350 ¹⁾	P, A B, T: 350; X, Y: 350 ¹⁾
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525				
Fluid temperature		[°C] -25 ... +70				
Viscosity permitted		[mm ² /s] 2.8...400 (2.8...400 cSt)				
Viscosity recommended		[mm ² /s] 30...80				
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)				
Flow max.		[l/min] 80	130	300	700	2000
Leakage at 350 bar (per flow path)		[ml/min] up to 60*	up to 100*	up to 200*	up to 800*	up to 5000*
		* depending on spool				
Pilot supply pressure (min/max)		[bar] 15 /210	15 /210	5 / 350 ¹⁾	5 / 350 ¹⁾	5 / 350 ¹⁾
Static / Dynamic						
Step response at 95%		The response times depend on the pilot oil pressure and on the speed of the increase / decrease of the pilot pressure.				
Recommended values are (act./deact.)		[ms] 13 / 28	20 / 30	50 / 60	100 / 150	300 / 370

¹⁾ with monitor switch: 105 bar



2

3 position spools	
Code	Spool type
1	
2	
3	
4	
5	
6	
7	
10	
11	
14	
15	
16	
21	
22	
31	
32	
76	
78	
81	
82	
102	

3 position spools	
Code	Spool type
8	
9	

2 position spools	
Code	Spool type
20	
26	
30	
101	

3 position spools (except spool 8 and 9)	
Code	Description
C	3 positions. Spring offset in position "0". Operated in position "a" or "b".
E	2 positions. Spring offset in position "0". Operated in position "a".
F	2 positions. Spring offset in position "b". Operated in position "0".
K	2 positions. Spring offset in position "0". Operated in position "b".
M	2 positions. Spring offset in position "a". Operated in position "0".

3 position spools (only for spool 8 and 9)	
Code	Description
C	3 positions. Spring offset in position "0". Operated in position "a" or "b".
E	2 positions. Spring offset in position "0". Operated in position "b".
F	2 positions. Spring offset in position "a". Operated in position "0".
K	2 positions. Spring offset in position "0". Operated in position "a".
M	2 positions. Spring offset in position "b". Operated in position "0".

2 position spools	
Code	Description
B	2 positions Spring offset in position "b". Operated in position "a".
D	2 positions, detent. Operated in position "a" or "b". No centre or offset position.
H	2 positions. Spring offset in position "a". Operated in position "b".

Code	Seals
N	NBR
V	FPM

Further spool types and styles on request.

Bold letters =
 Short-term availability

D	3	D	P			2			
Directional control valves	Size DIN NG 10 CETOP 05 NFPA D05	Hydraulically operated	Spool type	Style	Seals	Design series Not required for new orders			

3 position spools	
Code	Spool type
1	
2	
3	
4	
5	
6	
7	
10	
11	
14	
15	
16	
21	
22	
31	
32	
76	
78	
81	
82	
102	

3 position spools (except spool 8 and 9)	
Code	Description
C	3 positions. Spring offset in position "0". Operated in position "a" or "b".
E	2 positions. Spring offset in position "0". Operated in position "a".
F	2 positions. Spring offset in position "b". Operated in position "0".
K	2 positions. Spring offset in position "0". Operated in position "b".
M	2 positions. Spring offset in position "a". Operated in position "0".

3 position spools (only for spool 8 and 9)	
Code	Description
C	3 positions. Spring offset in position "0". Operated in position "a" or "b".
E	2 positions. Spring offset in position "0". Operated in position "b".
F	2 positions. Spring offset in position "a". Operated in position "0".
K	2 positions. Spring offset in position "0". Operated in position "a".
M	2 positions. Spring offset in position "b". Operated in position "0".

2 position spools	
Code	Description
B	2 positions. Spring offset in position "b". Operated in position "a".
D	2 positions, detent. Operated in position "a" or "b". No centre or offset position.
H	2 positions. Spring offset in position "a". Operated in position "b".

3 position spools	
Code	Spool type
8	
9	

2 position spools	
Code	Spool type
20	
26	
30	
101	

Code	Seals
N	NBR
V	FPM

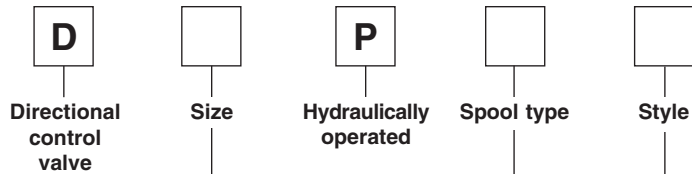
2

Further spool types and styles on request.

D_P.PMD RH



2



Code	Bore	Size
4	Ø20mm	NG16
9	Ø32mm	NG25
11	Ø50mm	NG32

3 position spools	
Code	Spool type
1 ¹⁾	
2 ¹⁾	
3 ²⁾	
4 ²⁾	
5 ²⁾	
6 ²⁾	
7 ²⁾	
11 ²⁾	
14 ²⁾	
15 ²⁾	
16 ²⁾	
21 ²⁾	
22 ²⁾	
31 ³⁾	
32 ³⁾	
54 ¹⁾	
81 ¹⁾	
82 ¹⁾	

3 position spools	
Code	Spool type
9 ¹⁾	

2 position spools	
Code	Spool type
20 ¹⁾	
26 ¹⁾	
30 ¹⁾	

¹⁾ All sizes (D4, D9, D11) available.
²⁾ Only D4 and D9 available.
³⁾ Only D9 available.

Further spool types on request.

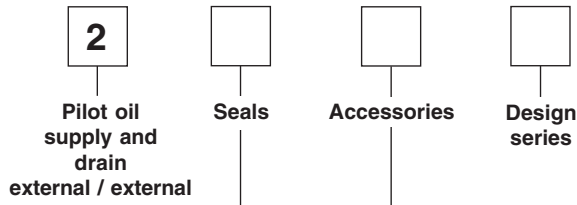
D_P.PMD RH

3 position spools (except spool 9)	
Code	Description
C ¹⁾	3 positions. Spring offset in position "0". Operated in position "a" or "b".
E ¹⁾	2 positions. Spring offset in position "0". Operated in position "a".
F ¹⁾	2 positions. Spring offset in position "b". Operated in position "0".
K ¹⁾	2 positions. Spring offset in position "0". Operated in position "b".
M ¹⁾	2 positions. Spring offset in position "a". Operated in position "0".
R ²⁾	Detent operated in position "0" or "b". No centre or offset position.
S ²⁾	Detent operated in position "0" or "a". No centre or offset position.

3 position spools (only for spool 9)	
Code	Description
C ¹⁾	3 positions. Spring offset in position "0". Operated in position "a" or "b".
E ¹⁾	2 positions. Spring offset in position "0". Operated in position "b".
F ¹⁾	2 positions. Spring offset in position "a". Operated in position "0".
K ¹⁾	2 positions. Spring offset in position "0". Operated in position "a".
M ¹⁾	2 positions. Spring offset in position "b". Operated in position "0".
R ²⁾	Detent operated in position "0" or "a". No centre or offset position.
S ²⁾	Detent operated in position "0" or "b". No centre or offset position.

2 position spools	
Code	Description
B ¹⁾	2 positions. Spring offset in position "b". Operated in position "a".
D ²⁾	2 positions, detent. Operated in position "a" or "b". No centre or offset position.
H ¹⁾	2 positions. Spring offset in position "a". Operated in position "b".





Code	Description
omit ⁴⁾	Standard valve without accessories
7 ⁴⁾	Pilot choke, meter-out
8 ⁵⁾	Stroke limit, side B
9 ⁵⁾	Stroke limit, side A
10 ⁴⁾⁶⁾	End position monitored, side A
11 ⁴⁾⁶⁾	End position monitored, side B
55 ⁴⁾⁶⁾	End pos. monitored, side A and B
60 ⁴⁾	Pilot choke, meter-in
66 ⁴⁾⁶⁾	Start position monitored, side A
80 ⁴⁾⁶⁾	Start position monitored, side B
88 ⁴⁾⁶⁾	Start pos. monitored, side A and B
89 ⁵⁾	Stroke limit on both sides

⁴⁾ All sizes (D4, D9, D11) available.

⁵⁾ Only D4 and D9 available.

⁶⁾ The plug M12x1 for monitor switch is included.
The monitor switch must be located on the side, to which the spool moves from the centre position.
All spools except spool 9:
style B, E, F with 11 or 80
style H, K, M with 10 or 66
style C with 55 or 88
Only spool 9:
style E, F with 10 or 66
style K, M with 11 or 80
style C with 55 or 88
Following spool are available for monitoring:
D4P & D9P:
Spool 1, 2, 3, 4, 7, 11, 14, 15, 9, 20, 30
D11P:
Spool 1, 9
The monitor switch can be combined with some accessories of the standard valve, these combinations have to be inquired at the factory.

Code	Seals
N	NBR
V	FPM

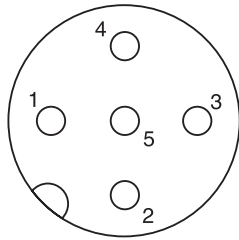


Electrical characteristics of position control M12x1

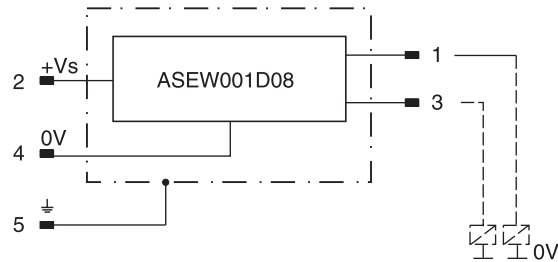
Protection class		IP 65 in accordance with DIN 40050 (plugged and mounted)
Ambient temperature	[°C]	0...+50
Supply voltage / ripple	[V]	18...42 / 10%
Current consumption without load	[A]	≤ 30
Max. output current per channel, ohmic	[mA]	400
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2A	[V]	≤ 1.1
Max. output drop at 0.4A	[V]	≤ 1.6
EMC		EN50081-1 / EN50082-2
Max. tolerance ambient field strength	[A/m]	<1200
Min. distance to next AC solenoid	[m]	>0.1
Interface		M12x1
Wiring min.	[mm ²]	5 x 0.25 braid shield recommended
Wiring length max.	[m]	50 recommended

2

M12 pin assignment



- 1 Normally open
- 2 + Supply 18...42V
- 3 Normally closed
- 4 0V
- 5 Earth ground



Definitions

Start position monitored:

The valve is de-energized. The inductive switch gives a signal at the moment (below 15% spool stroke) when the spool leaves the spring offset position.

End position monitored:

The inductive switch gives a signal before ending the stroke (above 85% spool stroke).

The flow curve diagram shows the flow versus pressure drop curves for all spools shown. To read the values in the diagram, the curve number for the selected spool and

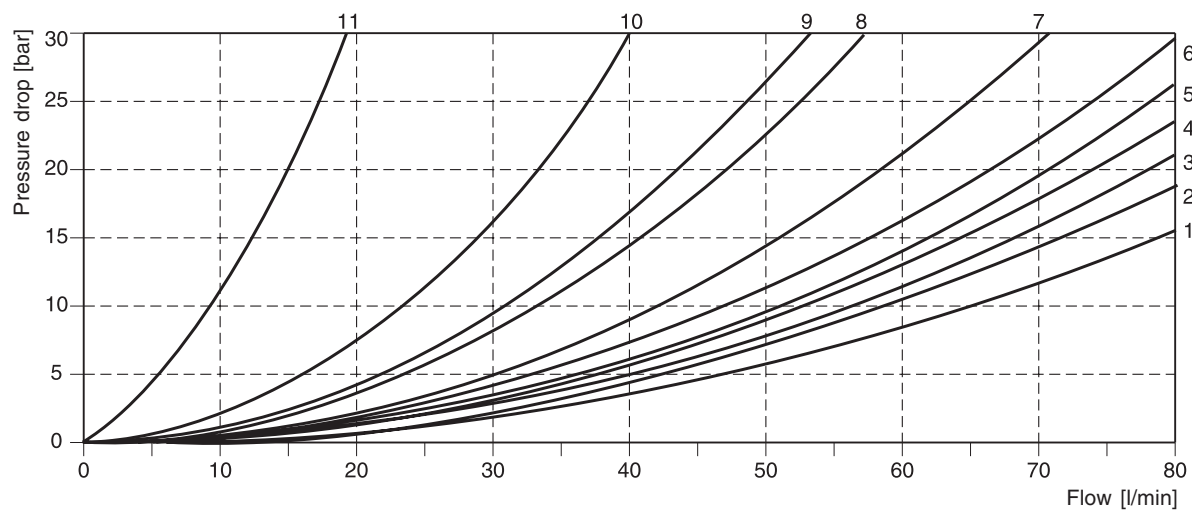
desired operating position must first be determined from the table below.

Spool	Position "b"		Position "a"		Position "0"					
	P->A	B->T	P->B	A->T	P->A	P->B	A->T	B->T	P->T	A->B
1	4	1	4	1	-	-	-	-	-	-
2	5	2	5	2	4	4	1	1	6	1
3	4	1	4	2	-	-	8	-	-	-
4	4	2	4	2	-	-	7	7	-	9
5	4	1	5	1	9	-	-	-	-	-
6	5	1	5	1	9	9	-	-	-	9
7	5	2	4	1	-	5	-	1	7	-
10	4	-	4	-	-	-	-	-	-	-
11	4	2	4	2	-	-	11	11	-	-
14	4	1	5	2	5	-	1	-	7	-
15	4	2	4	1	-	-	-	8	-	-
16	5	1	4	1	-	9	-	-	-	-
20	5	1	5	1	-	-	-	-	-	-
26	6	-	6	-	-	-	-	-	-	-
30	5	1	5	1	-	-	-	-	-	-
76	-	2	-	-	-	-	3	-	-	-
78	-	-	-	2	-	-	-	3	-	-
81	10	10	10	10	-	-	-	-	-	-
82	10	10	10	10	-	-	*	*	-	-
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T	A->B
8	2	2	2	2	-	-	-	-	8	-
9	3	3	3	3	-	-	-	-	9	-
	Position "b"		Position "a"							
	P->A	P->B	A->B	P->B	A->T					
21	3	3	3	6	1					
	P->A	B->T		P->A	P->B	A->B				
22	6	1		3	3	3				

* Only for pressure compensation, no high flow possible.

2

Flow curve



D_P.PMD RH



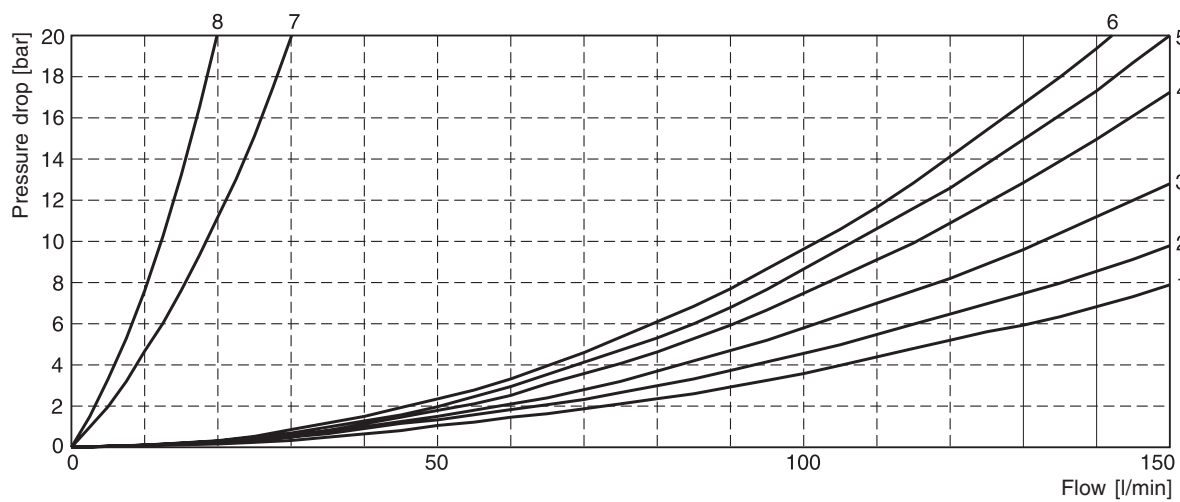
The flow curve diagram shows the flow versus pressure drop curves for all spools shown. To read the values in the diagram, the curve number for the selected spool and

desired operating position must first be determined from the table below.

2

Spool	Position "b"		Position "a"		Position "0"					
	P->A	B->T	P->B	A->T	P->A	P->B	A->T	B->T	P->T	A->B
1	4	3	4	3	-	-	-	-	-	-
2	4	1	4	1	3	3	1	1	5	1
3	4	3	5	2	-	-	4	-	-	-
4	4	2	4	2	-	-	3	3	-	5
5	4	3	5	3	5	-	-	-	-	-
6	4	3	4	3	6	6	-	-	-	6
7	5	1	4	3	-	4	-	2	6	-
10	4	-	4	-	-	-	-	-	-	-
11	4	3	4	3	-	-	8	8	-	-
12	4	3	4	3	7	7	7	7	8	8
14	4	3	5	1	4	-	2	-	6	-
15	5	2	4	3	-	-	-	4	-	-
16	5	3	4	3	-	5	-	-	-	-
20	4	3	4	3	-	-	-	-	-	-
26	4	-	4	-	-	-	-	-	-	-
30	4	2	4	2	-	-	-	-	-	-
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T	A->B
8	4	3	4	3	-	-	-	-	6	-
9	4	4	4	4	-	-	-	-	6	-
	Position "b"		Position "a"							
	P->A	P->B	A->B	P->B	A->T					
21	5	4	6	3	3					
	P->A	B->T		P->A	P->B	A->B				
22	3	3		4	5	6				

Flow curve



D_P.PMD RH

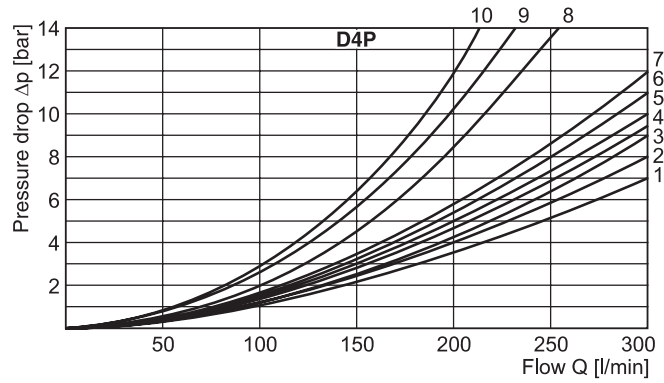


The flow diagrams shows the flow versus pressure drop curves for all spools. To read the values in the diagram, the

curve number for the selected spool and desired operating position must be determined from the table below first.

D4P

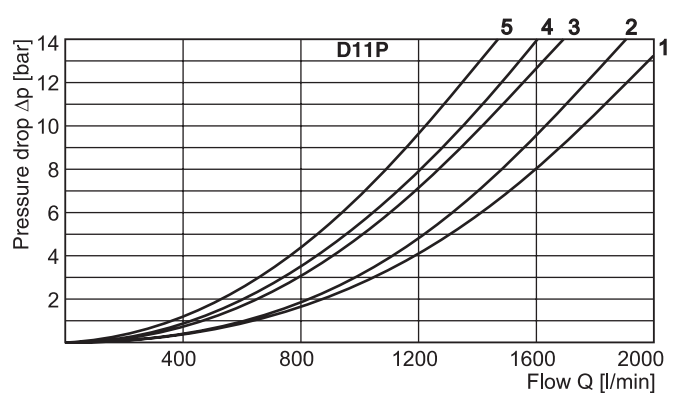
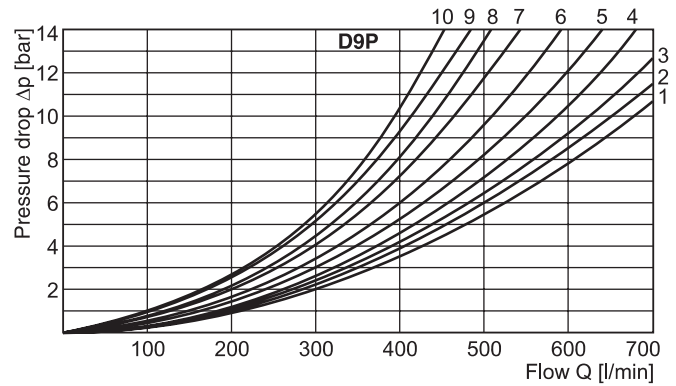
Spool Code	Curve number				
	P-A	P-B	P-T	A-T	B-T
1	1	1	-	4	5
2	1	2	6	4	6
3	1	2	-	5	6
4	1	1	-	5	5
5	2	2	-	3	5
6	1	2	-	3	6
7	1	1	6	4	5
9	2	9	8	7	10
11	1	1	-	4	5
14	1	1	6	4	5
15	1	2	-	4	6
16	2	2	-	3	5
20	3	5	-	3	5
21	2	8	-	2	-
22	8	2	-	-	3
26	3	5	-	-	-
30	2	3	-	6	7
54	2	3	-	6	7



2

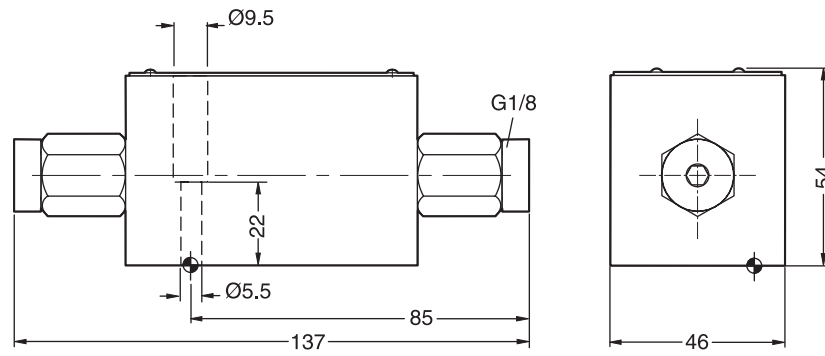
D9P and D11P





Spool Code	Curve number									
	P-A		P-B		P-T		A-T		B-T	
	D9	D11	D9	D11	D9	D11	D9	D11	D9	D11
1	3	5	2	5	-	-	3	4	5	1
2	2	5	1	5	1	5	3	4	5	1
3	4	-	2	-	-	-	3	-	6	-
4	4	-	3	-	-	-	3	-	5	-
5	1	-	2	-	-	-	4	-	5	-
6	2	-	2	-	-	-	4	-	6	-
7	3	-	1	-	7	-	3	-	5	-
9	4	3	8	3	9	2	4	3	10	1
11	3	-	2	-	-	-	3	-	5	-
14	1	-	2	-	8	-	3	-	5	-
15	3	-	3	-	-	-	4	-	5	-
16	3	-	3	-	-	-	4	-	5	-
20	6	5	5	5	-	-	6	3	8	-
21	5	-	10	-	-	-	3	-	-	-
22	10	-	5	-	-	-	-	-	5	-
26	6	-	5	-	-	-	-	-	-	-
30	3	5	2	5	-	-	3	4	5	1
54	-	5	-	5	-	-	-	4	-	1



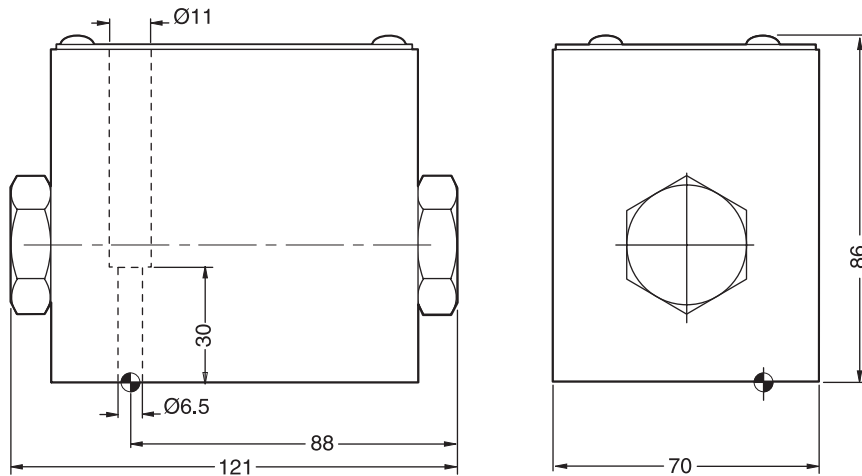
D1VP





2



Surface finish	 Kit			 Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK375	4x M5x30 DIN 912 12.9	6.8 Nm ± 15%	NBR: SK-D1VP-70 FPM: SK-D1VP-V70

D3DP

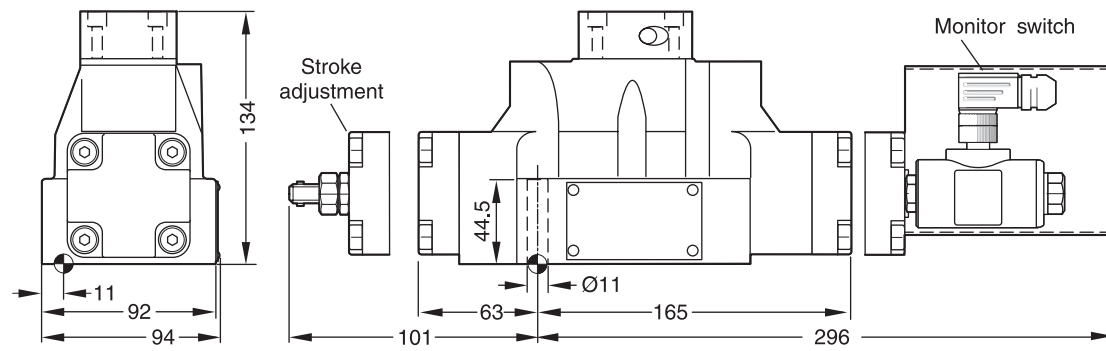


Surface finish	 Kit			 Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK385	4x M6x40 DIN 912 12.9	11 Nm ± 15%	NBR: SK-D3DP-35 FPM: SK-D3DP-V35







D_P.PMD RH

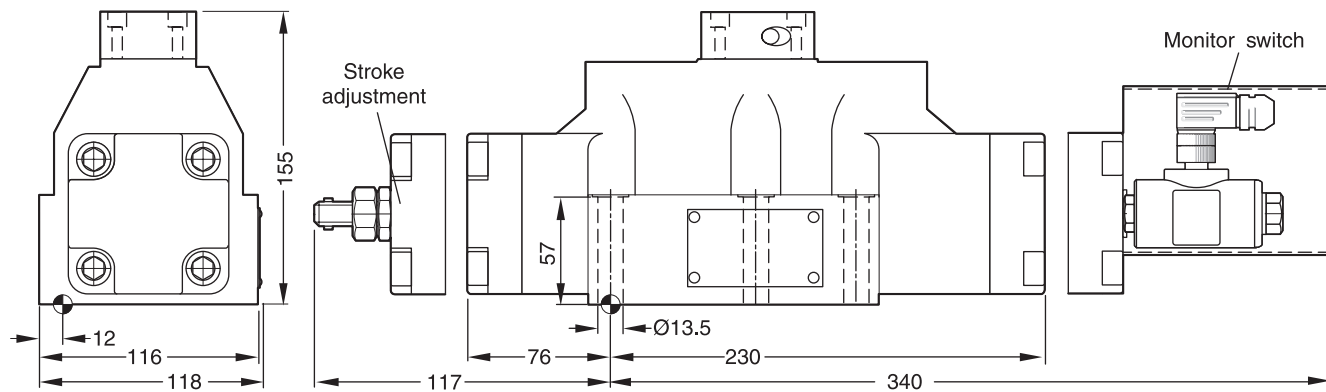
D4P







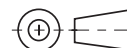
2

Surface finish	 Kit	 Kit	 Kit	 Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK320	4x M10x60 2x M6x55 DIN 912 12.9	54 Nm \pm 15% 11 Nm \pm 15%	NBR: SK-D41VW-70 FPM: SK-D41VW-V70

D9P



Surface finish	 Kit	 Kit	 Kit	 Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK360	6x M12x75 DIN 912 12.9	94 Nm \pm 15%	NBR: SK-D91VW-70 FPM: SK-D91VW-V70

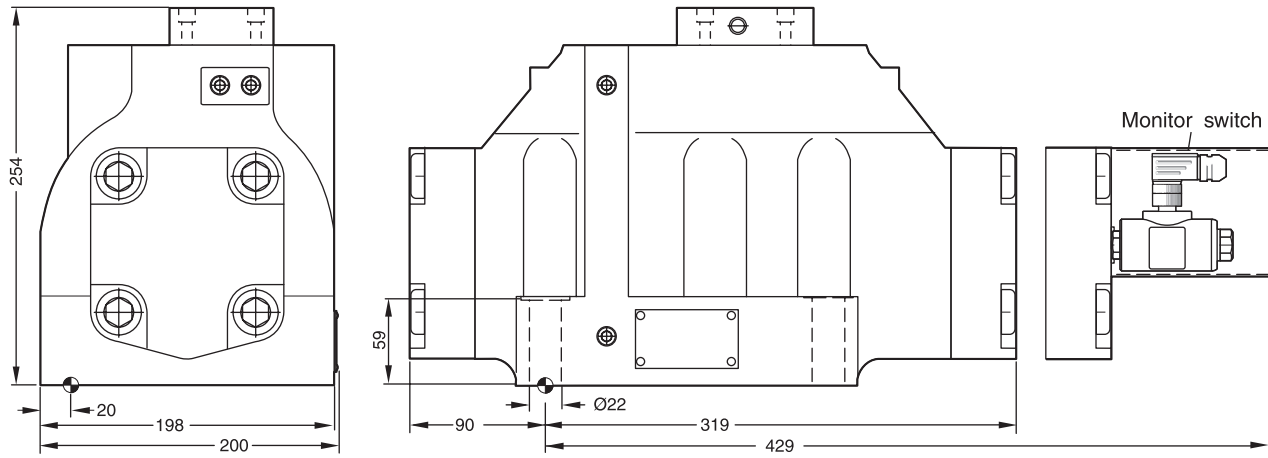


D_P.PMD RH



D11P

2



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK386	6x M20x90 DIN 912 12.9	460 Nm \pm 15%	NBR: SK-D111VW-70 FPM: SK-D111VW-V70

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.

