



Hydraulic Valves Industrial Standard



ENGINEERING YOUR SUCCESS.

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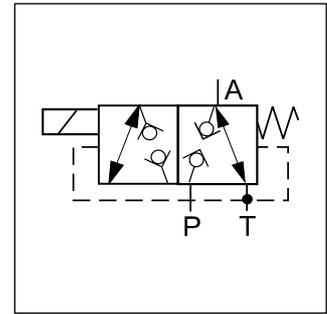
Characteristics / Ordering Code

2

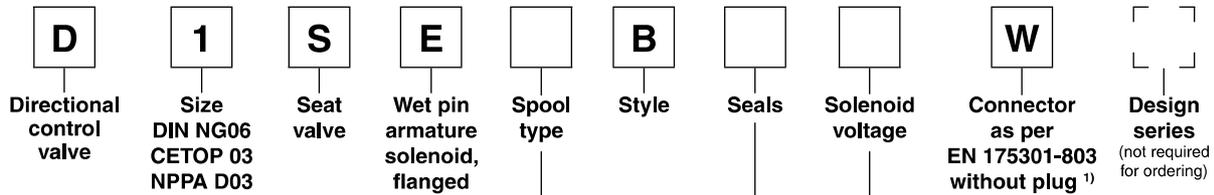
The directional valve type D1SE is equipped with a wet pin armature solenoid, drain free tapered poppet and compatible with the standards DIN NG06, CETOP 03, and NFPA D03. Due to the 3/2-way design, port A is either connected with P or discharged in the tank. The neutral position (solenoid not activated) is taken automatically by a return spring. This position remains until the solenoid is energized.

The valve poppet including activation lever and the armature of the solenoid are located in the pressurized oil chamber of connection T. The valve poppet is designed such that there can be no differential area in its axial operational direction (opening, closing). Thus it is statically pressure-balanced so that the valve can be switched in both flow directions even under pressure.

The unit has an all-steel design, the important functional inner parts are hardened, the poppet and seat are grinded.



Ordering code



Code	Spool type
30	
83	

Code	Voltage
K	12 V=
J	24 V=
U ²⁾	98 V=
G ²⁾	205 V=

Code	Seals
N	NBR
V	FPM

Bold letters = Short-term availability

Solenoids for repair

Voltage	Ordering code
12 V=	7329700 - 12 V
24 V=	7329700 - 24 V
98 V=	7329700 - 98 V
205 V=	7329700 - 205 V

¹⁾ Please order plug separately.

²⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.



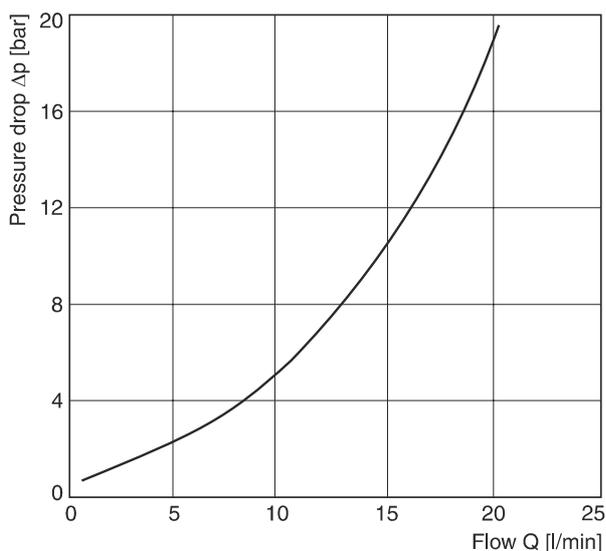
Technical Data / Characteristic Curves

2

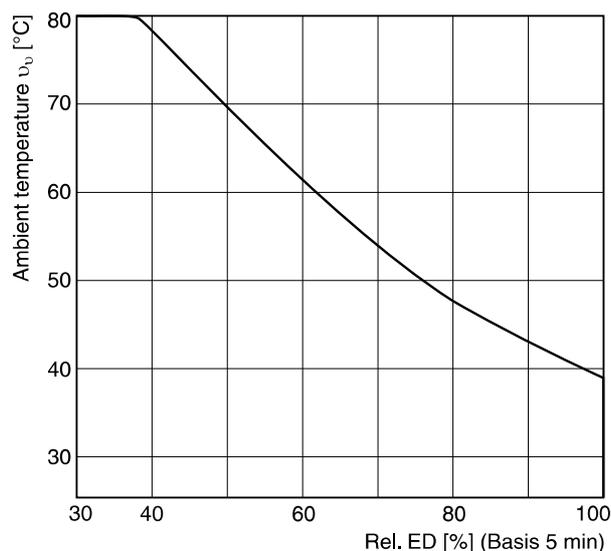
General					
Design	Directional poppet valve				
Actuation	Solenoid				
Size	DIN NG6 / CETOP 03 / NFPA D03				
Mounting interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03				
Mounting position	Unrestricted, preferably horizontal				
Ambient temperature	[°C] -25...+60, observe permissible duty cycle				
MTTF _D value	[years] 150				
Weight	[kg] 1.5				
Hydraulic					
Max. operating pressure	[bar] P, A, T: 350				
Fluid	Hydraulic oil according to DIN 51524				
Fluid temperature	[°C] -20...+60 (NBR: -25...+70)				
Viscosity permitted	[cSt] / [mm²/s] 10...500				
Viscosity recommended	[cSt] / [mm²/s] 30...80				
Filtration	ISO 4406 (1999); 18/16/13				
Flow max.	[l/min] 20				
Static / Dynamic					
Step response	[ms] Energized: approx. 50 [ms] De-energized: approx. 60				
Electrical characteristics					
Duty ratio	See diagram				
Max. switching frequency	[1/h] 2000				
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)				
	Code	K	J	U	G
Supply voltage	[V]	12 V =	24 V =	98 V =	205 V =
Tolerance supply voltage	[%]	±10	±10	±10	±10
Current consumption	[A]	1.95	1.1	0.25	0.13
Power consumption	[W]	23.4	26.4	24.3	26.6
Solenoid connection	Connector as per EN 175301-803				
Wiring min.	[mm²]	3 x 1.5 recommended			
Wiring length max.	[m]	50 recommended			

With electrical connections the protective conductor (PE \perp) must be connected according to the relevant regulations.

Performance curve Δp -Q



Duty cycle versus ambient temperature



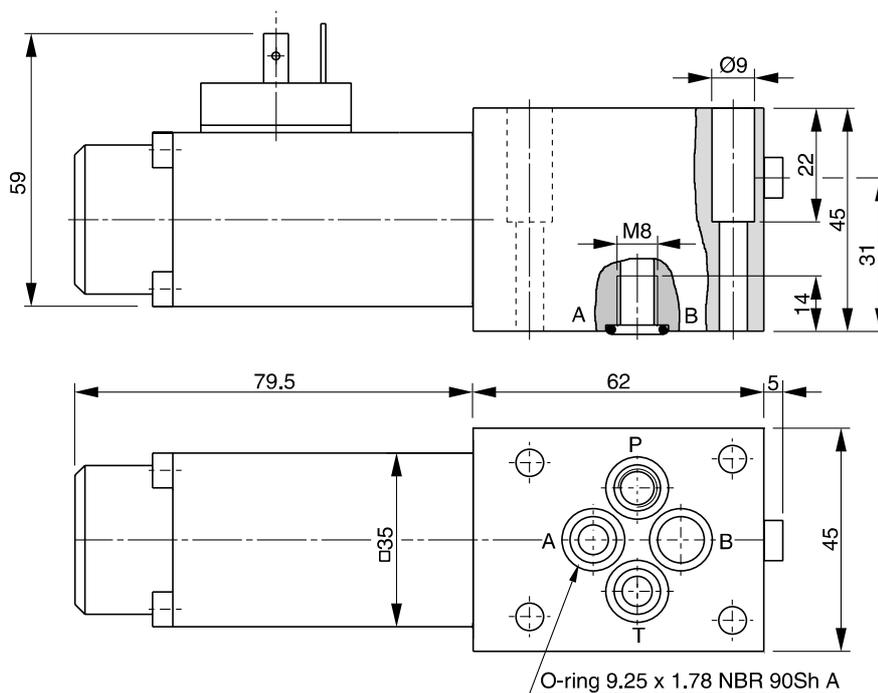
All characteristic curves measured with HLP46 at 50 °C.

D1SE UK.indd 25.03.2019



Dimensions

2



Surface finish	Kit	Kit	Kit	Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1SE-70 FPM: DK-D1SE-V70

Subplates and manifolds see chapter 12.

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

Characteristics

The NG06 directional control valve series D1VW provides high functional limits up to 80 l/min in combination with a very low, energy-saving pressure drop.

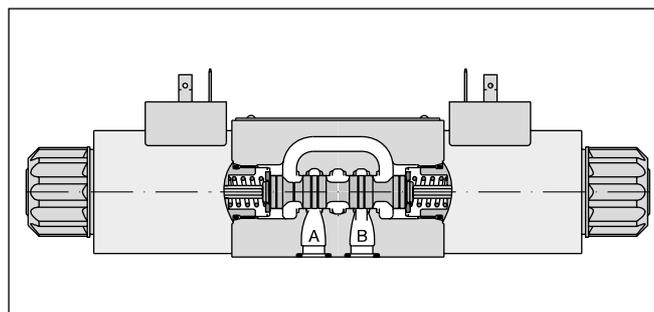
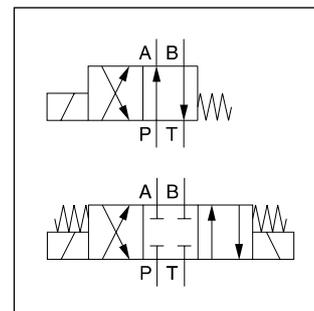
A wide variety of spool options allows to design an unlimited number of hydraulic circuits.

Versions with 8 watt coils, position control, ATEX approval, surface protection and connector variants are shown in the following chapters.

The valve is also available as sandwich type, see series Z1DW in chapter 7.

Valves with explosion proof solenoids Ex e mb II see series D1VW Explosion Proof in chapter 2 and catalogue MSG11-3343/UK.

Download of the PDF file at www.parker.com/ISDE, see "Support".



2

Technical data

General							
Design	Directional spool valve						
Actuation	Solenoid						
Nominal size	DIN NG06 / CETOP 03 / NFPA D03						
Mounting interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03						
Mounting position	unrestricted, preferably horizontal						
Ambient temperature	[°C] -25...+60						
MTTF _D value	[years] 150						
Weight	[kg] 1.5 (1 solenoid), 2.1 (2 solenoids)						
Vibration resistance	[g] 10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27						
Hydraulic							
Max. operating pressure	[bar] P, A, B: 350; T: 210 (DC), T: 140 (AC)						
Fluid	Hydraulic oil according to DIN 51524						
Fluid temperature	[°C] -20 ... +70 (NBR: -25...+70)						
Viscosity permitted	[cSt] / [mm ² /s] 2.8...400						
Viscosity recommended	[cSt] / [mm ² /s] 30...80						
Filtration	ISO 4406 (1999); 18/16/13						
Flow max.	[l/min] 80 (see shift limits)						
Leakage at 50 bar	[ml/min] Up to 10 per flow path, depending on spool, up to 15 per flow path for spool type 008 + 009						
Static / Dynamic							
Step response	see table response time						
Electrical characteristics							
Duty ratio	[%] 100 ED; CAUTION: coil temperature up to 150 °C possible						
Max. switching frequency	[1/h] 15000 (not for soft shift)						
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)						
	Code	K	J	U	G	Y	T
Supply voltage	[V]	12 V =	24 V =	98 V =	205 V =	110 V at 50 Hz/ 120 V at 60 Hz	230 V at 50 Hz/ 240 V at 60 Hz
Tolerance supply voltage	[%]	±10	±10	±10	±10	±5	±5
Current consumption	hold [A]	2.72	1.29	0.33	0.13	0.6 / 0.55	0.3 / 0.27
Current consumption	in rush [A]	2.72	1.29	0.33	0.13	2.5 / 2.4	1.25 / 1.2
Power consumption	hold [W]	32.7 W	31 W	31.9 W	28.2 W	70 / 70 VA	70 / 70 VA
Power consumption	in rush [W]	32.7 W	31 W	31.9 W	28.2 W	280 / 290 VA	280 / 290 VA
Solenoid connection		Connector as per EN 175301-803, solenoid identification as per ISO 9461 (code W).					
Wiring min.	[mm ²]	3 x 1.5 recommended					
Wiring length max.	[m]	50 recommended					

With electrical connections the protective conductor (PE \perp) must be connected according to the relevant regulations.



2

D

Directional control valve

1

**Size
DIN NG06
CETOP 03
NFPA D03**

V

3-chamber valve

W

Wet pin armature solenoid, threaded in tube

Spool type

Spool position

3 position spools		
Code	Spool type	
	a	b
001		
002		
003		
004		
005		
006		
007		
008 ¹⁾		
009 ¹⁾		
010		
011		
014		
015		
016		
021		
022		
031		
032		
034		
035		
061		
081		
082		
102		
204 ¹⁾		
205 ¹⁾		

2 position spools		
Code	Spool type	
	a	b
020		
026		
030		
083 ¹⁾		
101		
208		

3 position spools			
Code	Spool position		
C			3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008,009, 204, 205	
E	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "0".
F	 Spring offset in position "b".	 Spring offset in position "a".	2 positions. Operated in position "0".
K	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "0".
M	 Spring offset in position "a".	 Spring offset in position "b".	2 positions. Operated in position "0".

2 position spools			
Code	Spool position		
	Standard	Spool type 083	
B	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "b". Operated in position "a".
D	 Operated in position "a" or "b". No center or offset position.		2 positions. Operated in position "a" or "b". No center or offset position.
H	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "a". Operated in position "b".

- ¹⁾ Consider specific spool position.
- ²⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.
- ³⁾ DC only

Ordering Code

2



Seals



Solenoid voltage



Solenoid connector as per **EN 175301-803, without plug** (other connectors are available for D1MW Series)



Solenoid option



Design series (not required for ordering)

Code	Solenoid option
omit	manual override (standard)
T	without manual override
S2 ³⁾	Soft shift orifice size 0.5 mm.
S3 ³⁾	Soft shift orifice size 0.75 mm.
4N ³⁾	with lockable manual override

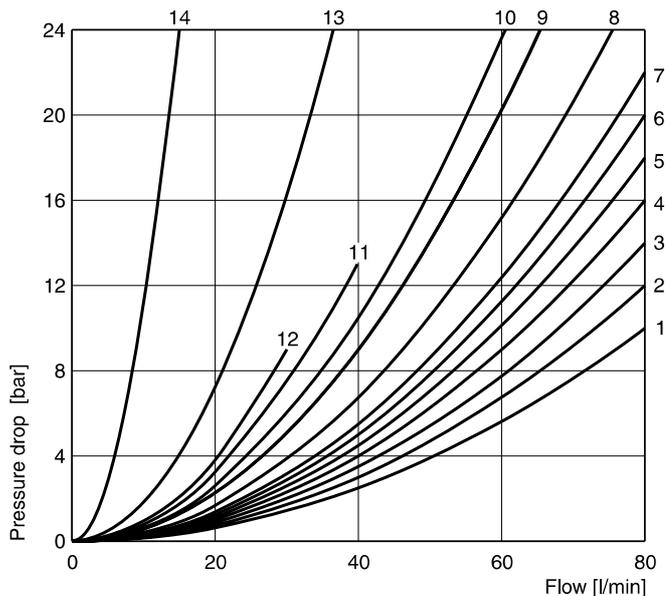
Code	Voltage
K	12 V =
J	24 V =
U ²⁾	98 V =
G ²⁾	205 V =
Y	110 V 50 Hz / 120 V 60 Hz
T	230 V 50 Hz / 240 V 60 Hz

Code	Seals
N	NBR
V	FPM

Bold letters =
Short-term availability

Further spool types, solenoid voltages and connectors on request.

Flow curve



All characteristic curves measured with HLP46 at 50 °C.

Spool	Position "b"			Position "a"			Position "0"				
	P-A	B-T	P-B	P-B	A-T	P-A	P-A	P-B	A-T	B-T	P-T
001	2	2		2	2						
002	1	4		1	4		1	1	5	5	2
003	3	4		3	6				7		
004	2	3		2	3				7	7	
005	2	2		2	2		12				
006	1	4		1	4		7	7			
007	3	2		2	2			3		2	7
010	3			3							
011	2	2		2	2				14	14	
014	3	2		2	2		3		2		7
015	3	6		3	4					7	
016	2	2		2	2			12			
020B	4	4		2	3						
026B	4			4							
030B	2	3		1	2						
034	4		8	3	3				5	7	
035	3	3		4		8			7	5	
081	13	13		13	13						
082	13	13		13	13				1)	1)	
101B	11	10		10	9						
102	1	4		1	4		5	5	8	8	6
61	1	3		1	3		3	2			
83H	5	2		5	2						
208	3			2							
	P-B	A-T		P-A	B-T		P-A	P-B	A-T	B-T	P-T
008	4	5		4	5						9
009	5	5		6	7						7
83B	5	2		5	2						
204	1	3		4	3		7		4		7
205	4	3		1	3			7		4	5

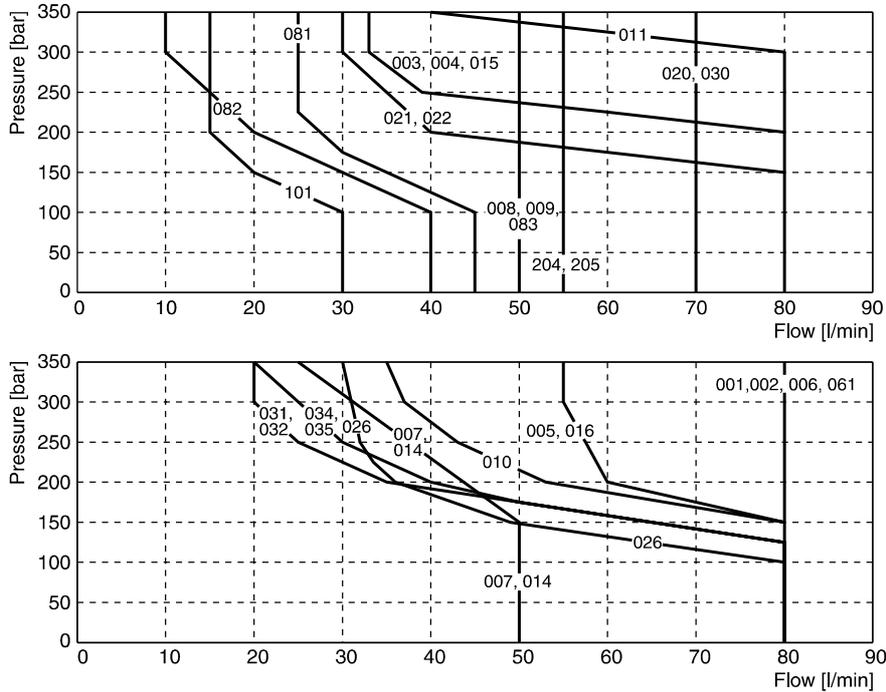
Spool	Position "b"			Position "a"		
	P-A	P-B	A-B	P-B	A-T	
021	2	4		4	2	
	P-A	B-T		P-A	P-B	A-B
022	6	2		5	2	

1) Only for pressure compensation, no high flow possible.

The diagram below specifies the shift limits for valves with DC & AC solenoids. Valves with spool position "F" or "M" can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm²/s and bal-

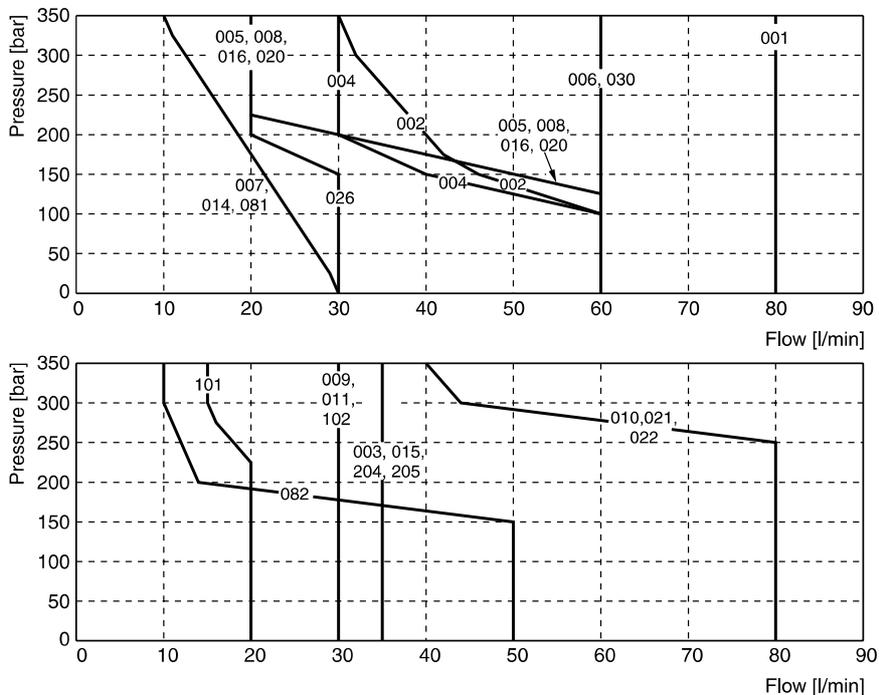
anced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

Valve with standard DC solenoid



Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids

Valve with standard AC solenoid

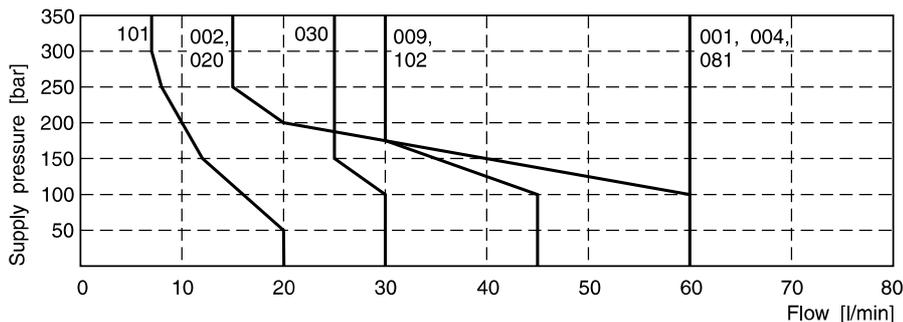


Measured with HLP46 at 50 °C, 95 % U_{nom} and warm solenoids

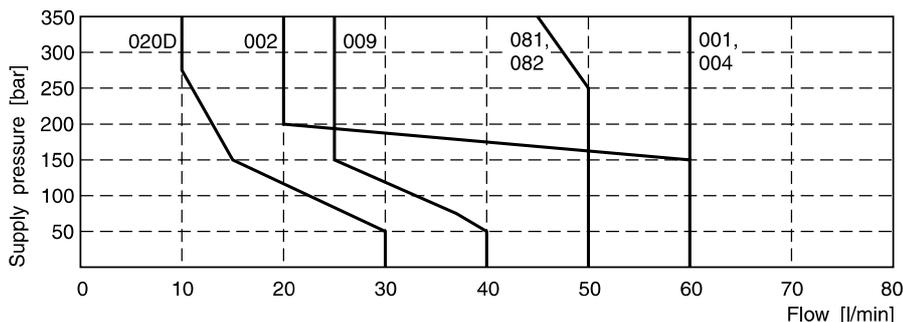
Shift Limits / Response Times

2

Shift limit diagram - Soft shift with 1 DC solenoid



Shift limit diagram - Soft shift with 2 DC solenoids



Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids.

Response times D1VW Standard and Soft Shift [ms]

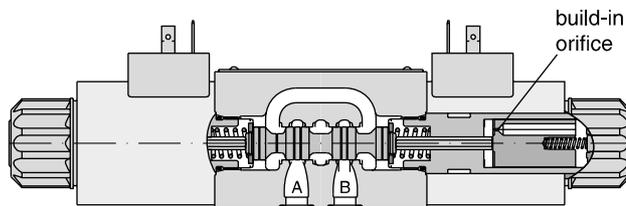
Standard solenoid		Orifice		Energize		De-energize	
Standard DC		w/o		45 - 60		20 - 30	
Standard AC		w/o		13		20	
Standard DC with rectifier plug		w/o		60 - 70		70 - 90	

Response times soft shift		2 solenoid valve		2 solenoid valve		1 solenoid valve	
		3 positions		3 positions		2 positions	
Code	Orifice size	Center position: Closed		Center position: Open		Energize	De-energize
		Energize	De-energize	Energize	De-energize		
S2	0.50 mm	200 - 750	310 - 650	220 - 400	350 - 750	90 - 350	160 - 500
S3	0.75 mm	180 - 300	300 - 400	200 - 350	300 - 500	90 - 350	130 - 350

The lower value applies to small flow rates and low pressure, the upper value to high flow rates and high pressure.

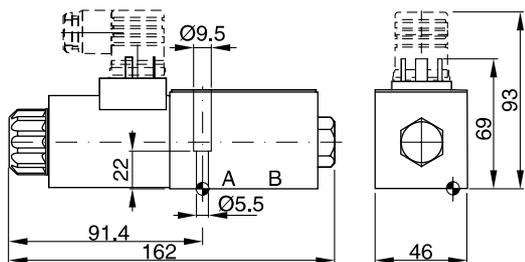
Step response times were obtained under the following conditions: HLP46 at 50 °C with the valve operating at nominal pressure and flow. Published response times are nominal and may vary with spool, flow, pressure and temperature.

Acceleration for orifice size 0.75, code "S3" (measured against a standard valve)

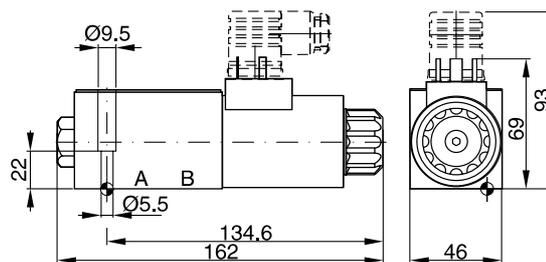


For even softer shifting, the proportional spools 081, 082, 101 and 102 can be used.

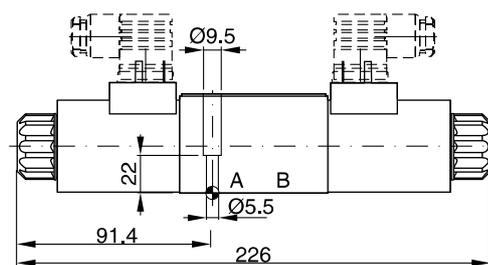
**Interface EN 175301-803, DC solenoid
B, E, F -style**



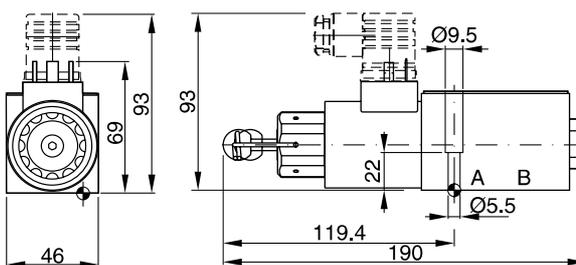
H, K, M -style



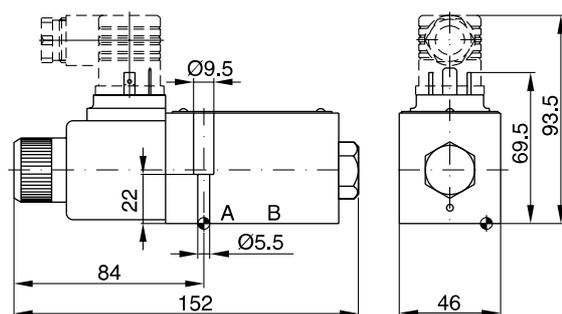
C, D -style



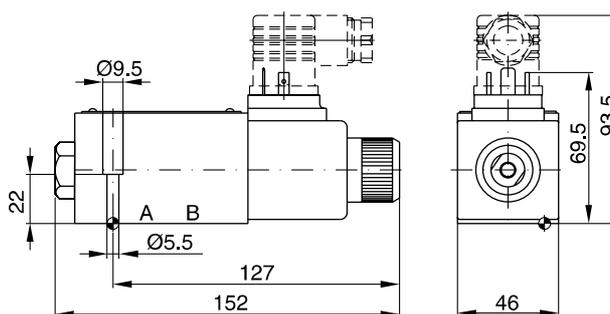
**Option 4N, with lockable manual override
(available for all styles, DC only)**



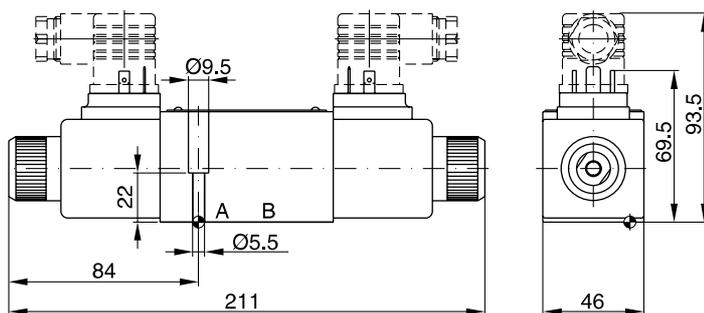
**Interface EN 175301-803, AC solenoid
B, E, F -style**



H, K, M -style



C, D -style

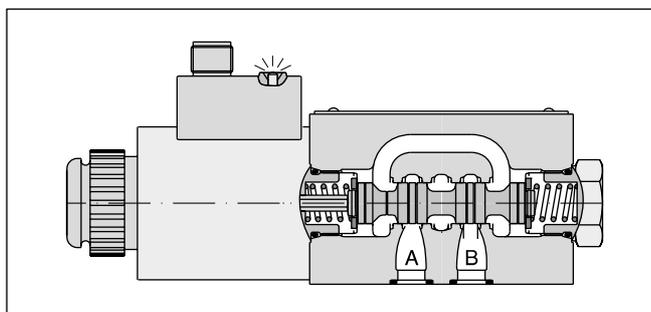
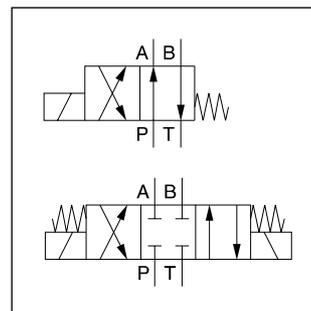


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ $\square_{0.01/100}$	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VW-N-91 FPM: SK-D1VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

Characteristics

The D1VW 8 Watt series is based on the standard D1VW design. The low watt, low current (<0.5 A) solenoid allows direct connection to a PLC or a bus knot. The valves are offered with standard solenoid connection (as per EN175301-803) and M12 x 1 connection. The version with M12 x 1 connection and LEDs is conform to the DESINA standard (DistributEd and Standardised INstAllation technology) for machine tools and manufacturing systems.



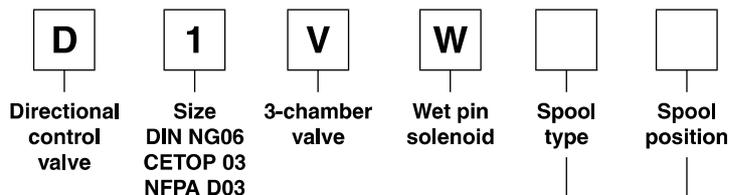
2

Technical data

General		
Design		Directional spool valve
Actuation		Solenoid
Size		DIN NG06 / CETOP 03 / NFPA D03
Mounting interface		DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03
Mounting position		unrestricted, preferably horizontal
Ambient temperature	[°C]	-25...+60
MTTF _D value	[years]	150
Weight	[kg]	1.5 (1 solenoid), 2.1 (2 solenoids)
Vibration resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6
		30 Random noise 20...2000 Hz acc. IEC 68-2-36
		15 Shock acc. IEC 68-2-27
Hydraulic		
Max. operating pressure	[bar]	P, A B: 350, T: 210
Fluid		Hydraulic oil according to DIN 51524
Fluid temperature	[°C]	-20 ... +70 (NBR: -25...+70)
Viscosity permitted	[cSt] / [mm ² /s]	2.8...400
Viscosity recommended	[cSt] / [mm ² /s]	30...80
Filtration		ISO 4406 (1999); 18/16/13
Flow max.	[l/min]	60 (see shift limits)
Leakage at 50 bar	[ml/min]	Up to 10 per flow path, depending on spool
Static / Dynamic		
Step response at 95 %	[ms]	Energized: 80...120; De-energized: 35...55
Electrical characteristics		
Duty ratio		100 % ED; CAUTION: coil temperature up to 70 °C possible
Max. switching frequency	[1/h]	10000
Protection class		IP65 in acc. with EN 60529, M12x1 IP67 (each with correctly mounted plug-in connector)
	Code	J
Supply voltage	[V]	24 V =
Tolerance supply voltage	[%]	±10
Current consumption	[A]	0.33
Power consumption	[W]	8
Solenoid connection		Connector as per EN 175301-803, solenoid identification as per ISO 9461 (code W), Plug M12x1 on coil as per IEC 61076-2-101 (code D).
Wiring min.	[mm ²]	3 x 1.5 recommended
Wiring length max.	[m]	50 recommended

With electrical connections the protective conductor (PE ⊥) must be connected according to the relevant regulations.

Ordering Code



2

3 position spools	
Code	Spool type
	a 0 b
001	
002	
003	
004	
005	
006	
007	
008 ¹⁾	
009 ¹⁾	
010	
011	
014	
015	
016	
081	
082	
102	

2 position spools	
Code	Spool type
	a b
020	
026	
030	
101	

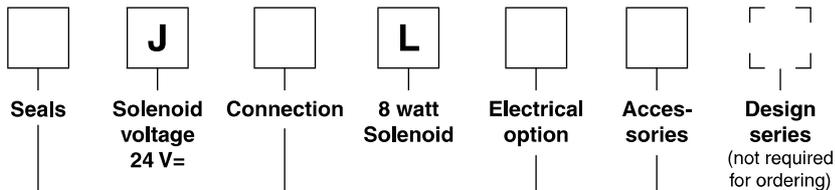
3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008, 009
E	 Operated in position "a".	 Operated in position "b".
	2 positions. Spring offset in position "0".	
K	 Operated in position "b".	 Operated in position "a".
	2 positions. Spring offset in position "0".	

2 position spools		
Code	Spool position	
B		2 positions. Spring offset in position "b". Operated in position "a".
D ²⁾		2 positions. Operated in position "a" or "b". No center or offset position.
H		2 positions. Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.
²⁾ Only for spool 020 available.
³⁾ Please order plug separately.



Ordering Code



Code	Accessories
	Standard valve (in combination with solenoid connection "D" and "W")
5	Always in combination with electrical option „J“

Solenoid identification acc. to ISO 9461

Code	Electrical option
	M12 connector in combination with solenoid connection "D" and "W", see „Pin Assignment“
J	M12 connector in combination with solenoid connection "D", see "Pin Assignment"

Code	Connection
D ³⁾	Connector M12x1 as per IEC 61076-2-101
W ³⁾	Connector as per EN 175301-803

Code	Seals
N	NBR
V	FPM

Bold letters = Short-term availability

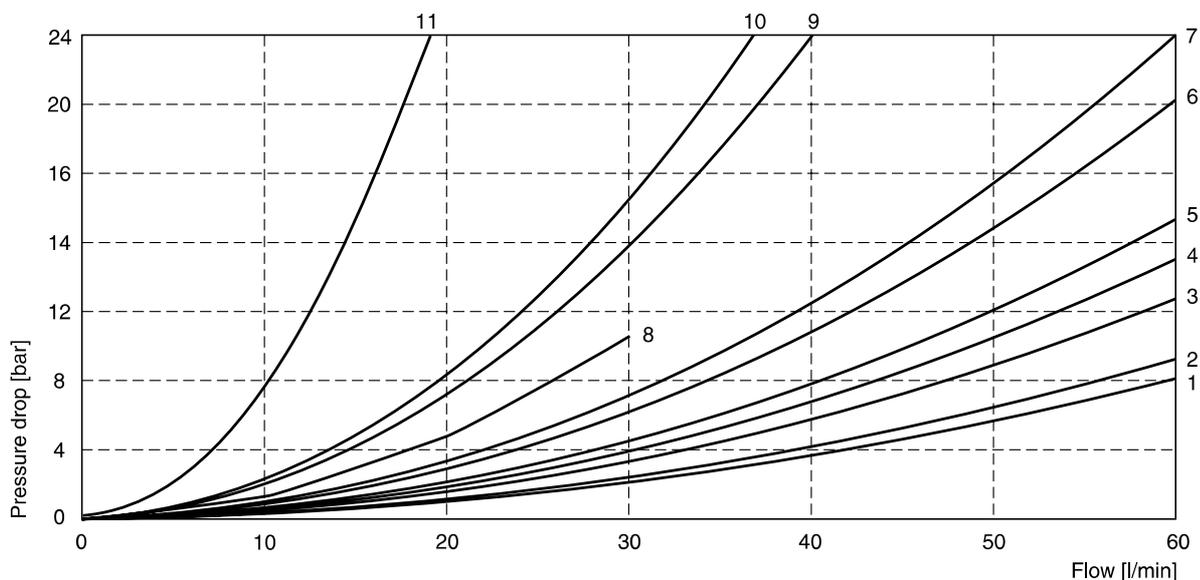
Further spool types on request.
To get a DESINA valve, order the combination: JDLJ5.

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in 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
001	3	3	3	3	-	-	-	-	-
002	3	4	3	4	1	1	3	3	1
003	4	4	4	5	-	-	4	-	-
004	3	4	3	4	-	-	4	4	-
005	3	3	3	3	8 (max. 30l)	-	-	-	-
006	3	4	3	4	4	4	-	-	-
007	4	3	3	3	-	2	-	1	4
010	4	-	4	-	-	-	-	-	-
011	3	3	3	3	-	-	11 (max. 25l)	11 (max. 25l)	-
014	4	3	3	3	2	-	1	-	4
015	4	5	4	4	-	-	-	4	-
016	3	3	3	3	-	8 (max. 30l)	-	-	-
020B	4	4	3	4	-	-	-	-	-
026B	4	-	4	-	-	-	-	-	-
030B	3	4	4	3	-	-	-	-	-
081	9	10	9	10	-	-	-	-	-
082	9	10	9	10	-	-	-	-	-
101B	4 (max. 40l)	7	7	6	-	-	-	-	-
102	3	4	3	4	3	3	5	5	3
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T
008	4	5	4	5	-	-	-	-	6
009	5	5	5	5	-	-	-	-	4

Flow curve diagram



All characteristic curves measured with HLP46 at 50 °C.

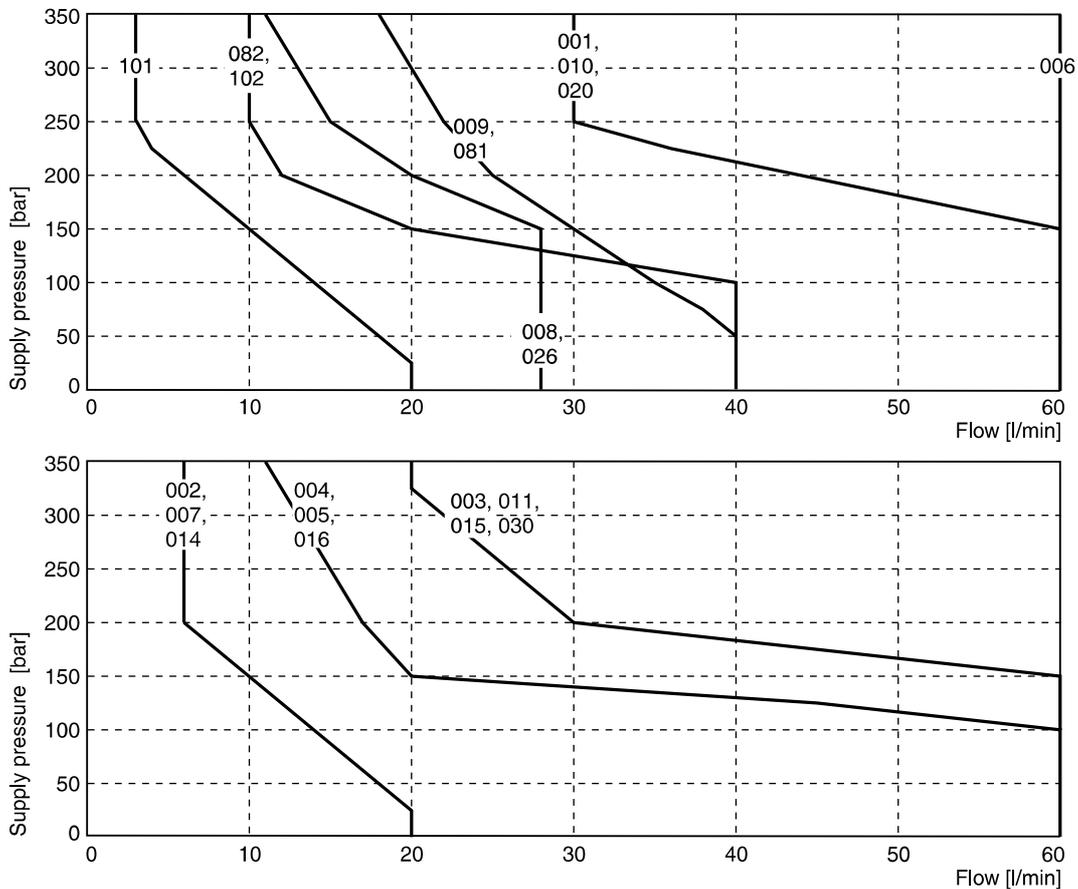
D1VW-8W UK.indd 24.04.2019



The diagram below specifies the shift limits. The specifications apply to a viscosity of 40 mm²/s and balanced flow conditions. The shift limits can be considerably lower at

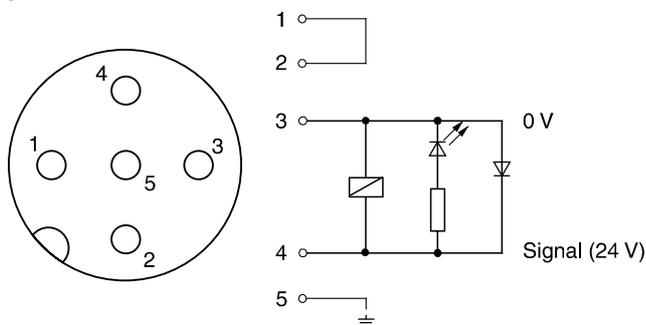
unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

Shift limits

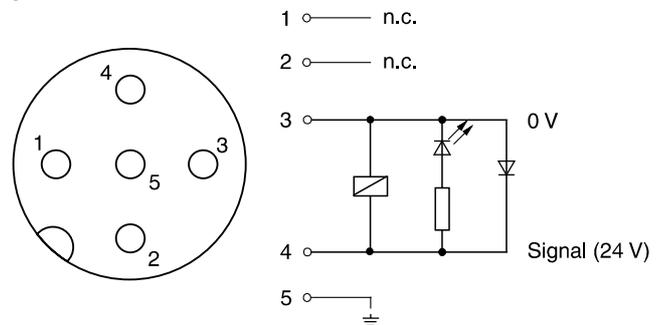


Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids.

**M12 pin assignment DESINA design,
code „JDLJ5“,
pins 1 and 2 connected ¹⁾**



**M12 pin assignment,
code “JDL“,
pins 1 and 2 not connected ¹⁾**

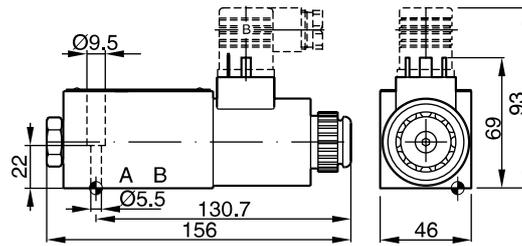
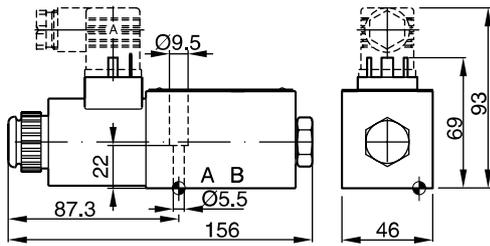


¹⁾ Surge diode with LED, max. voltage peak 50 V

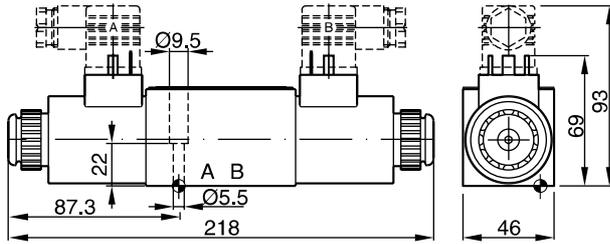
Dimensions

Interface EN 175301-803, DC solenoid, JWL
Style B, E

Style H, K

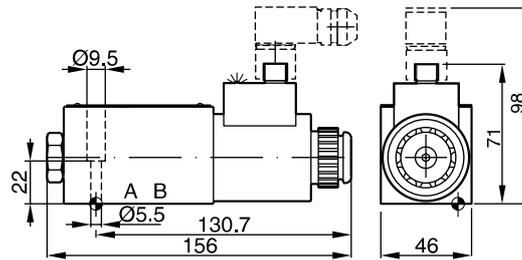
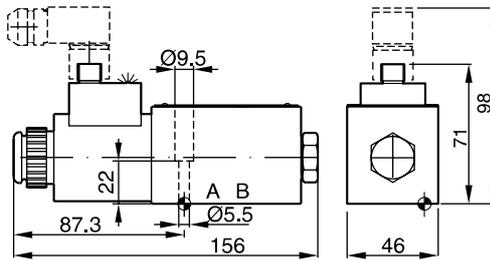


Style C, D

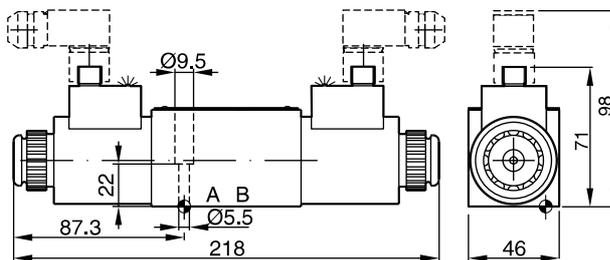


M12x1 connector, DC solenoid, JDLJ5 (DESINA) or JDL
Style B, E

Style H, K



Style C, D



Surface finish	 Kit	 Kit	 Kit	 Kit
$\sqrt{R_{max}6.3}$ 	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VW-N-91 FPM: SK-D1VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

The direct operated directional valves series D1VW with inductive position control are typically used in safety relevant applications. The start or end position can be monitored. The position control is available for single and double solenoid valves.

The fail-safe position of the directional valve during power failure is the spring offset or center position.

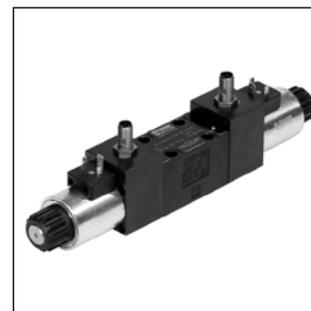
Please find detailed information on the machine directive in the position paper in chapter 1.

Attention:

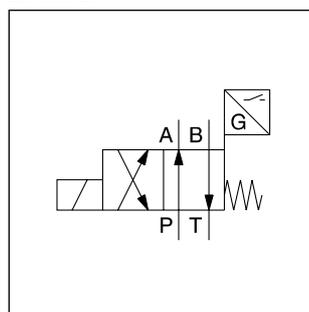
The adjustment of the position control is factory set and sealed. Replacement and repairs can only be undertaken by the manufacturer.



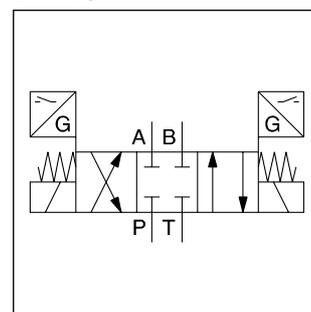
D1VW*B



D1VW*C

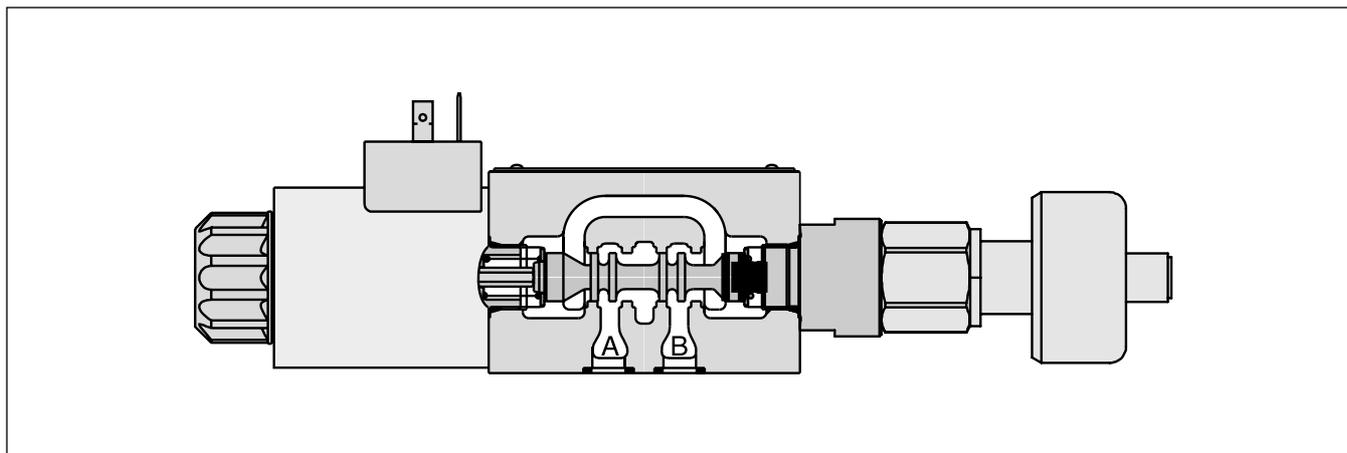


D1VW*B

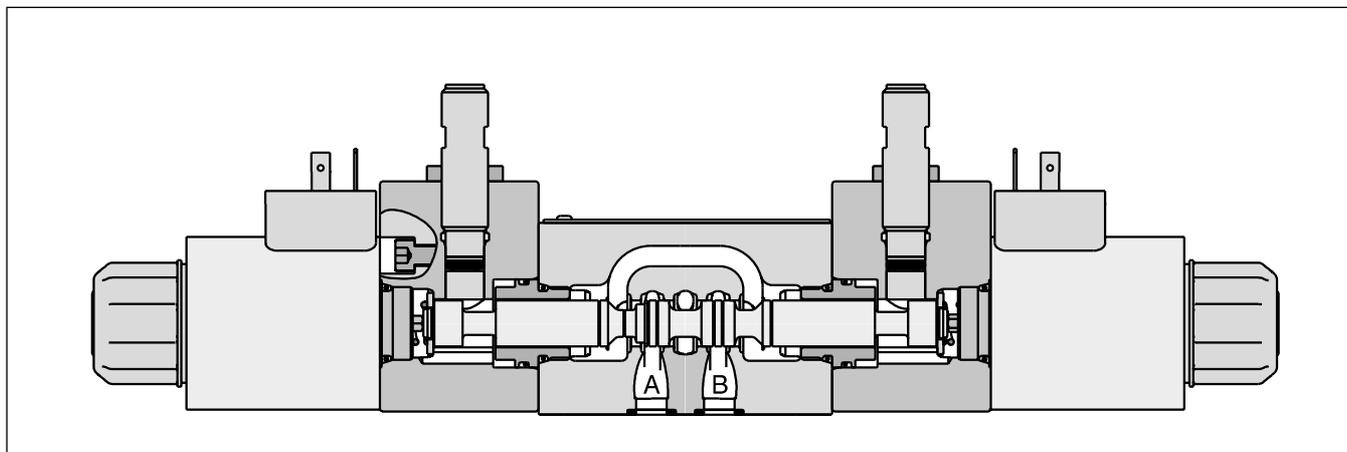


D1VW*C

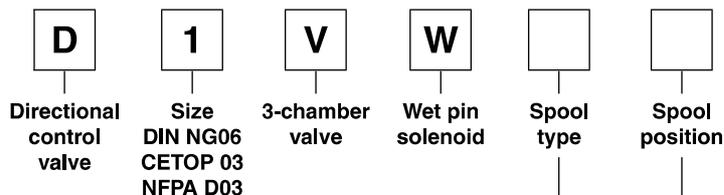
D1VW*B



D1VW*C



2



3 position spools	
Code	Spool type
001	a 0 b
002	
003 ¹⁾	
004	
005	
015 ²⁾	
016	
076	
078	

2 position spools	
Code	Spool type
020	a b
026 ³⁾	
030 ³⁾	

3 position spools		
Code	Spool position	
E	 Operated in position "a".	2 positions. Spring offset in position "0".
F	 Spring offset in position "b".	2 positions. Operated in position "0".
K	 Operated in position "b".	2 positions. Spring offset in position "0".
M	 Spring offset in position "a".	2 positions. Operated in position "0".

2 position spools		
Code	Spool position	
B	 Operated in position "b".	2 positions. Spring offset in position "b". Operated in position "a".
H	 Operated in position "a".	2 positions. Spring offset in position "a". Operated in position "b".

¹⁾ Only available for spool position "E" and "F".

²⁾ Only available for spool position "K" and "M".

³⁾ Only available for spool position "B" and "H".

⁴⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.

⁵⁾ Please order female connector M12x1 separately (see accessories, female connector M12x1 (order no.: 5004109).

⁶⁾ For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessory "I4N" or "I5N" (start position monitored) are required.



Seals



Solenoid voltage



Connector as per EN 175301-803, without plug (please order plug separately)



Manual override option



Position control ⁵⁾



Design series (not required for ordering)

Code	Position control	Spool position
I2N	End position monitored side B	E, F, B (Solenoid on a-side)
I5N⁶⁾	Start position monitored side B	
I1N	End position monitored side A	K, M, H (Solenoid on b-side)
I4N⁶⁾	Start position monitored side A	

Code	Manual override
omit	manual override (Standard)
T ⁶⁾	without manual override

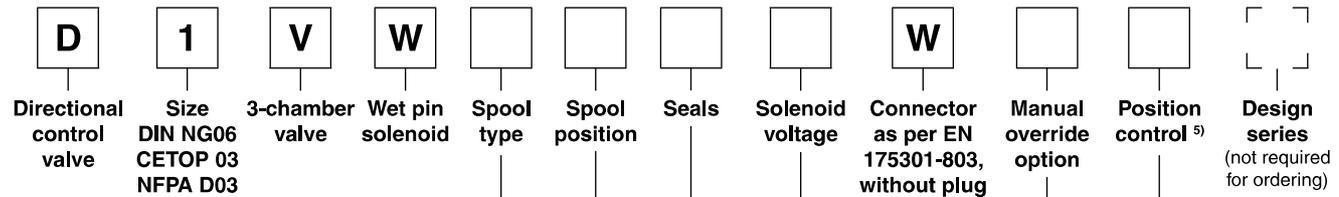
Code	Voltage
K	12 V=
J	24 V=
U ⁴⁾	98 V=
G ⁴⁾	205 V=

Code	Seals
N	NBR
V	FPM

Bold letters =
Short-term availability

Further spool types and voltages on request.

2



D
Directional control valve

1
Size
DIN NG06
CETOP 03
NFFPA D03

V
3-chamber valve

W
Wet pin solenoid

Spool type

Spool position

Seals

Solenoid voltage

W
Connector as per EN 175301-803, without plug (please order plug separately)

Manual override option

Position control ⁵⁾

Design series (not required for ordering)

3 position spools	
Code	Spool type
001	a 0 b
002	
003 ¹⁾	
004	
015 ¹⁾	

2 position spools	
Code	Spool type
020	a b

3 position spools	
Code	Spool position
C	<p>3 positions. Spring offset in position "0". Operated in position "a" or "b".</p>

2 position spools	
Code	Spool position
D ²⁾	<p>2 positions. Operated in position "a" or "b". No center or offset position.</p>

Code	Position control	Spool position
I3N	End positions	C, D
I6N ⁴⁾	Start positions	C

Code	Manual override
omit	manual override (Standard)
T ⁴⁾	without manual override

Code	Voltage
K	12 V=
J	24 V=
U ³⁾	98 V=
G ³⁾	205 V=

Code	Seals
N	NBR
V	FPM

Further spool types and voltages on request.

¹⁾ Only for position control code "I6N".

²⁾ Only for position control code "I3N".

³⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.

⁴⁾ For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessory "I6N" (start positions) is required.

⁵⁾ Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

General					
Design	Directional spool valve				
Actuation	Solenoid				
Size	DIN NG06 / CETOP 03 / NFPA D03				
Mounting interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03				
Mounting position	unrestricted, preferably horizontal				
Ambient temperature	[°C]	-20...+60			
MTTF _D value	[years]	150			
Weight	[kg]	1.8 (1 solenoid) / 3.8 (2 solenoids)			
Hydraulic					
Max. operating pressure	[bar]	P, A B: 350 ; T: 210			
Fluid	Hydraulic oil according to DIN 51524				
Fluid temperature	[°C]	-20 ... +70			
Viscosity permitted	[cSt] / [mm ² /s]	2.8...400			
Viscosity recommended	[cSt] / [mm ² /s]	30...80			
Filtration	ISO 4406 (1999); 18/16/13				
Flow max.	[l/min]	80 (see shift limits)			
Leakage at 50 bar	[ml/min]	Up to 10 per flow path, depending on spool			
Static / Dynamic					
Step response at 95 %	[ms]	Energized: 32 ; De-energized: 40			
Electrical characteristics					
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible				
Max. switching frequency	[1/h]	15000			
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)				
	Code	K	J	U	G
Supply voltage	[V]	12 V =	24 V =	98 V =	205 V =
Tolerance supply voltage	[%]	±10	±10	±10	±10
Current consumption	[A]	2.72	1.29	0.33	0.13
Power consumption	[W]	32.7	31	31.9	28.2
Solenoid connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461.				
Wiring min.	[mm ²]	3 x 1.5 recommended			
Wiring length max.	[m]	50 recommended			

With electrical connections the protective conductor (PE \downarrow) must be connected according to the relevant regulations.

Position Control

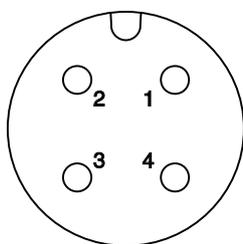
Single solenoid valves

Electrical characteristics of position control as per IEC 61076-2-101 (M12x1)

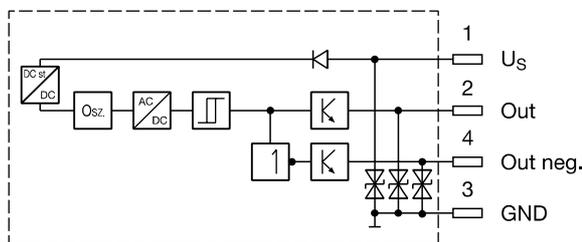
Supply voltage	[VDC]	24
Tolerance supply voltage	[%]	±20
Ripple supply voltage	[%]	≤10
Polarity protection	[V]	300
Current consumption without load	[mA]	≤20
Switching hysteresis	[mm]	<0.06
Max. output current per channel, ohmic	[mA]	250
Ambient temperature	[°C]	-20 ... +60
Protection		IP65 acc. EN 60529 (with correctly mounted plug-in connector)
Min. distance to next AC solenoid	[m]	0.1
Interface		M12x1 to IEC 61076-2-101
CE conform		EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204

2

M12 pin assignment



- 1 + U_s 19.2...28.8 V
- 2 Out B: normally open
- 3 0V
- 4 Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured that only the flow paths of the offset position are granted.

End position monitored:

The inductive switch gives a signal before the end position is reached (above 85 % spool stroke).

The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately (see accessories, plug M12x1; order no.: 5004109).

¹⁾ Only guaranteed with screened cable and female connector

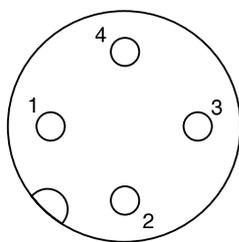
Double solenoid valves

Electrical characteristics of position control as per IEC 61076-2-101 (M12x1)

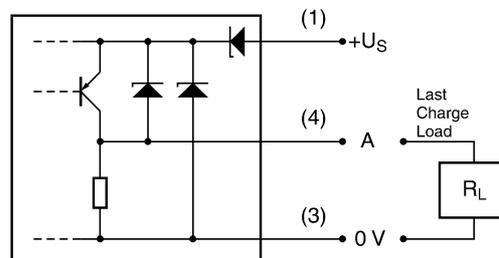
Protection class		IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient temperature	[°C]	-20...+60
Supply voltage U_s / ripple	[V]	10...30 / ± 10 %
Current consumption without load	[mA]	≤ 10
Max. output current per channel, ohmic	[mA]	200
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2 A	[V]	≤ 2
EMC		EN61000-6-4 / EN61000-6-2
Min. distance to next AC solenoid	[m]	> 0.1
Interface		M12x1 acc. to IEC 61076-2-101
Wiring min.	[mm ²]	3 x 0.14 braided shield recommended
Wiring length max.	[m]	50 recommended

2

M12 pin assignment



- 1 U_s 10...30 V
- 2 not connected
- 3 0 V
- 4 Out A: normally open



Definitions

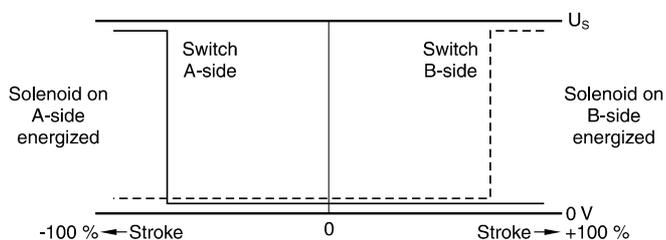
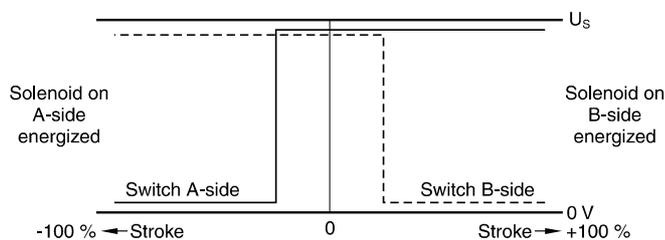
Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured that only the flow paths of the offset position are granted.

End position monitored:

The inductive switch gives a signal before the end position is reached (above 85 % spool stroke).

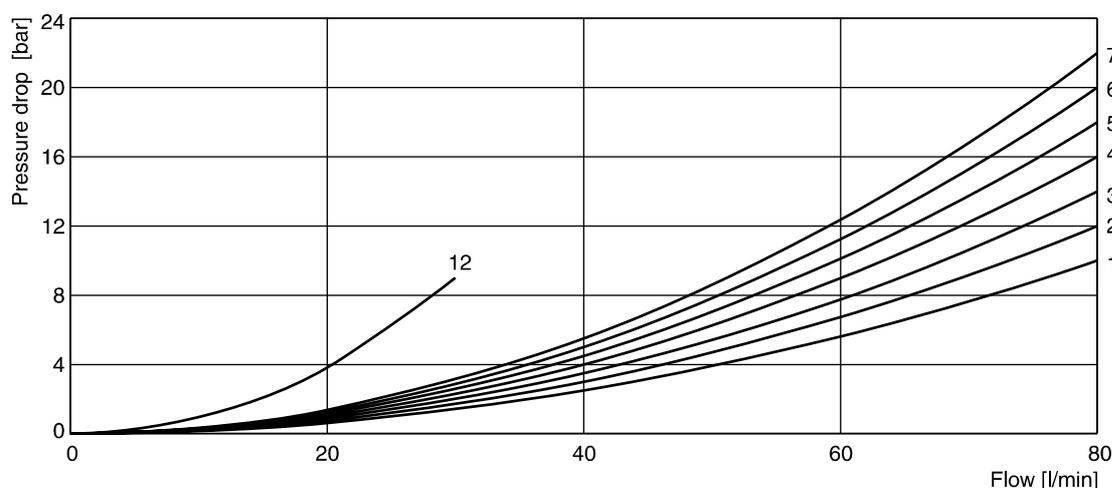


Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

The flow curve diagram shows the flow versus pressure drop for each spool type, operating position and flow direction is given in 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
001	2	2	2	2	-	-	-	-	-
002	1	4	1	4	1	1	5	5	2
003	3	4	3	6	-	-	7	-	-
004	2	3	2	3	-	-	7	7	-
005	2	2	2	2	12	-	-	-	-
015	3	6	3	4	-	-	-	7	-
016	2	2	2	2	-	12	-	-	-
020 B	4	4	2	3	-	-	-	-	-
026 B	4	-	4	-	-	-	-	-	-
030 B	2	3	1	2	-	-	-	-	-

Flow curve diagram

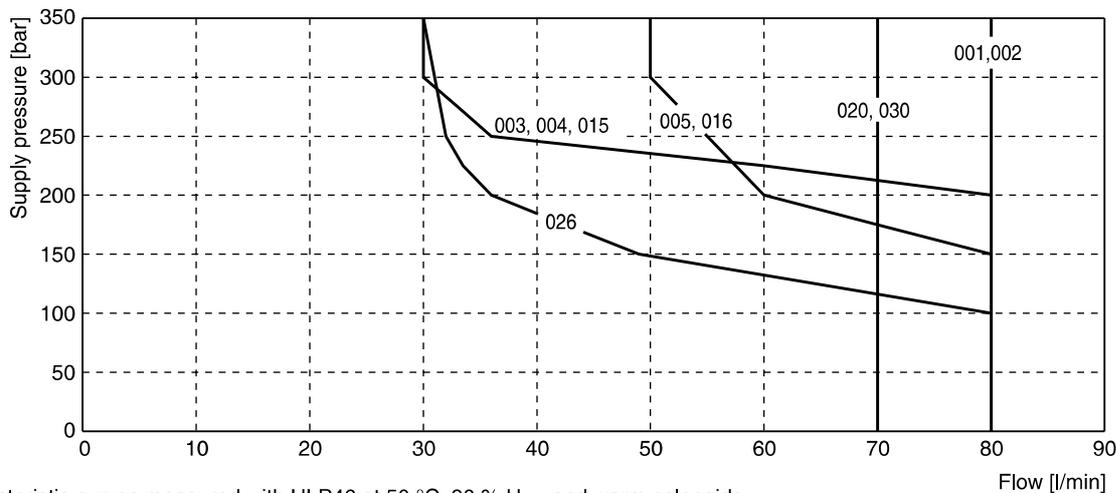


All characteristic curves measured with HLP46 at 50 °C.

Shift limit diagram

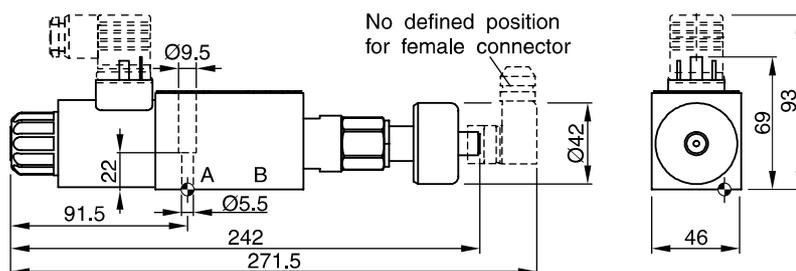
The diagram below specifies the shift limits. Valves with spool position “F” or “M” can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm²/s and balanced flow conditions. The shift limits can

be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

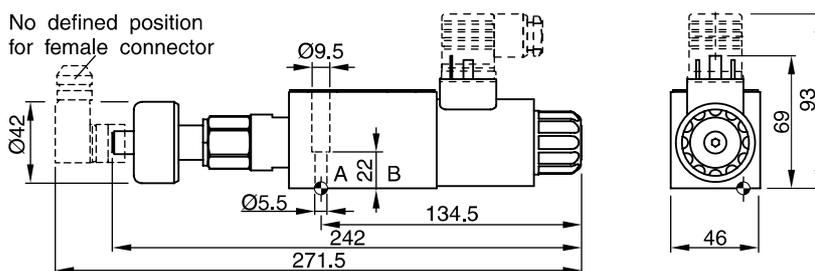


All characteristic curves measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids.

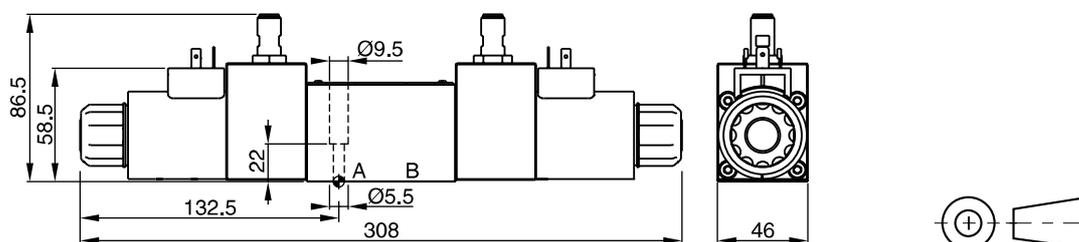
Interface EN 175301-803, DC solenoid, without plug M12x1¹⁾
B, E, F -style



H, K, M -style



Interface EN 175301-803, DC solenoid, without plug M12x1²⁾
C, D -style



Surface finish	Kit	Kit	Kit	Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VW-N-91 FPM: SK-D1VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
 The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.
 The space necessary to remove the M12x1 female connector is at least 22 mm.

Attention:

The adjustment of the position control is factory set and sealed. Replacement and repairs can only be undertaken by the manufacturer.

- ¹⁾ Please order plug M12x1 separately (see accessories, plug M12x1; order no.: 5004109).
- ²⁾ Please order plug M12x1 separately. Straight plug recommended – no defined position possible for angled plug.

Characteristics

The D1VW with explosion proof solenoids is based on the standard D1VW series. The specific solenoid design allows the usage in hazardous environments.

The explosion proof class is

CE Ex II 2 G
Ex e mb IIC T4 Gb

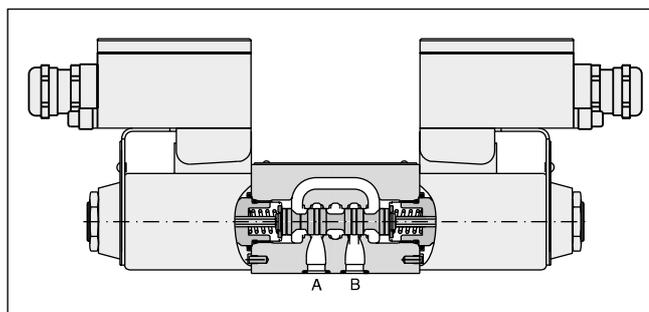
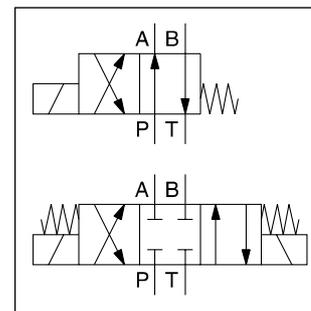
for use in zone 1 and 2 (according to ATEX). Additionally the solenoids are IECEx compliant.

All explosion proof solenoids are DC design. The valves for AC operate with integrated rectifier.

For further explosion proof valves please refer to catalogue MSG11-3343/UK.

Download of the PDF file at www.parker.com/ISDE, see "Support".

2



Technical data

General				
Design	Directional spool valve			
Actuation	Solenoid			
Size	DIN NG06 / CETOP 03 / NFPA D03			
Mounting interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03			
Mounting position	unrestricted, preferably horizontal			
Ambient temperature	[°C] -20 ... +60			
MTTF _D	[years] 150			
Weight	[kg] 1.8 (1 solenoid), 2.7 (2 solenoids)			
Hydraulic				
Max. operating pressure	[bar] P, A B: 350; T: 210			
Fluid	Hydraulic oil according to DIN 51524			
Fluid temperature	[°C] -20 ... +60			
Viscosity permitted	[cSt] / [mm ² /s] 2.8 ... 400			
Viscosity recommended	[cSt] / [mm ² /s] 30 ... 80			
Filtration	ISO 4406 (1999); 18/16/13			
Flow max.	[l/min] 60 (see shift limits)			
Leakage at 50 bar	[ml/min] Up to 10 per flow path, depending on spool			
Static / Dynamic				
Step response at 95 %	[ms] Energized: 32 (DC), 40 (AC) De-energized: 40 (DC), 75 (AC)			
Electrical characteristics				
Duty ratio	100 % ED; CAUTION: coil temperature up to 135 °C possible			
Max. switching frequency	[1/h] 15000 (DC), 7200 (AC)			
Protection class	CE Ex II 2 G , Ex e mb IIC T4 Gb, IP66 (plugged and mounted correctly)			
	Code	J	N	P
Supply voltage / ripple	[V] 24 V =	230/50 Hz	110/50 Hz	
Tolerance supply voltage	[%] ±10	±10	±10	
Current consumption	[A] 1.0	0.12	0.25	
Power consumption	[W] 24	24	24	
Solenoid connection	Box with M20x1.5 entry for cable glands. Solenoid identification as per ISO 9461.			
Wiring min.	[mm ²] 3 x 1.5 recommended			
Wiring length max.	[m] 50 recommended			

With electrical connections the protective conductor (PE \perp) must be connected according to the relevant regulations.

Ordering Code

**Directional Control Valve
Series D1VW Explosion Proof**

D

Directional control valve

1

**Size
DIN NG06
CETOP 03
NFFPA D03**

V

3-chamber valve

W

Wet pin solenoid

Spool type

Spool position

Seals

Solenoid voltage

E

Connection: Explosion proof with cable glands

E

Solenoid options: Explosion proof Ex e mb IIC and IECEx conformity

Design series (not required for ordering)

3 position spools	
Code	Spool type
	a 0 b
001	
002	
003	
004	
005	
006	
007	
008 1)	
009 1)	
010	
011	
014	
015	
016	
021	
022	
081	
082	
102	

2 position spools	
Code	Spool type
	a b
020	
026	
030	
101	

Code	Voltage
J	24 V=
P	110 V 50 Hz
N	230 V 50 Hz

Code	Seals
N	NBR
V	FPM

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008, 009
E		2 positions. Spring offset in position "0". Operated in position "a". Operated in position "b".
K		2 positions. Spring offset in position "0". Operated in position "b". Operated in position "a".

2 position spools		
Code	Spool position	
B		2 positions. Spring offset in position "b". Operated in position "a".
D		2 positions. Operated in position "a" or "b". No center or offset position.
H		2 positions. Spring offset in position "a". Operated in position "b".

2

1) Consider specific spool position.

Further spool types, styles, and combinations on request.



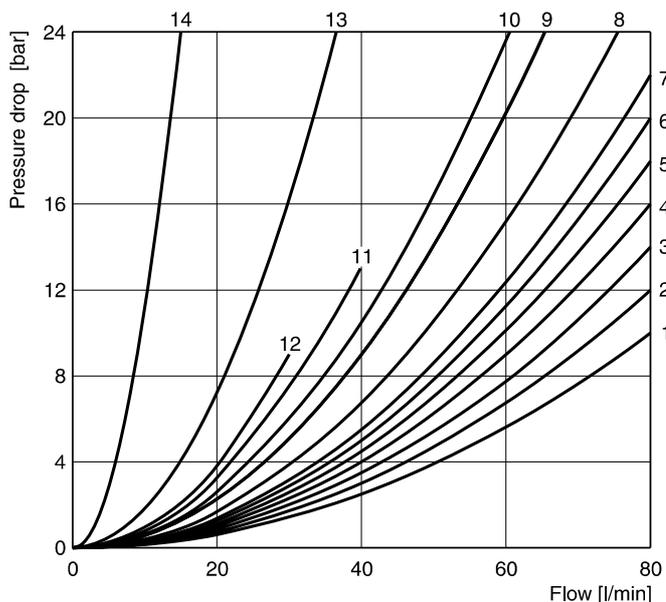
The flow curve diagram shows the flow versus pressure drop for each spool type, operating position and flow direction is given in the table below.

2

Spool	Position "b"			Position "a"			Position "0"				
	P-A	B-T	P-B	P-B	A-T	P-A	P-A	P-B	A-T	B-T	P-T
001	2	2		2	2						
002	1	4		1	4		1	1	5	5	2
003	3	4		3	6				7		
004	2	3		2	3				7	7	
005	2	2		2	2		12				
006	1	4		1	4		7	7			
007	3	2		2	2			3		2	7
010	3			3							
011	2	2		2	2				14	14	
014	3	2		2	2		3		2		7
015	3	6		3	4					7	
016	2	2		2	2			12			
020B	4	4		2	3						
026B	4			4							
030B	2	3		1	2						
081	13	13		13	13						
082	13	13		13	13				1)	1)	
101B	11	10		10	9						
102	1	4		1	4		5	5	8	8	6
	P-B	A-T		P-A	B-T		P-A	P-B	A-T	B-T	P-T
008	4	5		4	5						9
009	5	5		6	7						7

Spool	Position "b"			Position "a"		
	P-A	P-B	A-B	P-B	A-T	
021	2	4		4	2	
	P-A	B-T		P-A	P-B	A-B
022	6	2		5	2	

Flow curve diagram



All characteristic curves measured with HLP46 at 50 °C.

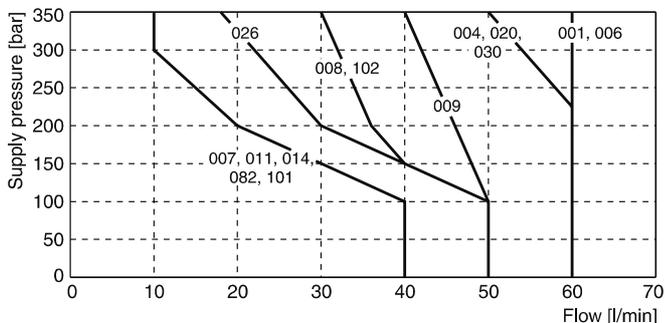
1) Only for pressure compensation, no high flow possible.

The diagram below specifies the shift limits for valves with AC and DC solenoids. The specifications apply to a viscosity of 40 mm²/s and balanced flow conditions. The

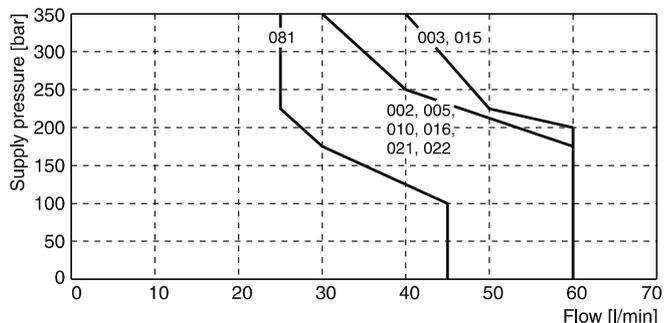
shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

2

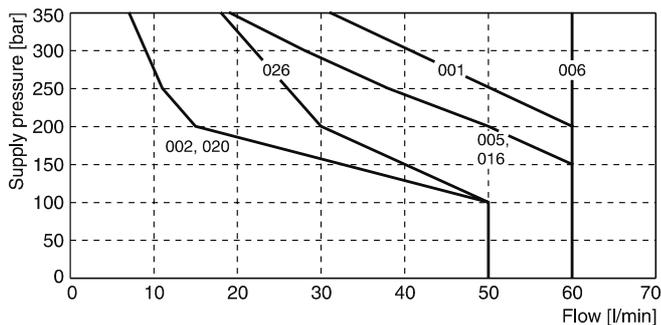
Shift limit diagram with DC solenoid



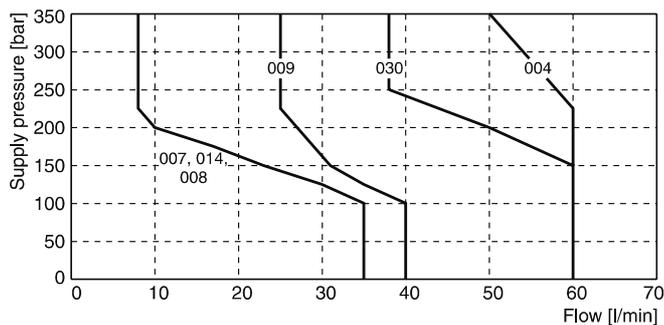
Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids



Shift limit diagram with AC solenoid



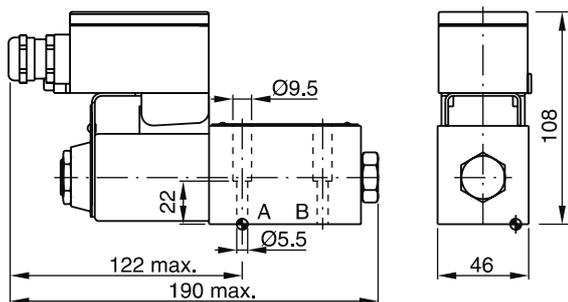
Measured with HLP46 at 50 °C, 95 % U_{nom} and warm solenoids



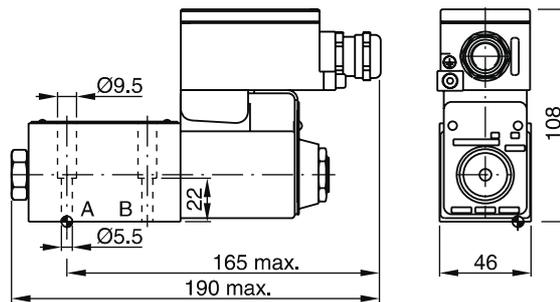
Dimensions

Dimensions

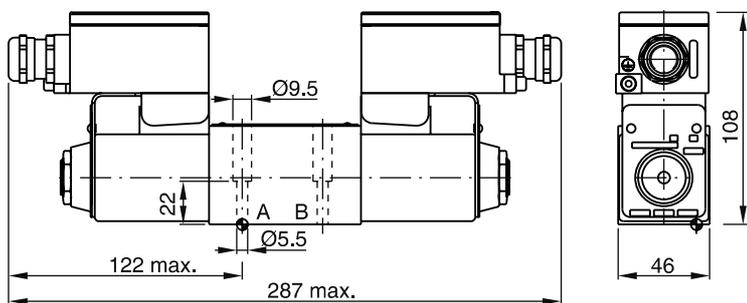
B, E -style

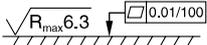


H, K -style



C, D -style



Surface finish	 Kit	 Kit	 Kit	 Kit NBR
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VW-N-91 FPM: SK-D1VW-V-91

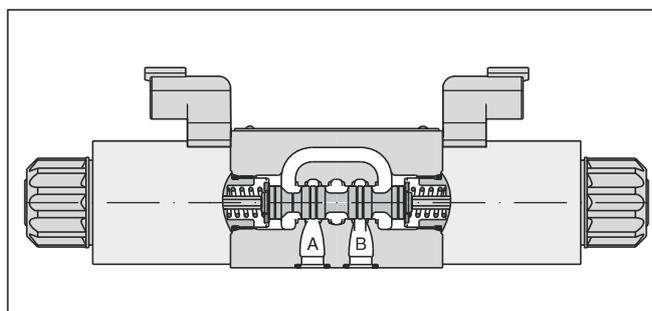
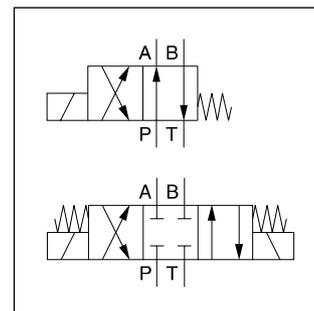
The D1MW is based on the D1VW series of directional control valves size NG06, but offers additional corrosion protection of the valve body, the solenoid coil and the anchor tube as well as the typical solenoid connections for the mobile market such as AMP Junior Timer and DT04-2P "Deutsch".

Technical features

- High corrosion protection (optional)
- Solenoid connection:
 - Standard (as per EN175301-803)
 - AMP Junior Timer
 - DT04-2P "Deutsch"
- Robust design for rough applications
- Extended manual override with rubber cover (optional)



With AMP Junior Timer



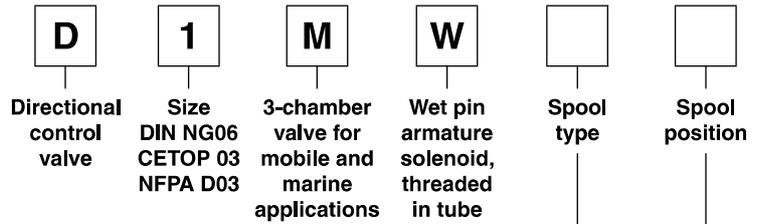
Connector DT04-2P "Deutsch"

Technical data

General			
Design	Directional spool valve		
Actuation	Solenoid		
Size	DIN NG06 / CETOP 03 / NFPA D03		
Mounting interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03		
Mounting position	Unrestricted, preferably horizontal		
Ambient temperature	[°C] -25...+60		
MTTF _D value	[years] 150		
Weight	[kg] 1.5 (1 solenoid), 2.1 (2 solenoids)		
Vibration resistance	10 Sinus 5...2000 Hz acc. IEC 68-2-6		
	30 Random noise 20...2000 Hz acc. IEC 68-2-36		
	15 Shock acc. IEC 68-2-27		
Hydraulic			
Max. operating pressure	[bar] P, A B: 350; T: 210		
Fluid	Hydraulic oil according to DIN 51524		
Fluid temperature	[°C] -20 ... +70 (NBR: -25...+70)		
Viscosity permitted	[cSt] / [mm ² /s] 2.8...400		
Viscosity recommended	[cSt] / [mm ² /s] 30...80		
Filtration	ISO 4406 (1999); 18/16/13		
Flow max.	[l/min] 80 (see shift limits)		
Leakage at 50 bar	[ml/min] Up to 10 per flow path, depending on spool		
Static / Dynamic			
Step response at 95 %	[ms] Energized: 32 De-energized: 40		
Electrical characteristics			
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible		
Max. switching frequency	[1/h] 15000		
Protection class	Standard (as per EN175301-803) IP65 acc. EN60529 (w. corr. mount. plug-in connector) AMP Junior Timer IP67 in acc. with EN60529 (with correctly mounted plug-in connector) DT04-2P "Deutsch" IP69K (with correctly mounted plug-in connector)		
	Code	K	J
Supply voltage	[V]	12 V =	24 V =
Tolerance supply voltage	[%]	±10	±10
Current consumption hold	[A]	2.72	1.29
Power consumption hold	[W]	32.7	31
Solenoid connection	Connector as per EN 175301-803 (code W), AMP Junior Timer (code A), DT04-2P "Deutsch" connector (code J). Solenoid identification as per ISO 9461.		
Wiring min.	[mm ²]	3 x 1.5 recommended	
Wiring length max.	[m]	50 recommended	

With electrical connections the protective conductor (PE \perp) must be connected according to the relevant regulations.

2



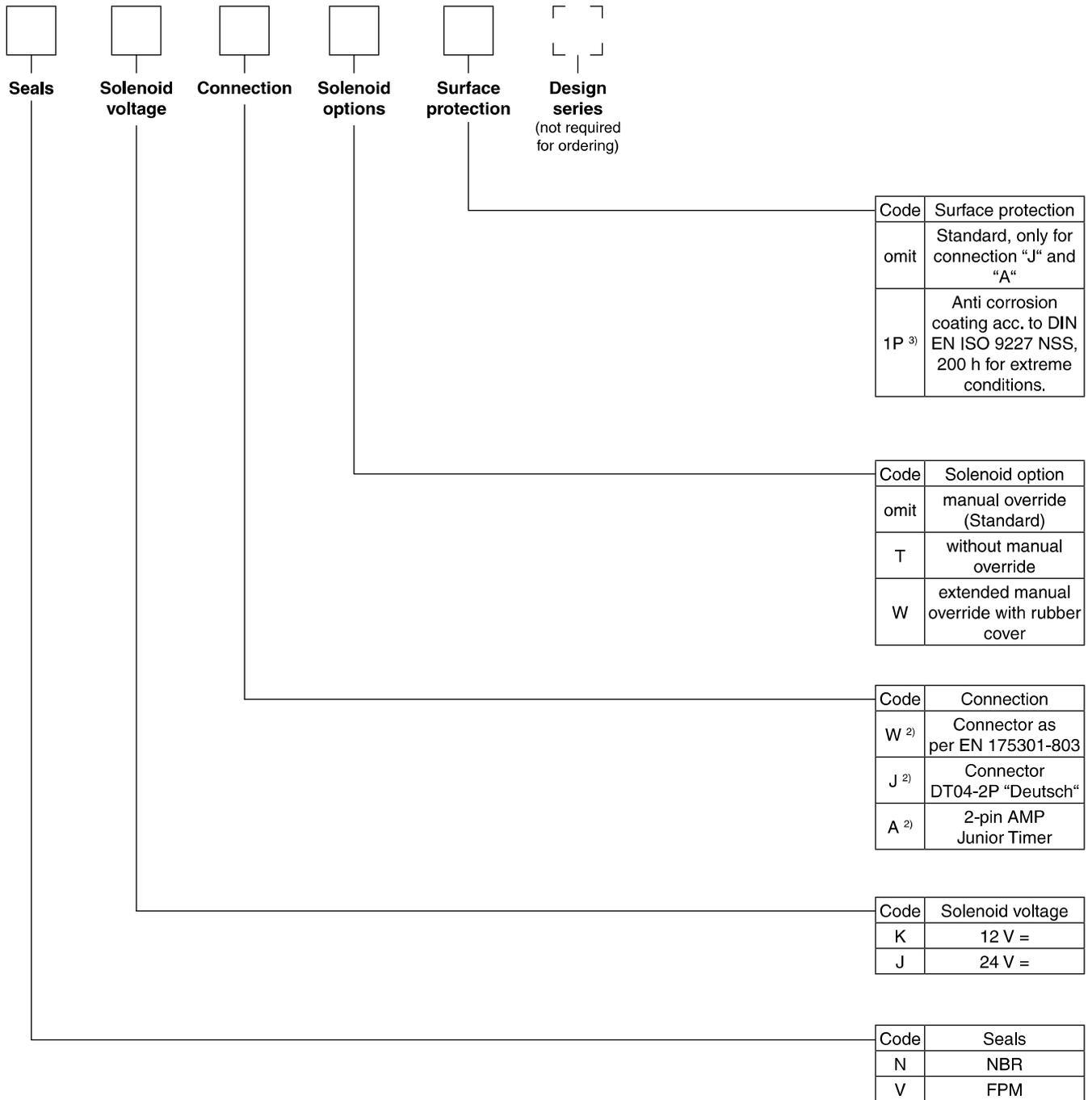
3 position spools		
Code	Spool type	
	a	0 b
001		
002		
003		
004		
005		
006		
007		
008 ¹⁾		
009 ¹⁾		
010		
011		
014		
015		
016		
021		
022		
031		
032		
034		
035		
061		
081		
082		
102		
204 ¹⁾		
205 ¹⁾		

2 position spools		
Code	Spool type	
	a	b
020		
026		
030		
083 ¹⁾		
101		
208		

3 position spools			
Code	Spool position		
C			3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008, 009, 204, 205	
E	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "0".
F	 Spring offset in position "b".	 Spring offset in position "a".	2 positions. Operated in position "0".
K	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "0".
M	 Spring offset in position "a".	 Spring offset in position "b".	2 positions. Operated in position "0".

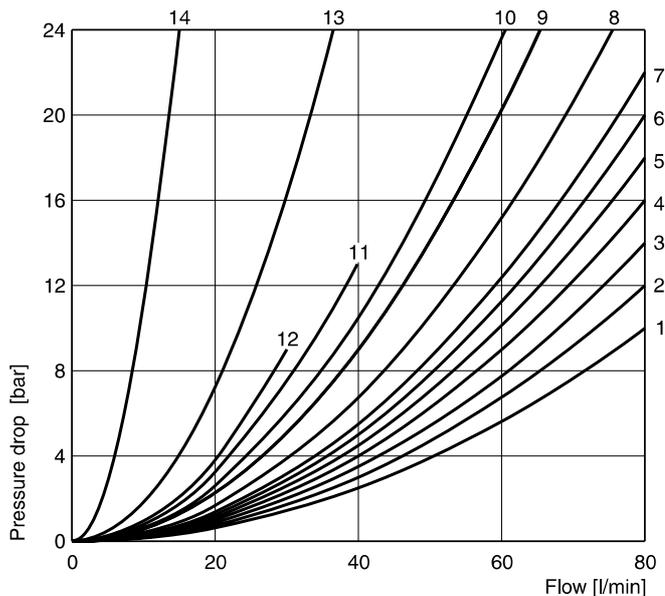
2 position spools			
Code	Spool position		
	Standard	Spool type 083	
B	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "b". Operated in position "a".
D	 Operated in position "a" or "b".	—	2 positions. Operated in position "a" or "b". No center or offset position.
H	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.
²⁾ Please order plug separately.
³⁾ Only in combination with connection "J" and "W".



Other spool types on request.

Flow curves



All characteristic curves measured with HLP46 at 50 °C.

Spool	Position "b"			Position "a"			Position "0"				
	P-A	B-T	P-B	P-B	A-T	P-A	P-A	P-B	A-T	B-T	P-T
001	2	2		2	2						
002	1	4		1	4		1	1	5	5	2
003	3	4		3	6				7		
004	2	3		2	3				7	7	
005	2	2		2	2		12				
006	1	4		1	4		7	7			
007	3	2		2	2			3		2	7
010	3			3							
011	2	2		2	2				14	14	
014	3	2		2	2		3		2		7
015	3	6		3	4					7	
016	2	2		2	2			12			
020B	4	4		2	3						
026B	4			4							
030B	2	3		1	2						
034	4		8	3	3				5	7	
035	3	3		4		8			7	5	
081	13	13		13	13						
082	13	13		13	13				1)	1)	
101B	11	10		10	9						
102	1	4		1	4		5	5	8	8	6
61	1	3		1	3		3	2			
83H	5	2		5	2						
208	3			2							
	P-B	A-T		P-A	B-T		P-A	P-B	A-T	B-T	P-T
008	4	5		4	5						9
009	5	5		6	7						7
83B	5	2		5	2						
204	1	3		4	3		7		4		7
205	4	3		1	3			7		4	5

Spool	Position "b"			Position "a"		
	P-A	P-B	A-B	P-B	A-T	
021	2	4		4	2	
	P-A	B-T		P-A	P-B	A-B
022	6	2		5	2	

1) Only for pressure compensation, no high flow possible.

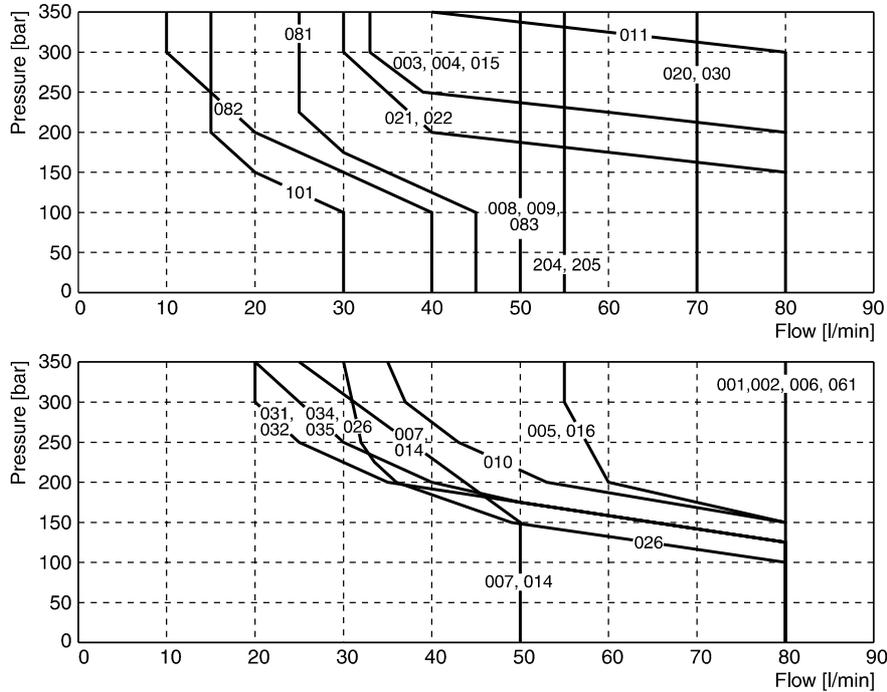


Shift limits, DC voltage

The diagram below specifies the shift limits for valves with DC & AC solenoids. Valves with spool position “F” or “M” can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm²/s and bal-

anced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

2

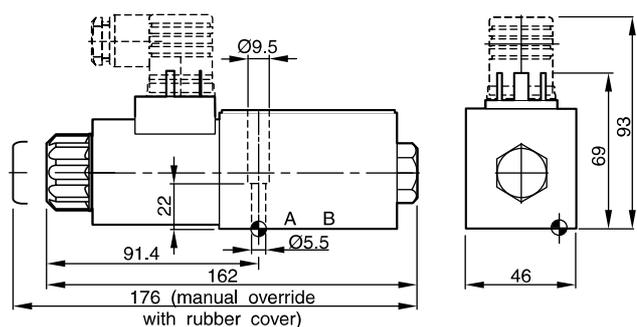


Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids

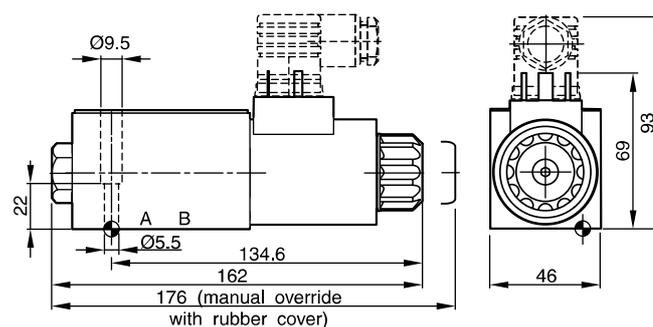
Dimensions

Dimensions with EN 175301-803 Connector

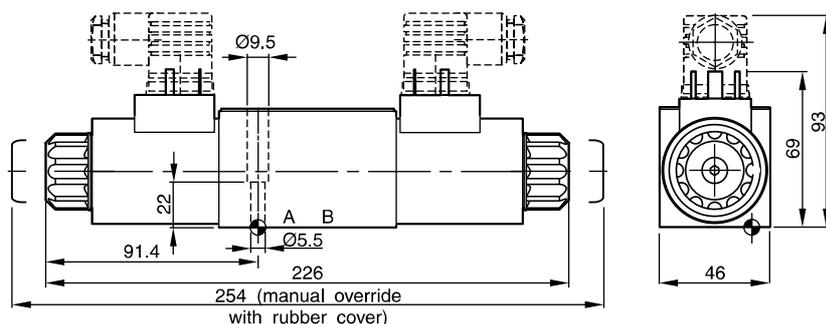
B, E, F-style



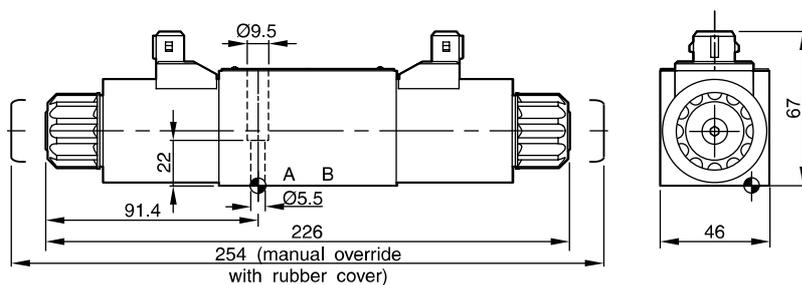
H, K, M-style



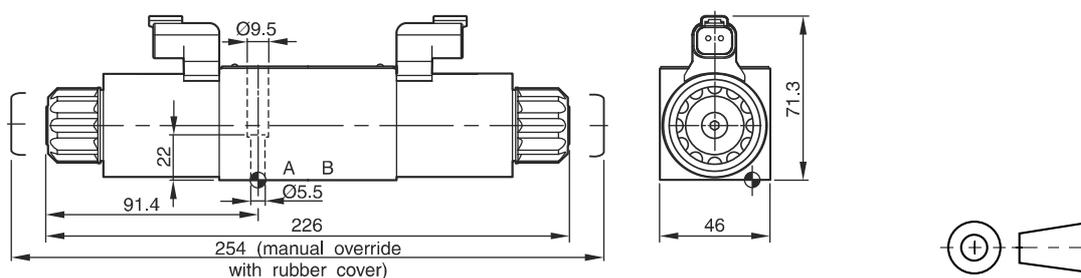
C and D-style

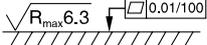


Dimensions with 2pin AMP Junior Timer Connector (only C and D-style shown)



Dimensions with "Deutsch" DT04-2P Connector (only C and D-style shown)



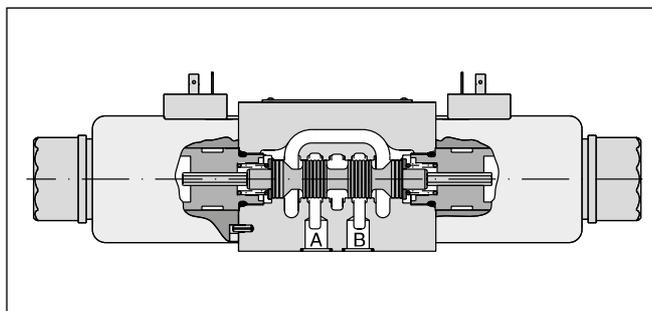
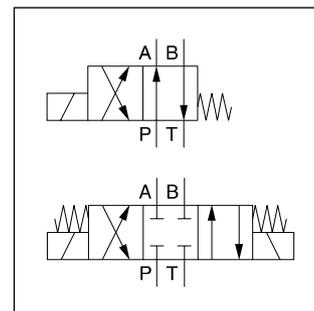
Surface finish	 Kit	 Kit	 Kit	 Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VW-N-91 FPM: SK-D1VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

The NG10 direct operated directional control valve series D3W provides high functional limits up to 150 l/min in combination with a low, energy saving pressure drop.

The wide variety of options includes soft shift anchor tubes for smooth operation.

Versions with position control, additional surface protection and connector variants are shown in the following chapters.

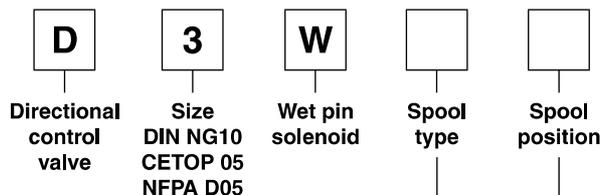


2

Technical data

General							
Design	Directional spool valve						
Actuation	Solenoid						
Size	DIN NG10 / CETOP 05 / NFPA D05						
Mounting interface	DIN 24340 A10 / ISO 4401 / CETOP RP 121-H / NFPA D05						
Mounting position	unrestricted, preferably horizontal						
Ambient temperature	[°C] -25...+60						
MTTF _D value	[years] 150						
Weight	[kg] 4.8 (1 solenoid), 6.3 (2 solenoids)						
Vibration resistance	[g] 10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27						
Hydraulic							
Max. operating pressure	[bar] P, A B: 350; T: 210 (DC), 105 (AC)						
Fluid	Hydraulic oil according to DIN 51524						
Fluid temperature	[°C] -20 ... +70 (NBR: -25...+70)						
Viscosity permitted	[cSt] / [mm ² /s] 2.8...400						
Viscosity recommended	[cSt] / [mm ² /s] 30...80						
Filtration	ISO 4406 (1999); 18/16/13						
Flow max.	[l/min] 150 (DC); 115 (AC) (see shift limits)						
Leakage at 50 bar	[ml/min] Up to 20 per flow path, depending on spool						
Static / Dynamic							
Step response	see table response times						
Electrical characteristics							
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible						
Max. switching frequency	[1/h] 10000						
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)						
	Code	K	J	U	G	Y	T
Supply voltage / ripple	[V]	12 V =	24 V =	98 V =	205 V =	110 V at 50 Hz/ 120 V at 60 Hz	230 V at 50 Hz/ 240 V at 60 Hz
Tolerance supply voltage	[%]	±10	±10	±10	±10	±5	±5
Current consumption hold	[A]	3	1.5	0.35	0.18	0.8 / 0.72	0.4 / 0.36
Current consumption in rush	[A]	3	1.5	0.35	0.18	3.41 / 3.31	1.75 / 1.7
Power consumption hold	[W]	36	36	34	36	88 / 86	88 / 86
Power consumption in rush	[W]	36	36	34	36	375 / 397	385 / 408
Solenoid connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461.						
Wiring min.	[mm ²]	3 x 1.5 recommended					
Wiring length max.	[m]	50 recommended					

With electrical connections the protective conductor (PE ⊥) must be connected according to the relevant regulations.



2

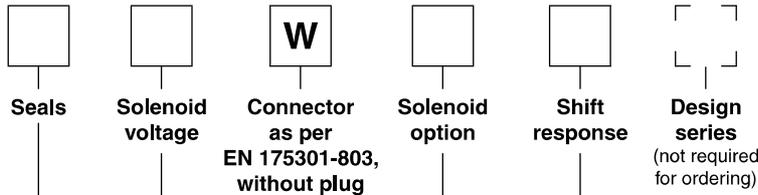
3 position spools	
Code	Spool type
	a 0 b
001	
002	
003	
004	
005	
006	
007	
008 ¹⁾	
009 ¹⁾	
010 ²⁾	
011	
012	
014	
015	
016	
021 ²⁾	
022 ²⁾	
031 ²⁾	
032 ²⁾	
081 ²⁾	
082 ²⁾	
102 ²⁾	

2 position spools	
Code	Spool type
	a b
020	
026	
030	
101 ²⁾	

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008, 009
E	 Operated in position "a".	 Operated in position "b".
F	 Spring offset in position "b".	 Spring offset in position "a".
K	 Operated in position "b".	 Operated in position "a".
M	 Spring offset in position "a".	 Spring offset in position "b".

2 position spools		
Code	Spool position	
B		2 positions. Spring offset in position "b". Operated in position "a".
D		2 positions. Operated in position "a" or "b". No center or offset position.
H		2 positions. Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.
²⁾ Only available for DC voltage.
³⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.
⁴⁾ DC only.



W
 Connector as per EN 175301-803, without plug (Please order plug separately)

Code	Shift response
omit	Standard response
S4 ⁴⁾	orifice diameter 1.0 mm
S7 ⁴⁾	orifice diameter 1.75 mm

Code	Solenoid option
omit	manual override (Standard)
T ⁴⁾	without manual override

Code	Solenoid voltage
K	12 V =
J	24 V =
U ³⁾	98 V =
G ³⁾	205 V =
Y	110 V 50 Hz / 120 V 60 Hz
T	230 V 50 Hz / 240 V 60 Hz

Code	Seals
N	NBR
V	FPM

Bold letters = Short-term availability

Further spool types and solenoid voltages on request.

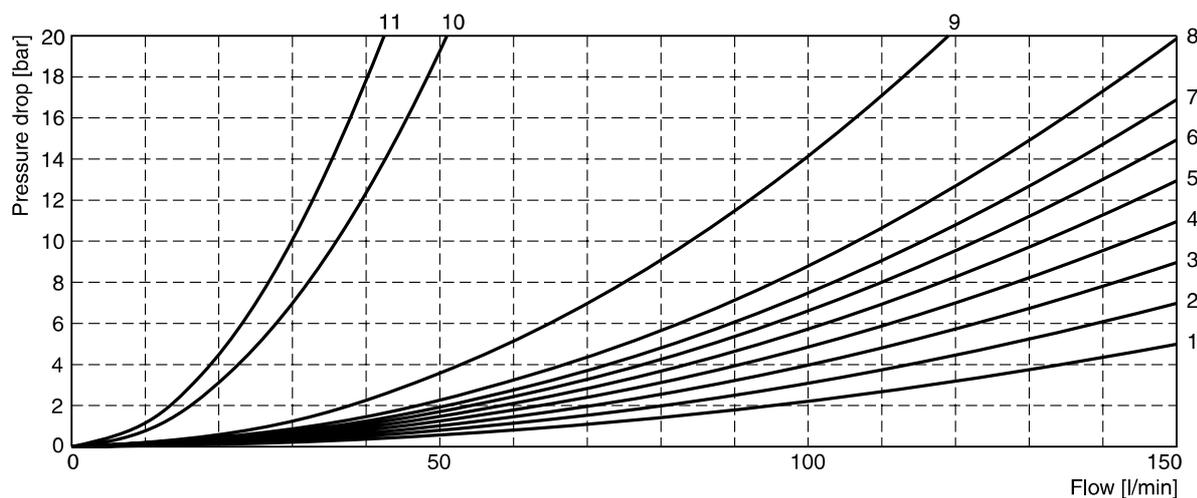
The flow curve diagram shows the flow versus pressure drop curves for all spool types. For each spool type,

operating position and flow direction the relevant curve number is given in 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	
001	6	5	6	6	-	-	-	-	-	-	
002	3	5	3	3	1	1	4	5	1	6	
003	2	2	3	1	-	-	3	-	-	-	
004	5	4	4	4	-	-	8	8	-	9	
005	2	2	2	2	3	-	-	-	-	-	
006	1	2	1	3	2	2	-	-	-	3	
007	2	1	2	2	-	1	-	2	3	-	
010	2	-	2	-	-	-	-	-	-	-	
011	2	2	2	2	-	-	11	11	-	11	
012	1	2	2	2	10	10	10	10	11	11	
014	1	2	2	2	1	-	2	-	3	-	
015	2	1	2	2	-	-	-	3	-	-	
016	2	2	1	2	-	2	-	-	-	-	
020	6	6	5	7	-	-	-	-	-	-	
026	5	-	5	-	-	-	-	-	-	-	
030	4	5	3	5	-	-	-	-	-	-	
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T	A->B	
008	8	7	7	6	-	-	-	-	9	-	
009	4	4	5	8	-	-	-	-	9	-	
Position b		Position a									
	P->A	P->B	A->B	P->B	A->T						
021	2	4	8	3	2						
	P->A	B->T	P->A		P->B	A->B					
022	3	2	3		2	8					

Flow curve diagram

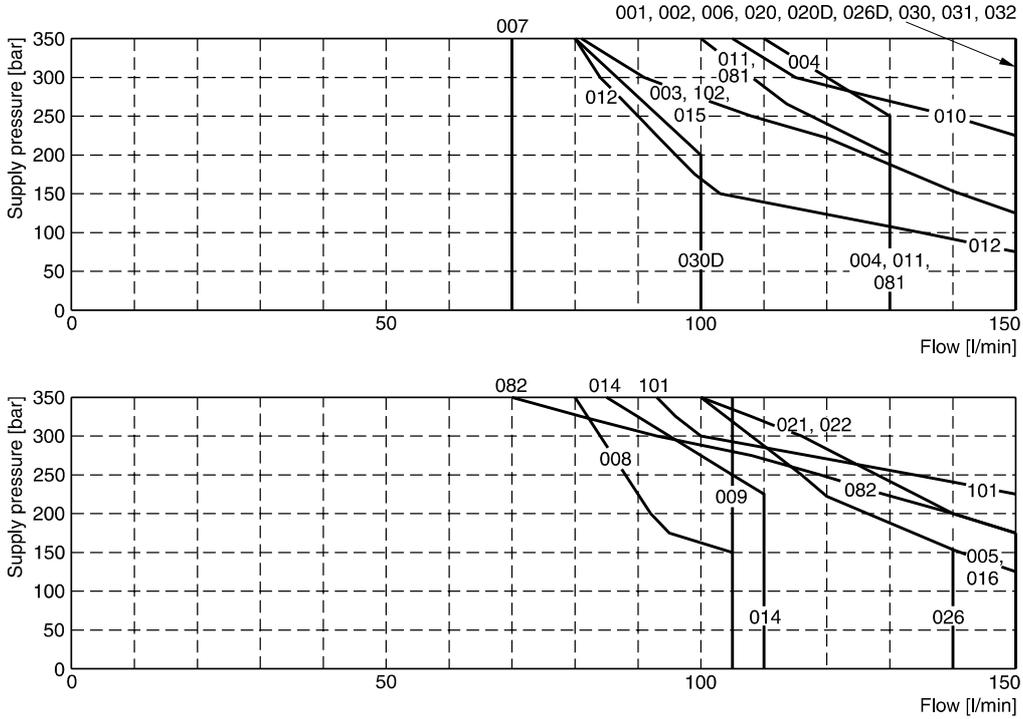


All characteristic curves measured with HLP46 at 50 °C.

The diagrams below specify the shift limits for valves with DC and AC solenoids. Valves with spool position “F” or “M” can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm²/s and bal-

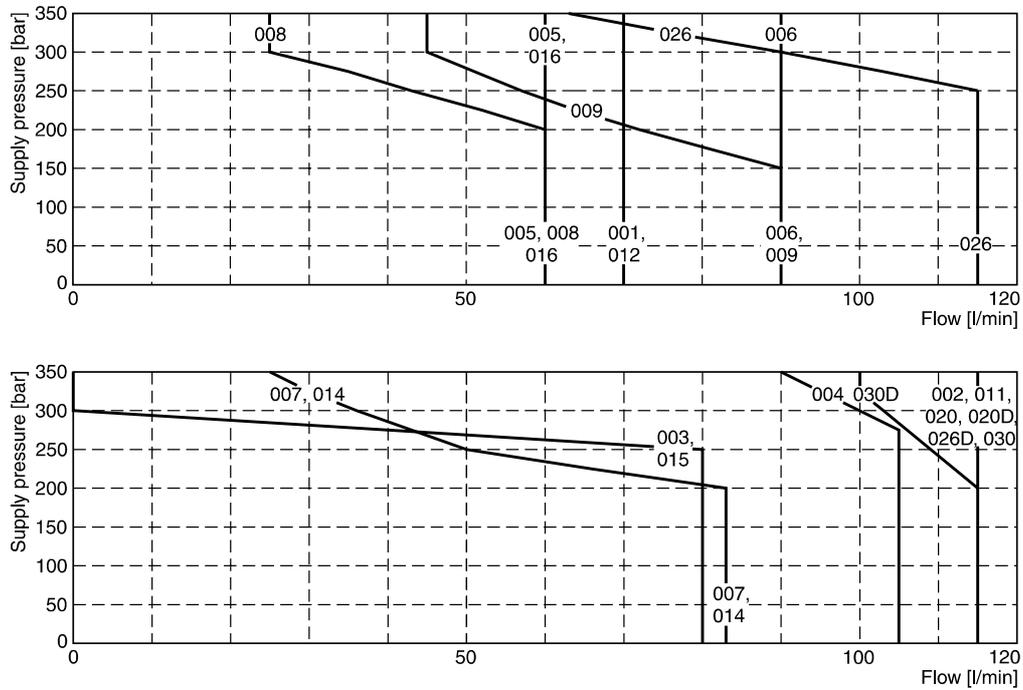
anced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

Shift limits, DC voltage



Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids.

Shift limits, AC voltage



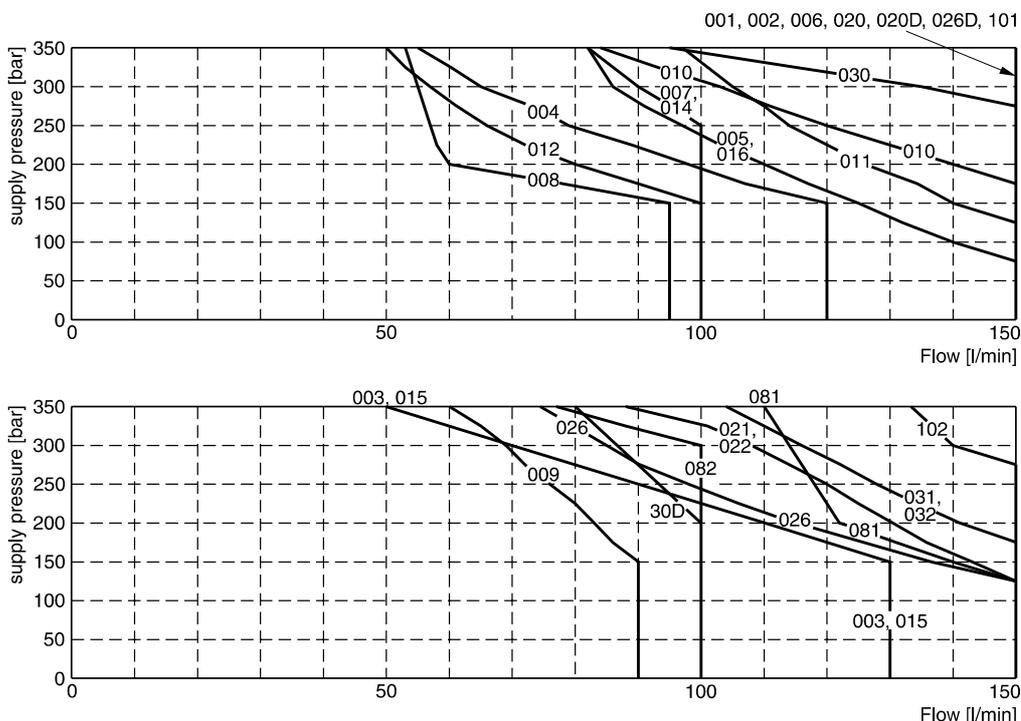
Measured with HLP46 at 50 °C, 95 % U_{nom} and warm solenoids.

Shift Limits / Response Times

Shift limits soft shift

The diagrams below specify the shift limits. Valves with spool position "F" or "M" can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm²/s and balanced flow conditions. The shift limits can

be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.



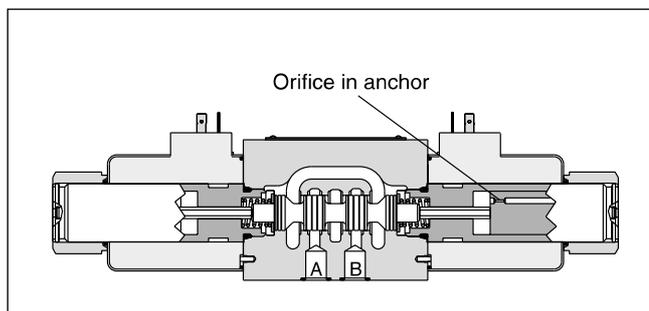
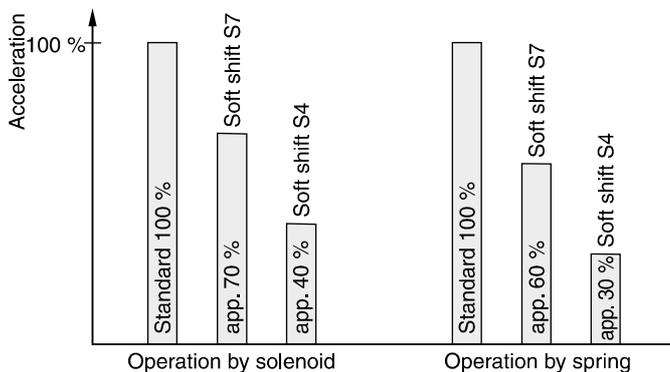
Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids.

Response times D3W Soft Shift

Code	Orifice size	Energize	De-energize
(Standard)	—	105 ms (DC) 21 ms (AC)*	85 ms (DC) 35 ms (AC)*
S4	1.0 mm	320 ms	550 ms
S7	1.75 mm	160 ms	370 ms

Step response times were obtained under the following conditions: HLP46 at 50 °C with the valve operating at 175 bar and 65 l/min. Published response times are nominal and may vary with spool, flow, pressure and temperature.

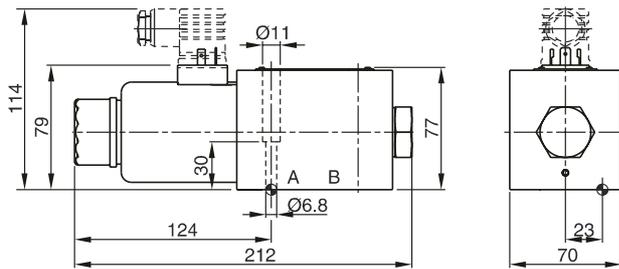
Acceleration for different orifice sizes (archived against a valve without soft shift)



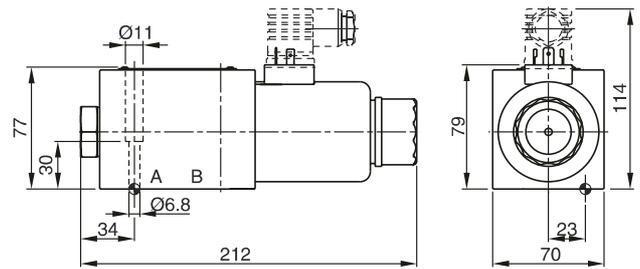
For even softer shifting, the proportional spools 081, 082, 101 and 102 can be used.

* For AC input and soft shift use rectifier plug.

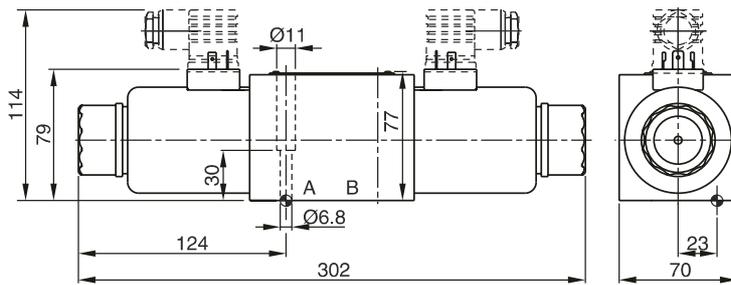
**Interface EN 175301-803, DC solenoid
 B, E, F -style**



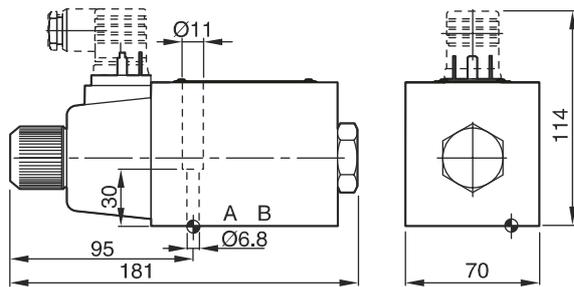
H, K, M -style



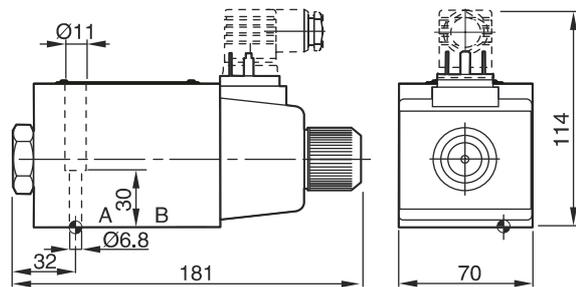
C, D -style



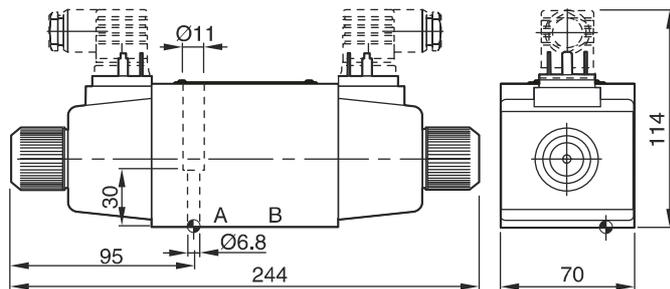
**Interface EN 175301-803, AC solenoid
 B, E, F -style**



H, K, M -style



C, D -style



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	NBR: SK-D3W-30 FPM: SK-D3W-V-30

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
 The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

Characteristics

The direct operated valves series D3W with inductive position control are typically used in safety relevant applications. The start or the end position can be monitored. The fail-safe position of the directional valve during power failure is the spring offset position.

2

Please find detailed information on the machine directive in the position paper in chapter 1.

Attention:

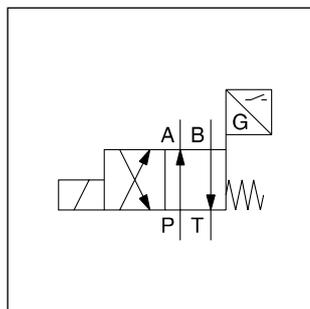
The adjustment of the position control is factory set and sealed. Replacement and repairs can only be undertaken by the manufacturer.



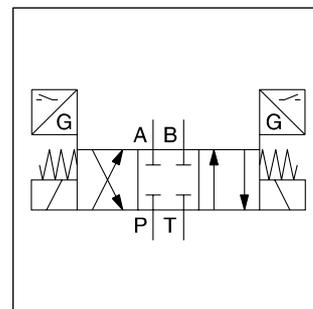
D3W*B



D3W*C

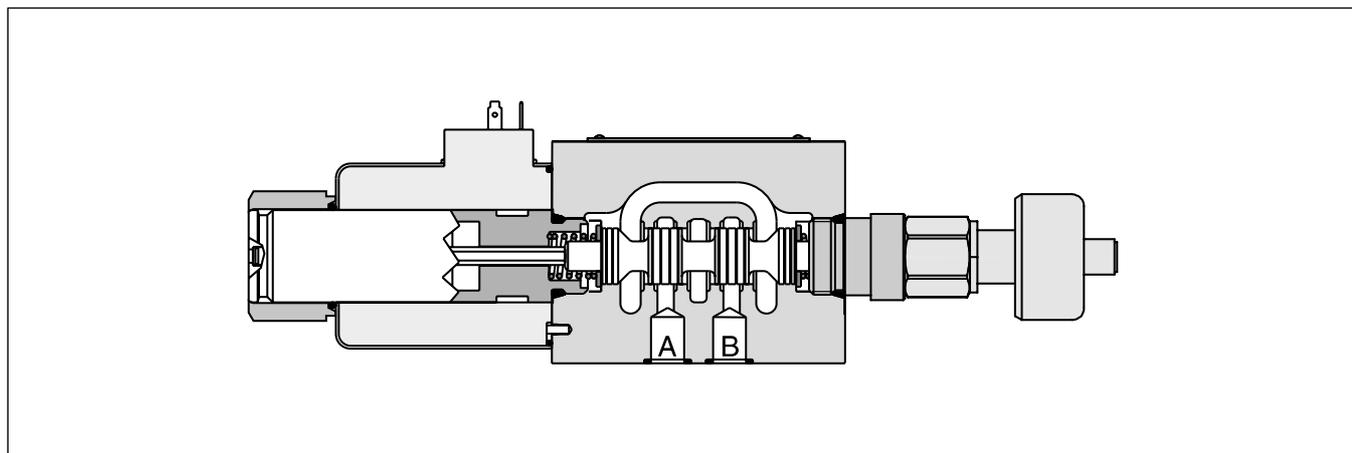


D3W*B

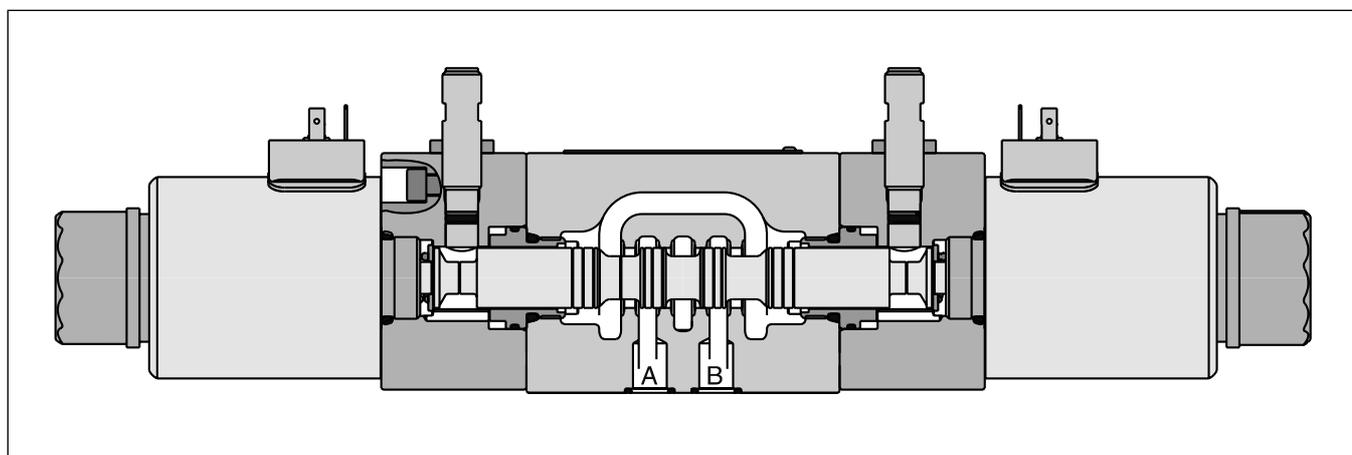


D3W*C

D3W*B



D3W*C



General					
Design	Directional spool valve				
Actuation	Solenoid				
Size	DIN NG10 / CETOP 05 / NFPA D05				
Mounting interface	DIN 24340 A10 / ISO 4401 / CETOP RP 121-H / NFPA D05				
Mounting position	unrestricted, preferably horizontal				
Ambient temperature	[°C]	-20...+60			
MTTF _D value	[years]	150			
Weight	[kg]	5.2			
Hydraulic					
Max. operating pressure	[bar]	P, A, B: 350; T: 210			
Fluid	Hydraulic oil according to DIN 51524				
Fluid temperature	[°C]	-20 ... +70			
Viscosity permitted	[cSt] / [mm ² /s]	2.8...400			
Viscosity recommended	[cSt] / [mm ² /s]	30...80			
Filtration	ISO 4406 (1999); 18/16/13				
Flow max.	[l/min]	150 (see shift limits)			
Leakage at 50 bar	[ml/min]	Up to 20 per flow path, depending on spool			
Static / Dynamic					
Step response at 95 %	Energized: 105; de-energized: 85				
Electrical characteristics					
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible				
Max. switching frequency	[1/h]	10000			
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)				
	Code	K	J	U	G
Supply voltage / ripple	[V]	12 V =	24 V =	98 V =	205 V =
Tolerance supply voltage	[%]	±10	±10	±10	±10
Current consumption hold	[A]	3	1.5	0.35	0.18
Power consumption hold	[W]	36	36	34	36
Solenoid connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461.				
Wiring min.	[mm ²]	3 x 1.5 recommended			
Wiring length max.	[m]	50 recommended			

With electrical connections the protective conductor (PE ⚡) must be connected according to the relevant regulations.

2

D

Directional control valve

3

Size
DIN NG10
CETOP 05
NFPA D05

W

Wet pin solenoid

□

Spool type

□

Spool position

3 position spools	
Code	Spool type
	a 0 b
001	
002	
003 ¹⁾	
004	
005 ²⁾	
015 ²⁾	
016 ¹⁾	
021 ¹⁾	
022 ²⁾	

2 position spools	
Code	Spool type
	a b
020	
026	
030	

3 position spools		
Code	Spool position	
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".

2 position spools		
Code	Spool position	
B		2 positions. Spring offset in position "b". Operated in position "a".
H		2 positions. Spring offset in position "a". Operated in position "b".

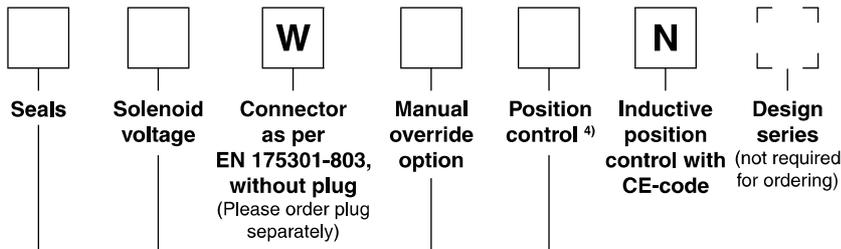
¹⁾ Only available for spool pos. "K" and "M".

²⁾ Only available for spool pos. "E" and "F".

³⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.

⁴⁾ Please order female connector M12x1 separately (see accessories, female connector M12x1 (order no.: 5004109).

⁵⁾ For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4" or "I5" (start position monitored) are required.



Code	Position control	Spool position
I2	End position monitored side B	E, F, B (Solenoid on a-side)
I5 ⁵⁾	Start position monitored side B	
I1	End position monitored side A	K, M, H (Solenoid on b-side)
I4 ⁵⁾	Start position monitored side A	

Code	Solenoid option
omit	manual override (Standard)
T ⁵⁾	without manual override

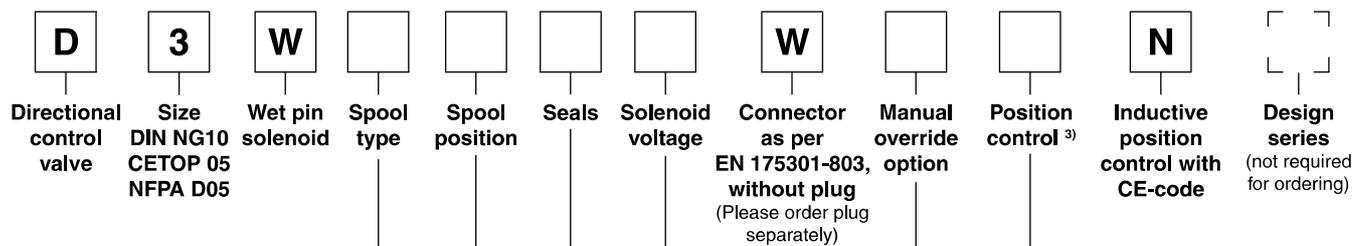
Code	Solenoid voltage
K	12 V =
J	24 V =
U ³⁾	98 V =
G ³⁾	205 V =

Code	Seals
N	NBR
V	FPM

Further spool types and solenoid voltages on request.

Ordering Code Double Solenoid Valve

2



3 position spools	
Code	Spool type
	a 0 b
001	
002	
004	

2 position spools	
Code	Spool type
	a b
020 ¹⁾	
026 ¹⁾	

3 position spools	
Code	Spool position
C	 3 positions. Spring offset in position "0". Operated in position "a" or "b".

2 position spools	
Code	Spool position
D	 2 positions. Spring offset in position "a". Operated in position "b".

Code	Position control	Spool position
I3	End positions	C, D
I6 ⁴⁾	Start positions	C

Code	Solenoid option
omit	manual override (Standard)
T ⁴⁾	without manual override

Code	Solenoid voltage
K	12 V=
J	24 V=
U ²⁾	98 V=
G ²⁾	205 V=

Code	Seals
N	NBR
V	FPM

Further spool types and solenoid voltages on request.

¹⁾ Only available for end position control code "I3".

²⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.

³⁾ Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

⁴⁾ For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessory "I6" (start positions) is required.



Single solenoid valve

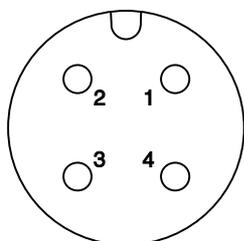
Electrical characteristics of position control as per IEC 61076-2-101 (M12x1)

Supply voltage	[VDC]	24
Tolerance supply voltage	[%]	±20
Ripple supply voltage	[%]	≤10
Polarity protection	[V]	300
Current consumption without load	[mA]	≤20
Switching hysteresis	[mm]	<0.06
Max. output current per channel, ohmic	[mA]	250
Ambient temperature	[°C]	-20 ... +60
Protection		IP65 acc. EN 60529 (with correctly mounted plug-in connector)
Min. distance to next AC solenoid	[m]	0.1
Interface		M12x1 to IEC 61076-2-101
CE conform		EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204

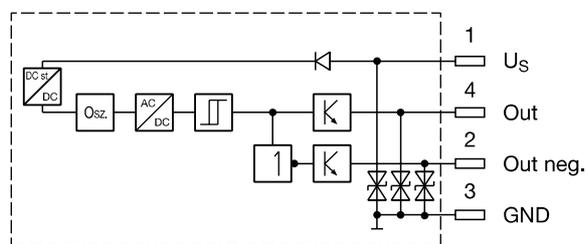
¹⁾ Only guaranteed with screened cable and female connector

2

M12 pin assignment



- 1 + U_s 19.2...28.8 V
- 2 Out B: normally open
- 3 0V
- 4 Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured that only the flow paths of the offset position are granted.

End position monitored:

The inductive switch gives a signal before the end position is reached (above 85 % spool stroke).

The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately (see accessories, plug M12x1; order no.: 5004109).

Position Control

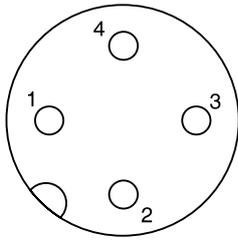
Double solenoid valves

Electrical characteristics of position control as per IEC 61076-2-101 (M12x1)

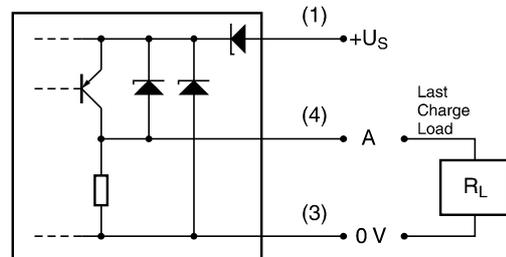
2

Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)	
Ambient temperature	[°C]	-20...+60
Supply voltage U_s / ripple	[V]	10...30 / ± 10 %
Current consumption without load	[mA]	≤ 10
Max. output current per channel, ohmic	[mA]	200
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2 A	[V]	≤ 2
EMC	EN61000-6-4 / EN61000-6-2	
Min. distance to next AC solenoid	[m]	> 0.1
Interface	M12x1 acc. to IEC 61076-2-101	
Wiring min.	[mm ²]	3 x 0.14 braid shield recommended
Wiring length max.	[m]	50 recommended

M12 pin assignment



- 1 U_s 10...30 V
- 2 not connected
- 3 0 V
- 4 Out A: normally open



Definitions

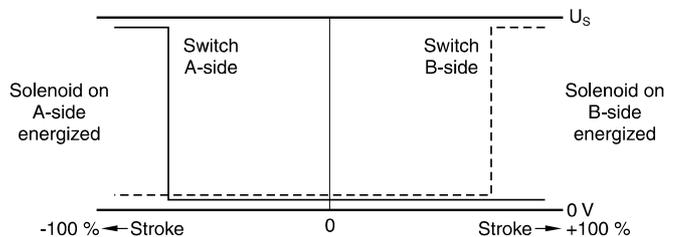
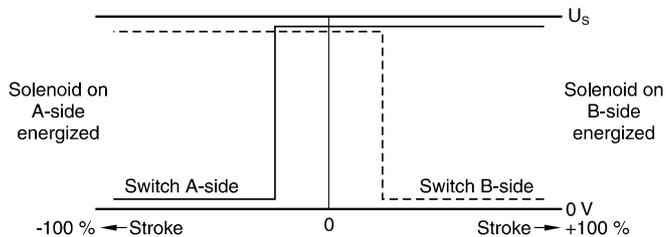
Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured that only the flow paths of the offset position are granted.

End position monitored:

The inductive switch gives a signal before the end position is reached (above 85 % spool stroke).



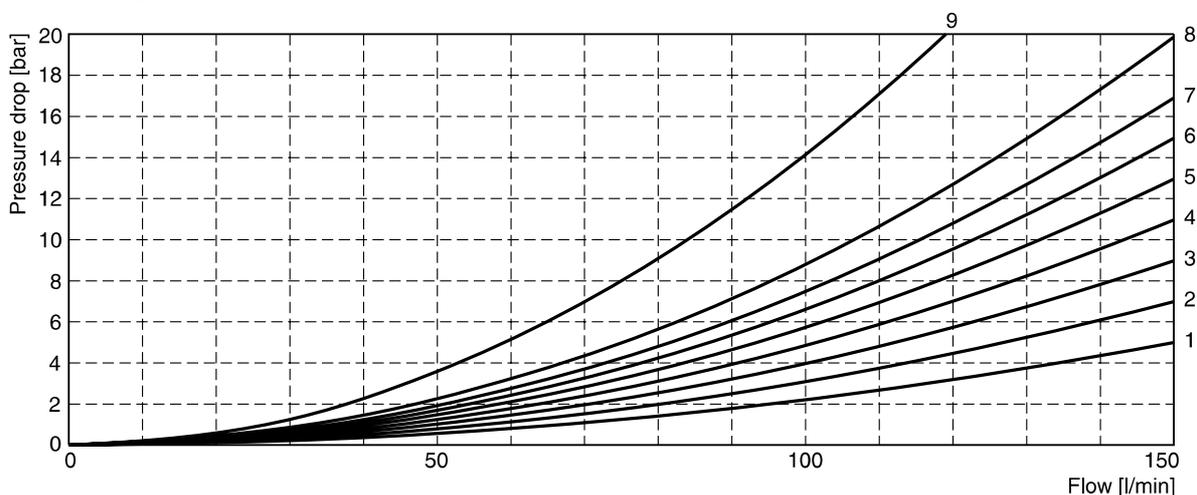
Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

The flow curve diagram shows the flow versus pressure drop for each spool type, operating position and flow direction as given in 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	
001	6	5	6	6	-	-	-	-	-	-	
002	3	5	3	3	1	1	4	5	1	6	
003	2	2	3	1	-	-	3	-	-	-	
004	5	4	4	4	-	-	8	8	-	9	
005	2	2	2	2	3	-	-	-	-	-	
015	2	1	2	2	-	-	-	3	-	-	
016	2	2	1	2	-	2	-	-	-	-	
020	6	6	5	7	-	-	-	-	-	-	
026	5	-	5	-	-	-	-	-	-	-	
030	4	5	3	5	-	-	-	-	-	-	
	Position b		Position a								
	P->A	P->B	A->B	P->B	A->T						
021	2	4	8	3	2						
	P->A	B->T		P->A	P->B	A->B					
022	3	2		3	2	8					

2

Flow curve diagram

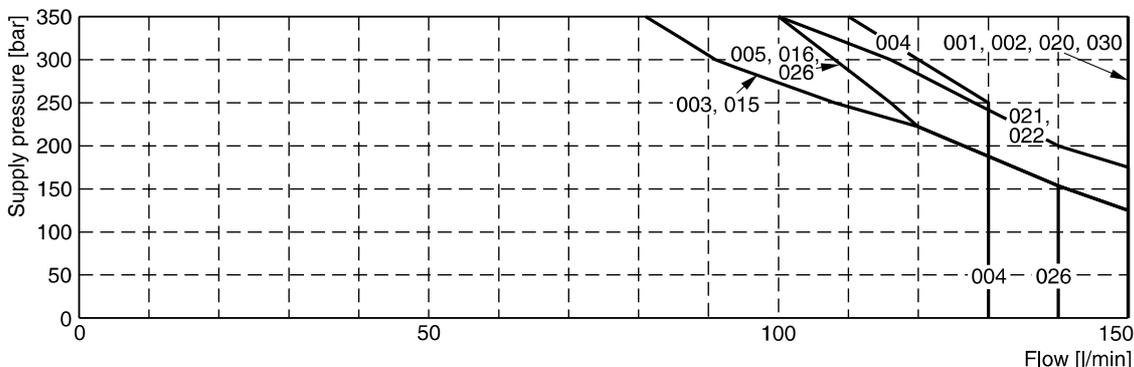


All characteristic curves measured with HLP46 at 50 °C.

Shift limit diagram

The diagram below specifies the shift limits. Valves with spool position “F” or “M” can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm²/s and balanced flow conditions. The shift limits can

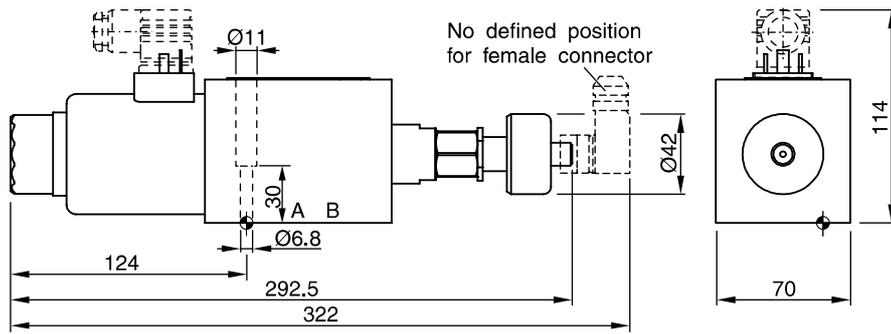
be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.



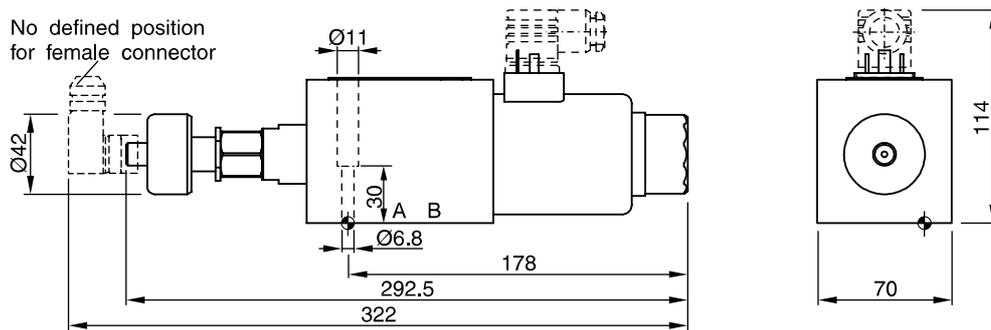
Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids.

Dimensions

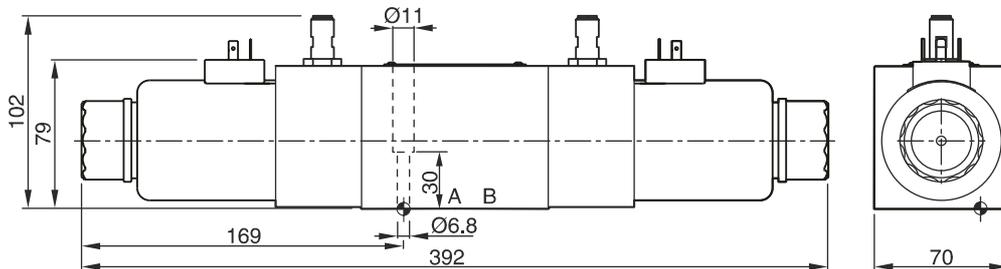
Interface EN 175301-803, DC solenoid, without plug M12x1¹⁾
B, E, F -style

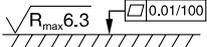


H, K, M -style



Interface EN175301-803, DC solenoid, without plug M12x1²⁾
C, D -style



Surface finish	 Kit	 Kit	 Kit	 Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	NBR: SK-D3W-30 FPM: SK-D3W-V-30

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

The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

The space necessary to remove the M12x1 female connector is at least 22 mm.

Attention:

The adjustment of the position control is factory set and sealed. Replacement and repairs can only be undertaken by the manufacturer.

¹⁾ Please order plug M12x1 separately (see accessories, plug M12x1; order no.: 5004109).

²⁾ Please order plug M12x1 separately. Straight plug recommended - no defined position possible for angled plug.

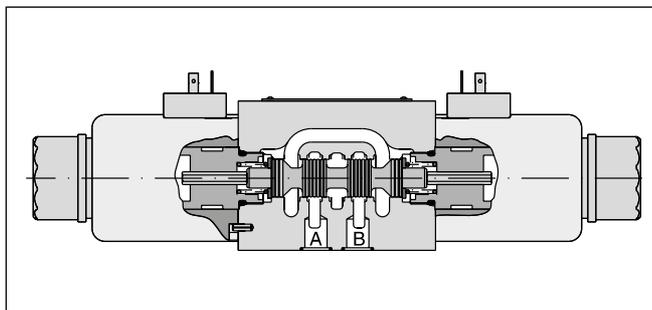
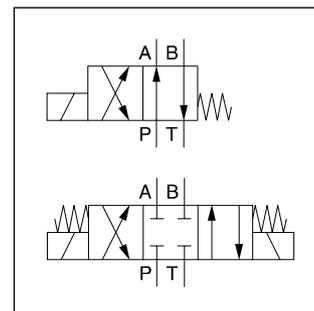
The D3MW is a solenoid operated directional control valve size NG10 in 3-chamber design. It is direct operated by wet pin solenoids.

The D3MW is designed for mobile and marine applications.

It is based on the D3W series, but offers additional corrosion protection of the valve body, the solenoid coil and the anchor tube as well as the typical solenoid connections for the mobile market such as AMP Junior Timer.

Features:

- High corrosion protection (optional)
- Solenoid connection:
 - Standard (as per EN175301-803)
 - AMP Junior Timer
 - DT04-2P "Deutsch"
- Robust design for rough applications

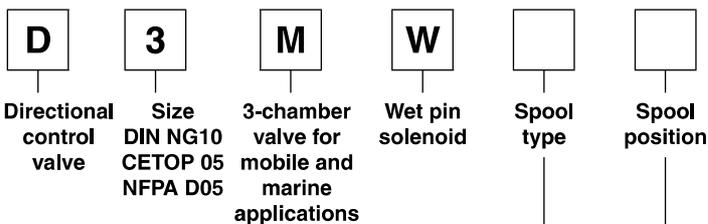


2

Technical data

General	
Design	Directional spool valve
Actuation	Solenoid
Size	DIN NG10 / CETOP 05 / NFPA D05
Mounting interface	DIN 24340 A10 / ISO 4401 / CETOP RP 121-H / NFPA D05
Mounting position	unrestricted, preferably horizontal
Ambient temperature	[°C] -25...+60
MTTF _D value	[years] 150
Weight	[kg] 4.8 (1 solenoid), 6.3 (2 solenoids)
Vibration resistance	[g] 10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic	
Max. operating pressure	[bar] P, A B: 350; T: 210
Fluid	Hydraulic oil according to DIN 51524
Fluid temperature	[°C] -20 ... +70 (NBR: -25...+70)
Viscosity permitted	[cSt] / [mm ² /s] 2.8...400
Viscosity recommended	[cSt] / [mm ² /s] 30...80
Filtration	ISO 4406 (1999); 18/16/13
Flow max.	[l/min] 150 (see shift limits)
Leakage at 50 bar	[ml/min] Up to 20 per flow path, depending on spool
Static / Dynamic	
Step response at 95 %	[ms] Energized: 105 De-energized: 85
Electrical characteristics	
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible
Max. switching frequency	[1/h] 10000
Protection class	Standard (as per EN175301-803) IP65 in acc. with EN60529 (with correctly mounted plug-in connector) AMP Junior Timer IP67 in acc. with EN60529 (with correctly mounted plug-in connector) DT04-P2 "Deutsch" IP69K (with correctly mounted plug-in connector)
	Code
Supply voltage / ripple	[V] K 12 V = J 24 V =
Tolerance supply voltage	[%] ±10 ±10
Current consumption	[A] 3 1.5
Power consumption	[W] 36 36
Solenoid connection	Connector as per EN 175301-803 (code W), AMP Junior Timer (code A), DT04-2P "Deutsch" connector (code J). Solenoid ident. as per ISO 9461.
Wiring min.	[mm ²] 3 x 1.5 recommended
Wiring length max.	[m] 50 recommended

With electrical connections the protective conductor (PE ⊥) must be connected according to the relevant regulations.



2

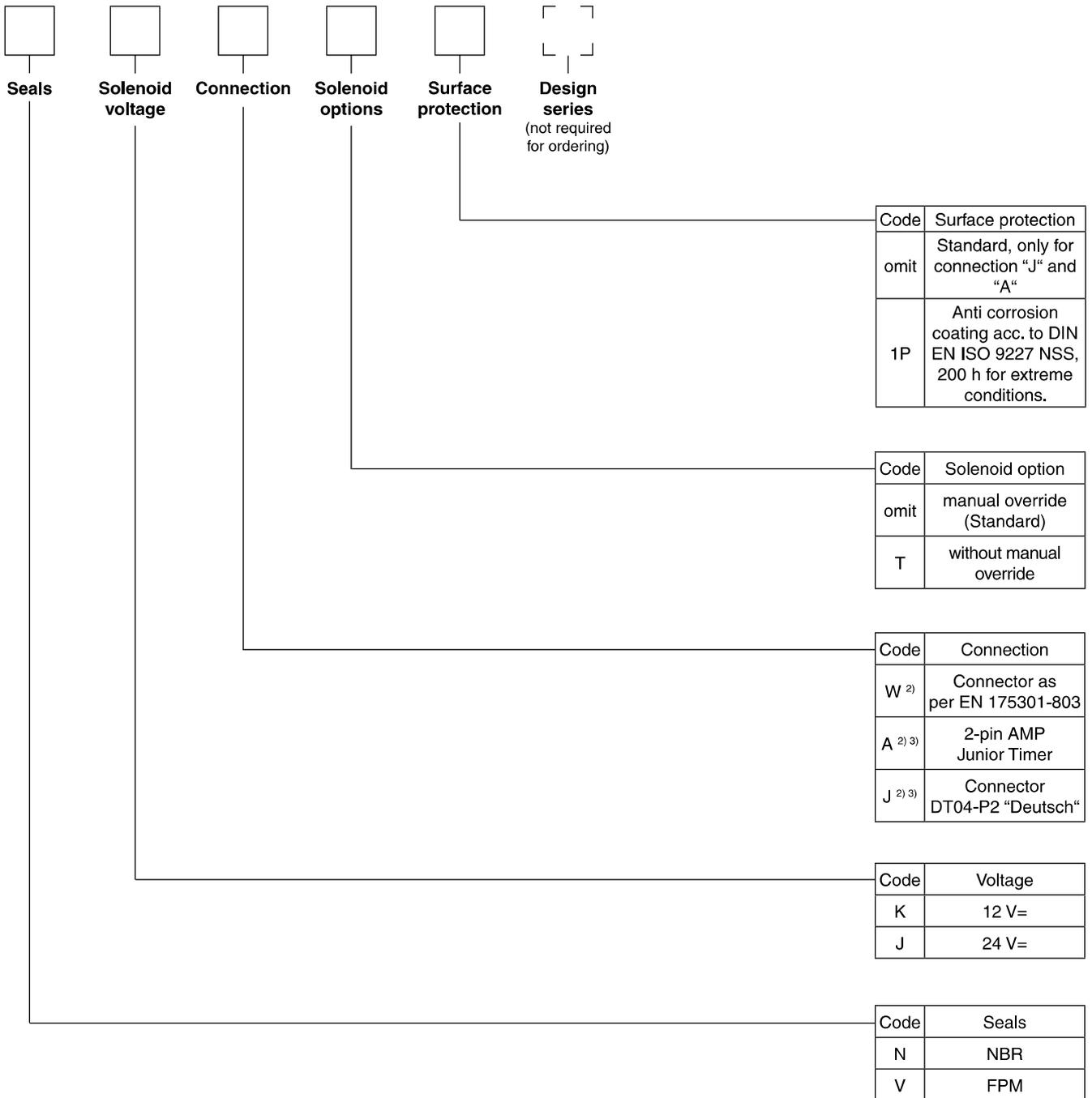
3 position spools	
Code	Spool type
	a 0 b
001	
002	
003	
004	
005	
006	
007	
008 ¹⁾	
009 ¹⁾	
010	
011	
012	
014	
015	
016	
021	
022	
031	
032	
081	
082	
102	

2 position spools	
Code	Spool type
	a b
020	
026	
030	
101	

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008, 009
E	 Operated in position "a".	 Operated in position "b".
F	 Spring offset in position "b".	 Spring offset in position "a".
K	 Operated in position "b".	 Operated in position "a".
M	 Spring offset in position "a".	 Spring offset in position "b".

2 position spools		
Code	Spool position	
B		2 positions. Spring offset in position "b". Operated in position "a".
D		2 positions. Operated in position "a" or "b". No center or offset position.
H		2 positions. Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.
²⁾ Please order plug separately.
³⁾ Only for voltage 24 V=.

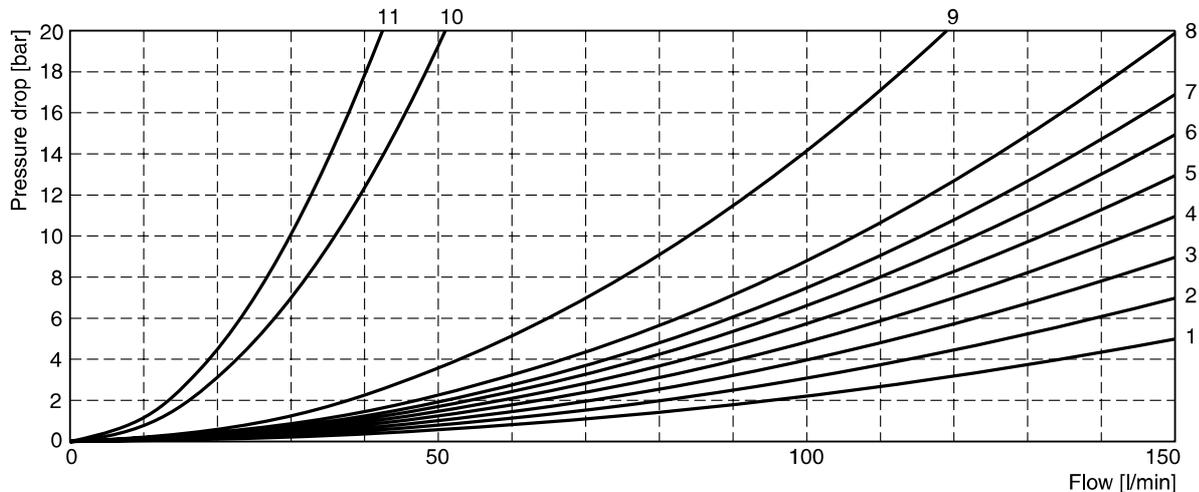


Further spool types on request.

Flow curves

The flow curve diagram shows the flow versus pressure drop curves for all spool types. For each spool type,

operating position and flow direction the relevant curve number is given in the table below.



All characteristic curves measured with HLP46 at 50 °C.

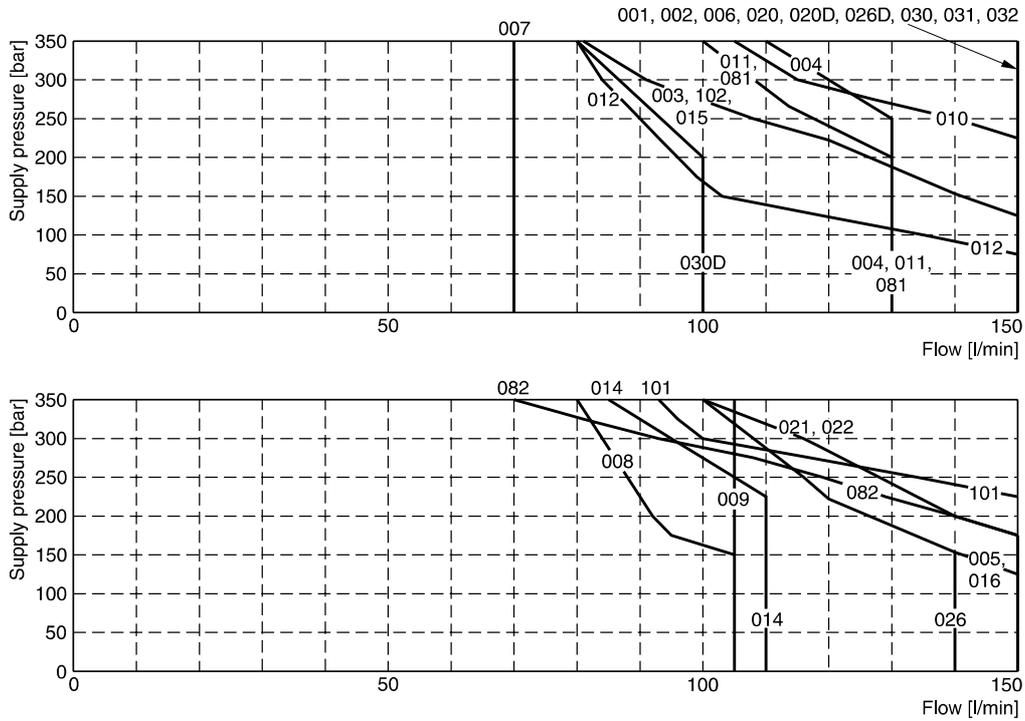
Spool	Position b		Position a		Position 0						
	P->A	B->T	P->B	A->T	P->A	P->B	A->T	B->T	P->T	A->B	
001	6	5	6	6	-	-	-	-	-	-	
002	3	5	3	3	1	1	4	5	1	6	
003	2	2	3	1	-	-	3	-	-	-	
004	5	4	4	4	-	-	8	8	-	9	
005	2	2	2	2	3	-	-	-	-	-	
006	1	2	1	3	2	2	-	-	-	3	
007	2	1	2	2	-	1	-	2	3	-	
010	2	-	2	-	-	-	-	-	-	-	
011	2	2	2	2	-	-	11	11	-	11	
012	1	2	2	2	10	10	10	10	11	11	
014	1	2	2	2	1	-	2	-	3	-	
015	2	1	2	2	-	-	-	3	-	-	
016	2	2	1	2	-	2	-	-	-	-	
020	6	6	5	7	-	-	-	-	-	-	
026	5	-	5	-	-	-	-	-	-	-	
030	4	5	3	5	-	-	-	-	-	-	
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T	A->B	
008	8	7	7	6	-	-	-	-	9	-	
009	4	4	5	8	-	-	-	-	9	-	
	Position b		Position a								
	P->A	P->B	A->B	P->B	A->T						
021	2	4	8	3	2						
	P->A	B->T		P->A	P->B	A->B					
022	3	2		3	2	8					

Shift limits, DC voltage

The diagrams below specify the shift limits for valves with DC and AC solenoids. Valves with spool position “F” or “M” can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm²/s and bal-

anced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

2



Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids.

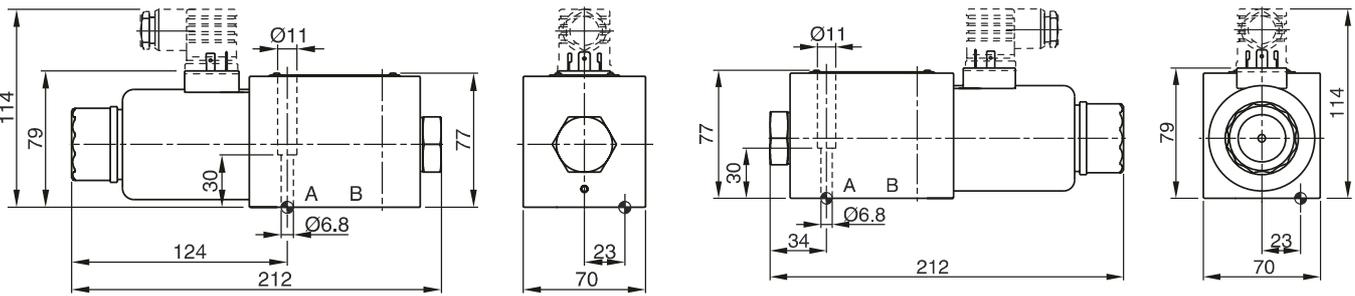
Dimensions

Interface EN 175301-803

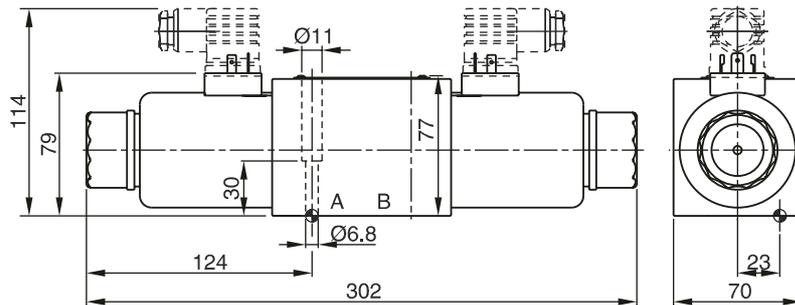
B, E, F -style

H, K, M -style

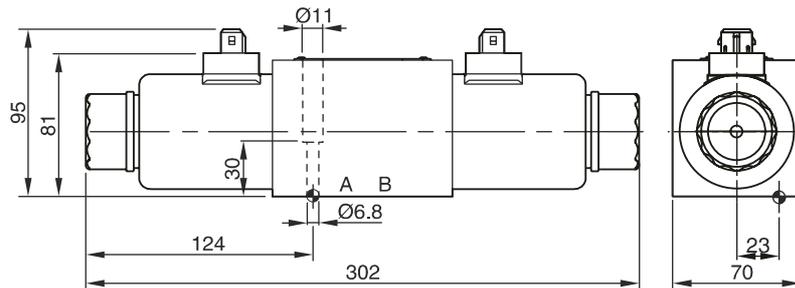
2



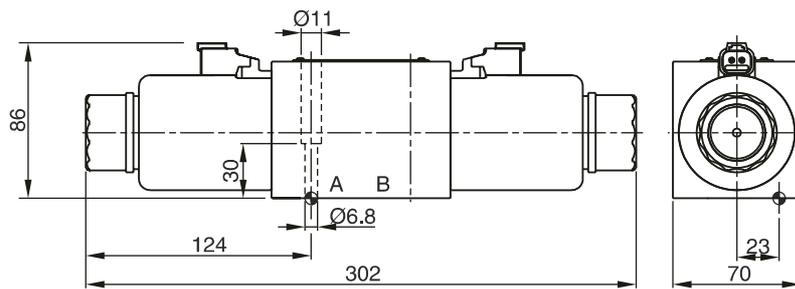
C, D -style



Dimensions with AMP Connector (only C and D -style shown)



Dimensions with DT04-P2 "Deutsch" Connector (only C and D -style shown)



Surface finish	Kit	Kit	Kit	Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	NBR: SK-D3W-N-30 FPM: SK-D3W-V-30

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

The pilot operated valves are available in 4 sizes:

- D31DW NG10 (standard)
- D31NW NG10 (high flow)
- D41VW NG16
- D81VW NG25 (for port diameter up to 26 mm)
- D91VW NG25 (for port diameter up to 32 mm)
- D111VW NG32

All valves are piloted by a D1VW valve. Please see the separate ordering code for valves with position control.

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

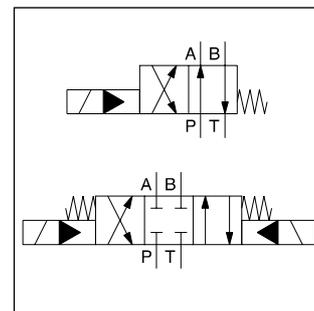
Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet) or an integral check valve.

Valves with explosion proof solenoids Ex e mb II see catalogue MSG11-3343/UK.

Download of the PDF file at www.parker.com/ISDE, see "Support".



D31DW



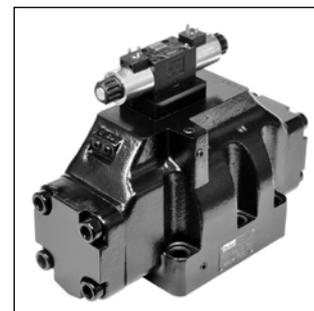
D31NW



D41VW

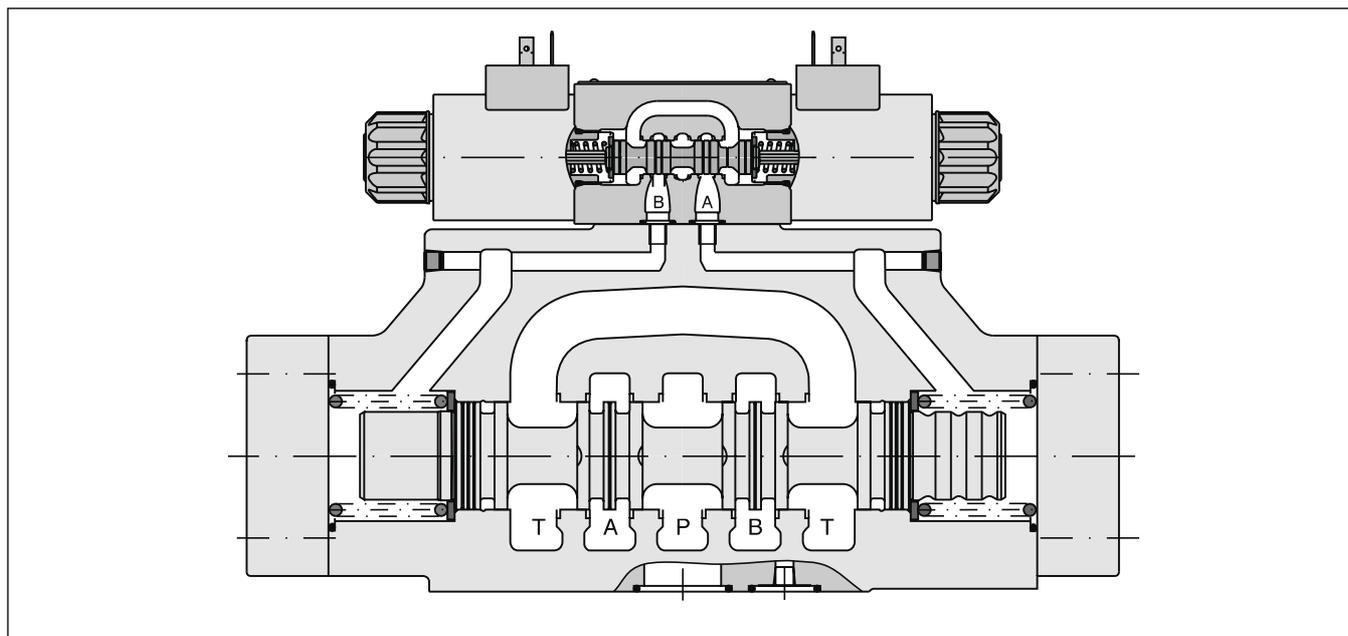


D81VW



D111VW

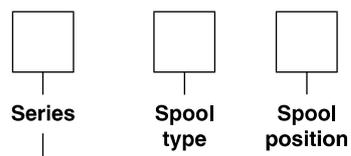
D81VW



Ordering Code

2

Code	Bore	Size	Feature
D31DW	Ø11 mm	NG10	
D31NW	Ø11 mm	NG10	High flow
D41VW	Ø20 mm	NG16	
D81VW	Ø26 mm	NG25	
D91VW	Ø32 mm	NG25	High flow
D111VW	Ø50 mm	NG32	



3 position spools		D31D	D31N	D41	D81/91	D111
Code	Spool type					
	a 0 b					
001		•	•	•	•	•
002		•	•	•	•	•
003		•	•	•	•	
004		•	•	•	•	•
005		•	•	•	•	
006		•	•	•	•	
007		•		•	•	
009 ¹⁾		•	•	•	•	•
011		•	•	•	•	
014		•		•	•	
015		•	•	•	•	
016		•	•	•	•	
021		•	•	•	•	
022		•	•	•	•	
031		•			•	
032		•			•	
054				•	•	•
081		•	•	•	•	•
082		•		•	•	•

2 position spools					
Code	Spool type				
	a b				
020		•	•	•	•
026		•		•	•
030		•	•	•	•

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 009
E		2 positions. Spring offset in position "0".
	Operated in position "a".	Operated in position "b".
F		2 positions. Operated in position "0".
	Spring offset in position "b".	Spring offset in position "a".
K		2 positions. Spring offset in position "0".
	Operated in position "b".	Operated in position "a".
M		2 positions. Operated in position "0".
	Spring offset in position "a".	Spring offset in position "b".
R ²⁾³⁾		2 positions, detent. Operated in position "0" or "b".
	No center in offset position.	No center in offset position.
S ²⁾³⁾		2 positions, detent. Operated in position "0" or "a". No center in offset position.
	No center in offset position.	No center in offset position.

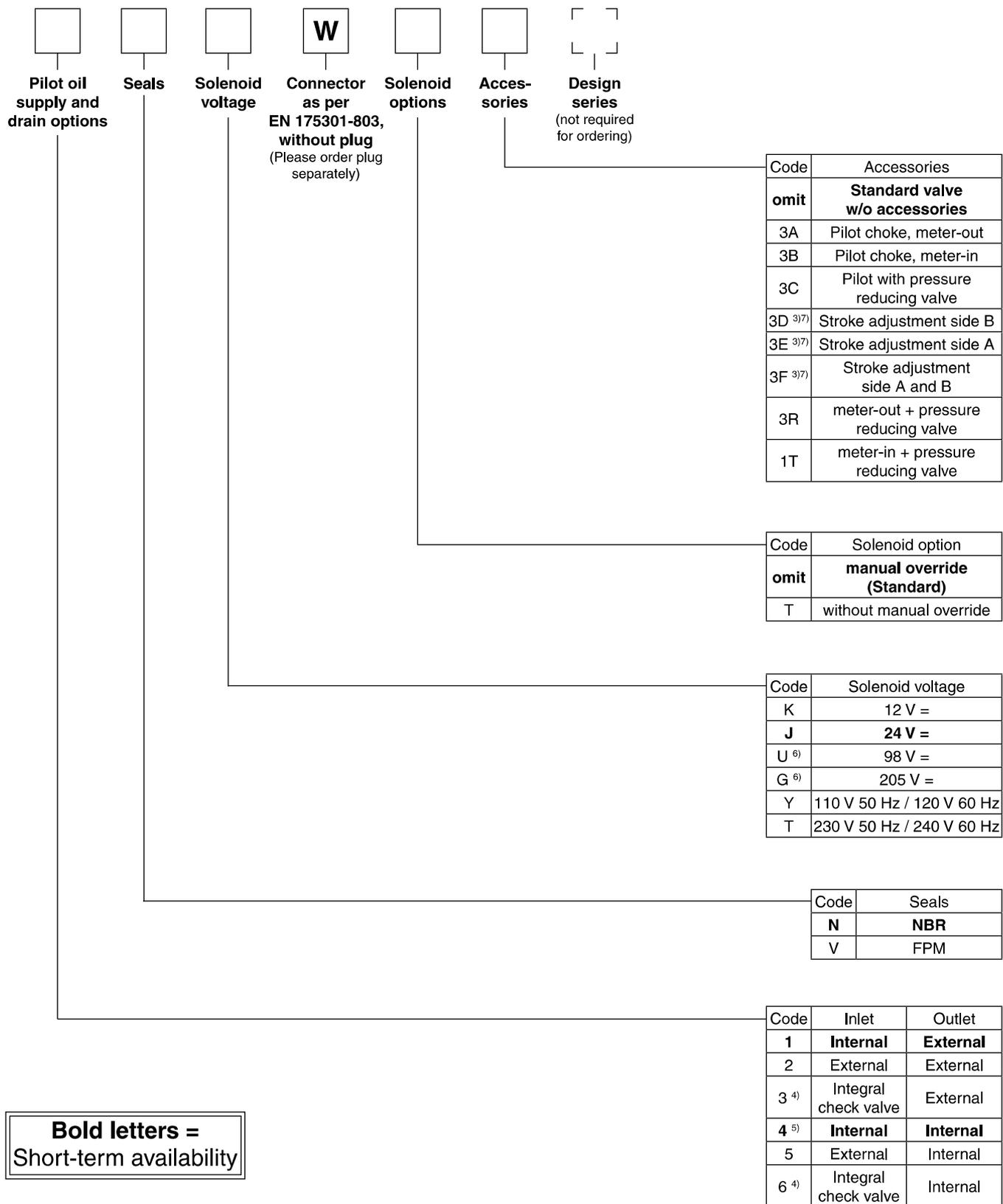
2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
D ²⁾³⁾		Detent, operated in position "a" or "b". No center or offset position.
H		Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.
²⁾ For D31NW and D111VW only pilot valve with detent available.
³⁾ D31DW*D/R/S is not available with accessories 3D, 3E or 3F.
⁴⁾ Not for D31DW, D91VW and D111VW available.
⁵⁾ Not for spools 002, 007, 009, 014, 030, 031, 032, 054 available.
⁶⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.
⁷⁾ Only D31, D41, D81, D91 available.



Ordering Code

**Pilot Operated Directional Control Valves
Series D31*W, D*1VW**



2

Bold letters =
Short-term availability

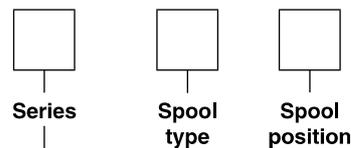
Further spool types and solenoid voltages on request.
Explosion proof solenoids Ex e mb II see catalogue MSG11-3343/UK.
Download of the PDF file at www.parker.com/ISDE, see „Support“.

2

Code	Bore	Size	Feature
D31DW	Ø11 mm	NG10	
D31NW	Ø11 mm	NG10	High flow
D41VW	Ø20 mm	NG16	
D81VW	Ø26 mm	NG25	
D91VW	Ø32 mm	NG25	High flow
D111VW	Ø50 mm	NG32	

3 position spools		D31D	D31N	D41	D81/91	D111
Code	Spool type					
001	a 0 b	•	•	•	•	•
002		•	•	•	•	•
003		•	•	•	•	•
004		•	•	•	•	•
005			•	•	•	
006			•	•	•	
007				•	•	
009 ¹⁾		•	•	•	•	•
011		•	•	•	•	
014				•	•	
015		•	•	•	•	
016			•	•	•	
021		•	•	•	•	
022		•	•	•	•	
031					•	
032					•	
054				•	•	•
081				•	•	•
082				•	•	•

2 position spools					
Code	Spool type				
020	a b	•	•	•	•
026		•		•	•
030		•	•	•	•



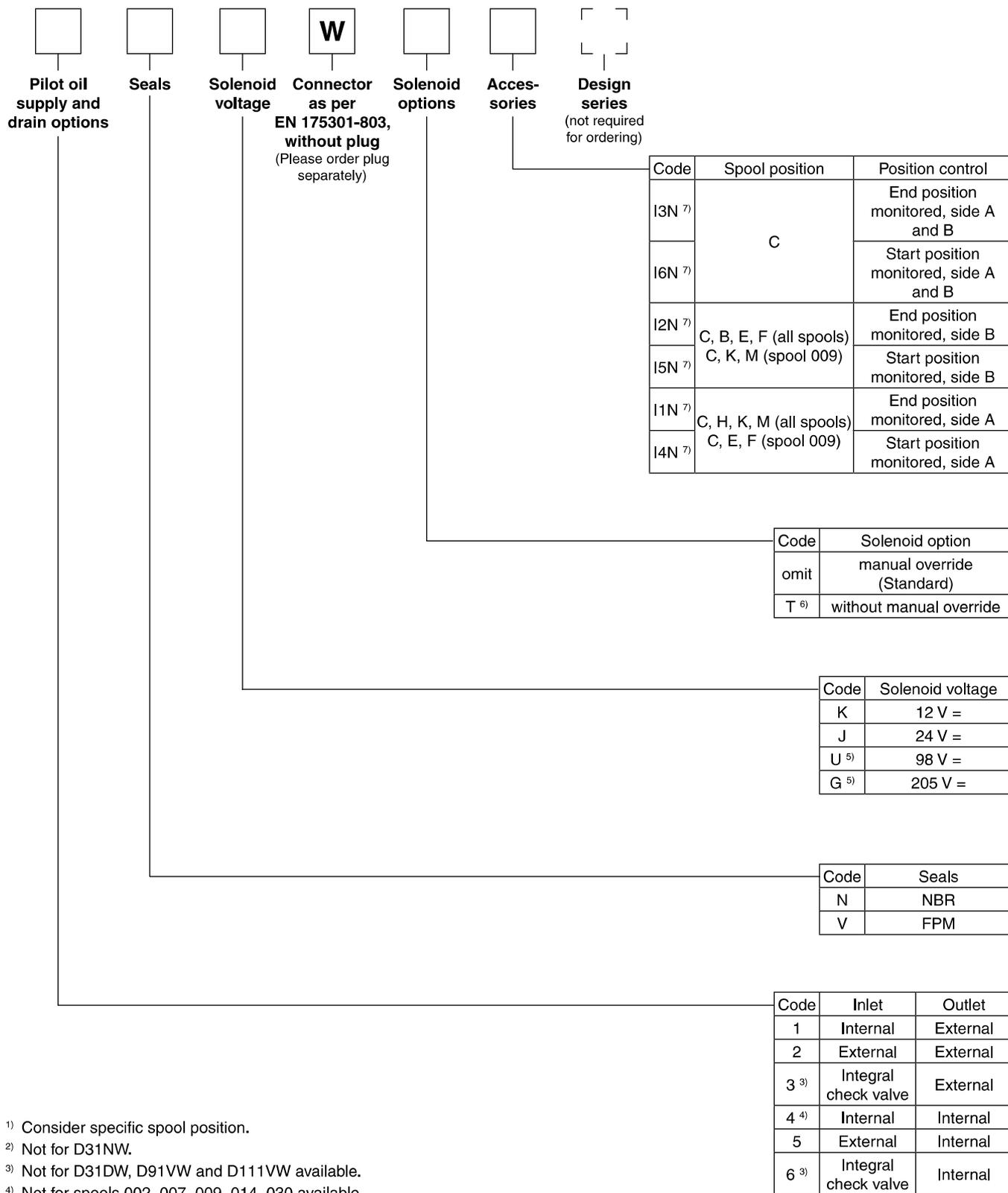
3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 009
E	 Operated in position "a".	 Operated in position "b".
F ²⁾	 Spring offset in position "b".	 Spring offset in position "a".
K	 Operated in position "b".	 Operated in position "a".
M ²⁾	 Spring offset in position "a".	 Spring offset in position "b".

2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
H		Spring offset in position "a". Operated in position "b".

Attention:

**The adjustment of the position control is factory set and sealed.
Replacement and repairs can only be undertaken by the manufacturer.**





1) Consider specific spool position.
 2) Not for D31NW.
 3) Not for D31DW, D91VW and D111VW available.
 4) Not for spools 002, 007, 009, 014, 030 available.
 5) To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.
 6) For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4N", "I5N" or "I6N" (start position monitored) are required.
 7) Please order female connector M12x1 separately (see accessories, female connector M12x1 (order no.: 5004109). The monitor switch has to be located on the side to which the spool moves from the spring offset position. For 4/3-way valves two switches are required.

Technical Data

2

General								
Design		Directional spool valve						
Actuation		Solenoid						
Series		D31DW	D31NW	D41VW	D81/91VW	D111VW		
Size		NG10	NG10	NG16	NG25	NG32		
Weight (1/ 2 solenoids) [kg]		6.0 / 6.6	7.6 / 8.1	9.7 / 10.3	17.9 / 18.6	67.4 / 68.0		
Mounting interface		DIN 24340 A10	DIN 24340 A10	DIN 24340 A16	DIN 24340 A25	DIN 24340 A32		
		ISO 4401	ISO 4401	ISO 4401	ISO 4401	ISO 4401		
		NFPA D05	NFPA D05	NFPA D07	NFPA D08	NFPA D10		
		CETOP RP 121-H						
Mounting position		unrestricted, preferably horizontal						
Ambient temperature [°C]		-25...+60 (without inductive position control)						
		-20...+60 (with inductive position control)						
MTTF _p value [years]		75						
Hydraulic								
Max. operating pressure [bar]		Pilot drain internal: P, A B, X: 350; T, Y: 105						
		Pilot drain external: P, A B, T, X: 350; Y: 105						
Fluid		Hydraulic oil according to DIN 51524						
Fluid temperature [°C]		-20 ... +70 (NBR: -25...+70), (without inductive position control)						
		-20...+70 (with inductive position control)						
Viscosity permitted [cSt] / [mm ² /s]		2.8...400						
Viscosity recommended [cSt] / [mm ² /s]		30...80						
Filtration		ISO 4406 (1999); 18/16/13						
Flow max. [l/min]		150	170	300	700	2000		
Leakage at 350 bar (per flow path) [ml/min]		up to 100*	72...422*	up to 200*	up to 800*	up to 5000*		
		*depending on spool						
Opening pressure integral check valve [bar]		n.a.	see p/Q diagram	see p/Q diagram	see p/Q diagram	n.a.		
Minimum pilot supply pressure [bar]		5	7	5				
Static / Dynamic								
Step response at 95 % [ms]		Energized / De-energized						
DC solenoids	Pilot pressure	50 bar	60 / 40	50 / 60	95 / 65	150 / 170	470 / 390	
		100 bar	55 / 40	50 / 60	75 / 65	110 / 170	320 / 390	
		250 bar	55 / 40	50 / 50	60 / 65	90 / 170	210 / 390	
		350 bar	55 / 40	50 / 50	60 / 65	85 / 170	200 / 390	
AC solenoids	Pilot pressure	50 bar	40 / 30	30 / 50	75 / 55	130 / 155	450 / 375	
		100 bar	35 / 30	30 / 50	65 / 55	90 / 155	300 / 375	
		250 bar	35 / 30	30 / 50	40 / 55	70 / 155	190 / 375	
		350 bar	35 / 30	30 / 50	40 / 55	65 / 155	180 / 375	
Electrical characteristics								
Duty ratio		100 % ED; CAUTION: coil temperature up to 150 °C possible						
Protection class		IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)						
		Code	K	J	U	G	Y	T
Supply voltage / ripple [V]		12 V =	24 V =	98 V =	205 V =	110 V at 50 Hz/ 120 V at 60 Hz	230 V at 50 Hz/ 240 V at 60 Hz	
Tolerance supply voltage [%]		±10	±10	±10	±10	±5	±5	
Current consumption hold [A]		2.72	1.29	0.33	0.13	0.58 / 0.49	0.31 / 0.26	
Current consumption in rush [A]		2.72	1.29	0.33	0.13	2.1 / 2.0	1.05 / 1.0	
Power consumption hold [W]		32.7 W	31 W	31.9 W	28.2 W	64 / 59 VA	68 / 62 VA	
Power consumption in rush [W]		32.7 W	31 W	31.9 W	28.2 W	231 / 240 VA	231 / 240 VA	
Solenoid connection		Connector as per EN 175301-803, solenoid identification as per ISO 9461.						
Wiring min. [mm ²]		3 x 1.5 recommended						
Wiring length max. [m]		50 recommended						

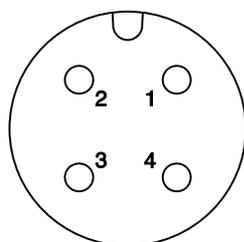
With electrical connections the protective conductor (PE \perp) must be connected according to the relevant regulations.



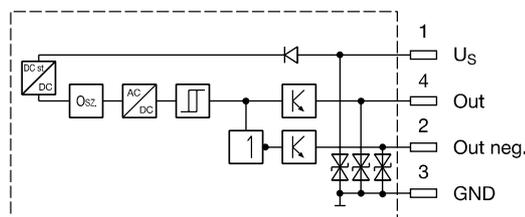
Electrical characteristics of position control as per IEC 61076-2-101 (M12x1), NG16/NG25/NG32

Supply voltage	[VDC]	24
Tolerance supply voltage	[%]	±20
Ripple supply voltage	[%]	≤10
Polarity protection	[V]	300
Current consumption without load	[mA]	≤20
Switching hysteresis	[mm]	<0.06
Max. output current per channel, ohmic	[mA]	250
Ambient temperature	[°C]	-20 ... +60
Protection		IP65 acc. EN 60529 (with correctly mounted plug-in connector)
Min. distance to next AC solenoid	[m]	0.1
Interface		M12x1 to IEC 61076-2-101
CE conform		EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204

M12 pin assignment



- 1 + US 19.2...28.8 V
- 2 Out B: normally open
- 3 0 V
- 4 Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

The valve is de-energized. The inductive switch gives a signal at the moment when the spool leaves the spring offset position (below 15 % spool stroke). At the switching point the spool is located within the closed position. It is secured that only the flow paths of the offset position are granted.

End position monitored:

The inductive switch gives a signal before the end position is reached (above 85 % spool stroke).

Please order plug M12x1 separately (see accessories, plug M12x1; order no.: 5004109).

¹⁾ Only guaranteed with screened cable and female connector

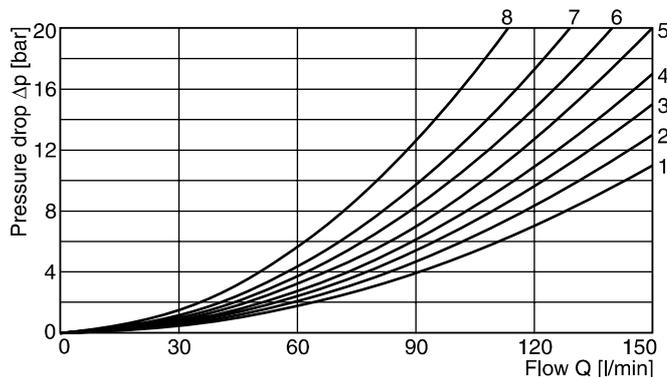
The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number

for each spool type, operating position and flow direction is given in the tables below.

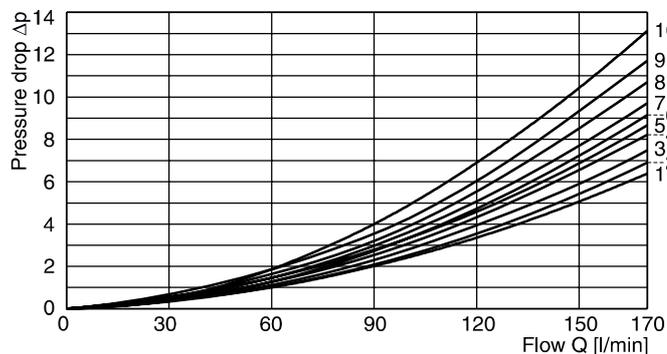
D31DW and D31NW

Spool Code	Curve number									
	P-A		P-B		P-T		A-T		B-T	
	*DW	*NW	*DW	*NW	*DW	*NW	*DW	*NW	*DW	*NW
001	4	3	4	3	-	-	3	2	3	5
002	2	3	3	3	3	7	3	4	4	3
003	2	2	4	3	-	-	1	4	2	4
004	4	2	3	3	-	-	2	4	3	4
005	1	2	4	4	-	-	2	1	3	4
006	2	8	3	9	-	-	3	7	4	9
007	4	-	2	-	5	-	2	-	2	-
009	2	4	2	6	8	6	5	4	6	10
011	3	3	2	3	-	-	3	2	3	4
014	2	-	4	-	5	-	2	-	3	-
015	4	2	2	2	-	-	2	1	2	4
016	4	4	1	3	-	-	1	2	2	4
020	4	6	4	4	-	-	4	3	4	6
021	3	-	4	7	-	-	2	8	-	-
022	5	4	2	-	-	-	-	9	4	-
026	3	-	3	-	-	-	-	-	-	-
030	4	5	3	3	-	-	3	2	3	5
031	3	-	4	-	-	-	1	-	-	-
032	5	-	2	-	-	-	-	-	2	-
081	6	-	6	-	-	-	7	-	7	-
082	7	-	6	-	-	-	5	-	7	-

D31DW



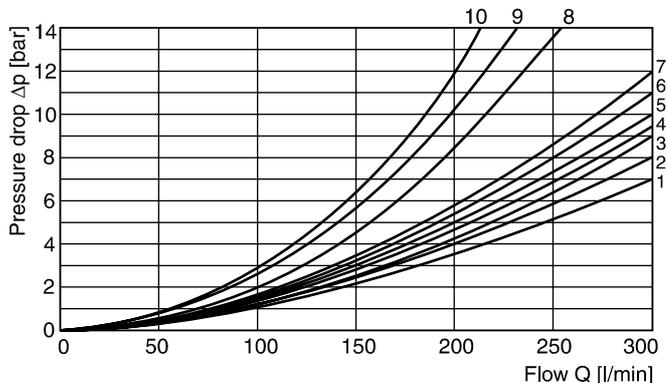
D31NW



D41VW

Spool Code	Curve number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	-	4	5
002	1	2	6	4	6
003	1	2	-	5	6
004	1	1	-	5	5
005	2	2	-	3	5
006	1	2	-	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	-	4	5
014	1	1	6	4	5
015	1	2	-	4	6
016	2	2	-	3	5
020	3	5	-	3	5
021	2	8	-	2	-
022	8	2	-	-	3
026	3	5	-	-	-
030	2	3	-	6	7
031	-	-	-	-	-
032	-	-	-	-	-
054	2	3	-	6	7
081	-	-	-	-	-
082	-	-	-	-	-

D41VW

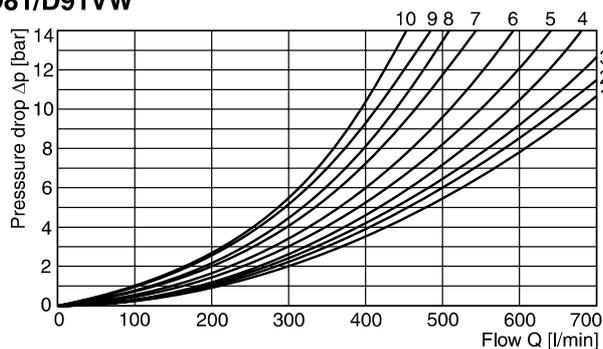


All characteristic curves measured with HLP46 at 50 °C.

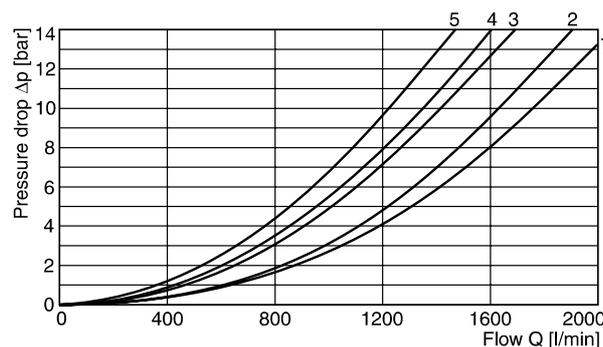
D81/D91VW and D111VW

Spool Code	Curve number									
	P-A		P-B		P-T		A-T		B-T	
	D8/9	D11	D8/9	D11	D8/9	D11	D8/9	D11	D8/9	D11
001	3	5	2	5	-	-	3	4	5	1
002	2	5	1	5	1	5	3	4	5	1
003	4	-	2	-	-	-	3	-	6	-
004	4	5	3	5	-	-	3	4	5	1
005	1	-	2	-	-	-	4	-	5	-
006	2	-	2	-	-	-	4	-	6	-
007	3	-	1	-	7	-	3	-	5	-
009	4	3	8	3	9	2	4	3	10	1
011	3	-	2	-	-	-	3	-	5	-
014	1	-	2	-	8	-	3	-	5	-
015	3	-	3	-	-	-	4	-	5	-
016	3	-	3	-	-	-	4	-	5	-
020	6	5	5	5	-	-	6	3	8	1
021	5	-	10	-	-	-	3	-	-	-
022	10	-	5	-	-	-	-	-	5	-
026	6	-	5	-	-	-	-	-	-	-
030	3	5	2	5	-	-	3	4	5	1
054	4	5	3	5	-	-	3	4	5	1

D81/D91VW



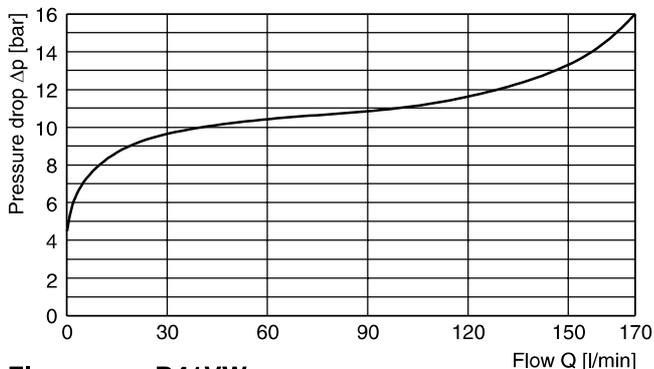
D111VW



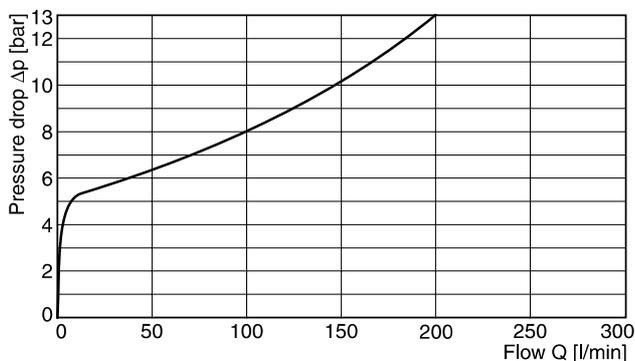
Integral check valve in the P port

Mounting an integral check valve in the P port is necessary to build up pilot pressure for valves with P to T connection and internal pilot oil supply. The pressure difference at the integral check valve (see performance curves) is to be added to all flow curves of the P-port of the main valve. Directional valves with an integral check valve are available for the series D31NW, D41VW and D81VW.

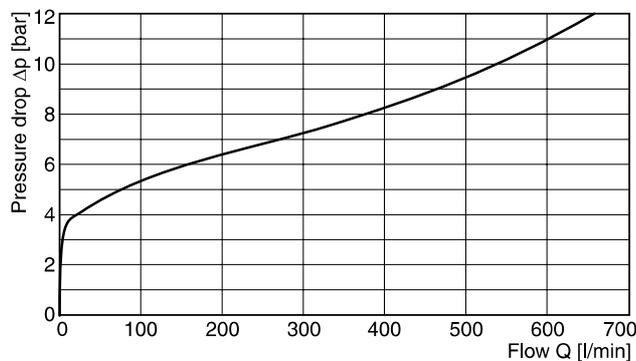
Flow curve D31NW



Flow curve D41VW

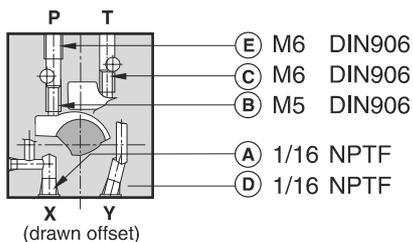


Flow curve D81VW



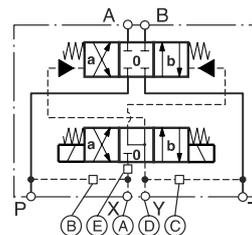
All characteristic curves measured with HLP46 at 50 °C.

D31DW

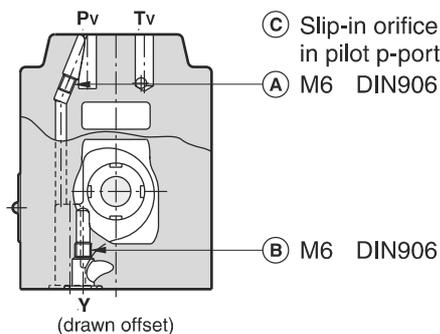


○ open, ● closed

Pilot oil		A	B	C	D	E
Inlet	Outlet					
internal	external	●	○	●	○	Orifice Ø1.2
external	external	○	●	●	○	Orifice Ø1.2
internal	internal	●	○	○	●	Orifice Ø1.2
external	internal	○	●	○	●	Orifice Ø1.2

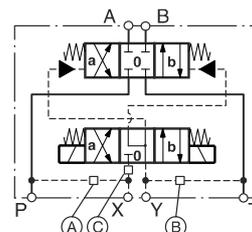


D31NW

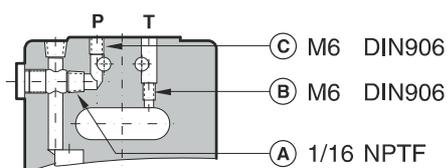


○ open, ● closed

Pilot oil		A	B	C
Inlet	Outlet			
internal	external	○	●	Orifice Ø1.0
external	external	●	●	Orifice Ø1.0
internal	internal	○	○	Orifice Ø1.0
external	internal	●	○	Orifice Ø1.0

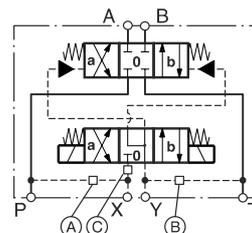


D41VW

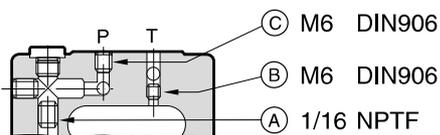


○ open, ● closed

Pilot oil		A	B	C
Inlet	Outlet			
internal	external	○	●	Orifice Ø1.5
external	external	●	●	Orifice Ø1.5
internal	internal	○	○	Orifice Ø1.5
external	internal	●	○	Orifice Ø1.5

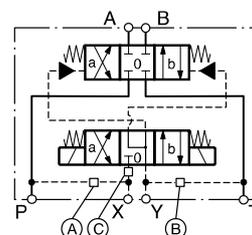


D81/91VW

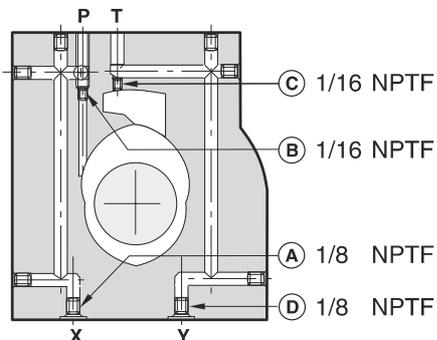


○ open, ● closed

Pilot oil		A	B	C
Inlet	Outlet			
internal	external	○	●	Orifice Ø1.5
external	external	●	●	Orifice Ø1.5
internal	internal	○	○	Orifice Ø1.5
external	internal	●	○	Orifice Ø1.5

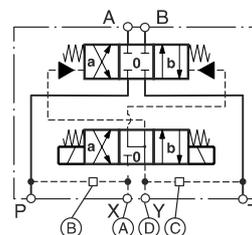


D111VW



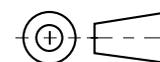
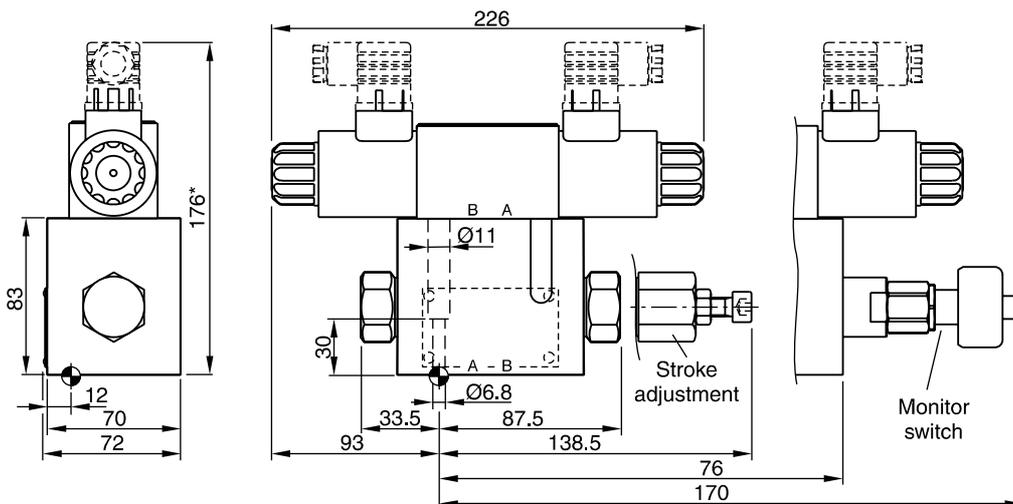
○ open, ● closed

Pilot oil		A	B	C	D
Inlet	Outlet				
internal	external	○	Orifice Ø1.5	●	○
external	external	Orifice Ø1.5	●	●	○
internal	internal	○	Orifice Ø1.5	○	○
external	internal	Orifice Ø1.5	●	○	○



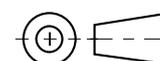
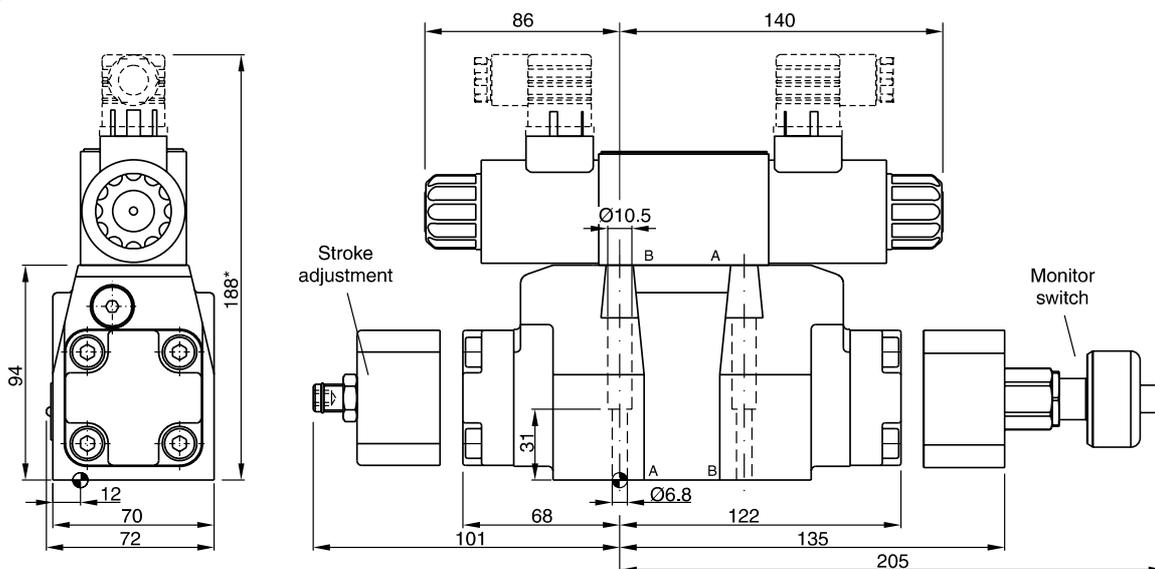
All orifice sizes for standard valves.

D31DW



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm $\pm 15\%$	NBR: SK-D31DW-N-91 FPM: SK-D31DW-V-91

D31NW



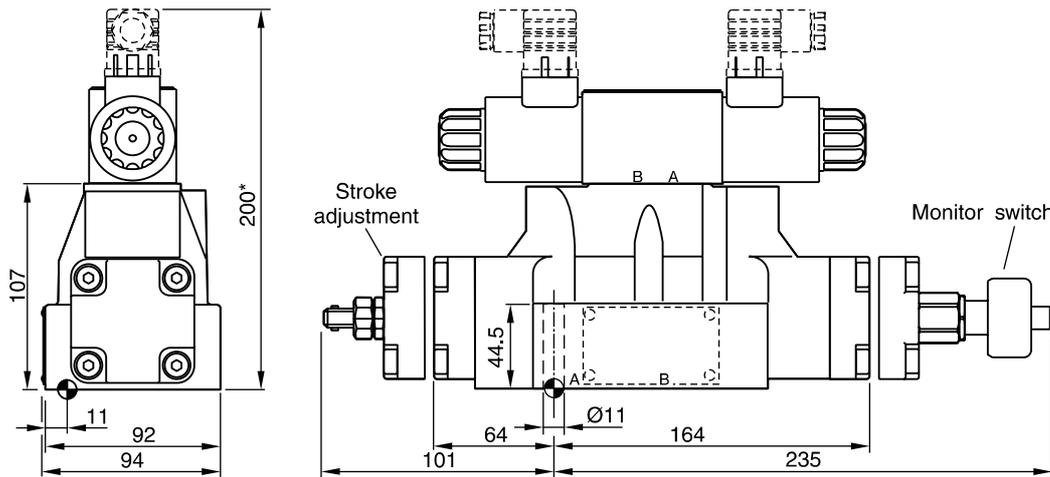
Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm $\pm 15\%$	NBR: SK-D31NW-N-91 FPM: SK-D31NW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
 The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).

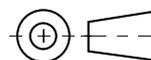
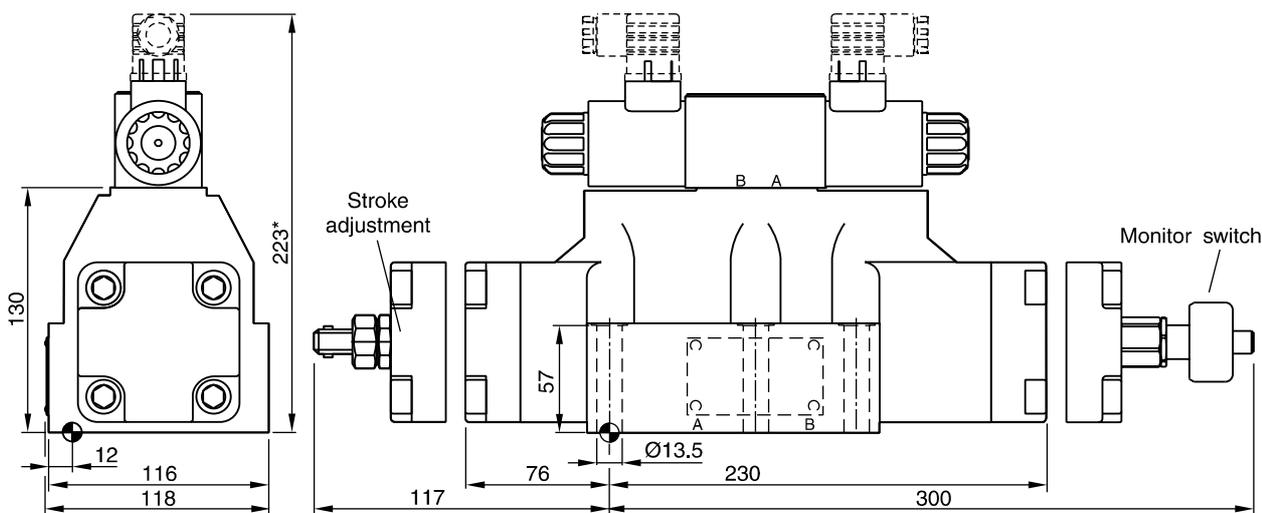
Dimensions

D41VW



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK320	4x M10x60 2x M6x55 ISO 4762-12.9	63 Nm $\pm 15\%$ 13.2 Nm $\pm 15\%$	NBR: SK-D41VW-N-91 FPM: SK-D41VW-V-91

D81VW, D91VW

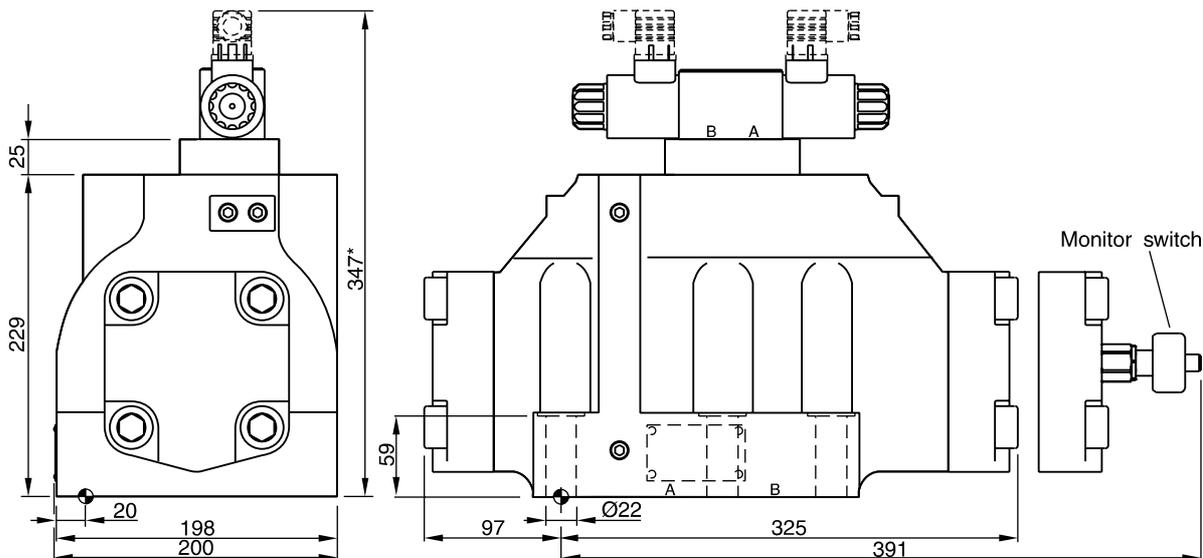


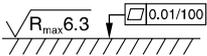
Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK360	6x M12x75 ISO 4762-12.9	108 Nm $\pm 15\%$	NBR: SK-D81VW-N-91 / SK-D91VW-N-91 FPM: SK-D81VW-V-91 / SK-D91VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).

D111VW



Surface finish	 Kit			 Kit
	BK386	6x M20x90 ISO 4762-12.9	517 Nm ±15 %	NBR: SK-D111VW-N-91 FPM: SK-D111VW-V-91

The space necessary to remove the plug as per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).

Characteristics

The series of regenerative and hybrid directional control valves are available in four sizes:

Direct operated valve:

D3DWR NG10 Hybrid function with adaptor plate (see chapter 12)

Pilot operated valves:

D31NWR NG10 Hybrid function with adaptor plate (see chapter 12)

D41VWR, D41VWZ NG16

D91VWR, D91VWZ NG25

D111VWR, D111VWZ NG32

The innovative integrated regenerative function in the A-line allows energy saving circuits with differential cylinders. The hybrid version can switch between regenerative mode and standard mode.

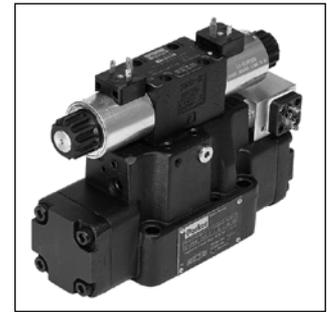
Features

- Energy saving A-regeneration
- Switchable hybrid version

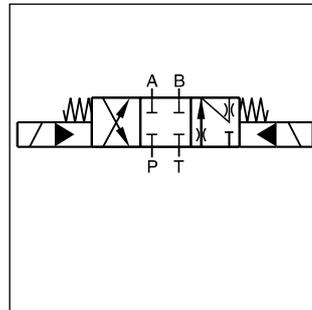
2



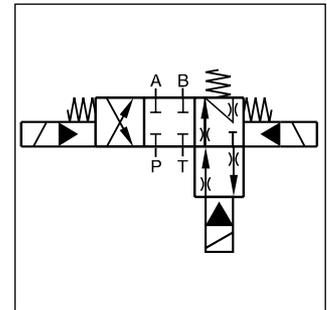
D41VWR



D41VWZ

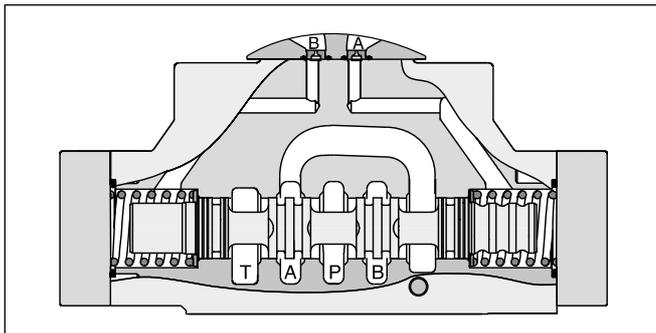


Regenerative D*1VWR

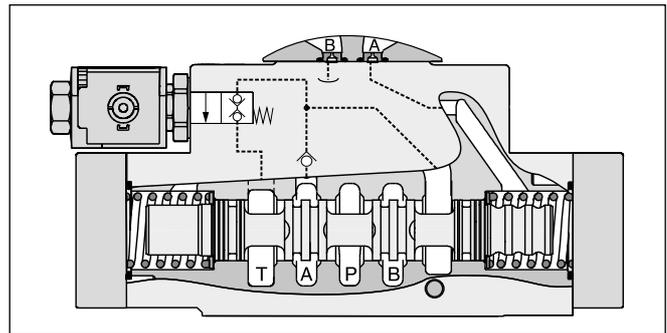


Hybrid D*1VWZ

Regenerative valve D*1VWR

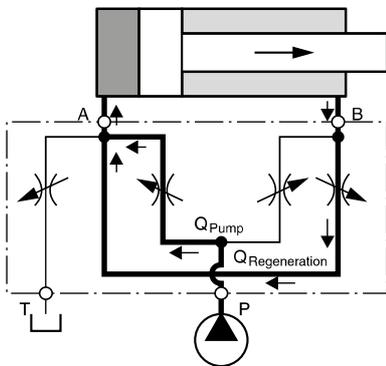


Hybrid valve D*1VWZ



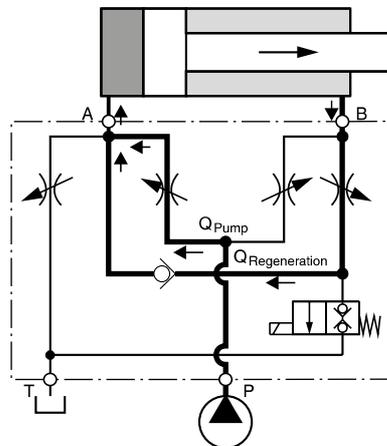
D*1VWR (regenerative valve)

Cylinder extending

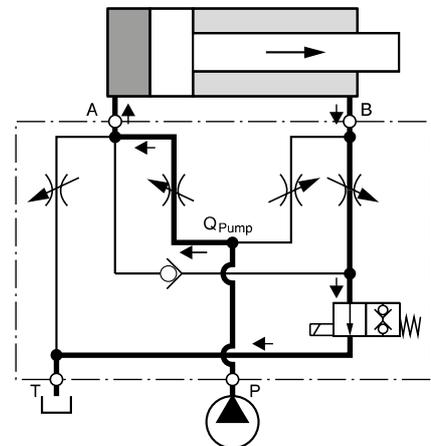


D*1VWZ (hybrid valve)

Cylinder extending regenerative mode (high speed)



Cylinder extending standard mode (high force)



D3DWR

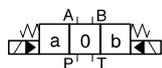
D3DW

Direct operated valve NG10

Spool type

C

3 spool position
 Spring offset in position "0".
 Operated in position "a" or "b".



Drain port

Seals

J

Solenoid voltage
 24 V =

W

Connector as per EN 175301-803, without connector
 (Please order plug separately)

Solenoid options

Design series

(not required for ordering)

Regenerative function ¹⁾

Code	Spool type
R01	
R04	
R81	
R82	

Code	Solenoid option
omit	manual override (Standard)
T	without manual override

Code	Seals
N	NBR
V	FPM

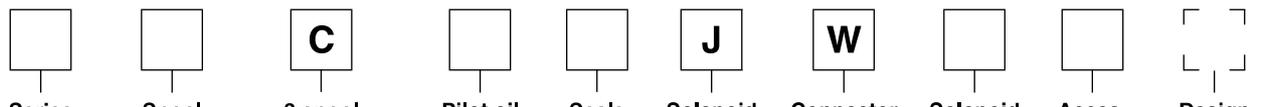
Code	Drain port
omit	Standard
9	for high pressure in the connection T1 (tank) or T2 (regenerative function) the connection X and Y can be used as drain port

2

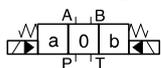
¹⁾ For regenerative and hybrid function please refer to solutions with sandwich- and adaptor plates "A10-1664 / A10-1665L / H10-1662 / H10-1666L" in chapter 12.

D31NWR, D*1VWR and D*1VWZ

2



3 spool position
Spring offset in position "0".
Operated in position "a" or "b".



Code	Bore	Size
D31NW	Ø11 mm	NG10
D41VW	Ø20 mm	NG16
D91VW	Ø32 mm	NG25
D111VW	Ø50 mm	NG32

Regenerative function ²⁾	
Code	Spool type
R01	
R04 ³⁾	
R54 ⁴⁾	
R81	
R82	

Hybrid function ^{1) 2)}	
Code	Spool type
Z01	
Z04 ³⁾	
Z54 ⁴⁾	
Z81	
Z82	

Code	Inlet	Outlet
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

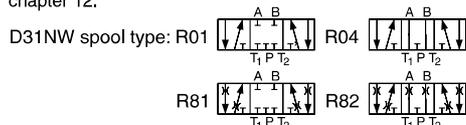
Code	Accessories
omit	Standard valve w/o accessories
3A	Pilot choke, meter-out
3B	Pilot choke, meter-in
3C	Pilot with pressure reducing valve
3D ³⁾	Stroke adjustment side B
3E ³⁾	Stroke adjustment side A
3F ³⁾	Stroke adjustment side A and B
3R	Meter-out + pressure reducing valve
1T	Meter-in + pressure reducing valve

Code	Solenoid option
omit	manual override (Standard)
T	without manual override

Code	Seals
N	NBR
V	FPM

¹⁾ Not for D31NW.

²⁾ For regenerative and hybrid function for D31NW (NG10) please refer to solutions with sandwich- and adaptor plates "A10-1664 / A10-1665L / H10-1662 / H10-1666L" in chapter 12.



³⁾ Not for D111VW.

⁴⁾ Only for D111VW.

General						
Design	Directional spool valve					
Actuation	Solenoid					
Series	D3DWR	D31NWR	D41VW	D81/91VW	D111VW	
Size	NG10	NG10	NG16	NG25	NG32	
Weight [kg]	6.3	8.1	10.3	18.6	68.0	
Mounting interface	DIN 24340 A10 ISO 4401 NFFPA D05	DIN 24340 A10 ISO 4401 NFFPA D05	DIN 24340 A16 ISO 4401 NFFPA D07	DIN 24340 A25 ISO 4401 NFFPA D08	DIN 24340 A32 ISO 4401 NFFPA D10	
CETOP RP 121-H						
Mounting position	unrestricted, preferably horizontal					
Ambient temperature [°C]	-25...+60					
MTTF _p value [years]	75 / 150 (D3DWR)					
Hydraulic						
Max. operating pressure [bar]	D3DWR: P, A B: 350; T: 210; option 9 ¹⁾ : P, A, B, T: 350; X, Y: 210 Pilot drain internal: P, A B, X: 350; T, Y: 105 Pilot drain external: P, A B, T, X: 350; Y: 105					
Fluid	Hydraulic oil according to DIN 51524					
Fluid temperature [°C]	-20 ... +70 (NBR: -25...+70)					
Viscosity permitted [cSt] / [mm ² /s]	2.8...400					
Viscosity recommended [cSt] / [mm ² /s]	30...80					
Filtration	ISO 4406; 18/16/13					
Flow max. [l/min]	150	170	300	700	2000	
Leakage at 350 bar (per flow path) [ml/min] *depending on spool	up to 20* (at 50 bar)	72...422*	up to 200*	up to 800*	up to 5000*	
Minimum pilot supply pressure [bar]	—	7	—	5	—	
Static / Dynamic						
Step response at 95 % [ms]	Energized / de-energized					
DC solenoids at 65 l/min 175 bar	105 / 85	—	—	—	—	
DC solenoids Pilot pressure 50 bar	—	50 / 60	95 / 65	150 / 170	470 / 390	
100 bar	—	50 / 60	75 / 65	110 / 170	320 / 390	
250 bar	—	50 / 50	60 / 65	90 / 170	210 / 390	
350 bar	—	50 / 50	60 / 65	85 / 170	200 / 390	
Electrical characteristics						
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible					
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)					
Supply voltage / ripple [V]	D3DWR 24 V =			D31NWR / D41VW / D91VW / D111VW 24 V =		
Tolerance supply voltage [%]	±10			±10		
Current consumption hold [A]	1.5			1.29		
Current consumption in rush [A]	1.5			1.29		
Power consumption hold [W]	36			31		
Power consumption in rush [W]	36			31		
Solenoid connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461.					
Wiring min. [mm ²]	3 x 1.5 recommended					
Wiring length max. [m]	50 recommended					

Electrical characteristics hybrid option

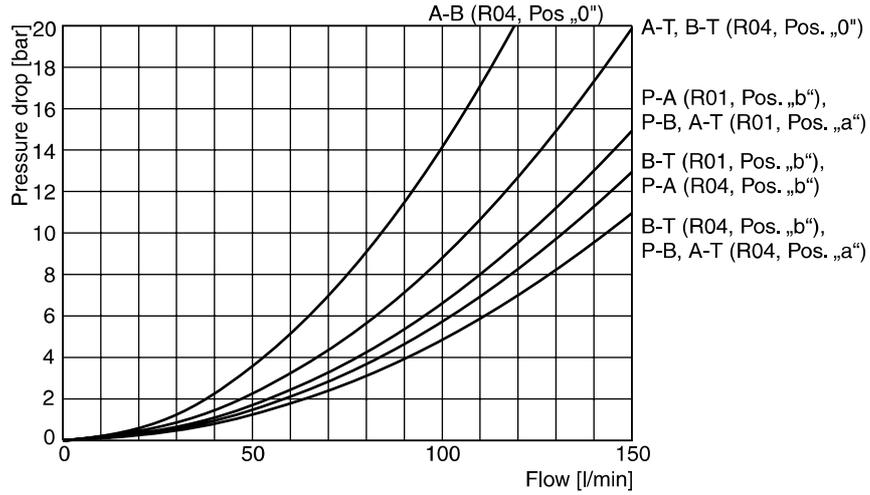
Duty ratio	100 %			
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)			
	D41	D91	D111	
Supply voltage [V]	24	24	24	
Tolerance supply voltage [%]	±10	±10	±10	
Current consumption [A]	1.21	0.96	1.29	
Power consumption [W]	29	23	31	
Solenoid connection	Connector as per EN 175301-803			
Wiring min. [mm ²]	3 x 1.5 recommended			
Wiring length max. [m]	50 recommended			

With electrical connections the protective conductor (PE ⚡) must be connected according to the relevant regulations.

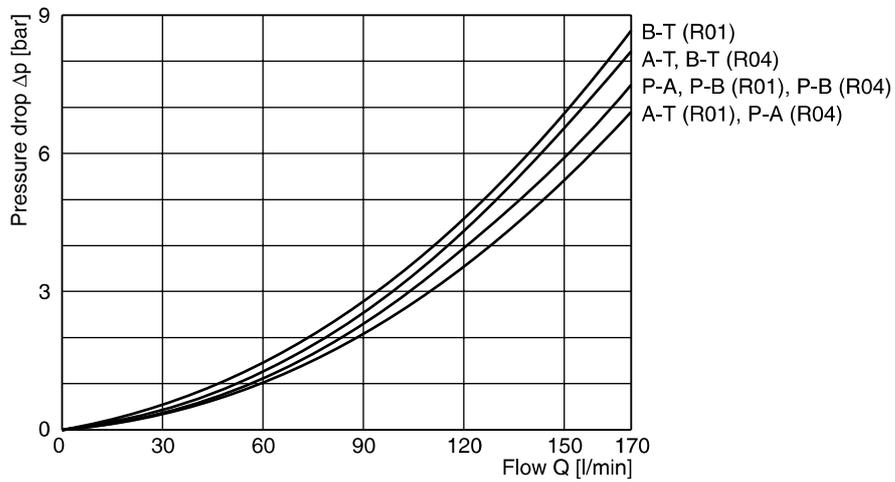
¹⁾ Bolts are not designed for simultaneous loading of all ports with maximum pressure.
The total pressure profile has to be adapted to the tensile strength of the bolts.

D3DWR

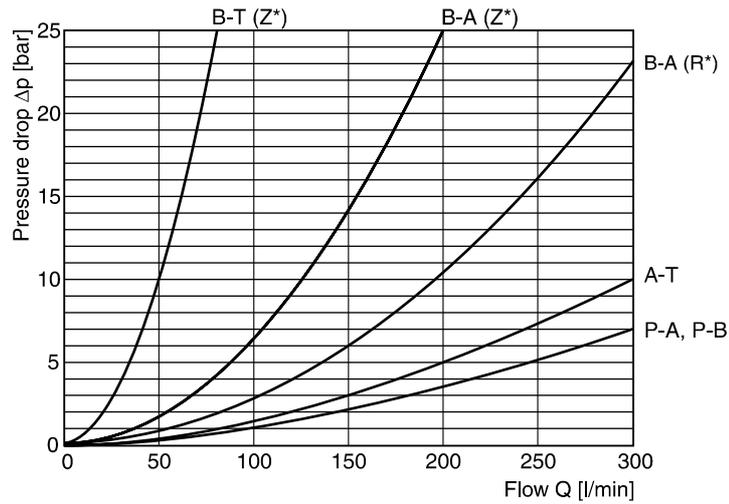
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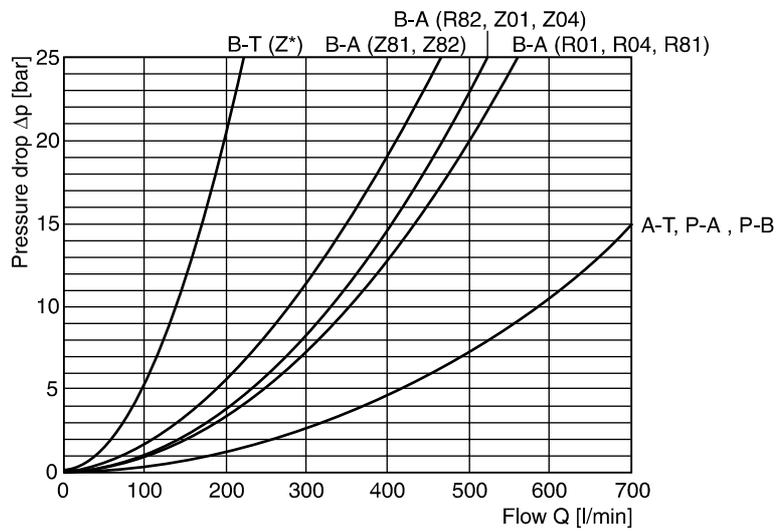
D31NWR



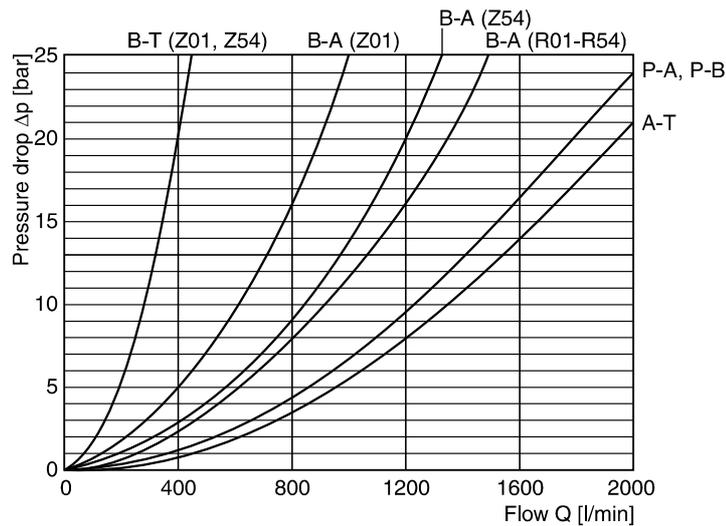
D41VW



D91VW



D111VW



D31NW on request.

D3-D11 REG-HYB UK.indd 24.04.19

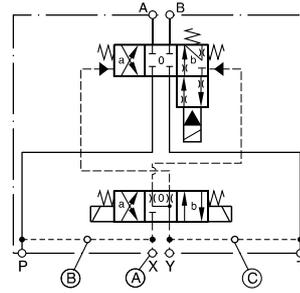
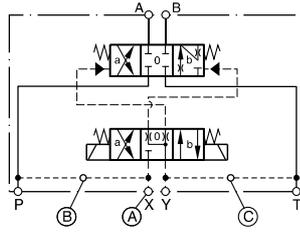


Pilot Flow

Pilot oil inlet (supply) and outlet (drain)

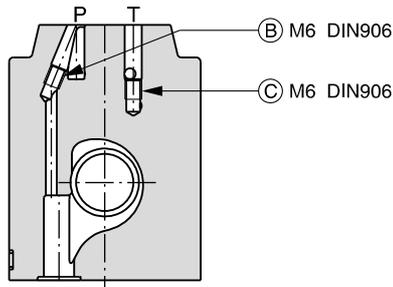
○ open, ● closed

Pilot oil		B	C
Inlet	Drain		
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○

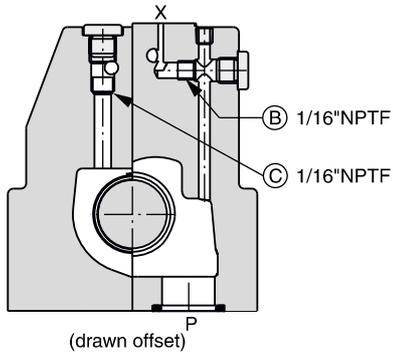


2

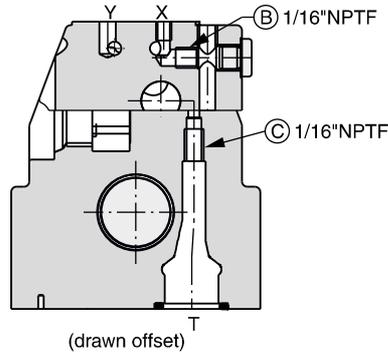
D31NWR



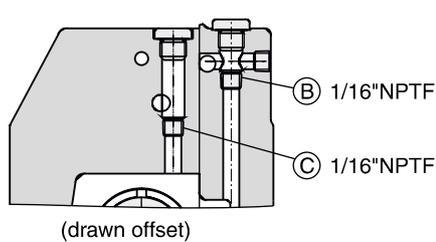
D41VWR



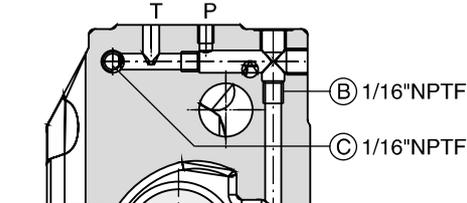
D41VWZ



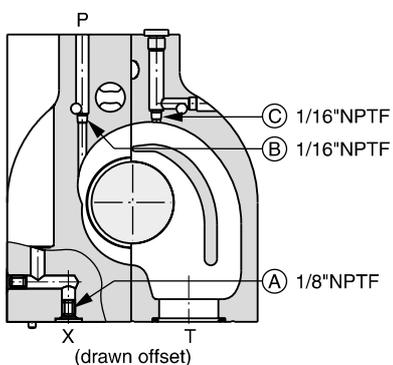
D91VWR



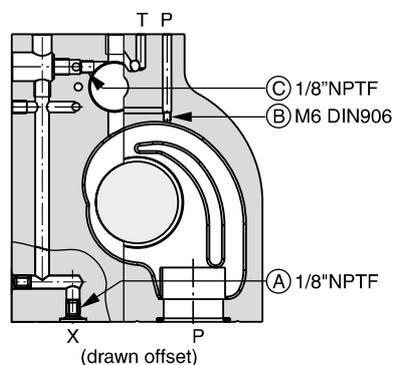
D91VWZ



D111VWR



D111VWZ



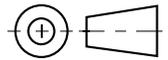
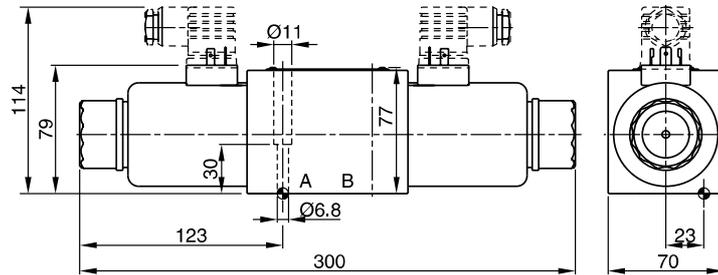
○ open, ● closed

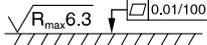
Pilot oil		A	B	C
Inlet	Outlet			
internal	external	○	Orifice Ø1.5	●
external	external	Orifice Ø1.5	●	●
internal	internal	○	Orifice Ø1.5	○
external	internal	Orifice Ø1.5	●	○

Dimensions

D3DWR

Regenerative and hybrid function with additional plate "H10-1666L / H10-1662 / A10-1664 / A10-1665L", see chapter 12



Surface finish	 Kit	 Kit	 Kit	 Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	NBR: SK-D3W-30 FPM: SK-D3W-V-30

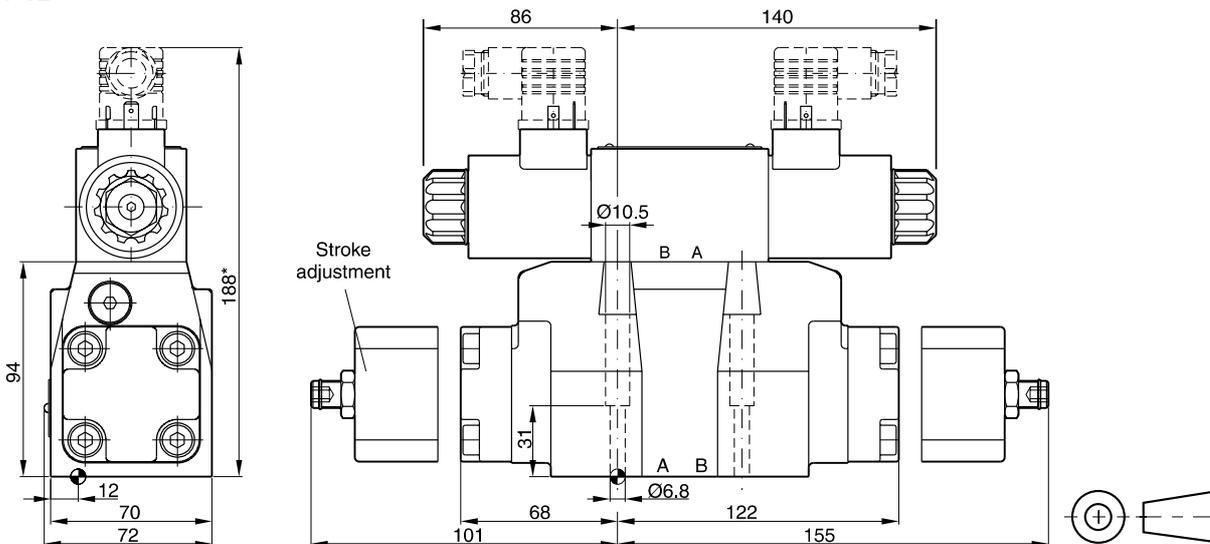
The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
 The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

2

Dimensions

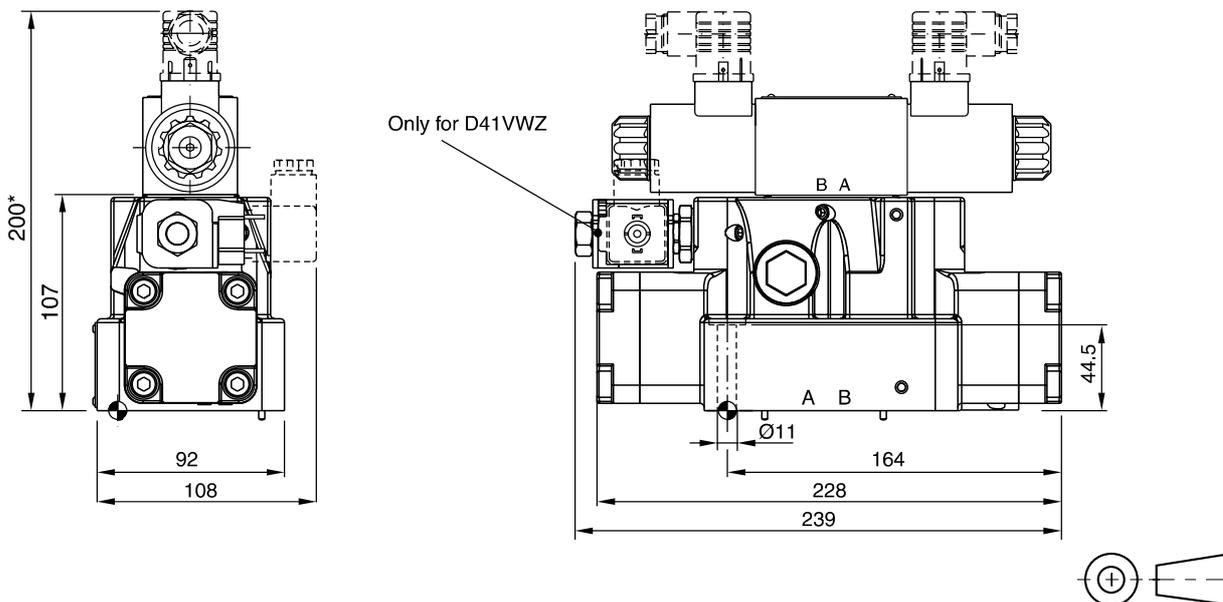
D31NWR

Regenerative and hybrid function with additional plate "H10-1666L / H10-1662 / A10-1664 / A10-1665L", see chapter 12



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm $\pm 15\%$	NBR: SK-D31NW-N-91 FPM: SK-D31NW-V-91

D41VWR/Z

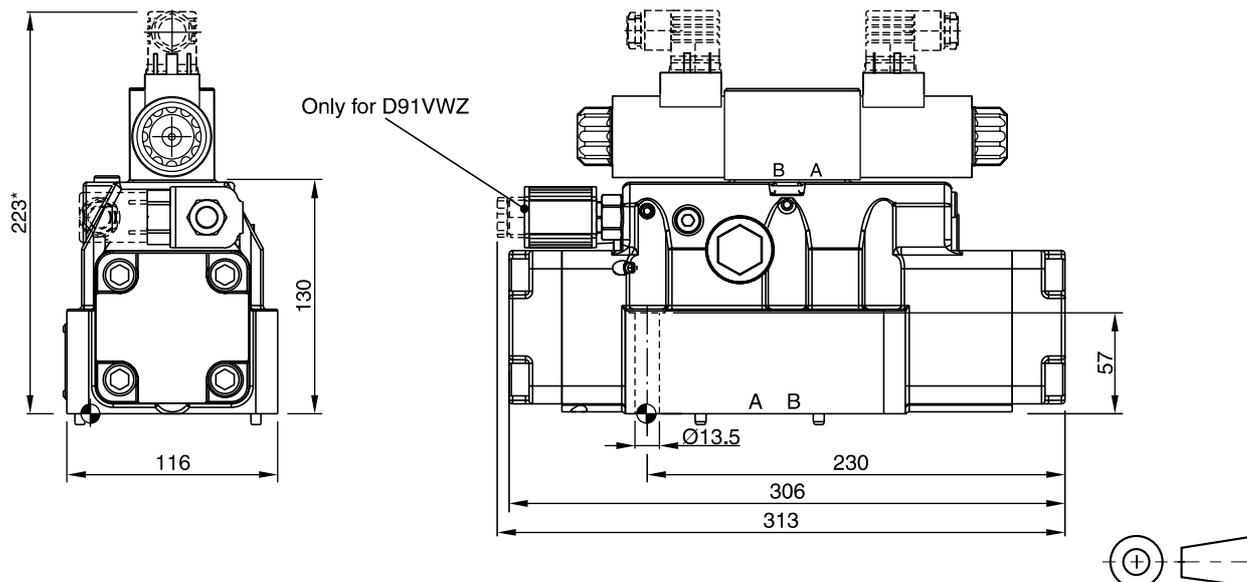


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK320	4x M10x60 2x M6x55 ISO 4762-12.9	63 Nm $\pm 15\%$ 13.2 Nm $\pm 15\%$	NBR: SK-D41VW-N-91 FPM: SK-D41VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

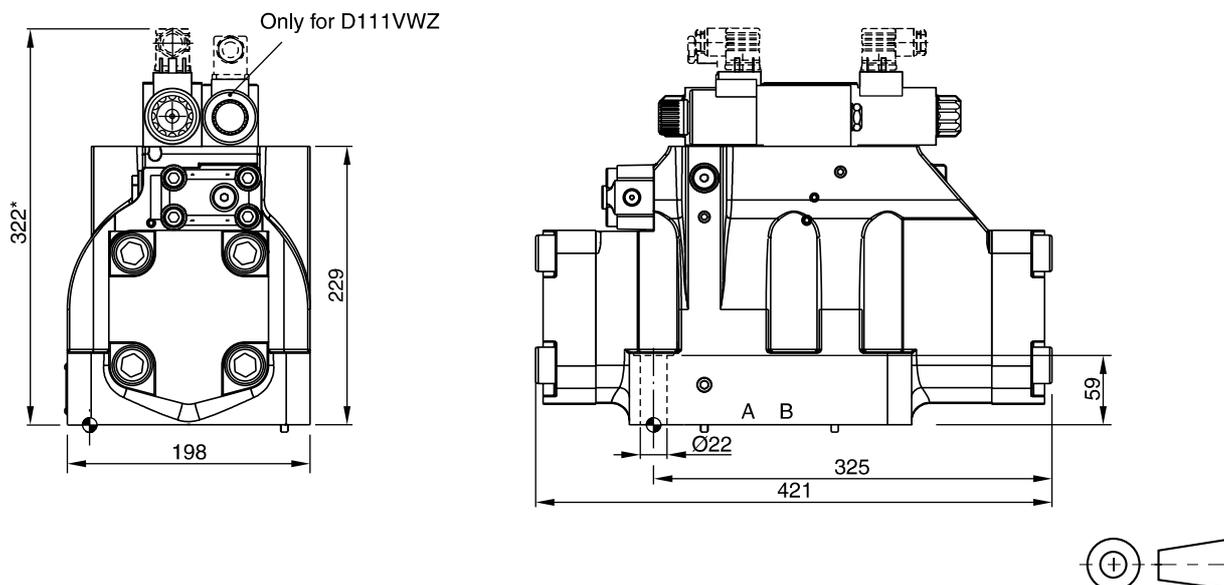
* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).

D91VWR/Z



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ 0.01/100	BK360	6x M12x75 ISO 4762-12.9	108 Nm ±15 %	NBR: SK-D81VW-N-91 / SK-D91VW-N-91 FPM: SK-D81VW-V-91 / SK-D91VW-V-91

D111VW



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ 0.01/100	BK386	6x M20x90 ISO 4762-12.9	517 Nm ±15 %	NBR: SK-D111VW-N-91 FPM: SK-D111VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
 The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).

Hydraulically operated directional control valves are available in 5 sizes:

- D1VP*4L NG06 – operated via end caps
- D1VP*90 NG06 – operated via end caps and mounting interface (X, Y)
- D3DP NG10 – operated via mounting interface (X, Y)
- D4P NG16 – operated via mounting interface (X, Y)
- D9P NG25 – operated via mounting interface (X, Y)
- D11P NG32 – operated via mounting interface (X, Y)

Size NG06 (D1VP) is available in two different designs:

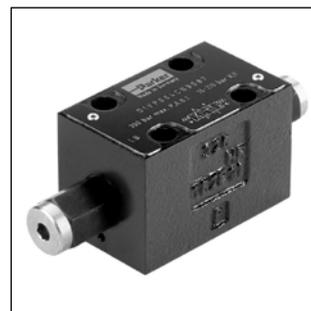
- D1VP*4L for operating pressure >10 bar (over tank pressure) with control ports in the end caps.
- D1VP*90 for operating pressure >15 bar with control ports in the end caps and mounting interface (X, Y).

All other series are operated only via mounting interface (X, Y).

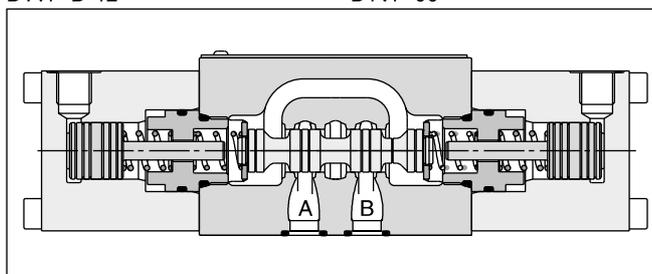
The shifting time is depending on the pilot pressure. For safe operation the minimum pilot pressure has to be ensured in all operating conditions. The maximum pilot pressure varies from the maximum operating pressure in some sizes.



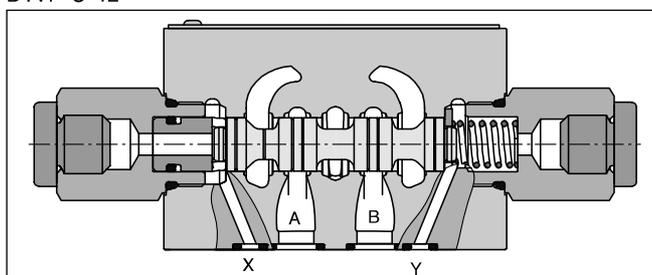
D1VP*B*4L



D1VP*90



D1VP*C*4L



D1VP*90

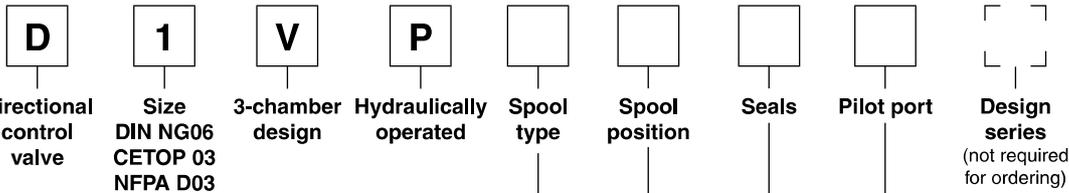
Technical data

General						
Design	Directional spool valve					
Actuation	Hydraulic					
Series	D1VP*4L	D1VP*90	D3DP	D4P	D9P	D11P
Size	NG06	NG06	NG10	NG16	NG25	NG32
Weight [kg]	1.3	1.3	3.7	9.0	17.0	66.0
Mounting interface	DIN 24340 A06 ISO 4401 NFFPA D03	DIN 24340 A06 ISO 4401 NFFPA D03	DIN 24340 A10 ISO 4401 NFFPA D05	DIN 24340 A16 ISO 4401 NFFPA D07	DIN 24340 A25 ISO 4401 NFFPA D08	DIN 24340 A32 ISO 4401 NFFPA D10
	CETOP RP 121-H					
Mounting position	unrestricted, preferably horizontal					
Ambient temperature [°C]	-25...+60					
MTTF _p value [years]	150					
Hydraulic						
Max. operating pressure [bar]	P, A B: 350; T: 140	P, A B, T: 350; X, Y: 210	P, A B, T: 350; X, Y: 210	P, A B, T: 350; X, Y: 350	P, A B, T: 350; X, Y: 350	P, A B, T: 350; X, Y: 350
Fluid	Hydraulic oil according to DIN 51524					
Fluid temperature [°C]	-20 ... +70 (NBR: -25...+70)					
Viscosity permitted [cSt] / [mm ² /s]	2.8...400					
Viscosity recommended [cSt] / [mm ² /s]	30...80					
Filtration	ISO 4406 (1999); 18/16/13					
Flow max. [l/min]	60 ¹⁾	60 ¹⁾	130	300	700	2000
Leakage at 350 bar (per flow path) [ml/min]	up to 60 ²⁾	up to 60 ²⁾	up to 100 ²⁾	up to 200 ²⁾	up to 800 ²⁾	up to 5000 ²⁾
Operating pressure (min/max) [bar]	10 ³⁾ / 210	15 / 210	15 / 210	5 / 350	5 / 350	5 / 350
Pilot volume (start position to end position) [cm ³]	0.59	0.34	1,1	4,2	12,3	59,7
Static / Dynamic						
Step response	The response times depend on the pilot oil pressure and on the speed of the increase / decrease of the pilot pressure.					

¹⁾ Depending on spool, see shift limits.

²⁾ Depending on spool.

³⁾ > tank pressure.



2

3 position spools	
Code	Spool type
	a 0 b
001	
002	
004	
006	
008 ¹⁾	
009 ¹⁾	

2 position spools	
Code	Spool type
	a b
020	
026	
030	

Code	Pilot port
4L	High tank pressure, indirect via pilot spool
90	Direct via X, Y port or pipe thread G $\frac{1}{4}$

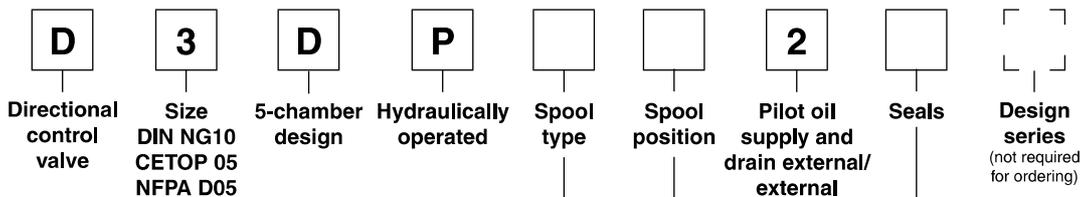
Code	Seals
N	NBR
V	FPM

3 position spools ²⁾			
Code	Spool position		
C			3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008 and 009	
E			2 positions. Spring offset in position "0".
F			2 positions. Operated in position "0".
K			2 positions. Spring offset in position "0".
M			2 positions. Operated in position "0".

2 position spools ²⁾			
Code	Spool position		
B			Spring offset in position "b". Operated in position "a".
D			Detent, operated in position "a" or "b". No centre or offset position.
H			Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.
²⁾ Code 4L without ports X and Y.

Further spool types and styles on request.



2

3 position spools	
Code	Spool type
001	
002	
003	
004	
005	
006	
007	
008 ¹⁾	
009 ¹⁾	
010	
011	
014	
015	
016	
021	
022	
031	
032	
081	
082	
102	

2 position spools	
Code	Spool type
020	
026	
030	
101	

Code	Seals
N	NBR
V	FPM

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008 and 009
E		2 positions. Spring offset in position "0".
F		2 positions. Operated in position "0".
K		2 positions. Spring offset in position "0".
M		2 positions. Operated in position "0".

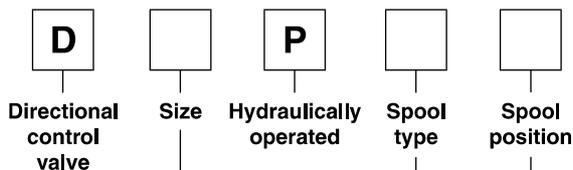
2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
D		Detent, operated in position "a" or "b". No center or offset position.
H		Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.

Further spool types and styles on request.



2



Code	Bore	Size
4	Ø20 mm	NG16
9	Ø32 mm	NG25
11	Ø50 mm	NG32

3 position spools		D4	D9	D11
Code	Spool type			
	a 0 b			
001		•	•	•
002		•	•	•
003		•	•	
004		•	•	•
005		•	•	
006		•	•	
007		•	•	
009 ¹⁾		•	•	•
011		•	•	
014		•	•	
015		•	•	
016		•	•	
021		•	•	
022		•	•	
031			•	
032			•	
054		•	•	•
081		•	•	•
082		•	•	•

2 position spools		D4	D9	D11
Code	Spool type			
	a b			
020		•	•	•
026		•	•	
030		•	•	•

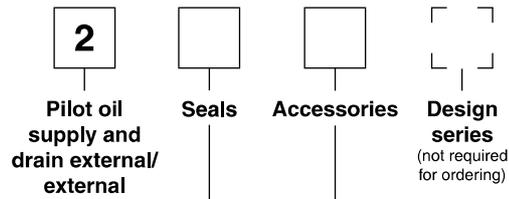
3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 009
E	 Operated in position "a".	 Operated in position "b".
F	 Spring offset in position "b".	 Spring offset in position "a".
K	 Operated in position "b".	 Operated in position "a".
M	 Spring offset in position "a".	 Spring offset in position "b".
R ²⁾	 No centre in offset position.	 No centre in offset position.
S ²⁾	 No centre in offset position.	 No centre in offset position.

2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
D		Detent, operated in position "a" or "b". No centre or offset position.
H		Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.

²⁾ Only D4 and D9 available.

Ordering Code



Code	Accessories
omit	Standard valve w/o accessories
3A	Pilot choke, meter-out
3B	Pilot choke, meter-in
3D ²⁾	Stroke adjustment side B
3E ²⁾	Stroke adjustment side A
3F ²⁾	Stroke adjustment side A and B

Code	Seals
N	NBR
V	FPM



Further spool types, styles and position control on request.

Flow Curve Diagrams / Shift Limits

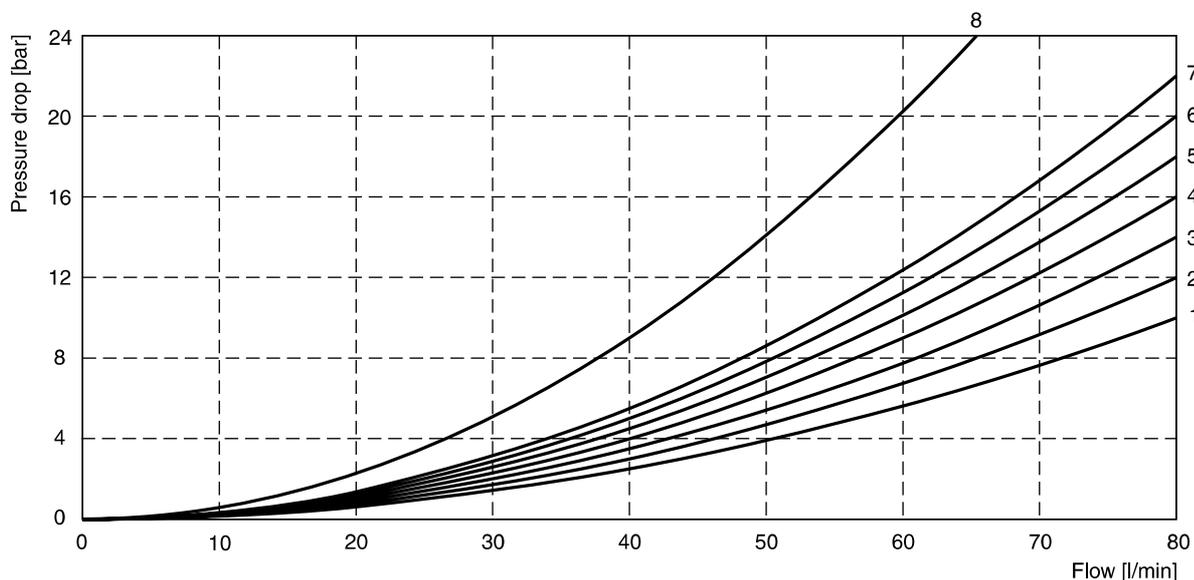
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number

for each spool type, operating position and flow direction is given in 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
001	2	2	2	2	-	-	-	-	-
002	1	4	1	4	1	1	5	5	2
004	2	3	2	3	-	-	7	7	-
006	1	4	1	4	7	7	-	-	-
020	4	4	2	3	-	-	-	-	-
026	4	-	4	-	-	-	-	-	-
030	2	3	1	2	-	-	-	-	-
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T
008	4	5	4	5	-	-	-	-	8
009	5	5	6	7	-	-	-	-	7

2

Flow curves



All characteristic curves measured with HLP46 at 50°C.

Shift limits

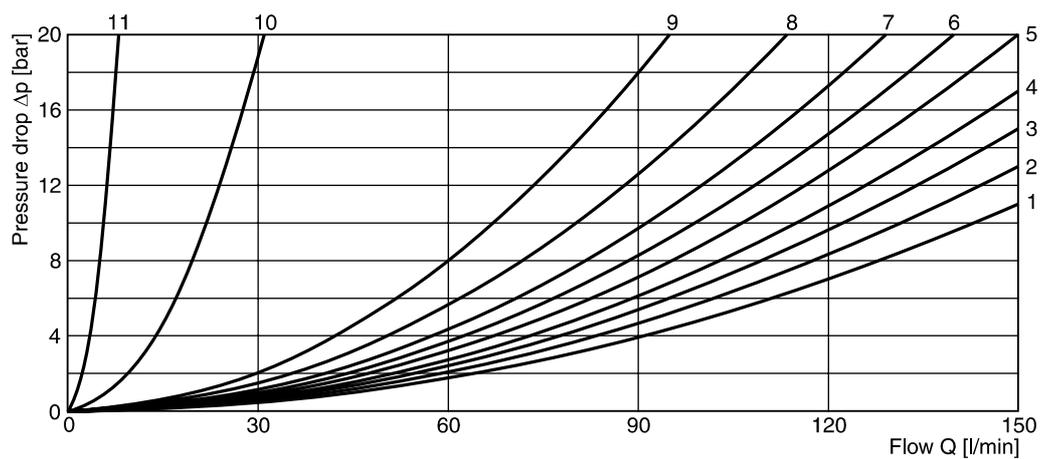
Spool	Shift limit [l/min]
001	
002	
004	
006	60
020	
030	
008	40
009	
026	20

The flow curve diagram shows the flow versus pressure drop for each spool type, operating position and flow direction drop curves for all spool types. The relevant curve number is given in 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	
001	4	3	4	3	–	–	–	–	–	–	
002	2	4	3	3	2	2	1	2	3	4	
003	2	2	4	1	–	–	5	–	–	–	
004	4	3	3	2	–	–	5	5	–	6	
005	1	3	4	2	4	–	–	–	–	–	
006	2	4	3	3	5	5	–	–	–	6	
007	4	2	2	2	–	2	–	2	5	–	
010	2	–	2	–	–	–	–	–	–	–	
011	3	3	2	3	–	–	10	10	–	11	
014	2	3	4	2	2	–	2	–	5	–	
015	4	2	2	2	–	–	–	4	–	–	
016	4	2	1	1	–	4	–	–	–	–	
020	4	4	4	4	–	–	–	–	–	–	
026	3	–	3	–	–	–	–	–	–	–	
030	4	3	3	3	–	–	–	–	–	–	
081	6	7	6	7	–	–	–	–	–	–	
082	7	7	6	5	–	–	11	11	–	11	
101	9	9	9	9	–	–	–	–	–	–	
102	2	2	2	1	6	6	3	5	6	6	
	P-B	A-T	P-A	B-T	P-A	P-B	A-T	B-T	P-T	A-B	
008	4	2	5	6					8		
009	2	5	2	6	–	–	–	–	8	–	
	Position „b“		Position „a“		Position „0“						
	P-A	B-T	A-B	P-B	A-T		A-T				
021	3	5	6	4	2	–	–	–			
031	3	5	6	4	1	–	9	–			
	P-A	B-T		P-A	P-B	A-B		B-T			
022	5	4	–	5	2	6	–	–			
032	5	2	–	5	2	6	–	9			

2

Flow curves



All characteristic curves measured with HLP46 at 50°C.

D_P UK.indd 24.04.2019



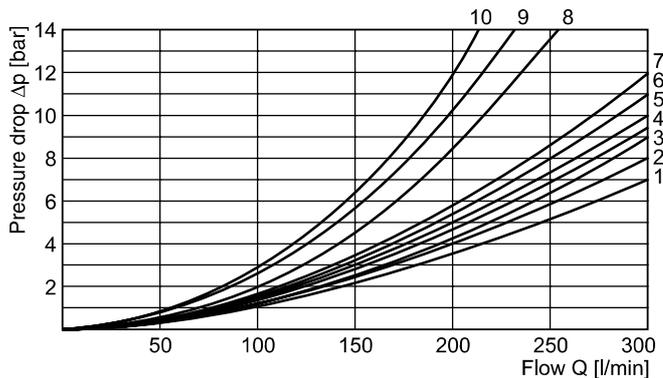
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number

for each spool type, operating position and flow direction is given in the table below.

D4P

Spool Code	Curve number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	-	4	5
002	1	2	6	4	6
003	1	2	-	5	6
004	1	1	-	5	5
005	2	2	-	3	5
006	1	2	-	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	-	4	5
014	1	1	6	4	5
015	1	2	-	4	6
016	2	2	-	3	5
020	3	5	-	3	5
021	2	8	-	2	-
022	8	2	-	-	3
026	3	5	-	-	-
030	2	3	-	6	7
054	2	3	-	6	7

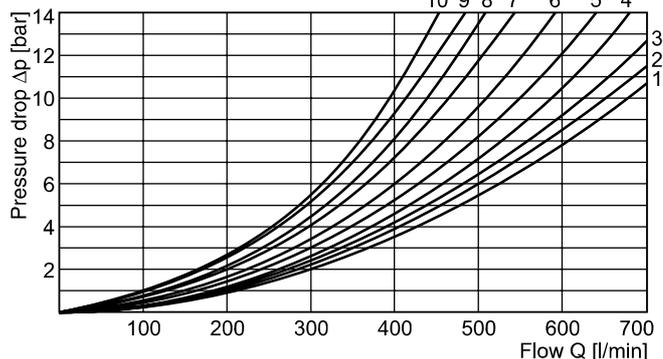
D4P



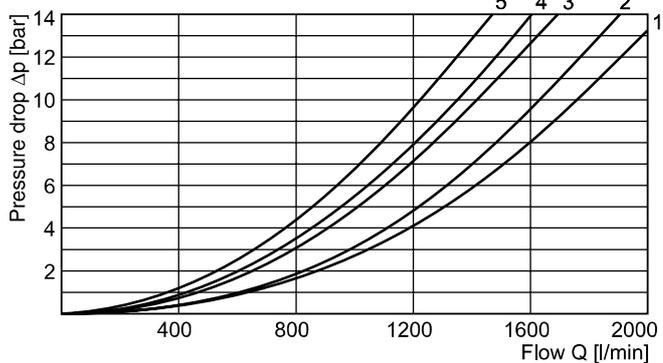
D9P and D11P

Spool Code	Curve number									
	P-A		P-B		P-T		A-T		B-T	
	D9	D11	D9	D11	D9	D11	D9	D11	D9	D11
001	3	5	2	5	-	-	3	4	5	1
002	2	5	1	5	1	5	3	4	5	1
003	4	-	2	-	-	-	3	-	6	-
004	4	5	3	5	-	-	3	4	5	1
005	1	-	2	-	-	-	4	-	5	-
006	2	-	2	-	-	-	4	-	6	-
007	3	-	1	-	7	-	3	-	5	-
009	4	3	8	3	9	2	4	3	10	1
011	3	-	2	-	-	-	3	-	5	-
014	1	-	2	-	8	-	3	-	5	-
015	3	-	3	-	-	-	4	-	5	-
016	3	-	3	-	-	-	4	-	5	-
020	6	5	5	5	-	-	6	3	8	1
021	5	-	10	-	-	-	3	-	-	-
022	10	-	5	-	-	-	-	-	5	-
026	6	-	5	-	-	-	-	-	-	-
030	3	5	2	5	-	-	3	4	5	1
054	-	5	-	5	-	-	-	4	-	1

D9P



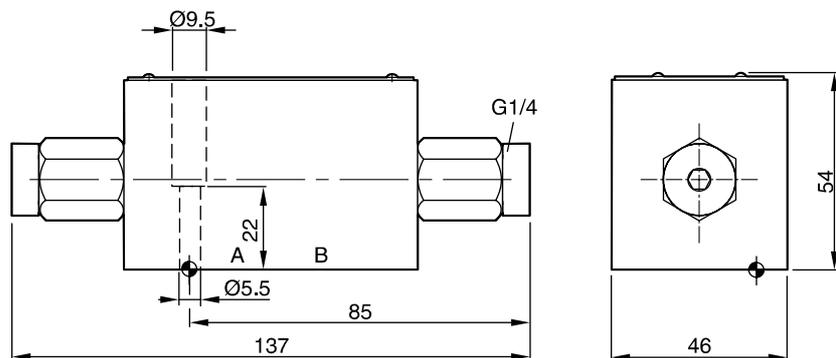
D11P

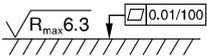


All characteristic curves measured with HLP46 at 50°C.

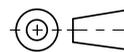
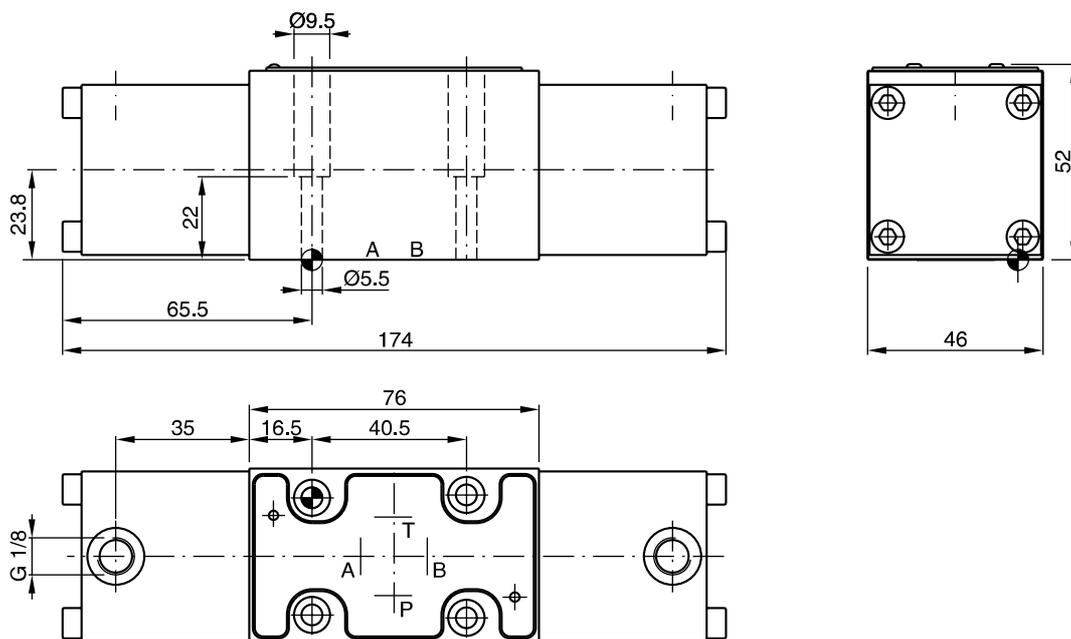


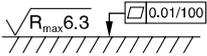
D1VP*90



Surface finish	 Kit	 Kit	 Kit	 Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VP-N-87 FPM: SK-D1VP-V-87

D1VP*4L

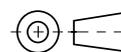
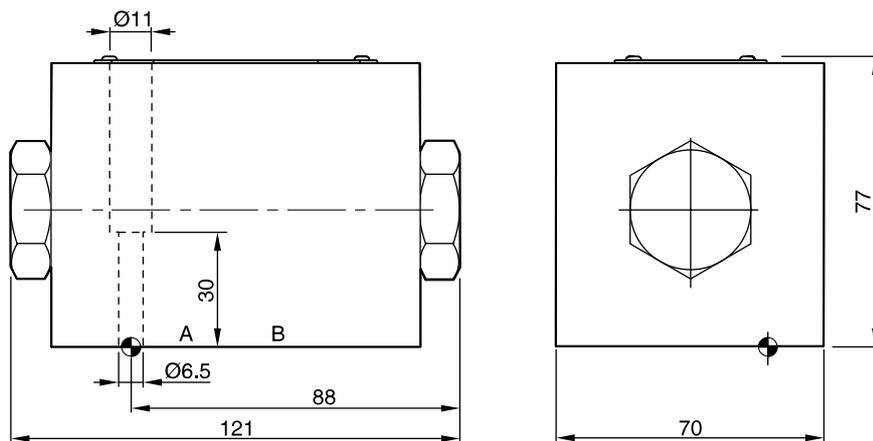


Surface finish	 Kit	 Kit	 Kit	 Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VP-N4-91 FPM: SK-D1VP-V4-91

Dimensions

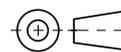
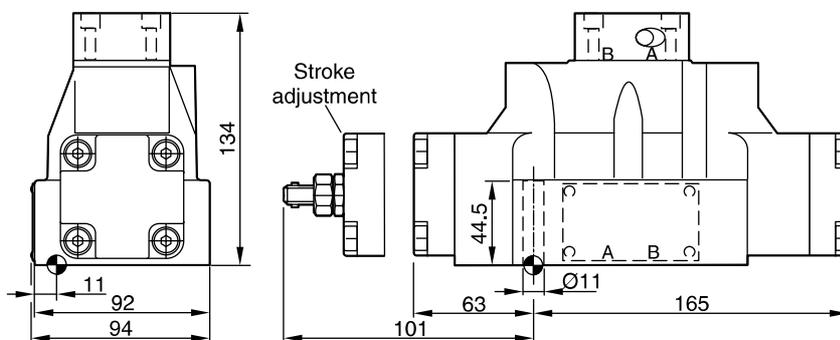
D3DP

2



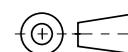
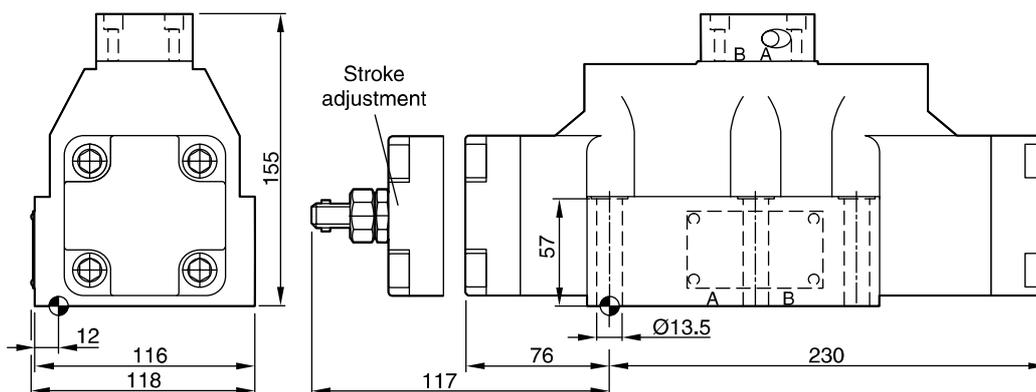
Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	NBR: SK-D3DP-N-42 FPM: SK-D3DP-V-42

D4P



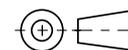
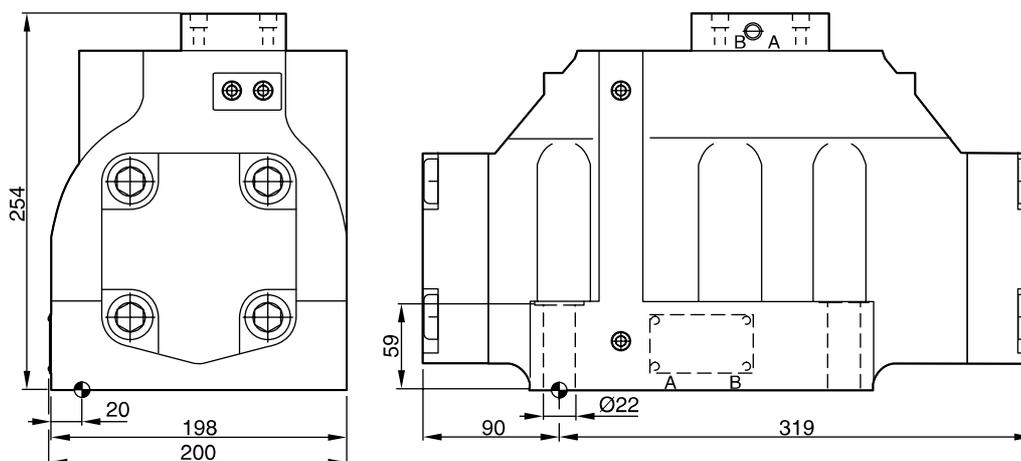
Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK320	4x M10x60 2 x M6x55 ISO 4762-12.9	63 Nm ±15 % 13.2 Nm ±15 %	NBR: SK-D41VW-N-91 FPM: SK-D41VW-V-91

D9P



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK360	6x M12x75 ISO 4762-12.9	108 Nm ± 15 %	NBR: SK-D91VW-N-91 FPM: SK-D91VW-V-91

D11P



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK386	6x M20x90 ISO 4762-12.9	517 Nm ± 15 %	NBR: SK-D111VW-N-91 FPM: SK-D111VW-V-91

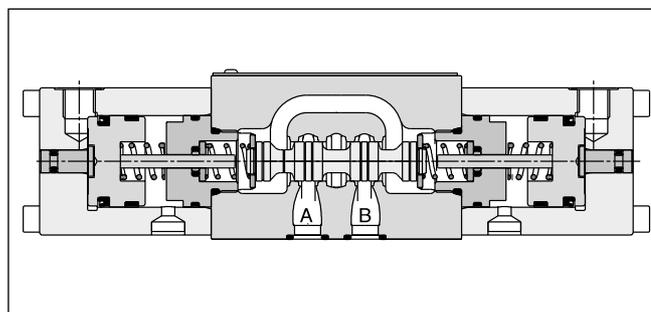
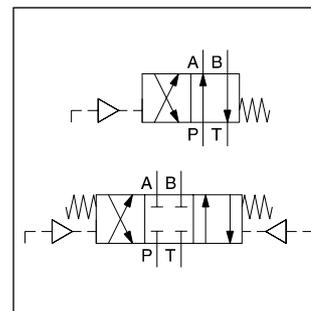
Characteristics

Pneumatically controlled directional control valves of series D1VA are based on the standard D1VW design.

The main spool is operated via an auxiliary spool of larger diameter. Thus enables low operating pressures from 3 to 5 bar.

Pneumatic connection via thread G1/8 in the end caps.

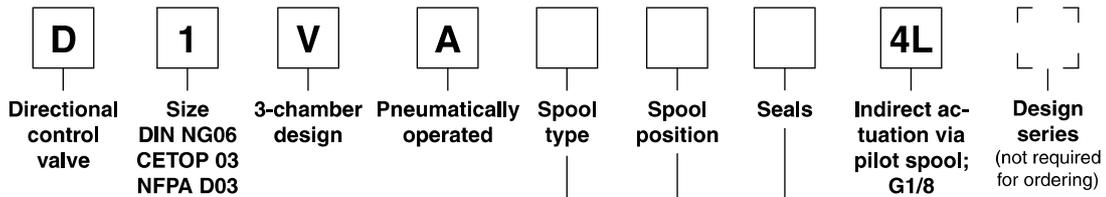
2



Technical data

General			
Design	Directional spool valve		
Actuation	Pneumatic		
Size	DIN NG06 / CETOP 03 / NFPA D03		
Mounting interface	DIN 24340 A06, ISO 4401, NFPA D03, CETOP RP 121-H		
Mounting position	unrestricted, preferably horizontal		
Ambient temperature	[°C]	-25...+60	
MTTF _D value	[years]	150	
Weight	[kg]	1.3	
Hydraulic			
Max. operating pressure	[bar]	P, A B: 350; T: 105	
Fluid	Hydrauliköl nach DIN 51524		
Fluid temperature	[°C]	-20 ... +70 (NBR: -25...+70)	
Viscosity permitted	[cSt] / [mm ² /s]	2.8...400	
Viscosity recommended	[cSt] / [mm ² /s]	30...80	
Filtration	ISO 4406 (1999); 18/16/13		
Flow max.	[l/min]	60 ¹⁾	
Leakage at 350 bar (per flow path)	[ml/min]	up to 60 ¹⁾	
Operating pressure w/o tank pressure	[bar]	min. 3	
with max tank	[bar]	min. 5	
Static / Dynamic			
Step response	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.) depending on pilot pressure and pipe length	[ms]	13/28	

¹⁾ Depending on spool.



2

3 position spools	
Code	Spool type
	a 0 b
001	
002	
004	
006	
008 ¹⁾	
009 ¹⁾	

2 position spools	
Code	Spool type
	a b
020	
026	
030	

Code	Seals
N	NBR
V	FPM

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008, 009
E		2 positions. Spring offset in position "0". Operated in position "a".
F		2 positions. Spring offset in position "b". Operated in position "a".
K		2 positions. Operated in position "b". Spring offset in position "0".
M		2 positions. Spring offset in position "a". Operated in position "0".

2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
D		Detent, operated in position "a" or "b". No centre or offset position.
H		Spring offset in position "a". Operated in position "b".

Bold letters = Short-term availability

¹⁾ Consider specific spool position.

Further spool types and styles on request.

Flow Curve Diagrams / Shift Limits

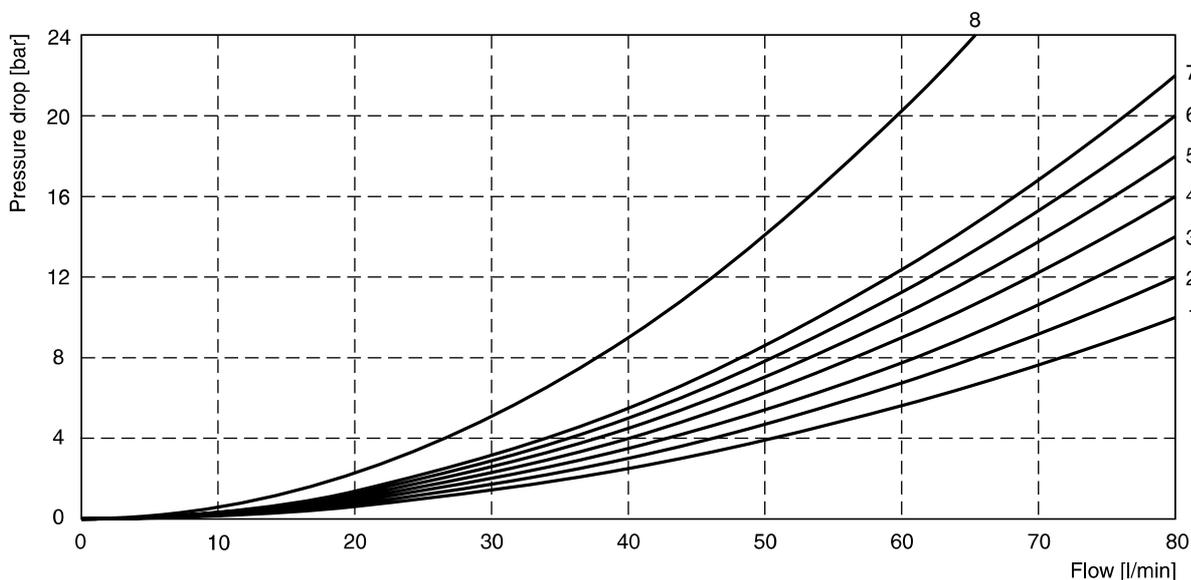
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number

for each spool type, operating position and flow direction is given in 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
001	2	2	2	2	-	-	-	-	-
002	1	4	1	4	1	1	5	5	2
004	2	3	2	3	-	-	7	7	-
006	1	4	1	4	7	7	-	-	-
020	4	4	2	3	-	-	-	-	-
026	4	-	4	-	-	-	-	-	-
030	2	3	1	2	-	-	-	-	-
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T
008	4	5	4	5	-	-	-	-	8
009	5	5	6	7	-	-	-	-	7

2

Flow curves

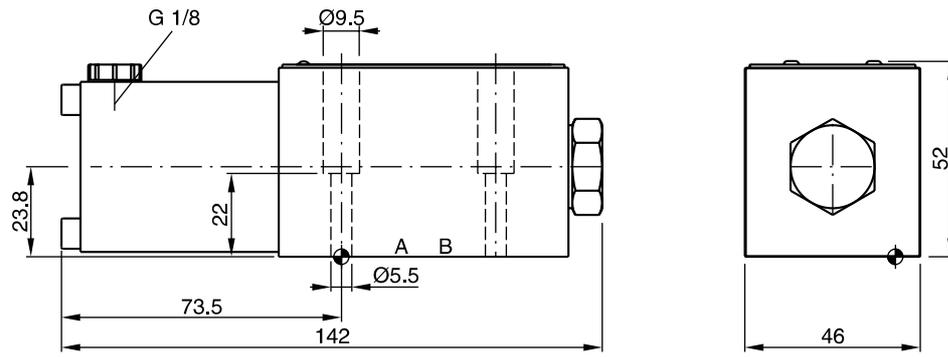


All characteristic curves measured with HLP46 at 50 °C.

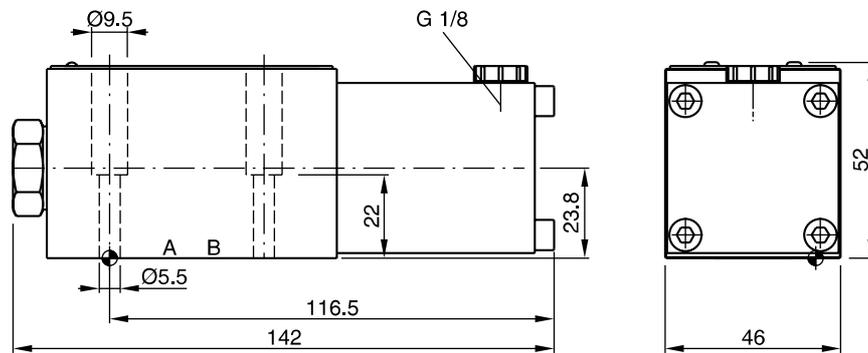
Shift limits

Spool	Shift limit [l/min]
001	60
002	
004	
006	
020	
030	
008	40
009	
026	20

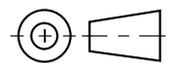
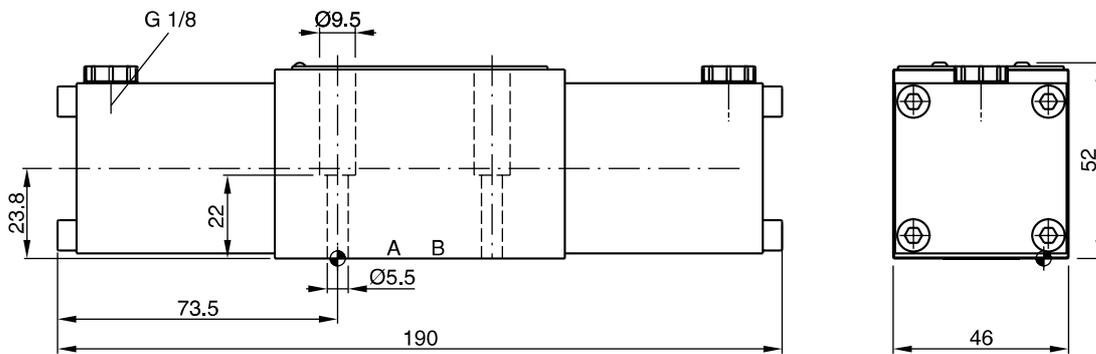
B, E, F -style



H, K, M -style



C, D -style



Surface finish	 Kit	 Kit	 Kit	 Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VA-N-91 FPM: SK-D1VA-V-91

Characteristics

The D1VL is a 3 chamber, D3DL, D4L and D9L are 5 chamber 4/3- or 4/2-way directional control valves.

The hand lever is directly connected to the spool and can be located either on the A or B side. Spring offset and detent designs are available.

2

Directional control valves with hand lever are available in 4 sizes:

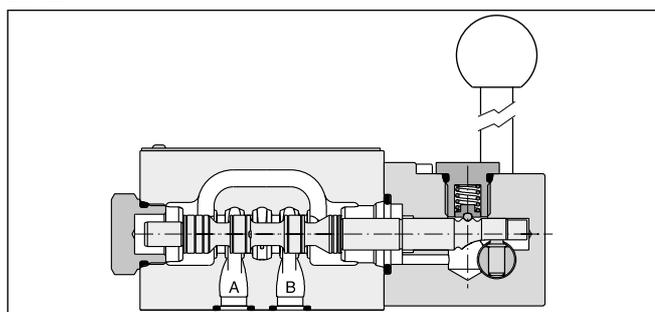
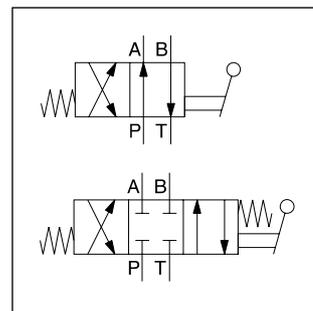
- D1VL NG06
- D3DL NG10
- D4L NG16
- D9L NG25

Features

- All hand lever parts stainless steel



D1VL



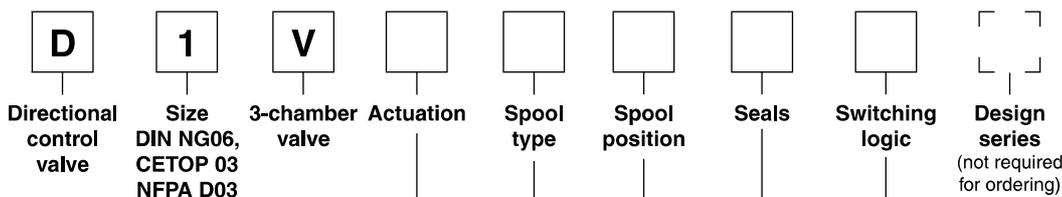
D1VL

Technical data

General					
Design	Directional spool valve				
Actuation	Lever				
Series	D1VL	D3DL	D4L	D9L	
Size	NG06	NG10	NG16	NG25	
Weight [kg]	1.4	3.7	9.0	17.0	
Mounting interface	DIN 24340 A06	DIN 24340 A10	DIN 24340 A16	DIN 24340 A25	
	ISO 4401	ISO 4401	ISO 4401	ISO 4401	
	NFPA D03	NFPA D05	NFPA D07	NFPA D08	
CETOP RP 121-H					
Mounting position	unrestricted, preferably horizontal				
Ambient temperature [°C]	-25...+60				
MTTF _p value [years]	150				
Hydraulic					
Max. operating pressure [bar]	P, A B: 350; T: 140	P, A B: 350; T: 140	external drain	external drain	
			P, A B, T: 350; X, Y: 140 internal drain	P, A B, T: 350; X, Y: 140 internal drain	
Fluid	Hydraulic oil according to DIN 51524				
Fluid temperature [°C]	-20 ... +70 (NBR: -25...+70)				
Viscosity permitted [cSt] / [mm ² /s]	2.8...400				
Viscosity recommended [cSt] / [mm ² /s]	30...80				
Filtration	ISO 4406 (1999); 18/16/13				
Flow max. [l/min]	80	130	300	700	
Leakage at 350 bar (per flow path) [ml/min]	–	up to 100 ¹⁾	up to 200 ¹⁾	up to 800 ¹⁾	
Leakage at 50 bar (per flow path) [ml/min]	up to 10 ¹⁾	–	–	–	

¹⁾ Depending on spool.

Ordering Code



Code	Actuation
L	Hand lever side B
LB	Hand lever side A

Code	Switching logic
4J ²⁾	Center of rotation below spool axis (Parker style)
4K ²⁾	Center of rotation above spool axis (Denison style)

3 position spools	
Code	Spool type
	a 0 b
001	
002	
004	
006	
009 ¹⁾	
010 ²⁾	
042 ³⁾	

2 position spools	
Code	Spool type
	a b
020	

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 009
E		2 positions. Spring offset in position "0".
	Operated in position "a".	Operated in position "b".
K		2 positions. Spring offset in position "0".
	Operated in position "b".	Operated in position "a".
N		3 positions, detent. Operated in position "a", "0" or "b".
	No centre in offset position.	No centre in offset position.
R		2 positions, detent. Operated in position "0" or "b".
	No centre in offset position.	No centre in offset position.
S		2 positions, detent. Operated in position "0" or "a". No center in offset position.
	No centre in offset position.	No centre in offset position.

2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
D		Detent, operated in position "a" or "b". No center or offset position.
H		Spring offset in position "a". Operated in position "b".

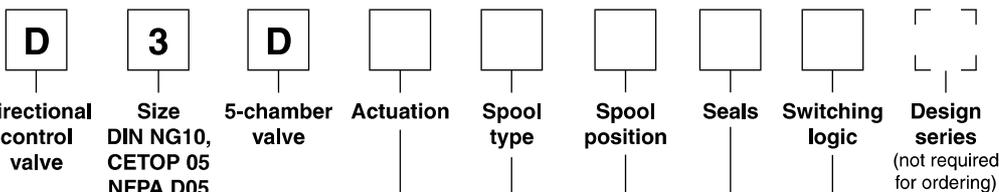
¹⁾ Consider specific spool position.
²⁾ Only for D3DL.
³⁾ Only for D1VL.

Bold letters =
Short-term availability

Further spool types on request.



Ordering Code



2

Code	Actuation
L	Hand lever side B
LB	Hand lever side A

Code	Switching logic
4J ²⁾	Center of rotation below spool axis (Parker style)
4K ²⁾	Center of rotation above spool axis (Denison style)

3 position spools	
Code	Spool type
	a 0 b
001	
002	
004	
006	
009 ¹⁾	
010	

2 position spools	
Code	Spool type
	a b
020	

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 009
E		2 positions. Spring offset in position "0".
	Operated in position "a".	Operated in position "b".
K		2 positions. Spring offset in position "0".
	Operated in position "b".	Operated in position "a".
N		3 positions, detent. Operated in position "a", "0" or "b".
	No centre in offset position.	No centre in offset position.
R		2 positions, detent. Operated in position "0" or "b".
	No centre in offset position.	No centre in offset position.
S		2 positions, detent. Operated in position "0" or "a". No center in offset position.
	No centre in offset position.	No centre in offset position.

Code	Seals
N	NBR
V	FPM

2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
D		Detent, operated in position "a" or "b". No center or offset position.
H		Spring offset in position "a". Operated in position "b".

¹⁾ Consider specific spool position.
²⁾ Details see dimensions.

Bold letters =
Short-term availability

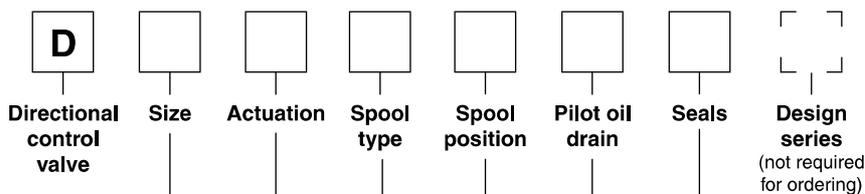
Further spool types on request.



Ordering Code

Directional Control Valves Series D4L, D9L

2



Code	Bore	Size
4	Ø20 mm	NG16
9	Ø32 mm	NG25

Code	Outlet
2 ²⁾	External
5 ³⁾	Internal

Code	Seals
N	NBR
V	FPM

Code	Actuation
L	Hand lever side B
LB	Hand lever side A

3 position spools			
Code	Spool type	D4	D9
001		•	•
002		•	•
003		•	•
004		•	•
006		•	
007		•	•
009 ¹⁾		•	•
011		•	•
014		•	•
015		•	•

2 position spools			
Code	Spool type	D4	D9
020		•	•
030		•	•

Code	3 position spools		
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".	
	Standard	Spool type 009	
E		2 positions. Spring offset in position "0".	
F		2 positions. Spring offset in position "b".	
K		2 positions. Spring offset in position "0".	
M		2 positions. Spring offset in position "a".	
N		3 positions, detent. Operated in position "a", "0" or "b".	
R		2 positions, detent. Operated in position "0" or "b".	
S		2 positions, detent. Operated in position "0" or "a". No center in offset position.	

Code	2 position spools		
B		Spring offset in position "b". Operated in position "a".	
D		Detent, operated in position "a" or "b". No center or offset position.	
H		Spring offset in position "a". Operated in position "b".	

¹⁾ Consider specific spool position.
²⁾ Pressure T-port > 140 bar.
³⁾ Pressure T-port < 140 bar.

Further spool types on request.



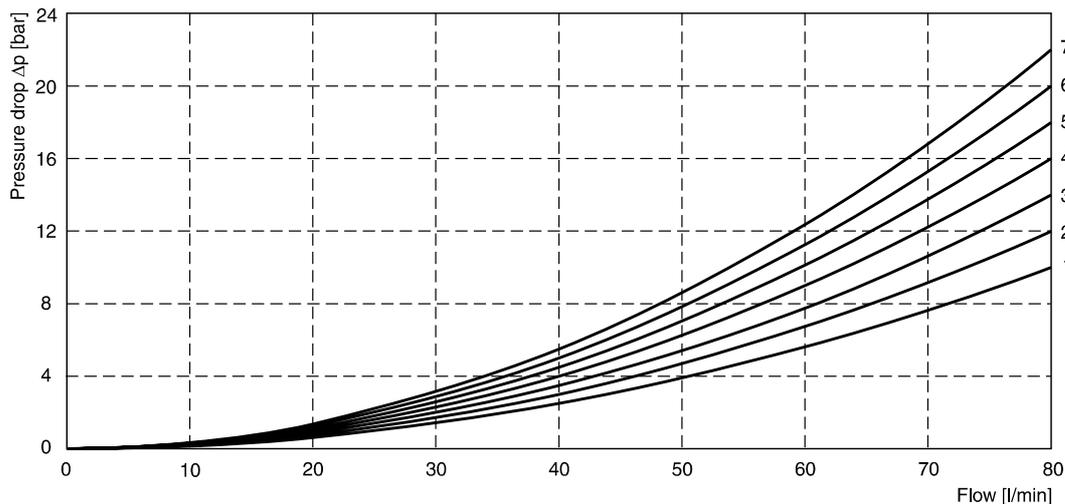
The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number

for each spool type, operating position and flow direction is given in the tables below.

D1VL

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
001	2	2	2	2	-	-	-	-	-
002	1	4	1	4	1	1	5	5	2
004	2	3	2	3	-	-	7	7	-
006	1	4	1	4	7	7	-	-	-
020	4	4	2	3	-	-	-	-	-
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T
009	5	5	6	7	-	-	-	-	7

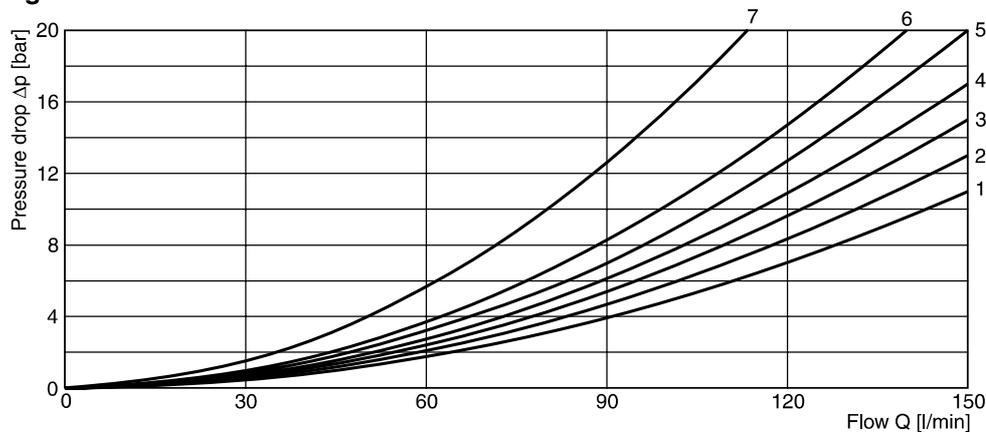
Flow curve diagram D1VL



D3DL

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
001	4	3	4	3	-	-	-	-	-	-
002	2	4	3	3	2	2	1	2	3	4
004	4	3	3	2	-	-	5	5	-	6
006	2	4	3	3	5	5	-	-	-	6
020	4	4	4	4	-	-	-	-	-	-
	P-B	A-T	P-A	B-T	P-A	P-B	A-T	B-T	P-T	A-B
009	2	5	2	6	-	-	-	-	7	-

Flow curve diagram D3DL



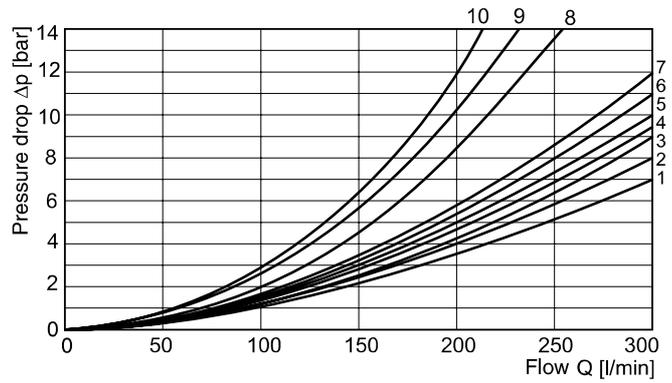
All characteristic curves measured with HLP46 at 50 °C.

The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number

for each spool type, operating position and flow direction is given in the tables below.

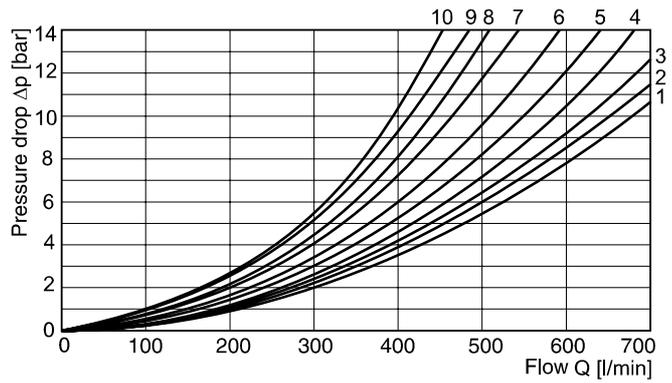
D4L

Spool	Curve number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	-	4	5
002	1	2	6	4	6
003	1	2	-	5	6
004	1	1	-	5	5
006	1	2	-	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	-	4	5
014	1	1	6	5	4
015	2	1	-	6	5
020	3	5	-	3	5
030	2	3	-	6	7



D9L

Spool	Curve number				
	P-A	P-B	P-T	A-T	B-T
001	3	2	-	3	5
002	2	1	1	3	5
003	4	2	-	3	6
004	4	3	-	3	5
007	3	1	7	3	5
009	4	8	9	4	10
014	1	3	7	5	3
015	2	4	-	5	3
020	6	5	-	6	8
030	3	2	-	3	5

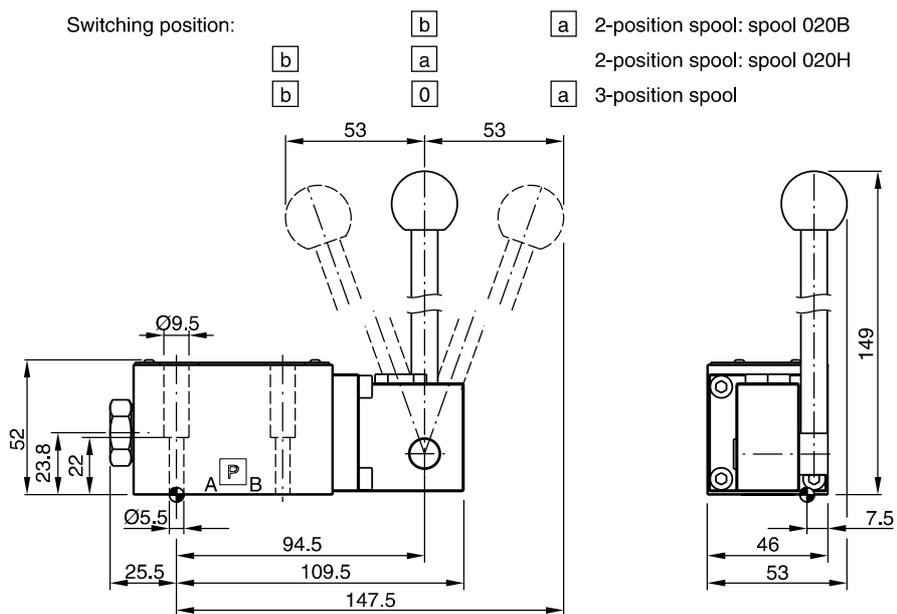


All characteristic curves measured with HLP46 at 50 °C.

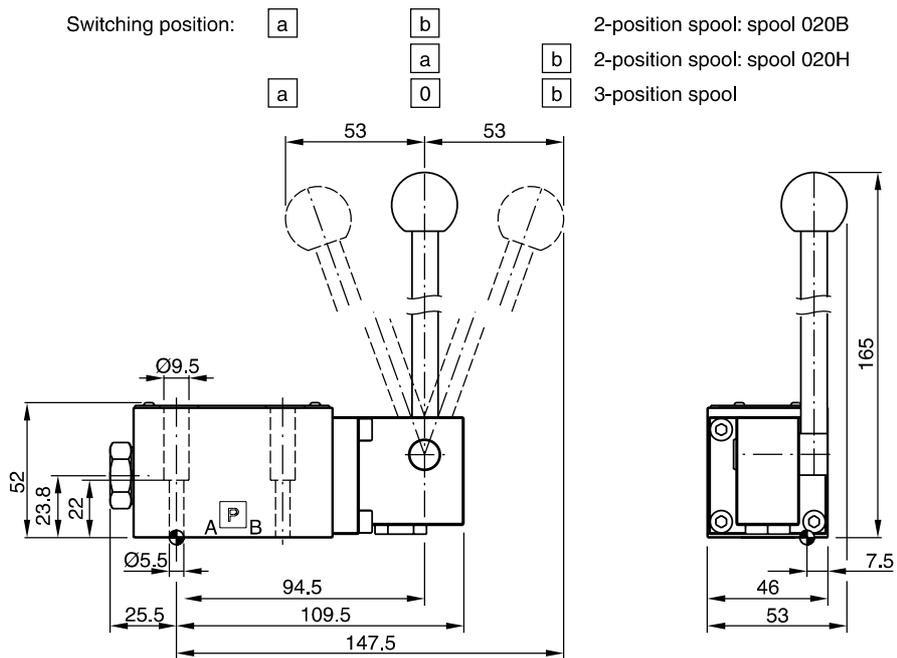
Dimensions

D1VL*4J

2



D1VL*4K

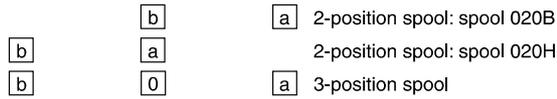


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VL-N-91 FPM: SK-D1VL-V-91

Valid for all styles. Switching position see ordering code.

D1VL*4J

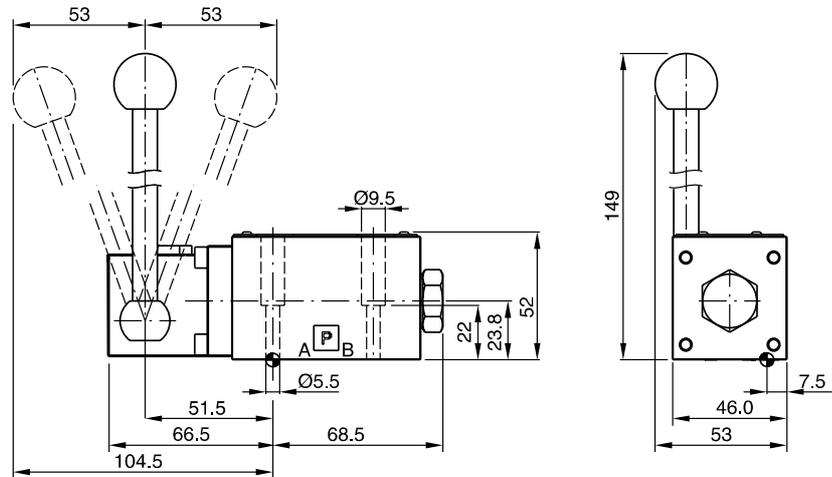
Switching position:



a 2-position spool: spool 020B

2-position spool: spool 020H

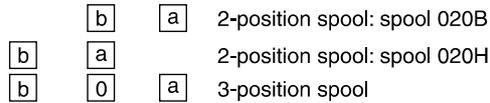
a 3-position spool



Surface finish	Kit	Kit	Kit	Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VL-N-91 FPM: SK-D1VL-V-91

D3DL*4J

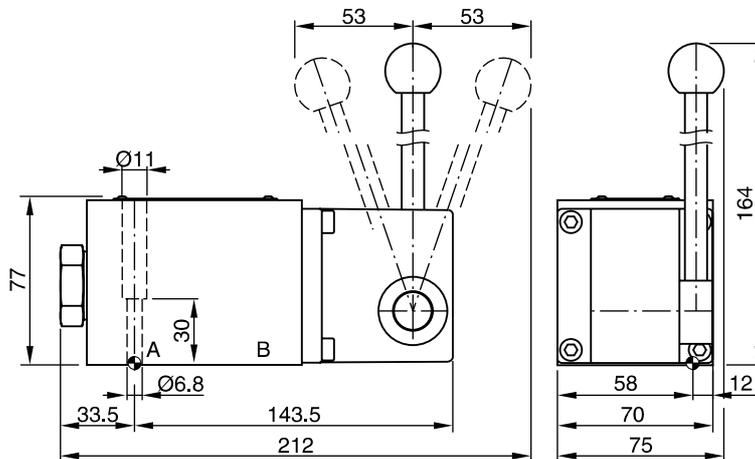
Switching position:



a 2-position spool: spool 020B

2-position spool: spool 020H

a 3-position spool



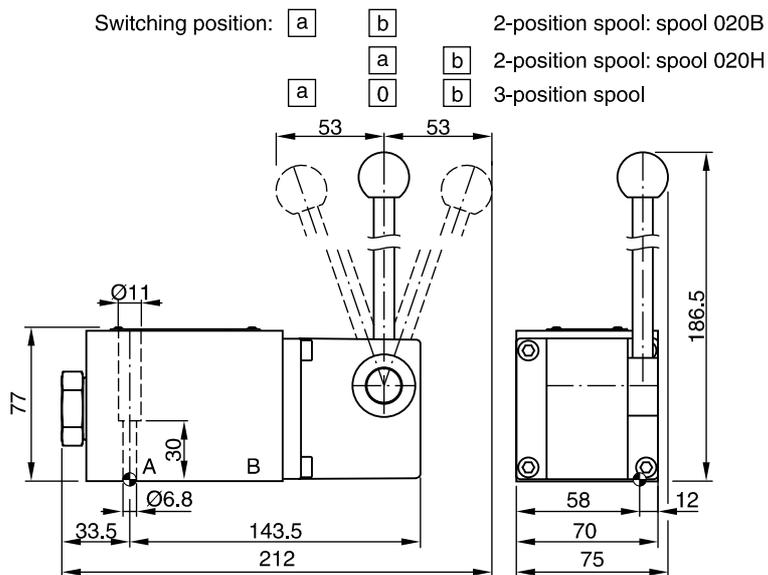
Surface finish	Kit	Kit	Kit	Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	NBR: SK-D3DL-N-42 FPM: SK-D3DL-V-42

Valid for all styles. Switching position see ordering code.

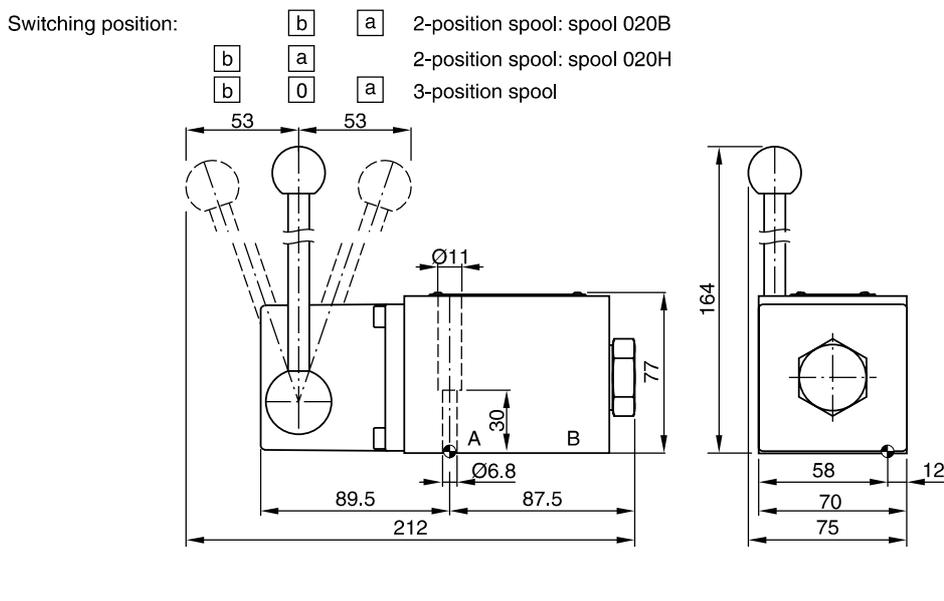
Dimensions

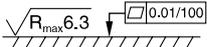
D3DL*4K

2



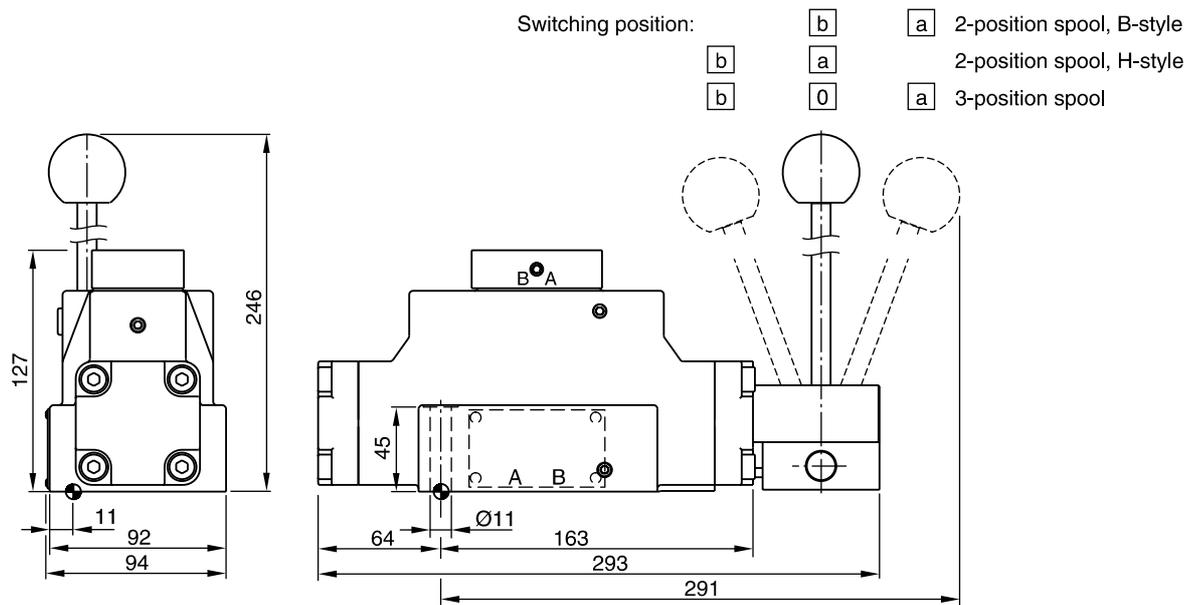
D3DLB*4J



Surface finish	 Kit	 Kit	 Kit	 Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	NBR: SK-D3DL-N-35 FPM: SK-D3DL-V-35

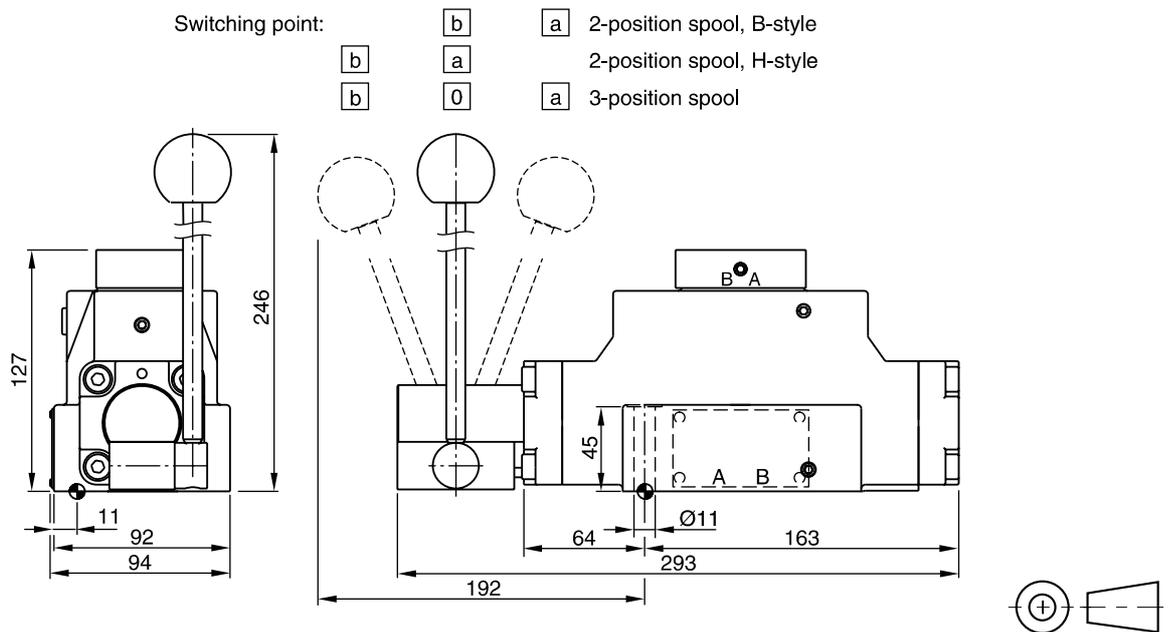
Valid for all styles. Switching position see ordering code.

D4L



2

D4LB

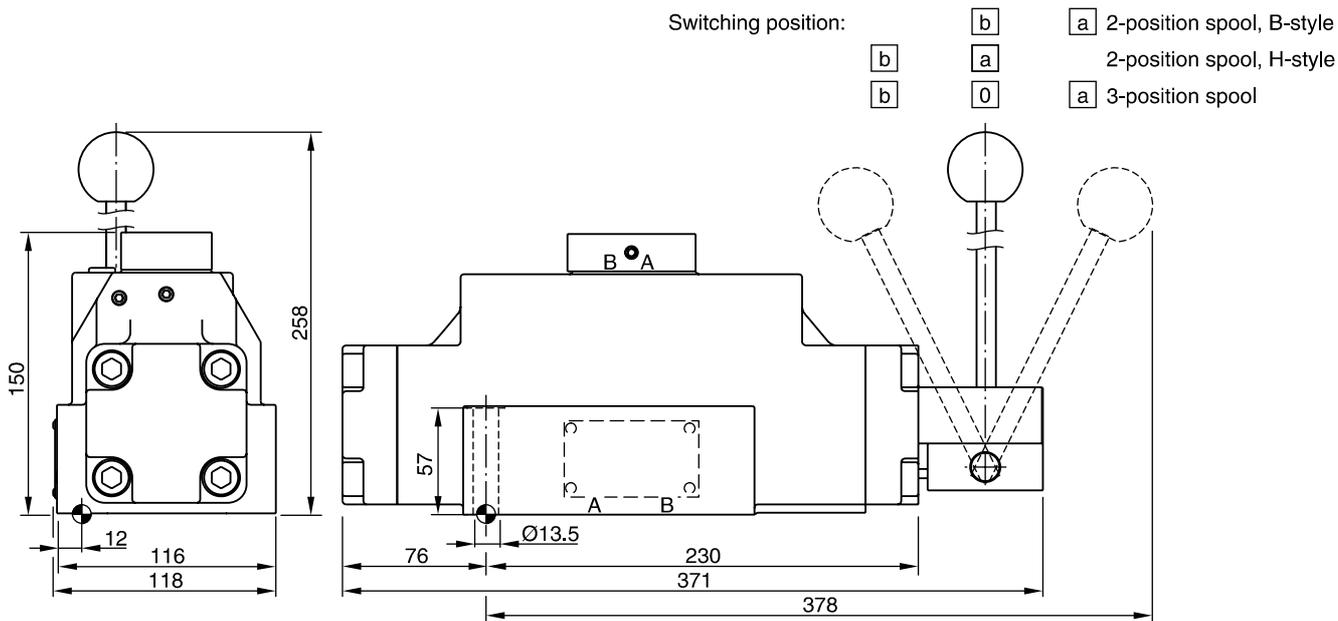


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK320	4x M10x60 2x M6x55 ISO 4762-12.9	63 Nm 13.2 Nm $\pm 15\%$	NBR: SK-D4L-N-91 FPM: SK-D4L-V-91

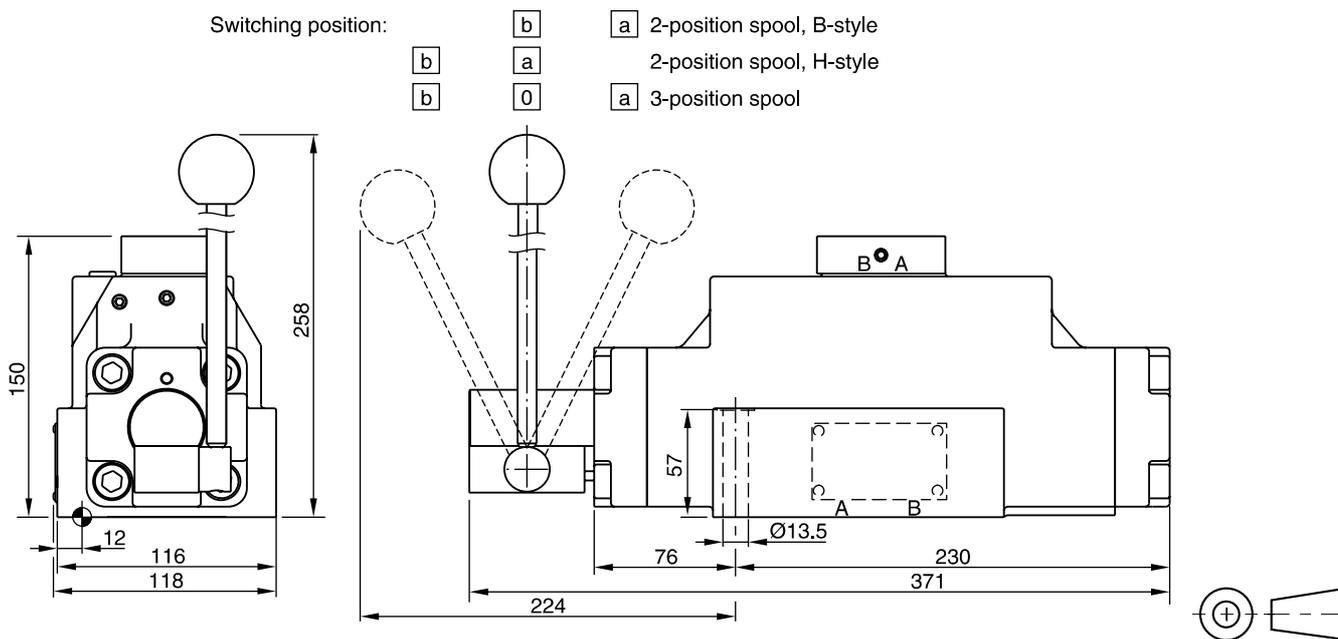
Valid for all styles. Switching position see ordering code.

D9L

2



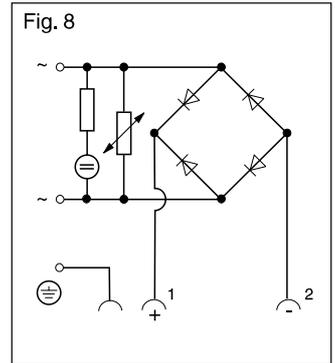
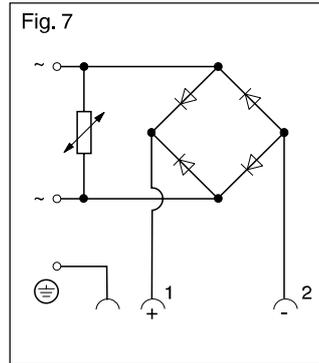
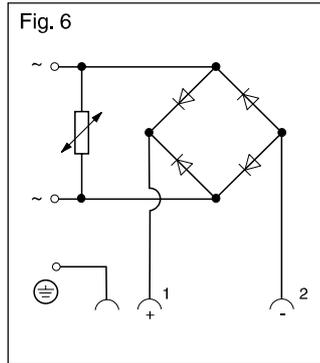
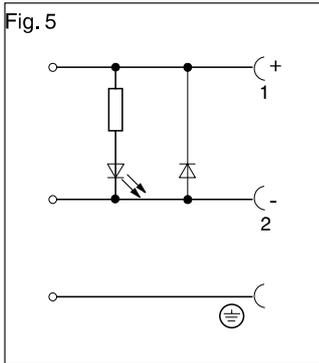
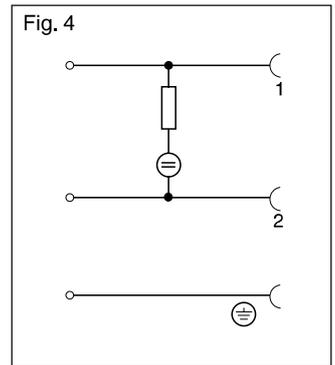
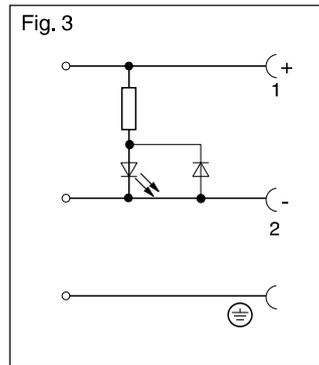
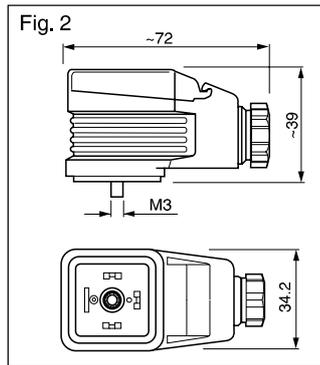
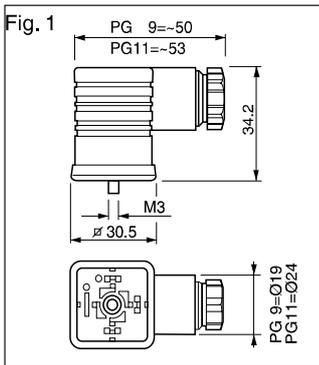
D9LB



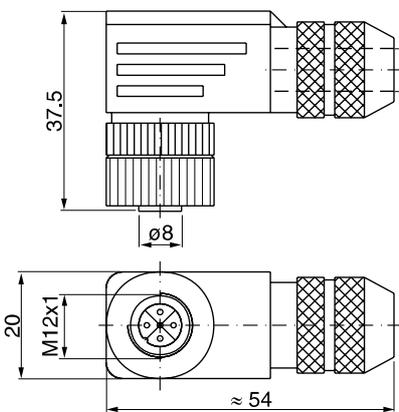
Surface finish	Kit	Kit	Torque	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK360	6x M12x75 ISO 4762-12.9	108 Nm $\pm 15\%$	NBR: SK-D9L-N-91 FPM: SK-D9L-V-91

Valid for all styles. Switching position see ordering code.

Description	Cable connection	Figure circuit	Order no.	
			black (B)	grey (A)
Plug EN 175301-803 ¹⁾ , style AF Protection class IP65 for voltages up to 250V	PG 9 PG 11	Fig. 1	5001710 5001716	5001711 5001717
Plug with LED 24VDC Plug with lamp insert 120VAC Plug with lamp insert 230VAC	PG 11	Fig. 1 and 3 Fig. 1 and 4	5001571 5001573 5001575	5001572 5001574 5001576
Plug with LED 24VDC and suppressing circuit Plug with rectifier: Bridge-type rectifier with silicon diodes. Varistors are used to protect the diodes against power surges from the power supply up to 250VAC. Plug with cable strain relief and transparent cover	PG 11	Fig. 1 and 5 Fig. 1 and 6 Fig. 2	5001708 5001737 5001723	5001709 5001738 5001724
Inserts for plug 5001723 and 5001724		Circuit	Order no.	
Bridge-type rectifier up to 250VAC 7		7	5001727	
Bridge-type rectifier with lamp 250VAC		8	5001734	



Plug M12x1, order no.: 5004109



The angled plug for M12x1 is a 5-pin design. The connections in the plug can be screwed in. The plug can be turned 4 x 90°.

Plug kit 2-pin Junior Timer (AMP)

Order no.	Number of plugs in 1 kit
393 000 K822	1
393 000 K825	10
393 000 K826	50
393 000 K827	100

Plug kit DT04-2P "Deutsch"

Order no.	Number of plugs in 1 kit
45216087	1

¹⁾ (New) EN 175301-803 corresponds to (old) DIN 43650.

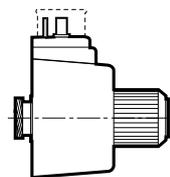
Solenoid kit (displayed: EN plug)

A solenoid kit contains tube, coil, retainer and seals for the solenoid, if necessary for the ordered version.

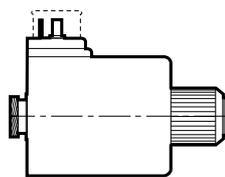
Coil kit

A coil kit contains coil, retainer and seals for the coil, if necessary for the ordered version.

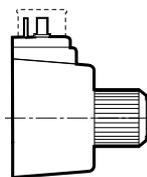
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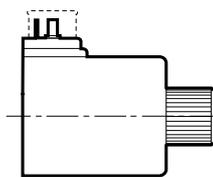
AC



DC



AC



DC

For D1VW standard

Solenoid kits: AK-D1VWS... (Soft shift on request)		(Example: AK-D1VWSJW91)	
Voltage Volt/Hertz	Voltage Code	EN plug D1VW	EN plug without manual override (Code „T“) D1VW
12 V=	K	KW91	KWT91
24 V=	J	JW91	JWT91
98 V=	U	UW91	UWT91
205 V=	G	GW91	GWT91
110 V/50 Hz / 120 V/60 Hz	Y	YW91	–
230 V/50 Hz / 240 V/60 Hz	T	TW91	–

Coil kits: AK-D1VWC... (Example: AK-D1VWCJW91)		EN plug D1VW
Voltage Volt/Hertz	Voltage Code	
12 V=	K	KW91
24 V=	J	JW91
98 V=	U	UW91
205 V=	G	GW91
110 V/50 Hz / 120 V/60 Hz	Y	YW91
230 V/50 Hz / 240 V/60 Hz	T	TW91

D1VW 8 Watt

Solenoid kits: AK-D1VWS...			Coil kits: AK-D1VWC...		
Voltage Volt/Hertz	Voltage Code	EN plug D1VW	M12x1 „DESINA“ (Code „DLJ5“) D1VW	EN plug D1VW	M12x1 „DESINA“ (Code „DLJ5“) D1VW
24 V=	J	JWL91	JDLJ591	JWL91	JDLJ591

D3W

Solenoid kits: AK-D3WS... (Soft shift on request) (Example: AK-D3WSJW30)				Coil kits: AK-D3WC...	
Voltage Volt/Hertz	Voltage Code	EN plug D3W	EN plug without manual override (Code „T“) D3W	EN plug D3W	EN plug without manual override (Code „T“) D3W
12 V=	K	KW30	KWT30	KW30	KWT30
24 V=	J	JW30	JWT30	JW30	JWT30
98 V=	U	UW30	UWT30	UW30	UWT30
205 V=	G	GW30	GWT30	GW30	GWT30
110 V/50 Hz / 120 V/60 Hz	Y	YW30	–	YW30	–
230 V/50 Hz / 240 V/60 Hz	T	TW30	–	TW30	–

Other solenoids, coil kits and tube kits on request.

Bold letters = Short-term availability

O-rings to seal between valve and mounting surface

Valve size	Valve series	Ports	Dimensions inner Ø x section Ø	Quantity ¹⁾
DIN NG06	D1	P, A, B, T X, Y	9.25 x 1.78	4
			4.47 x 1.78	2
DIN NG10	D3	P, A, B, T X, Y	12.42 x 1.78	5
			10.82 x 1.78	2
DIN NG16	D4	P, A, B, T X, Y	21.89 x 2.62	4
			10.82 x 1.78	2
DIN NG25	D8	P, A, B, T X, Y	29.82 x 2.62	4
			20.29 x 2.62	2
DIN NG25	D9	P, A, B, T X, Y	34.59 x 2.62	4
			20.29 x 2.62	2
DIN NG32	D11	P, A, B, T X, Y	53.57 x 3.53	4
			14.00 x 1.78	2

2

**Seal kits (connecting surface and inner seals)
 Spool valves**

Valve series	Material	Order code for valve size						
		D1	D3	D31	D4	D8	D9	D11
D**W Solenoid	NBR	SK-D1VW-N-91	SK-D3W-N-30	–	SK-D41VW-N-91	SK-D81VW-N-91	SK-D91VW-N-91	SK-D111VW-N-91
	FPM	SK-D1VW-V-91	SK-D3W-V-30	–	SK-D41VW-V-91	SK-D81VW-V-91	SK-D91VW-V-91	SK-D111VW-V-91
D*DW Solenoid	NBR	–	–	SK-D31DW-N-91	–			
	FPM	–	–	SK-D31DW-V-91				
D*NW Solenoid	NBR	–	–	SK-D31NW-N-91				
	FPM	–	–	SK-D31NW-V-91				
D**P Hydr.	NBR	–	SK-D3DP-N-35	–	SK-D41VW-N-91	–	SK-D91VW-N-91	SK-D111VW-N-91
	FPM	–	SK-D3DP-V-35	–	SK-D41VW-V-91	–	SK-D91VW-V-91	SK-D111VW-V-91
D1VP*90 Hydr.	NBR	SK-D1VP-N-87	–					
	FPM	SK-D1VP-V-87						
D1VP*4L Hydr.	NBR	SK-D1VP-N4L-91						
	FPM	SK-D1VP-V4L-91						
D*L/LB Hand lever	NBR	SK-D1VL-N-91	SK-D3DL-N-35	–	SK-D4L-N-91	–	SK-D9L-N-91	–
	FPM	SK-D1VL-V-91	SK-D3DL-V-35	–	SK-D4L-V-91	–	SK-D9L-V-91	–

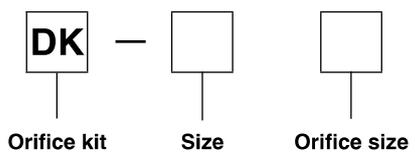
Seated valve

Valve series	Material	D1SE
D1SE Solenoid	NBR	SK-D1SE-70
	FPM	SK-D1SE-V70

¹⁾ Number per set

Slip-in orifice for P, A, B port of directional control valves NG06 and NG10

2

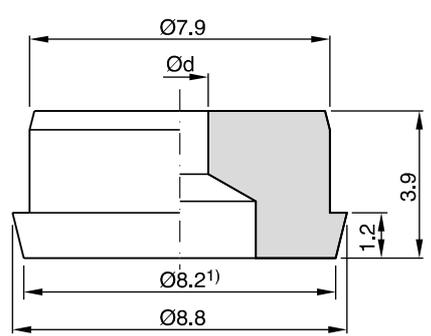


Code	Size
D1VW91	NG06
D3W31	NG10

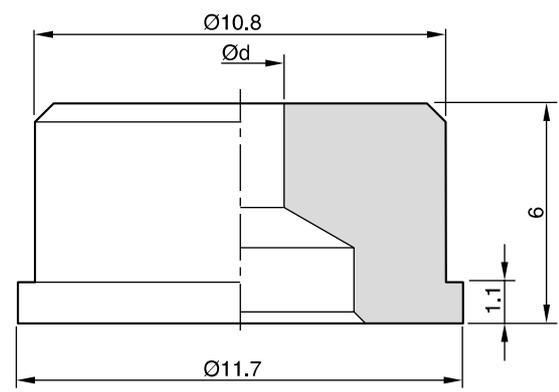
Code	Orifice Ø	NG6	NG10
00	without orifice	x	x
06	0.6 mm	x	
08	0.8 mm	x	x
09	0.9 mm	x	
10	1.0 mm	x	x
11	1.1 mm	x	
12	1.2 mm	x	x
14	1.4 mm	x	x
15	1.5 mm	x	x
18	1.8 mm	x	
20	2.0 mm	x	x
25	2.5 mm	x	x
30	3.0 mm		x
45	4.5 mm		x

The orifice kit DK-D1VW91 includes special O-rings (NBR - black and FPM - green) which have to be used with the orifice.
 Package size: Each kit contains 10 orifices of the same size.

**Dimensions
 NG06**



NG10

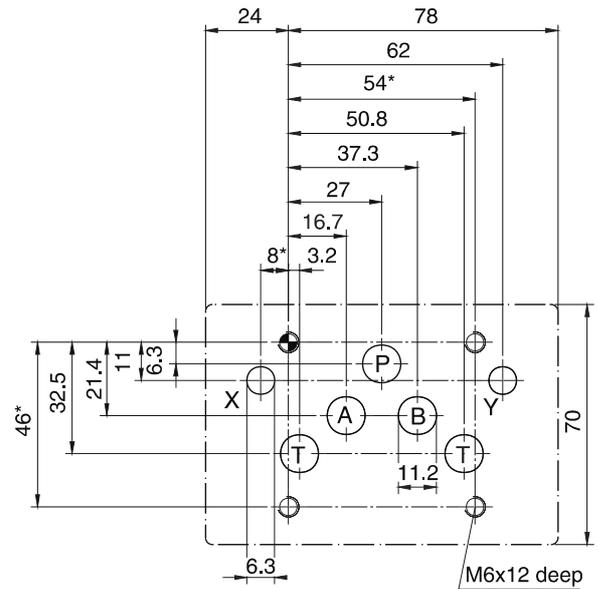
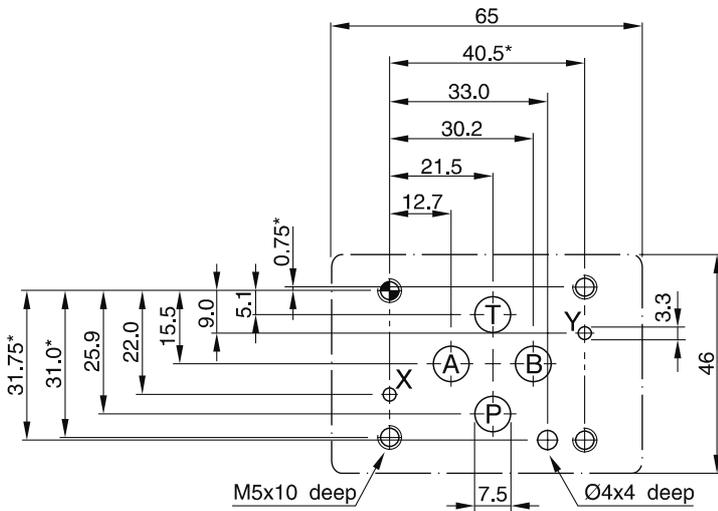


¹⁾ Only for ports P, A, B with max. dia. 7.5 mm.



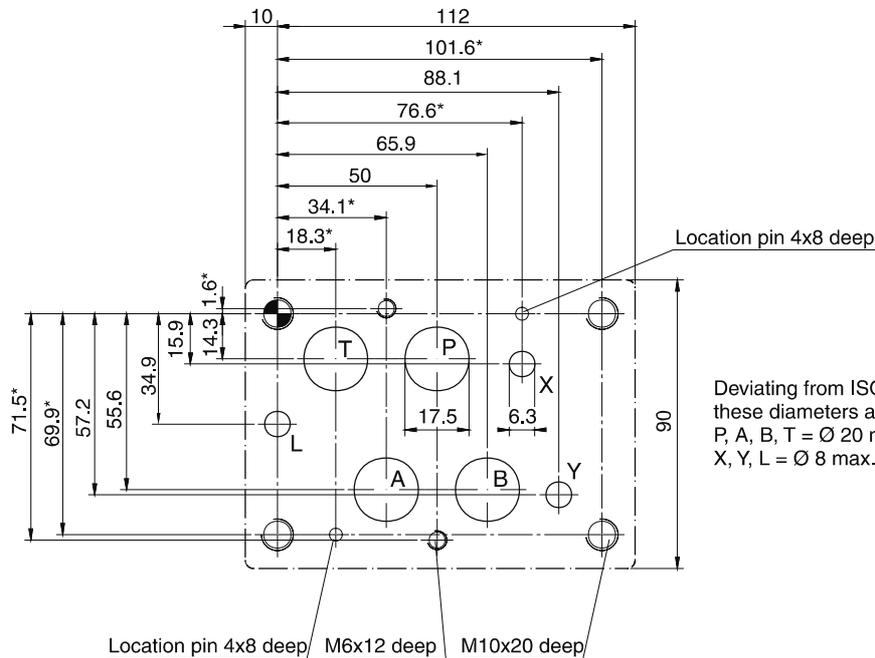
Size 6, mounting pattern to ISO 4401-03-03-0-05

Size 10, mounting pattern to ISO 4401-05-05-0-05



Deviating from ISO 4401
 these diameters are possible:
 X, Y = Ø 8 max.

Size 16, mounting pattern to ISO 4401-07-07-0-05

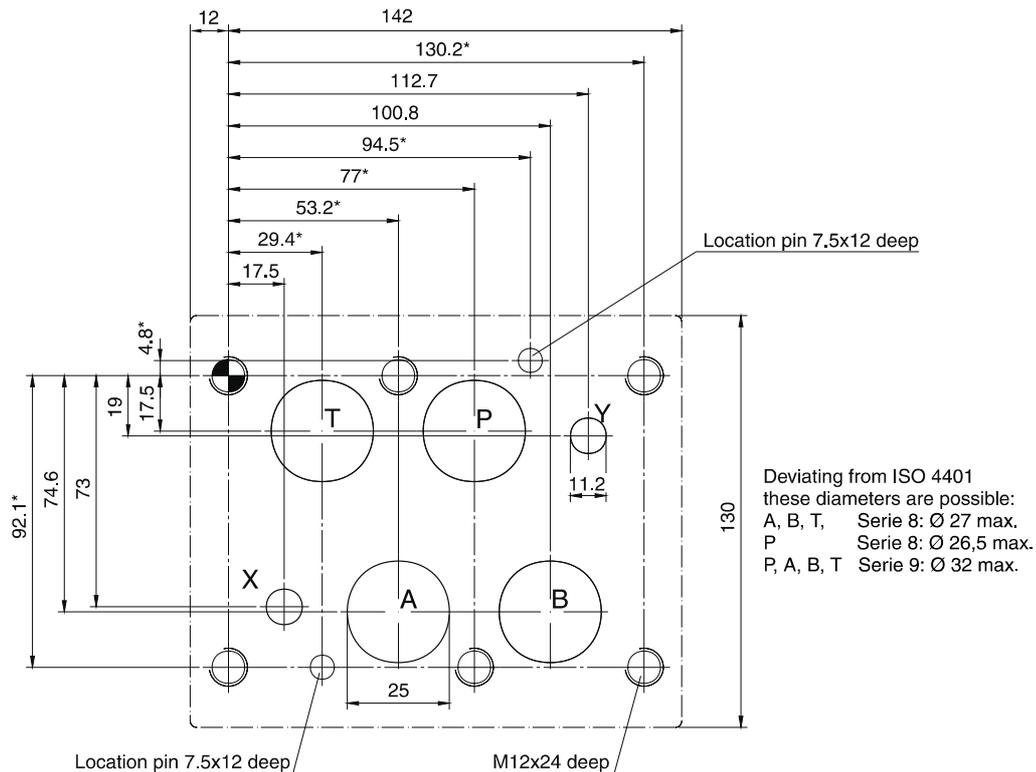


Deviating from ISO 4401
 these diameters are possible:
 P, A, B, T = Ø 20 max.
 X, Y, L = Ø 8 max.

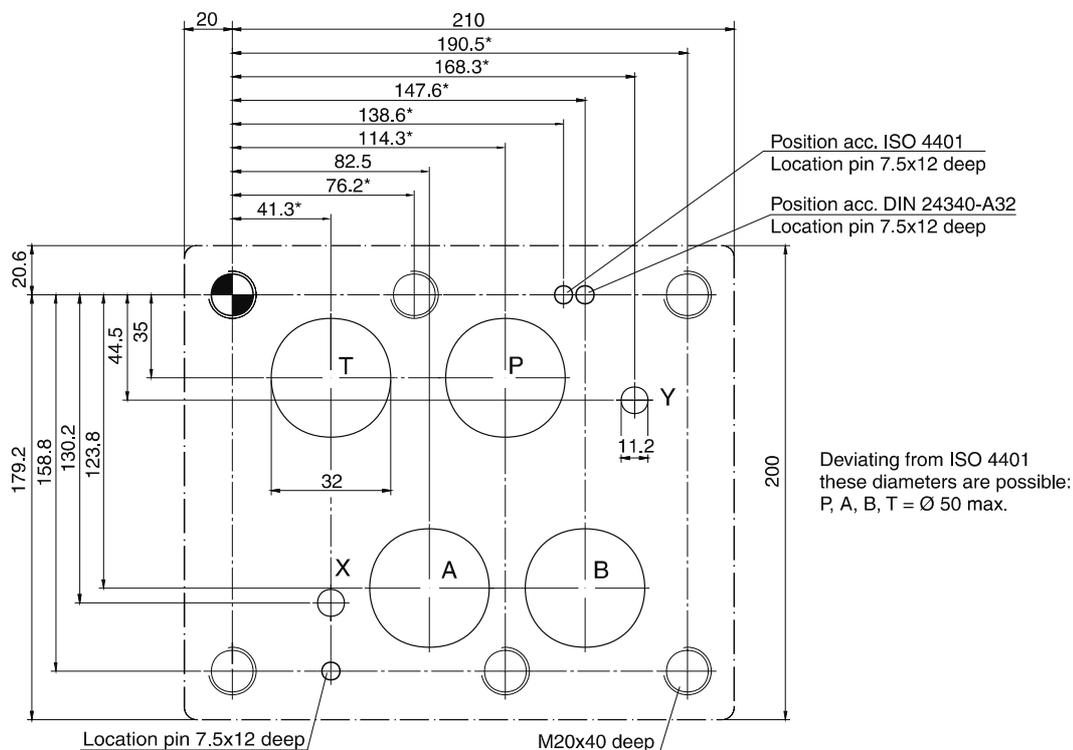
With * marked dimensions ± 0.1 mm. All other dimensions ± 0.2 mm.

Subplates and manifolds see chapter 12.

Size 25, mounting pattern to ISO 4401-08-08-0-05



Size 32, mounting pattern to ISO 4401-10-09-0-05



With * marked dimensions ± 0.1 mm. All other dimensions ± 0.2 mm.

Subplates and manifolds see chapter 12.