

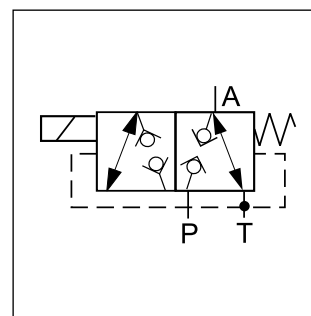
Series	Description	Direct operated					Pilot operated				Page	
		DIN / ISO	06	10	16	25	32	10	16	25		32
<b>Seat valves, electrically operated</b>												
D1SE		•										2-2
<b>Spool valves, electrically operated</b>												
D1VW	Standard, soft shift	•										2-5
D1VW	8 Watt solenoid	•										2-13
D1VW	Inductive position control	•										2-19
D1VW	Explosion proof (conform to ATEX)	•										2-28
D1MW	For wash down applications	•										2-33
D3W	Standard		•									2-39
D3W	Inductive position control		•									2-46
D3MW	For wash down applications		•									2-55
D31DW	Standard and position control							•				2-61
D31NW	Highest flow							•				
D41VW	Standard and inductive position control								•			
D81/91VW	Standard and inductive position control									•		
D111VW	Standard and inductive position control										•	
<b>Spool valves, electrically operated, regenerative and hybrid design</b>												
D31NWR	Hybrid configuration with sandwich plate							•				2-74
D41VWR/Z									•			
D91VWR/Z										•		
D111VWR/Z											•	
<b>Spool valves, hydraulically operated</b>												
D1VP		•										2-81
D3DP			•									
D4P				•								
D9P					•							
D11P						•						
<b>Spool valves, pneumatically operated</b>												
D1VA		•										2-92
<b>Spool valves, mechanically operated</b>												
D1VL		•										2-96
D3DL			•									
D4L				•								
D9L					•							
<b>Accessories</b>												
	Plugs											2-107
	Actuator kits											2-108
	O-rings and seal kits											2-109
	Slip-in orifices											2-110
	Mounting patterns											2-111

**Characteristics / Ordering Code**

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.



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**Ordering code**

<b>D</b>	<b>1</b>	<b>S</b>	<b>E</b>		<b>B</b>			<b>W</b>	
Directional control valve	Size DIN NG06 CETOP 03 NPPA D03	Seat valve	Wet pin armature solenoid, flanged	Spool type	Style	Seals	Solenoid voltage	Connector as per EN 175301-803 without plug <sup>1)</sup>	Design series (not required for ordering)

Code	Spool type
30	
83	

Code	Voltage
K	12 V=
J	24 V=
U <sup>2)</sup>	98 V=
G <sup>2)</sup>	205 V=

Code	Seals
<b>N</b>	<b>NBR</b>
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

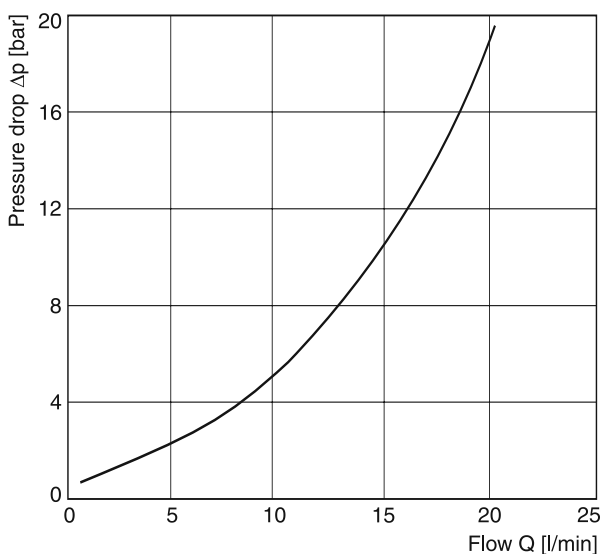
<sup>1)</sup> Please order plug separately.

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

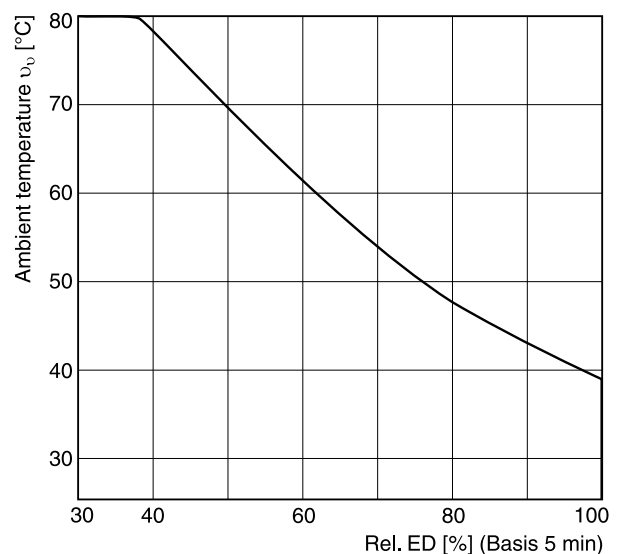
General					
Design	Directional poppet valve				
Actuation	Solenoid				
Size	DIN NG6 / CETOP 03 / NFPA D03				
Mounting interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03				
Mounting position	Unrestricted				
Ambient temperature [°C]	-25...+50, observe permissible duty cycle				
MTTF <sub>D</sub> value [years]	150				
Weight [kg]	1.5				
Hydraulic					
Max. operating pressure [bar]	P, A, T: 350				
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525				
Fluid temperature [°C]	-25 ... +70				
Viscosity permitted [cSt] / [mm <sup>2</sup> /s]	10...500				
Viscosity recommended [cSt] / [mm <sup>2</sup> /s]	30...80				
Filtration	ISO 4406 (1999); 18/16/13				
Flow max. [l/min]	20				
Static / Dynamic					
Step response [ms]	Energized: approx. 50				
	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. [mm <sup>2</sup> ]	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.

Performance curve Δp-Q

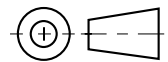
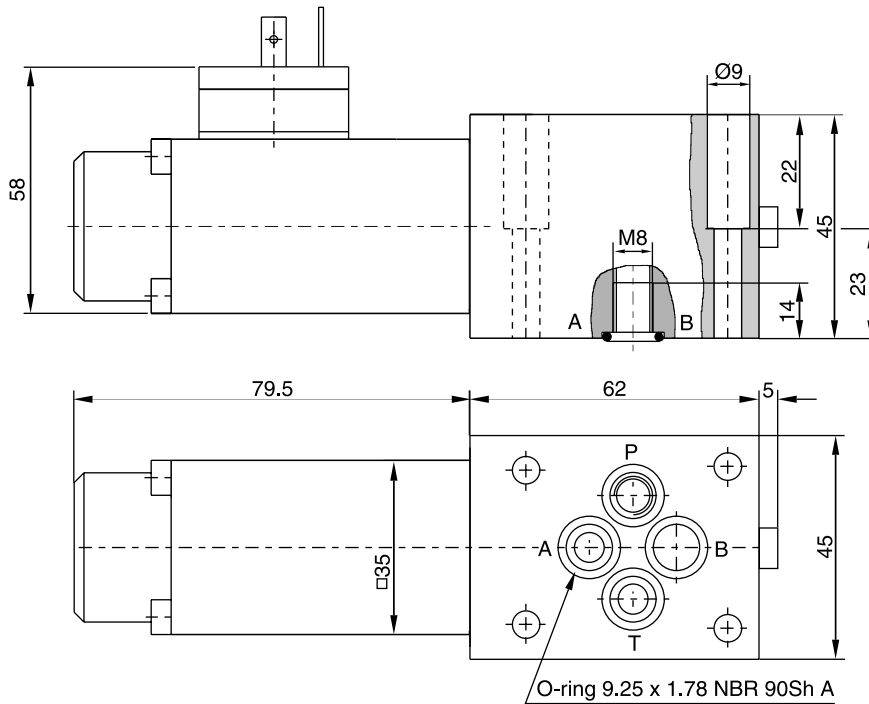






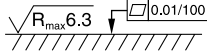
Duty cycle versus ambient temperature



All characteristic curves measured with HLP46 at 50 °C.

**2**



Surface finish	 Kit	 Kit	 Kit	 Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	<b>NBR: SK-D1SE-70</b> 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**

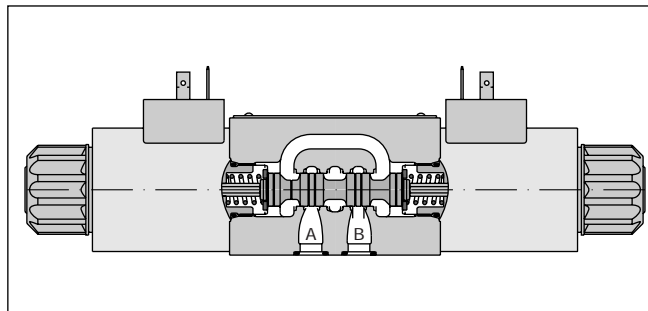
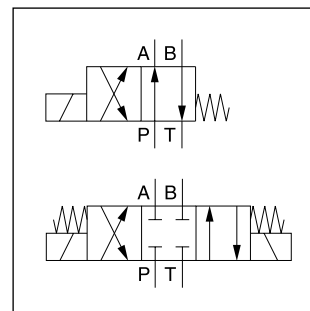
The NG06 directional control valve series D1VW provides high functional limits up to 80 l/min in combination with a very low, energy-saving pressure drop.

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.

Valves with explosion proof solenoids EEx me II see catalogue HY11-3343.

Download: [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) - see "Literature"

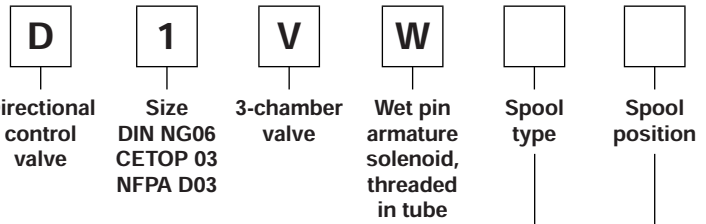


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**Technical data**

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...+50
MTTF <sub>D</sub> value	[years] 150
Weight	[kg] 1.5 (1 solenoid), 2.1 (2 solenoids)
Hydraulic	
Max. operating pressure	[bar] P, A, B: 350; T: 210 (DC), T: 140 (AC)
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525
Fluid temperature	[°C] -25 ... +70
Viscosity permitted	[cSt] / [mm <sup>2</sup> /s] 2.8...400
Viscosity recommended	[cSt] / [mm <sup>2</sup> /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	IP 65 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	32.7 W 31 W 31.9 W 28.2 W 70 / 70 VA 70 / 70 VA
Power consumption in rush	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 <sup>2</sup> ] 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**

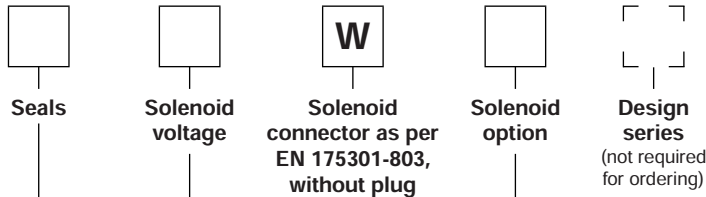
3 position spools	
Code	Spool type
001	a 0 b
002	
003	
004	
005	
006	
007	
008 <sup>1)</sup>	
009 <sup>1)</sup>	
010	
011	
014	
015	
016	
021	
022	
031	
032	
034	
035	
061	
081	
082	
102	
204 <sup>1)</sup>	
205 <sup>1)</sup>	

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

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

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

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



Code	Solenoid option
<b>omit</b>	<b>Standard solenoid with manual override</b>
T	without manual override
S2 <sup>3)</sup>	Soft shift orifice size 0.5 mm.
S3 <sup>3)</sup>	Soft shift orifice size 0.75 mm.
4N <sup>3)</sup>	with lockable manual override

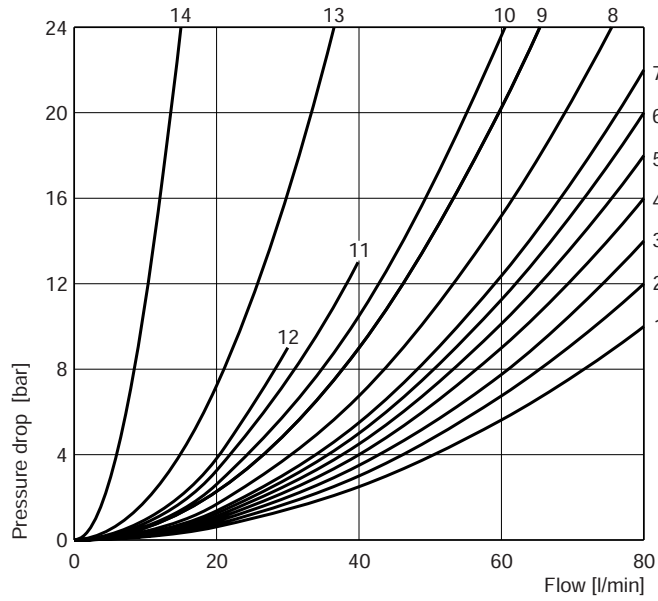
Code	Voltage
<b>K</b>	<b>12 V =</b>
<b>J</b>	<b>24 V =</b>
U <sup>2)</sup>	98 V =
G <sup>2)</sup>	205 V =
Y	110 V 50 Hz / 120 V 60 Hz
T	230 V 50 Hz / 240 V 60 Hz

Code	Seals
<b>N</b>	<b>NBR</b>
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						2
003	3	4		3	6		1	1	5	5	
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.

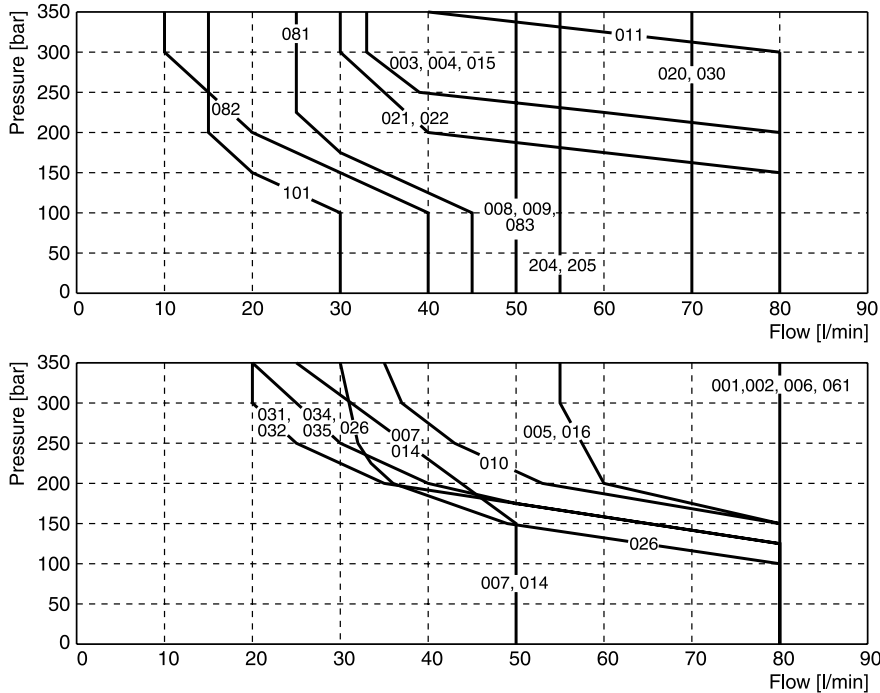


The diagram below specifies the shift limits for valves with DC & AC solenoids. Valves with spool position "F" or "M" can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm<sup>2</sup>/s and bal-

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.

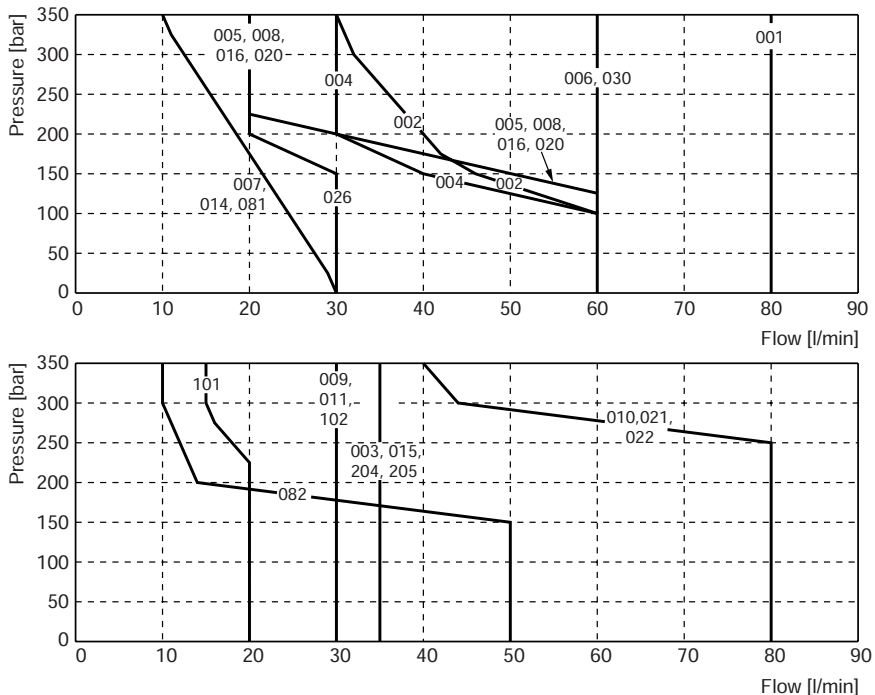
**2**

**Valve with standard DC solenoid**



Measured with HLP46 at 50 °C, 90 % U<sub>nom</sub> and warm solenoids

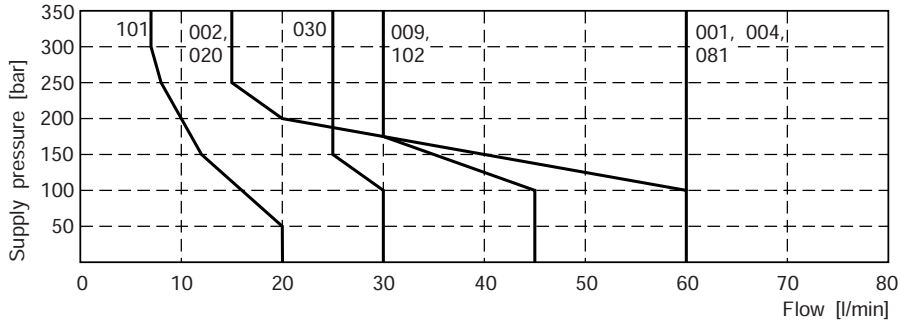
**Valve with standard AC solenoid**



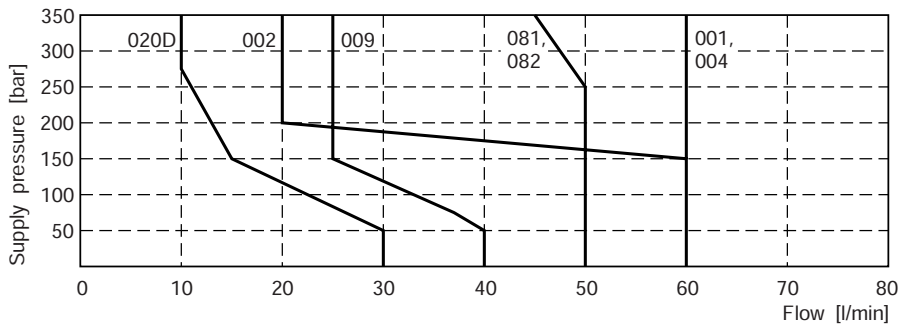
Measured with HLP46 at 50 °C, 95 % U<sub>nom</sub> and warm solenoids

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<sub>nom</sub> 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	

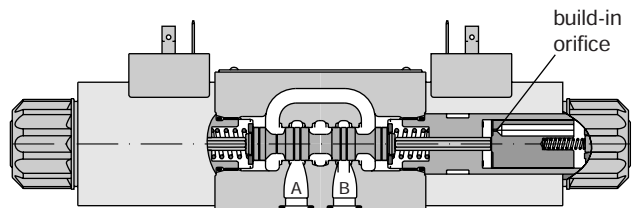
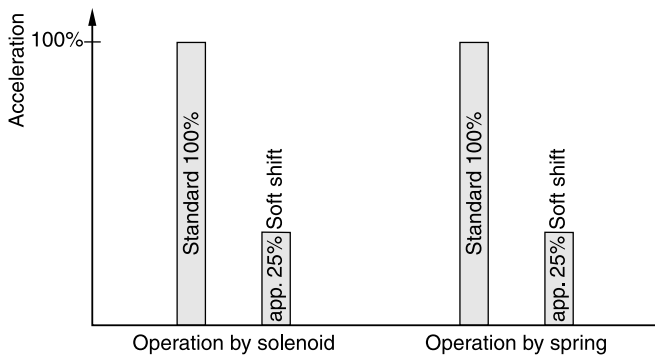
  

Response times soft shift		2 solenoid valve		2 solenoid valve		1 solenoid valve	
		3 positions		3 positions		2 positions	
Code	Orifice size	Center position: Closed		Center position: Open		Energize	De-energize
		Energize	De-energize	Energize	De-energize		
S2	0.50 mm	200 - 750	310 - 650	220 - 400	350 - 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.

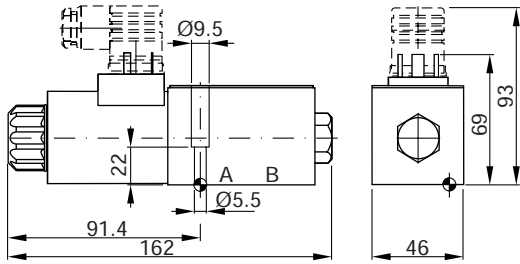
Step response times were obtained under the following conditions: HLP46 at 50 °C with the valve operating at nominal pressure and flow. Published response times are nominal and may vary with spool, flow, pressure and temperature.

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

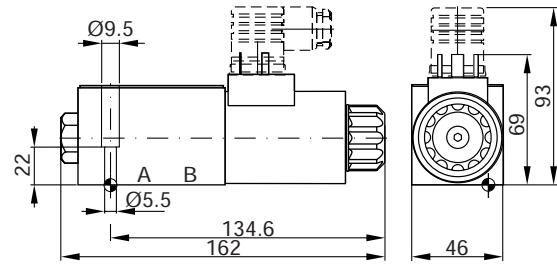


For even softer shifting, the proportional spools 081, 082, 101 and 102 can be used.

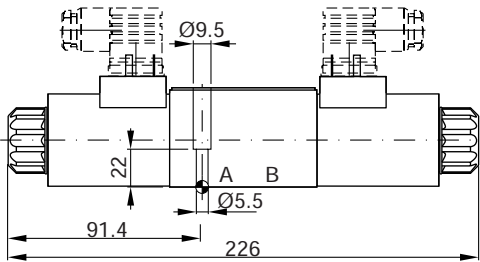
**Interface EN 175301-803, DC solenoid  
 B, E, F -style**



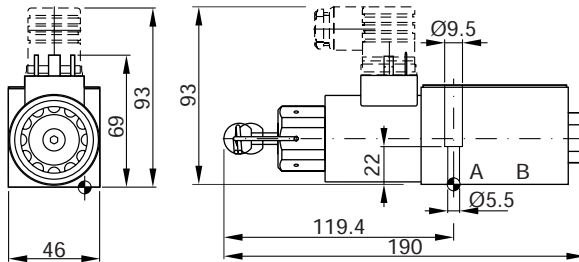
**H, K, M -style**



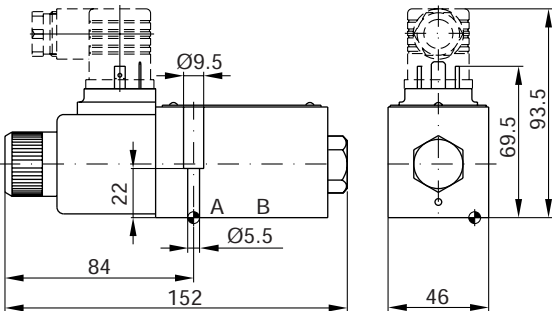
**C, D -style**



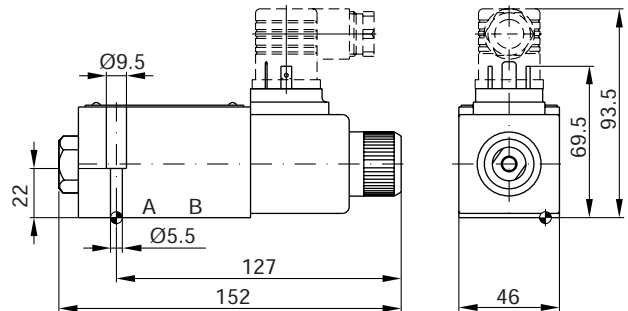
**Option 4N, with lockable manual override  
 (available for all styles, DC only)**



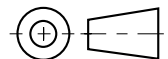
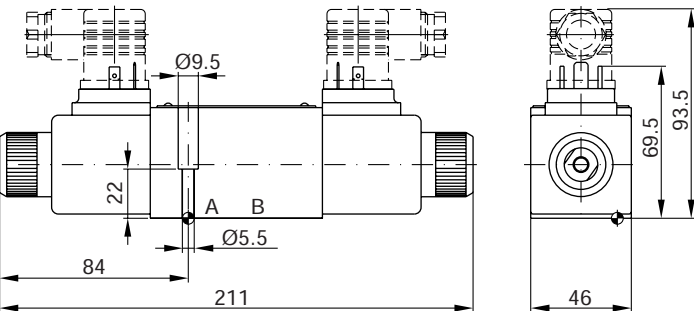
**Interface EN 175301-803, AC solenoid  
 B, E, F -style**



**H, K, M -style**



**C, D -style**



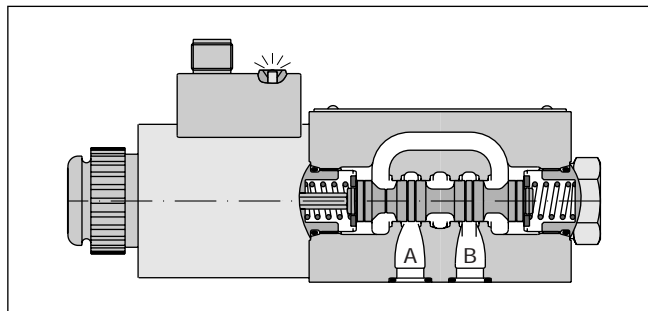
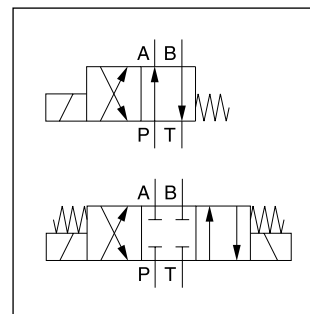
Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{\max} 6.3}$ $\square 0.01/100$	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	NBR: SK-D1VW-N-91 FPM: SK-D1VW-V-91

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 (**D**istribut**E**d and **S**tandardised **I**n**S**t**A**llation technology) for machine tools and manufacturing systems.

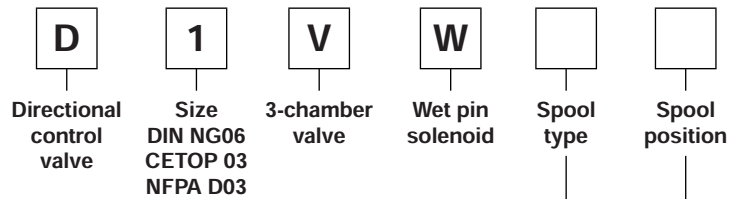


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**Technical data**

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...+50
MTTF <sub>D</sub> value	[years] 150
Weight	[kg] 1.5 (1 solenoid), 2.1 (2 solenoids)
Hydraulic	
Max. operating pressure	[bar] P, A B: 350, T: 210
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525
Fluid temperature	[°C] -25 ... +70
Viscosity permitted	[cSt] / [mm <sup>2</sup> /s] 2.8...400
Viscosity recommended	[cSt] / [mm <sup>2</sup> /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	IP 65 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 <sup>2</sup> ] 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**

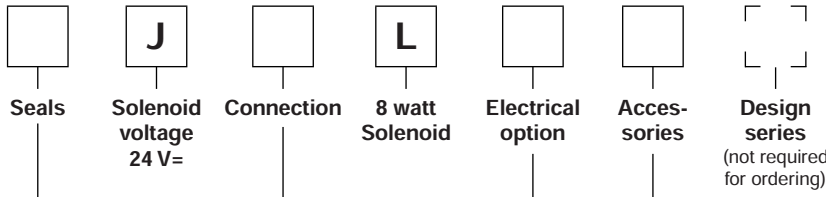
3 position spools	
Code	Spool type
	a 0 b
001	
002	
003	
004	
005	
006	
007	
008 <sup>1)</sup>	
009 <sup>1)</sup>	
010	
011	
014	
015	
016	
081	
082	
102	

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

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

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

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



Code	Accessories
<b>omit</b>	<b>Standard valve (in combination with solenoid connection "D" and "W")</b>
5	Only in combination with solenoid connection "D" and surge diode with LED "J"

**Solenoid identification  
 acc. to ISO 9461**

Code	Electrical option
<b>omit</b>	<b>Standard valve (in combination with solenoid connection "D" and "W")</b>
J	Surge diode with LED, max. voltage peak 50V (only available in combination with solenoid connection "D")

Code	Connection
D <sup>3)</sup>	M12x1 on coil as per IEC 61076-2-101
<b>W <sup>3)</sup></b>	<b>Connector as per EN 175301-803, without plug</b>

Code	Seals
<b>N</b>	<b>NBR</b>
V	FPM

**Bold letters =  
 Short-term availability**

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

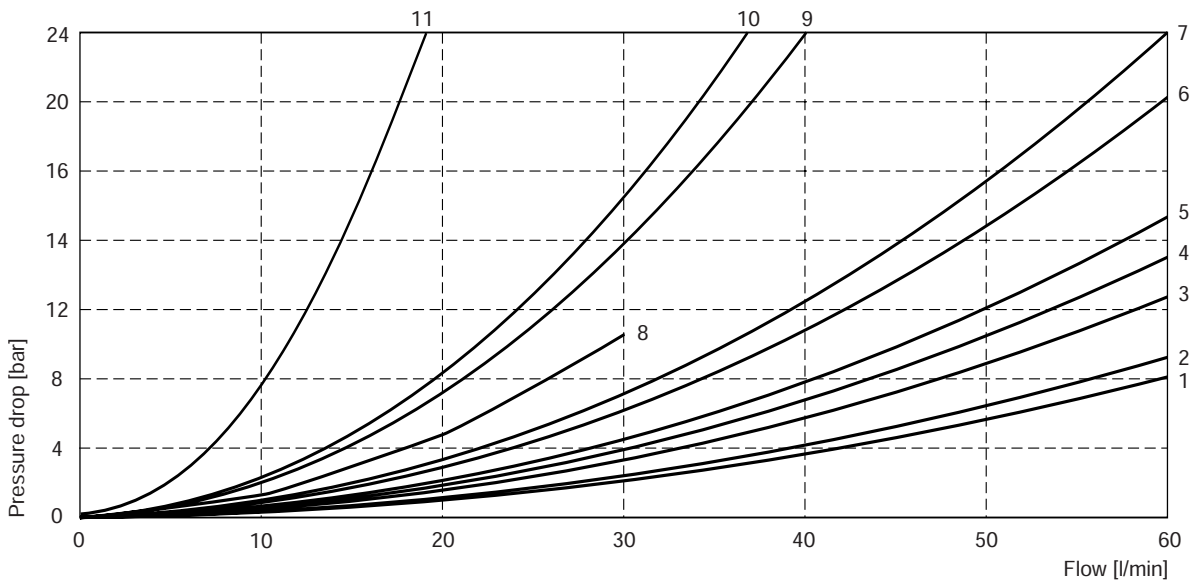
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number

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.

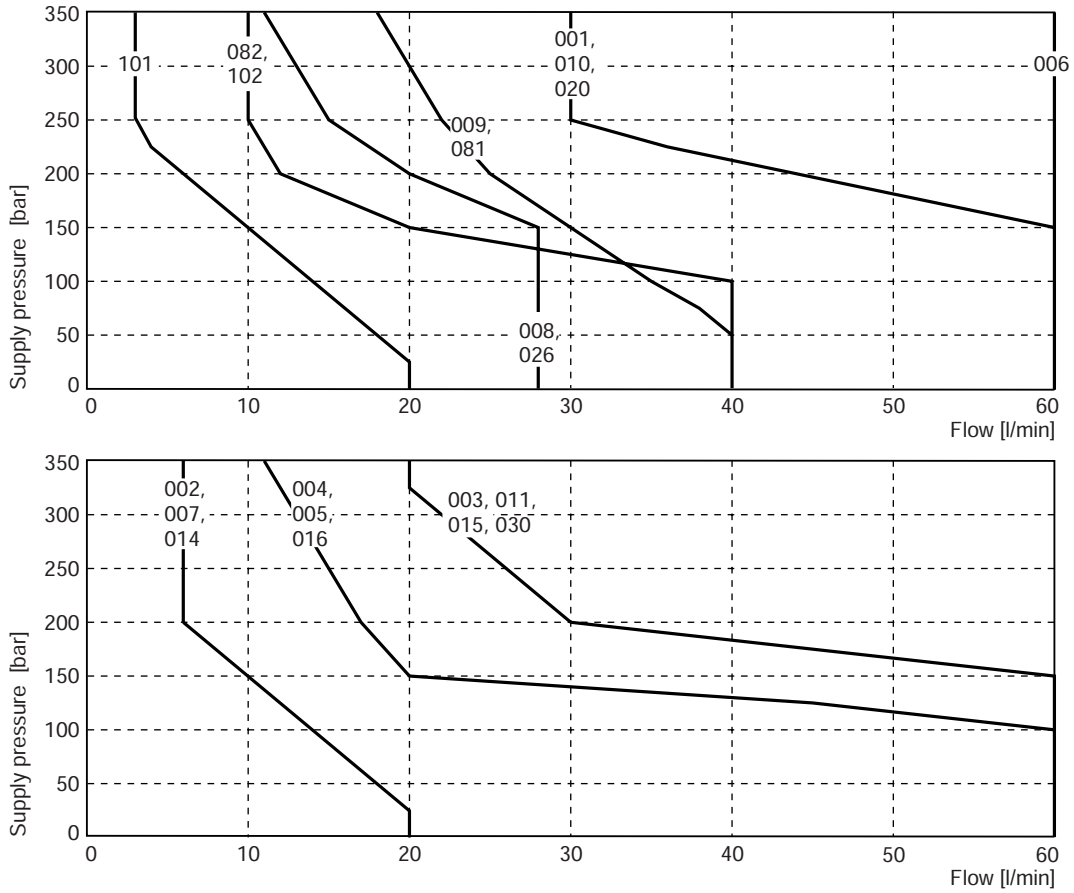
D1VW-8W UK.indd RH 29.08.2013



The diagram below specifies the shift limits. The specifications apply to 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.

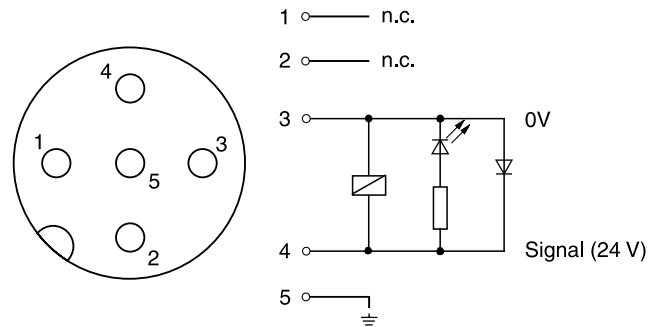
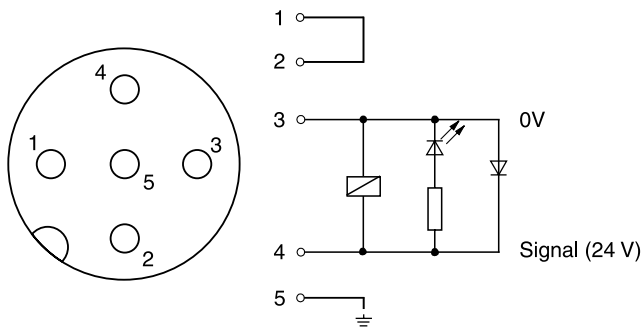
**Shift limits**



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

**M12 pin assignment DESINA design (code „JDLJ5”), Pins 1 and 2 connected**

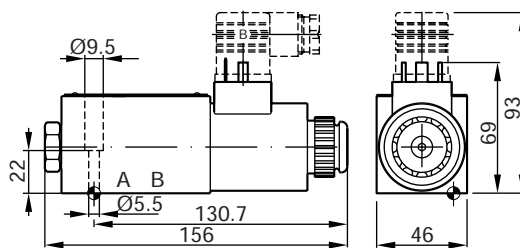
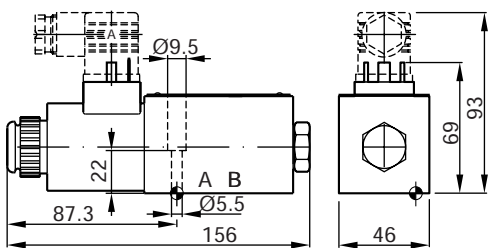
**M12 pin assignment code “JDL”, Pins 1 and 2 not connected**



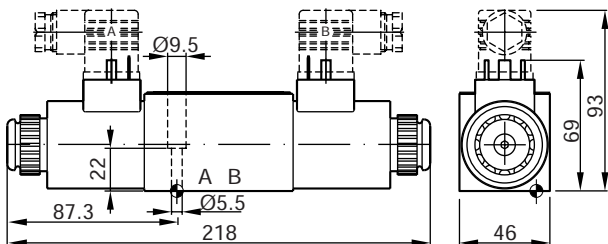
Dimensions

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

Style H, K

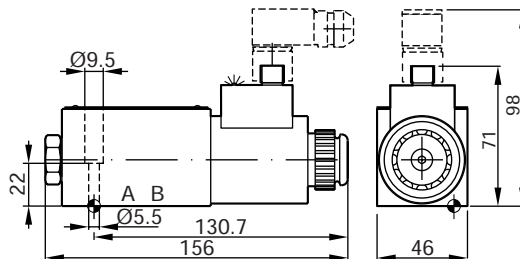
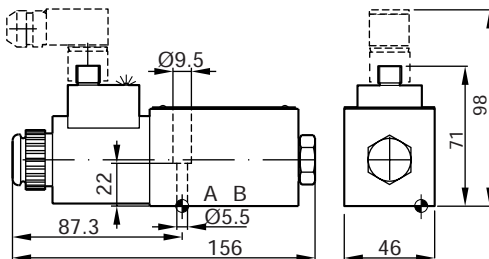


Style C, D

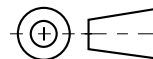
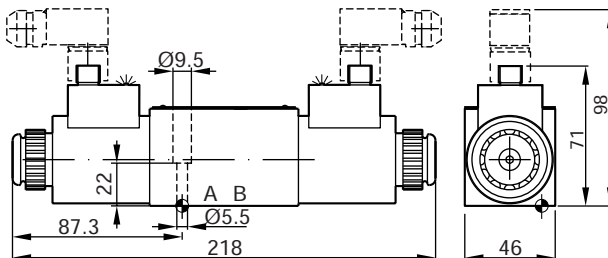


M12x1 connector, DC solenoid, JDLJ5 (DESINA) or JDL  
Style B, E

Style H, K



Style C, D



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	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.

The direct operated directional valves 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:**

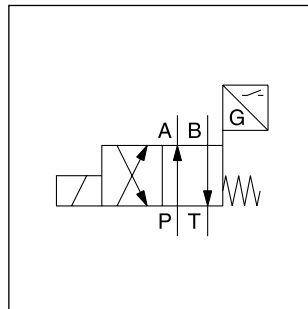
**The adjustment of the position control is factory set and sealed. Replacement and repairs can only be undertaken by the manufacturer.**



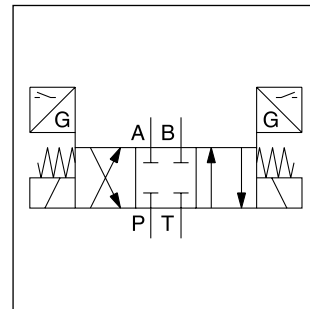
D1VW\*B



D1VW\*C

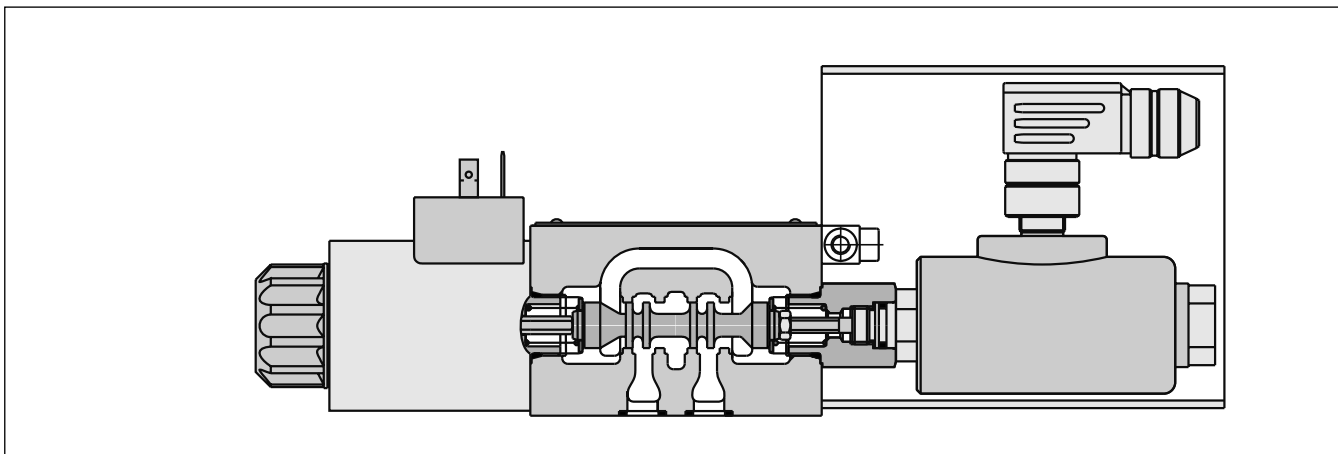


D1VW\*B

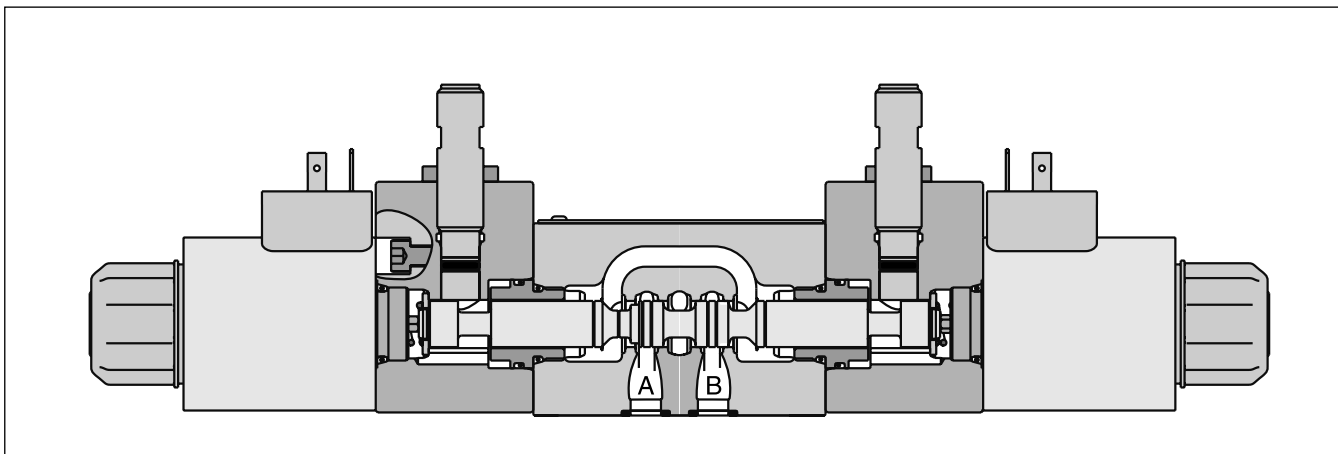


D1VW\*C

**D1VW\*B**



**D1VW\*C**



**D**

Directional control valve

**1**

Size  
DIN NG06  
CETOP 03  
NFPA D03

**V**

3-chamber valve

**W**

Wet pin solenoid

Spool type

Spool position

Spool position

2

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

2 position spools	
Code	Spool type
	a b
020	
026 <sup>3)</sup>	
030 <sup>3)</sup>	

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	 Spring offset in position "b". Operated in position "a".	2 positions. Spring offset in position "b". Operated in position "a".
H	 Spring offset in position "a". Operated in position "b".	2 positions. Spring offset in position "a". Operated in position "b".

<sup>1)</sup> Only available for spool position "E" and "F".

<sup>2)</sup> Only available for spool position "K" and "M".

<sup>3)</sup> Only available for spool position "B" and "H".

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

<sup>5)</sup> For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "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



Design series (not required for ordering)

Code	Position control	Spool position
I2N	End position monitored side B	E, F, B (Solenoid on a-side)
<b>I5N<sup>5)</sup></b>	<b>Start position monitored side B</b>	
I1N	End position monitored side A	K, M, H (Solenoid on b-side)
<b>I4N<sup>5)</sup></b>	<b>Start position monitored side A</b>	

Code	Manual override
omit	<b>Standard valve with manual override</b>
T <sup>5)</sup>	without manual override

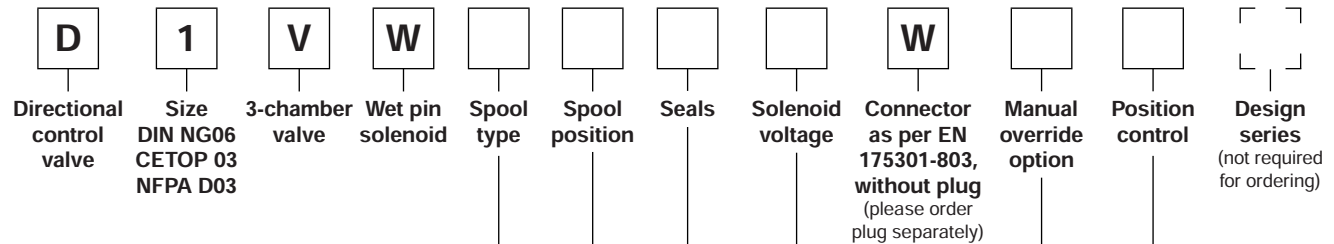
Code	Voltage
K	12 V=
<b>J</b>	<b>24 V=</b>
U <sup>4)</sup>	98 V=
G <sup>4)</sup>	205 V=

Code	Seals
<b>N</b>	<b>NBR</b>
V	FPM

**Bold letters = Short-term availability**

Further spool types and voltages on request.

2



3 position spools	
Code	Spool type
	a 0 b
001	
002	
003 <sup>1)</sup>	
004	
015 <sup>1)</sup>	
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".

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

Code	Position control	Spool position
I3N	End positions	C, D
I6N <sup>4)</sup>	Start positions	C

Code	Manual override
omit	Standard valve with manual override
T <sup>4)</sup>	without manual override

Code	Voltage
K	12 V=
J	24 V=
U <sup>3)</sup>	98 V=
G <sup>3)</sup>	205 V=

Code	Seals
N	NBR
V	FPM

<sup>1)</sup> Only for position control code "I6N".  
<sup>2)</sup> Only for position control code "I3N".  
<sup>3)</sup> To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.  
<sup>4)</sup> For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I6N" (start positions) is required.

Further spool types and voltages on request.

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]	0...+50			
MTTF <sub>D</sub> 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 in accordance with DIN 51524 ... 51525				
Fluid temperature	[°C]	-25 ... +70			
Viscosity permitted	[cSt] / [mm²/s]	2.8...400			
Viscosity recommended	[cSt] / [mm²/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	IP 65 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.	[mm²]	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.

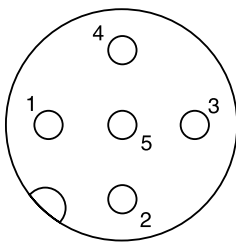
**Single solenoid valves**

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

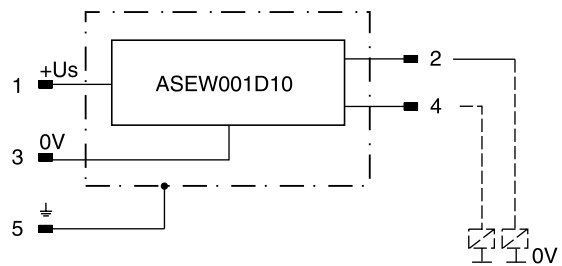
Protection class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient temperature	[°C]	0...+50
Supply voltage $U_s$ / ripple	[V]	18...42 / 10 %
Current consumption without load	[mA]	≤ 30
Max. output current per channel, ohmic	[mA]	400
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2 A	[V]	≤ 1.1
Max. output drop at 0.4 A	[V]	≤ 1.6
EMC		EN50081-1 / EN50082-2
Max. tolerance ambient field strength	[A/m]	<1200
Min. distance to next AC solenoid	[m]	>0.1
Interface		M12x1
Wiring min.	[mm <sup>2</sup> ]	5 x 0.25 braided shield recommended
Wiring length max.	[m]	50 recommended

2

**M12 pin assignment**



- 1  $U_s$  18...42V
- 2 Out B: normally open
- 3 0V
- 4 Out A: normally closed
- 5 Earth ground



**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. Delivery includes plug M12 x 1 (see accessories, plug M12x1; order no.: 5004109).

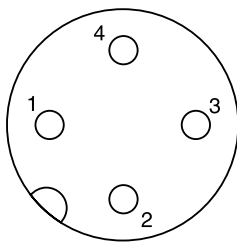


**Double solenoid valves**

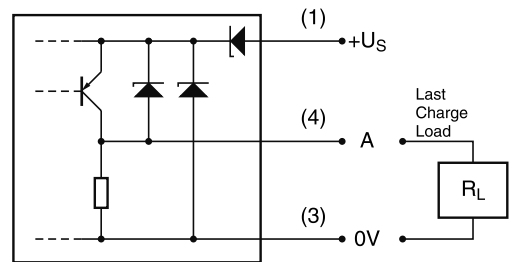
**Electrical characteristics of position control as per IEC 61076-2-101 (M12x1)**

Protection class	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)	
Ambient temperature	[°C]	0...+50
Supply voltage $U_s$ / ripple	[V]	10...30 / $\pm 10\%$
Current consumption without load	[mA]	$\leq 10$
Max. output current per channel, ohmic	[mA]	200
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2 A	[V]	$\leq 2$
EMC	EN61000-6-4 / EN61000-6-2	
Min. distance to next AC solenoid	[m]	$>0.1$
Interface	M12x1	
Wiring min.	[mm <sup>2</sup> ]	3 x 0.14 braided shield recommended
Wiring length max.	[m]	50 recommended

**M12 pin assignment**



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



**Definitions**

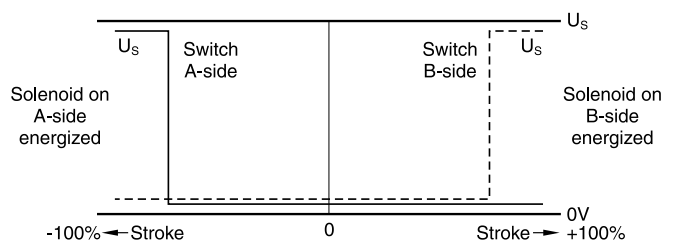
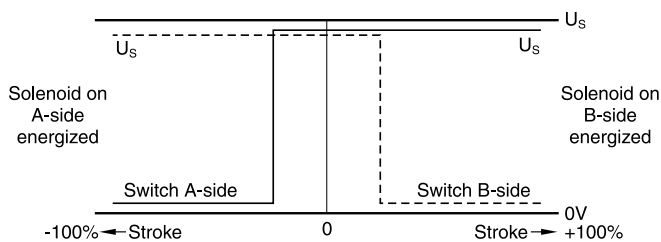
**Start position monitored:**

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).



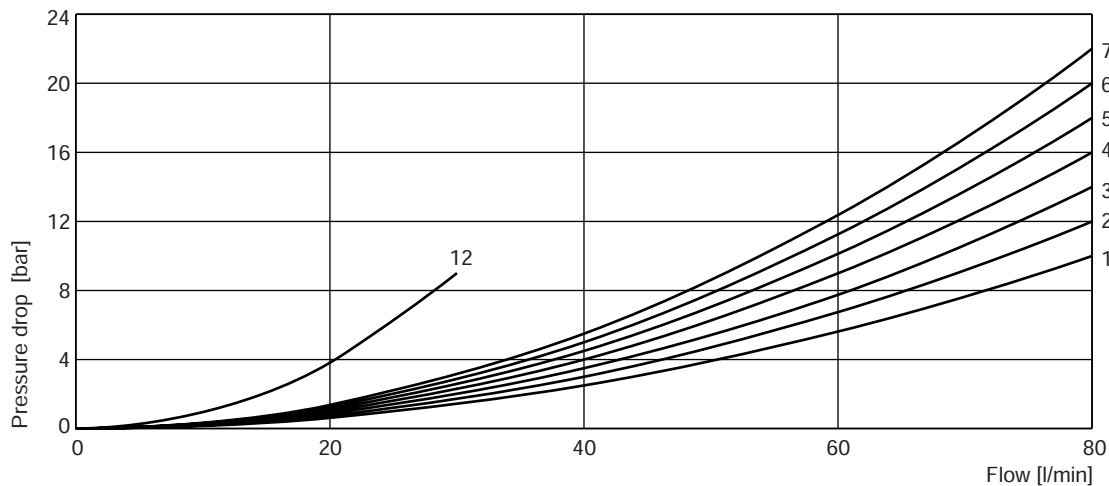
Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

The flow curve diagram shows the flow versus pressure drop 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
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**

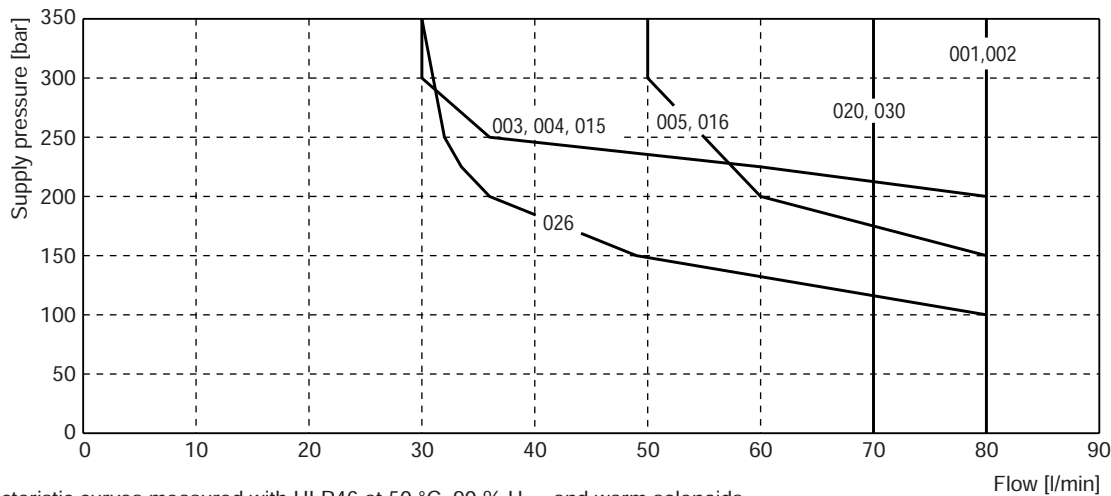


All characteristic curves measured with HLP46 at 50 °C.

**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 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.

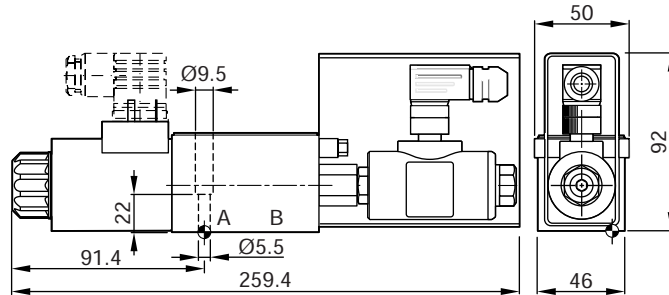


All characteristic curves measured with HLP46 at 50 °C, 90 % U<sub>nom</sub> and warm solenoids.

D1VW-IPC UK.indd RH 29.08.2013

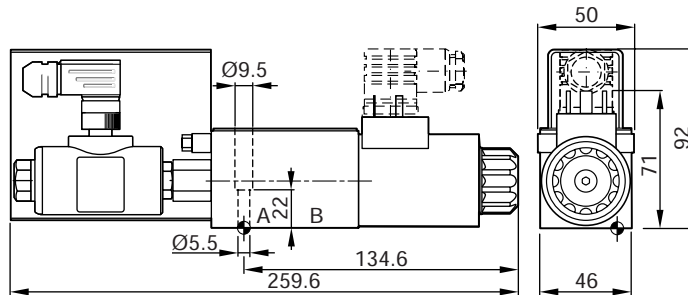
**Dimensions**

Interface EN 175301-803, DC solenoid, with plug M12x1<sup>1)</sup>  
B, E, F -style

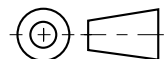
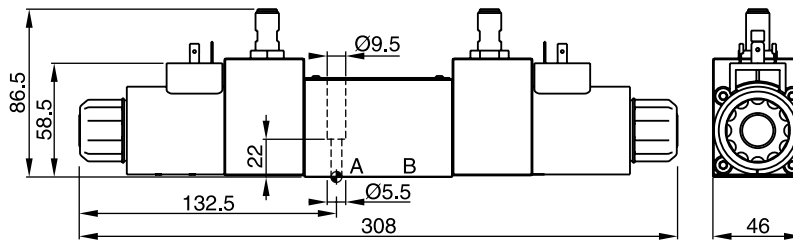






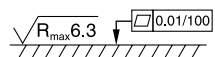
2

H, K, M -style



Interface EN 175301-803, DC solenoid, without plug M12x1<sup>2)</sup>  
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.

**Attention:**

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


<sup>1)</sup> Delivery includes plug M12 x 1 (see accessories, plug M12x1; order no.: 5004109).

<sup>2)</sup> Please order plug M12 x 1 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  II 2 G  
Ex mbe II T4 Gb

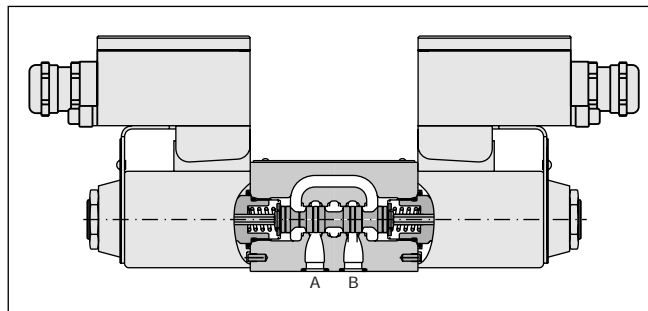
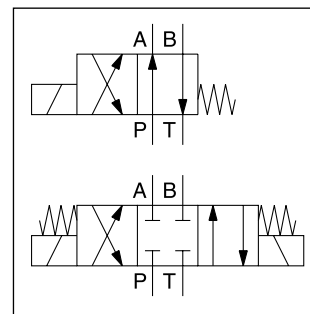
for use in zone 1.

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


Further ATEX conform valves please refer to catalogue HY11-3343.

Download:

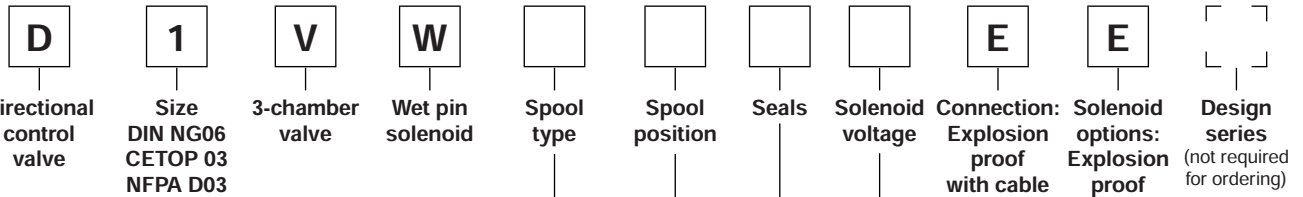
[www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) - see "Literature"



**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 <sub>D</sub>	[years]	150		
Weight	[kg]	1.8 (1 solenoid), 2.7 (2 solenoids)		
Hydraulic				
Max. operating pressure	[bar]	P, A B: 350 T: 140		
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525			
Fluid temperature	[°C]	-20 ... +60		
Viscosity permitted	[cSt] / [mm <sup>2</sup> /s]	2.8 ... 400		
Viscosity recommended	[cSt] / [mm <sup>2</sup> /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  II 2 G , Ex mbe II 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 <sup>2</sup> ]	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 <sup>1)</sup>	
009 <sup>1)</sup>	
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".

<sup>1)</sup> Consider specific spool position.

Further spool types, styles,  
and combinations on request.

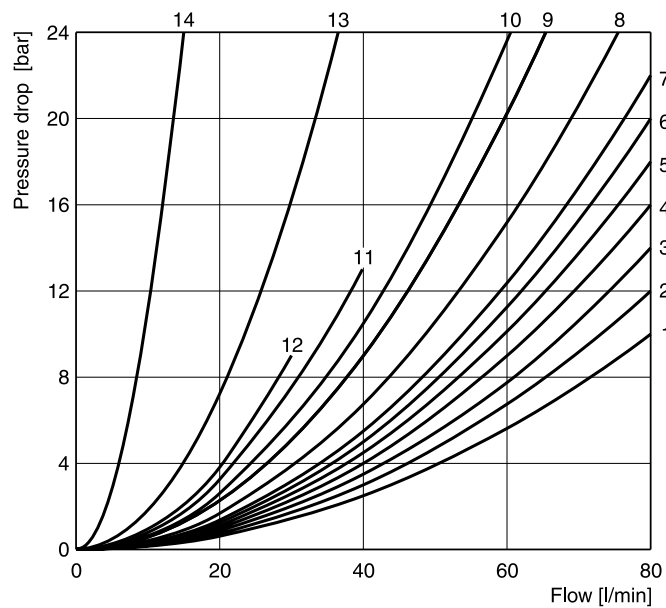
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

**2**

Spool	Position "b"			Position "a"			Position "0"				
	P-A	B-T	P-B	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**



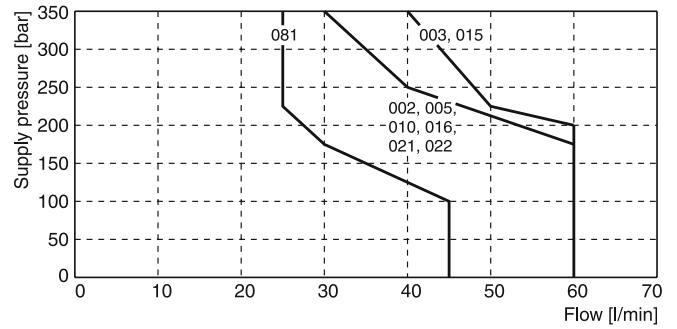
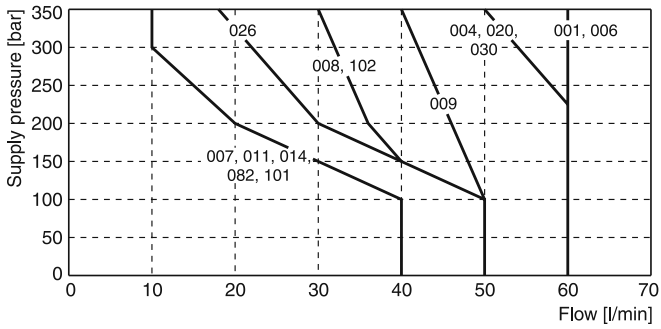
All characteristic curves measured with HLP46 at 50 °C.

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 balanced flow conditions. The shift limits can be con-

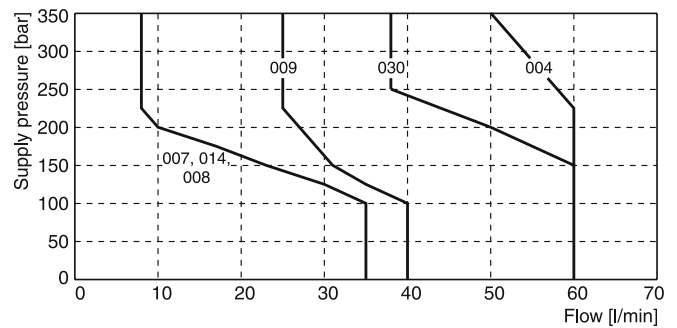
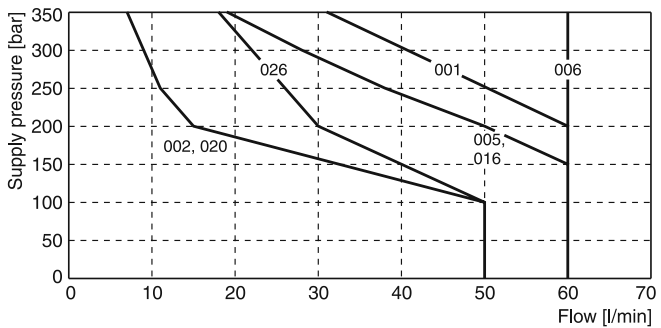
siderably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

**Shift limit diagram with DC solenoid**



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

**Shift limit diagram with AC solenoid**

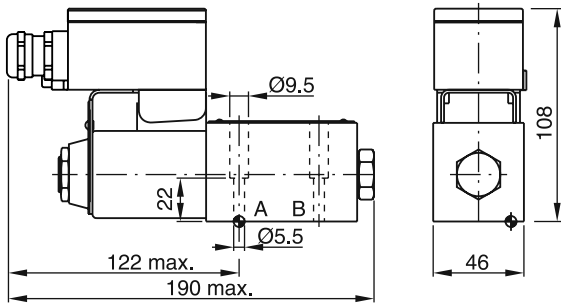


Measured with HLP46 at 50 °C, 95 %  $U_{nom}$  and warm solenoids

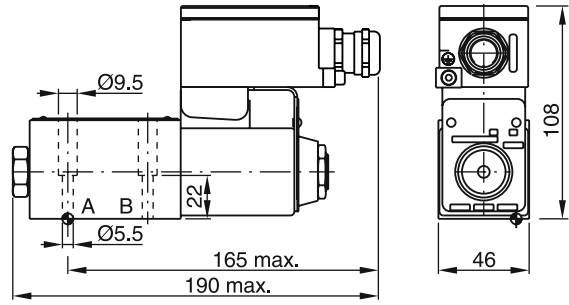
Dimensions

Dimensions

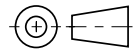
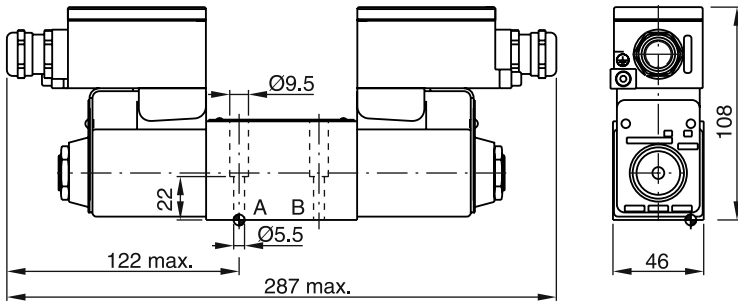
B, E -style





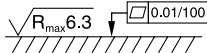


H, K -style



C, D -style



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



**Characteristics**

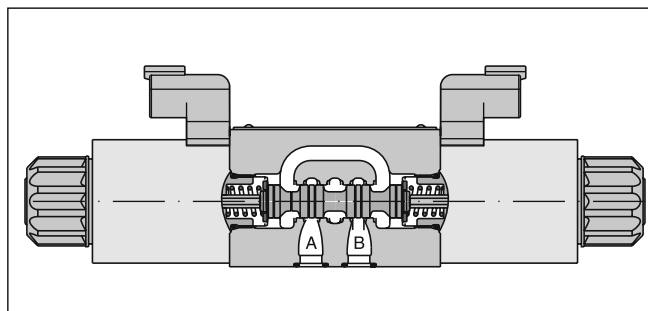
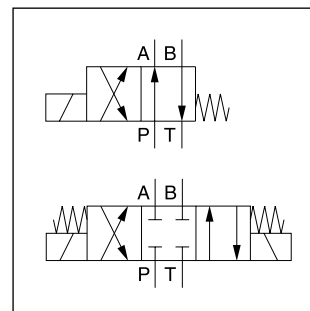
The D1MW is based on the D1VW series of directional control valves size NG06, but offers additional corrosion protection of the valve body, the solenoid coil and the anchor tube as well as the typical solenoid connections for the mobile market such as AMP Junior Timer and DT04-2P "Deutsch".

**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

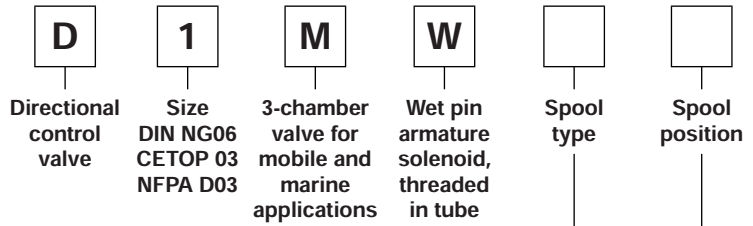


Connector DT04-2P "Deutsch"

**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...+50
MTTF <sub>D</sub> value	[years] 150
Weight	[kg] 1.5 (1 solenoid), 2.1 (2 solenoids)
Hydraulic	
Max. operating pressure	[bar] P, A B: 350; T: 210
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525
Fluid temperature	[°C] -25 ... +70
Viscosity permitted	[cSt] / [mm <sup>2</sup> /s] 2.8...400
Viscosity recommended	[cSt] / [mm <sup>2</sup> /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 in acc. with EN60529 (with correctly mounted plug-in connector) AMP Junior Timer IP67 in acc. with EN60529 (with correctly mounted plug-in connector) DT04-2P "Deutsch" IP69K (with correctly mounted plug-in connector)
	Code
Supply voltage	[V] K 12 V = J 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 <sup>2</sup> ] 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.



2

3 position spools	
Code	Spool type
001	a 0 b
002	
004	
006	
008 <sup>1)</sup>	
011	
021	
022	
081	
082	

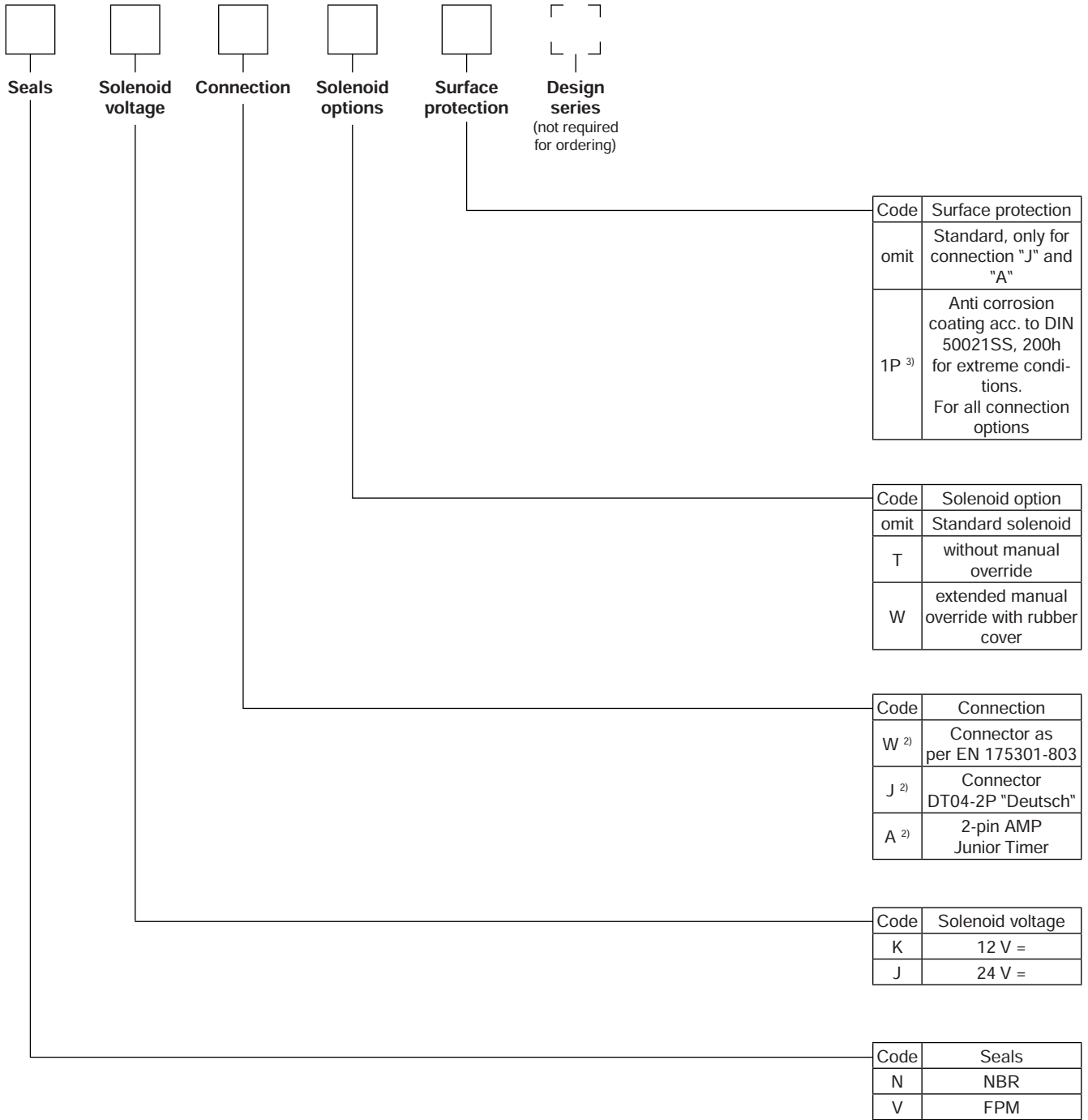
2 position spools	
Code	Spool type
020	a b
030	

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

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



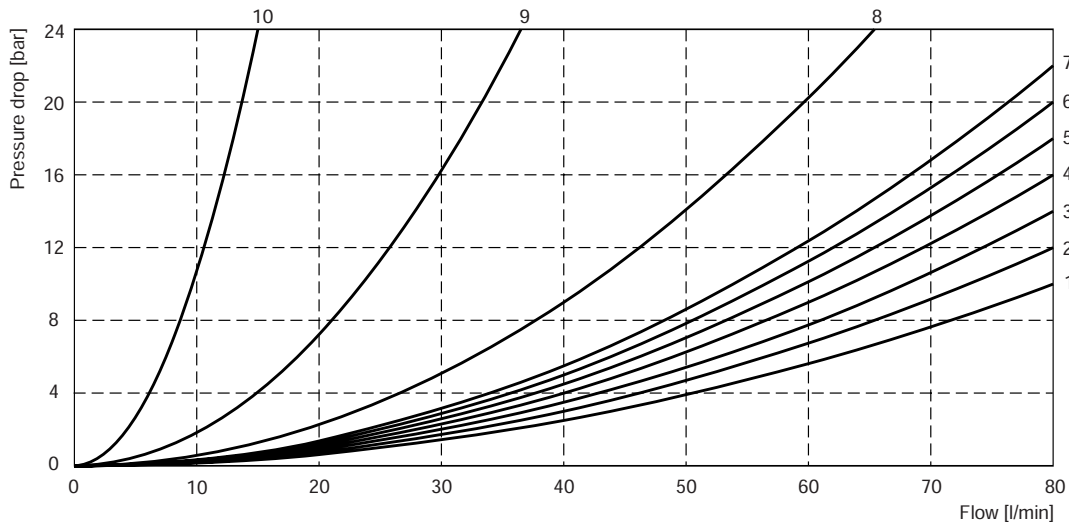
Other spool types on request.

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.

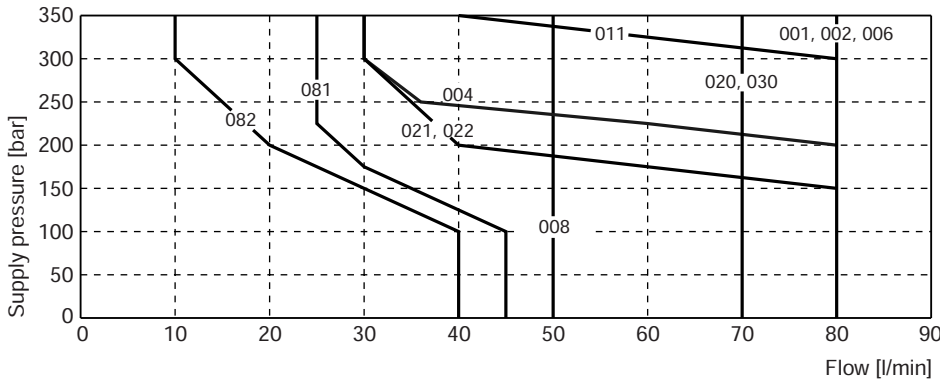
Spool	Position „b“		Position „a“		Position „0“				
	P->A	B->T	P->B	A->T	P->A	P->B	A->T	B->T	P->T
001	2	2	2	2	-	-	-	-	-
002	1	4	1	4	1	1	5	5	2
004	2	3	2	3	-	-	7	7	-
006	1	4	1	4	7	7	-	-	-
011	2	2	2	2	-	-	10	10	-
020B	4	4	2	3	-	-	-	-	-
030B	2	3	1	2	-	-	-	-	-
081	9	9	9	9	-	-	-	-	-
082	9	9	9	9	-	-	1)	1)	-
	P->B	A->T	P->A	B->T	P->A	P->B	A->T	B->T	P->T
008	4	5	4	5	-	-	-	-	8
	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.

**Shift limits**



The diagram 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 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.

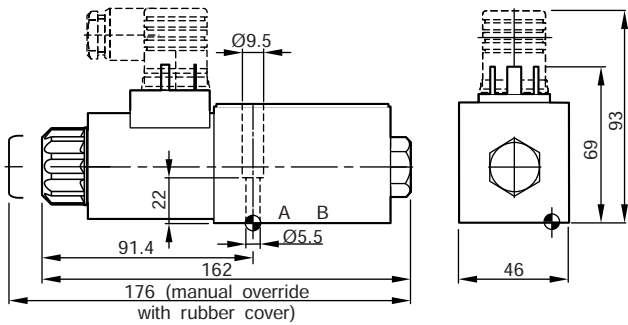
Measured with HLP46 at 50 °C, 90 % U<sub>nom</sub> and warm solenoids.

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

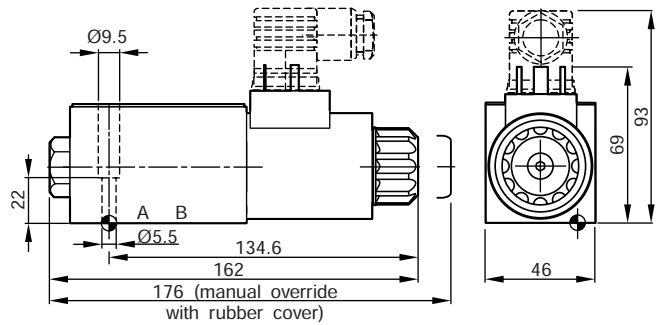
**Dimensions**

**Dimensions with EN 175301-803 Connector**

**B, E, F -style**

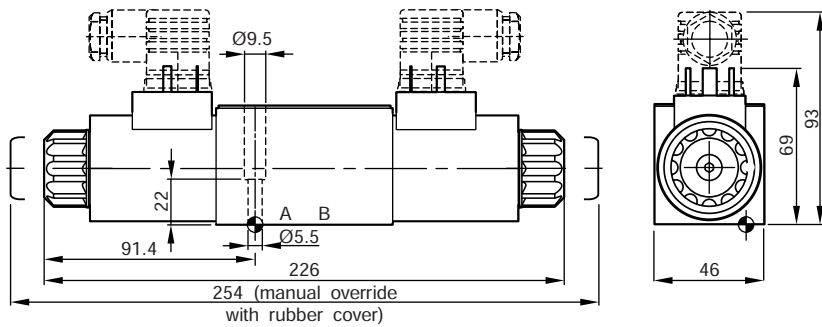


**H, K, M -style**

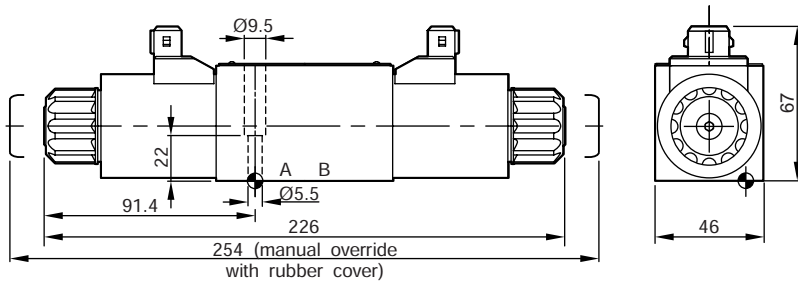


**2**

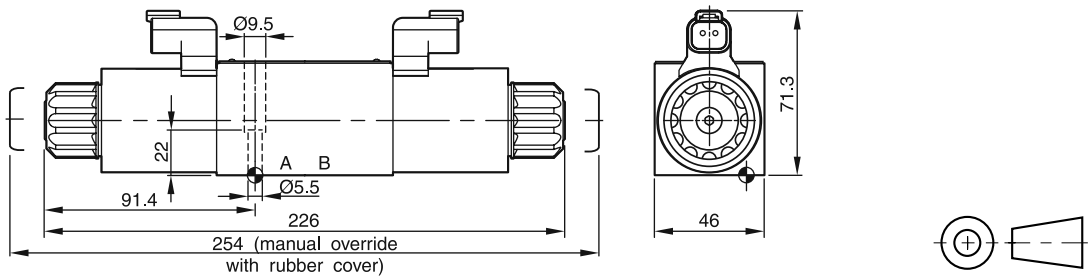
**C and D -style**



**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

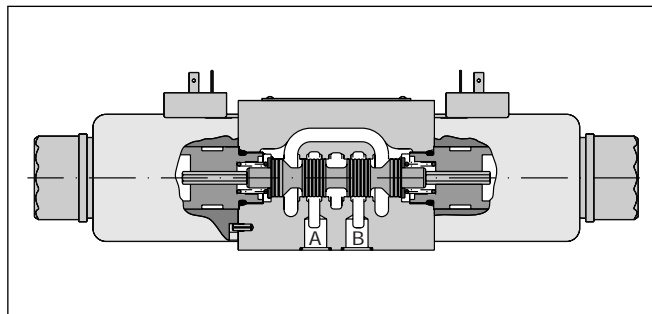
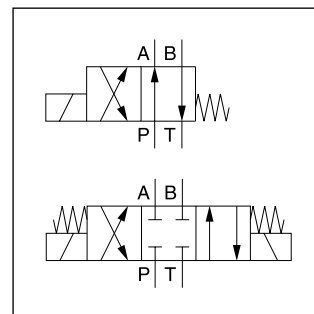
The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.  
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.



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.

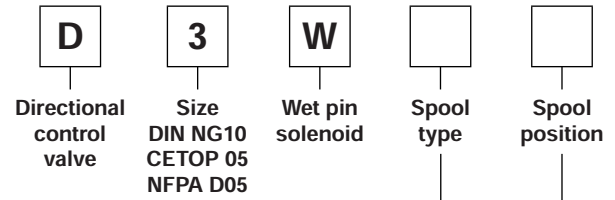


**2**

**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...+50
MTTF <sub>D</sub> value [years]	150
Weight [kg]	4.8 (1 solenoid), 6.3 (2 solenoids)
Hydraulic	
Max. operating pressure [bar]	P, A B: 350; T: 210 (DC), 105 (AC)
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525
Fluid temperature [°C]	-25 ... +70
Viscosity permitted [cSt] / [mm <sup>2</sup> /s]	2.8...400
Viscosity recommended [cSt] / [mm <sup>2</sup> /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 time
Electrical characteristics	
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible
Max. switching frequency [1/h]	10000
Protection class	IP 65 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 <sup>2</sup> ]	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
001	a 0 b
002	
003	
004	
005	
006	
007	
008 <sup>1)</sup>	
009 <sup>1)</sup>	
010 <sup>2)</sup>	
011	
012	
014	
015	
016	
021 <sup>2)</sup>	
022 <sup>2)</sup>	
031 <sup>2)</sup>	
032 <sup>2)</sup>	
081 <sup>2)</sup>	
082 <sup>2)</sup>	
102 <sup>2)</sup>	

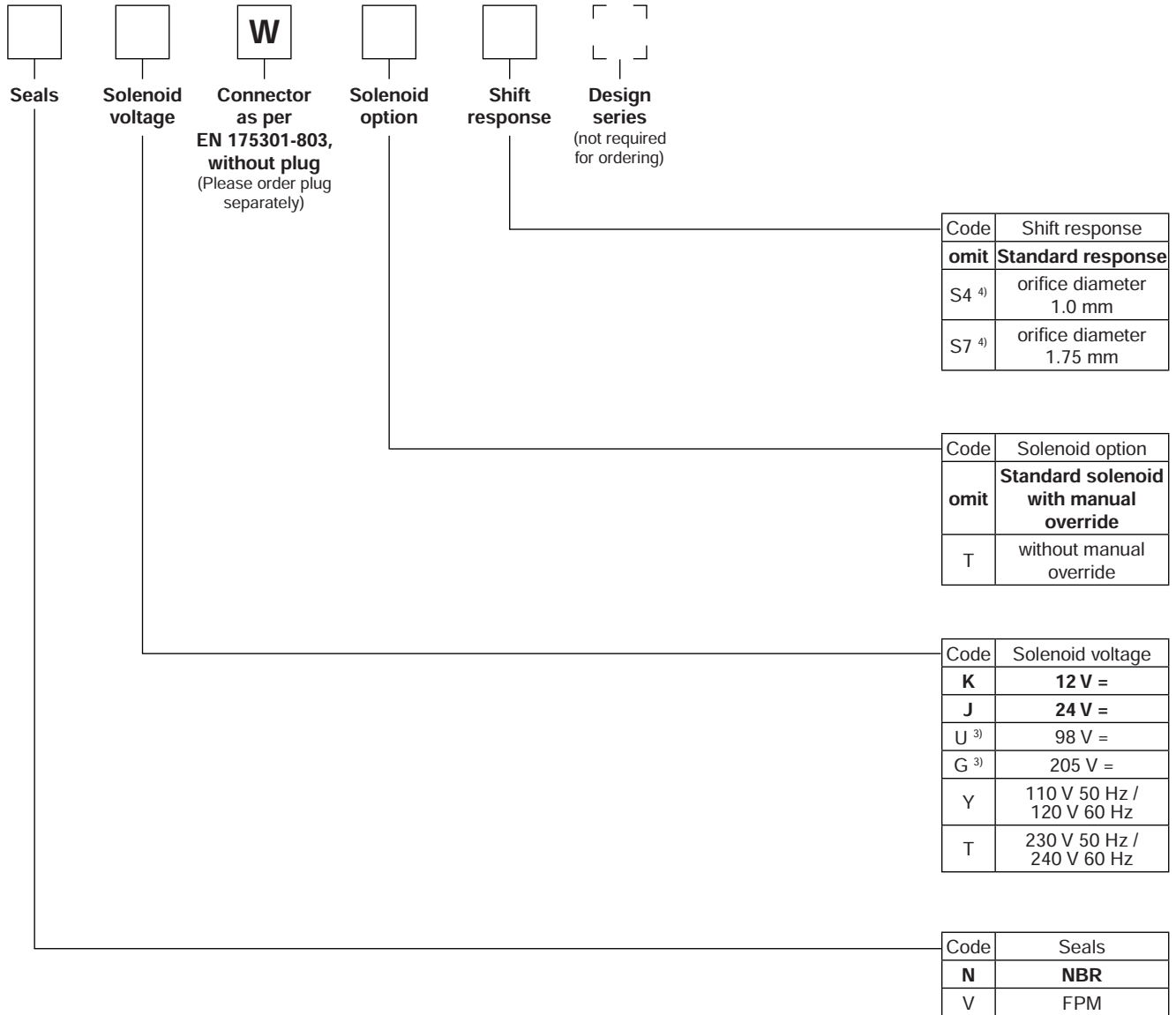
2 position spools	
Code	Spool type
020	a b
026	
030	
101 <sup>2)</sup>	

3 position spools		
Code	Spool position	
C		<b>3 positions.</b> 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		<b>2 positions.</b> Spring offset in position "b". Operated in position "a".
D		<b>2 positions.</b> Operated in position "a" or "b". No center or offset position.
H		<b>2 positions.</b> Spring offset in position "a". Operated in position "b".

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





**Bold letters =**  
Short-term availability

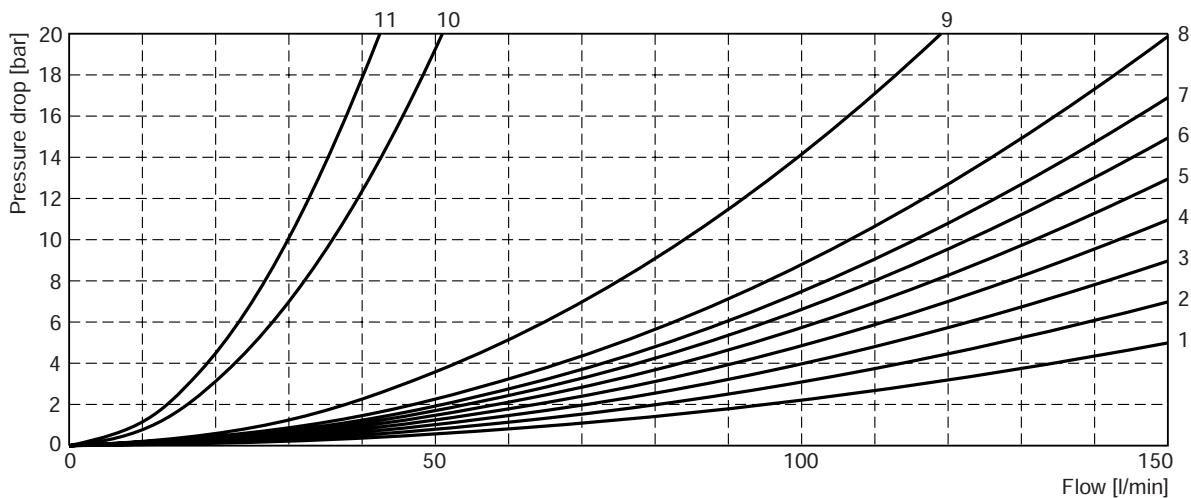
Further spool types and solenoid voltages on request.

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**



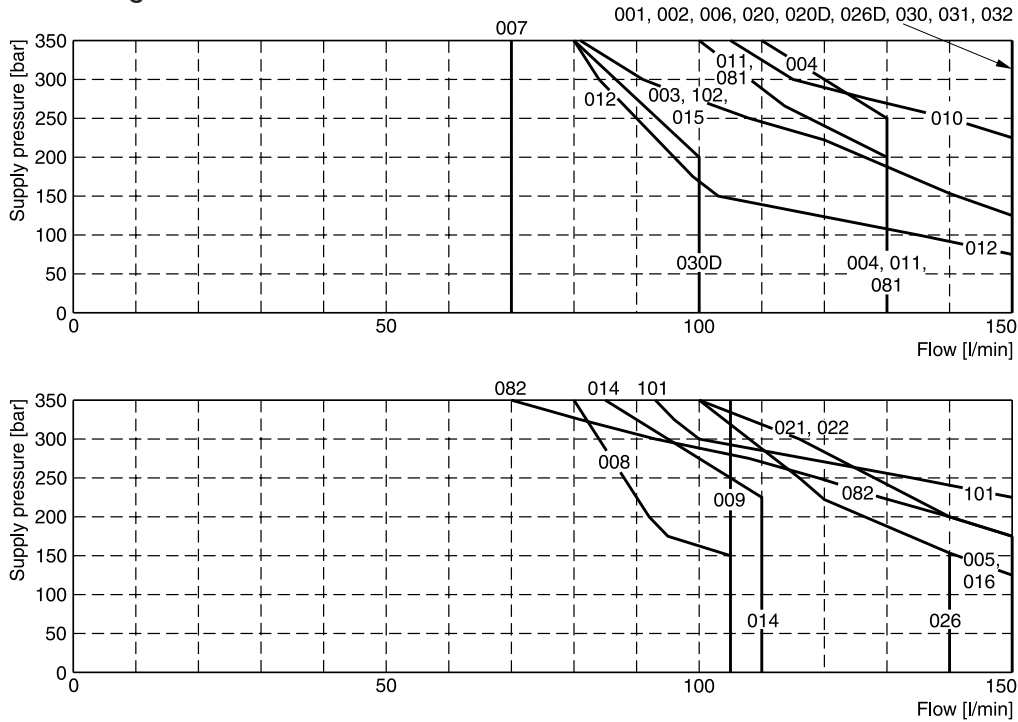
All characteristic curves measured with HLP46 at 50 °C.

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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 balanced flow conditions. The

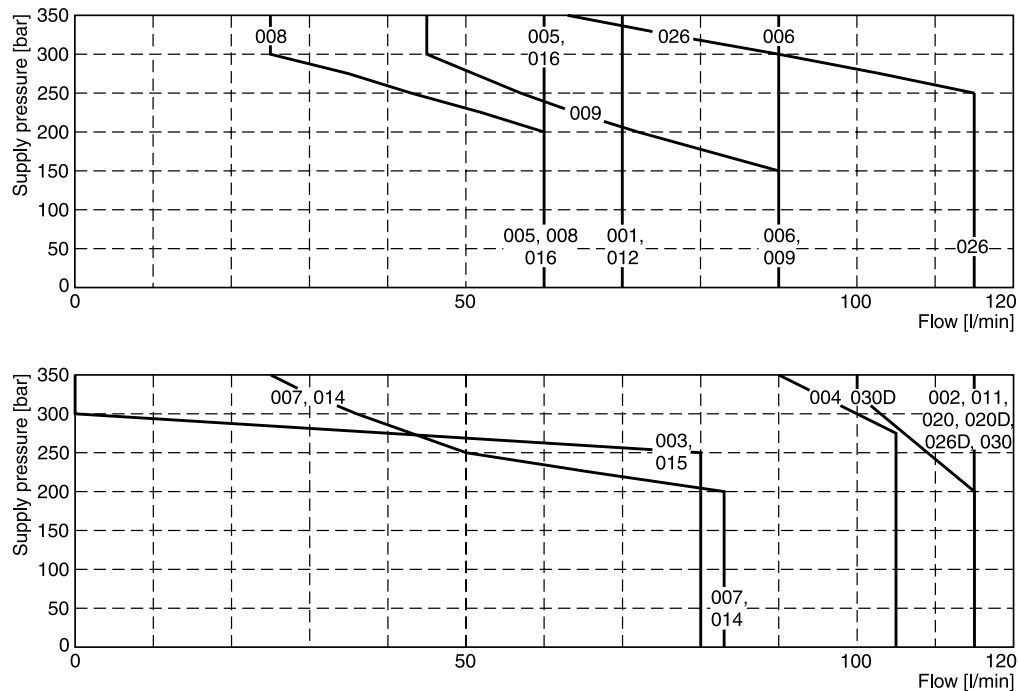
shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

**Shift limits, DC voltage**



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

**Shift limits, AC voltage**



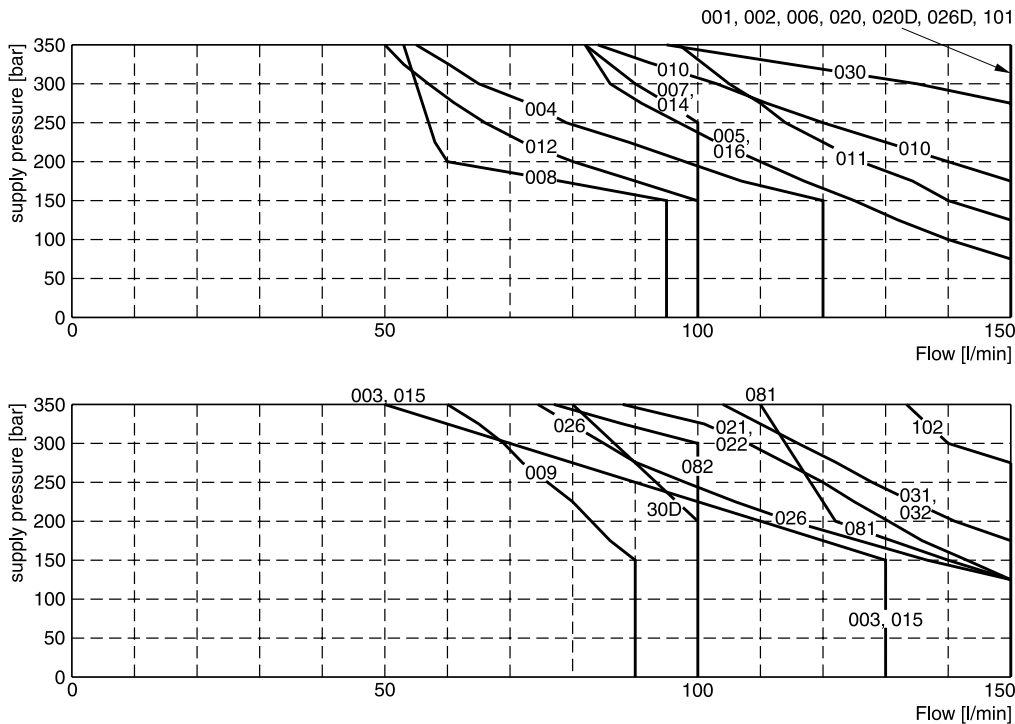
Measured with HLP46 at 50 °C, 95 %  $U_{nom}$  and warm solenoids.

**Shift limits 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 balanced flow condi-

tions. 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



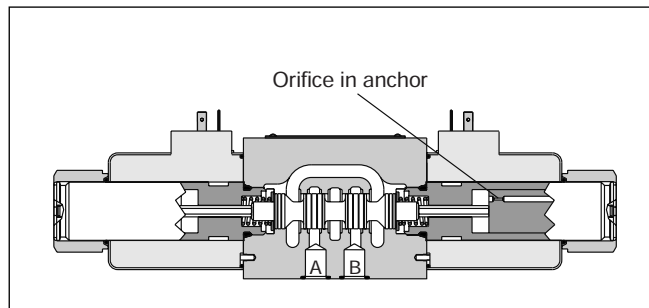
Measured with HLP46 at 50 °C, 90 %  $U_{nom}$  and warm solenoids.

**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.

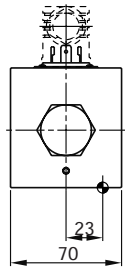
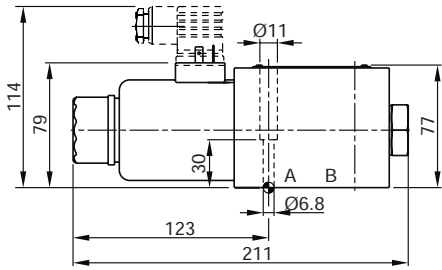
**Acceleration for different orifice sizes (archived against a valve without soft shift)**



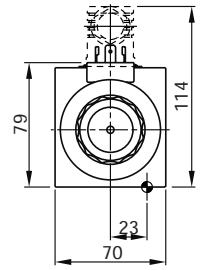
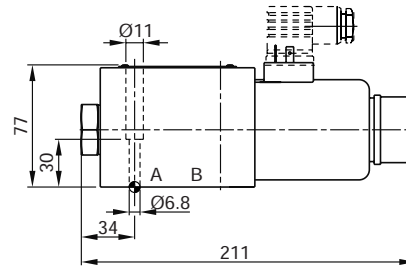
For even softer shifting, the proportional spools 081, 082, 101 and 102 can be used.

\* For AC input and soft shift use rectifier plug.

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

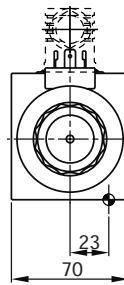
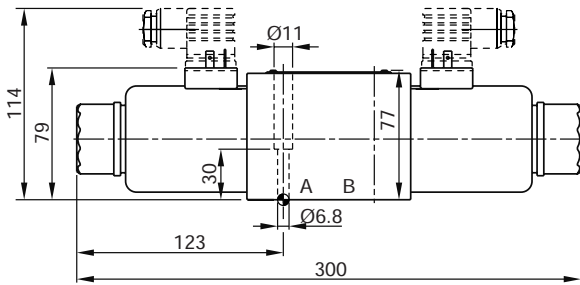


**H, K, M -style**

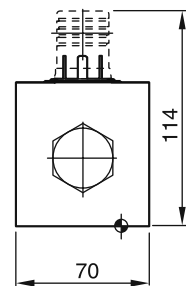
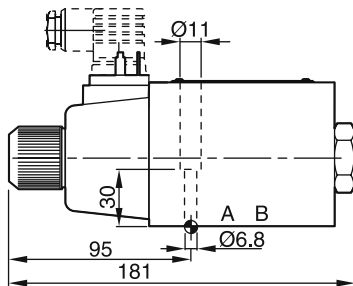


**2**

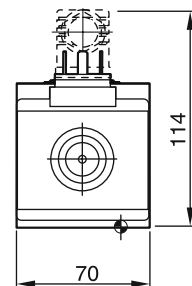
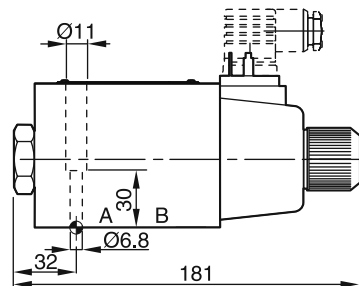
**C, D -style**



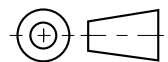
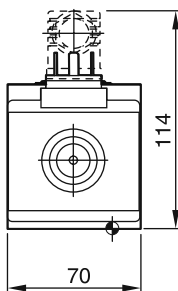
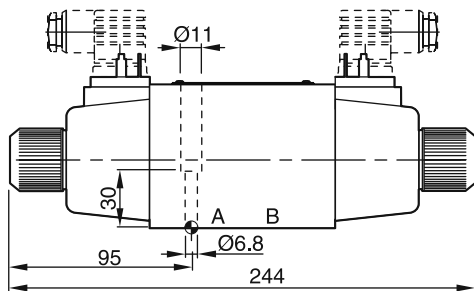
**Interface EN 175301-803, AC solenoid  
 B, E, F -style**







**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 %	<b>NBR: SK-D3W-30</b> 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 position control is available for single solenoid valves only.

**2**

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

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

**Attention:**

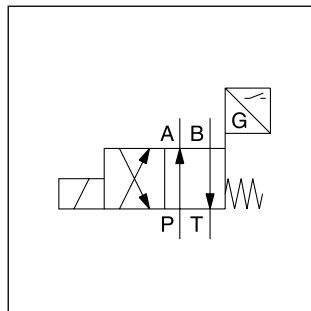
The adjustment of the position control is factory set and sealed. Replacement and repairs can only be undertaken by the manufacturer.



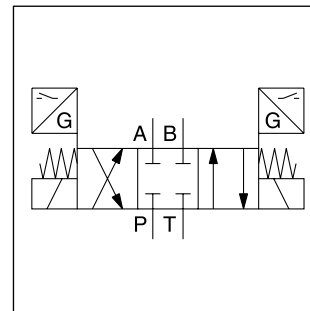
D3W\*B



D3W\*C

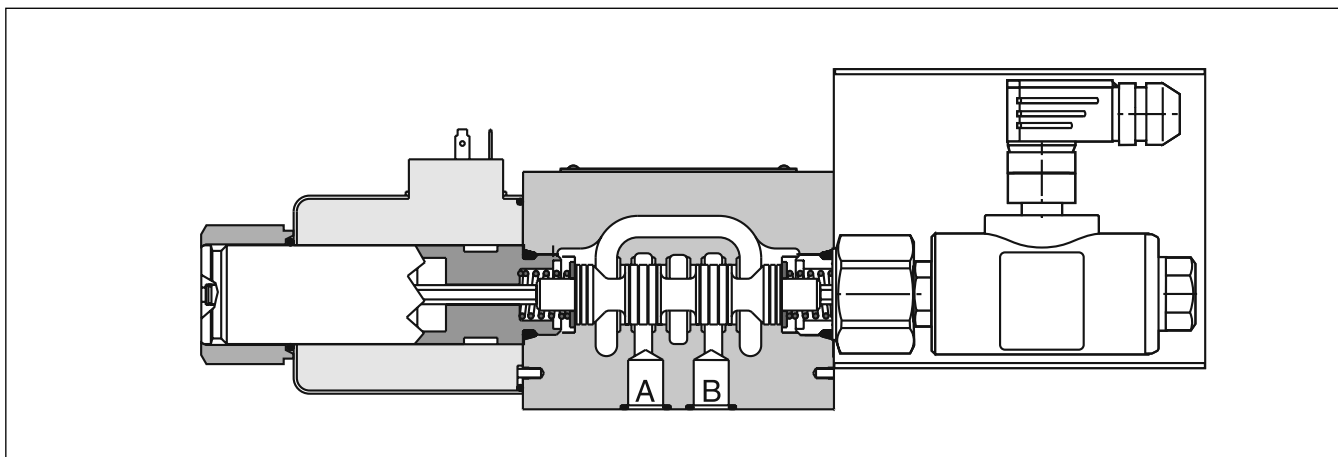


D3W\*B

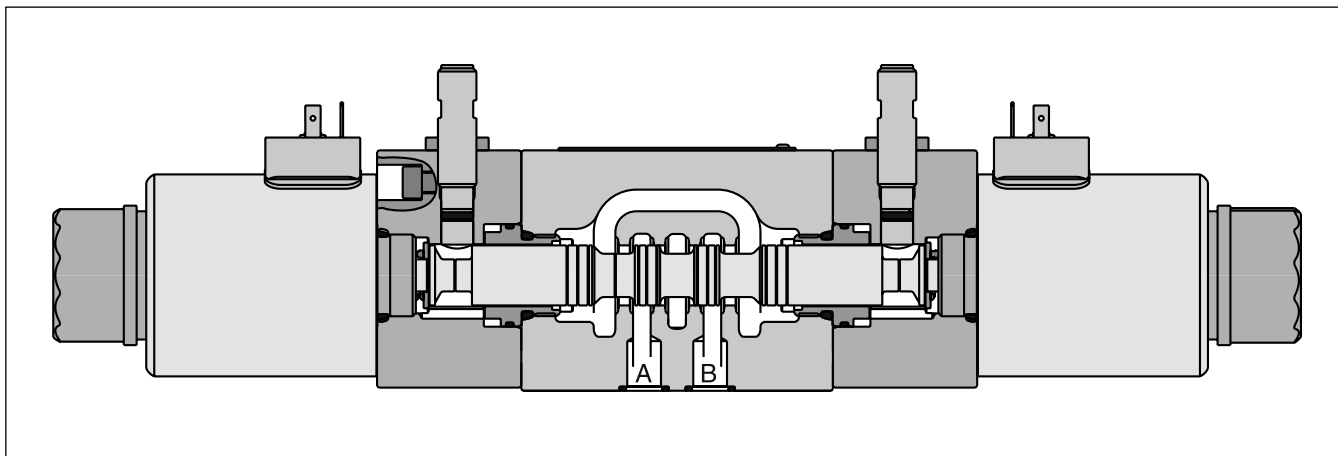


D3W\*C

**D3W\*B**



**D3W\*C**



D3W IPC UK.INDD RH 29.08.2013

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]	0...+50				
MTTF <sub>D</sub> value [years]	150				
Weight [kg]	5.2				
Hydraulic					
Max. operating pressure [bar]	P, A, B: 350; T: 210				
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525				
Fluid temperature [°C]	0 ... +70				
Viscosity permitted [cSt] / [mm <sup>2</sup> /s]	2.8...400				
Viscosity recommended [cSt] / [mm <sup>2</sup> /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	IP 65 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 <sup>2</sup> ]	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.

**D**

Directional control valve

**3**

Size  
DIN NG10  
CETOP 05  
NFPA D05

**W**

Wet pin solenoid

Spool type

Spool position

**2**

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

2 position spools	
Code	Spool type
020	a b
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".

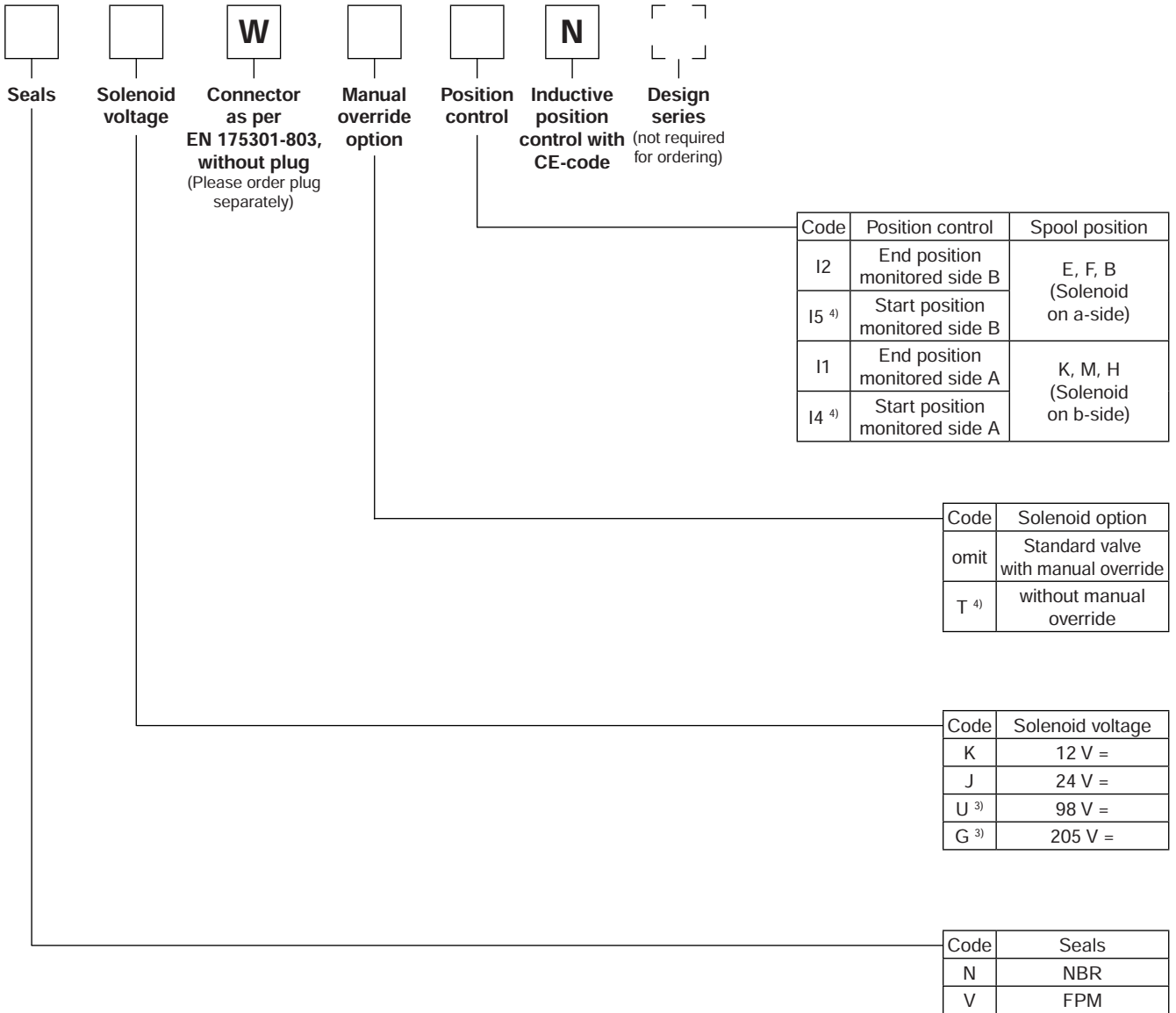
<sup>1)</sup> Only available for spool pos. "K" and "M".

<sup>2)</sup> Only available for spool pos. "E" and "F".

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

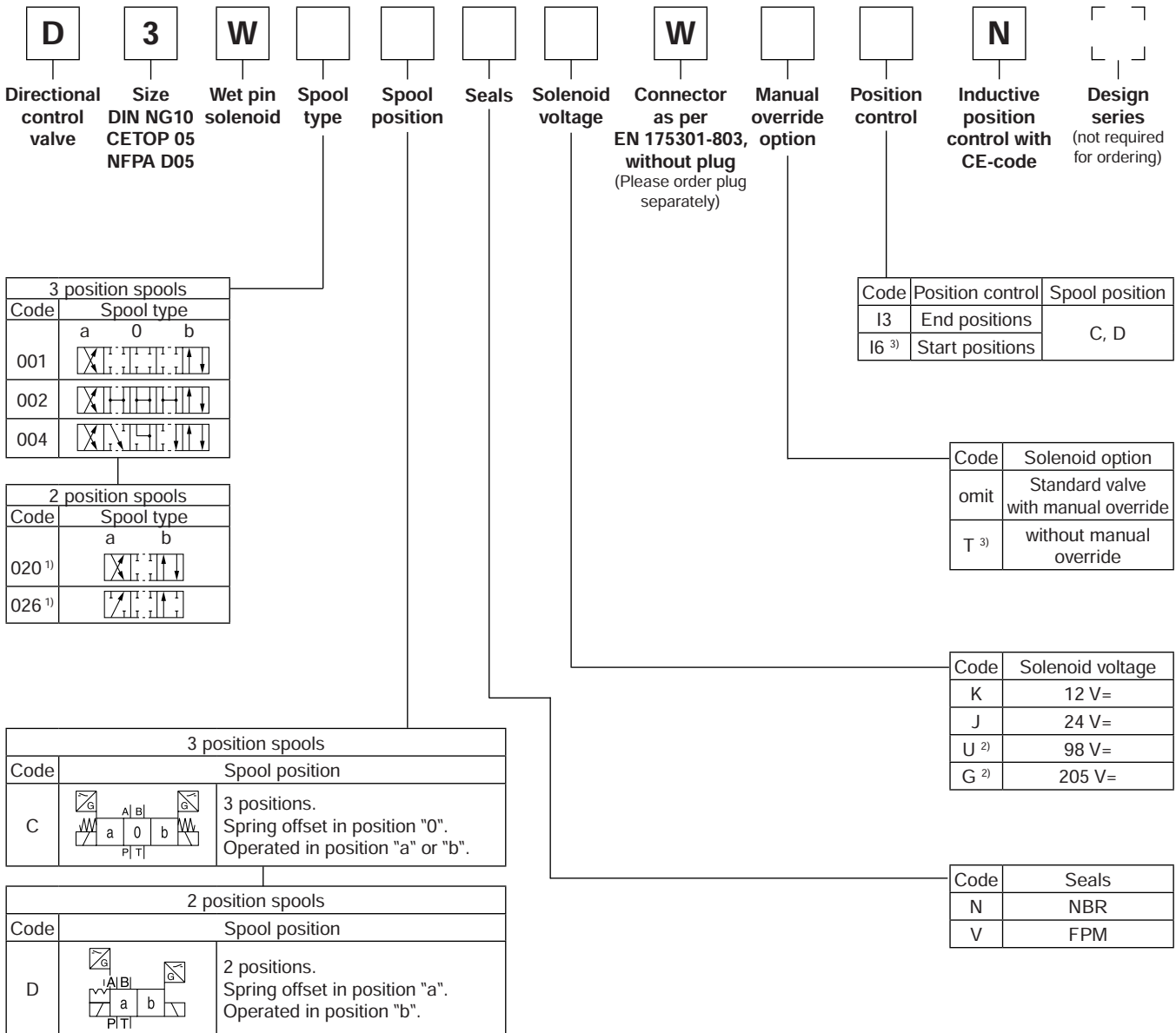
<sup>4)</sup> For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4" or "I5" (start position monitored) are required.





Further spool types and solenoid voltages on request.

**2**



Further spool types and solenoid voltages on request.

<sup>1)</sup> Only available for end position control code "I3".

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

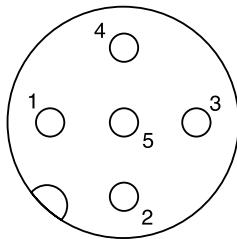
<sup>3)</sup> For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I6" (start positions) is required.

**Single solenoid valve**

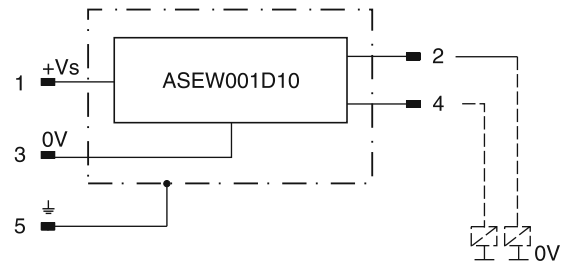
**Electrical characteristics of position control as per IEC 61076-2-101 (M12x1)**

Protection class	IP 65 in accordance with EN 60529 (plugged and mounted)	
Ambient temperature	[°C]	0...+50
Supply voltage $U_s$ / ripple	[V]	18...42 / 10 %
Current consumption without load	[mA]	≤ 30
Max. output current per channel, ohmic	[mA]	400
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2 A	[V]	≤ 1.1
Max. output drop at 0.4 A	[V]	≤ 1.6
EMC	EN50081-1 / EN50082-2	
Max. tolerance ambient field strength	[A/m]	<1200
Min. distance to next AC solenoid	[m]	>0.1
Interface	M12x1	
Wiring min.	[mm <sup>2</sup> ]	5 x 0.25 brad shield recommended
Wiring length max.	[m]	50 recommended

**M12 pin assignment**



- 1  $U_s$  18...42V
- 2 Out B: normally open
- 3 0V
- 4 Out A: normally closed
- 5 Earth ground



**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. Delivery includes plug M12 x 1 (see accessories, plug M12x1; order no.: 5004109).

**Position Control**

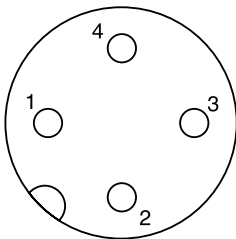
**Double solenoid valves**

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

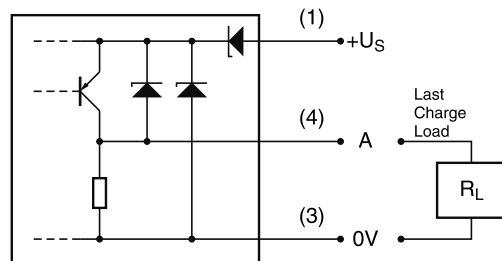
Protection class	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)	
Ambient temperature	[°C]	0...+50
Supply voltage $U_s$ / ripple	[V]	10...30 / ±10 %
Current consumption without load	[mA]	≤ 10
Max. output current per channel, ohmic	[mA]	200
Min. output load per channel, ohmic	[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	
Wiring min.	[mm <sup>2</sup> ]	3 x 0.14 braid shield recommended
Wiring length max.	[m]	50 recommended

2

**M12 pin assignment**



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



**Definitions**

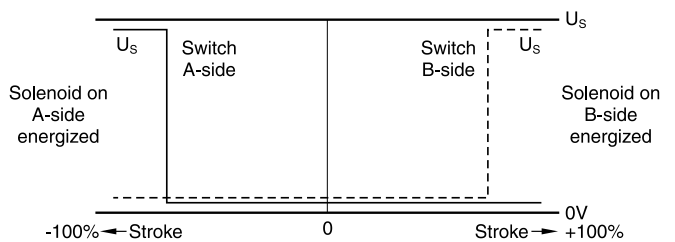
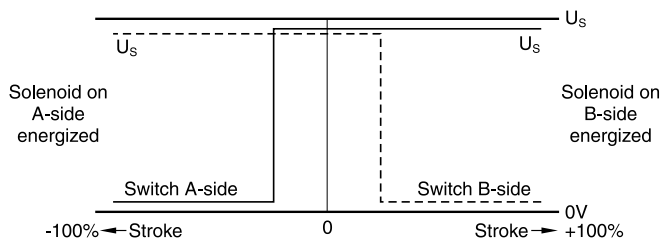
Start position monitored:

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).



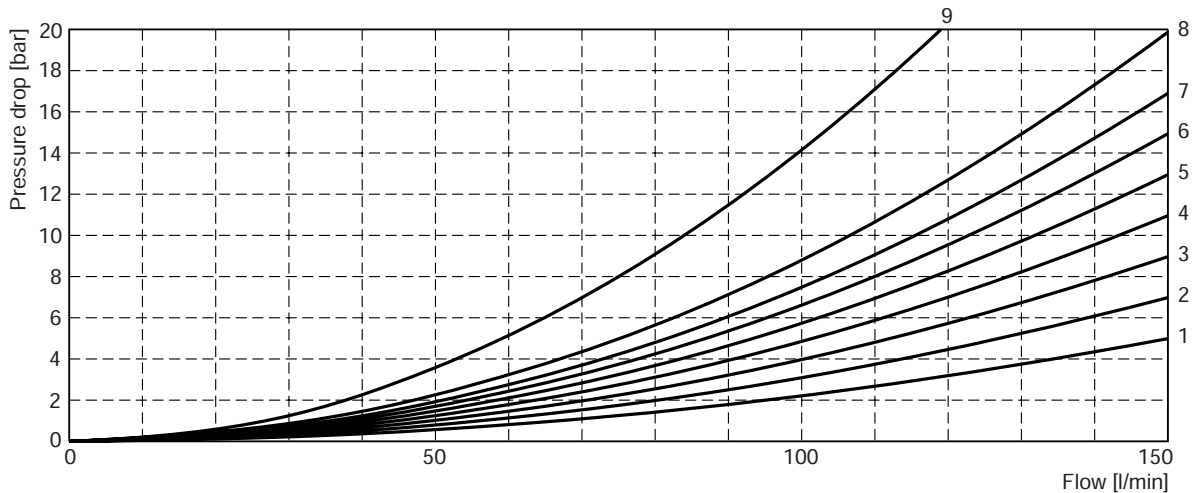
Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

The flow curve diagram shows the flow versus pressure drop 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	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**

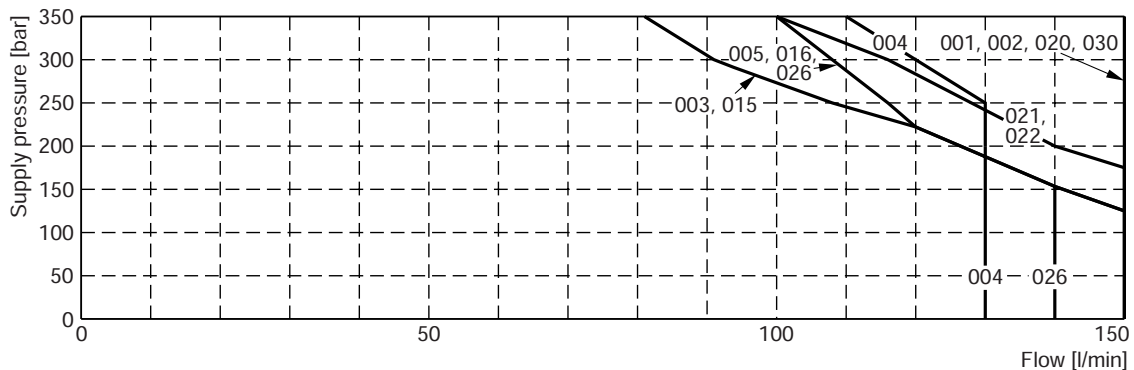


All characteristic curves measured with HLP46 at 50 °C.

**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 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.



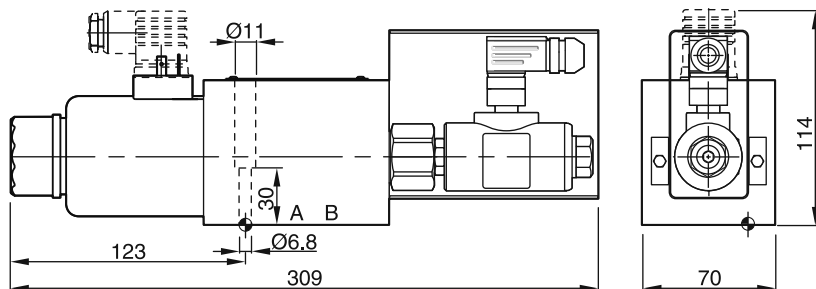
Measured with HLP46 at 50 °C, 90 % U<sub>nom</sub> and warm solenoids.

D3W IPC UK.INDD RH 29.08.2013

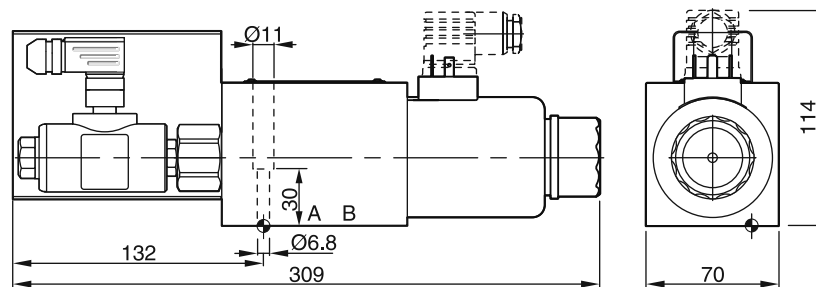
Dimensions

Interface EN 175301-803, DC solenoid, with plug M12x1<sup>1)</sup>  
B, E, F -style

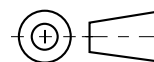
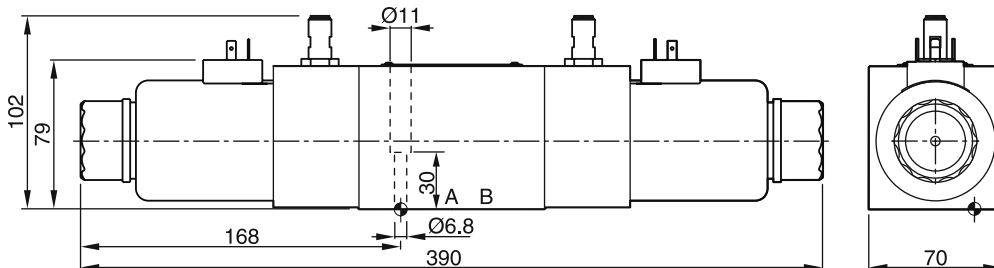
2





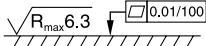


H, K, M -style



Interface EN175301-803, DC solenoid, without plug M12x1<sup>2)</sup>  
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.

Attention:

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

<sup>1)</sup> Delivery includes plug M12 x 1 (see accessories, plug M12x1; order no.: 5004109).

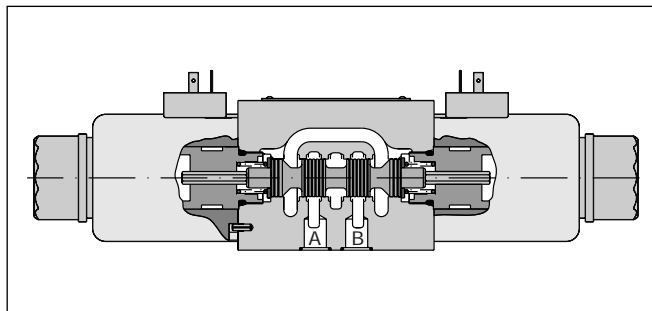
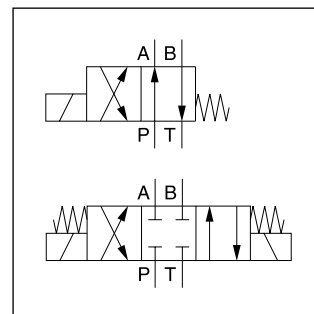
<sup>2)</sup> Please order plug M12x1 separately. Straight plug recommended - no defined position possible for angled plug.

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.

**Technical features:**

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



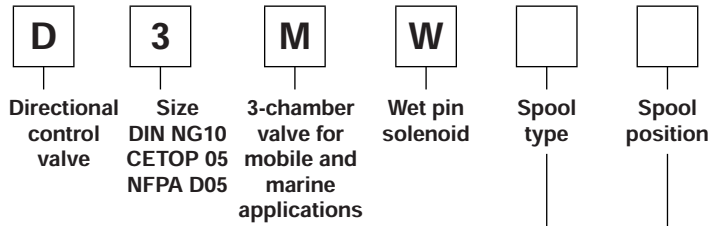
**2**

**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...+50		
MTTF <sub>D</sub> value	[years] 150		
Weight	[kg] 4.8 (1 solenoid), 6.3 (2 solenoids)		
Hydraulic			
Max. operating pressure	[bar] P, A B: 350; T: 210		
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525		
Fluid temperature	[°C] -25 ... +70		
Viscosity permitted	[cSt] / [mm <sup>2</sup> /s] 2.8...400		
Viscosity recommended	[cSt] / [mm <sup>2</sup> /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) IP 65 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	K	J
Supply voltage / ripple	[V]	12 V =	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 <sup>2</sup> ]	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.

**Directional Control Valve  
 Series D3MW**



**2**

3 position spools	
Code	Spool type
001	a 0 b
002	
004	
006	
008 <sup>1)</sup>	
011	
021	
022	
081	
082	

2 position spools	
Code	Spool type
020	a b
030	

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

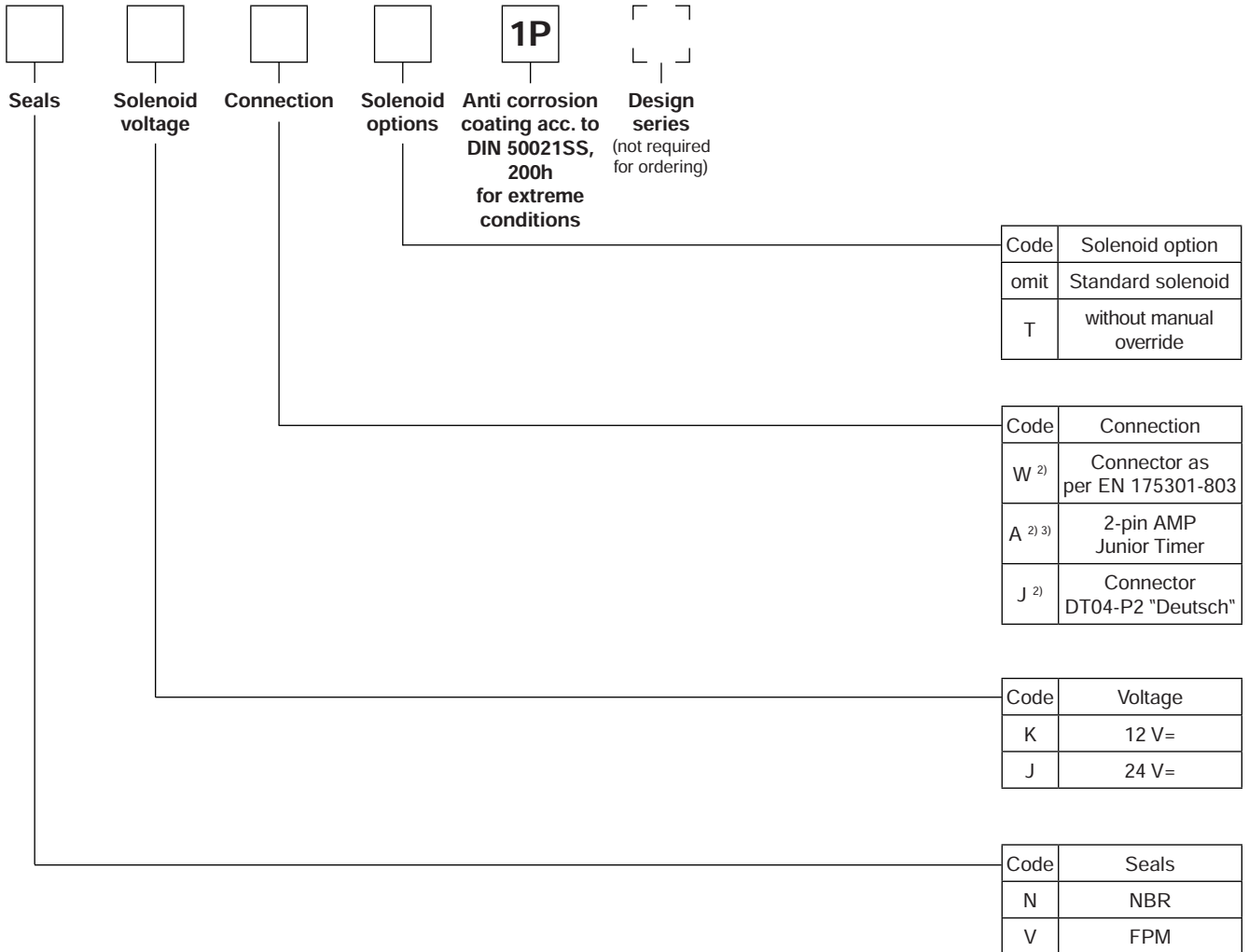
  

2 position spools		
Code	Spool position	
B	 Spring offset in position "b". Operated in position "a".	
D	 Operated in position "a" or "b". No center or offset position.	
H	 Spring offset in position "a". Operated in position "b".	

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

Further spool types on request.



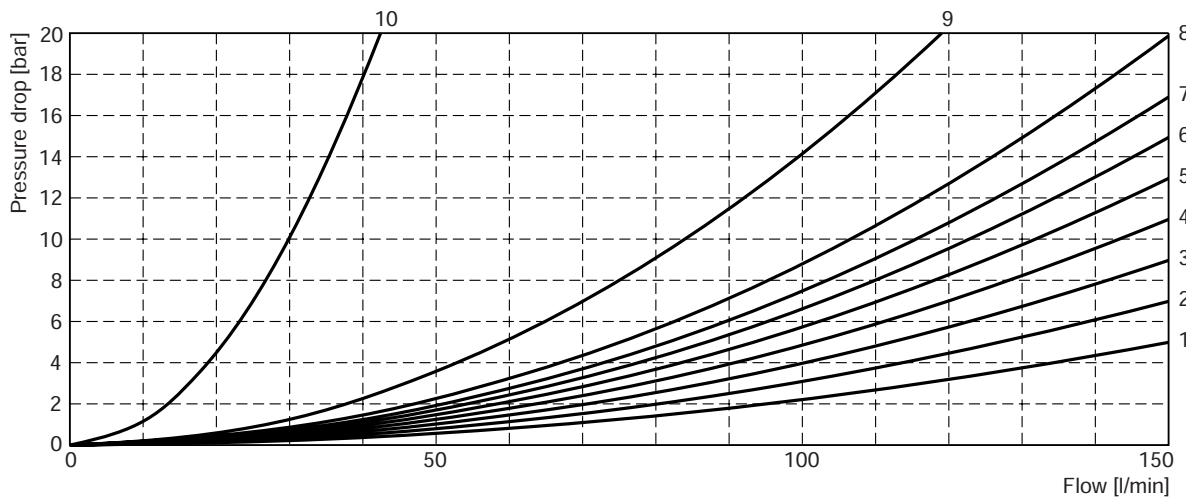


The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

**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	A->B
001	6	5	6	6	-	-	-	-	-	-
002	3	5	3	3	1	1	4	5	1	6
004	5	4	4	4	-	-	8	8	-	9
006	1	2	1	3	2	2	-	-	-	3
011	2	2	2	2	-	-	10	10	-	10
020	6	6	5	7	-	-	-	-	-	-
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	-
	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**

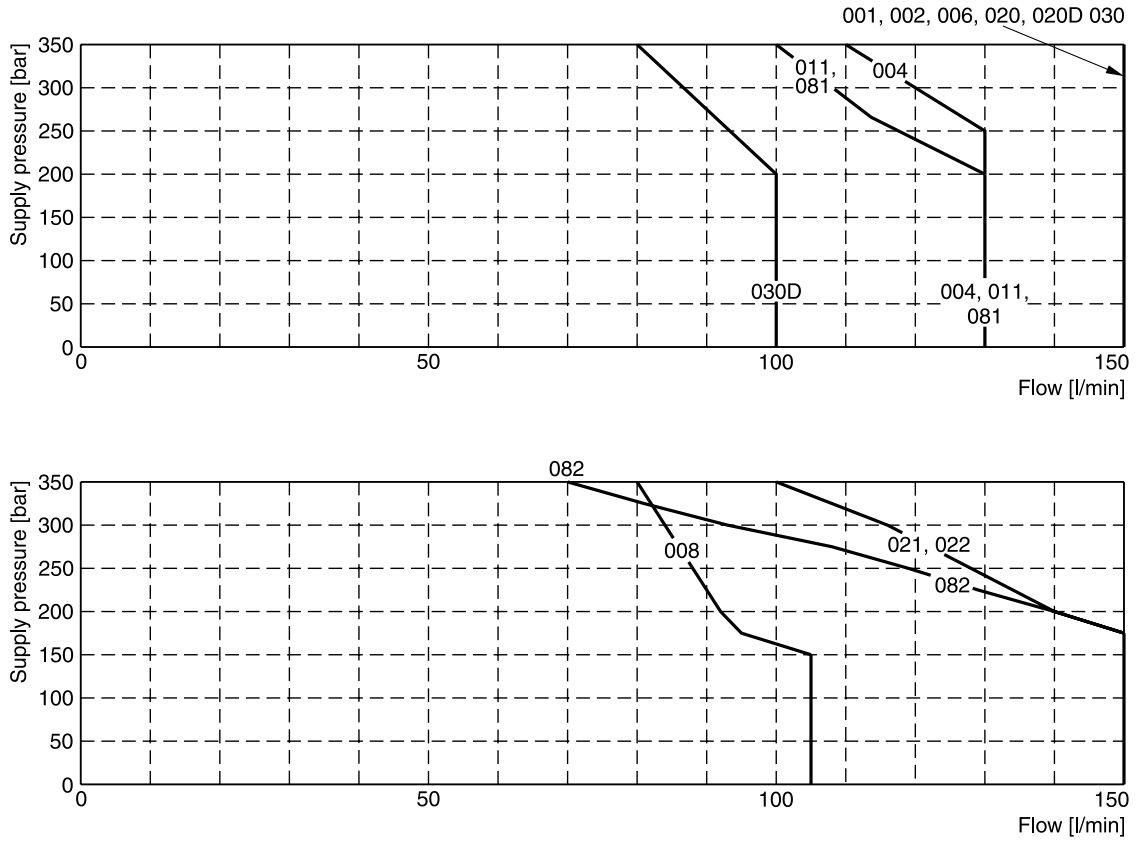


All characteristic curves measured with HLP46 at 50 °C.

The diagram below specifies the shift limits for valves with DC solenoids. Valves with spool position "F" or "M" can only be operated up to 70 % of the limits. The specifications apply to 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, DC voltage**

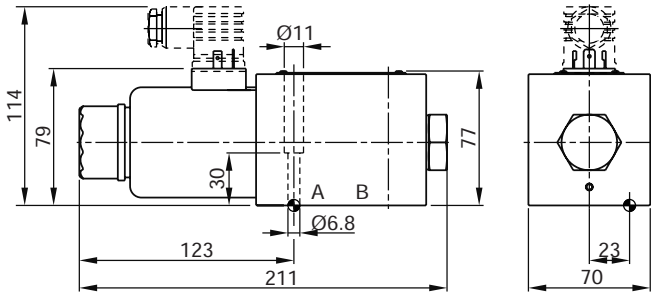


Measured with HLP46 at 50 °C, 90 %  $U_{nom}$  and warm solenoids.

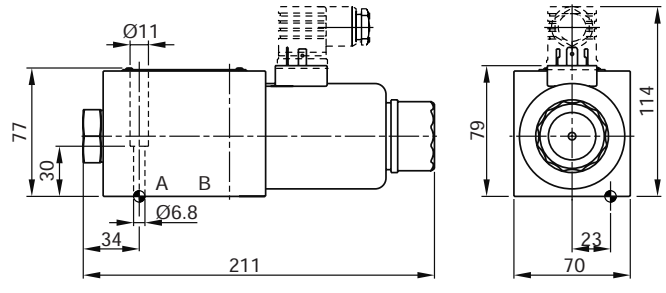
Dimensions

Interface EN 175301-803

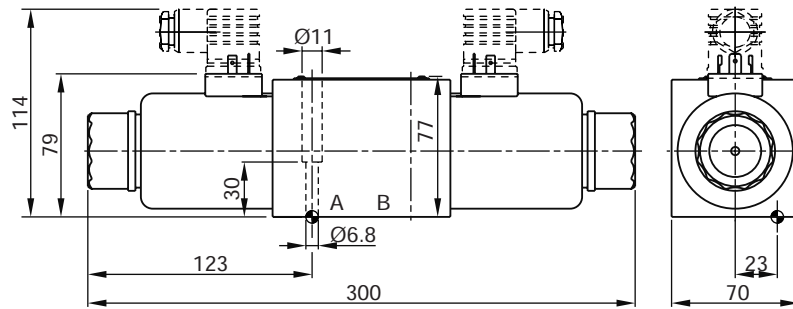
B, E, F -style



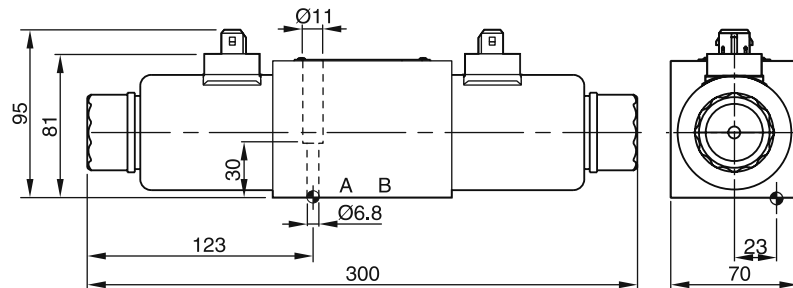
H, K, M -style



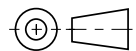
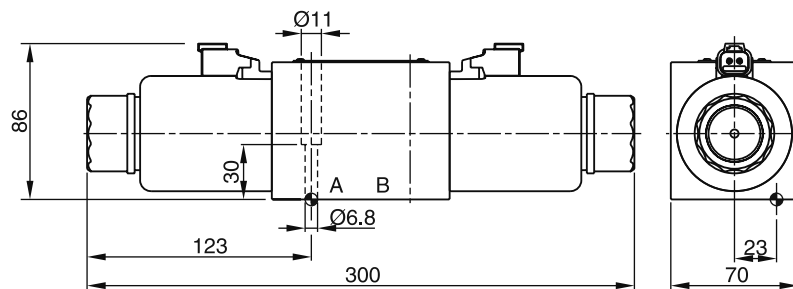
C, D -style





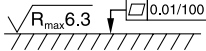


Dimensions with AMP Connector (only C and D -style shown)



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 %	<b>NBR: SK-D3W-N-30</b> 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.

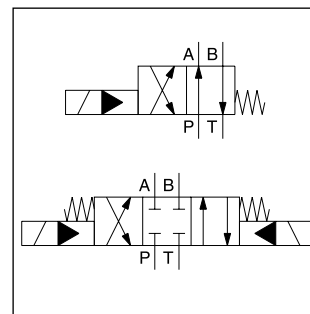
Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet) or an integral check valve.

Valves with explosion proof solenoids EEx me II see catalogue HY11-3343.

Download: [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) - see "Literature"



D31DW



D31NW



D41VW

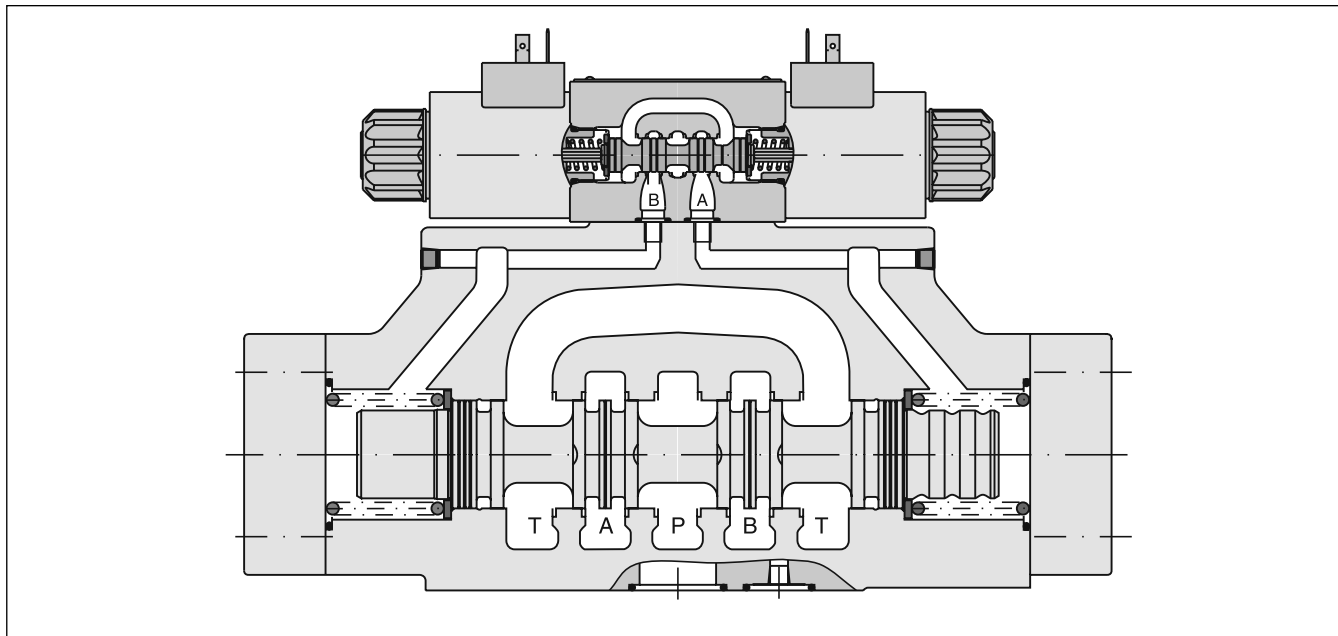


D81VW



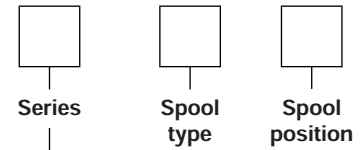
D111VW

**D81VW**



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	



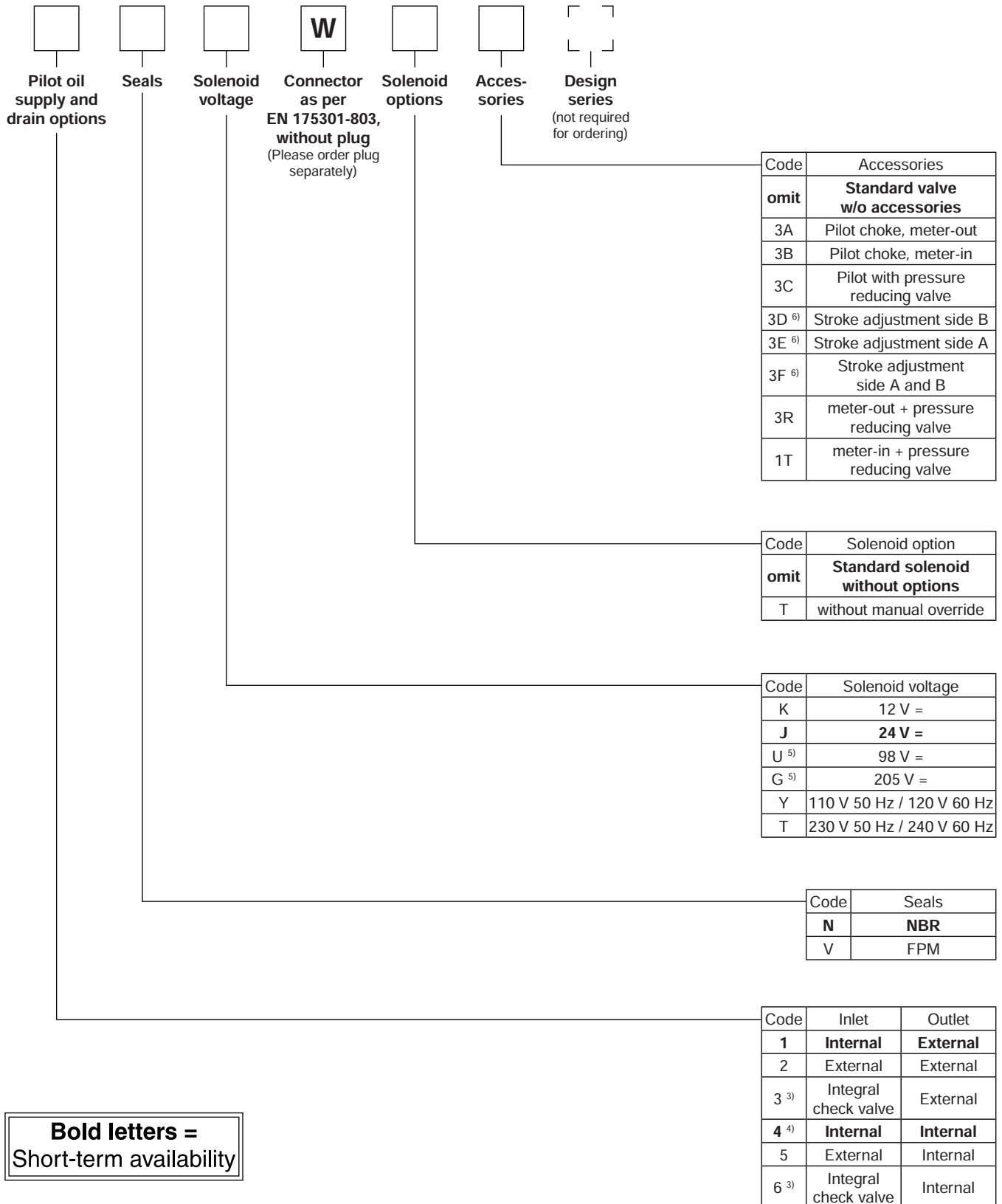
3 position spools		D31D	D31N	D41	D81/91	D111
Code	Spool type					
001		•	•	•	•	•
002		•	•	•	•	•
003		•	•	•	•	•
004		•	•	•	•	•
005		•	•	•	•	•
006		•	•	•	•	•
007		•	•	•	•	•
009 <sup>1)</sup>		•	•	•	•	•
011		•	•	•	•	•
014		•	•	•	•	•
015		•	•	•	•	•
016		•	•	•	•	•
021		•	•	•	•	•
022		•	•	•	•	•
031		•	•	•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

2 position spools		D31D	D31N	D41	D81/91	D111
Code	Spool type					
020		•	•	•	•	•
026		•	•	•	•	•
030		•	•	•	•	•

3 position spools		
Code	Spool position	
C		<b>3 positions.</b> Spring offset in position "0". Operated in position "a" or "b".
E	Standard 	Kolbentyp 009 
	Operated in position "a".	Operated in position "b".
F	Standard 	Kolbentyp 009 
	Spring offset in position "b".	Spring offset in position "a".
K	Standard 	Kolbentyp 009 
	Operated in position "b".	Operated in position "a".
M	Standard 	Kolbentyp 009 
	Spring offset in position "a".	Spring offset in position "b".
R <sup>2)</sup>	Standard 	Kolbentyp 009 
	No center in offset position.	No center in offset position.
S <sup>2)</sup>	Standard 	Kolbentyp 009 
	No center in offset position.	No center in offset position.

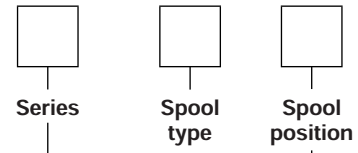
2 position spools		
Code	Spool position	
B		Spring offset in position "b". Operated in position "a".
D <sup>2)</sup>		Detent, operated in position "a" or "b". No center or offset position.
H		Spring offset in position "a". Operated in position "b".

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



Further spool types and solenoid voltages on request.  
Explosion proof solenoids EEx me II see catalogue HY11-3343.  
Download:  
[www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) - see "Literature"

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		•	•	•	•	•
002		•	•	•	•	•
003		•	•	•	•	•
004		•	•	•	•	•
007				•	•	
009 <sup>1)</sup>		•	•	•	•	•
011		•	•	•	•	•
014				•	•	
015		•	•	•	•	•
021		•	•	•	•	•
022		•	•	•	•	•

2 position spools		D31D	D31N	D41	D81/91	D111
Code	Spool type					
020		•	•	•	•	•
026		•		•	•	
030		•	•	•	•	•

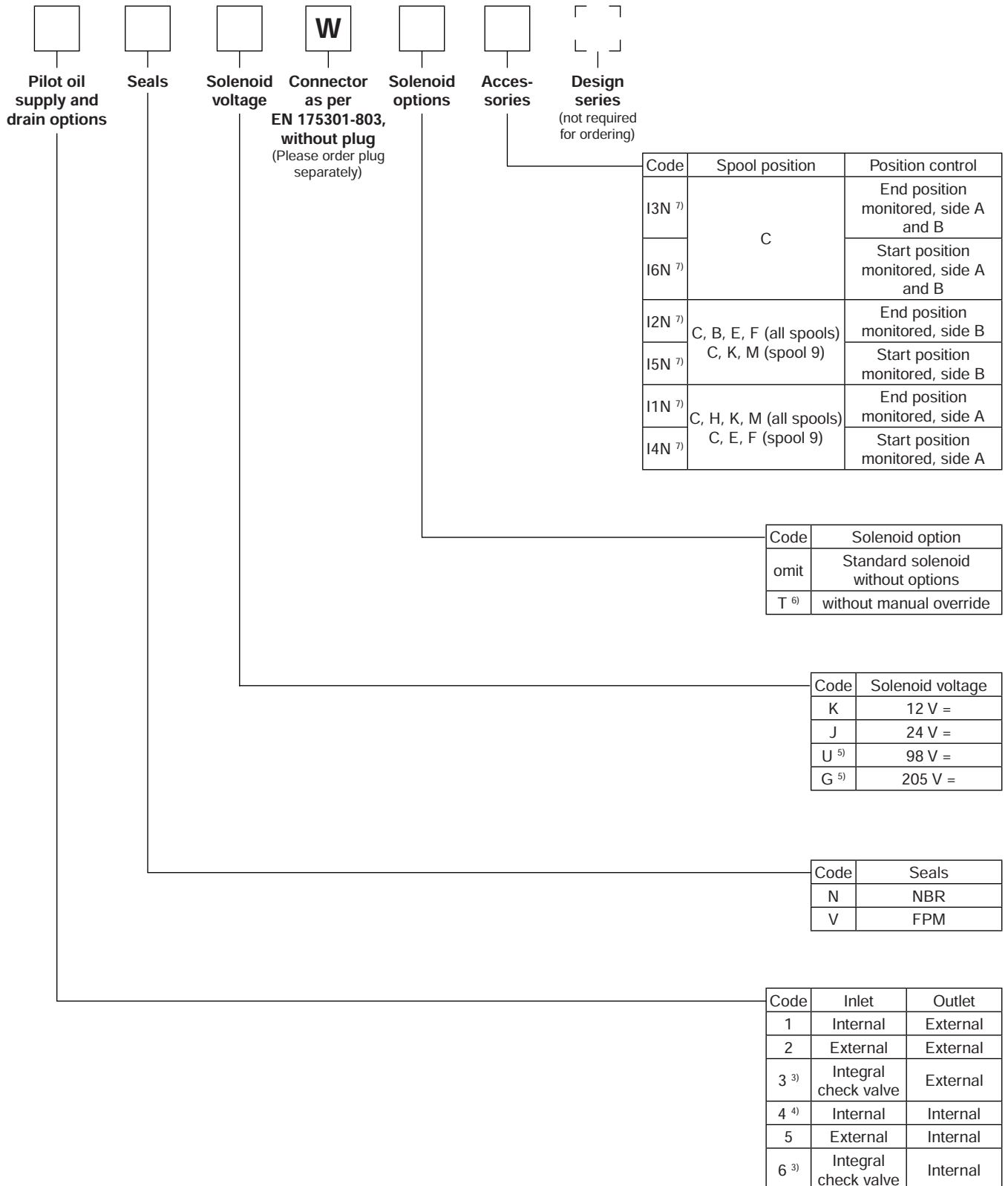
3 position spools		
Code	Spool position	
<b>C</b>		<b>3 positions.</b> Spring offset in position "0". Operated in position "a" or "b".
	Standard      Kolbentyp 009	
<b>E</b>	 Operated in position "a".	 Operated in position "b".
<b>F</b> <sup>2)</sup>	 Spring offset in position "b".	 Spring offset in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

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

<sup>1)</sup> Consider specific spool position.  
<sup>2)</sup> Not for D31NW.  
<sup>3)</sup> Not for D31DW, D91VW and D111VW available.  
<sup>4)</sup> Not for spools 002, 007, 009, 014, 030 available.  
<sup>5)</sup> To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.  
<sup>6)</sup> 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.  
<sup>7)</sup> The plug M12 x 1 for the position control is included. 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.







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

**Technical Data**

2

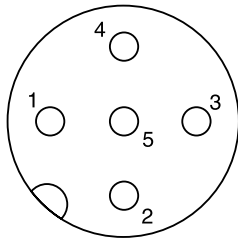
General								
Design		Directional spool valve						
Actuation		Solenoid						
Series		D31DW	D31NW	D41VW	D81/91VW	D111VW		
Size		NG10	NG10	NG16	NG25	NG32		
Weight (1/ 2 solenoids) [kg]		6.0 / 6.6	7.6 / 8.1	9.7 / 10.3	17.9 / 18.6	67.4 / 68.0		
Mounting interface		DIN 24340 A10	DIN 24340 A10	DIN 24340 A16	DIN 24340 A25	DIN 24340 A32		
		ISO 4401 NFPA D05	ISO 4401 NFPA D05	ISO 4401 NFPA D07	ISO 4401 NFPA D08	ISO 4401 NFPA D10		
		CETOP RP 121-H						
Mounting position		unrestricted, preferably horizontal						
Ambient temperature [°C]		-25...+50 (without inductive position control)						
		0...+50 (with inductive position control)						
MTTF <sub>p</sub> value [years]		75						
Hydraulic								
Max. operating pressure [bar]		Pilot drain internal: P, A B, X: 350; T, Y: 105 (D31NW: P, A, B, X: 315; T, Y: 140)						
		Pilot drain external: P, A B, T, X: 350; Y: 105 (D31NW: P, A, B, T, X: 315; Y:140)						
Fluid		Hydraulic oil in accordance with DIN 51524 ... 51525						
Fluid temperature [°C]		-25 ... +70						
Viscosity permitted [cSt] / [mm <sup>2</sup> /s]		2.8...400						
Viscosity recommended [cSt] / [mm <sup>2</sup> /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		IP 65 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	31	31.9	28.2	64 / 59 VA	68 / 62 VA	
Power consumption in rush [W]		32.7	31	31.9	28.2	231 / 240 VA	231 / 240 VA	
Solenoid connection		Connector as per EN 175301-803, solenoid identification as per ISO 9461.						
Wiring min. [mm <sup>2</sup> ]		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.

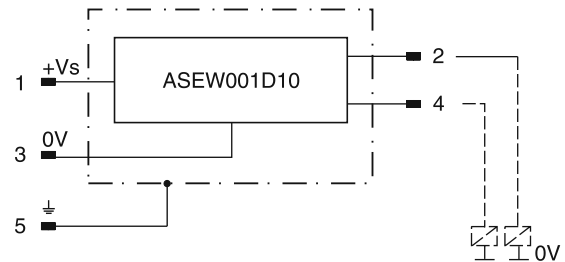
**Electrical characteristics of position control M12x1**

Protection class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient temperature	[°C]	0...+50
Supply voltage $U_s$ / ripple	[V]	18...42 / 10 %
Current consumption without load	[mA]	≤ 30
Max. output current per channel, ohmic	[mA]	400
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2 A	[V]	≤ 1.1
Max. output drop at 0.4 A	[V]	≤ 1.6
EMC		EN50081-1 / EN50082-2
Max. tolerance ambient field strength	[A/m]	<1200
Min. distance to next AC solenoid	[m]	>0.1
Interface		M12x1 acc. to IEC 61076-2-101
Wiring min.	[mm <sup>2</sup> ]	5 x 0.25 brad shield recommended
Wiring length max.	[m]	50 recommended

**M12 pin assignment**



- 1  $U_s$  18...42V
- 2 Out B: normally open
- 3 0V
- 4 Out A: normally closed
- 5 Earth ground



**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).

Delivery includes plug M12 x 1 (see accessories, plug M12x1; order no.: 5004109).

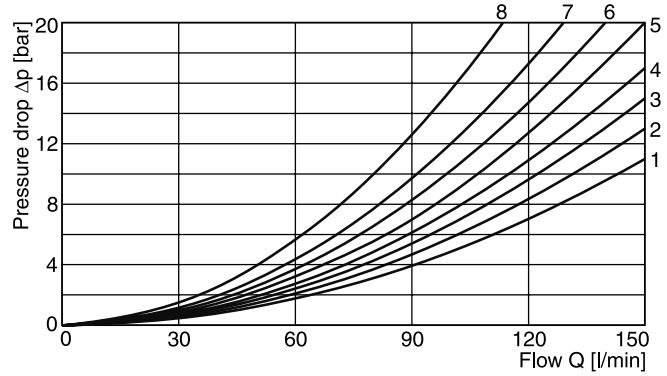
The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number

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

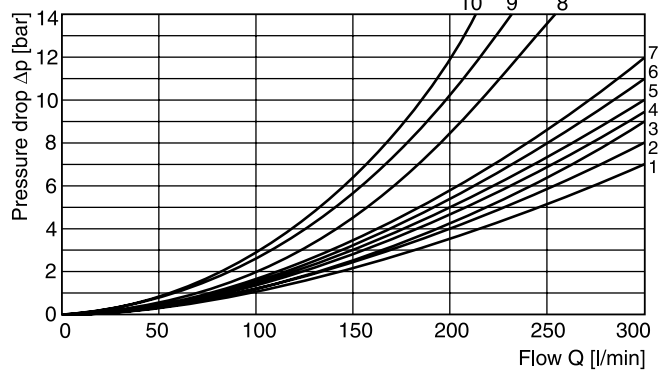
**D31DW and D41VW**

Spool Code	Curve number									
	P-A		P-B		P-T		A-T		B-T	
	D3	D4	D3	D4	D3	D4	D3	D4	D3	D4
001	4	1	4	1	-	-	3	4	3	5
002	2	1	3	2	3	6	3	4	4	6
003	2	1	4	2	-	-	1	5	2	6
004	4	1	3	1	-	-	2	5	3	5
005	1	2	4	2	-	-	2	3	3	5
006	2	1	3	2	-	-	3	3	4	6
007	4	1	2	1	5	6	2	4	2	5
009	2	2	2	9	8	8	5	7	6	10
011	3	1	2	1	-	-	3	4	3	5
014	2	1	4	1	5	6	2	4	3	5
015	4	1	2	2	-	-	2	4	2	6
016	4	2	1	2	-	-	1	3	2	5
020	4	3	4	5	-	-	4	3	4	5
021	3	2	4	8	-	-	2	2	-	-
022	5	8	2	2	-	-	-	-	4	3
026	3	3	3	5	-	-	-	-	-	-
030	4	2	3	3	-	-	3	6	3	7
031	3	-	4	-	-	-	1	-	-	-
032	5	-	2	-	-	-	-	-	2	-
054	-	2	-	3	-	-	-	6	-	7
081	6	-	6	-	-	-	7	-	7	-
082	7	-	6	-	-	-	5	-	7	-

**D31DW**



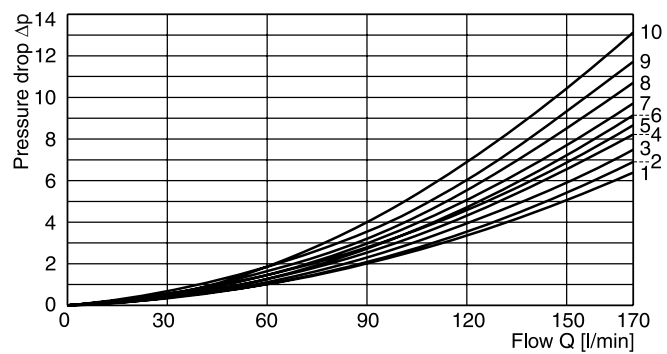
**D41VW**



**D31NW**

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

**D31NW**



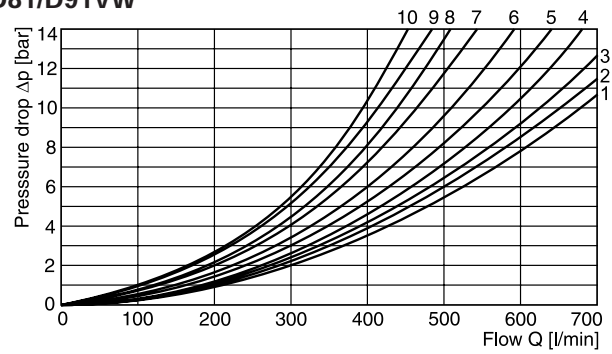
All characteristic curves measured with HLP46 at 50 °C.

D3-D11 UK.indd RH 29.08.2013

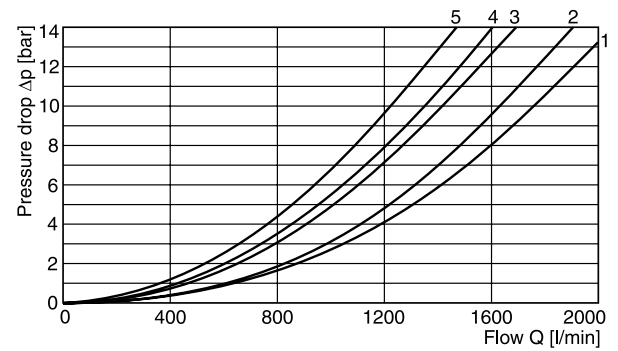
D81/D91VW and D111VW

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



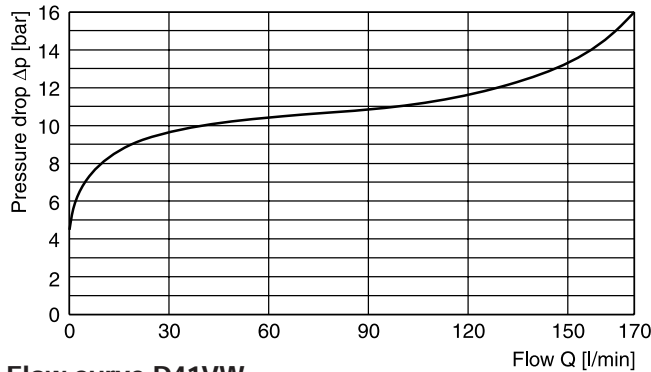
D111VW



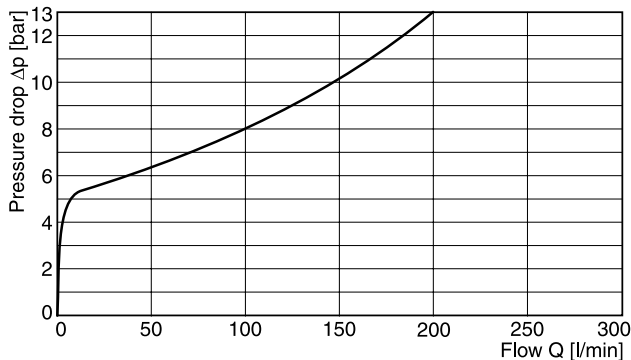
Integral check valve in the P port

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.

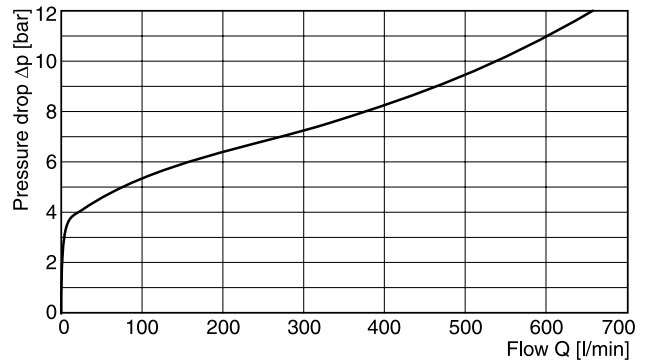
Flow curve D31NW



Flow curve D41VW

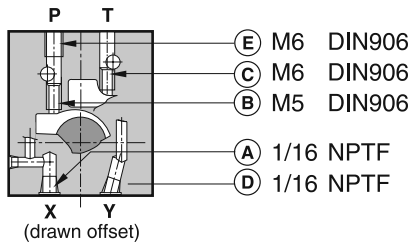


Flow curve D81VW



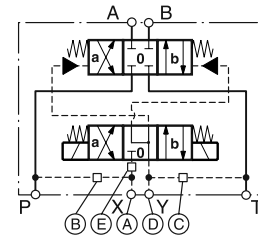
All characteristic curves measured with HLP46 at 50 °C.

**D31DW**

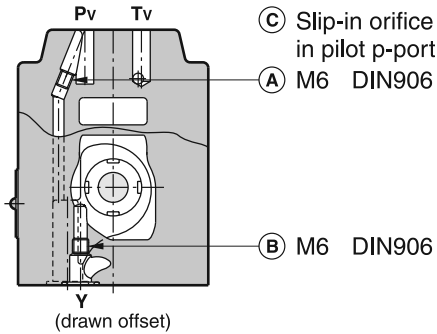


○ open, ● closed

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

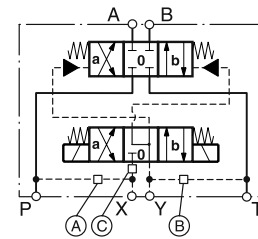


**D31NW**

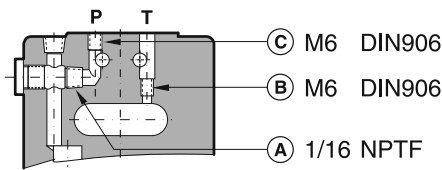


○ open, ● closed

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

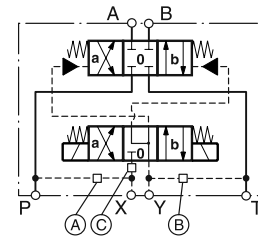


**D41VW**

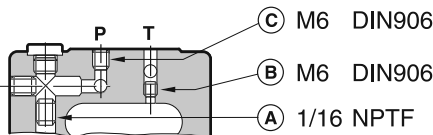


○ open, ● closed

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

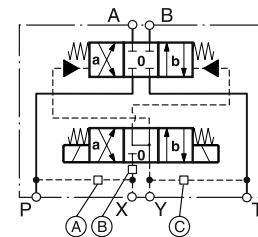


**D81/91VW**

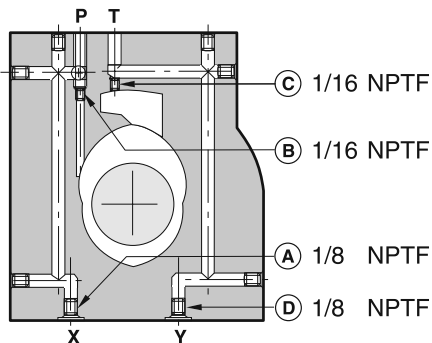


○ open, ● closed

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

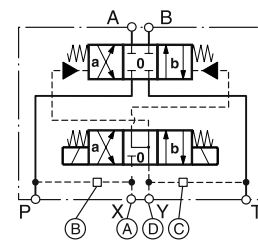


**D111VW**



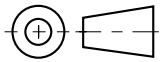
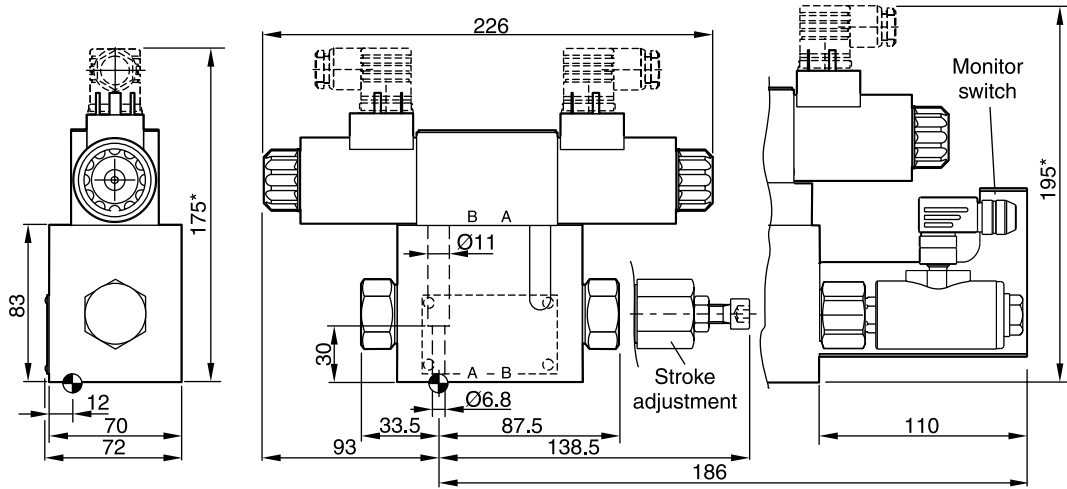
○ open, ● closed

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	●	○	○



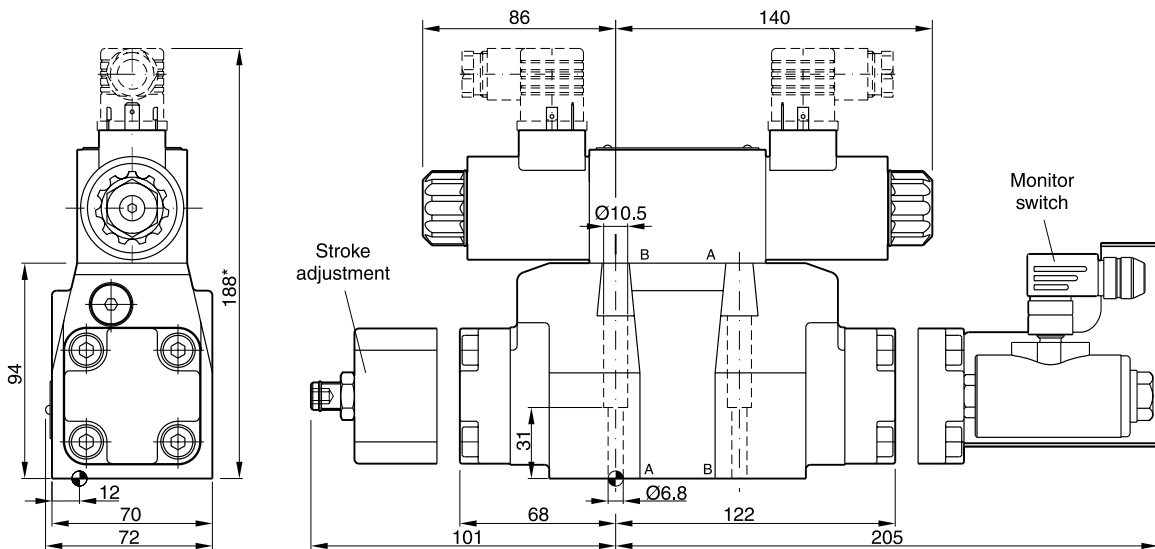
All orifice sizes for standard valves.

**D31DW**



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

**D31NW**

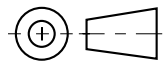
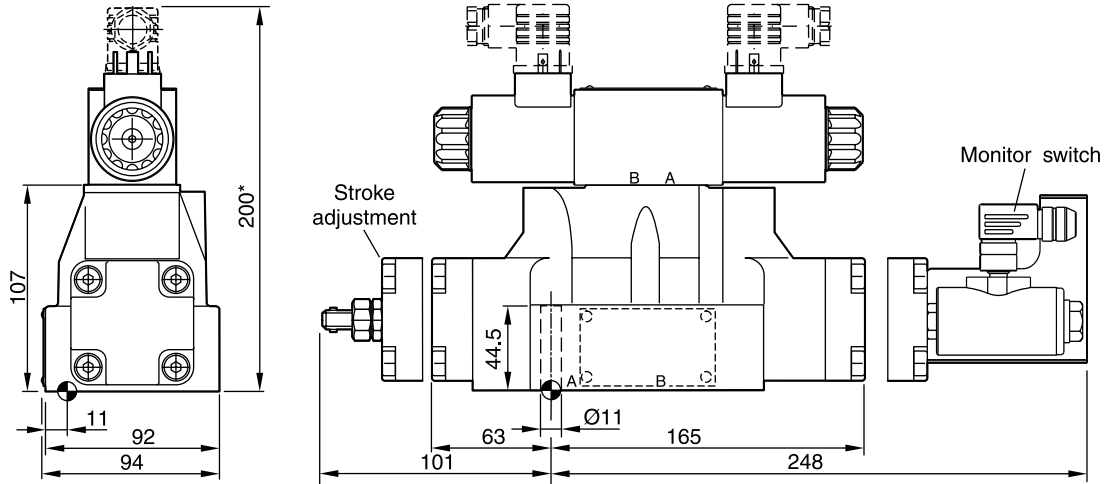







Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ 0.01/100	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	<b>NBR: SK-D31NW-N-91</b> FPM: SK-D31NW-V-91

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.

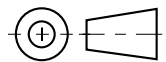
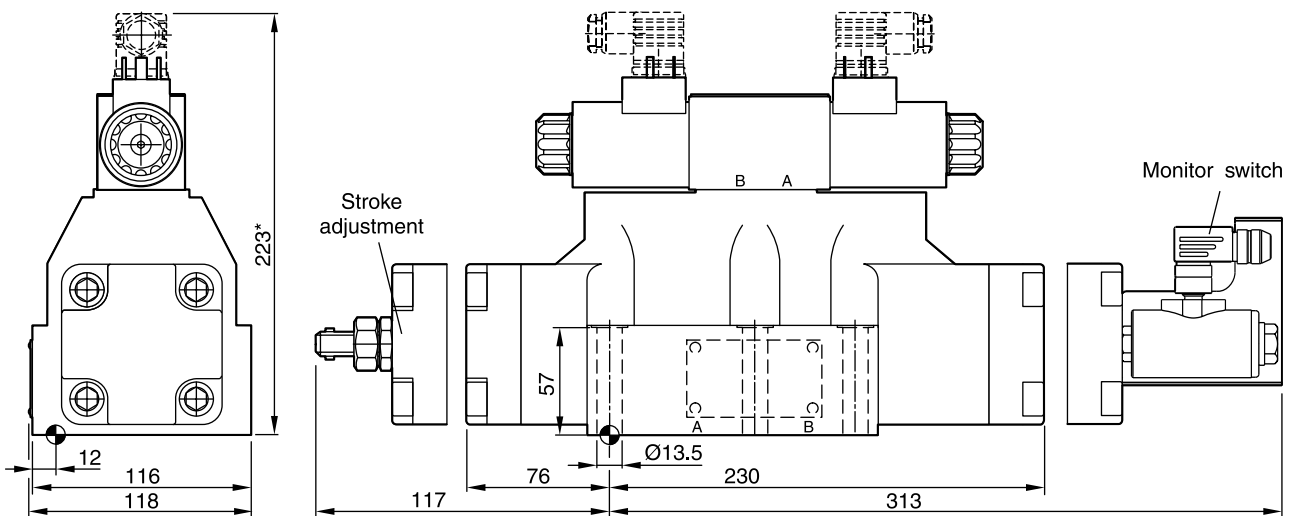
\* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).


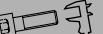



**D41VW**



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

**D81VW, D91VW**



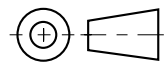
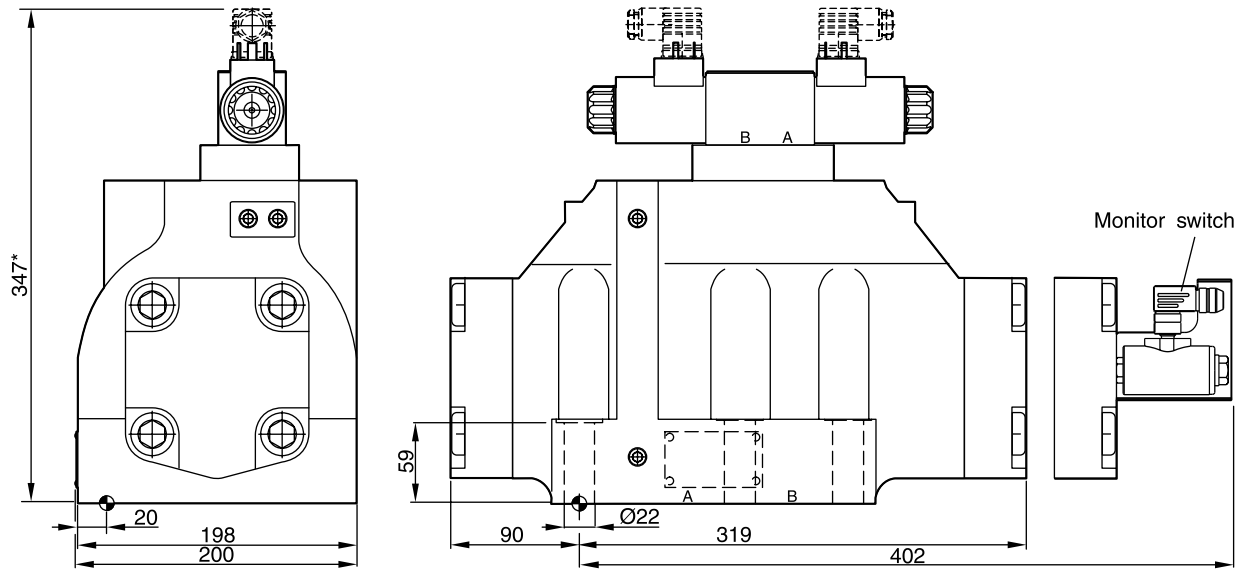
Surface finish	 Kit	 Kit		 Kit
$\sqrt{R_{max} 6.3}$ 	BK360	6x M12x75 ISO 4762-12.9	108 Nm $\pm 15\%$	<b>NBR: SK-D81VW-N-91 / SK-D91VW-N-91</b> FPM: SK-D81VW-V-91 / SK-D91VW-V-91





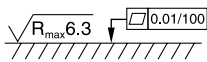
The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.  
 The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

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



**D111VW**



Surface finish	 Kit	 Kit	 Kit	 Kit
	BK386	6x M20x90 ISO 4762-12.9	517 Nm ±15 %	<b>NBR: SK-D111VW-N-91</b> 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:

- 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.

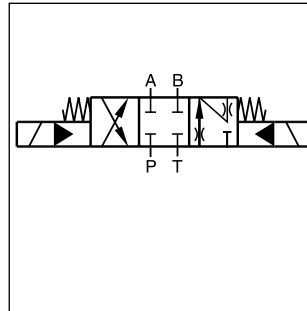
**Features**

- Energy saving A-regeneration
- Switchable hybrid version

Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



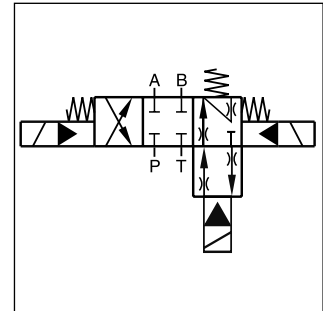
D41VWR



Regenerative D\*1VWR

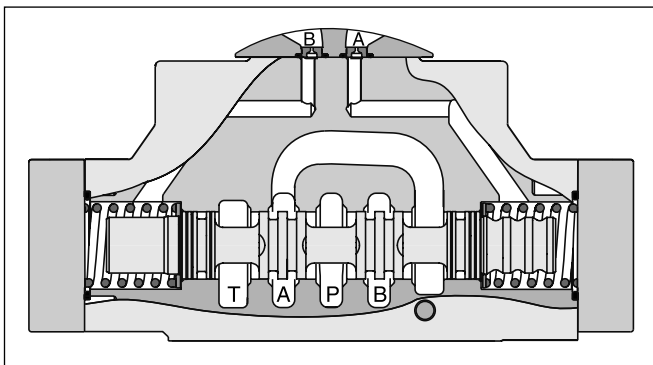


D41VWZ

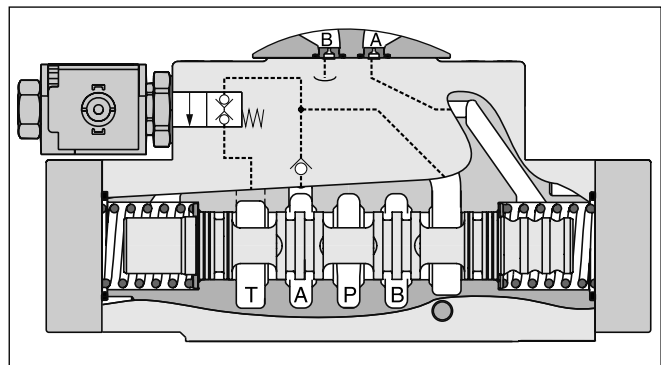


Hybrid D\*1VWZ

**Regenerative valve D\*1VWR**

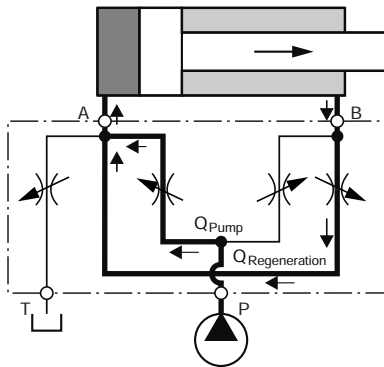


**Hybrid valve D\*1VWZ**



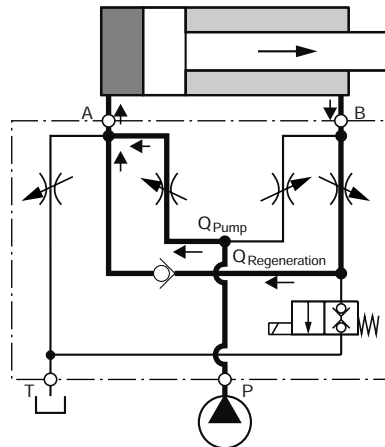
**D\*1VWR (regenerative valve)**

Cylinder extending

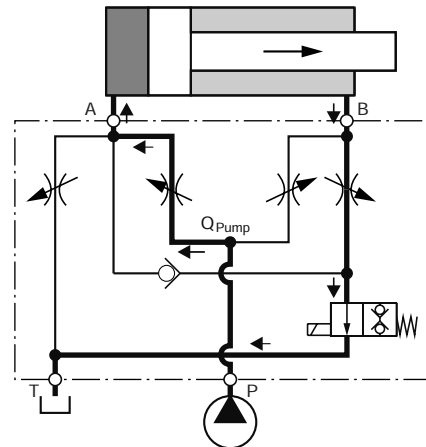


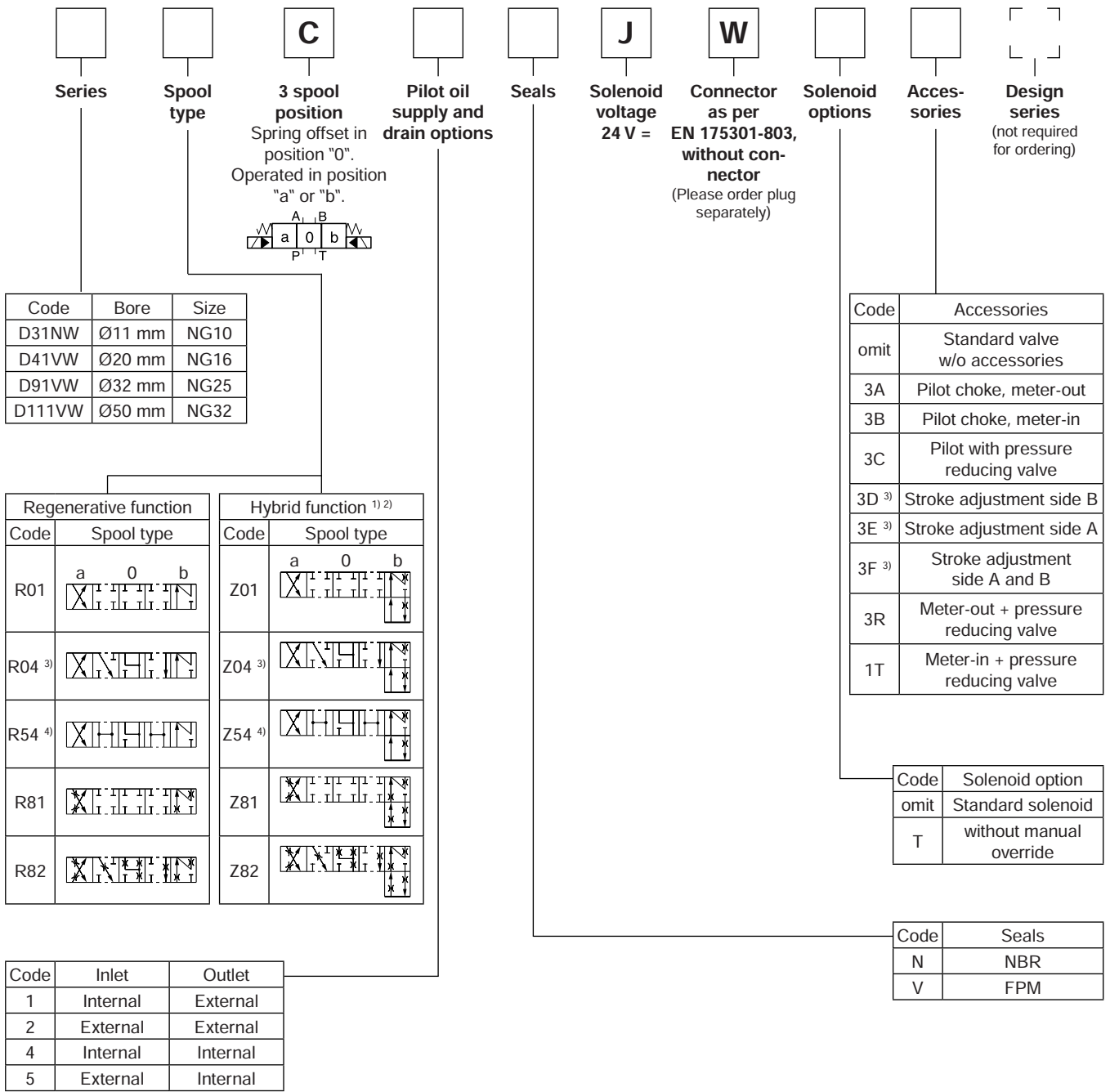
**D\*1VWZ (hybrid valve)**

Cylinder extending regenerative mode (high speed)



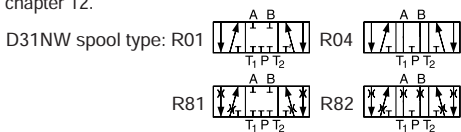
Cylinder extending standard mode (high force)





<sup>1)</sup> Not for D31NW.

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



<sup>3)</sup> Not for D111VW.

<sup>4)</sup> Only for D111VW.

**Technical Data**

2

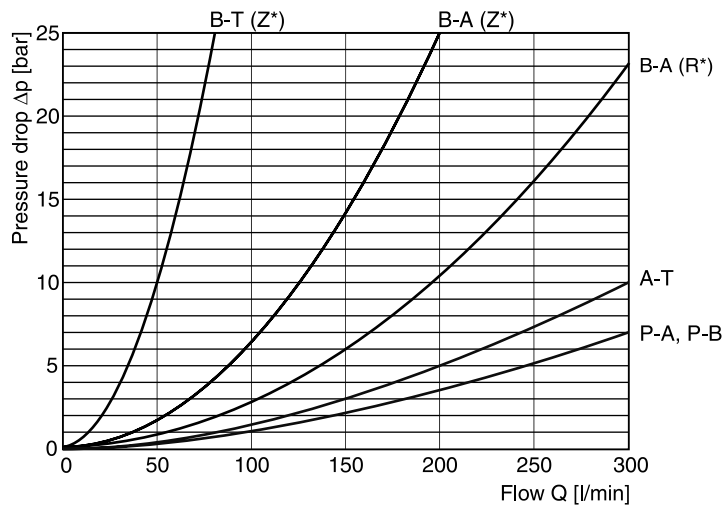
General						
Design	Directional spool valve					
Actuation	Solenoid					
Series	D31NW	D41VW	D81/91VW	D111VW		
Size	NG10	NG16	NG25	NG32		
Weight [kg]	8.1	10.3	18.6	68.0		
Mounting interface	DIN 24340 A10	DIN 24340 A16	DIN 24340 A25	DIN 24340 A32		
	ISO 4401	ISO 4401	ISO 4401	ISO 4401		
	NFPA D05	NFPA D07	NFPA D08	NFPA D10		
CETOP RP 121-H						
Mounting position	unrestricted, preferably horizontal					
Ambient temperature [°C]	-25...+50 (without inductive position control); 0...+50 (with inductive position control)					
MTTF <sub>p</sub> value [years]	75					
Hydraulic						
Max. operating pressure [bar]	Pilot drain internal: P, A B, X: 350; T, Y: 105 (D31NW: P, A, B, X: 315; T, Y: 140)					
	Pilot drain external: P, A B, T, X: 350; Y: 105 (D31NW: P, A, B, T, X: 315; Y:140)					
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525					
Fluid temperature [°C]	-25 ... +70					
Viscosity permitted [cSt] / [mm <sup>2</sup> /s]	2.8...400					
Viscosity recommended [cSt] / [mm <sup>2</sup> /s]	30...80					
Filtration	ISO 4406 (1999); 18/16/13					
Flow max. [l/min]	170	300	700	2000		
Leakage at 350 bar (per flow path) [ml/min]	72...422*	up to 200*	up to 800*	up to 5000*		
*depending on spool						
Minimum pilot supply pressure [bar]	7		5			
Static / Dynamic						
Step response at 95 % [ms]	Energized / De-energized					
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
AC solenoids	Pilot pressure	50 bar	30 / 50	75 / 55	130 / 155	450 / 375
		100 bar	30 / 50	65 / 55	90 / 155	300 / 375
		250 bar	30 / 50	40 / 55	70 / 155	190 / 375
		350 bar	30 / 50	40 / 55	65 / 155	180 / 375
Electrical characteristics						
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible					
Protection class	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)					
Supply voltage / ripple [V]	24 V =					
Tolerance supply voltage [%]	±10					
Current consumption hold [A]	1.29					
Current consumption in rush [A]	1.29					
Power consumption hold [W]	31					
Power consumption in rush [W]	31					
Solenoid connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461.					
Wiring min. [mm <sup>2</sup> ]	3 x 1.5 recommended					
Wiring length max. [m]	50 recommended					

**Electrical characteristics hybrid option**

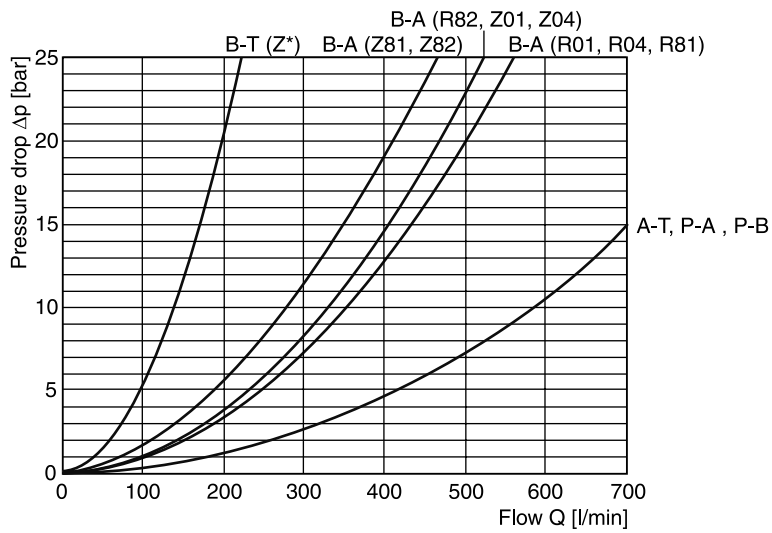
Duty ratio	100 %		
Protection class	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)		
	D41	D91	D111
Supply voltage [V]	24	24	24
Tolerance supply voltage [%]	±10	±10	±10
Current consumption [A]	1.21	0.96	1.29
Power consumption [W]	29	23	31
Solenoid connection	Connector as per EN 175301-803		
Wiring min. [mm <sup>2</sup> ]	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.

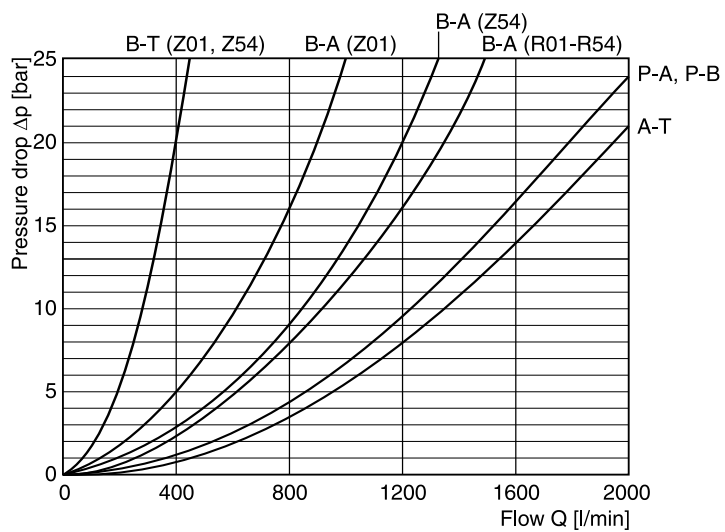
**D41VW**



**D91VW**



**D111VW**



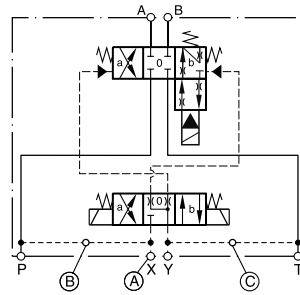
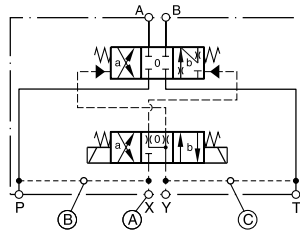
D31NW on request.

D3-D11 REG-HYB UK.indd RH 29.08.2013

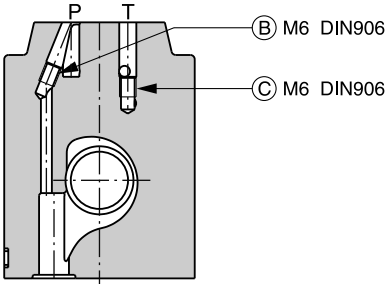
**Pilot oil inlet (supply) and outlet (drain)**

○ open, ● closed

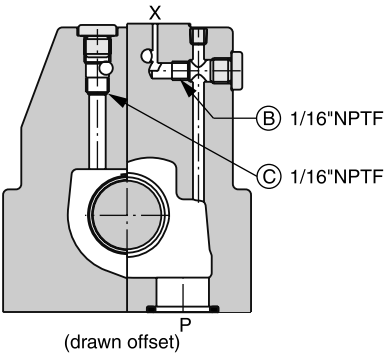
Pilot oil		B	C
Inlet	Drain		
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



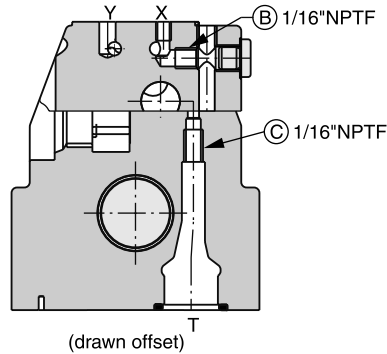
**D31NWR**



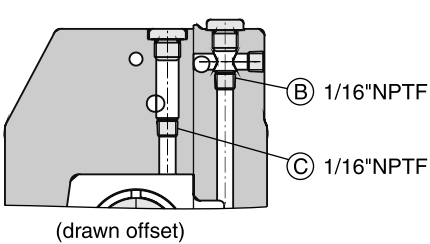
**D41VWR**



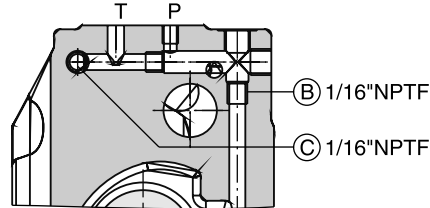
**D41VWZ**



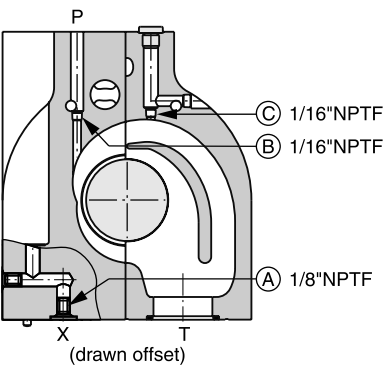
**D91VWR**



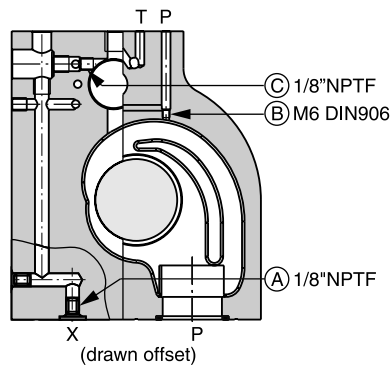
**D91VWZ**



**D111VWR**



**D111VWZ**

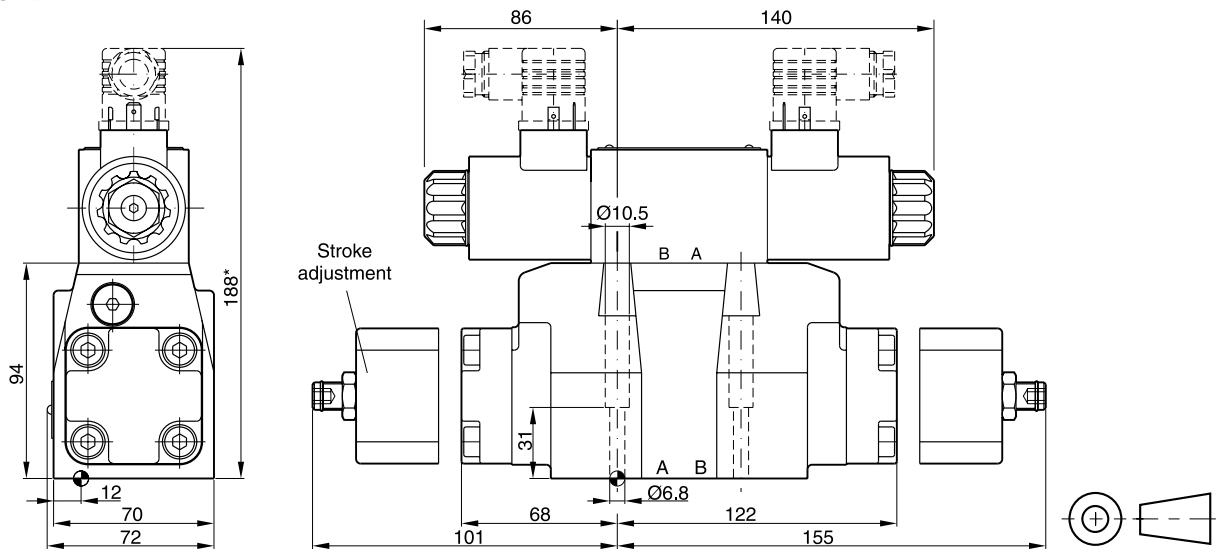


○ open, ● closed

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	●	○

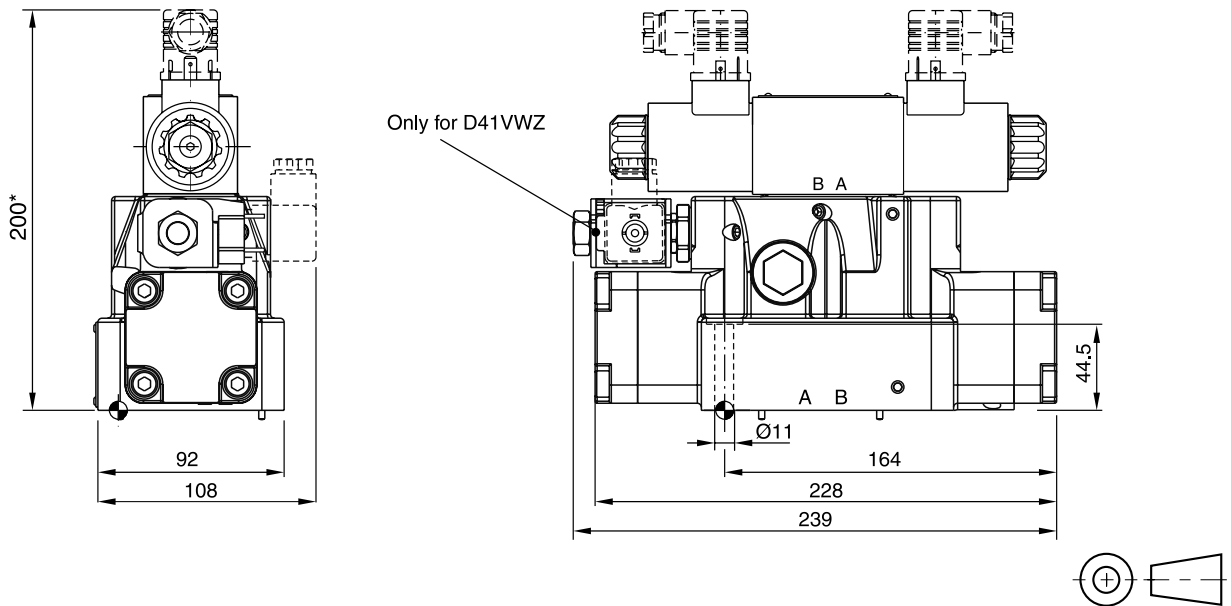
**D31NWR**

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 ± 15 %	<b>NBR: SK-D31NW-N-91</b> FPM: SK-D31NW-V-91

**D41VWR/Z**

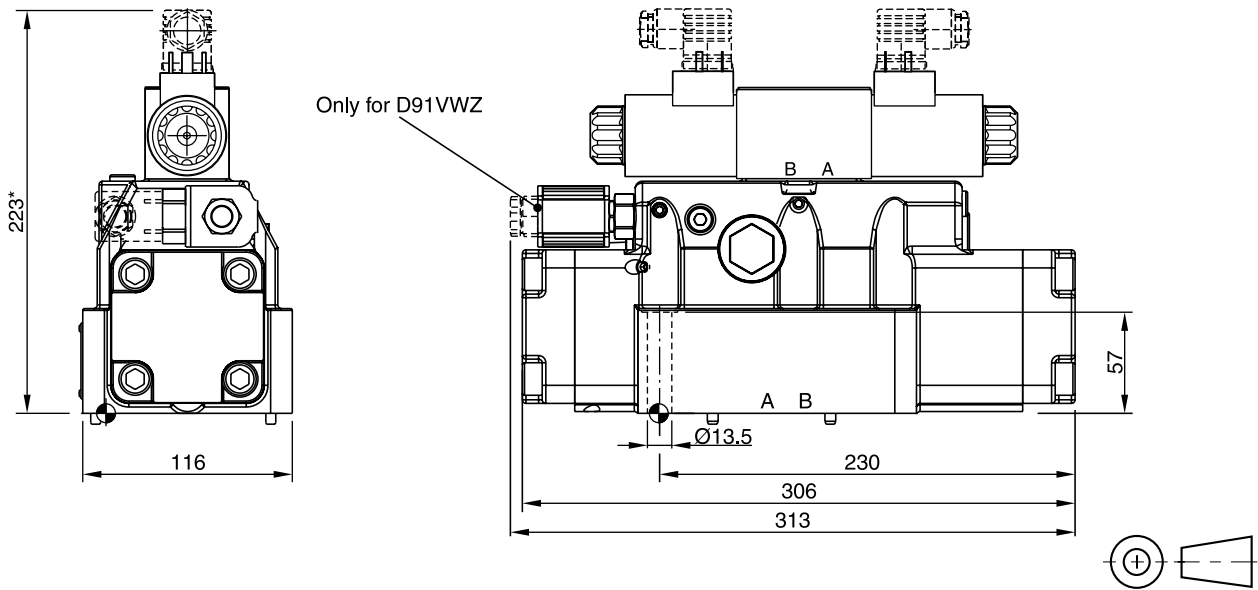


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK320	4x M10x60 2x M6x55 ISO 4762-12.9	63 Nm ± 15 % 13.2 Nm ± 15 %	<b>NBR: SK-D41VW-N-91</b> FPM: SK-D41VW-V-91

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.

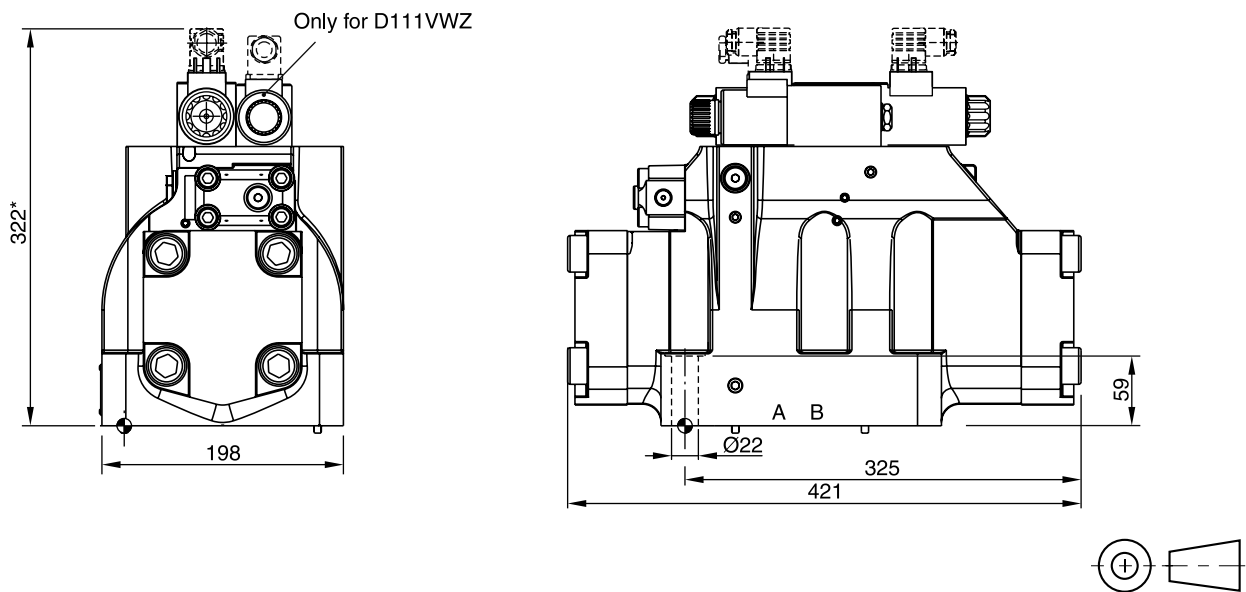
\* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).

**D91VWR/Z**



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

**D111VW**



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK386	6x M20x90 ISO 4762-12.9	517 Nm $\pm 15\%$	<b>NBR: SK-D111VW-N-91</b> 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).



**Characteristics**

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).

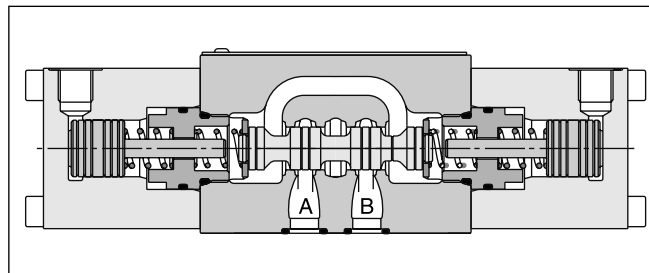
The shifting time is depending on the pilot pressure. For safe operation the minimum pilot pressure has to be ensured in all operating conditions. The maximum pilot pressure varies from the maximum operating pressure in some sizes.



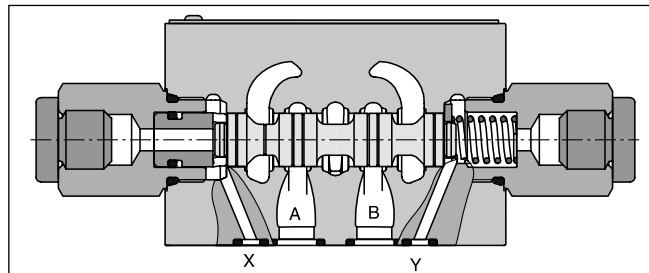
D1VP\*B\*4L



D1VP\*90



D1VP\*C\*4L



D1VP\*90

**Technical data**

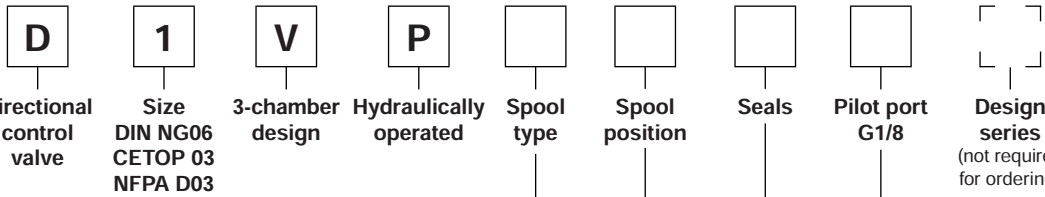
General						
Design	Directional spool valve					
Actuation	Hydraulic					
Series	D1VP*4L	D1VP*90	D3DP	D4P	D9P	D11P
Size	NG06	NG06	NG10	NG16	NG25	NG32
Weight [kg]	1.3	1.3	3.7	9.0	17.0	66.0
Mounting interface	DIN 24340 A06	DIN 24340 A06	DIN 24340 A10	DIN 24340 A16	DIN 24340 A25	DIN 24340 A32
	ISO 4401 NFA D03	ISO 4401 NFA D03	ISO 4401 NFA D05	ISO 4401 NFA D07	ISO 4401 NFA D08	ISO 4401 NFA D10
	CETOP RP 121-H					
Mounting position	unrestricted, preferably horizontal					
Ambient temperature [°C]	-25...+50					
MTTF <sub>p</sub> 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 <sup>1)</sup>	P, A B, T: 350; X, Y: 350 <sup>1)</sup>	P, A B, T: 350; X, Y: 350 <sup>1)</sup>
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525					
Fluid temperature [°C]	-25 ... +70					
Viscosity permitted [cSt] / [mm <sup>2</sup> /s]	2.8...400					
Viscosity recommended [cSt] / [mm <sup>2</sup> /s]	30...80					
Filtration	ISO 4406 (1999); 18/16/13					
Flow max. [l/min]	60 <sup>1)</sup>	60 <sup>1)</sup>	130	300	700	2000
Leakage at 350 bar (per flow path) <sup>2)</sup> [ml/min]	up to 60	up to 60	up to 100	up to 200	up to 800	up to 5000
Operating pressure (min/max) [bar]	10 <sup>3)</sup> / 210	15 / 210	15 / 210	5 / 350 <sup>4)</sup>	5 / 350 <sup>4)</sup>	5 / 350 <sup>4)</sup>
Pilot volume [cm <sup>3</sup> ]	1.2	0.7				
Pilot flow [l/min]	10	10				
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.					

<sup>1)</sup> Depending on spool, see shift limits.

<sup>2)</sup> Depending on spool.

<sup>3)</sup> > tank pressure.

<sup>4)</sup> With monitor switch.



2

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

Code	Pilot port G1/8
4L	High tank pressure, indirect via pilot spool
90	Direct via X, Y port or pipe thread G1/8

Code	Seals
N	NBR
V	FPM

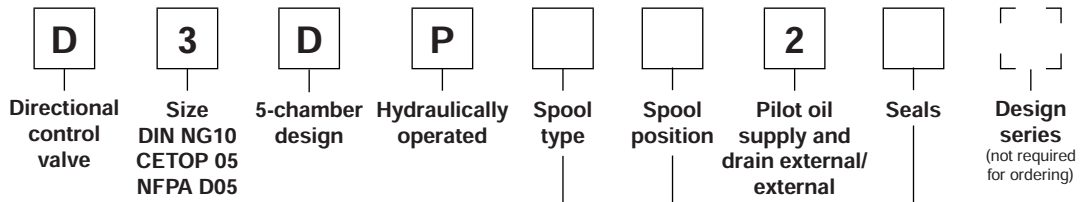
2 position spools	
Code	Spool type
	a b
020	
026	
030	

3 position spools <sup>2)</sup>			
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 <sup>2)</sup>			
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".

<sup>1)</sup> Consider specific spool position.  
<sup>2)</sup> 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 <sup>1)</sup>	
009 <sup>1)</sup>	
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

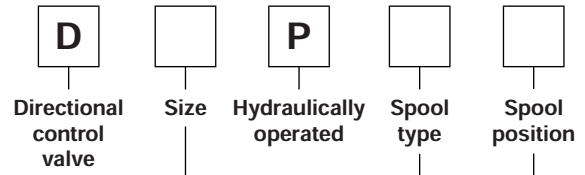
3 position spools			
Code	Spool position		
C			3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool type 008 and 009	
E			2 positions. Spring offset in position "0".
F			2 positions. Operated in position "0".
K			2 positions. Spring offset in position "0".
M		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

<sup>1)</sup> 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			
001		•	•	•
002		•	•	•
003		•	•	
004		•	•	•
005		•	•	
006		•	•	
007		•	•	
009 <sup>1)</sup>		•	•	•
011		•	•	
014		•	•	
015		•	•	
016		•	•	
021		•	•	
022		•	•	
031			•	
032			•	
054		•	•	•
081		•	•	•
082		•	•	•

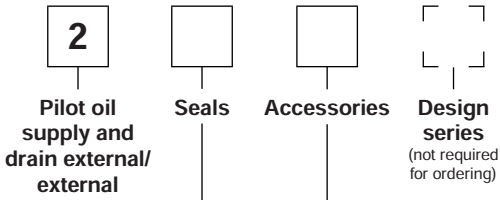
2 position spools		D4	D9	D11
Code	Spool type			
020		•	•	•
026		•	•	
030		•	•	•

3 position spools			
Code	Spool position		
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".	
	Standard	Spool type 008 and 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 <sup>2)</sup>		2 positions detent. Operated in position "0" or "b".	
	No centre in offset position.	No centre in offset position.	
S <sup>2)</sup>		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 centre or offset position.
H		Spring offset in position "a". Operated in position "b".

<sup>1)</sup> Consider specific spool position.  
<sup>2)</sup> Only D4 and D9 available.





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

Code	Seals
N	NBR
V	FPM

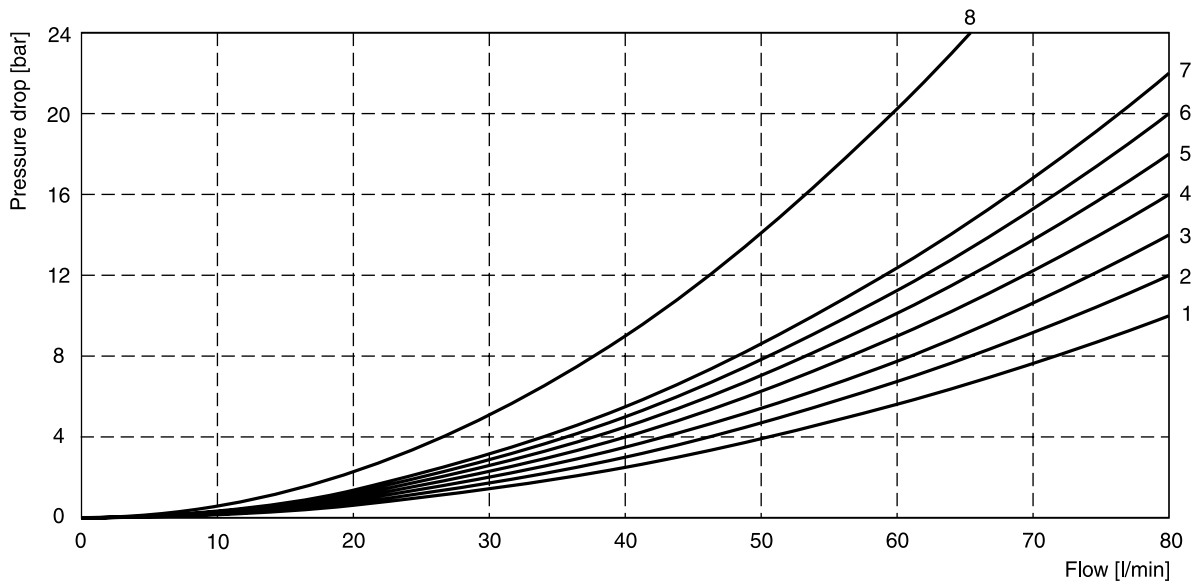
Further spool types and position control on request.

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

**Flow curve**



All characteristic curves measured with HLP46 at 50°C.

**Shift limits**

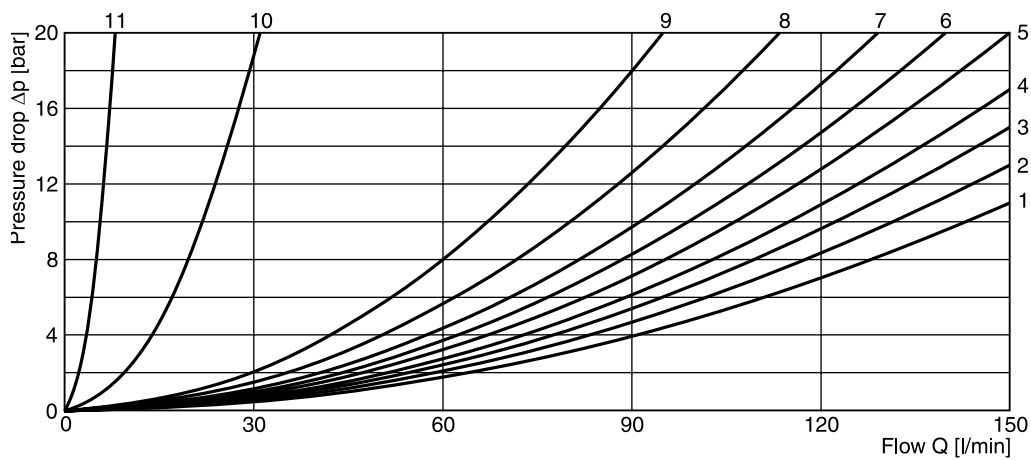
Spool	Shift limit [l/min]
001	60
002	
004	
006	
020	
030	
008	40
009	
026	20

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	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 curve**



All characteristic curves measured with HLP46 at 50°C.

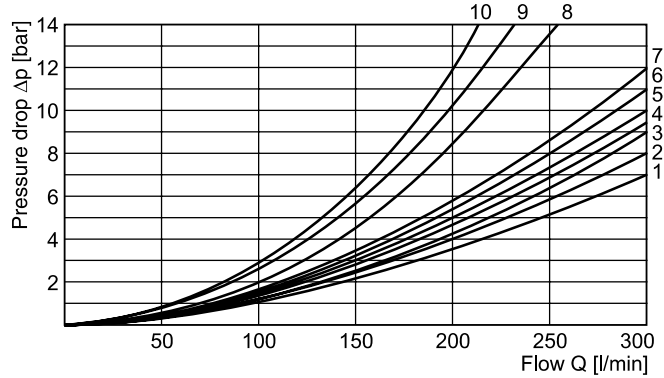
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number

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

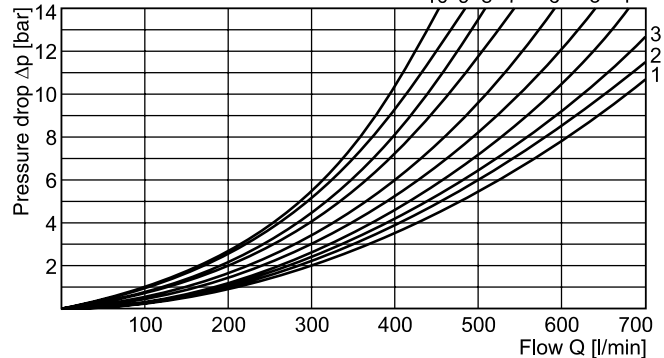
**D4P**



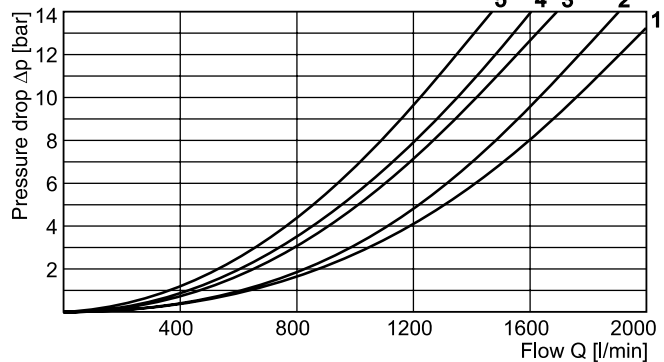
**D9P and D11P**

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**



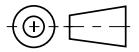
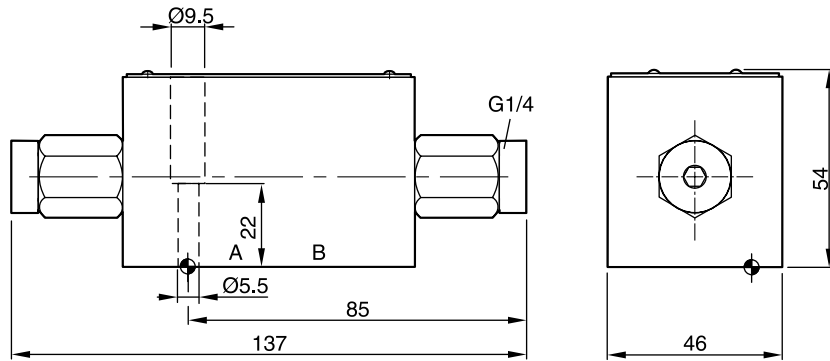
**D11P**








All characteristic curves measured with HLP46 at 50°C.

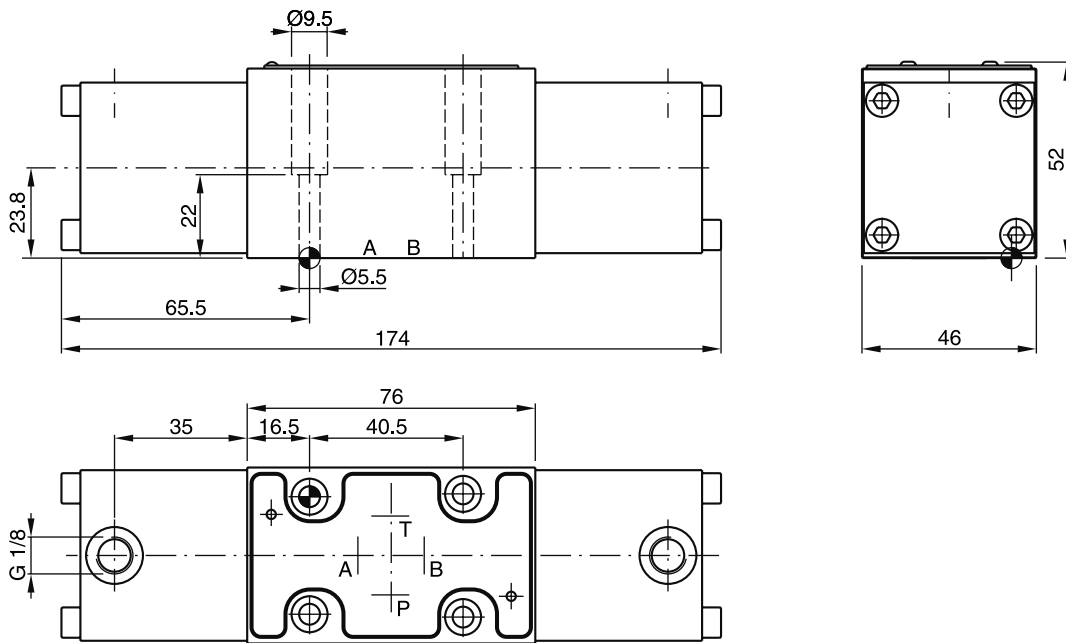







**D1VP\*90**



Surface finish	 Kit	 Kit	 Kit	 Kit
$\sqrt{R_{max} 6.3}$ 	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	<b>NBR: SK-D1VP-N-87</b> FPM: SK-D1VP-V-87

**D1VP\*4L**

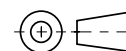
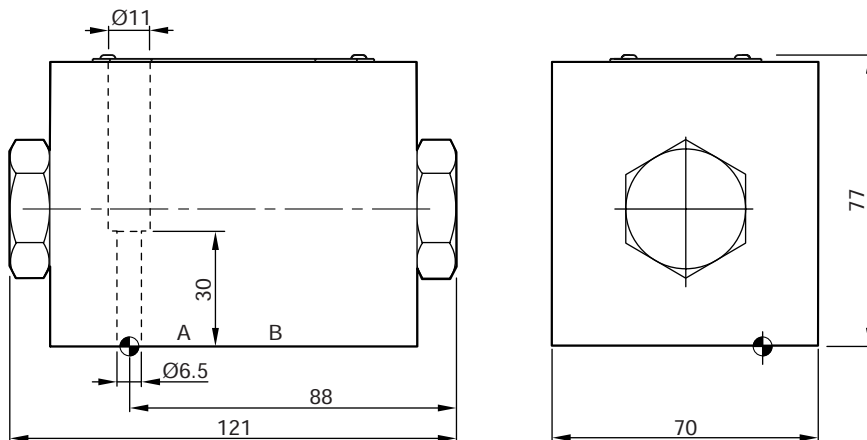






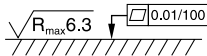
Surface finish	 Kit	 Kit	 Kit	 Kit
$\sqrt{R_{max} 6.3}$ 	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	<b>NBR: SK-D1VP-N4-91</b> FPM: SK-D1VP-V4-91

Dimensions

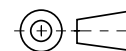
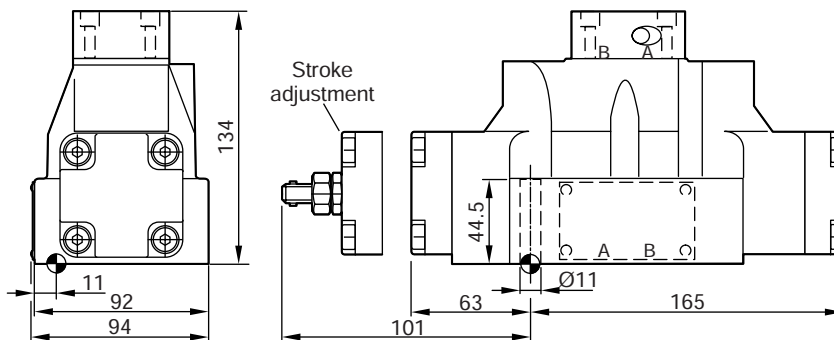
D3DP





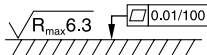
2



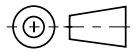
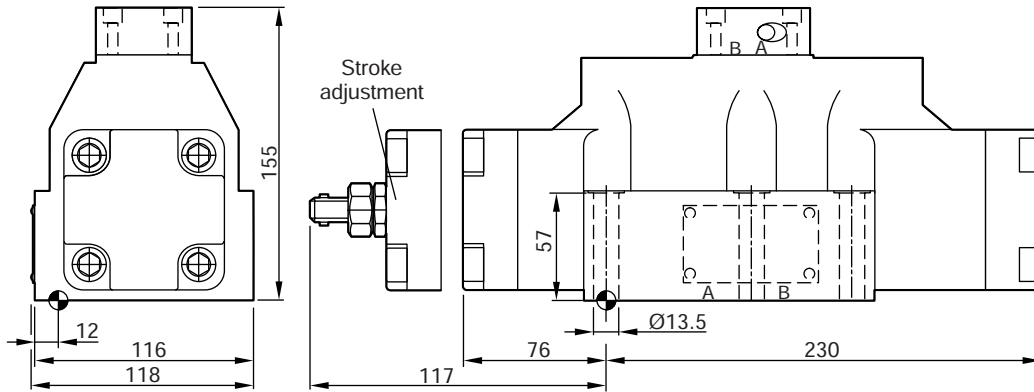
Surface finish	 Kit	 Kit	 Kit	 Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	<b>NBR: SK-D3DP-N-42</b> FPM: SK-D3DP-V-42






D4P



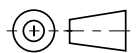
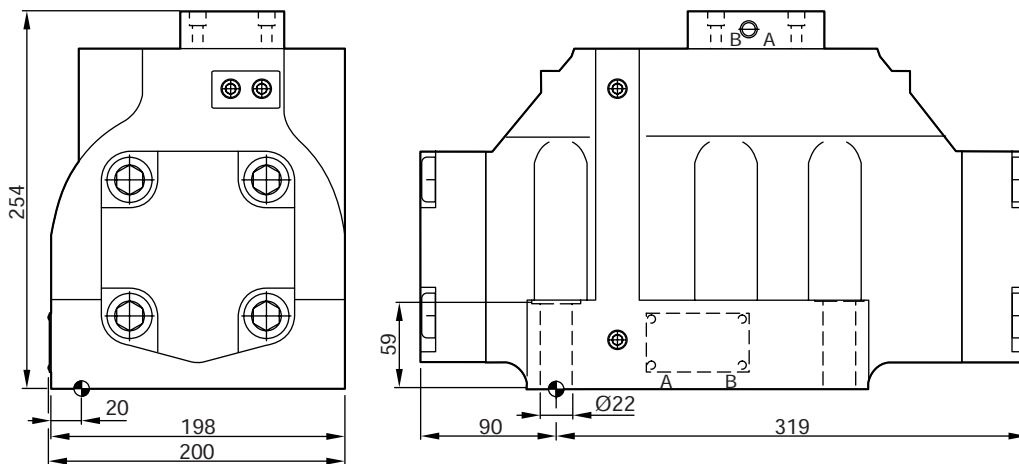
Surface finish	 Kit	 Kit	 Kit	 Kit
	BK320	4x M10x60 2 x M6x55 ISO 4762-12.9	63 Nm ±15 % 13.2 Nm ±15 %	<b>NBR: SK-D41VW-N-91</b> FPM: SK-D41VW-V-91






**D9P**



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

**D11P**



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

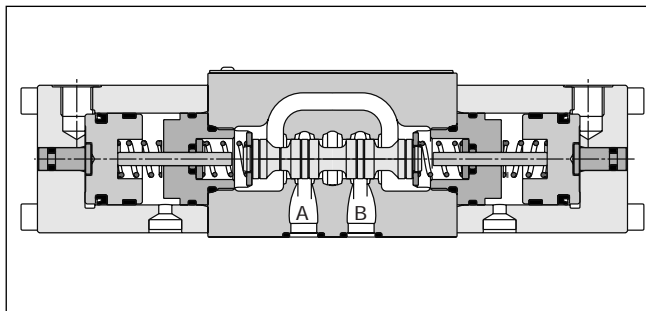
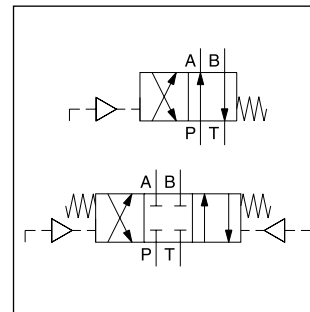
**Characteristics**

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.

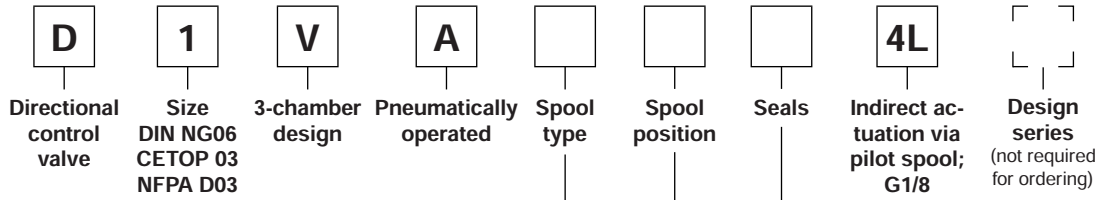
2



**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...+50
MTTF <sub>D</sub> value	[years]	150
Weight	[kg]	1.3
Hydraulic		
Max. operating pressure	[bar]	P, A B: 350; T: 105
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525	
Fluid temperature	[°C]	-25 ... +70
Viscosity permitted	[cSt] / [mm <sup>2</sup> /s]	2.8...400
Viscosity recommended	[cSt] / [mm <sup>2</sup> /s]	30...80
Filtration	ISO 4406 (1999); 18/16/13	
Flow max.	[l/min]	60 <sup>1)</sup>
Leakage at 350 bar (per flow path)	[ml/min]	up to 60 <sup>1)</sup>
Operating pressure w/o tank pressure	[bar]	min. 3
	with max tank	[bar]
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

<sup>1)</sup> Depending on spool.



**2**

3 position spools	
Code	Spool type
001	
002	
004	
006	
008 <sup>1)</sup>	
009 <sup>1)</sup>	

2 position spools	
Code	Spool type
020	
026	
030	

Code	Seals
<b>N</b>	<b>NBR</b>
V	FPM

3 position spools		
Code	Spool position	
<b>C</b>		<b>3 positions. Spring offset in position "0". Operated in position "a" or "b".</b>
	Standard	Spool type 008, 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".

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

**Bold letters =  
 Short-term availability**

<sup>1)</sup> Consider specific spool position.

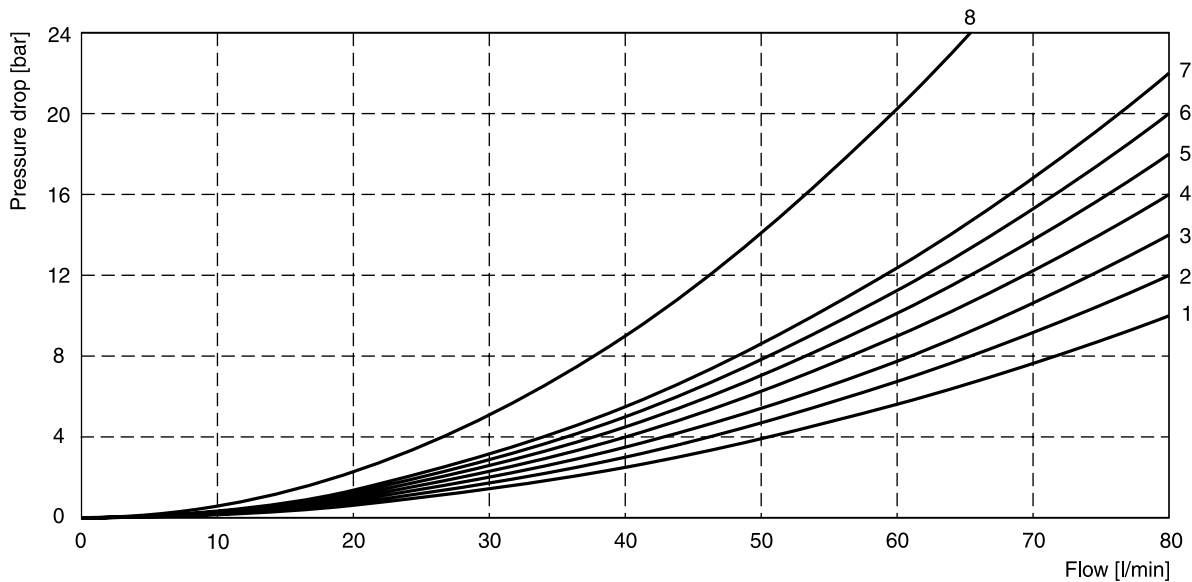
Further spool types and styles on request.

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	2	2	2	2	-	-	-	-	8
009	3	3	3	3	-	-	-	-	7

**Flow curve**

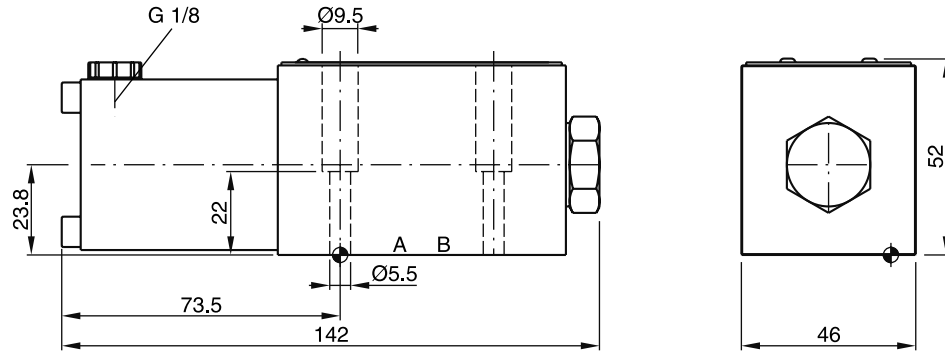


All characteristic curves measured with HLP46 at 50 °C.

**Shift limits**

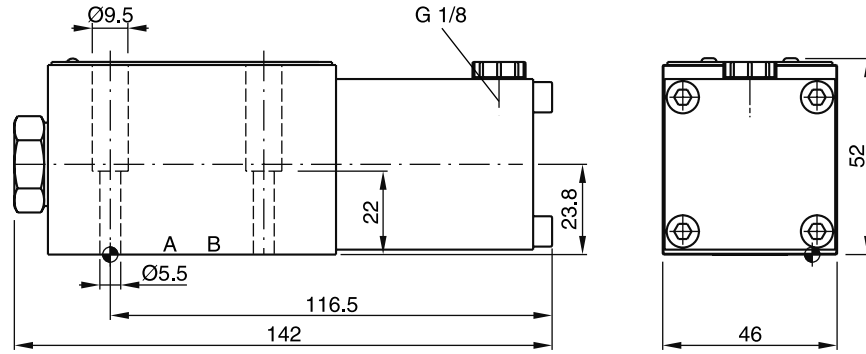
Spool	Shift limit [l/min]
001	60
002	
004	
006	
020	
030	
08	40
09	
026	20

**B, E, F -style**

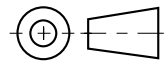
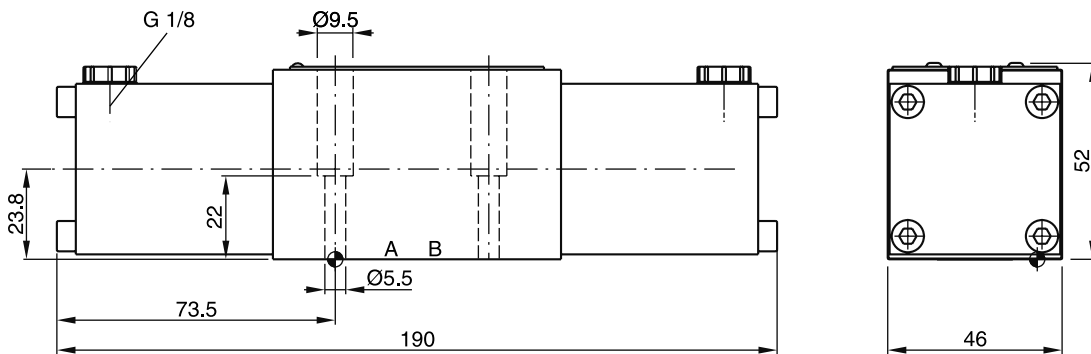






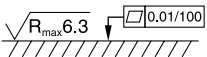
**2**

**H, K, M -style**



**C, D -style**



Surface finish	 Kit	 Kit	 Kit	 Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	<b>NBR: SK-D1VA-N-91</b> 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:

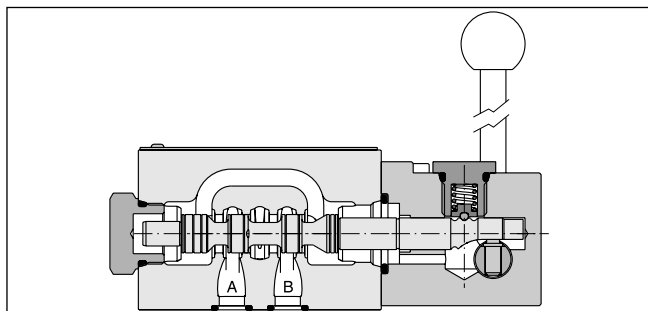
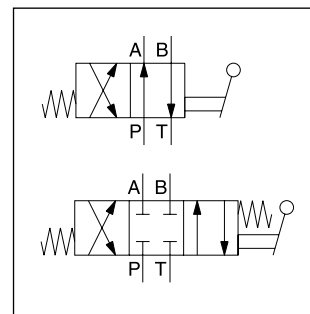
- D1VL NG06
- D3DL NG10
- D4L NG16
- D9L NG25

**Technical features**

- All hand lever parts stainless steel



D1VL



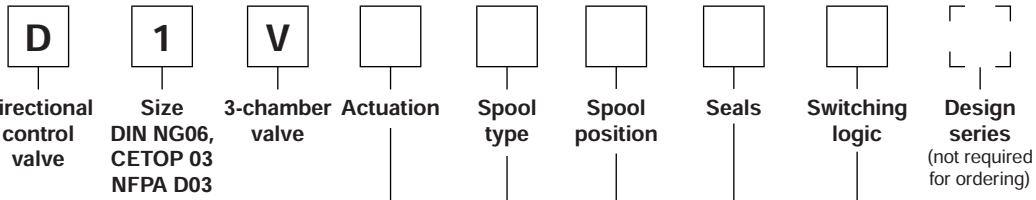
D1VL

**Technical data**

General					
Design	Directional spool valve				
Actuation	Lever				
Series	<b>D1VL</b>	<b>D3DL</b>	<b>D4L</b>	<b>D9L</b>	
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...+50				
MTTF <sub>p</sub> 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	P, A B, T: 350; X, Y: 140	
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525	internal drain	P, A B: 350; T, X, Y: 140	internal drain	
			P, A B: 350; T, X, Y: 140	P, A B: 350; T, X, Y: 140	
Fluid temperature [°C]	-25 ... +70				
Viscosity permitted [cSt] / [mm²/s]	2.8...400				
Viscosity recommended [cSt] / [mm²/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*	up to 200*	up to 800*	
Leakage at 50 bar (per flow path) [ml/min]	up to 10*	–	–	–	

\* Depending on spool.





**2**

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

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

3 position spools	
Code	Spool type
001	a 0 b 
002	
004	
006	
009 <sup>1)</sup>	
042	

2 position spools	
Code	Spool type
020	a b 

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

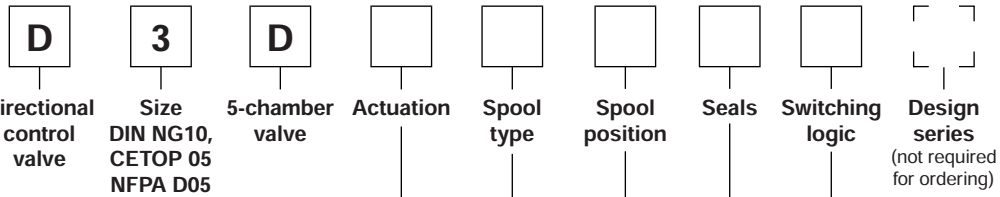
Code	Seals
N	NBR
V	FPM

<sup>1)</sup> Consider specific spool position.  
<sup>2)</sup> Details see dimensions.

**Bold letters =**  
**Short-term availability**

Further spool types on request.

2



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

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

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

2 position spools	
Code	Spool type
020	a b

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

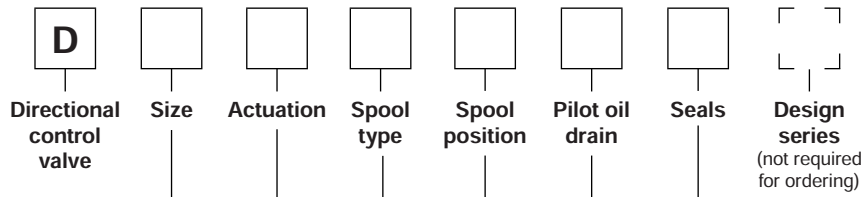
Code	Seals
N	NBR
V	FPM

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

<sup>1)</sup> Consider specific spool position.  
<sup>2)</sup> Details see dimensions.

**Bold letters =**  
**Short-term availability**

Further spool types on request.



Code	Bore	Size
4	Ø20 mm	NG16
9	Ø32 mm	NG25

Code	Outlet
2 <sup>2)</sup>	External
5 <sup>3)</sup>	Internal

Code	Seals
N	NBR
V	FPM

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

3 position spools			D4	D9
Code	Spool type			
	a	0	b	
001				• •
002				• •
003				• •
004				• •
006				•
007				• •
009 <sup>1)</sup>				• •
011				• •
014				• •
015				• •

2 position spools			D4	D9
Code	Spool type			
	a	b		
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".

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

Further spool types on request.

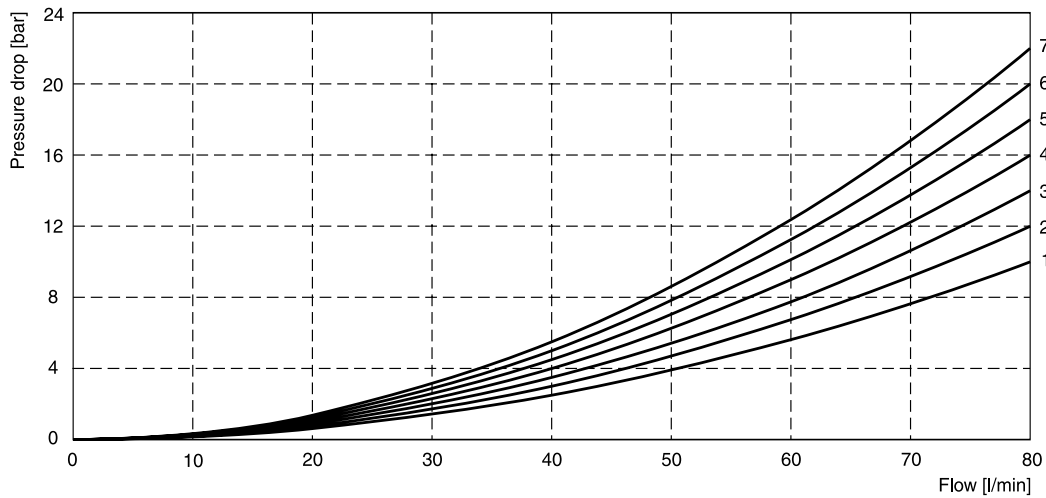
The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number

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

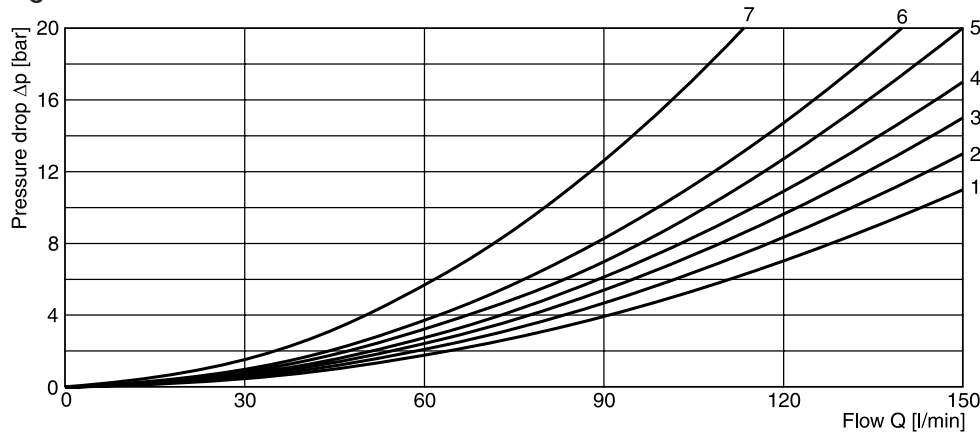
**Flow curve diagram D1VL**



**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**



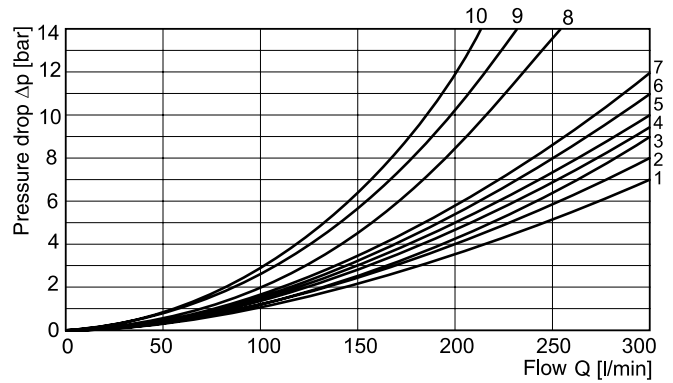
All characteristic curves measured with HLP46 at 50 °C.

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.

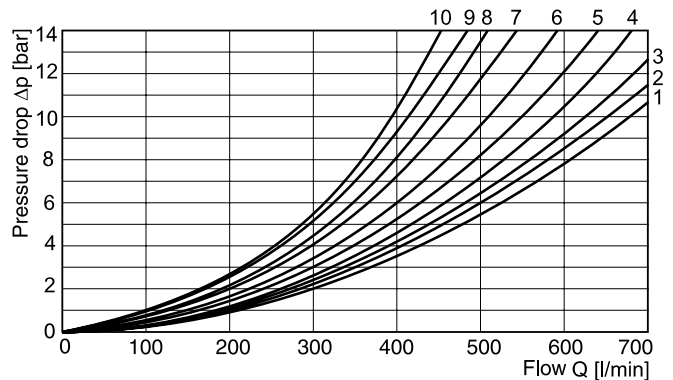
**D4L**

Spool 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
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**

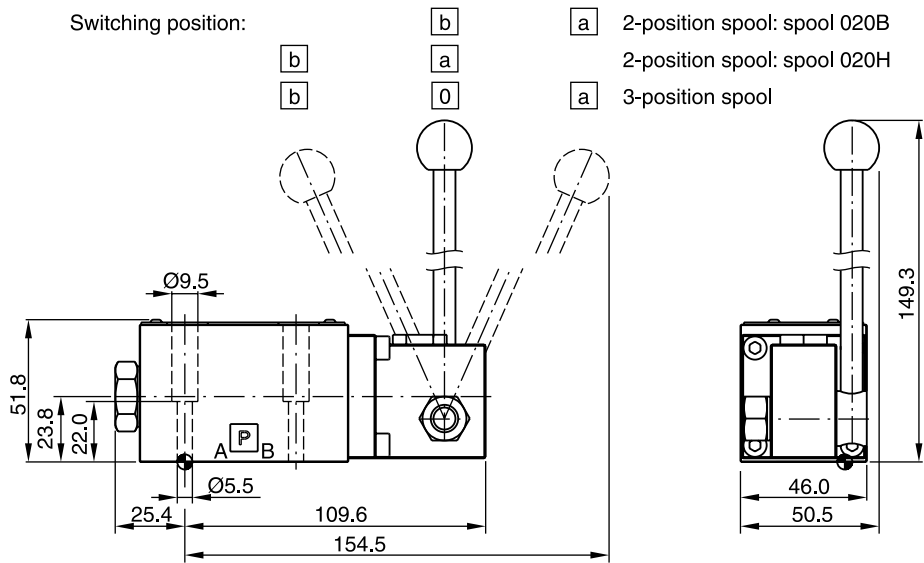
Spool Code	Curve number				
	P-A	P-B	P-T	A-T	B-T
001	3	2	-	3	5
002	2	1	1	3	5
003	4	2	-	3	6
004	4	3	-	3	5
007	3	1	7	3	5
009	4	8	9	4	10
014	1	3	7	5	3
015	2	4	-	5	3
020	6	5	-	6	8
030	3	2	-	3	5



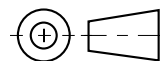
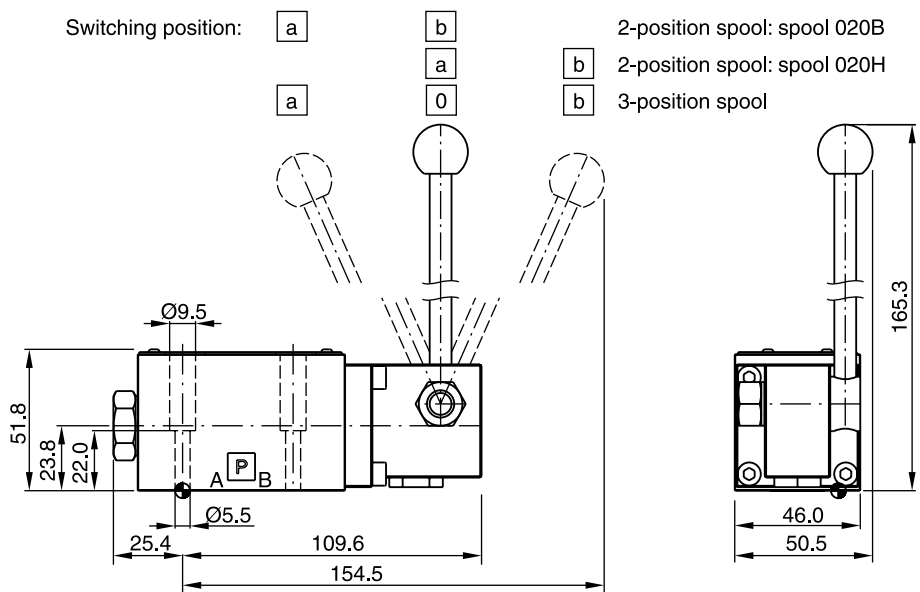
All characteristic curves measured with HLP46 at 50 °C.

**D1VL\*4J**

**2**



**D1VL\*4K**



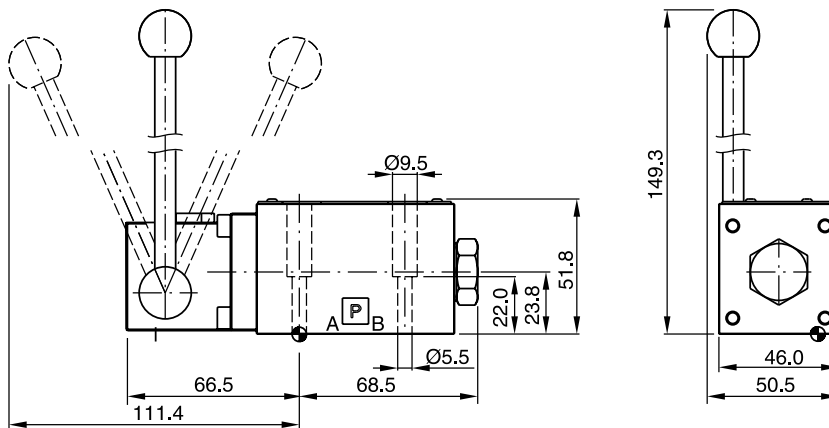
Surface finish	Kit	Kit	Kit	Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	<b>NBR: SK-D1VL-N-91</b> FPM: SK-D1VL-V-91

Valid for all styles. Switching position see ordering code.

**D1VL\*4J**

Switching position:

- b a 2-position spool: spool 020B
- b a 2-position spool: spool 020H
- b 0 a 3-position spool

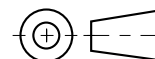
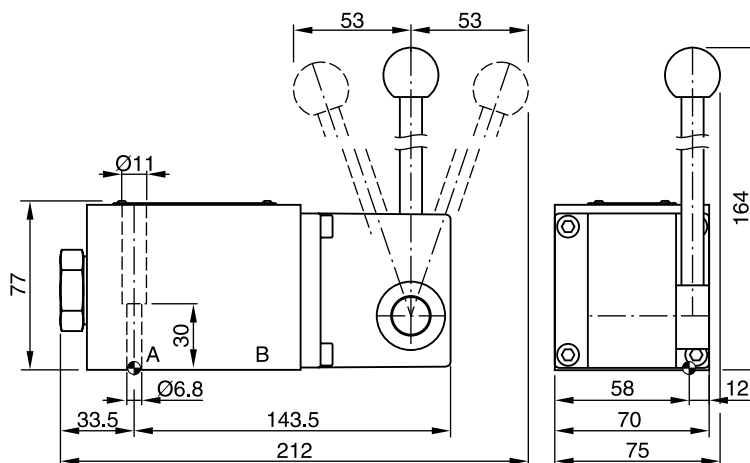


Surface finish	Kit	Kit	Torque	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	<b>NBR: SK-D1VL-N-91</b> FPM: SK-D1VL-V-91

**D3DL\*4J**

Switching position:

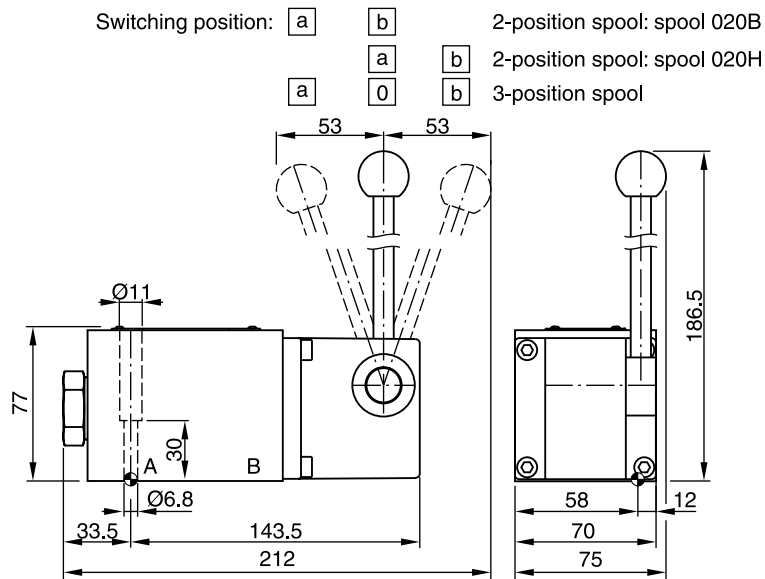
- b a 2-position spool: spool 020B
- b a 2-position spool: spool 020H
- b 0 a 3-position spool



Surface finish	Kit	Kit	Torque	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ±15 %	<b>NBR: SK-D3DL-N-42</b> FPM: SK-D3DL-V-42

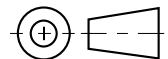
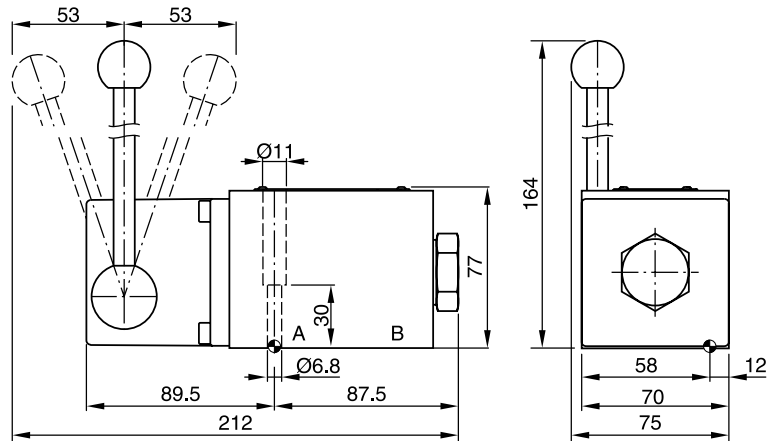
**D3DL\*4K**

**2**



**D3DLB\*4J**

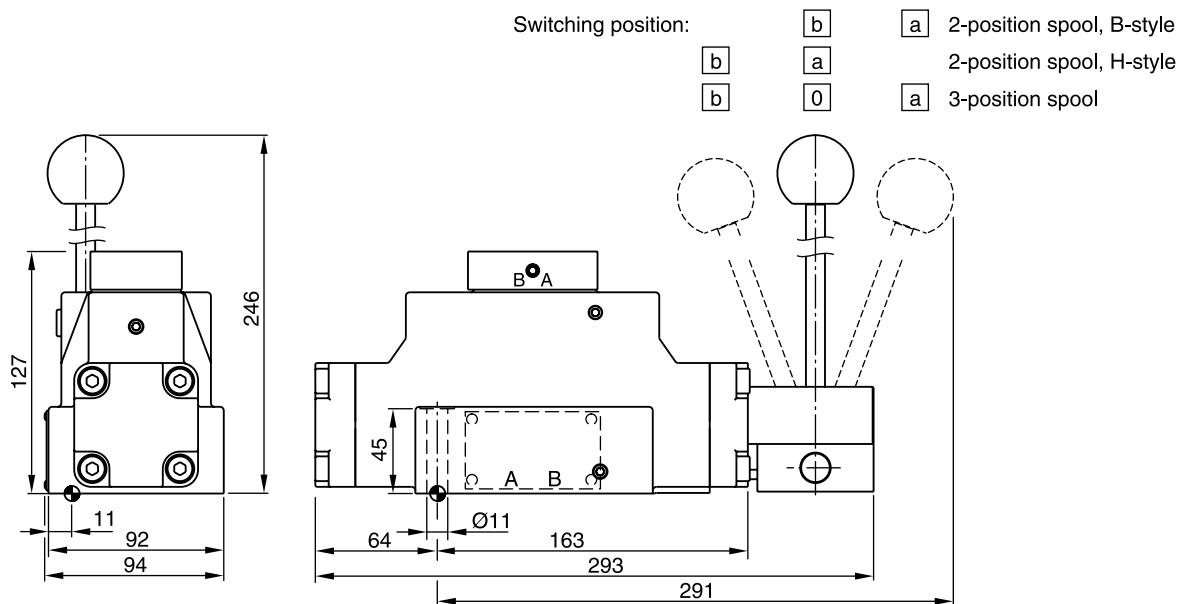
Switching position:  b  a 2-position spool: spool 020B  
 b  a 2-position spool: spool 020H  
 b  0  a 3-position spool



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

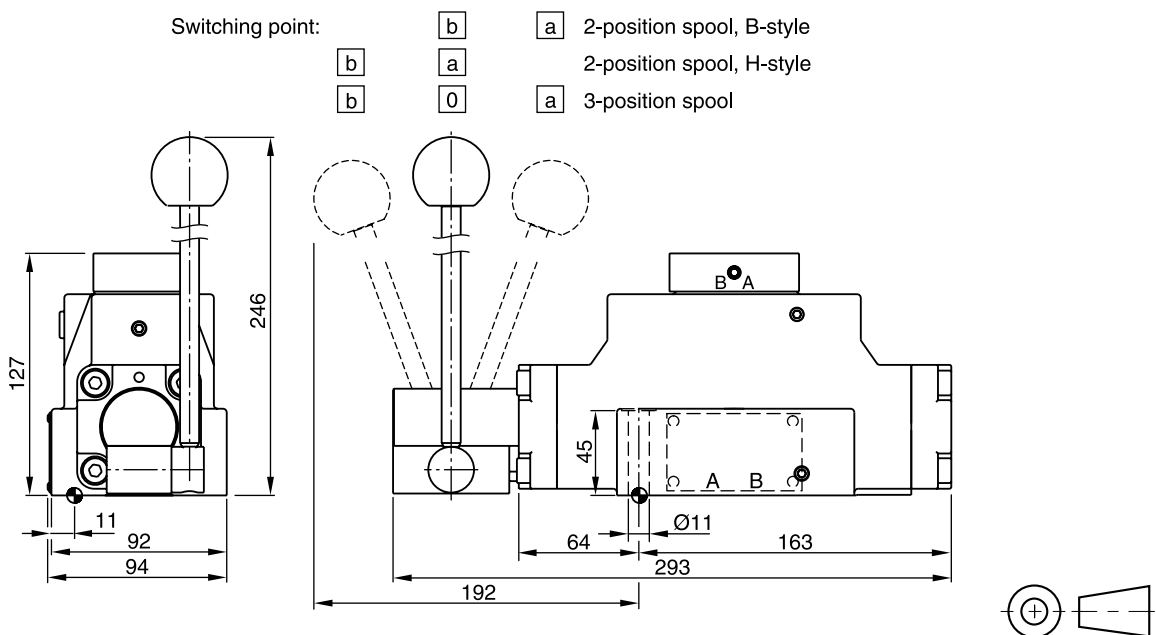


**D4L**



**2**

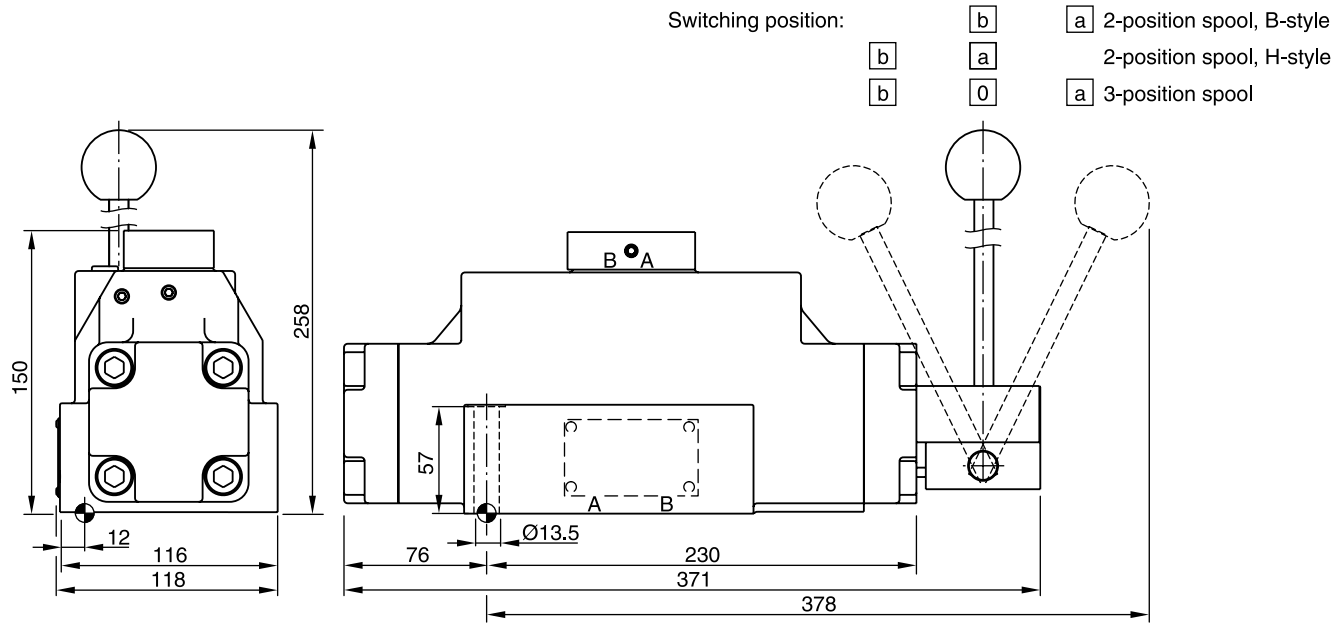
**D4LB**



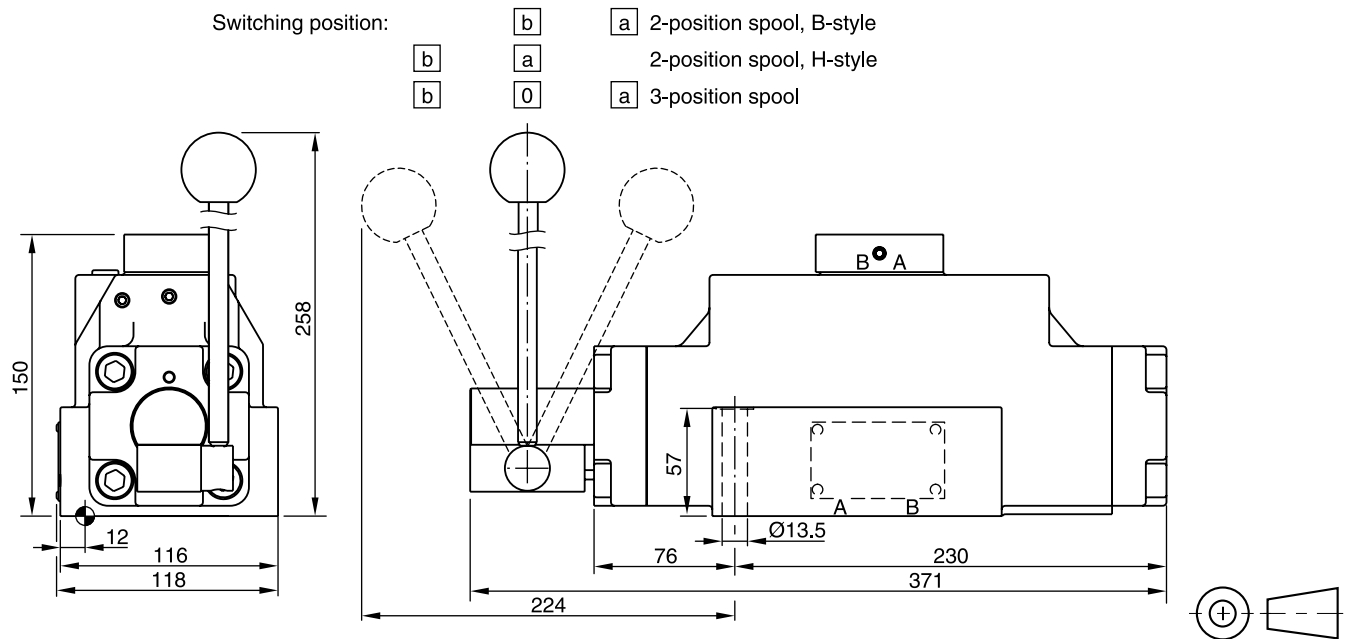
Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK320	4x M10x60 2x M6x55 ISO 4762-12.9	63 Nm 13.2 Nm $\pm 15\%$	<b>NBR: SK-D4L-N-91</b> FPM: SK-D4L-V-91

**D9L**

**2**

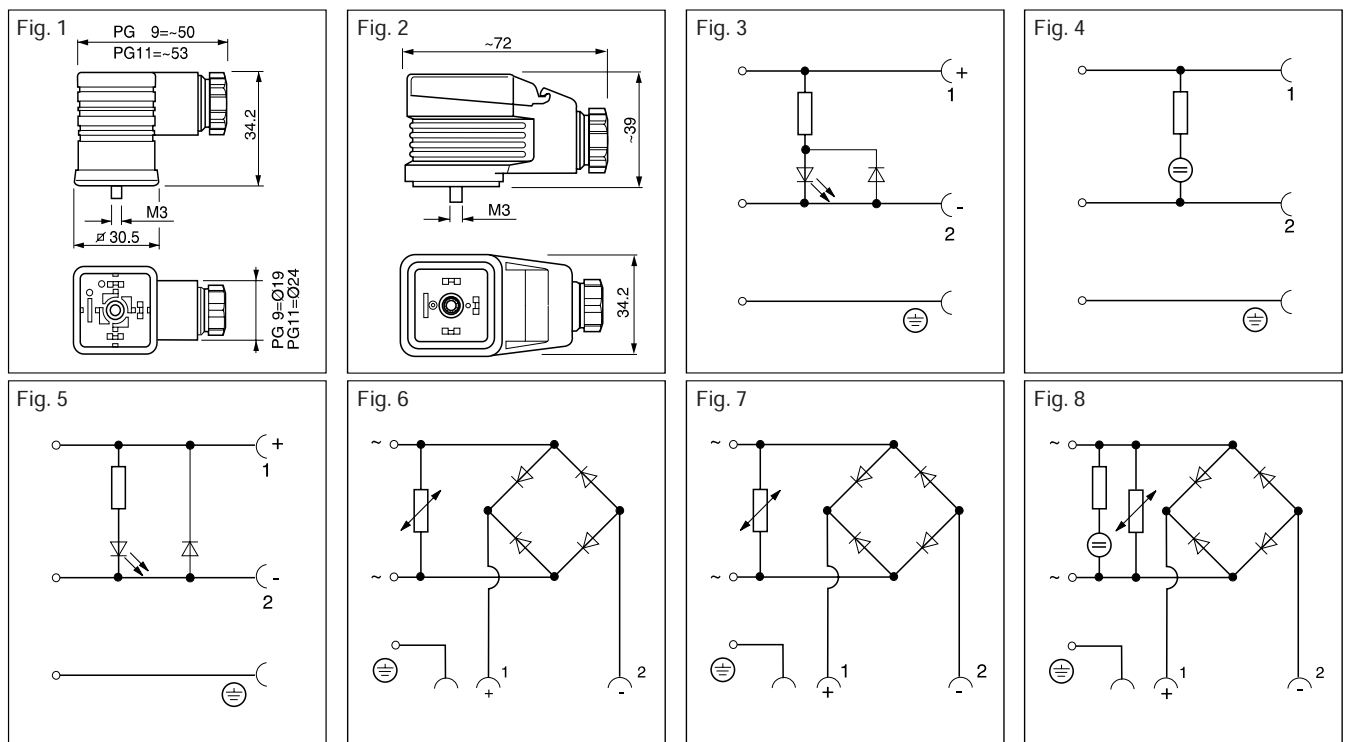


**D9LB**

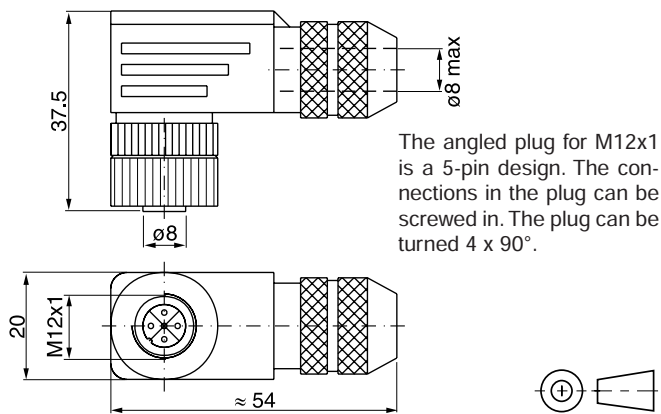


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{\max} 6.3}$ $\square 0.01/100$	BK360	6x M12x75 ISO 4762-12.9	108 Nm $\pm 15\%$	<b>NBR: SK-D9L-N-91</b> FPM: SK-D9L-V-91

Description	Cable connection	Figure circuit	Order No.	
			black (B)	grey (A)
Plug EN 175301-803 <sup>1)</sup> , style AF Protection class IP 65 for voltages up to 250 V	PG 9 PG 11	Fig. 1	5001710 5001716	5001711 5001717
Plug with LED 24 VDC Plug with lamp insert 120 VAC Plug with lamp insert 230 VAC	PG 11	Fig. 1 and 3	5001571	5001572
		Fig. 1 and 4	5001573 5001575	5001574 5001576
Plug with LED 24 VDC and suppressing circuit		Fig. 1 and 5	5001708	5001709
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 250 VAC. Plug with cable strain relief and transparent cover	PG 11	Fig. 1 and 6	5001737	5001738
		Fig. 2	5001723	5001724
Inserts for plug 5001723 and 5001724		Circuit	Order No.	
Bridge-type rectifier up to 250 VAC 7		7	5001727	
Bridge-type rectifier with lamp 250 VAC		8	5001734	



**Plug M12x1, Order No.: 5004109**



**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

<sup>1)</sup> (New) EN 175301-803 corresponds to (old) DIN 43650.

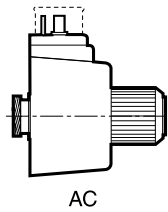
**Solenoid kit (displayed: EN plug)**

A solenoid kit contains tube, coil, retainer and seals for the solenoid.

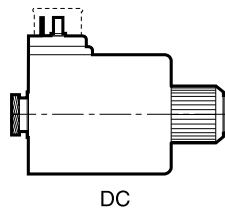
**Coil kit**

A coil kit contains coil, retainer and seals for the coil.

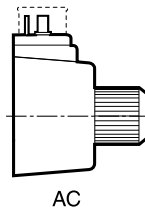
2



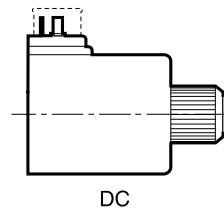
AC



DC



AC



DC

**For D1VW standard**

Solenoid kits: <b>AK-D1VW-S-...</b> (Soft shift on request)		(Example: <b>AK-D1VW-S-JW-91</b> )	
Voltage Volt/Hertz	Voltage Code	EN plug D1VW	EN plug without manual override (Code „T”) D1VW
12 V=	K	<b>KW-91</b>	KWT-91
24 V=	J	<b>JW-91</b>	JWT-91
98 V=	U	UW-91	UWT-91
205 V=	G	GW-91	GWT-91
110 V/50 Hz / 120 V/60 Hz	Y	<b>YW-91</b>	-
230 V/50 Hz / 240 V/60 Hz	T	<b>TW-91</b>	-

Coil kits: <b>AK-D1VW-C-...</b> (Example: <b>AK-D1VW-C-JW-91</b> )		
Voltage Volt/Hertz	Voltage Code	EN plug D1VW
12 V=	K	<b>KW-91</b>
24 V=	J	<b>JW-91</b>
98 V=	U	UW-91
205 V=	G	GW-91
110 V/50 Hz / 120 V/60 Hz	Y	<b>YW-91</b>
230 V/50 Hz / 240 V/60 Hz	T	<b>TW-91</b>

**D1VW 8 Watt**

Solenoid kits: <b>AK-D1VW-S-...</b>				Coil kits: <b>AK-D1VW-C-...</b>	
Voltage Volt/Hertz	Voltage Code	EN plug D1VW	M12x1 „DESINA” (Code „DLJ5”) D1VW	EN plug D1VW	M12x1 „DESINA” (Code „DLJ5”) D1VW
24 V=	J	JWL-91	JDLJ5-91	<b>JWL-91</b>	JDLJ5-91

**D3W**

Solenoid kits: <b>AK-D3W-S-...</b> (Soft shift on request) (Example: <b>AK-D3W-S-JW-30</b> )					Coil kits: <b>AK-D3W-C-...</b>	
Voltage Volt/Hertz	Voltage Code	EN plug D3W	EN plug without manual override (Code „T”) D3W	EN plug with 210bar tank pressure (Code „H”) D3W	EN plug D3W	EN plug without manual override (Code „T”) D3W
12 V=	K	KW-30	KWT-30	KW-30	KW-30	KWT-30
24 V=	J	<b>JW-30</b>	JWT-30	JW-30	<b>JW-30</b>	JWT-30
98 V=	U	UW-30	UWT-30	UW-30	UW-30	UWT-30
205 V=	G	GW-30	GWT-30	GW-30	GW-30	GWT-30
110 V/50 Hz / 120 V/60 Hz	Y	<b>YW-30</b>	-	YWH-30	<b>YW-30</b>	-
230 V/50 Hz / 240 V/60 Hz	T	<b>TW-30</b>	-	TWH-30	<b>TW-30</b>	-

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 <sup>1)</sup>
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	-

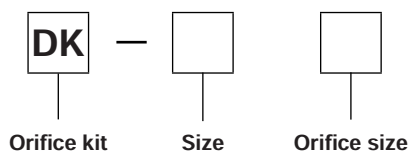
**Seated valve**

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

<sup>1)</sup> 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

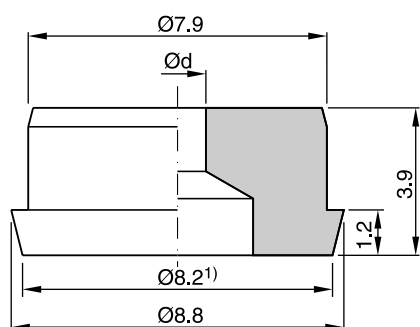
Code	Orifice Ø	NG6	NG10
00	without orifice	x	x
06	0.6 mm	x	
08	0.8 mm	x	x
09	0.9 mm	x	
10	1.0 mm	x	x
11	1.1 mm	x	
12	1.2 mm	x	x
14	1.4 mm	x	x
15	1.5 mm	x	x
18	1.8 mm	x	
20	2.0 mm	x	x
25	2.5 mm	x	x
30	3.0 mm		x
45	4.5 mm		x

The orifice kit DK-D1VW91 includes special O-rings (NBR - black and FPM - green) which have to be used with the orifice.

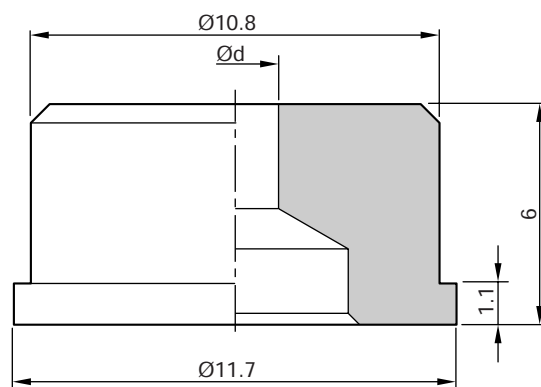
Package size: Each kit contains 10 orifices of the same size.

**Dimensions**

**NG06**



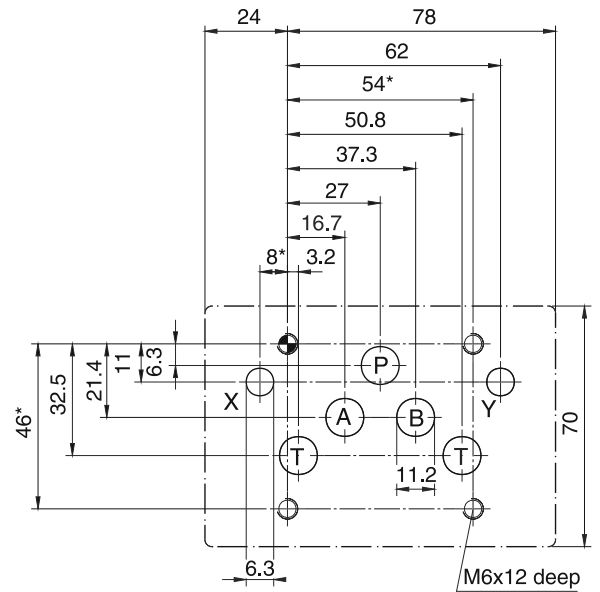
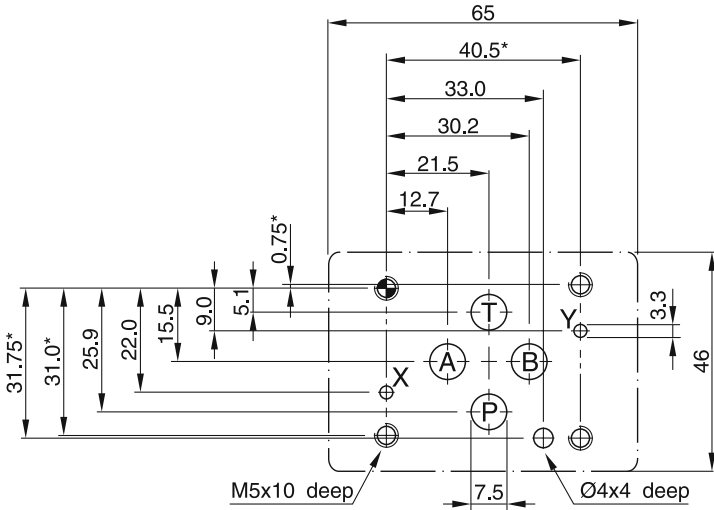
**NG10**



<sup>1)</sup> Only for ports P, A, B with max. dia. 7.5 mm.

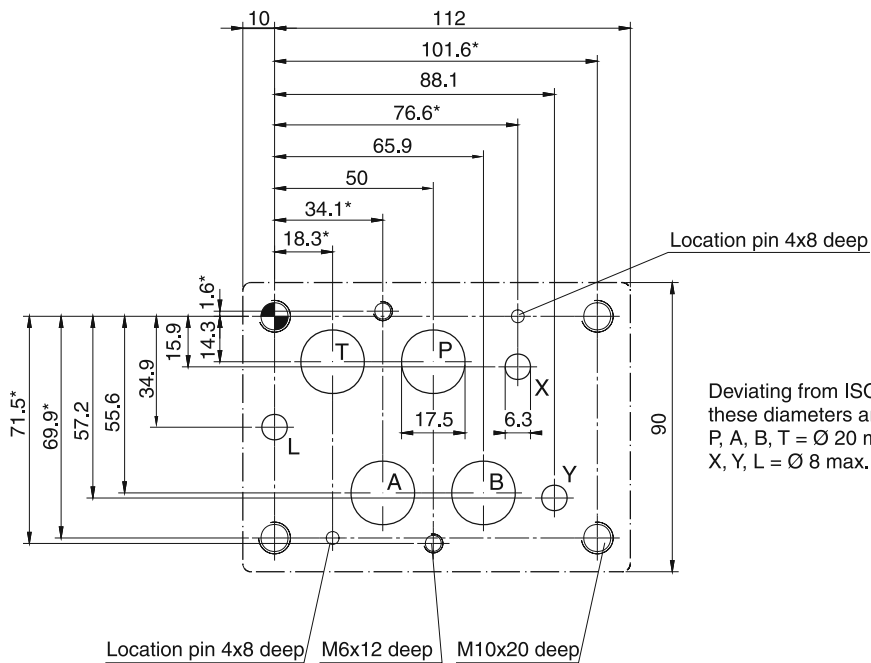
**Size 6**, mounting pattern to ISO 4401-03-03-0-05

**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

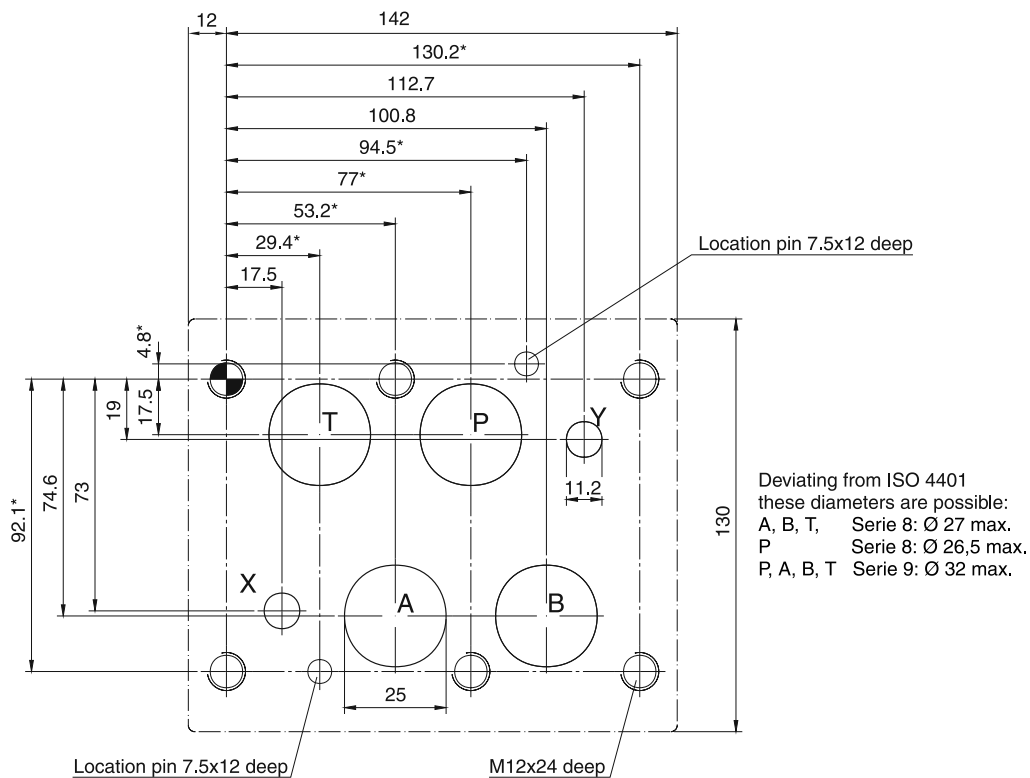


Deviating from ISO 4401  
 these diameters are possible:  
 P, A, B, T = Ø 20 max.  
 X, Y, L = Ø 8 max.

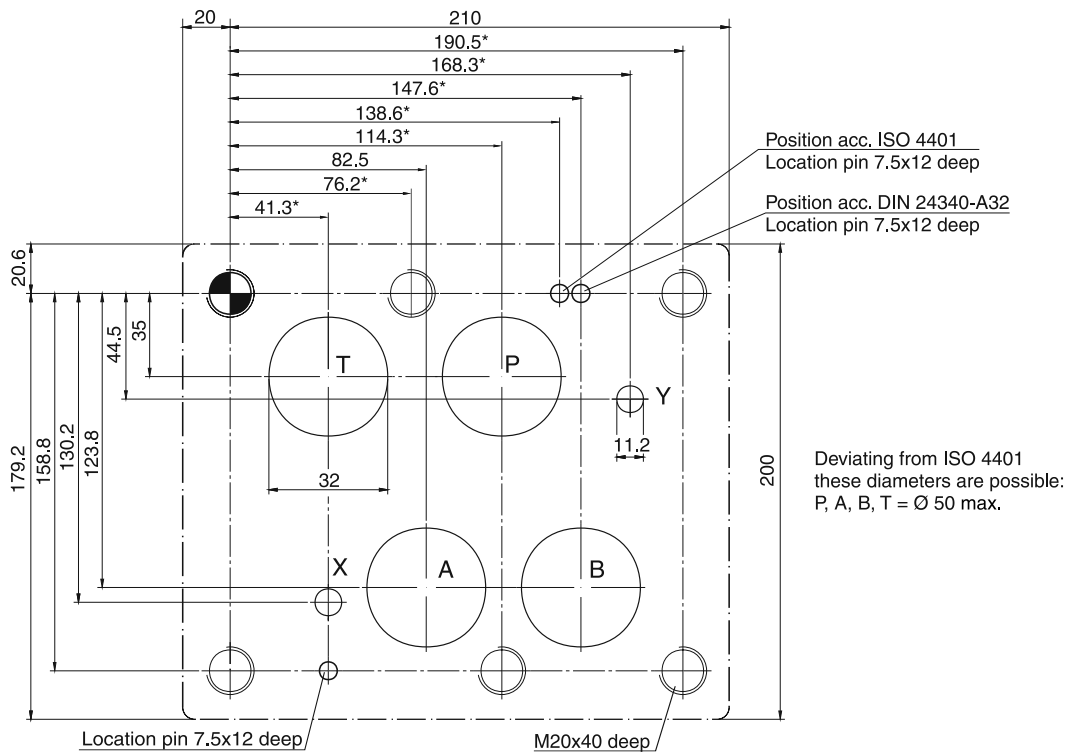
With \* marked dimensions ± 0.1 mm. All other dimensions ± 0.2 mm.

**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.**