

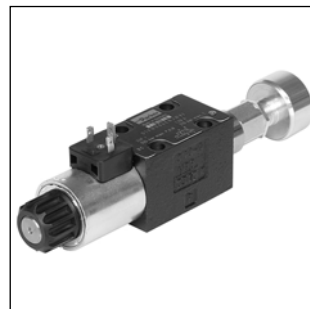
The direct operated directional valves series D1VW with inductive position control are typically used in safety relevant applications. The start or end position can be monitored. The position control is available for single and double solenoid valves.

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

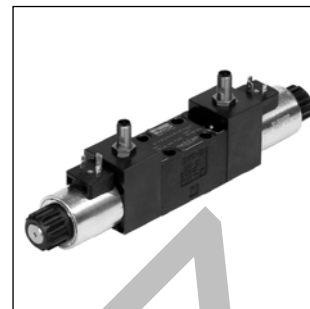
Please find detailed information on the machine directive in the position paper in chapter 1.

**Attention:**

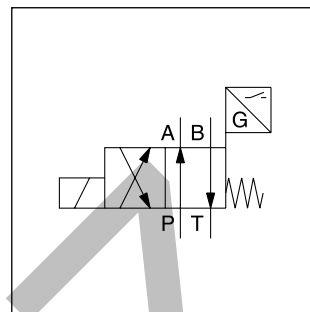
**The adjustment of the position control is factory set and sealed. Replacement and repairs can only be undertaken by the manufacturer.**



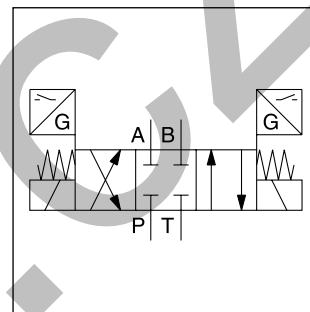
D1VW\*B



D1VW\*C

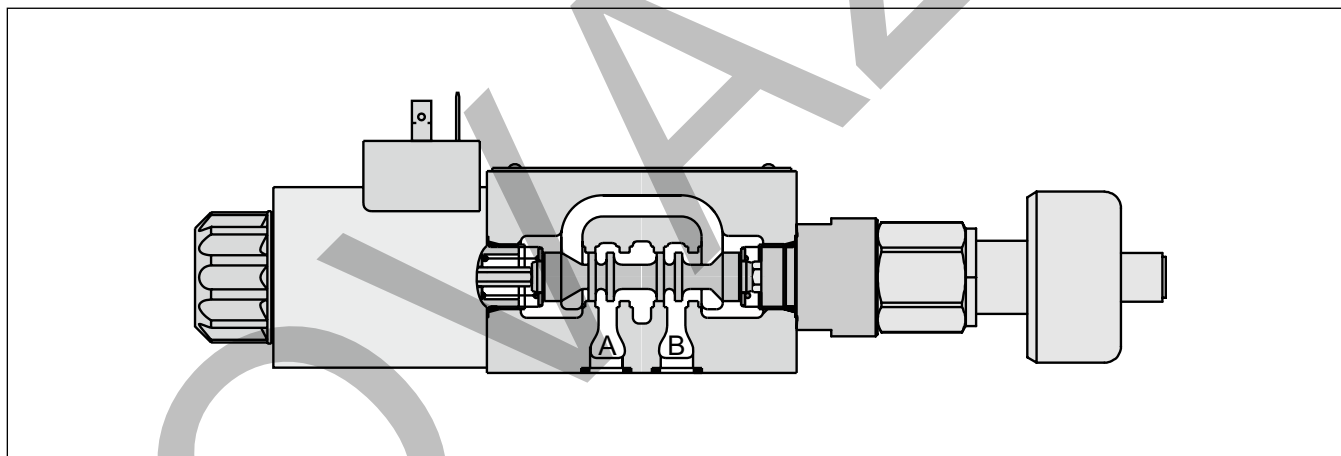


D1VW\*B

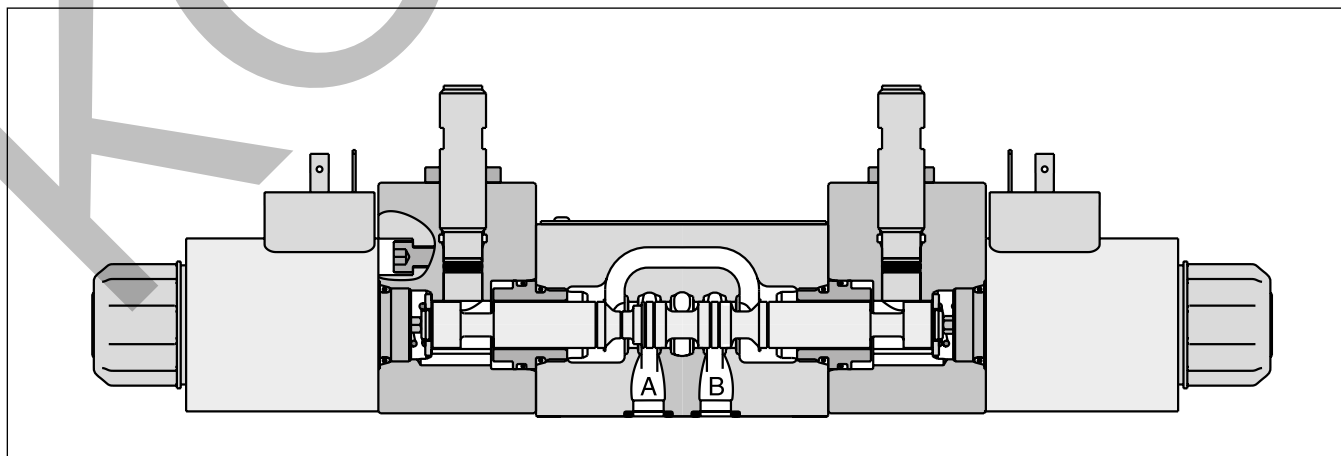


D1VW\*C

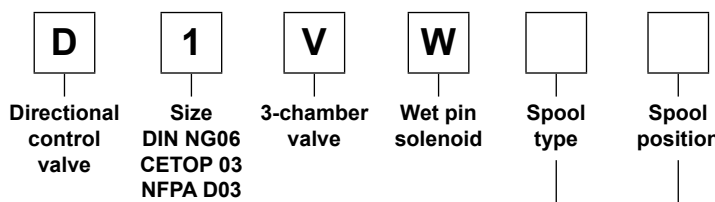
**D1VW\*B**



**D1VW\*C**



2



3 position spools	
Code	Spool type
	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		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		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 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> Please order female connector M12x1 separately (see accessories, female connector M12x1 (order no.: 5004109)).  
<sup>6)</sup> For hydraulic presses according to the safety regulations DIN EN ISO 16092-3, solenoid option "T" (without manual override) and accessory "I4N" or "I5N" (start position monitored) are required.



Seals



Solenoid voltage



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



Manual override option



Position control <sup>5)</sup>



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>6)</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>6)</sup></b>	<b>Start position monitored side A</b>	

Code	Manual override
<b>omit</b>	<b>manual override (Standard)</b>
T <sup>6)</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



**D**  
Directional control valve

**1**  
Size  
DIN NG06  
CETOP 03  
NFFPA D03

**V**  
3-chamber valve

**W**  
Wet pin solenoid

Spool type

Spool position

Seals

Solenoid voltage

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

Manual override option

Position control<sup>5)</sup>

Design series (not required for ordering)

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	manual override (Standard)
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

Further spool types and voltages on request.

- <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 DIN EN ISO 16092-3, solenoid option "T" (without manual override) and accessory "I6N" (start positions) is required.
- <sup>5)</sup> Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

<b>General</b>					
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> value	[years] 150				
Weight	[kg] 1.8 (1 solenoid) / 3.8 (2 solenoids)				
<b>Hydraulic</b>					
Max. operating pressure	[bar] P, A B: 350 ; T: 210				
Fluid	Hydraulic oil according to DIN 51524				
Fluid temperature	[°C] -20 ... +70				
Viscosity permitted	[cSt] / [mm <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				
<b>Static / Dynamic</b>					
Step response at 95 %	[ms] Energized: 32 ; De-energized: 40				
<b>Electrical characteristics</b>					
Duty ratio	100 % ED; CAUTION: coil temperature up to 150 °C possible				
Max. switching frequency	[1/h] 15000				
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)				
	Code	K	J	U	G
Supply voltage	[V]	12 V =	24 V =	98 V =	205 V =
Tolerance supply voltage	[%]	±10	±10	±10	±10
Current consumption	[A]	2.72	1.29	0.33	0.13
Power consumption	[W]	32.7	31	31.9	28.2
Solenoid connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461.				
Wiring min.	[mm <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.

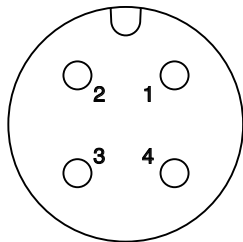
**Single solenoid valves**

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

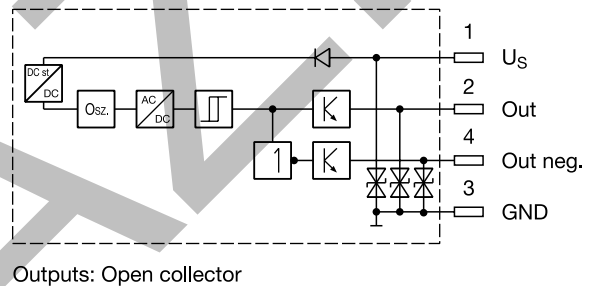
Supply voltage	[VDC]	24
Tolerance supply voltage	[%]	±20
Ripple supply voltage	[%]	≤10
Polarity protection	[V]	300
Current consumption without load	[mA]	≤20
Switching hysteresis	[mm]	<0.06
Max. output current per channel, ohmic	[mA]	250
Ambient temperature	[°C]	-20 ... +60
Protection		IP65 acc. EN 60529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

2

**M12 pin assignment**



- 1 + U<sub>s</sub> 19.2...28.8 V
- 2 Out B: normally open
- 3 0V
- 4 Out A: normally closed



**Definitions**

**Start position monitored:**

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

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

**End position monitored:**

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

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

<sup>1)</sup> Only guaranteed with screened cable and female connector

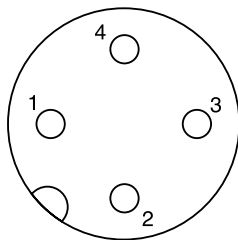
**Double solenoid valves**

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

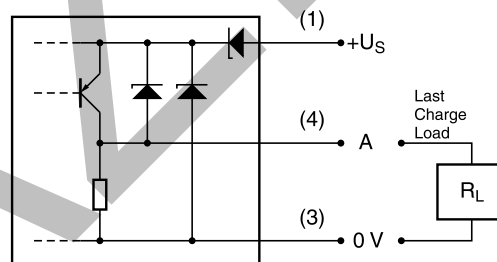
Protection class		IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient temperature	[°C]	-20...+60
Supply voltage $U_s$ / ripple	[V]	10...30 / $\pm 10\%$
Current consumption without load	[mA]	$\leq 10$
Max. output current per channel, ohmic	[mA]	200
Min. output load per 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 acc. to IEC 61076-2-101
Wiring min.	[mm <sup>2</sup> ]	3 x 0.14 braided shield recommended
Wiring length max.	[m]	50 recommended

**2**

**M12 pin assignment**



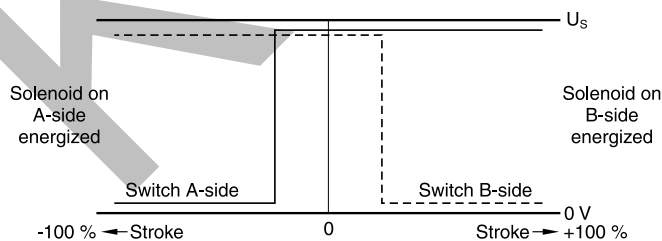
- 1  $U_s$  10...30 V
- 2 not connected
- 3 0 V
- 4 Out A: normally open



**Definitions**

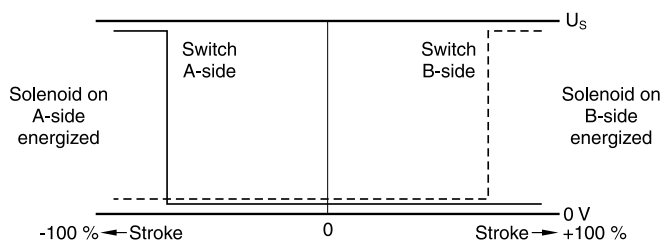
**Start position monitored:**

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



**End position monitored:**

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



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

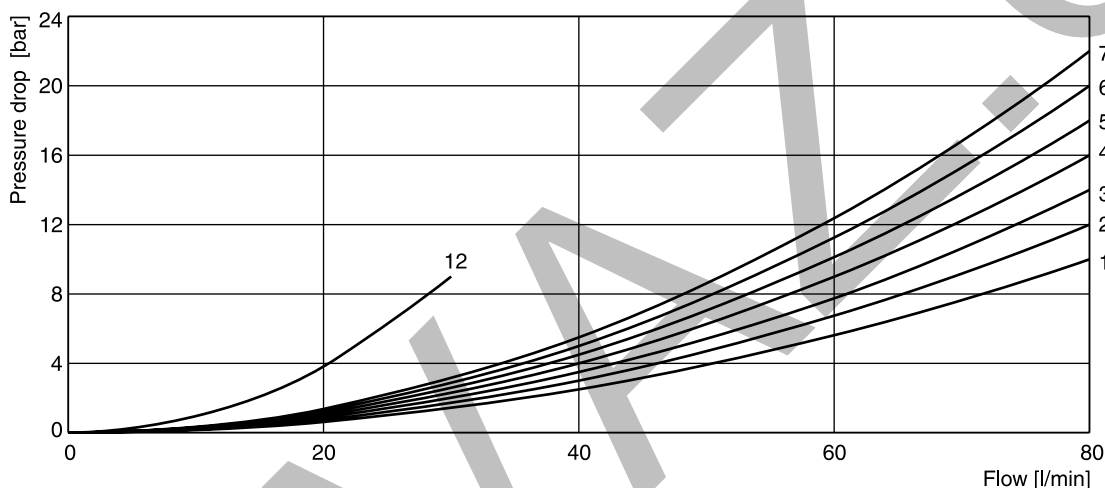
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number

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	-	-	-	-	-

2

**Flow curve diagram**

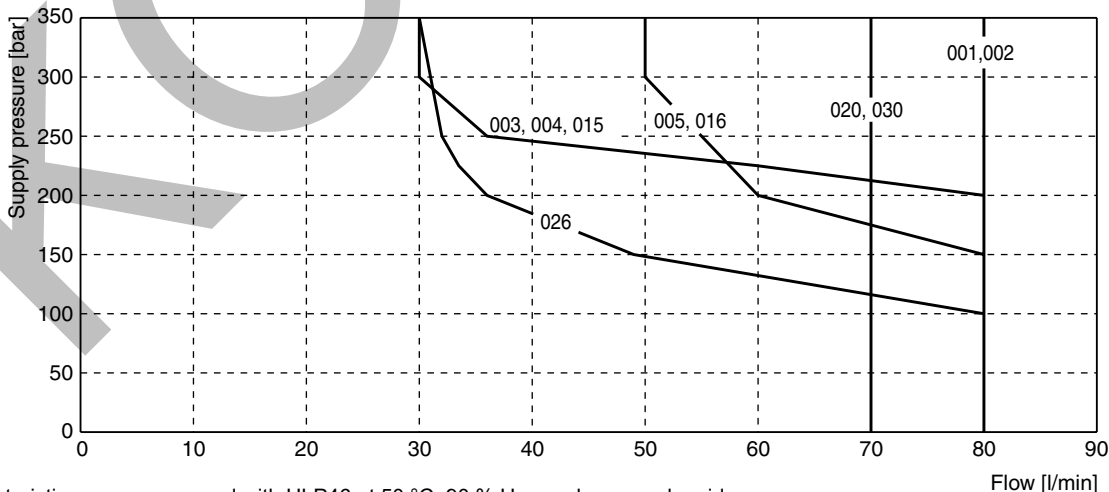


All characteristic curves measured with HLP46 at 50 °C.

**Shift limit diagram**

The diagram below specifies the shift limits. Valves with spool position “F” or “M” can only be operated up to 70 % of the limits. The specifications apply to a viscosity of 40 mm<sup>2</sup>/s and balanced flow conditions. The shift limits can

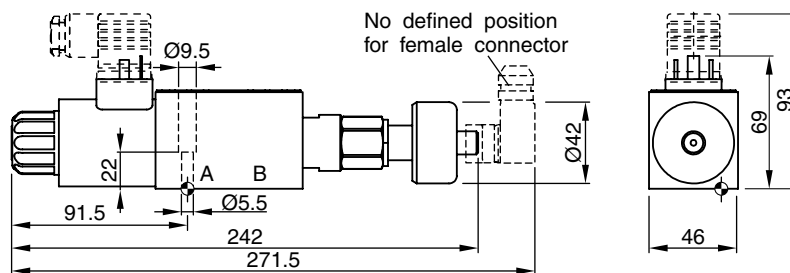
be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.



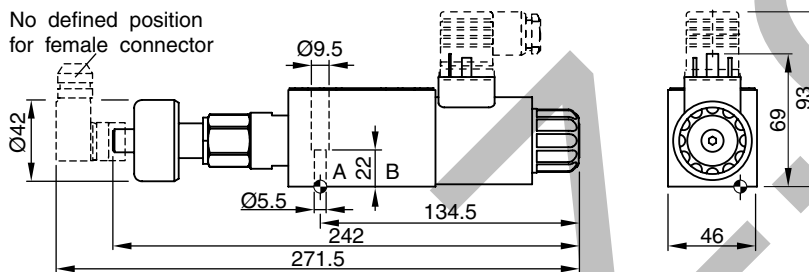
All characteristic curves measured with HLP46 at 50 °C, 90 % U<sub>nom</sub> and warm solenoids.



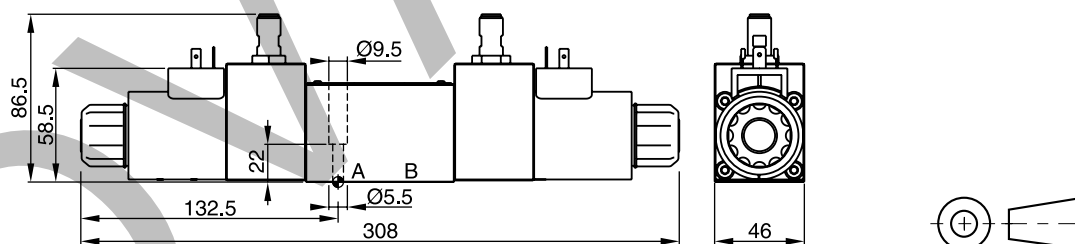
**Interface EN 175301-803, DC solenoid, without plug M12x1<sup>1)</sup>**  
**B, E, F -style**



**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 %	<b>NBR: SK-D1VW-N-91</b> FPM: SK-D1VW-V-91

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

**Attention:**

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

<sup>1)</sup> Please order plug M12x1 separately (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.