

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.

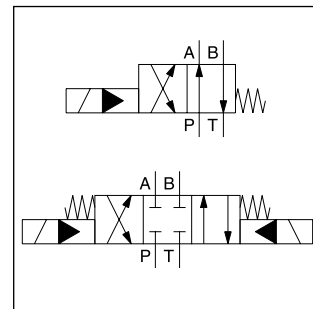
Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet) or an integral check valve.

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

Download: www.parker.com/euro_hcd - see "Literature"



D31DW



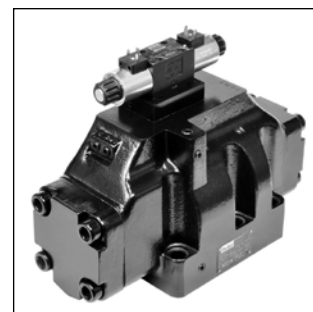
D31NW



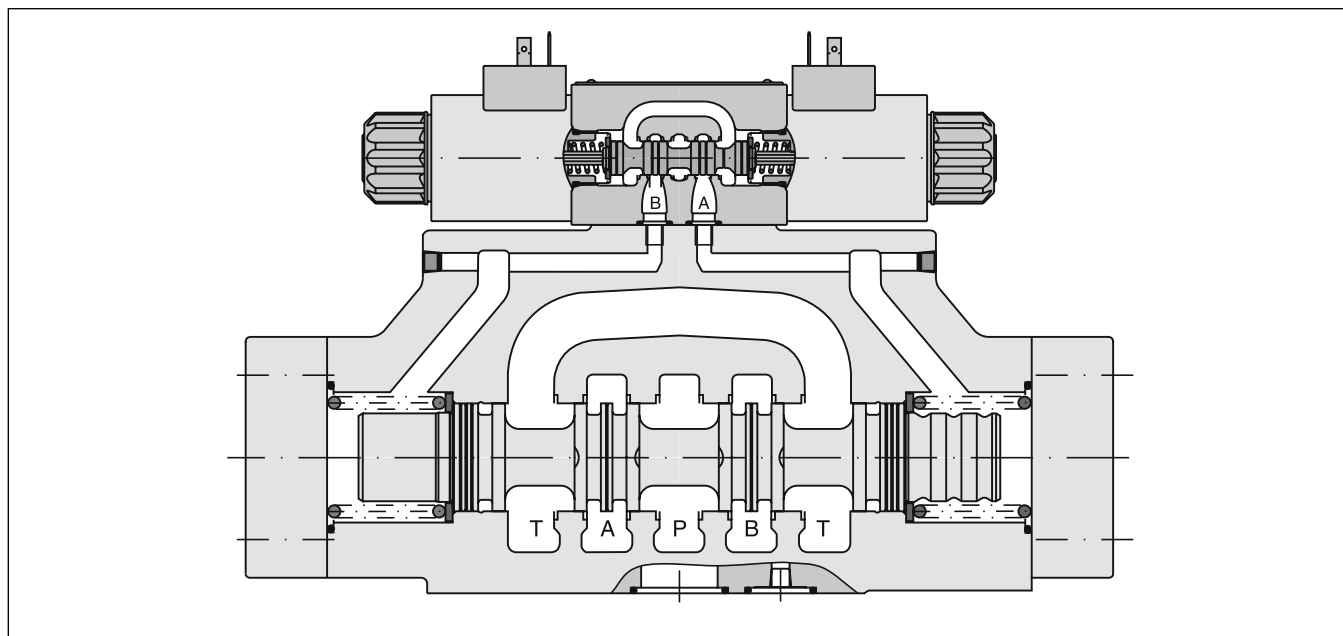
D41VW



D81VW



D111VW

D81VW

Ordering Code

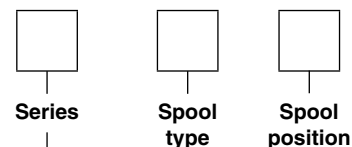
Pilot Operated Directional Control Valves
Series D31DW, D31NW, D*1VW

2

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

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

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



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

Ordering Code**Pilot Operated Directional Control Valves
Series D31DW, D31NW, D*1VW**

**Pilot oil
supply and
drain options**

Seals

**Solenoid
voltage**

W

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

**Solenoid
options**

**Access-
ories**

**Design
series
(not required
for ordering)**

Code	Accessories
omit	Standard valve w/o accessories
3A	Pilot choke, meter-out
3B	Pilot choke, meter-in
3C	Pilot with pressure reducing valve
3D ⁶⁾	Stroke adjustment side B
3E ⁶⁾	Stroke adjustment side A
3F ⁶⁾	Stroke adjustment side A and B
3R	meter-out + pressure reducing valve
1T	meter-in + pressure reducing valve

Code	Solenoid option
omit	Standard solenoid without options
T	without manual override

Code	Solenoid voltage
K	12 V =
J	24 V =
U ⁵⁾	98 V =
G ⁵⁾	205 V =
Y	110 V 50 Hz / 120 V 60 Hz
T	230 V 50 Hz / 240 V 60 Hz

Code	Seals
N	NBR
V	FPM

Code	Inlet	Outlet
1	Internal	External
2	External	External
3 ³⁾	Integral check valve	External
4 ⁴⁾	Internal	Internal
5	External	Internal
6 ³⁾	Integral check valve	Internal

2

Bold letters =
Short-term availability

Further spool types and solenoid voltages on request.
Explosion proof solenoids EEx e mb II see catalogue HY11-3343.

Download:

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	



Series

Spool
typeSpool
position

3 position spools		D31D	D31N	D41	D81/91	D111
Code	Spool type					
001		•	•	•	•	•
002		•	•	•	•	•
003		•	•	•	•	•
004		•	•	•	•	•
007				•	•	
009 ¹⁾		•	•	•	•	•
011		•	•	•	•	•
014				•	•	
015		•	•	•	•	•
021		•	•	•	•	•
022		•	•	•	•	•

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

3 position spools		
Code	Spool position	
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Kolbentyp 009
E	 Operated in position "a".	 Operated in position "b".
F²⁾	 Spring offset in position "b".	 Spring offset in position "a".
K	 Operated in position "b".	 Operated in position "a".
M²⁾	 Spring offset in position "a".	 Spring offset in position "b".

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

¹⁾ Consider specific spool position.²⁾ Not for D31NW.³⁾ Not for D31DW, D91VW and D111VW available.⁴⁾ Not for spools 002, 007, 009, 014, 030 available.⁵⁾ To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.⁶⁾ For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4N", "I5N" or "I6N" (start position monitored) are required.⁷⁾ The plug M12 x 1 for the position control is not 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.

**Pilot oil
supply and
drain options**

Seals

**Solenoid
voltage**

W

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

**Solenoid
options**

**Access-
ories**

**Design
series**
(not required
for ordering)

Code	Spool position	Position control
I3N ⁷⁾	C	End position monitored, side A and B
I6N ⁷⁾		Start position monitored, side A and B
I2N ⁷⁾	C, B, E, F (all spools) C, K, M (spool 9)	End position monitored, side B
I5N ⁷⁾		Start position monitored, side B
I1N ⁷⁾	C, H, K, M (all spools) C, E, F (spool 9)	End position monitored, side A
I4N ⁷⁾		Start position monitored, side A

Code	Solenoid option
omit	Standard solenoid without options
T ⁶⁾	without manual override

Code	Solenoid voltage
K	12 V =
J	24 V =
U ⁵⁾	98 V =
G ⁵⁾	205 V =

Code	Seals
N	NBR
V	FPM

Code	Inlet	Outlet
1	Internal	External
2	External	External
3 ³⁾	Integral check valve	External
4 ⁴⁾	Internal	Internal
5	External	Internal
6 ³⁾	Integral check valve	Internal

Attention:

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

General									
Design			Directional spool valve						
Actuation			Solenoid						
Series			D31DW	D31NW	D41VW	D81/91VW	D111VW		
Size			NG10	NG10	NG16	NG25	NG32		
Weight (1/ 2 solenoids)		[kg]	6.0 / 6.6	7.6 / 8.1	9.7 / 10.3	17.9 / 18.6	67.4 / 68.0		
Mounting interface			DIN 24340 A10	DIN 24340 A10	DIN 24340 A16	DIN 24340 A25	DIN 24340 A32		
			ISO 4401	ISO 4401	ISO 4401	ISO 4401	ISO 4401		
			NFPA D05	NFPA D05	NFPA D07	NFPA D08	NFPA D10		
			CETOP RP 121-H						
Mounting position			unrestricted, preferably horizontal						
Ambient temperature		[°C]	-25...+60 (without inductive position control) 0...+60 (with inductive position control)						
		[°C]							
MTTF _p value		[years]	75						
Hydraulic									
Max. operating pressure			[bar]	Pilot drain internal: P, A B, X: 350; T, Y: 105 Pilot drain external: P, A B, T, X: 350; Y: 105					
			[bar]						
Fluid			Hydraulic oil according to DIN 51524						
Fluid temperature			[°C]	-20 ... +70 (NBR: -25...+70), (without inductive position control) 0...+70 (with inductive position control)					
			[°C]						
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]	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.			[mm²]	3 x 1.5 recommended					
Wiring length max.			[m]	50 recommended					

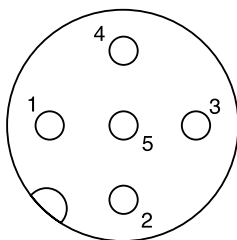
With electrical connections the protective conductor (PE ↓) must be connected according to the relevant regulations.

Electrical characteristics of position control M12x1

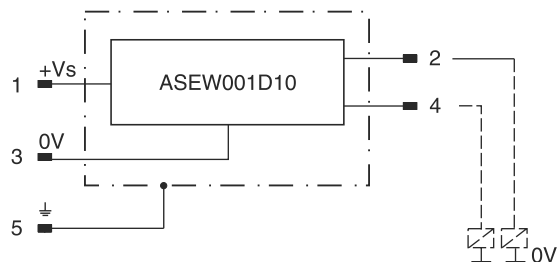
Protection class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient temperature	[°C]	0...+50
Supply voltage U_s / ripple	[V]	18...42 / 10 %
Current consumption without load	[mA]	≤ 30
Max. output current per channel, ohmic	[mA]	400
Min. output load per channel, ohmic	[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.	[mm²]	5 x 0.25 brad 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).

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

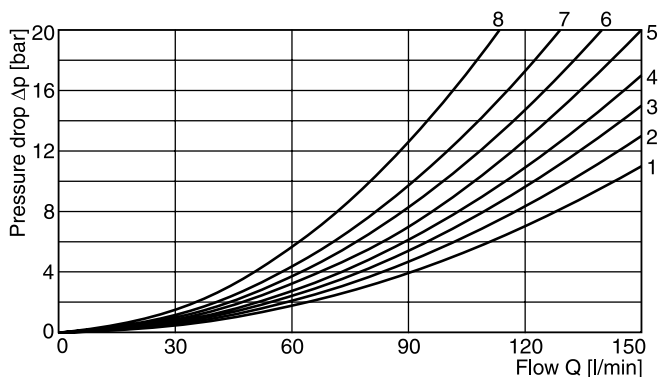
The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number

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

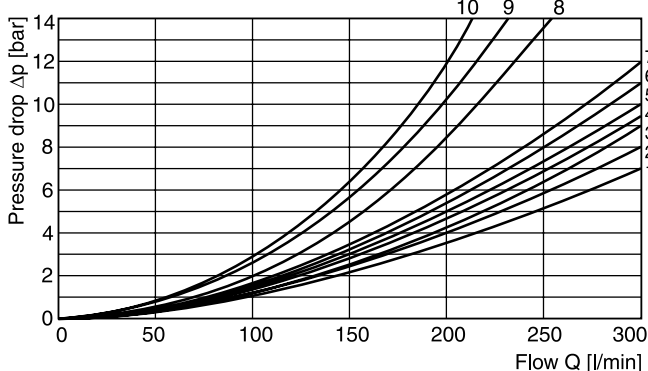
D31DW and D41VW

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



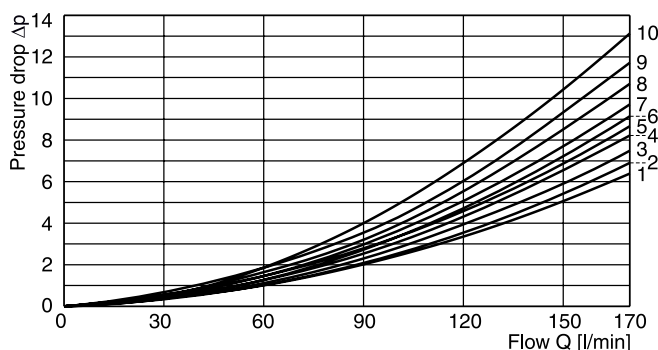
D41VW



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

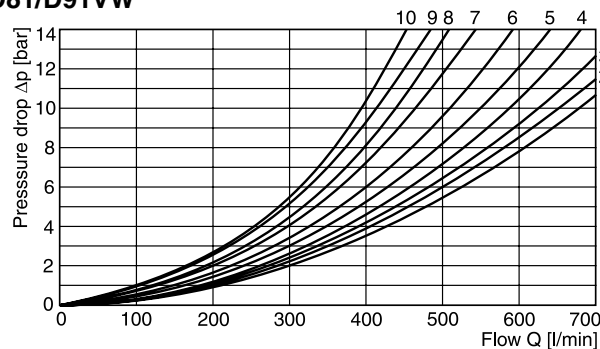


All characteristic curves measured with HLP46 at 50 °C.

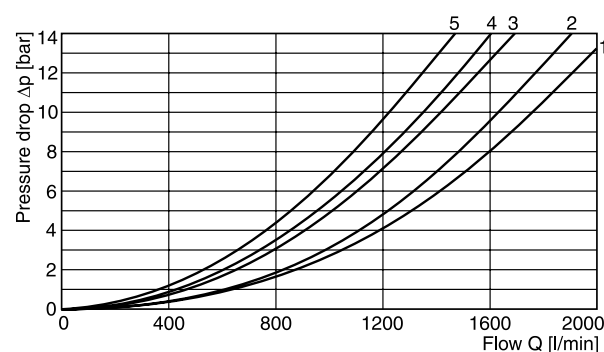
D81/D91VW and D111VW

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



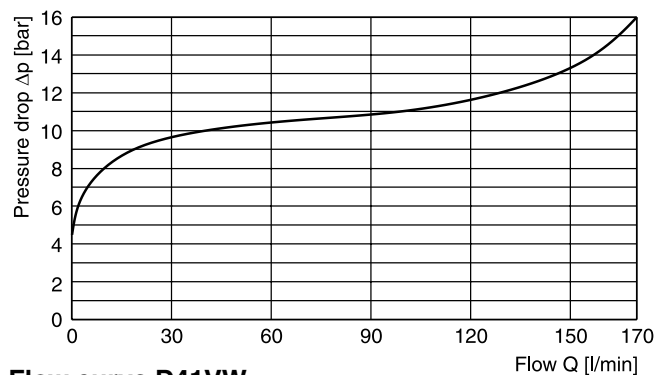
D111VW



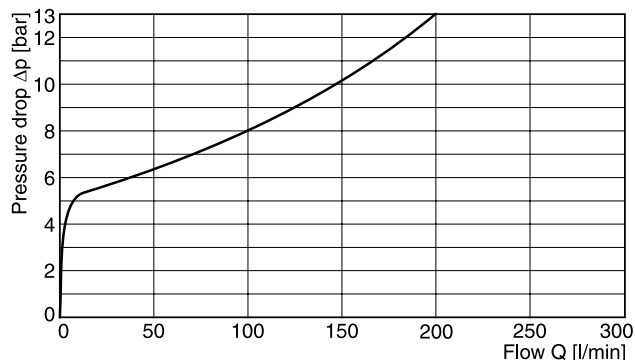
Integral check valve in the P port

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.

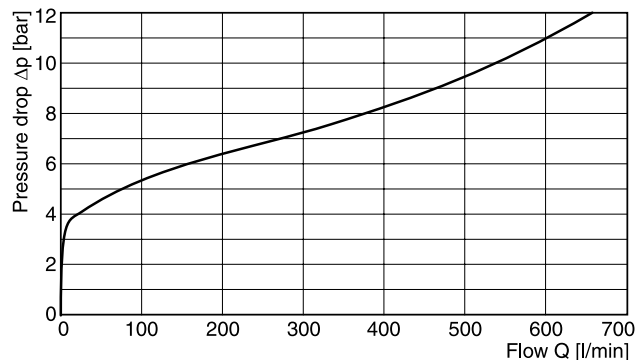
Flow curve D31NW



Flow curve D41VW

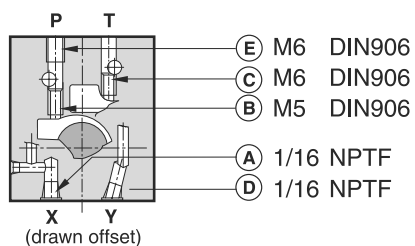


Flow curve D81VW



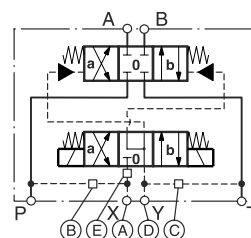
All characteristic curves measured with HLP46 at 50 °C.

D31DW

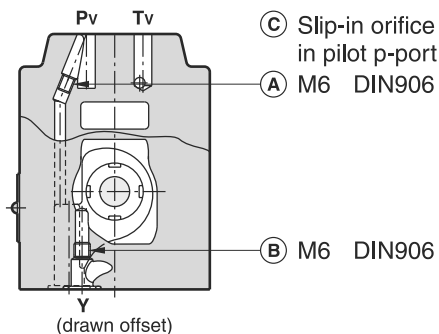


○ open, ● closed

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

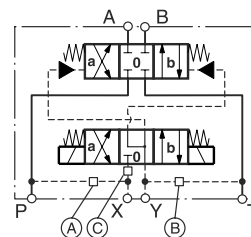


D31NW

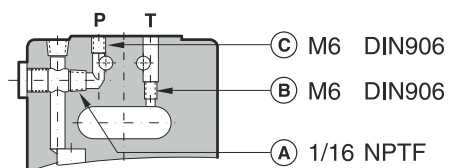


○ open, ● closed

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

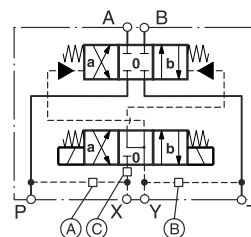


D41VW

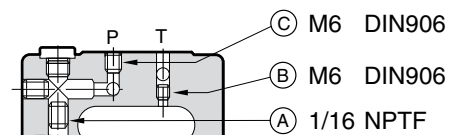


○ open, ● closed

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

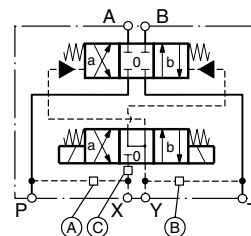


D81/91VW

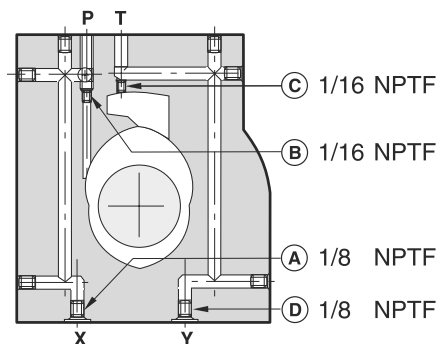


○ open, ● closed

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

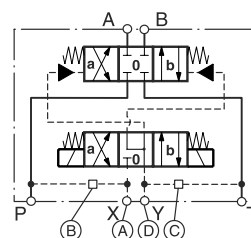


D111VW



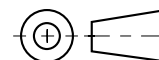
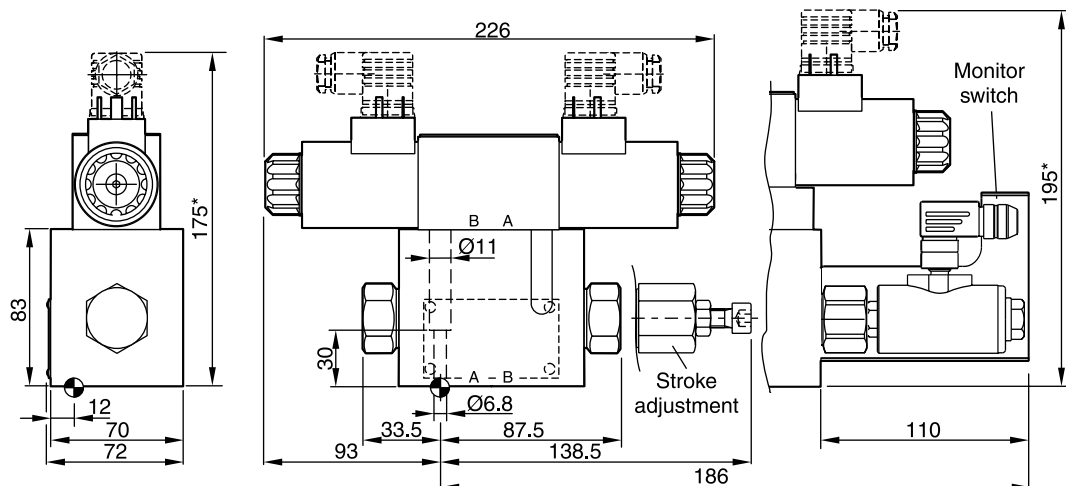
○ open, ● closed

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	●	○	○



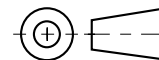
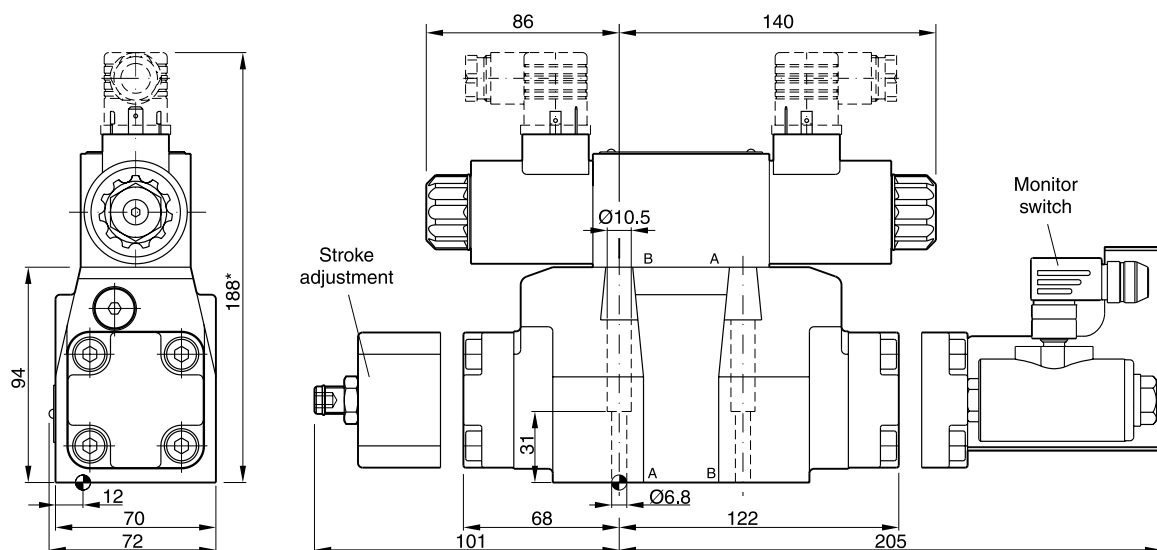
All orifice sizes for standard valves.

D31DW



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

D31NW

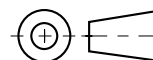
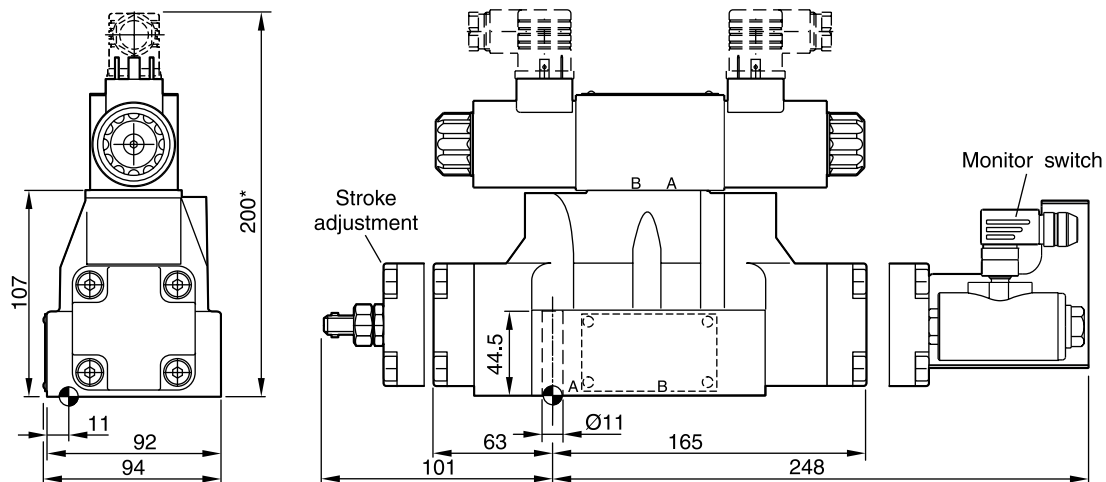


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{\max} 6.3}$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm $\pm 15\%$	NBR: SK-D31NW-N-91 FPM: SK-D31NW-V-91

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

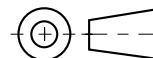
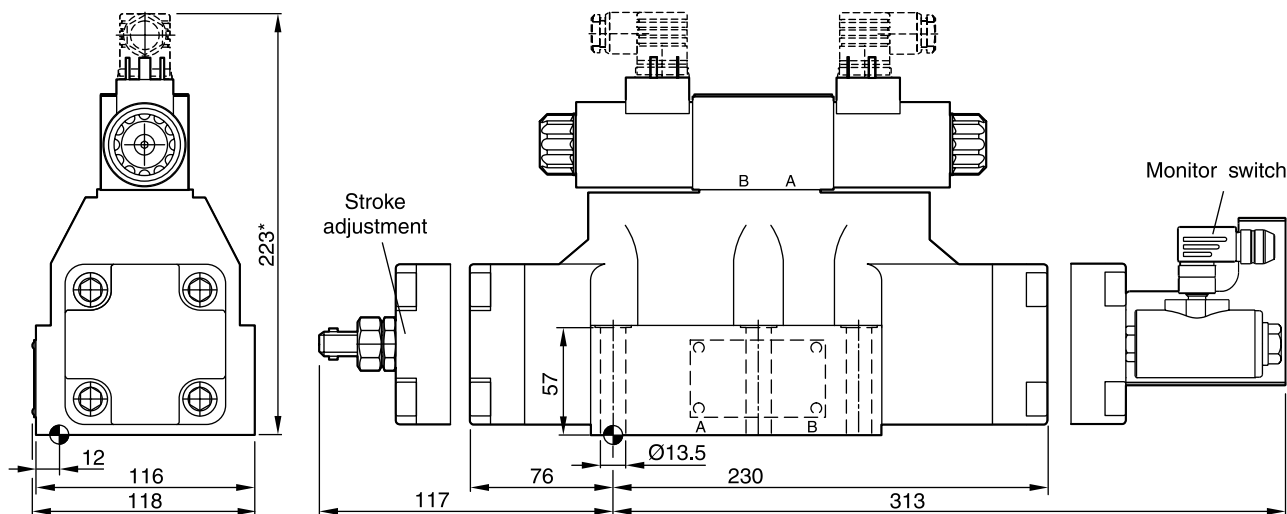
* Please add for each sandwich plate +40 mm (pressure reducing valve, choke valve meter-in/-out).

D41VW



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

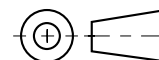
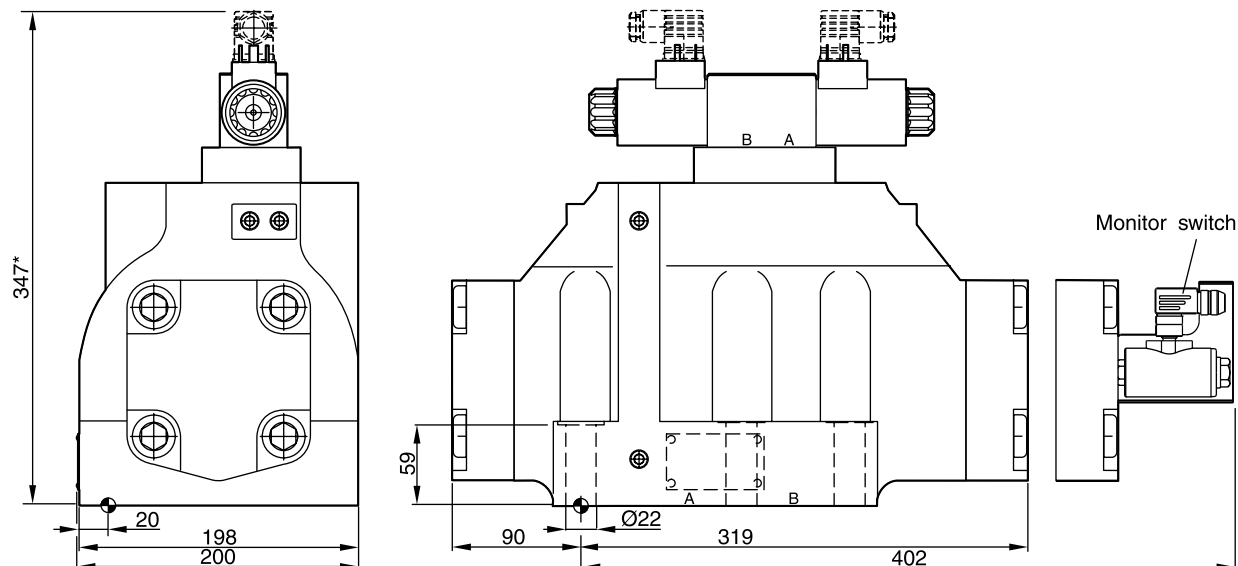
D81VW, D91VW

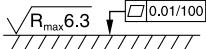


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK360	6x M12x75 ISO 4762-12.9	108 Nm $\pm 15\%$	NBR: SK-D81VW-N-91 / SK-D91VW-N-91 FPM: SK-D81VW-V-91 / SK-D91VW-V-91

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

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

D111VW

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

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

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