

The pilot operated proportional directional valves D*1FC are available in 4 sizes:

D31FC - NG10 (CETOP 05)

D41FC - NG16 (CETOP 07)

D91FC - NG25 (CETOP 08)

D111FC - NG32 (CETOP 10)

The digital onboard electronics is situated in a robust metal housing, which allows the usage under rough environmental conditions.

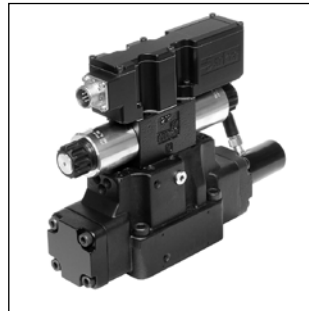
The nominal values are factory set. The cable connection to a serial RS232 interface is available as accessory.

The innovative integrated regenerative function into the A-line (optional) allows energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.

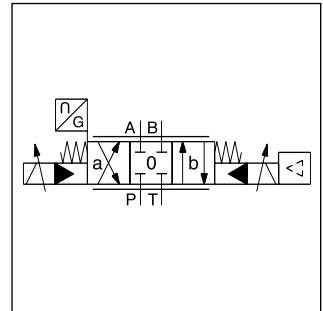
Technical Features

- Progressive flow characteristics for sensitive adjustment
- Low hysteresis
- High dynamics
- High flow capacity
- Centre position monitoring optional
- Energy saving A-regeneration optional
- Switchable hybrid version optional

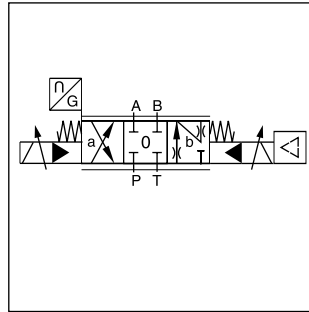
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



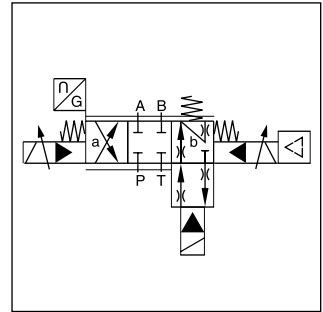
D41FC



Standard D*1FC

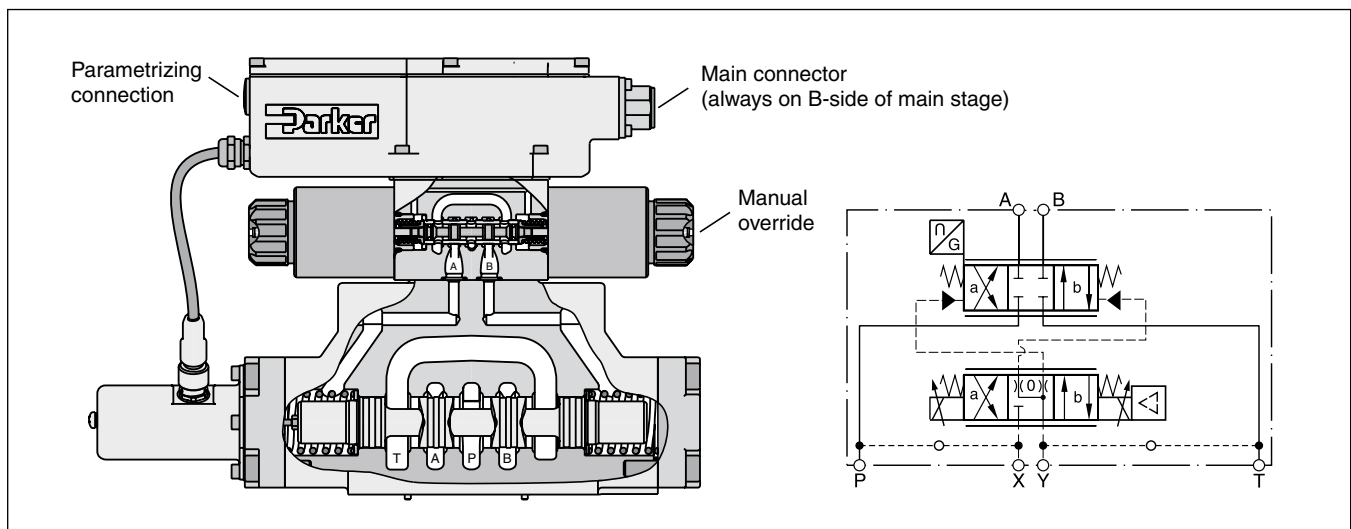


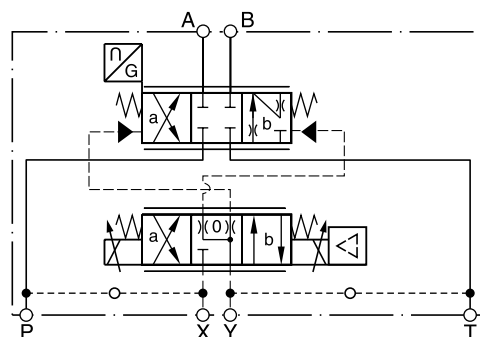
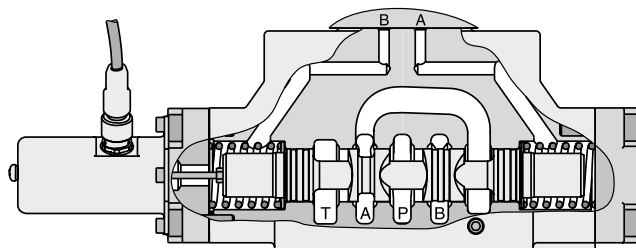
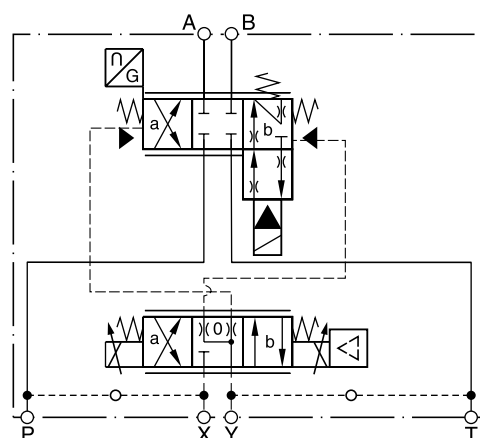
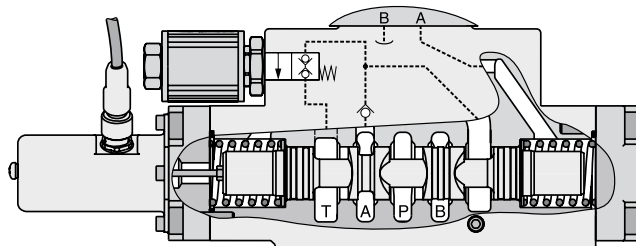
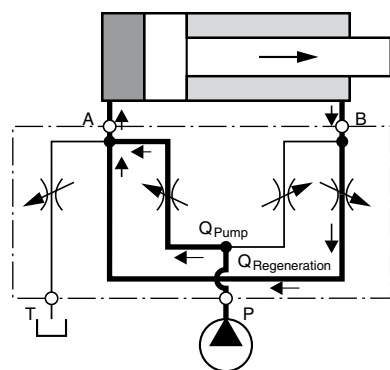
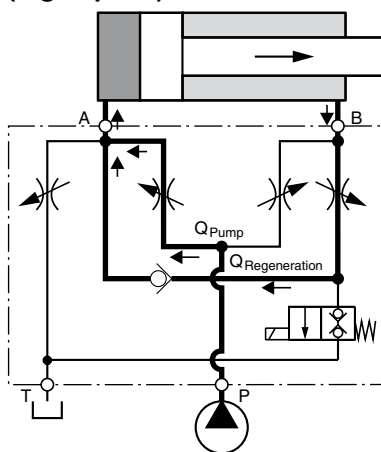
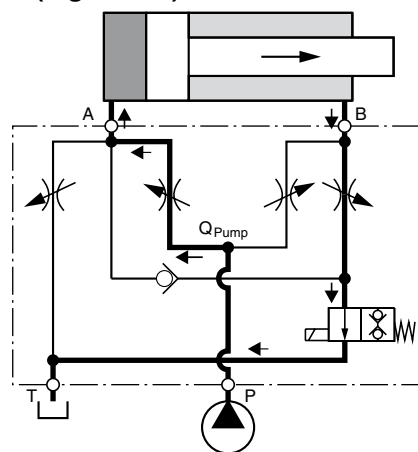
Regeneration D*1FCR



Hybrid D*1FCZ

D41FC



D*1FCR and D*1FCZ**Regenerative valve D*1FCR****Hybrid valve D*1FCZ****D*1FCR (regenerative valve)
Cylinder extending
(high speed)****D*1FCZ (hybrid valve)
Cylinder extending
regenerative mode
(high speed)****Cylinder extending
standard mode
(high force)****Flow rate in % of nominal flow**

Size	spool	Port					
		A-T	P-A	P-B	B-A (R-valve)	B-A (hybrid)	B-T (hybrid)
D41FCR/Z	31/32	100 %	50 %	100 %	50 %	45 %	20 %
D91FCR/Z	31/32	100 %	50 %	100 %	50 %	50 %	25 %
D111FCR/Z	31/32	100 %	50 %	100 %	50 %	50 %	20 %

Ordering Code

Pilot Operated Proportional DC Valve
Series D*1FC

D

1

F

C

C

Directional control valve

Size

NG06 pilot

Proportional control

Integrated electronics with position feedback

Function

Flow

Spool position on power down

Pilot connection

Seal

Command signal

Electronic option

Valve option

Design series (not required for ordering)

Code	Nominal size
3	NG10 / CETOP 05
4	NG16 / CETOP 07
9 ¹⁾	NG25 / CETOP 08
11	NG32 / CETOP 10

Code	Valve option
0	Standard for spool type B, E R
8 ^{6) 7)}	Monitor switch
L ⁵⁾	Hybrid valve 24V normally closed for spool type Z

Code	Electronic option ⁴⁾
0	6+PE acc. EN175201-804
7	6+PE + enable

Standard		Regenerative function ²⁾		Hybrid function ^{2) 3)}	
Code	Spool type	Code	Spool type	Code	Spool type
Overlap 10 %, electrically normalized					
E01					
E02					
B31	$Q_B = Q_A / 2$ 	R31		Z31	
B32	$Q_B = Q_A / 2$ 	R32		Z32	

Code	Flow [l/min]			
	at $\Delta p = 5$ bar per metering edge			
	D31	D41	D91	D111
D	90	—	—	—
E	120	—	—	—
F	—	200	—	—
H	—	—	450	—
L	—	—	—	1000

Code	Command signal	Function
B	0...±10 V	0...+10 V P -> B
E	0...±20 mA	0...+20 mA P -> B
K	0...±10 V	0...+10 V P -> A
S	4...20 mA	12...20 mA P -> A

Code	Seal
N	NBR
V	FPM

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

Short delivery time for all variations

Parametrizing cable OBE → RS232, item no. 40982923

¹⁾ With enlarged connections Ø 32 mm²⁾ For regenerative and hybrid function at D31FB (NG10) please refer solutions with sandwich- and adaptor plates "A10-1664 / A10-1665L / H10-1662 / H10-1666L" in chapter 12.

D31FC spool type: R31 R32

T_1 P T_2

³⁾ Not for D31FC⁴⁾ Please order plugs separately, see accessories⁵⁾ See page "regenerative and hybrid function" (not for D31FC)⁶⁾ Not for D111FCZ*⁷⁾ Monitor switch for hybrid valves: code 8 includes options of code L (24 V normally closed)

General					
Design	Pilot operated DC valve				
Actuation	Proportional solenoid				
Size	NG10 (CETOP 05) D31	NG16 (CETOP 07) D41	NG25 (CETOP 08) D91	NG32 (CETOP 10) D111	
Mounting interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA				
Mounting position	unrestricted				
Ambient temperature	[°C]	-20...+60			
MTTF _D value ¹⁾	[years]	75			
Weight	[kg]	9.0	12.5	21.0	68.5
Vibration resistance	[g]	10 Sinus 5...200 Hz acc. IEC 68-2-6			
		30 Random noise 20...20 Hz acc. IEC 68-2-36			
		15 Shock acc. IEC 68-2-27			
Hydraulic					
Max. operating pressure	[bar]	Pilot drain internal: P, A, B, X 350; T, Y 210			
	[bar]	Pilot drain external: P, A, B, T, X 350; Y 210			
Fluid	Hydraulic oil according to DIN 51524 ... 535, other on request				
Fluid temperature	[°C]	-20...+60 (NBR: -25...+60)			
Viscosity permitted	[cSt] / [mm²/s]	20...400			
Viscosity recommended	[cSt] / [mm²/s]	30...80			
Filtration	ISO 4406 (1999); 18/16/13				
Nominal flow					
at Δp=5 bar per control edge ²⁾	[l/min]	90 / 120	200	450	1000
Leakage at 100 bar, main stage	[ml/min]	200	200	600	1000
Leakage at 100 bar, pilot stage	[ml/min]	<100			
Overlap	[%]	electrically normalized at 10 (see flow characteristics)			
Pilot supply pressure	[bar]	20 - 350			
Pilot flow, step response	[l/min]	2.9	4.1	6.7	15
Static / Dynamic					
Step response at 100 % step ³⁾	[ms]	35	37	66	120
Hysteresis	[%]	≤ 0.1			
Sensitivity	[%]	≤ 0.05			

¹⁾ If valves with onboard electronics are used in safety-related parts of control systems, in case the safety function is requested, the valve electronics voltage supply is to be switched off by a suitable switching element with sufficient reliability.

²⁾ Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

³⁾ Measured with load (210 bar pressure drop / two control edges)

Electrical characteristics			
Duty ratio		[%]	100
Protection class			IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Supply voltage/ripple DC		[V]	18...30, electric shut-off at < 17, ripple < 5 % eff., surge free
Current consumption max.		[A]	2.0
Pre fusing medium lag		[A]	2.5
Command signal			
Code K (B)	Voltage	[V]	10...0...-10, ripple <0.01 % eff., surge free, 0...+10 V P→A (P→B)
	Impedance	[kOhm]	100
Code E	Current	[mA]	20...0...-20, ripple <0.01 % eff., surge free, 0...+20 mA P→B
	Impedance	[Ohm]	200
Code S	Current	[mA]	4...12...20, ripple <0.01 % eff., surge free, 12...20 mA P→A < 3.6 mA = enable off, > 3.8 mA = enable on acc. to NAMUR NE43
	Impedance	[Ohm]	200
Differential input max.	Code 0/7	[V]	30 for terminal D and E against PE (terminal G)
	Code 0	[V]	11 for terminal D and E against 0 V (terminal B)
Adjustment ranges	Min	[%]	0...50
	Max	[%]	50...100
	Ramp	[s]	0...32.5
Interface			RS 232, parametrizing connection 5pole
Enable signal (code 7)		[V]	5...30
Diagnostic signal		[V]	+10...0...-10 / +12.5 error detection, rated max. 5 mA
EMC			EN 61000-6-2, EN 61000-6-4
Electrical connection			6 + PE acc. to EN 175201-804
Wiring min.		[mm ²]	7 x 1.0 (AWG16) overall braid shield
Wiring length max.		[m]	50
Electrical characteristics hybrid option			
Duty ratio		[%]	100
Protection class			IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Supply voltage		[V]	24
Tolerance supply voltage		[%]	±10
Current consumption		[A]	1.21
Power consumption		[W]	29
Solenoid connection			Connector as per EN 175301-803
Wiring min.		[mm ²]	3 x 1.5 recommended
Wiring length max.		[m]	50 recommended

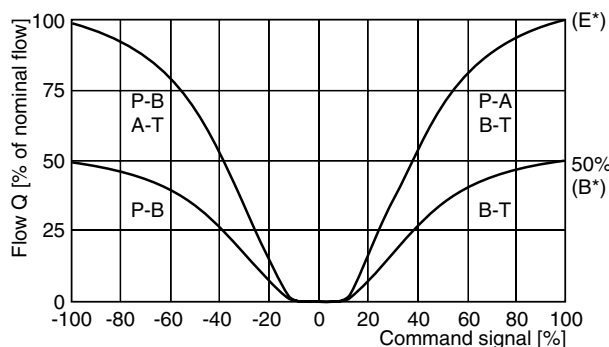
With electrical connections the protective conductor (PE $\perp$) must be connected according to the relevant regulations.

D*1FC B/E Flow characteristics

at $\Delta p = 5$ bar per metering edge

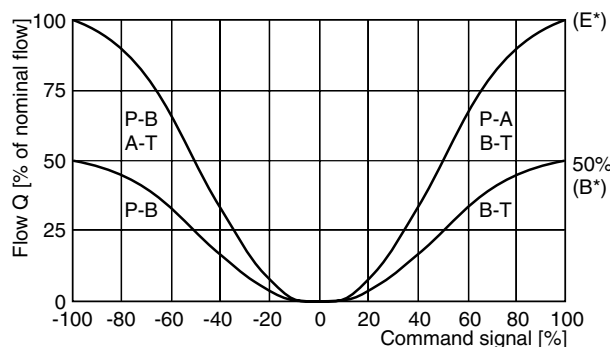
D31FC

Spool code E01, E02, B31, B32



D41FC

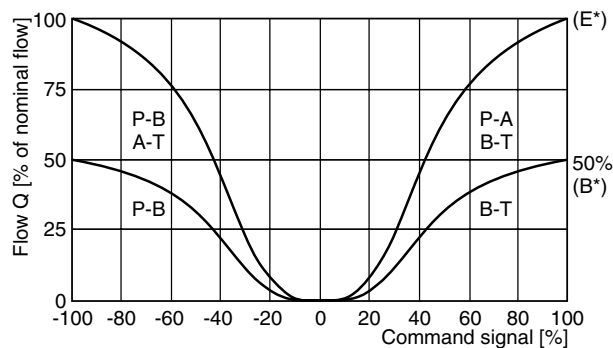
Spool code E01, E02, B31, B32



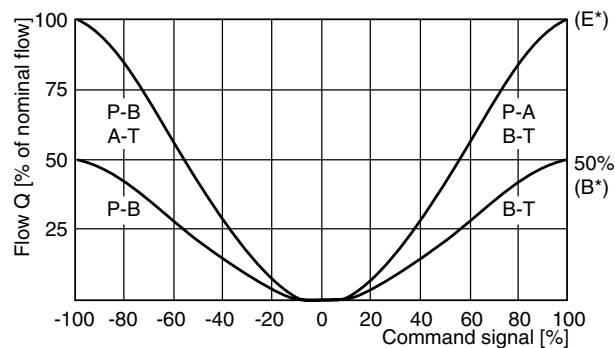
All characteristic curves measured with HLP46 at 50 °C.

Flow curves**D91FC**

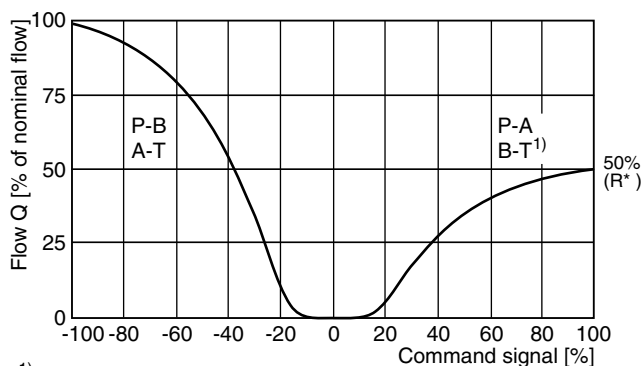
Spool type E01, E02, B31, B32

**D111FC**

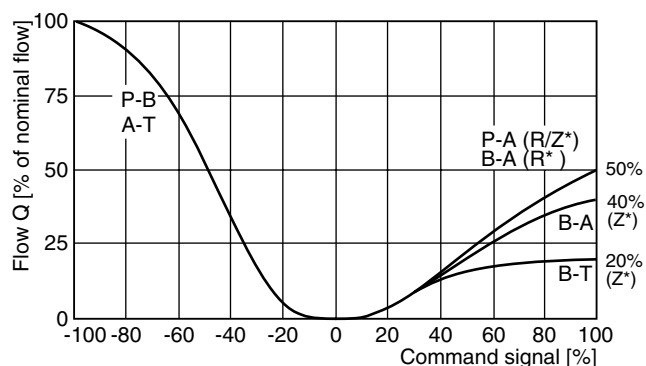
Spool type E01, E02, B31, B32

**Flow curves D*1FCR/Z**at $\Delta p = 5$ bar per metering edge**D31FC**

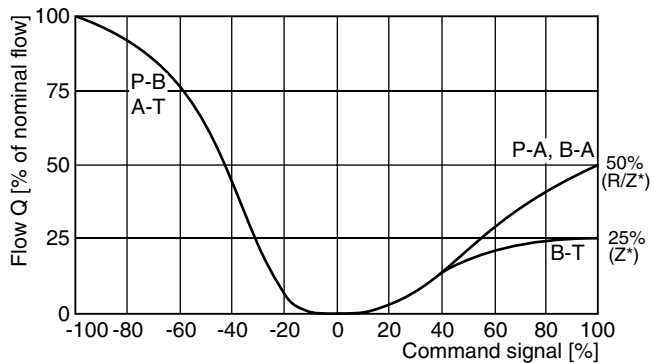
Spool type R31, R32

¹⁾ with 2 tank ports**D41FC**

Spool type R31, R32, Z31, Z32

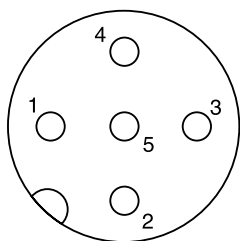
**D91FC**

Spool type R31, R32, Z31, Z32

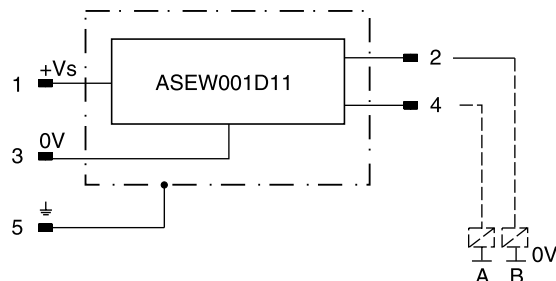
**D111FC**

spool type R/Z* on request

All characteristic curves measured with HLP46 at 50 °C.

Monitor switch M12x1 pin assignment

- 1 + Supply 18...42 V
- 2 output B (normally closed)
- 3 0 V
- 4 output A (normally closed)
- 5 Earth ground



The neutral position is monitored. The signal changes after less than 10 % of the spool stroke.

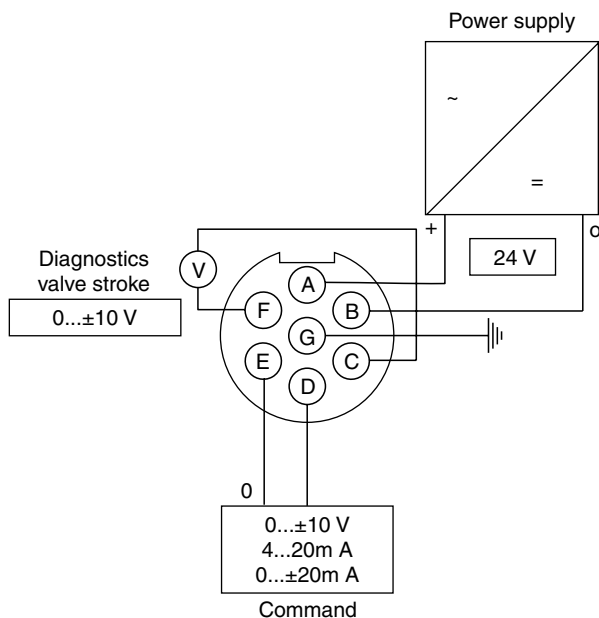
Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

Electrical monitor switch

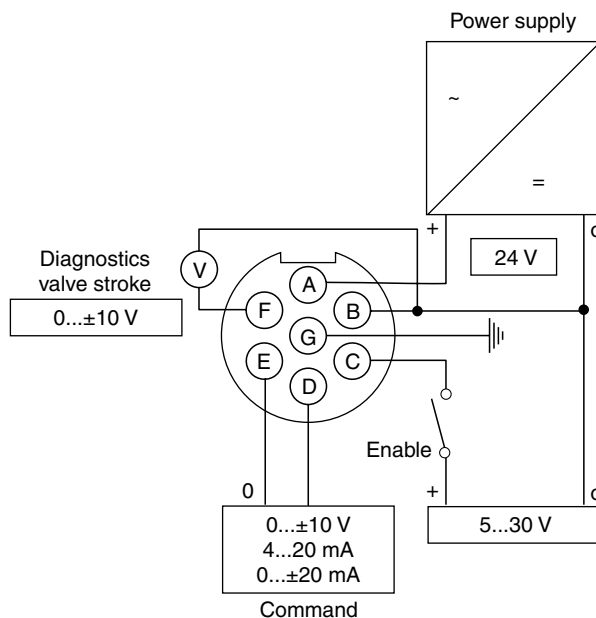
Protection class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)	
Ambient temperature	[°C]	0-70
Supply voltage/ripple	[V]	18...42, ripple < 10 % eff.
Current consumption without load	[mA]	< 30
Max. output current per channel, ohmic	[mA]	400
Min. output load per channel, ohmic	[kOhm]	100
Max. output drop at 0.2 A	[V]	< 1.1
Max. output drop at 0.4 A	[V]	< 1.6
EMC	EN61000-6-2, EN61000-6-4	
Max. tol. ambient field strength	[A/m]	1200
Min. distance to next AC solenoid	[m]	0.1
Interface	4+PE acc. IEC 61076-2-101 (M12)	
Wiring min.	[mm²]	5 x 0.5 (AWG 20) overall braid shield
Wiring length max.	[m]	50

Wiring

Code 0, 6 + PE acc. EN 175201-804



Code 7, 6 + PE acc. EN 175201-804 + enable



ProPxD interface program

The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

The PC software can be downloaded free of charge at www.parker.com/euro_hcd – see page “Support”.

Features

- Comfortable editing of valve parameters
- Saving and loading of customized parameter sets
- Executable with all Windows® operating systems from Windows® XP upwards
- Simple communication between PC and valve electronics via serial interface RS232

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

The parametrizing cable may be ordered under item no. 40982923.

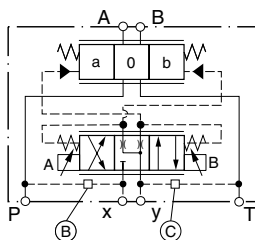
3

PC			Modul
No.	Value	Description	Module
P1	0.0	Zero Adjust [%]	
P3	100.0	Max [%] A-channel	
P4	100.0	Max [%] B-channel	
P7	0.0	Min [%] A-channel	
P8	0.0	Min [%] B-channel	
S5	0	ramp up [ms] A	
S6	0	ramp down [ms] A	
S7	0	ramp up [ms] B	
S8	0	ramp down [ms] B	

Pilot oil inlet (supply) and outlet (drain)

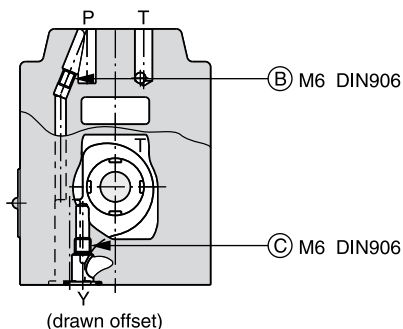
○ open, ● closed

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

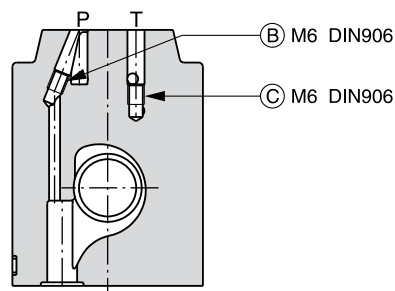


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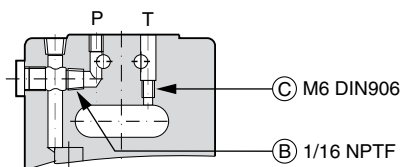
D31FCB/E



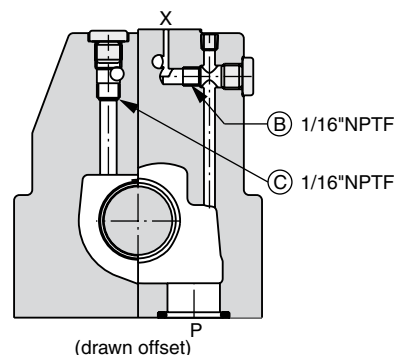
D31FCR



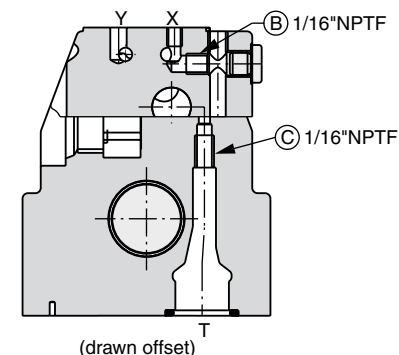
D41FCB/E



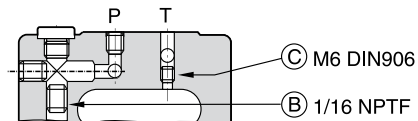
D41FCR



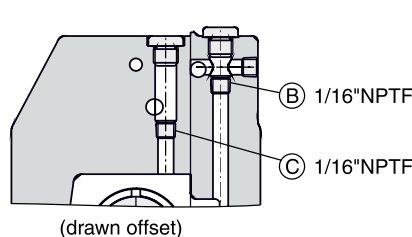
D41FCZ



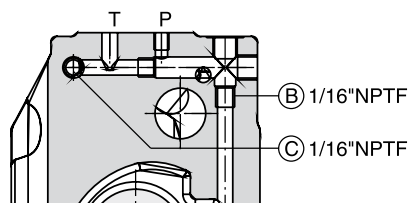
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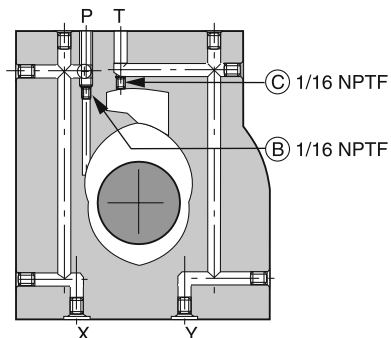
D91FCR



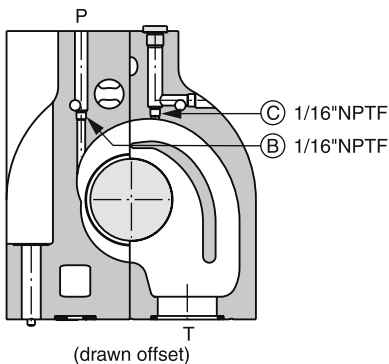
D91FCZ



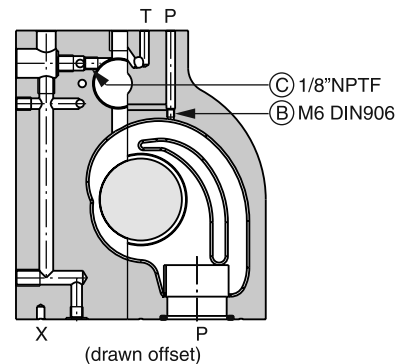
D111FCB/E

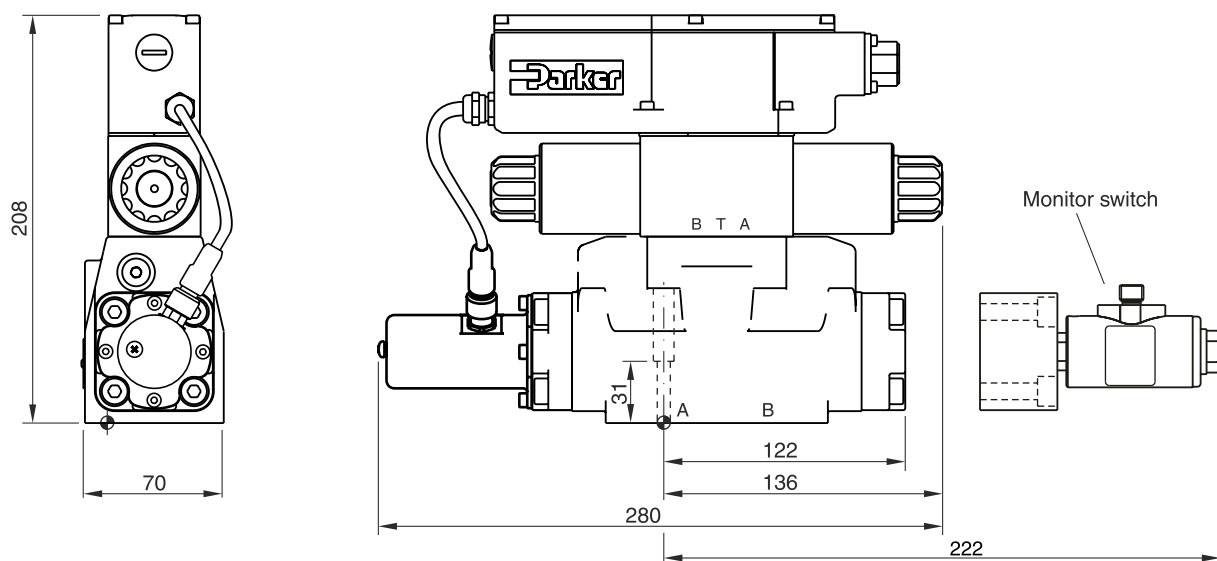


D111FCR

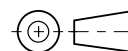


D111FCZ

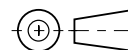
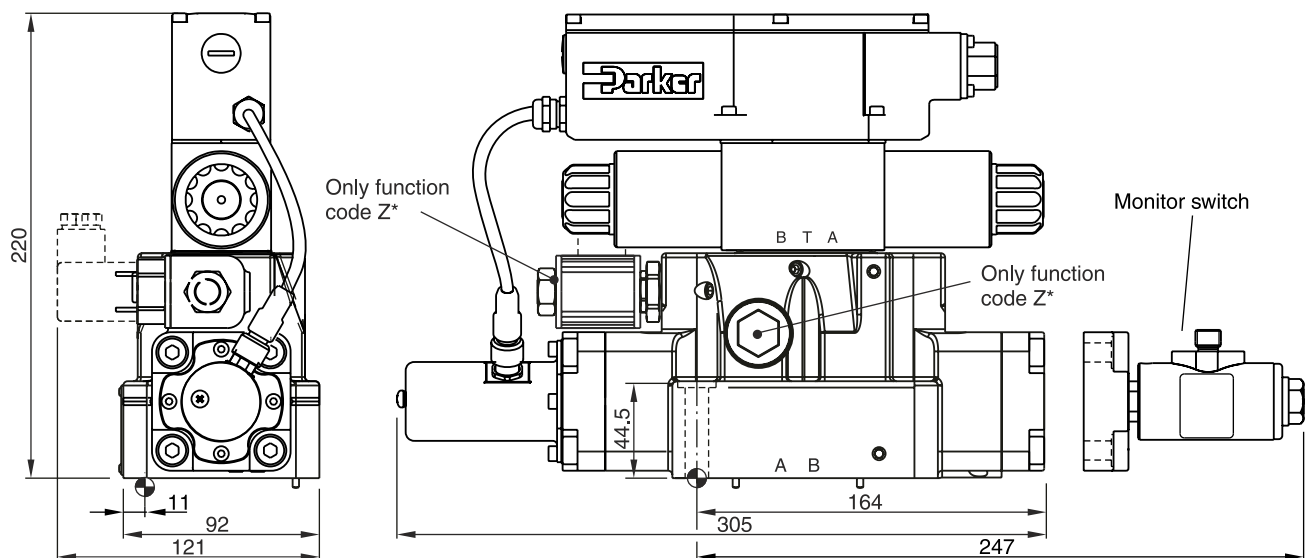


D31FC

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

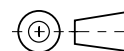
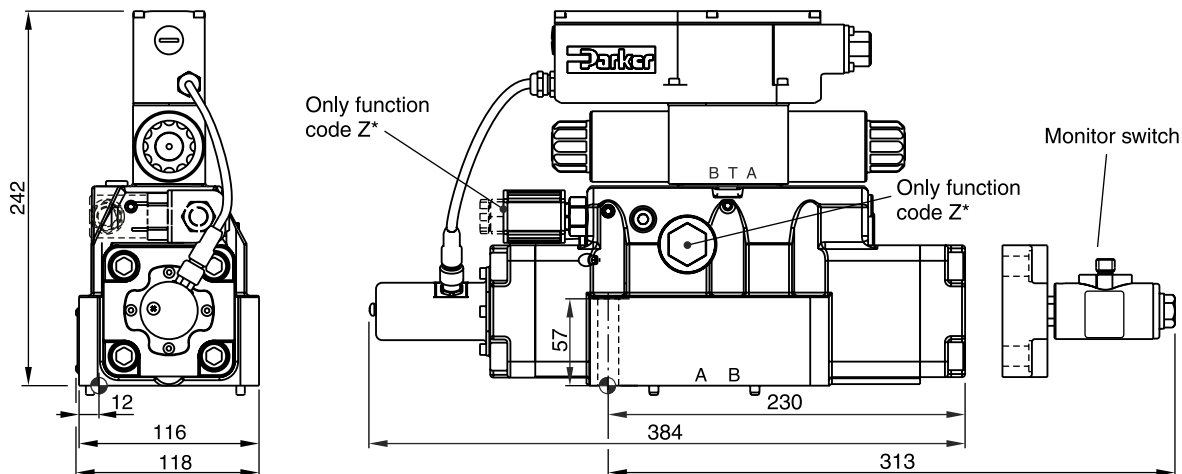


Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{\max} 6.3}$ $\downarrow$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm $\pm 15\%$	NBR: SK-D31FC FPM: SK-D31FC-V

D41FC

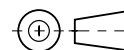
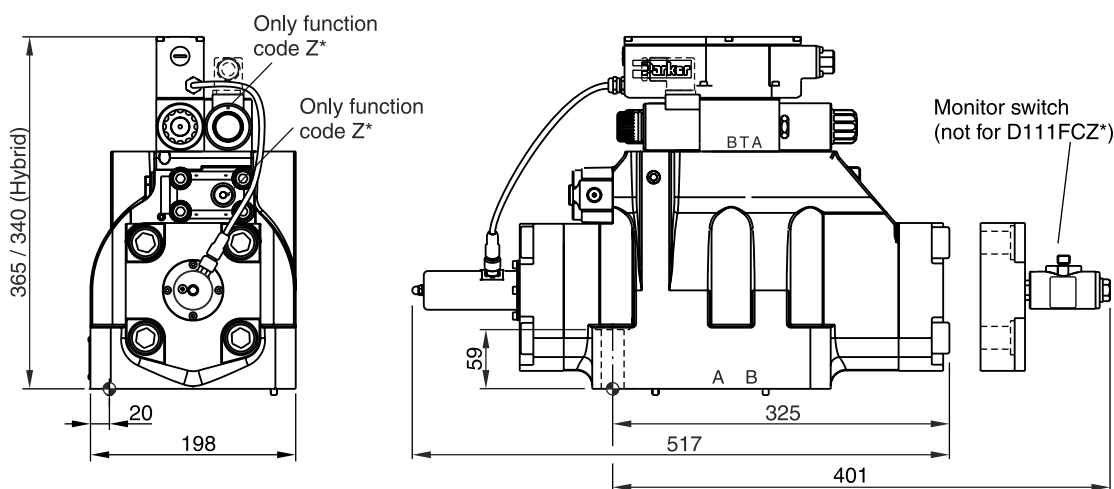
Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{\max} 6.3}$ $\downarrow$ $\square 0.01/100$	BK320	2x M6x55 4x M10x60 ISO 4762-12.9	13.2 Nm $\pm 15\%$ 63 Nm $\pm 15\%$	NBR: SK-D41FC FPM: SK-D41FC-V

D91FC



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-D91FC FPM: SK-D91FC-V

D111FC



Surface finish	Kit	Kit	Kit	Kit
$\sqrt{R_{\max} 6.3}$ $\square 0.01/100$	BK386	6x M20x90 ISO 4762-12.9	517 Nm $\pm 15\%$	NBR: SK-D111FC FPM: SK-D111FC-V