

The pilot operated proportional directional valves D*1FC with position feedback 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 parametrizing cable to connect to a serial RS232 interface is available as accessory.

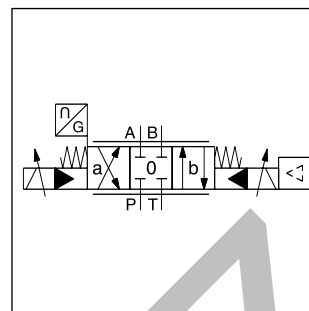
The innovative integrated regenerative function into the A-line (optional) allows energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.

Features

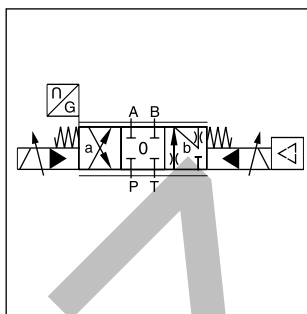
- Progressive flow characteristics for sensitive adjustment
- Low hysteresis
- High dynamics
- High flow capacity
- Centre position monitoring optional
- Energy saving A-regeneration optional
- Switchable hybrid version optional



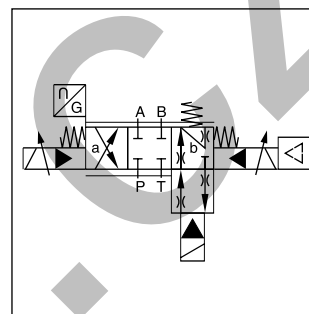
D41FC



Standard D*1FC

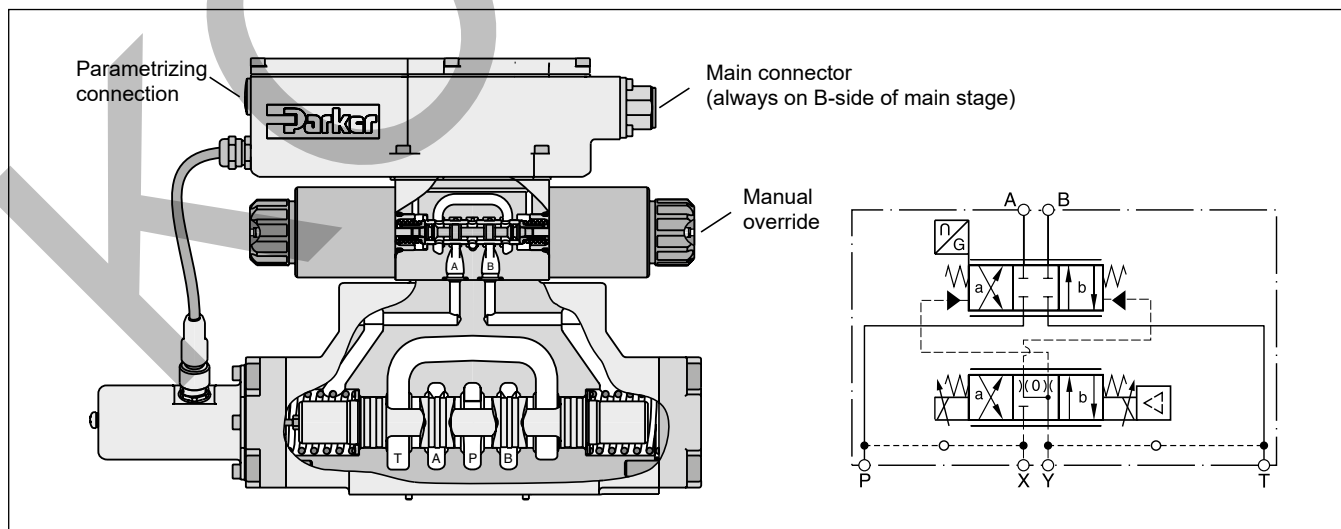


A-regeneration D*1FCR



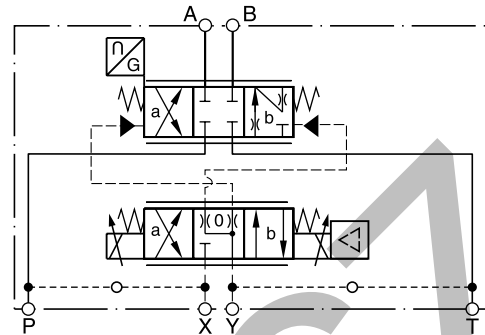
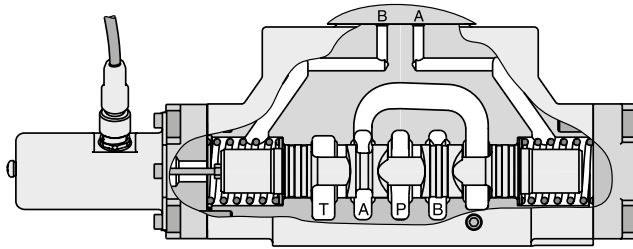
Hybrid D*1FCZ

D41FC

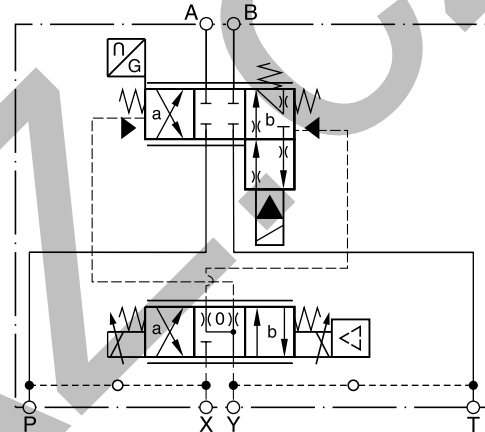
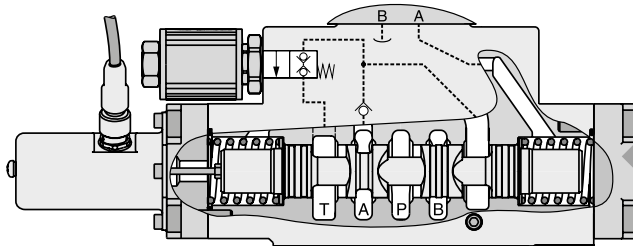


D*1FCR and D*1FCZ

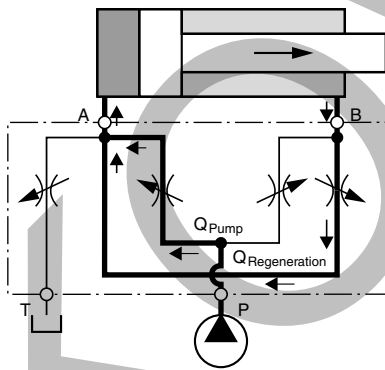
Regenerative valve D*1FCR



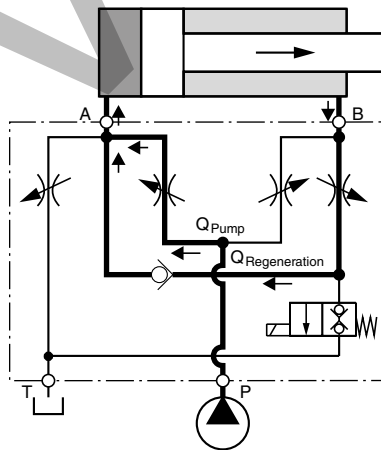
Hybrid valve D*1FCZ



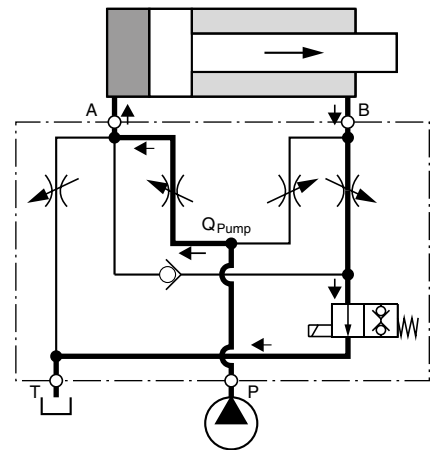
**D*1FCR (regenerative valve)
 Cylinder extending
 (high speed)**



**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 %

D

Directional control valve

1

NG06 pilot

F

Integrated electronics with position feedback

C

Proportional control

C

Flow

C

Spool position on power down

C

Pilot connection

C

Seal

C

Command signal

C

Electronic option

C

Valve option

C

Design series (not required for ordering)

Size

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

Function

Standard

Code	Spool type
Overlap	
E01	
E02	
B31	$Q_B = Q_A / 2$
B32	$Q_B = Q_A / 2$

Regenerative function ²⁾

Code	Spool type
Overlap	
R31	
R32	

Hybrid function ^{2) 3)}

Code	Spool type
Overlap	
Z31	
Z32	

Flow

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

Spool position on power down

Code	Spool position
a	0
b	1

Valve option

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

Electronic option

Code	Electronic option ⁴⁾
0	6+PE acc. EN175201-804
5	11+PE acc. EN175201-804
7	6+PE + enable acc. EN175201-804

Command signal

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

Seal

Code	Seal
N	NBR
V	FPM

Design series

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 mm.

²⁾ For regenerative and hybrid function at D31FC (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

³⁾ Not for D31FC.

⁴⁾ Please order plugs separately, see accessories.

⁵⁾ 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).

⁸⁾ Please order female connector M12x1 separately (see accessories, female connector M12x1 (order no.: 5004109).

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...2000 Hz acc. IEC 68-2-6 10 (RMS) Random noise 20...2000 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		
Fluid		[bar]	Pilot drain external: P, A, B, T, X 350; Y 210		
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; 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
pilot stage		[ml/min] <100			
Opening point		[%] set to 10 command signal (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			
Temperature drift		[%/K] < 0.005			
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: $Q_x = Q_{\text{Nom.}} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{\text{Nom.}}}}$

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

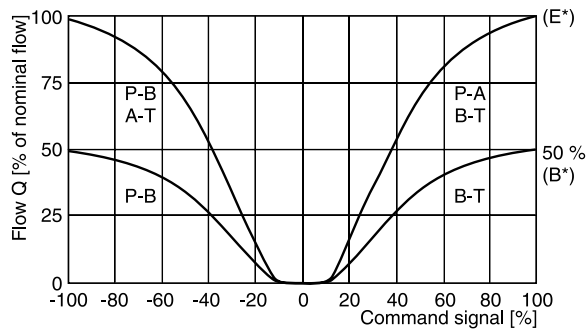
Electrical characteristics				
Duty ratio		[%]	100	
Protection class			IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)	
Supply voltage/ripple DC		[V]	18...30, electric shut-off at < 17, ripple < 5 % eff., surge free	
Current consumption max.		[A]	2.0	
Pre fusing medium lag		[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]	< 250	
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]	< 250	
Differential input max.		[V]		
Code 0/7			30 for terminal D and E against PE (terminal G)	
			11 for terminal D and E against 0 V (terminal B)	
Code 5			30 for terminal 4 and 5 against PE (terminal ⚡)	
			11 for terminal 4 and 5 against 0 V (terminal 2)	
Adjustment ranges	Min	[%]	0...50	
	Max	[%]	50...100	
	Ramp	[s]	0...32.5	
Interface			RS 232, parametrizing connection 5pole	
Enable signal (code 5/7)		[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	Code 0/7		6 + PE acc. to EN 175201-804	
	Code 5		11 + PE acc. to EN 175201-804	
Wiring min.	Code 0/7	[mm²]	7 x 1.0 (AWG20) overall braid shield	
	Code 5	[mm²]	8 x 1.0 (AWG20) 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.		[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.

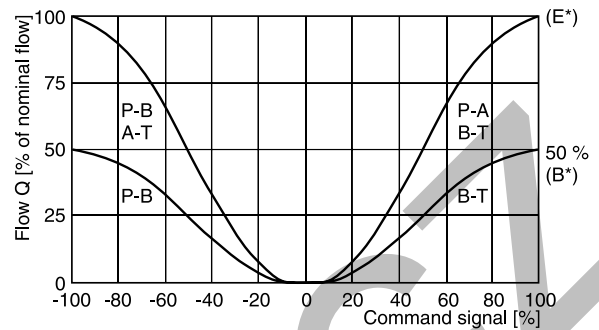
D*1FC B/E Flow characteristics

(set to opening point 10 %) at $\Delta p = 5$ bar per metering edge

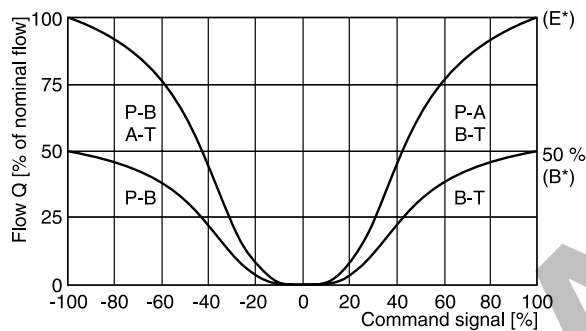
D31FC, Spool code E01, E02, B31, B32



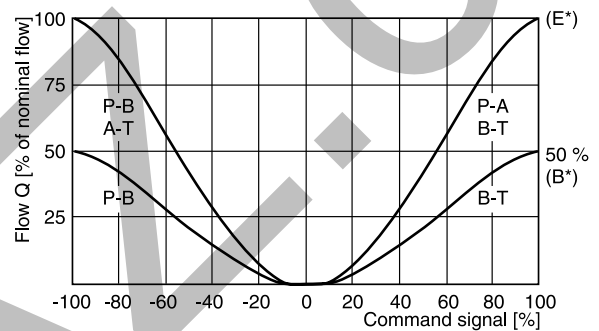
D41FC, Spool code E01, E02, B31, B32



D91FC, Spool type E01, E02, B31, B32



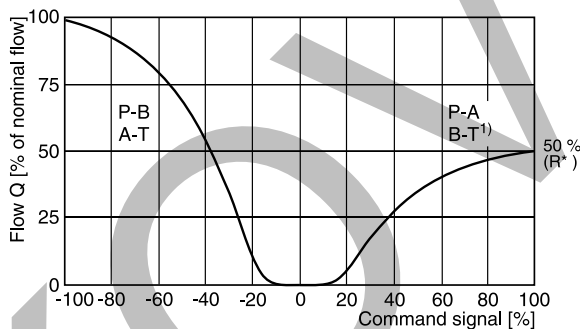
D111FC, Spool type E01, E02, B31, B32



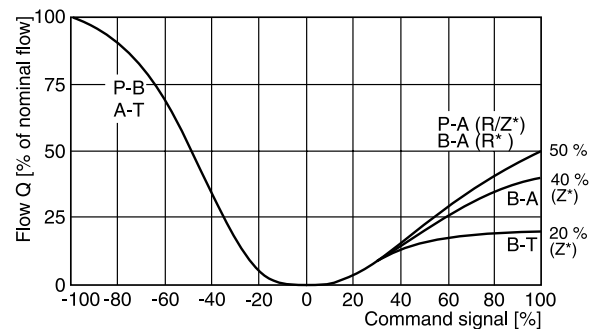
Flow characteristics D*1FCR/Z

(set to opening point 10 %) at $\Delta p = 5$ bar per metering edge

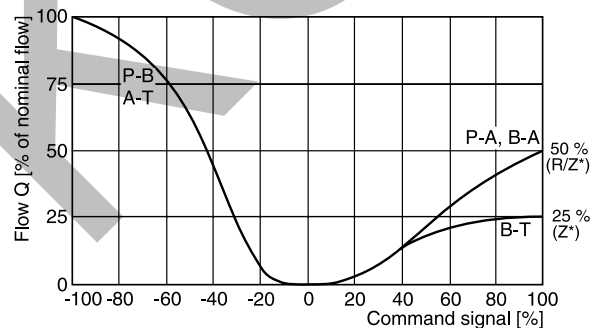
D31FC, Spool type R31, R32



D41FC, Spool type R31, R32, Z31, Z32



D91FC, Spool type R31, R32, Z31, Z32



D111FC, spool type R/Z* on request

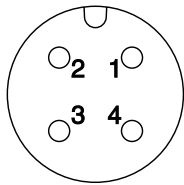
¹⁾ With 2 tank ports.

All characteristic curves measured with HLP46 at 50 °C.

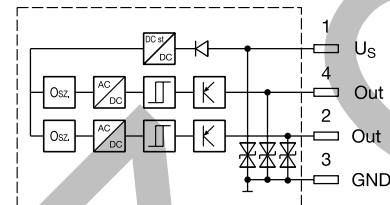
Electrical characteristics of position control M12x1 as per IEC 61076-2-101

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
CE conform		EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204
Min. distance to next AC solenoid	[m]	0.1
Interface		M12x1 acc. to IEC 61076-2-101

M12x1 connector pin assignment



- 1 + US 19.2...28.8 V
- 2 Output B (normally closed)
- 3 0 V
- 4 Output A (normally closed)



Outputs: Open collector

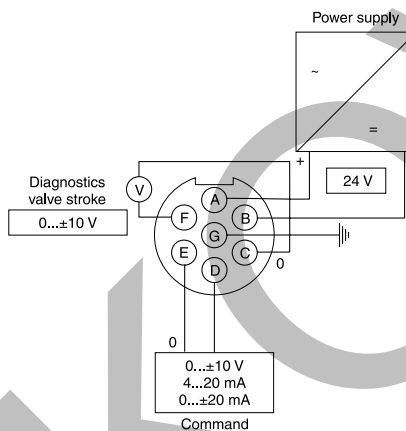
Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

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

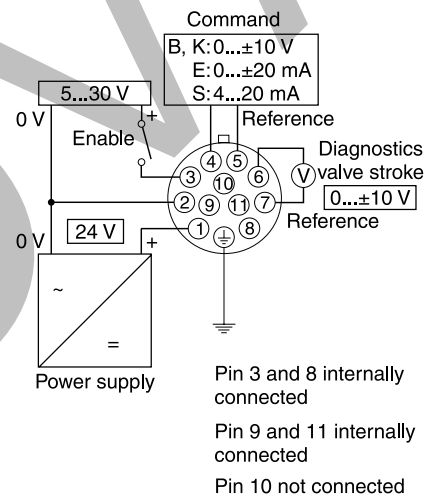
Please order female connector M12x1 separately (see accessories, female connector M12x1 (order no.: 5004109).

Wiring according EN 175201-804

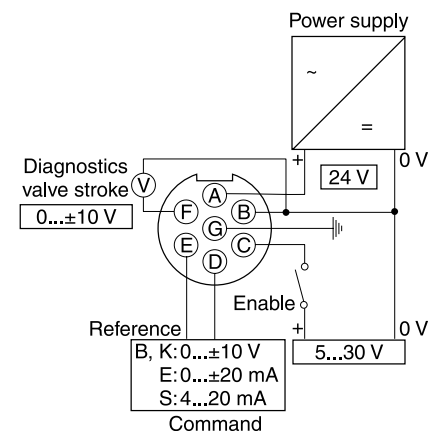
Code 0/3, 6+PE



Code 5, 11+PE



Code 1/7, 6+PE + enable



¹⁾ Only guaranteed with screened cable and female connector

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/isde – see page "Support" or directly at www.parker.com/propxd.

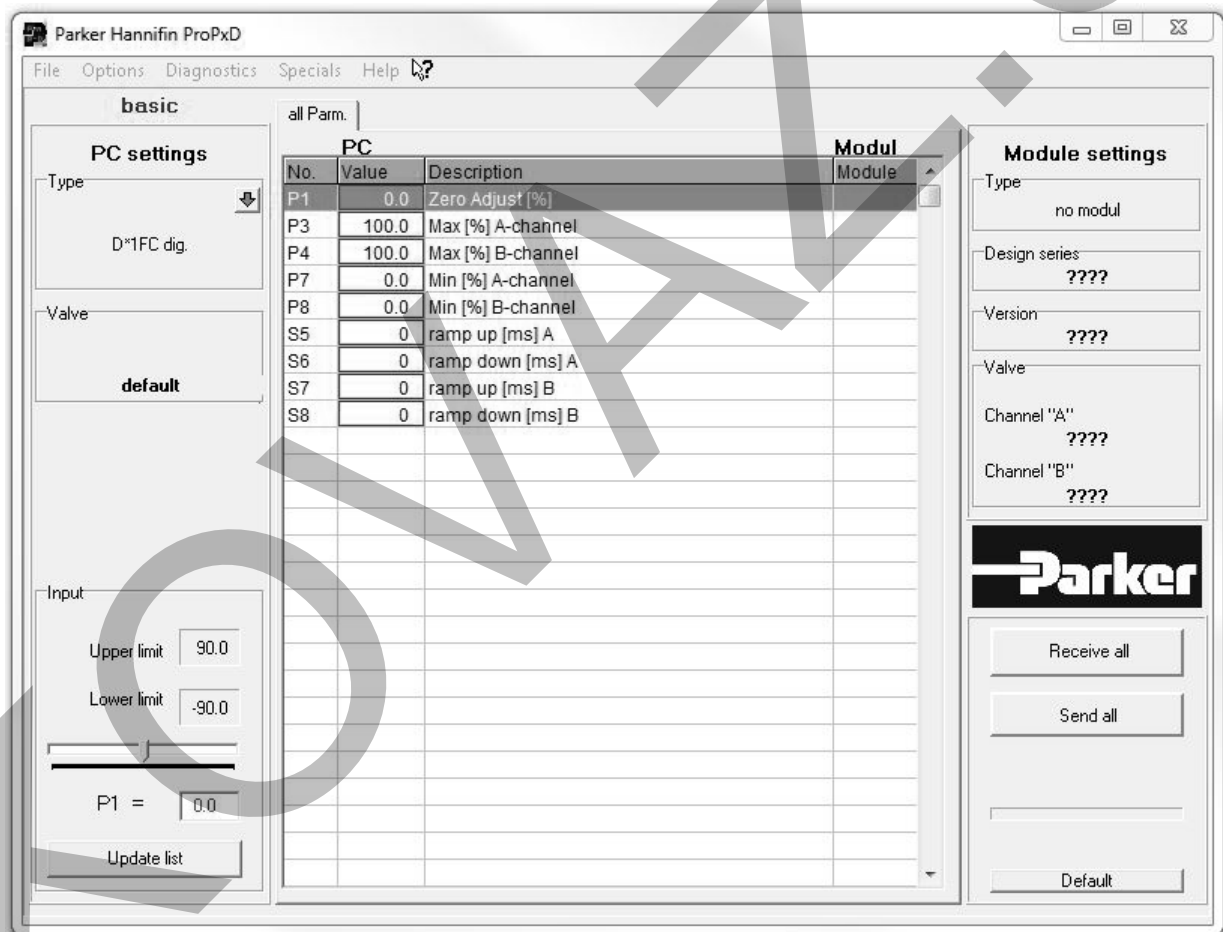
Features

- 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 RS232C

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.

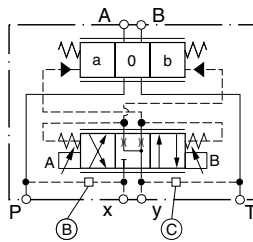
3



Pilot oil inlet (supply) and outlet (drain)

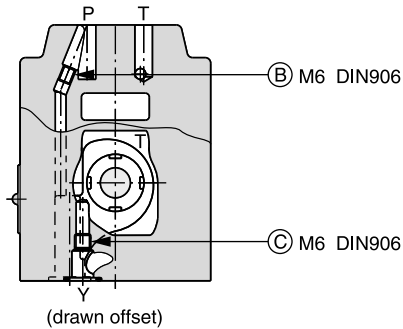
○ open, ● closed

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

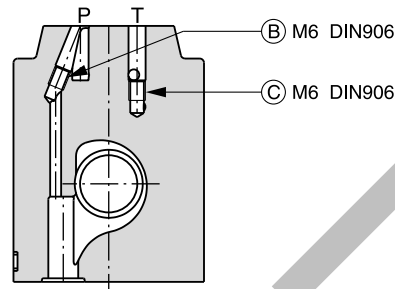


3

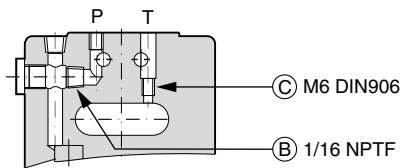
D31FCB/E



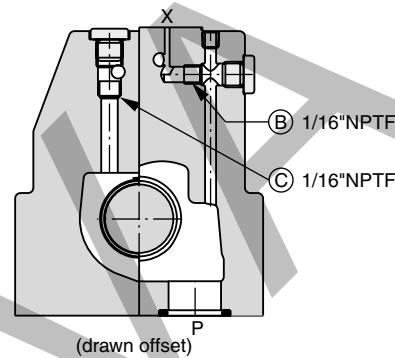
D31FCR



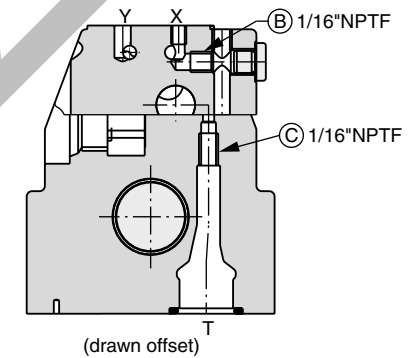
D41FCB/E



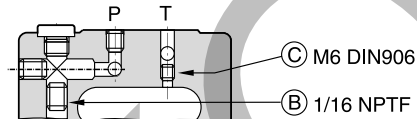
D41FCR



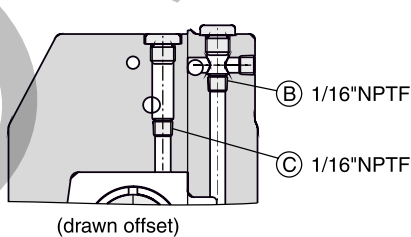
D41FCZ



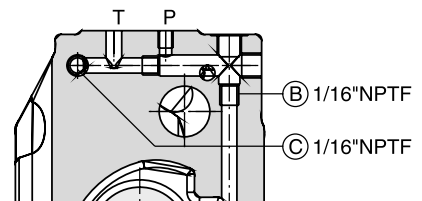
D91FCB/E



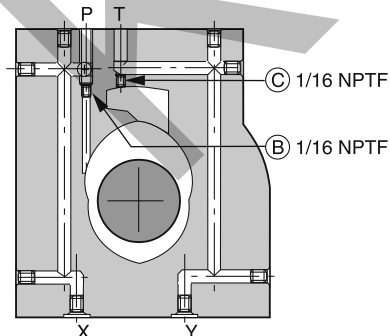
D91FCR



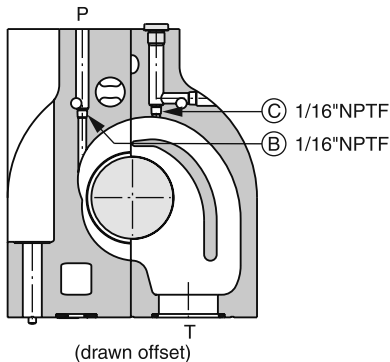
D91FCZ



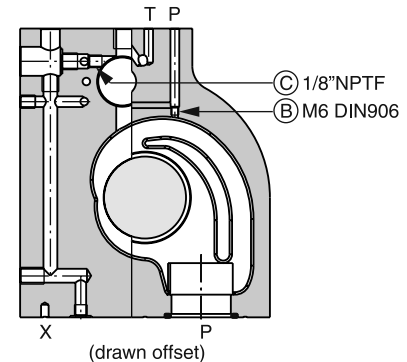
D111FCB/E



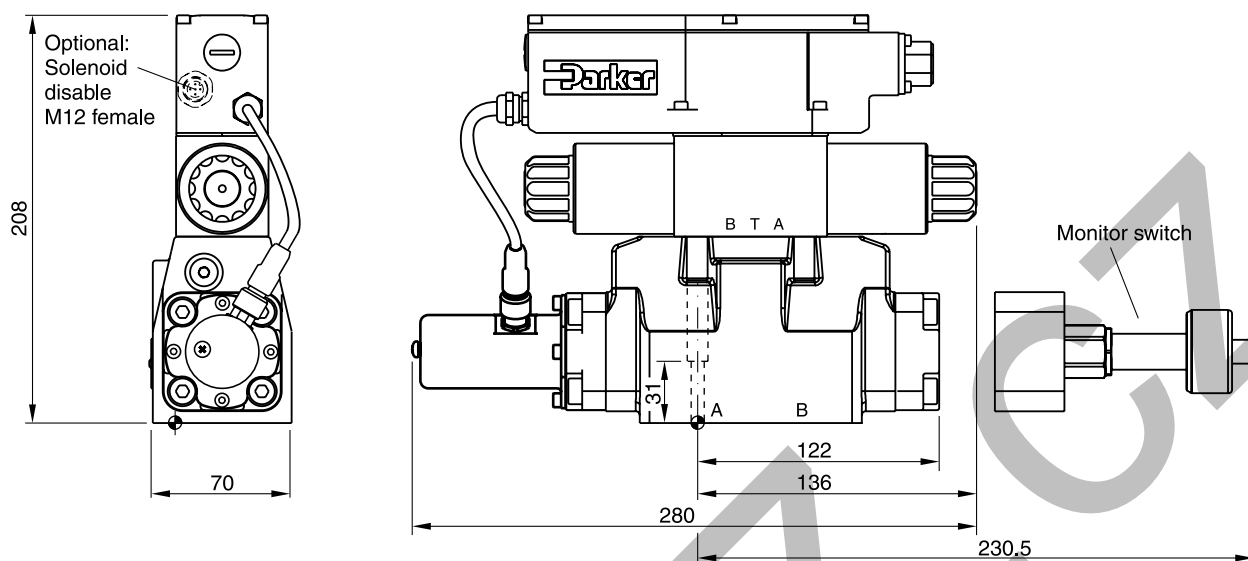
D111FCR



D111FCZ



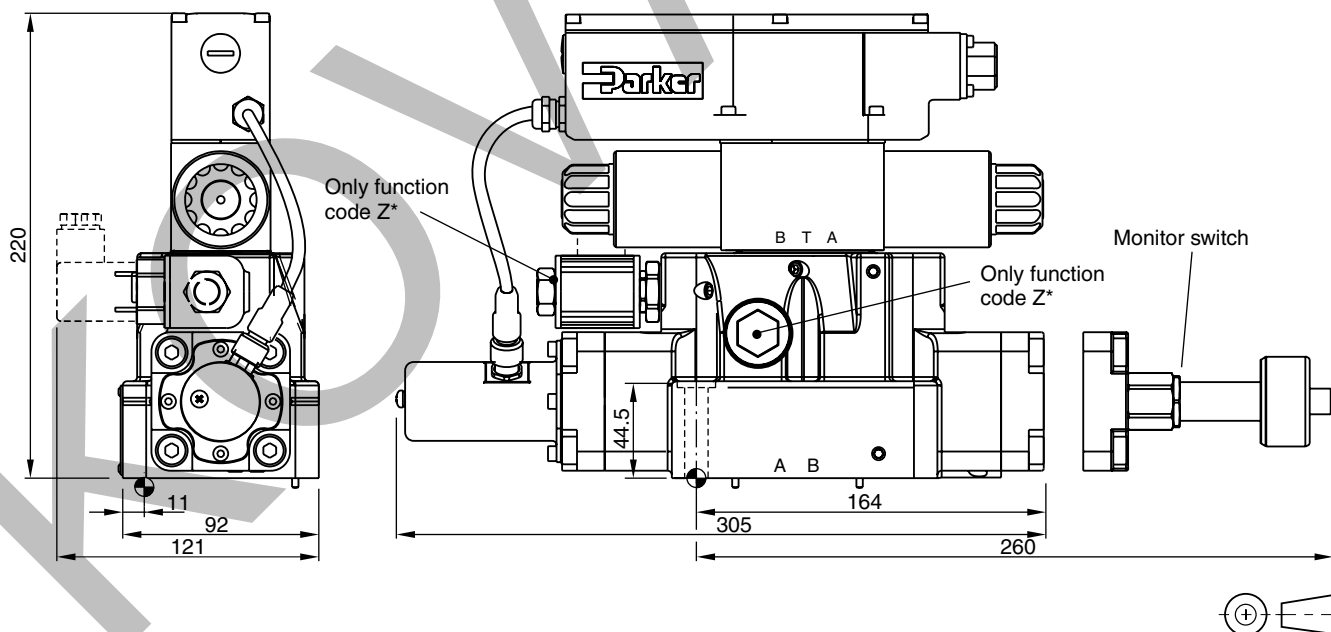
D31FC



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

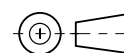
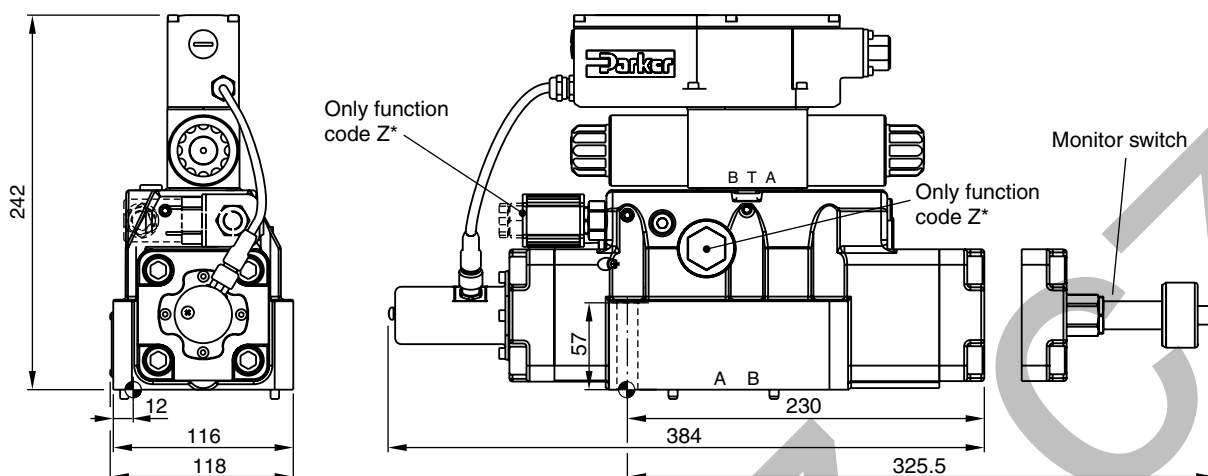
D41FC



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

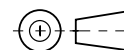
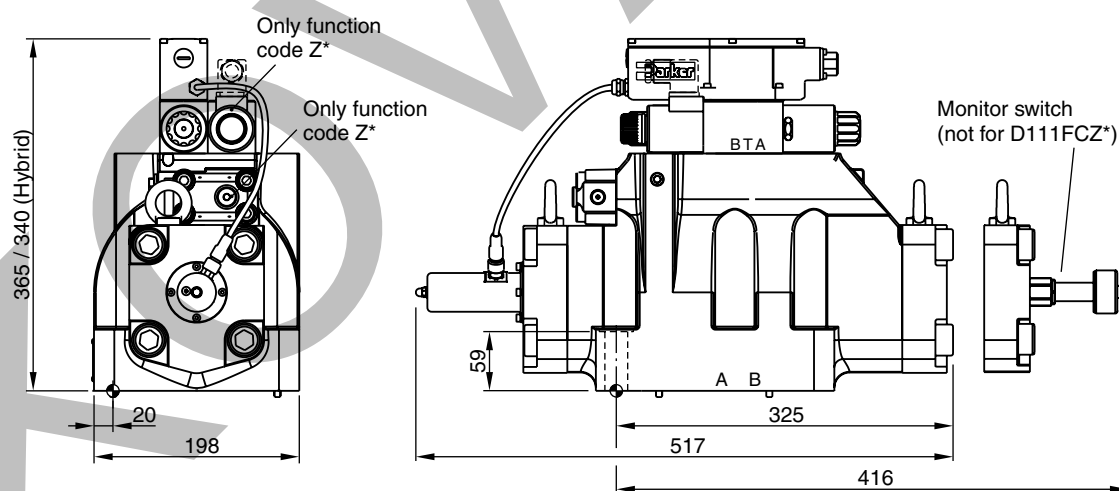
Dimensions

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