The series of pilot operated servo proportional valves D*1FP transfers the advantages of the Parker patented Voice Coil Drive (VCD®) to larger frame sizes and thus high flow rates. The high dynamics / high precision drive of the pilot valve allows the optimum control of the main spool and results in servo class performance of the complete valves.

The D*1FP series is available in 5 sizes:

D31FP NG10 (CETOP05)
D41FP NG16 (CETOP07)
D81FP NG25 (CETOP08) for port diam. up to 26 mm
D91FP NG25 (CETOP08) for port diam. up to 32 mm
D111FP NG32 (CETOP10)

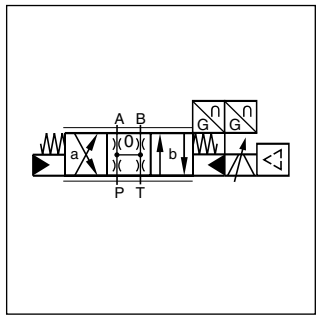
The safety concept works with a safe 4th position at the D1FP pilot valve. This ensures that the main stage is hydraulically balanced at power down and allows to have the main spool spring centered (for overlapped spools) or approximately 10% spring offset to spool position A or B (for zerolap spools).

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

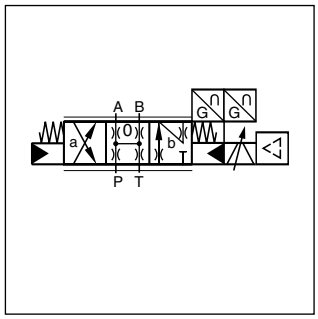
Technical features

- High dynamics
- High flow
- Defined spool positioning at power-down - optional P-A/B-T or P-B/A-T or center position (for overlapped spools)
- Onboard electronics
- **NEW:** Energy saving A-regeneration
- **NEW:** Switchable hybrid version

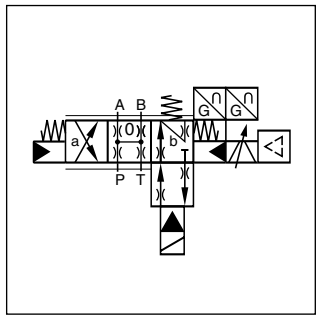
D41FP Standard



Standard D*1FPE



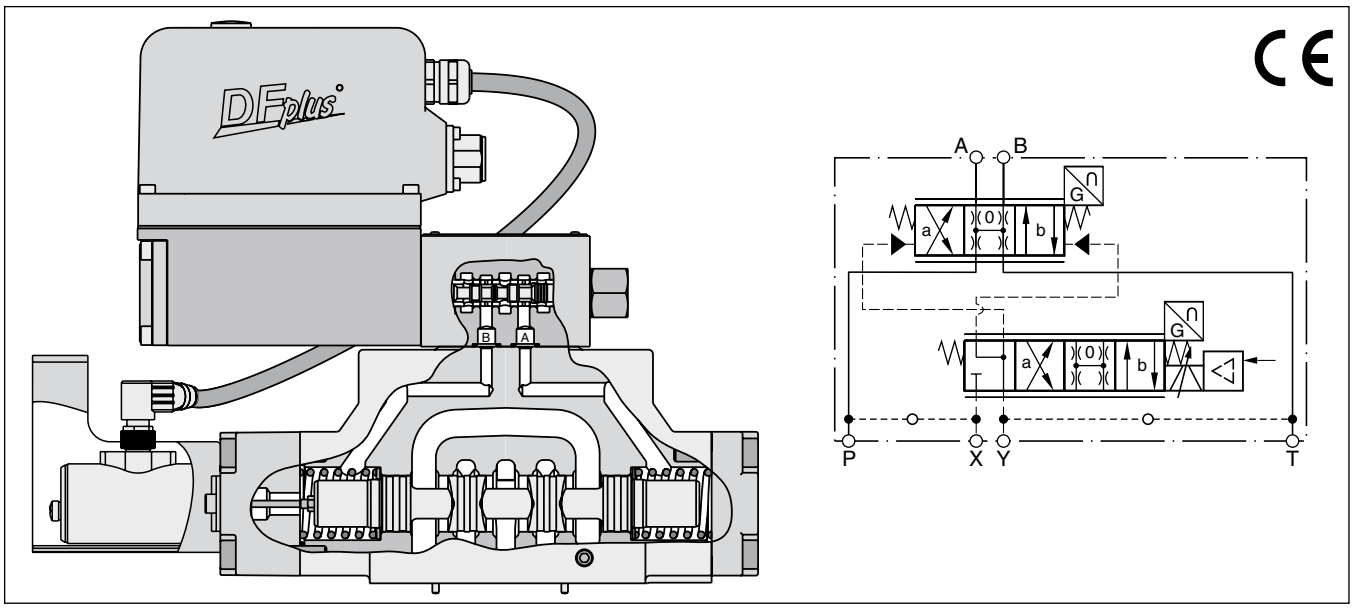
NEW: A-regeneration D*1FPR



NEW: Hybrid D*1FPZ

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

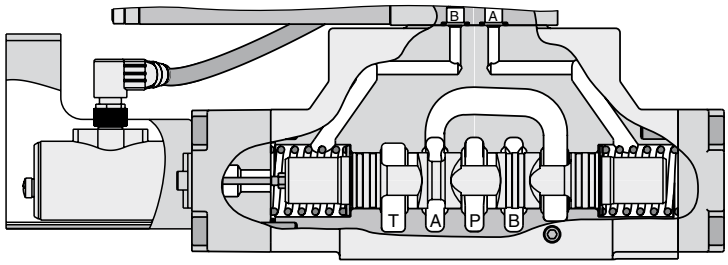
D41FPE52 (Standard)

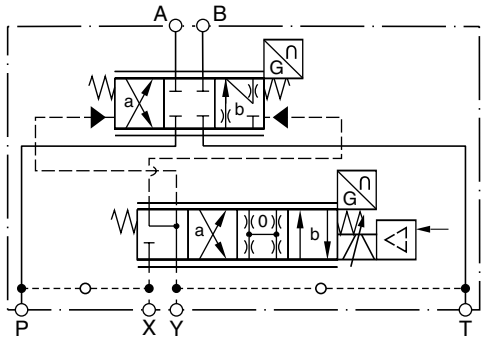


3

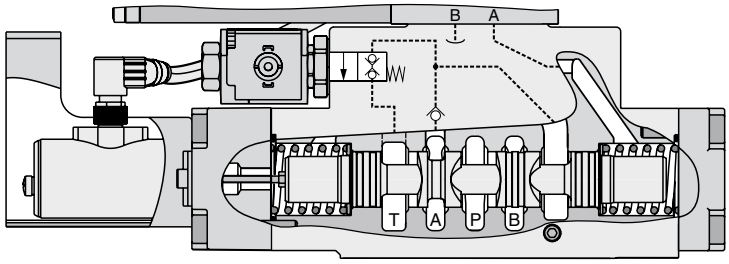
D*1FPR and D*1FPZ

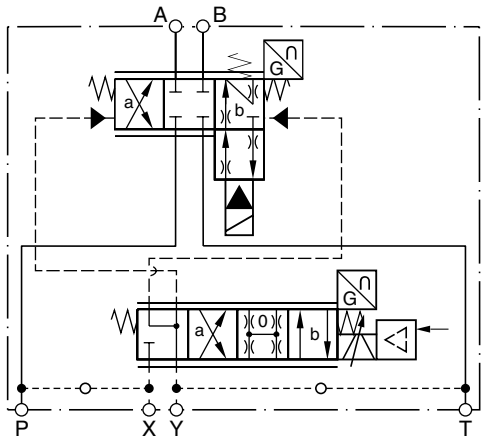
Regenerative valve D*1FPR



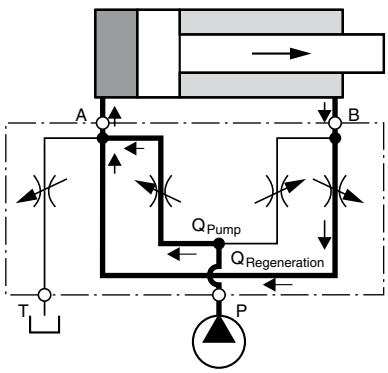


Hybrid valve D*1FPZ

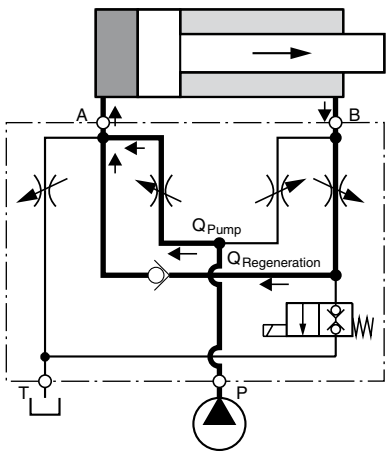




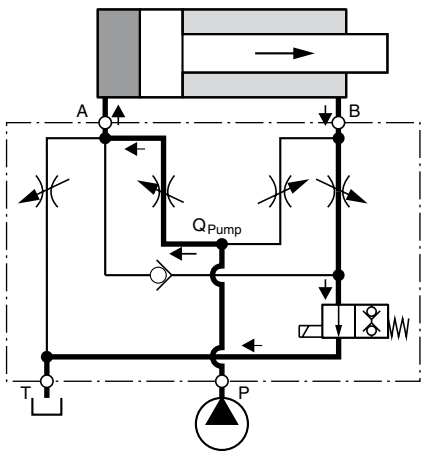
D*1FPR (regenerative valve)
Cylinder extending



D*1FPZ (hybrid valve)
Cylinder extending
in regeneration mode (high speed)



Cylinder extending
in standard mode (high force)



Flow rate in % of nominal flow

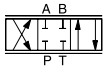
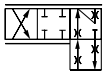
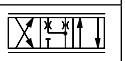
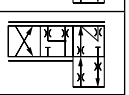
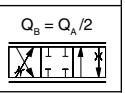
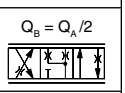
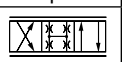
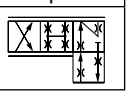
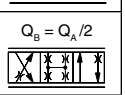
Size [1]	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FPR/Z	31/32/61	100%	50%	100%	50%	40%	20%
D91FPR/Z	31/32/61	100%	50%	100%	50%	50%	25%
D111FPR/Z	31/32/61	on request					

[1] D31FP: For size NG10 please refer solution with sandwich- and adaptor plates "H10-1666L / H10-1662 / A10-1664 / A10-1665L" in chapter 12.

D		1	F	P									
Directional control valve	Size	NG06 pilot	Proportional control	High response	Function	Flow	Spool position on power down	Pilot connections	Seals	Command signal	Valve options	Hybrid option	Design series

Code	Size
3	NG10 / CETOP05
4	NG16 / CETOP07
8	NG25 / CETOP08
9 [1]	NG25 / CETOP08
11	NG32 / CETOP10

[1] for enlarged connections Ø 32 mm

Standard		NEW: regenerative function [4] [5]		NEW: hybrid function [5] [6]	
Code	Spool type	Code	Spool type	Code	Spool type
overlap 10%		overlap 10%		overlap 10%	
E01		R31		Z31	
E02		R32		Z32	
B31					
B32					
zerolap		zerolap		zerolap	
E52		R61		Z61	
B61					

Code	Hybrid option
0	Standard for spool code B, E, R
L [7]	Hybrid valve 24V normaly closed for spool code Z

[7] see page "Regenerative and hybrid function" (not for D31FP)

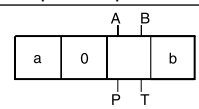
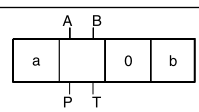
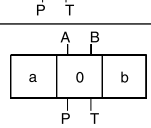
Code	Valve options
0	6+PE acc. EN175201-804
5	11+PE acc. EN175201-804
7	6+PE + Enable

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

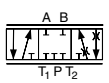
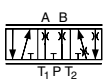
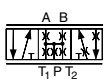
Code	Seals
N	NBR
V	FPM
H	for HFC fluid

Code	Inlet	Drain
1	internal	external
2	external	external
4	internal	internal
5	external	internal

Code	Flow [l/min] at Δp = 5bar per metering edge				
	D31	D41	D81	D91	D111
D	90	—	—	—	—
E	120	—	—	—	—
F	—	200	—	—	—
H	—	—	400	450	—
L	—	—	—	—	1000

Code	Spool pos. on power down
A [2]	
B [2]	
C [3]	

[2] approx. 10% opening, only zero lapped spools.
[3] for overlapped spools.
[4] not for size code 8.
[5] for regenerative and hybrid function at code 3 (NG10) please refer to solutions with sandwich and adaptor plates "H10-1666L / H10-1662 / A10-1664 / A10-1665L" in chapter 12.

D31FP spooltype: R31  R32  R61 

[6] nor for valve D31FP and D81FP

Please order connector separately.

3

General						
Design			Servo Proportional directional control valve, pilot operated			
Actuation			VCD®-actuator			
Size			**NG10 (CETOP 05)**	**NG16 (CETOP 07)**	**NG25 (CETOP 08)**	**NG32 (CETOP 10)**
			D31	**D41**	**D81 / D91**	**D111**
Mounting Interface			DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting position			unrestricted			
Ambient temperature		[°C]	-20...+60			
$MTTF_D$ value		[years]	50			
Weight		[kg]	11.3	14.2	23.5	64.5
Vibration resistance		[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27			
Hydraulic						
Max. operating pressure		[bar]	Internal Pilot Drain P, A, B, X 350; T, Y 35 External Pilot Drain P, A, B, T, X 350; Y 35			
Fluid			Hydraulic oil acc. DIN 51524...535, other on request			
Fluid temperature		[°C]	-20...+60			
Viscosity	permitted	[cSt] / [mm2/s]	20...380			
	recommended	[cSt] / [mm2/s]	30...80			
Filtration			ISO 4406 (1999) 18/16/13 (meet NAS 1638: 7)			
Nominal flow at Δp = 5 bar per control edge [1]		[l/min]	120	200	400 / 450	1000
Max. recommended Flow (Standard)		[l/min]	250	600	1000	3000
Regenerative B-A / B-T			depending on application, see flow curves			
Leakage at 100 bar						
	Overlapped spool	[ml/min]	200	200	600	1000
	Zerolapped spool	[ml/min]	900	900	1000	5000
	Pilot	[ml/min]	< 1000			
Pilot supply pressure		[bar]	20...350			
Pilot flow during step response at 210 bar		[l/min]	10	12	24	40
Static / Dynamic						
Step response at 100% stroke [2]		[ms]	10	13	19	45
Frequency response						
	Amplitude ±5 % at 210 bar	[Hz]	128	95	95	40
	Phase ±5 % at 210 bar	[Hz]	118	95	90	75
Hysteresis		[%]	< 0.1			
Sensitivity		[%]	< 0.05			
Temperature drift of Center Position		[%/K]	< 0.025			
Electrical						
Duty ratio		[%]	100			
Protection class			IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)			
Supply voltage / ripple		[V]	22...30, ripple < 5% eff., surge free			
Current consumption max.		[A]	3.5			
Pre-fusing		[A]	4.0 A medium lag			
Input signal	Code K (B)	voltage [V]	+10...0...-10, ripple < 0.01 % eff., surge free, 0...+10V P–>A (P–>B)			
		Impedance [kOhm]	100			
	Code E	voltage [mA]	+20...0...-20, ripple < 0.01 % eff., surge free, 0...+20mA P–>B			
		Impedance [Ohm]	250			
	Code S	current [mA]	4...12...20, ripple < 0.01 % eff., surge free, 12...20 mA P–>A			
		Impedance [Ohm]	250			
			< 3.6 mA = enable off, > 3.8 mA = enable on acc. NAMUR NE43			
Input Capacitance typ.		[nF]	1			
Differential input max.	Code 0	[V]	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)			
	Code 5	[V]	30 for terminal 4 and 5 against PE (terminal ⏚) 11 for terminal 4 and 5 against 0V (terminal 2)			
	Code 7	[V]	30 for terminal D and E against PE (terminal G)			
Enable signal	Code 5/7	[V]	5...30, Ri = 9 kOhm			
Diagnostic signal		[V]	+10...0...-10 / +Ub, rated max. 5 mA			
EMC			EN 61000-6-2, EN 61000-6-4			
Electrical connection	Code 0/7		6 + PE acc. EN 175201-804			
	Code 5		11 + PE acc. EN 175201-804			
Wiring min.	Code 0/7	[mm²]	7 x 1.0 (AWG16) overall braid shield			
	Code 5	[mm²]	8 x 1.0 (AWG16) overall braid shield			
Wiring lenght max.		[m]	50			

[1] Flow rate for different Δp per control edge:

$$Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$$

[2] Measured with load (210 bar pressure drop/two control edges)

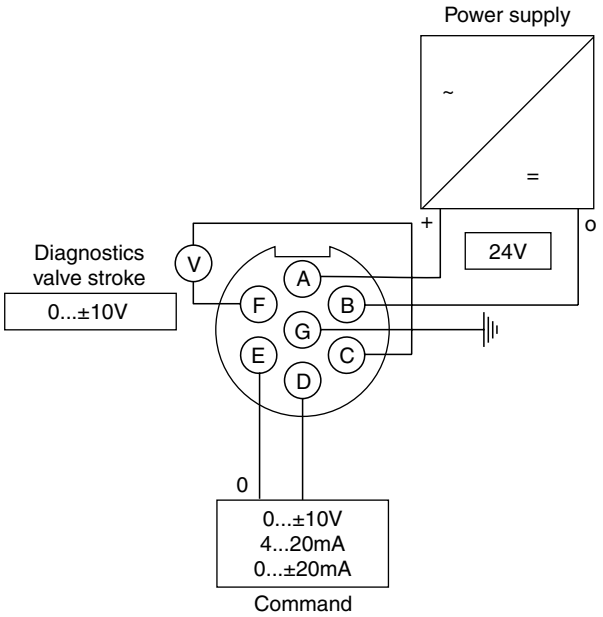
Electrical characterisrics hybrid option

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
Tolernace 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.	[mm²]	3 x 1.5 recommended		
Wiring length max.	[m]	50 recommended		

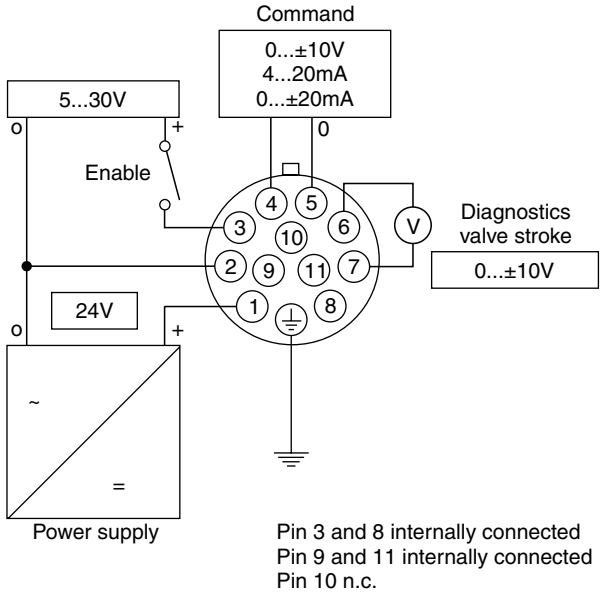
With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Wiring

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

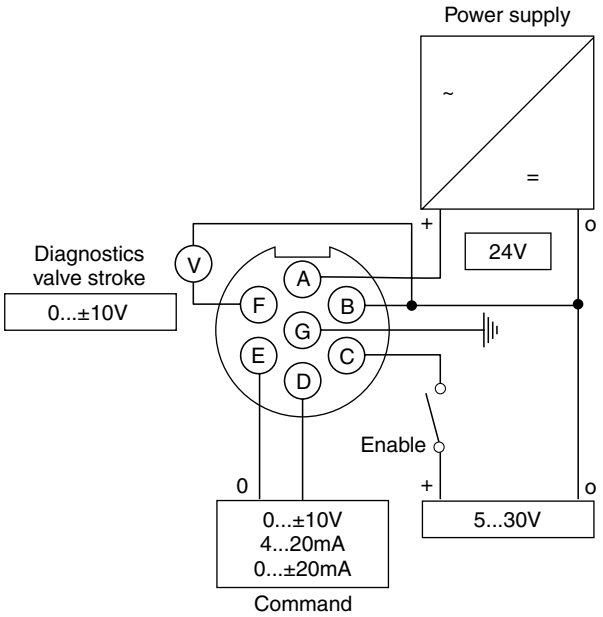


Code 5, 11 + PE acc. EN 175201-804



Pin 3 and 8 internally connected
Pin 9 and 11 internally connected
Pin 10 n.c.

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

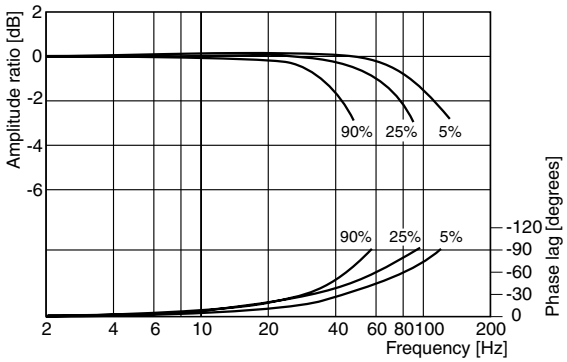


3

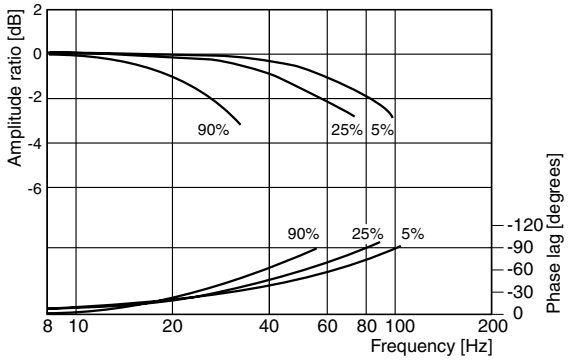
Frequency response

±5 % / ±25 % / ±90 % command signal
Dynamics at 210 bar pilot supply pressure

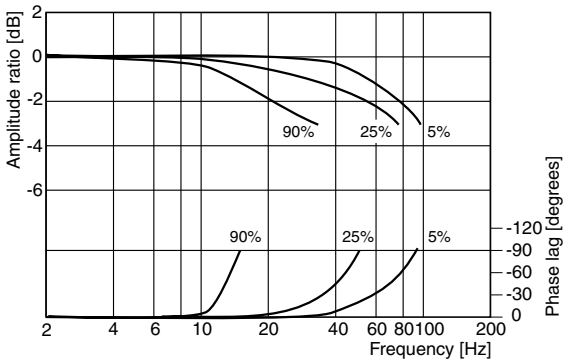
D31FP



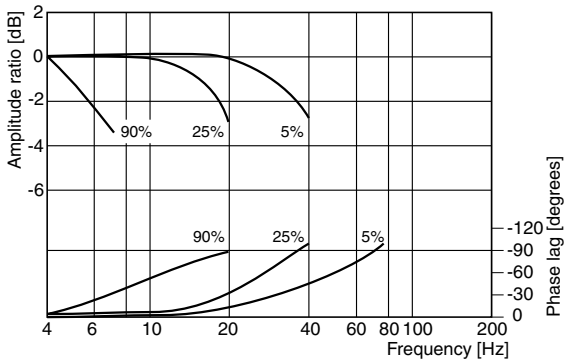
D41FP



D81/91FP



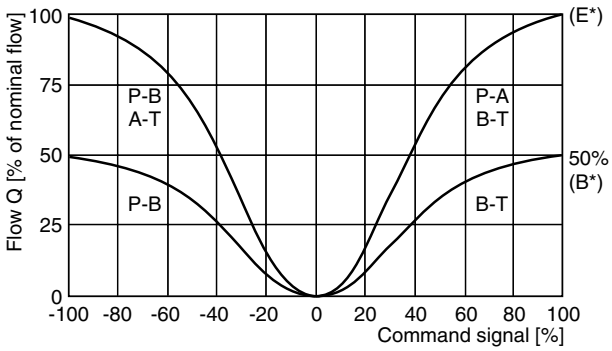
D111FP



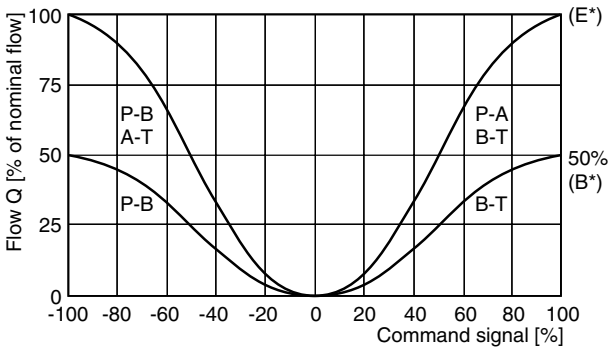
D*1FPB/E flow curves

at Δp = 5 bar per metering edge

D31FP
spool type E01/02/52, B31/32/61



D41FP
spool type E01/02/52, B31/32/61

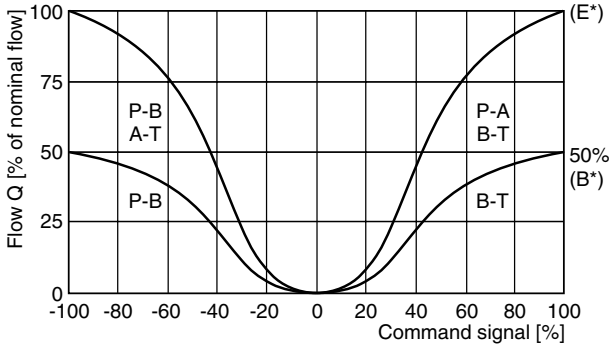


All characteristic curves measured with HLP46 at 50°C.

Flow curves

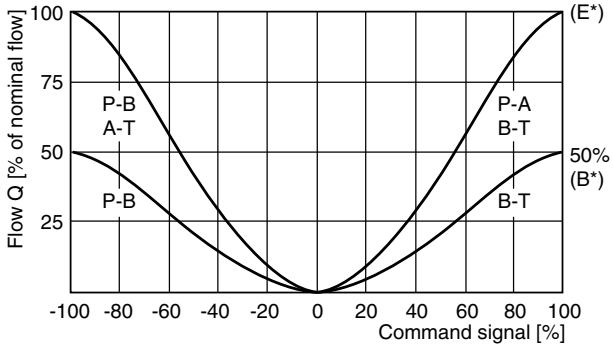
D81/91FP

Spool type E01/02/52, B31/32/61



D111FP

Spool type E01/02/52, B31/32/61

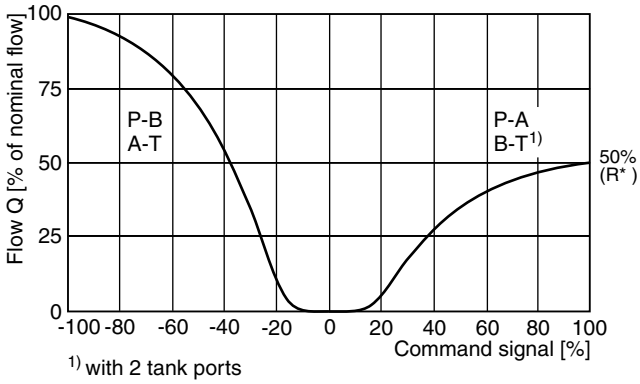


D*1FPR/Z flow curves

at Δp = 5 bar per metering edge

D31FP

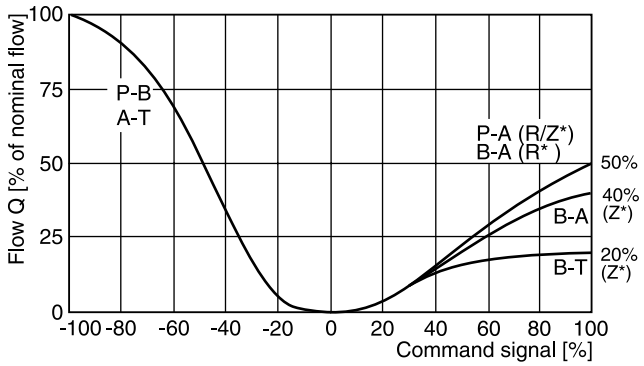
Spool type R31/32/61



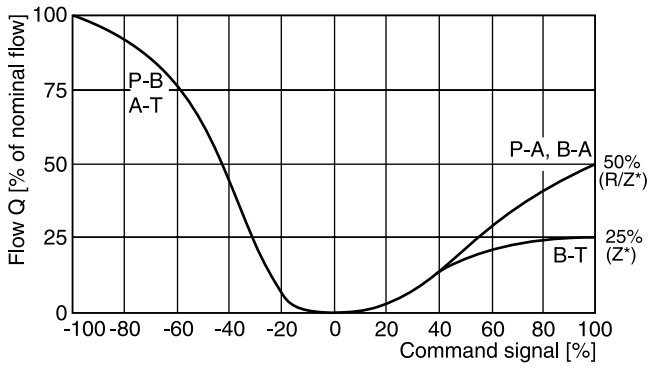
1) with 2 tank ports

D41FP

Spool type R/Z 31/32/61



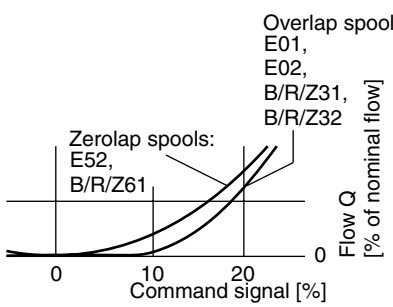
D91FP spool type R/Z 31/32/61



D111FP

spool type R/Z* on request

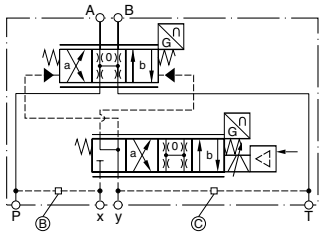
Detail:
Standard, regenerative and hybrid flow curves



Pilot oil inlet (supply) and outlet (drain)

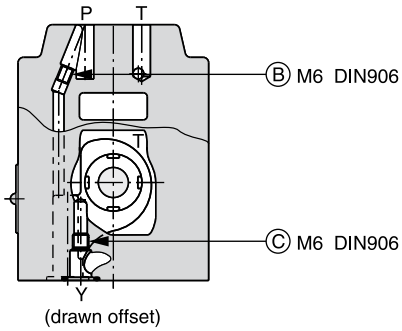
○ **open,** ● **closed**

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



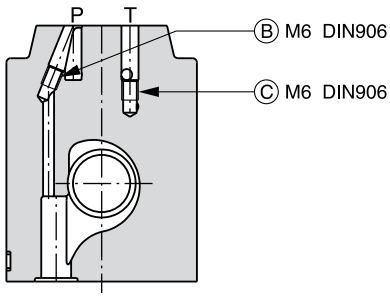
3

D31FPB/E

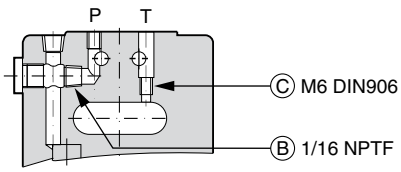


(drawn offset)

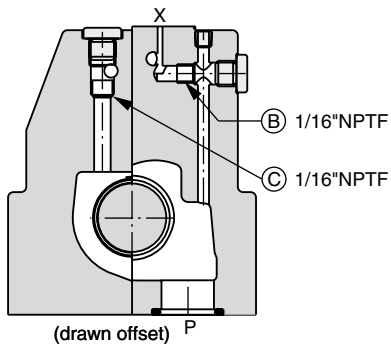
D31FPR



D41FPB/E



D41FPR



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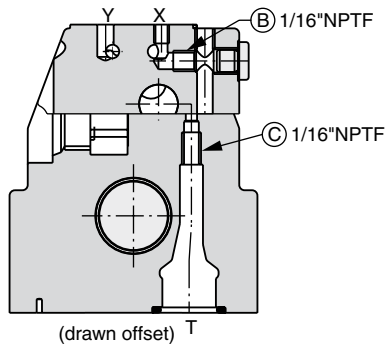
D41FPZ



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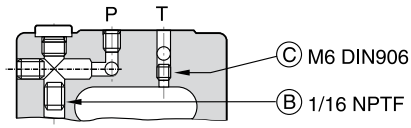
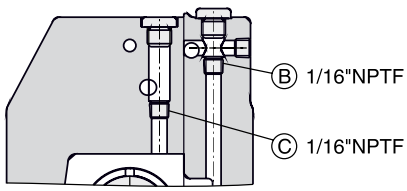
D91FPB/E

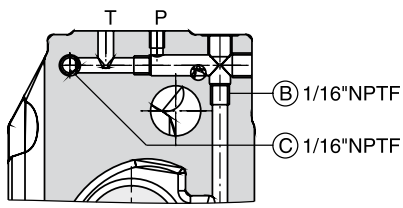


D91FPR

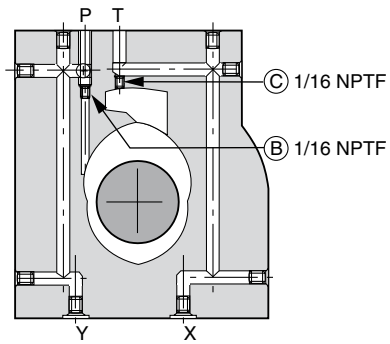


(drawn offset)

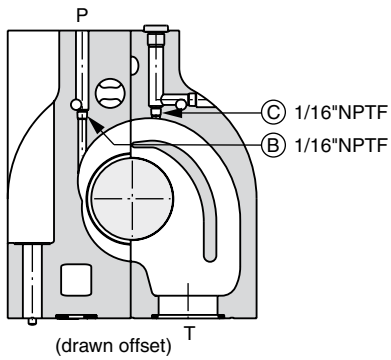
D91FPZ



D111FPB/E



D111FPR



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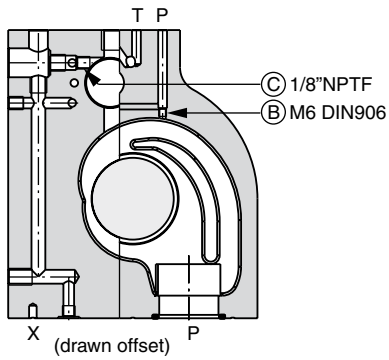
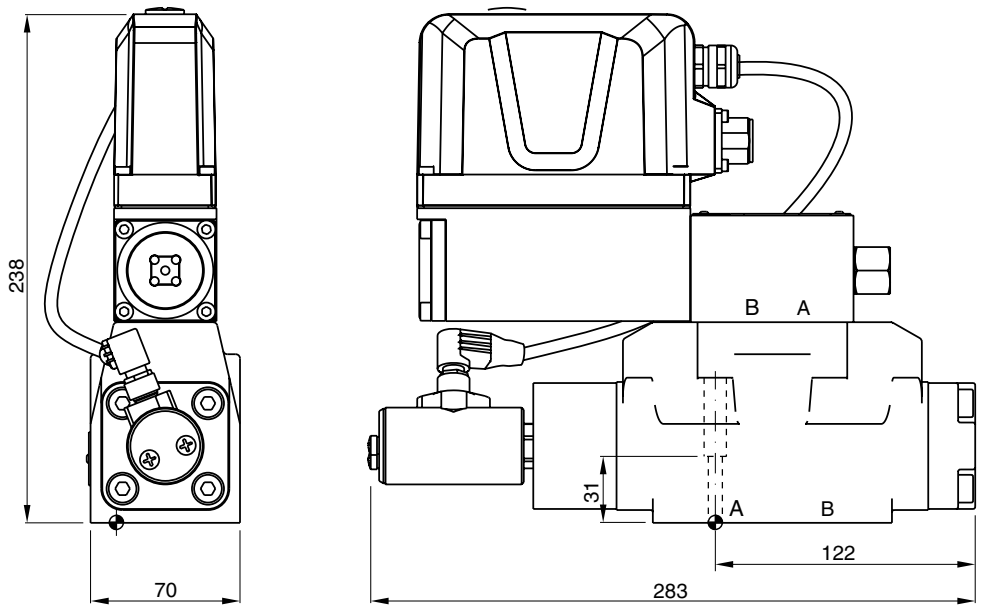
D111FPZ



(drawn offset)

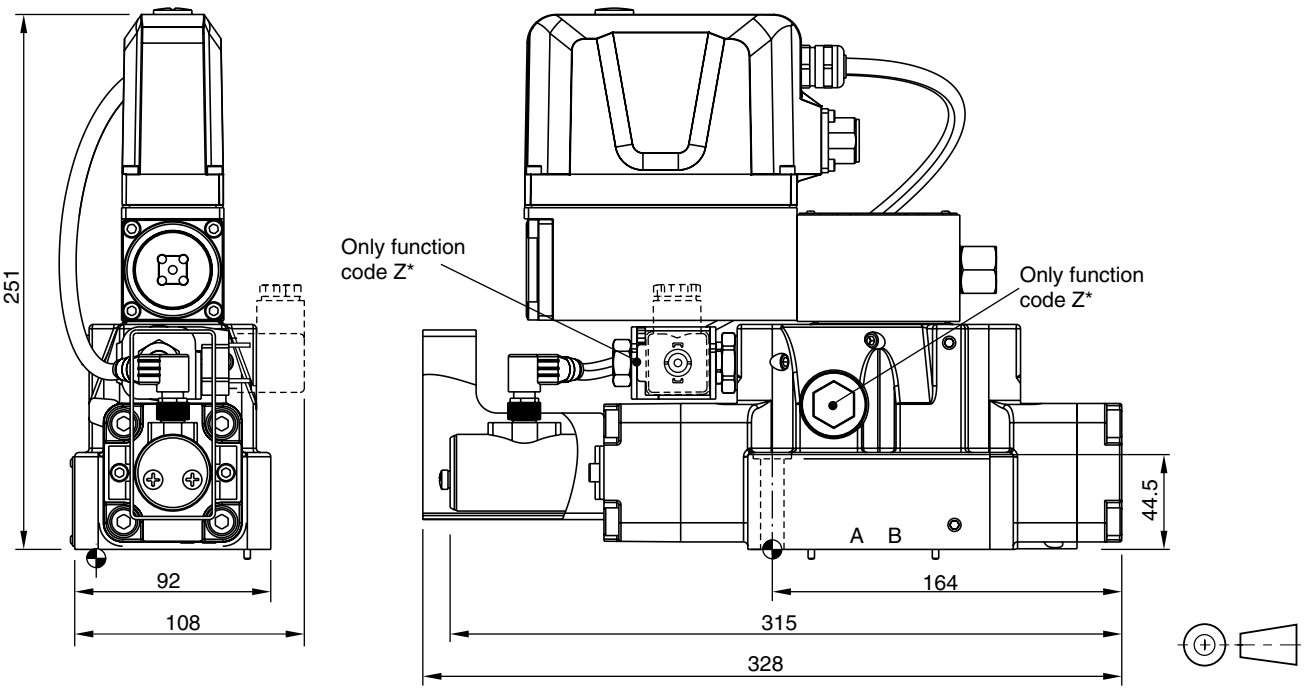
D31FP



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

Surface finish	Kit			Kit
$R_{max}6.3$ 0.01/100	BK385	4x M6x40 DIN 912 12.9	13.2 Nm ±15%	NBR: SK-D31FP FPM: SK-D31FP-V

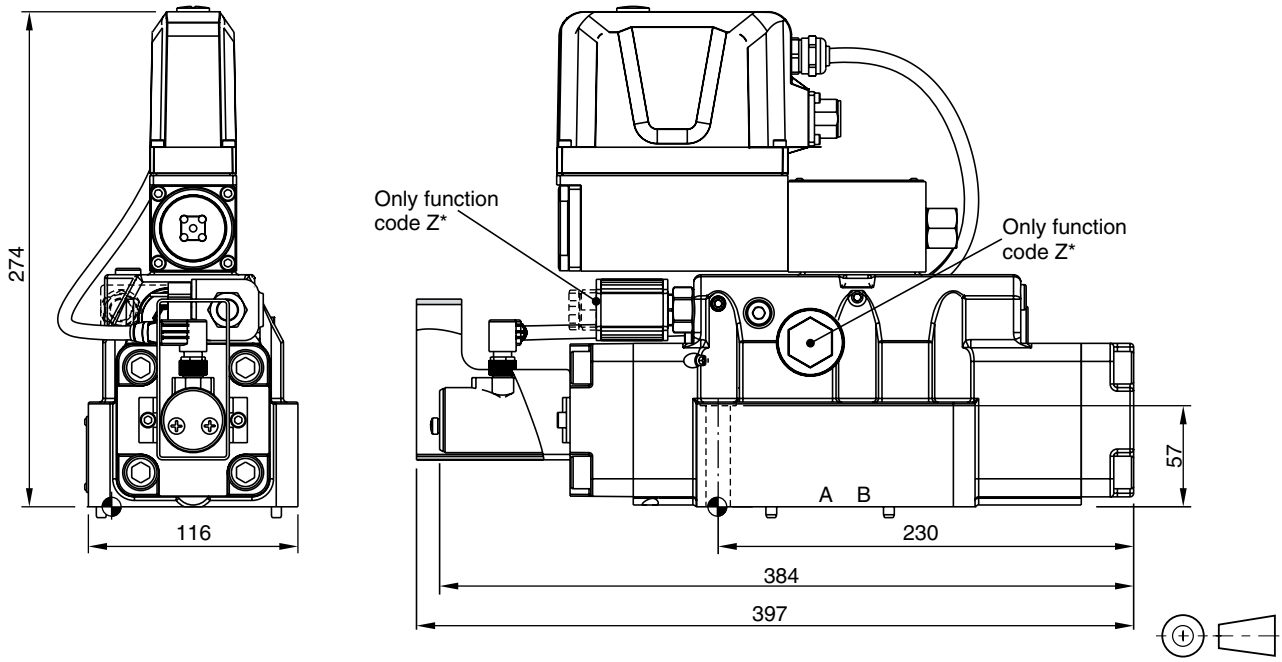
D41FP



Surface finish	Kit			Kit
$R_{max}6.3$ 0.01/100	BK320	2x M6x55 4x M10x60 DIN 912 12.9	13.2 Nm ±15% 63 Nm ±15%	NBR: SK-D41FP FPM: SK-D41FP-V

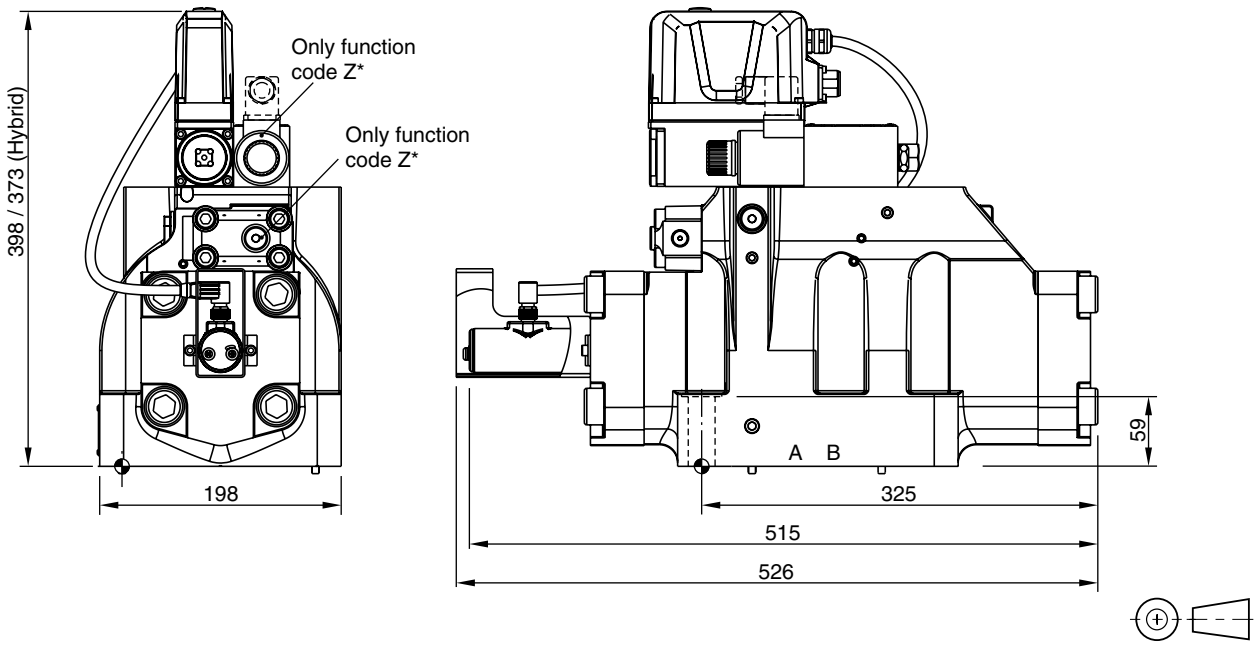
3

D81/91FP



Surface finish	Kit			Kit
$\sqrt{R_{max}6.3}$ ⏥ 0.01/100	BK360	6x M12x75 DIN 912 12.9	108 Nm ±15%	NBR: SK-D81/D91FP FPM: SK-D81/D91FP-V

D111FP



Surface finish	Kit			Kit
$\sqrt{R_{max}6.3}$ ⏥ 0.01/100	BK386	6x M20x90 DIN 912 12.9	517 Nm ±15%	NBR: SK-D111FP FPM: SK-D111FP-V