

Steering

OSPB, OSPC, OSPD Open Center and OSPB Closed



Danfoss is one of the largest producers in the world of steering components for hydrostatic steering systems on off-road vehicles. Danfoss offers steering solutions both at component and system levels. Our product range makes it possible to cover applications of all types, ranging from ordinary 2 wheel steering (also known as Ackermann steering) to articulated steering, automatic steering (for example, by sensor) and remote controlled steering via satellite. We can offer more than 1,800 different steering units and 250 different priority valves categorized in types, variants and sizes.

For hydrostatic steering systems, Danfoss offers:

- Mini steering units with displacements from 32 to 100 cm³/rev [1.95 to 6.10 in³/rev], flow up to 20 l/min [5.28 US gal/min], steering pressure up to 140 bar [2030 psi].
- Steering units with displacements from 40 to 1200 cm³/rev [2.44 to 73.2 in³/rev], flow up to 100 l/min [26.4 US gal/min], steering pressure up to 240 bar [3481 psi].
- Priority valves for rated flows at 40, 80, 120, 160 and 320 l/min [10.6, 21.1, 31.7, 42.3 and 84.5 US gal/ min], pressure up to 350 bar [5076 psi].
- Pilot operated flow-amplifiers with amplification factors of 4, 5, 8, 10 or 20 for rated oil flows of 240 and 400 l/min [63.4 and 105.7 US gal/min], steering pressure up to 240 bar [3480 psi].
- Pilot operated steering valve with steering flow up to 100 l/min [26.4 US gal/min], steering pressure up to 250 bar [3625 psi] and with integrated priority valve for pump flow up to 120 l/min [31.7 US gal/ min].

For electrohydraulic steering systems Danfoss offers:

- Pilot operated steering valves (pilot operated by hydrostatic steering unit or by electrical signal) with steering flows up to 100 l/min [26.4 US gal/min], steering pressure up to 250 bar [3625 psi].
- Steering units with integrated electrical operated steering valve with steering flow up to 50 l/min [13.2 US gal/min], steering pressure up to 210 bar [3045 psi].
- Electrical operated steering valve with steering flow up to 70 l/min [18.5 US gal/min], steering pressure up to 210 bar [3045 psi].

Characteristic features for steering units:

- Low steering torque: From 0.5 N•m to 3 N•m in normal steering situations
- Low noise level
- Low pressure drop

A wide range of steering components

- Many types available: Open center Non-reaction, Open center Reaction, Power Beyond, Closed center Non-reaction, Load Sensing, Load Sensing Reaction
- One or more built-in valve functions: relief valve, shock valves, suction valves, non-return valve in P-line and in LS-line
- Optional port connections (according to ISO, SAE or DIN standards)

Characteristic features for electrohydraulic steering systems with OSPE, EHPS, and EHi:

- Possibility of GPS, row sensor, variable steering ratio and joystick steering
- The possibility of manual steering even on very heavy vehicles
- EHPS: High steering pressure requiring smaller cylinders and flow
- EHPS: Low pilot pressure and flow giving extremely low noise in the cabin
- EHPS: Can be combined with Danfoss PVG 32 proportional valve

Steering Units, OSPB, OSPC, OSPD Open Center

Versions

Open center steering units have open connection between pump and tank in the neutral position. In open center steering systems, pumps with fixed displacement are used.

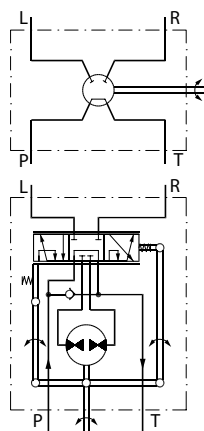
With reaction steering units any external forces acting on the steered wheels result in a corresponding movement of the steering wheel when the driver is not steering the vehicle.

With non-reaction steering units there is no corresponding movement of the steering wheel when the driver is not steering the vehicle.

OSPB

Steering unit with no valve functions

OSPB ON Open center Non-reaction



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Steering Units, OSPB, OSPC, OSPD Open Center

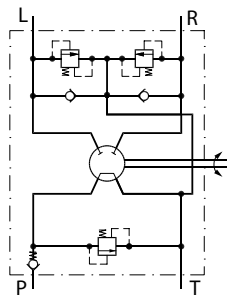
OSPC

Steering unit with integrated valve functions

OSPC ON

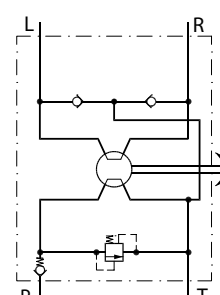


OSPC ON Open center Non-reaction

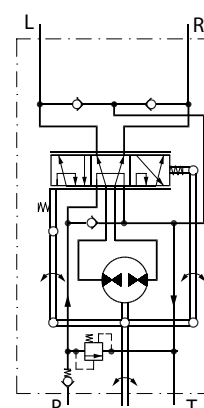
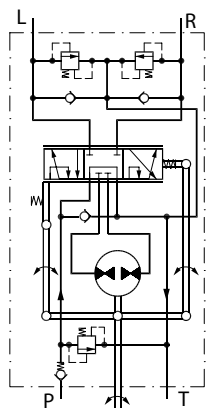


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OSPC OR Open center Reaction



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Steering Units, OSPB, OSPC, OSPD Open Center

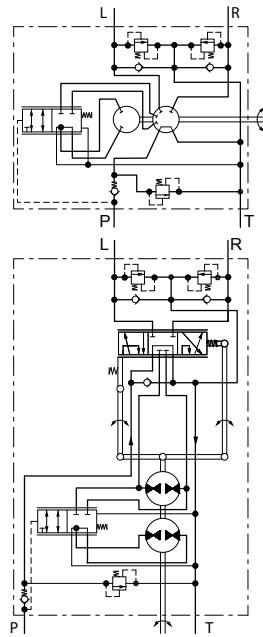
OSPD

Steering unit with 2 rotary meters and with integrated valve functions

The OSPD has 2 rotary meters (gear wheel sets). In the case of no pump supply only one rotary meter is active for emergency steering. In normal steering situations both rotary meters are active.



OSPD ON Open center Non-reaction



150-581.11

Steering units open center and closed center

Technical data

Displacement, flow and pressure

Common data: Look in sub catalogue: "General, Steering Components" page 28.

OSPB/OSPC ON/OR

Steering unit	Displacement cm ³ /rev [in ³ /rev]	Recommended* oil flow l/min [US gal/min]	Max. pressure, bar (psi)		
			System pressure/ P-T port pressure	T, absolute port pressure	L-T/R-T port pressure
OSPC 40 ON	40 [2.44]	4-18 [1.05-4.76]	140 [2030]	40 [580]	280 [4061]
OSPB/OSPC 50 ON	50 [3.05]	5-18 [1.32-4.76]			
OSPC 60 ON	60 [3.66]	6-18 [1.59-4.76]			
OSPC 70 ON	70 [4.27]	7-18 [1.85-4.76]	175 [2538]		
OSPB/OSPC 80 ON	80 [4.88]	8-30[2.11-7.93]			
OSPB/OSPC 100 ON	100 [6.10]	10-30 [2.64-7.93]	210 [3045]		
OSPB/OSPC 125 ON	125 [7.63]	13-50 [3.43-13.21]			
OSPB/OSPC 160 ON	160 [9.76]	16-50 [4.23-13.21]			
OSPB/OSPC 185 ON	185 [11.29]	19-50 [5.02-13.21]			
OSPB/OSPC 200 ON	200 [12.20]	20-50 [4.23-13.21]			
OSPB/OSPC 230 ON	230 [14.04]	23-50 [6.08-13.21]			
OSPB/OSPC 250 ON	250 [15.26]	25-50 [6.60-13.21]			
OSPB/OSPC 315 ON	315 [19.22]	32-70 [8.45-18.49]			
OSPB/OSPC 400 ON	400 [24.41]	40-70 [10.57-18.49]			
OSPB/OSPC 500 ON	500 [30.51]	50-70 [13.21-18.49]			
OSPC 40 OR	40 [2.44]	4-18 [1.05-4.76]	140 [2030]	40 [580]	280 [4061]
OSPC 50 OR	50 [3.05]	5-18 [1.32-4.76]			
OSPC 60 OR	60 [3.66]	6-18 [1.59-4.76]			
OSPC 70 OR	70 [4.27]	7-18 [1.85-4.76]	175 [2538]		
OSPC 80 OR	80 [4.88]	8-30[2.11-7.93]			
OSPC 100 OR	100 [6.10]	10-30 [2.64-7.93]	210 [3045]		
OSPC 125 OR	125 [7.63]	13-50 [3.43-13.21]			
OSPC 160 OR	160 [9.76]	16-50 [4.23-13.21]			
OSPC 185 OR	185 [11.29]	19-50 [5.02-13.21]			
OSPC 200 OR	200 [12.20]	20-50 [4.23-13.21]			
OSPB 50 CN	50 [3.05]	5 [1.32]			
OSPB 80 CN	80 [4.88]	8 [2.11]			
OSPB 100 CN	100 [6.10]	10 [2.64]	175 [2538]		
OSPB 125 CN	125 [7.63]	13 [3.43]			
OSPB 160 CN	160 [9.76]	16 [4.23]			
OSPB 200 CN	200 [12.20]	20 [5.28]			
OSPB 315 CN	315 [19.22]	32 [8.45]			
OSPB 400 CN	400 [24.41]	40 [10.57]			

* Criteria for determining the recommended oil flow:

- As a minimum the oil flow it takes to ensure sufficient steering speed at idle engine speed
- Ensures the least possible pressure loss at full speed

Any OSPB ON and OSPC ON/OR can withstand 210 bar in max. system pressure. However, OSPB/C w. small gear wheel set and high pressure will have relatively high slippage values

Steering units open center and closed center

Common data: Look in sub catalogue: "General, steering components" page 28.

OSPD ON / OR

Steering unit	Displacement manual steer mode cm ³ /rev [in ³ /rev]	Displacement normal steer mode cm ³ /rev [in ³ /rev]	Recommended* oil flow l/min [US gal/min]	Max. pressure, bar (psi)		
				System pressure/ P-T port pressure	T, absolute port pressure	L-T/R-T port pressure
OSPD 60/185 ON	60 [3.66]	185 [11.29]	20-50 [5.28-13.21]	210 [3045]	40 [580]	280 [4061]
OSPD 60/220 ON	60 [3.66]	220 [13.43]	22-50 [5.81-13.21]			
OSPD 60/260 ON	60 [3.66]	260 [15.87]	26-50 [6.87-13.21]			
OSPD 70/195 ON	70 [4.27]	195 [11.90]	20-50 [5.28-13.21]			
OSPD 70/230 ON	70 [4.27]	230 [14.04]	23-50 [6.08-13.21]			
OSPD 100/260 ON	100 [6.10]	260 [15.87]	26-50 [6.87-13.21]			
OSPD 100/300 ON	100 [6.10]	300 [18.31]	30-50 [7.93-13.21]			
OSPD 125/285 ON	125 [7.63]	285 [17.39]	30-50 [7.93-13.21]			
OSPD 125/325 ON	125 [7.63]	325 [19.83]	33-70 [8.72-18.49]			
OSPD 125/440 ON	125 [7.63]	440 [26.85]	44-70 [11.62-18.49]			
OSPD 60/185 OR	60 [3.66]	185 [11.29]	20-50 [5.28-13.21]			
OSPD 60/220 OR	60 [3.66]	220 [13.43]	22-50 [5.81-13.21]			
OSPD 70/195 OR	70 [4.27]	195 [11.90]	20-50 [5.28-13.21]			
OSPD 70/230 ON	70 [4.27]	230 [14.04]	23-50 [6.08-13.21]			

* Criteria for determining the recommended oil flow:

- As a minimum the oil flow it takes to ensure sufficient steering speed at idle engine speed
- Ensures the least possible pressure loss at full speed

Valve functions in OSPC and OSPD steering units

The data below comes from measurements on a representative sample of steering units from production. Oil with a viscosity of 21 mm²/s [100 SUS] at 50°C [122°F] was used during measuring.

Pressure relief valve

The pressure relief valve protects pump and steering unit against excessive pressure and limits the system pressure while steering. The pressure relief valve is set at 25 l/min [6.60 US gal/min] flow.

Setting tolerances:

170 bar [2466 psi]: rated value +5 bar [+73 psi]

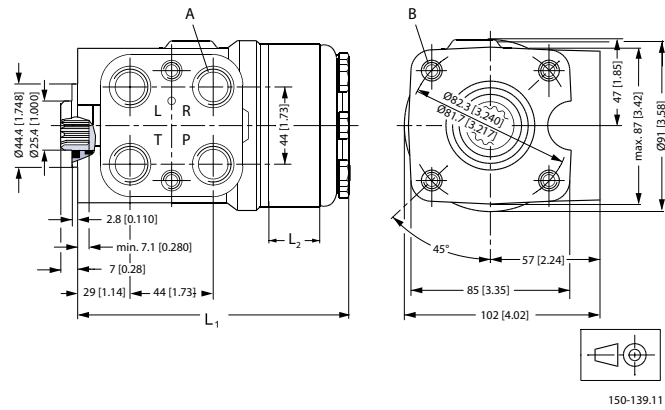
> 170 bar [2466 psi]: rated value +10 bar [+145 psi]

Steering units open center and closed center

Dimensions

OSPB ON and OSPB CN

OSPB ON and OSPB CN



OSPB ON and OSPB CN version

	A	B
European version	G 1/2; 15 mm [0.59 in] deep	M10 × 1.5, 16 mm [0.63 in] deep
US version	3/4 - 16 UNF O-ring boss; 15 mm [0.59 in] deep	3/8 - 16 UNC, 16 mm [0.63 in] deep

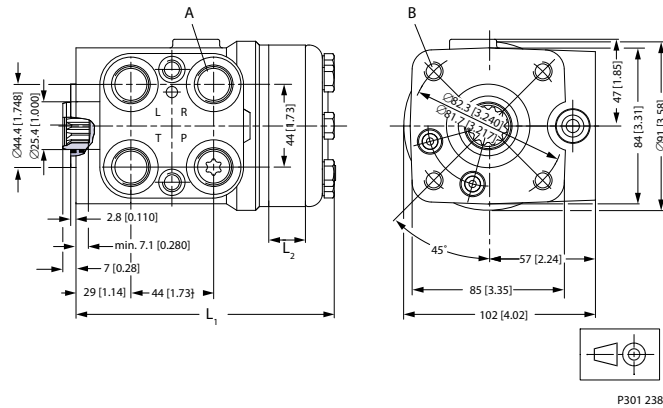
OSPB ON and OSPB CN dimensions

Type	L₁		L₂	
	mm	[in]	mm	[in]
OSPB 50	126	[4.96]	6.5	[0.26]
OSPB 80	129	[5.08]	10.4	[0.41]
OSPB 100	132	[5.20]	13.0	[0.51]
OSPB 125	135	[5.31]	16.2	[0.64]
OSPB 160	140	[5.51]	20.8	[0.82]
OSPB 200	145	[5.71]	26.0	[1.02]
OSPB 250	151	[5.94]	32.5	[1.28]
OSPB 315	160	[6.30]	40.9	[1.61]
OSPB 400	171	[6.73]	52.0	[2.05]
OSPB 500	184	[7.24]	65.0	[2.56]

Steering units open center and closed center

OSPC ON and OSPC OR

OSPC ON and OSPC OR



OSPC ON and OSPC OR versions

	A	B
European version:	G 1/2 w. spot-face or M18 × 1.5 ISO 6149 or M22 × 1.5 (P and T) + M18 × 1.5 (L and R) DIN 3852; 15 mm [0.59 in] deep	M10 × 1.5, 16 mm [0.63 in] deep
US version:	3/4 - 16 UNF O-ring boss; 15 mm [0.59 in] deep	3/8 - 16 UNC, 16 mm [0.63 in] deep

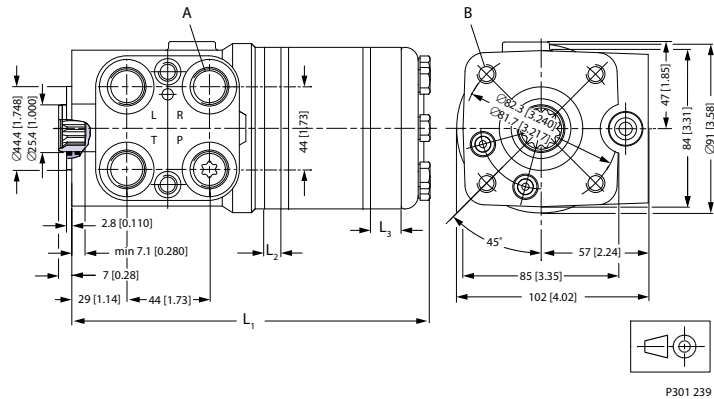
OSPC ON and OSPC OR dimensions

Type	L₁		L₂	
	mm	[in]	mm	[in]
OSPC 40	126	[4.96]	6.5	[0.26]
OSPC 50	126	[4.96]	6.5	[0.26]
OSPC 60	128	[5.04]	9.1	[0.36]
OSPC 70	128	[5.04]	9.1	[0.36]
OSPC 80	129	[5.08]	10.4	[0.41]
OSPC 100	132	[5.20]	13.0	[0.51]
OSPC 125	135	[5.31]	16.2	[0.64]
OSPC 160	140	[5.51]	20.8	[0.82]
OSPC 185	143	[5.63]	24.0	[0.94]
OSPC 200	145	[5.71]	26.0	[1.02]
OSPC 230	149	[5.87]	29.9	[1.18]
OSPC 250	151	[5.94]	32.5	[1.28]
OSPC 315	160	[6.30]	40.9	[1.61]
OSPC 400	171	[6.73]	52.0	[2.05]
OSPC 500	184	[7.24]	65.0	[2.56]

Steering units open center and closed center

OSPD ON and OSPD OR

OSPD ON and OSPD OR



OSPD ON and OSPD OR versions

	A:	B:
European version	G 1/2; 15 mm [0.59 in] deep w. spot-face;	M10 x 1.5, 16 mm [0.63 in] deep

OSPD ON and OSPD OR dimensions

Type	L ₁		L ₂		L ₃	
	mm	[in]	mm	[in]	mm	[in]
OSPD 60/185	191	[7.52]	9.1	[0.36]	16.2	[0.64]
OSPD 60/220	195	[7.68]	9.1	[0.36]	20.8	[0.82]
OSPD 70/195	190	[7.48]	9.1	[0.36]	16.2	[0.64]
OSPD 70/230	195	[7.68]	9.1	[0.36]	20.8	[0.82]
OSPD 100/260	199	[7.83]	13.0	[0.51]	20.8	[0.82]
OSPD 100/300	204	[8.03]	13.0	[0.51]	26.0	[1.02]
OSPD 125/285	202	[7.95]	16.2	[0.64]	20.8	[0.82]
OSPD 125/325	207	[8.15]	16.2	[0.64]	26.0	[1.02]
OSPD 125/440	222	[8.74]	16.2	[0.64]	40.9	[1.61]

SAMER has become a preferred Hydraulic Supplier with many Manufacturers because offers the best of what really matters:
the hardware at the internal core of the Machine Application.

SAMER offers following services:

- Systems design with pumps and motors in closed and open loop circuits including valves,
- Sale of hydraulic components and electronic devices. --Commissioning and start up on machinery.
- Repair of hydraulic components
- Postsale and service troubleshoot on phone

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