

Technical Information

## Steering

OSPB, OSPC, OSPD Open Center and  
OSPB Closed Center



**Revision history***Table of revisions*

<b>Date</b>	<b>Changed</b>	<b>Rev</b>
May 2017	Updated technical data	0701
April 2016	Updated to Engineering Tomorrow design	0602
August 2014	Port thread deleted=	FA
July 2014	Changed to Danfoss layout	EA
August 2013		DA
November 2009	Steering column deleted	CA
May 2008	TAD deleted	BA
November 2002	First version	AA

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## A wide range of steering components



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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 cm<sup>3</sup>/rev [1.95 to 6.10 in<sup>3</sup>/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 cm<sup>3</sup>/rev [2.44 to 73.2 in<sup>3</sup>/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

### Conversion factors

1 N·m = [8.851 lbf·in]

1 N = [0.2248 lbf]

1 mm = [0.0394 in]

1 cm<sup>3</sup> = [0.061 in<sup>3</sup>]

1 l = [0.264 US gal]

1 bar = [14.5 psi]

°F = [1.8°C + 32]

### Survey of literature with technical data on Danfoss steering components

Detailed data on all Danfoss steering components and accessories can be found in our steering component catalogues, which is divided in to the following individual sub catalogues:

General information	Steering components
Technical data on mini steering units	OSPM
Technical data on open center, and closed center steering units	OSPB, OSPC, and OSPD
Technical data on load sensing steering units, priority valves and flow amplifiers	OSPB, OSPC, OSPF, OSPD, OSPL, OSPBX, OSPLX, OVPL, OLS and OSQ
Technical data on load sensing steering unit with amplification	OSPU
Technical data on hydraulic and electrohydraulic pilot operated steering valves, electrical actuation modules and appropriate steering units.	EHPS, EHPS w. OLS 320, PVE for EHPS and OSPCX
Technical data on combined steering unit/ electrohydraulic steering valves and steering wheel sensors	OSPE
Technical data on electrohydraulic steering valves	EHi
Technical data on steering wheel sensors	SASA

For technical information on individual variants, please contact the Danfoss Sales Organization.

**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.

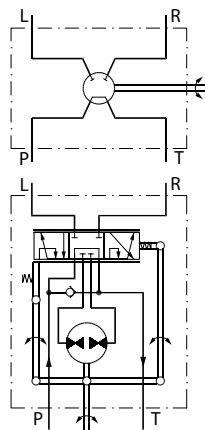
With reaction steering units any external forces acting on the steered wheels result in a corresponding movement of the steering wheel when the driver is not steering the vehicle.

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*



150-181.10



**Steering Units, OSPB, OSPC, OSPD Open Center**

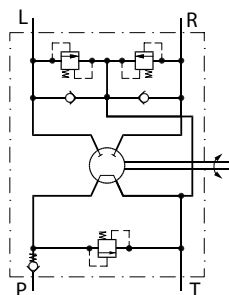
**OSPC**

**Steering unit with integrated valve functions**

*OSPC ON*

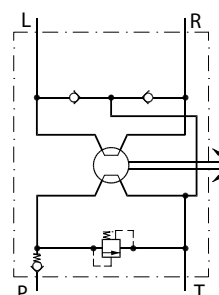


*OSPC ON Open center Non-reaction*



150-370.10

*OSPC OR Open center Reaction*



150-434.10

**Steering Units, OSPB, OSPC, OSPD Open Center**

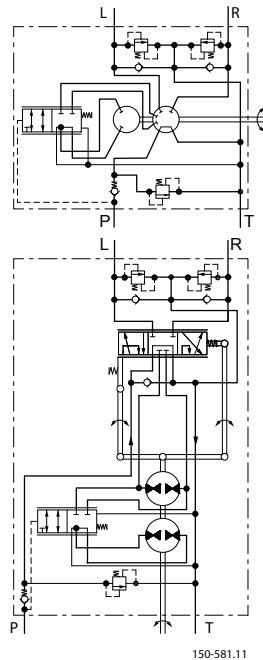
**OSPD**

**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*





**Code numbers and weights**
**OSPB open center non-reaction steering units**

OSPB has no valve functions.

Steering unit	Code Numbers, connections		Pump flow range		Weight	
	European version G 1/2	US version 3/4-16UNF O <sup>1)</sup>	l/min	[US gal/min]	kg	[lb]
OSPB 50 ON	150N0039	150N0025	5-18	[1.32-4.76]	5.2	[11.46]
OSPB 80 ON	150N0040	150N0026	10-30	[2.64-7.93]	5.3	[11.68]
OSPB 100 ON	150N0041	150N0027			5.4	[11.90]
OSPB 125 ON	150N0042	150N0024	20-50	[5.28-13.21]	5.5	[12.13]
OSPB 160 ON	150N0043	150N0028			5.6	[12.35]
OSPB 200 ON	150N0044	150N0023			5.8	[12.79]
OSPB 250 ON	150N0052	150N0022			6.0	[13.23]
OSPB 315 ON	150N0045	150N0030			20-70	[5.28-18.49]
OSPB 400 ON	150N0046	150N0031	7.0	[15.43]		
OSPB 500 ON	150N0047	150N0032	7.6	[16.76]		

<sup>1)</sup> O-ring chamfer on port connections. Valve blocks OVP and OVR can be mounted on the all the OSPB steering units from the above table.

## Code numbers and weights

### OSPC open center non-reaction steering units

OSPC ON in the table below have all the following valve functions incorporated:

- check valve in P-port
- relief valve
- shock valves
- suction valves

Steering unit	Code Numbers, connections		Pump flow range		Valve settings				Weight							
					Relief valve		Shock valve									
	European version G 1/2 S <sup>2)</sup>	US version 3/4-16 UNF O <sup>1)</sup>	l/min	[US gal/ min]	bar	[psi]	bar	[psi]	kg	[lb]						
OSPC 40 ON	150N2148	-	5-18	[1.32-4.76]	140	[2030]	200	[2900]	5.2	[11.46]						
OSPC 50 ON	150N2149	150N2136							5.2	[11.46]						
OSPC 80 ON	150N2150	150N2137	10-30	[2.64-7.93]					170	[2465]	225	[3263]	5.3	[11.68]		
OSPC 100 ON	150N2151	150N2138											5.4	[11.90]		
OSPC 125 ON	150N2152	150N2139											20-50	[5.28-13.21]	5.5	[12.13]
OSPC 160 ON	150N2153	150N2140													5.6	[12.35]
OSPC 200 ON	150N2154	150N2141													5.8	[12.79]
OSPC 250 ON	150N2155	150N2168													6.0	[13.23]
OSPC 315 ON	150N2156	150N2142	20-70	[5.28-18.49]									6.2	[13.67]		
OSPC 400 ON	150N2157	-											7.0	[15.43]		
OSPC 500 ON	150N2158	-			7.6	[16.78]										

<sup>2)</sup> Spot-face around port connections (can not be used in connection with OVR angular block).

<sup>1)</sup> O-ring chamfer on port connections

If you wish other port connection displacements, combination of displacement and pump flow range, valve combinations and/or other valve settings, please fill in the *Order specification* on page 12 and contact the Danfoss Sales Organisation.

## Code numbers and weights

### OSPC open center reaction steering units

OSPC OR in the table below have all the following valve functions incorporated:

- check valve in P-port
- relief valve
- suction valves

Steering unit	Code numbers	Pump flow range		Valve settings		Weight	
	Connections			Relief valve			
	European version G 1/2	l/min	[US gal/min]	bar	[psi]	kg	[lb]
OSPC 80 OR	150N2159	10-30	[2.64-7.93]	170	[2465]	5.3	[11.68]
OSPC 200 OR	150N2160	20-50	[5.28-13.21]			5.8	[12.79]

If you wish other displacements, port connections, pump flow range, valve combinations and/or other valve settings, please fill in the *Order specification* on page 12 and contact the Danfoss Sales Organisation.

### OSPD open center non-reaction steering units

OSPD ON in the table below has the following valve functions incorporated:

- check valve in P-port
- relief valve
- shock valves
- suction valves

Steering unit	Code numbers	Pump flow range		Valve settings				Weight	
	Connections European version G1/2 S <sup>2)</sup>	l/min	[US gal/min]	Relief valve		Shock valve			
				bar	[psi]	bar	[psi]	kg	[lb]
OSPD 70/195 ON	11113183	20-50	[5.28-13.21]	170	[2465]	225	[3263]	7.5	[16.53]

<sup>2)</sup> Spot-face around port connections (can not be used in connection with OVR angular block)

If you wish other displacements, reaction type, pump flow range and/or other valve settings, please fill in the *Order specification* on page 12 and contact the Danfoss Sales Organisation.

**Order specification**
**Specification table for non catalogue numbers**

Specification table for Danfoss open center steering units type OSPC and OSPD which are not available in the code number tables.

Fill in your company data and place x's in the table where appropriate then send to your Danfoss Sales Organisation.

Your company	Name	Vehicle	Potential pcs/year	Completed by	Date										
Steering unit type	OSPC			OSPD											
Reaction type	ON (Open center Non-reaction)			OR (Open center Reaction)											
DP, cm <sup>3</sup> /rev OSPC ON	40	50	60	70	80	100	125	160	185	200	230	250	315	400	500
DP, cm <sup>3</sup> /rev OSPC OR	40	50	60	70	80	100	125	160	185	200					
DP, cm <sup>3</sup> /rev OSPD ON	60/185	60/220	60/260	70/195	70/230	70/270	100/260	100/300	125/285	125/325	125/440				
DP, cm <sup>3</sup> /rev OSPD OR	60/185		60/220			70/195			70/230						
Pump flow range l/min	5-18			10-30			20-50			20-70					
Port threads	G1/2		G1/2 - S <sup>2)</sup>			M18 × 1.5 - O <sup>1)</sup> S <sup>2)</sup>			M22 × 1.5/M18 × 1.5 - S <sup>2)</sup>		3/4-16UNF - O <sup>1)</sup>				
Relief valve bar	70	80	90	100	110	120	140	170	190	200	210	no relief valve			
Shock valves bar	150	180	200	225	240	no shock valves									
Suction valves	Yes						No								
Neutral setting springs <sup>4)</sup>	Soft: 0.5 - 1.8 N•m in normal steering situations					Standard: 0.8 - 3 N•m in normal steering situations					Strong: 1.5 - 4 N•m in normal steering situations				
Unit black painted	Yes						No								

<sup>1)</sup> O-ring chamfer on port connections

<sup>2)</sup> Spot-face around port connections (can not be used in connection with OVR angular block)

<sup>4)</sup> Soft springs only allowed for pump flow up to 30 l/min

DP: Displacement

All OSPC and OSPD steering units specified by code numbers in this catalogue have check valve in P-connection.

All steering units specified by code numbers in this catalogue have standard neutral setting springs.

An alternative way to specify a variant is to state an existing code number and add the modifications, you would like to have implemented in the basic steering unit.

Code number of basic steering unit: \_\_\_\_\_

**Order specification**

Requested modifications: \_\_\_\_\_

**Steering units, OSPB Closed center**

**Version and code numbers - OSPB**

**Closed center**

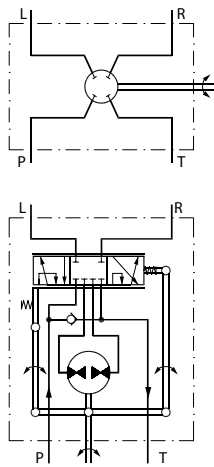
Closed center steering units are blocked on their P port in the neutral position. In closed center steering systems, variable oil flow is required.

**Non-reaction**

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



*OSPB CN Closed center Non-reaction*



150-184.10

**Code numbers and weights**

**OSPB code numbers and weights**

OSPB has no valve functions.

*OSPB closed center non-reaction steering units*

Steering unit	Code numbers	Weight	
	Connections US version 3/4-16UNF O <sup>1)</sup>	kg	[lb]
OSPB 50 CN	150-0125	5.2	[11.46]
OSPB 80 CN	150-0126	5.3	[11.68]
OSPB 100 CN	150-0127	5.4	[11.90]
OSPB 125 CN	150-0129	5.5	[12.13]
OSPB 160 CN	150-0128	5.6	[12.35]
OSPB 200 CN	150-0146	5.8	[12.79]
OSPB 315 CN	150G4104	6.2	[13.23]
OSPB 400 CN	150G4105	7.0	[15.43]

<sup>1)</sup> O-ring chamfer on port connections

Valve blocks OVP and OVR can be mounted on the all the OSPB steering units from the above table

**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 <sup>3</sup> /rev [in <sup>3</sup> /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]	175 [2538]		
OSPB 100 CN	100 [6.10]	10 [2.64]			
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 <sup>3</sup> /rev [in <sup>3</sup> /rev]	Displacement normal steer mode cm <sup>3</sup> /rev [in <sup>3</sup> /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

Please contact the Danfoss Sales Organisation regarding steering units with code numbers not mentioned in this catalogue. They may have different technical data.

**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 mm<sup>2</sup>/s [100 SUS] at 50°C [122°F] was used during measuring.

**Pressure relief valve**

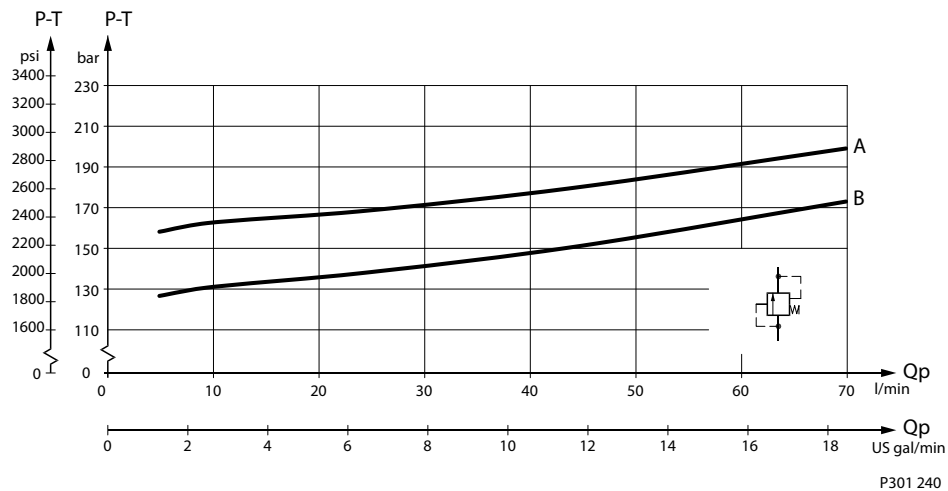
The pressure relief valve protects pump and steering unit against excessive pressure and limits the system pressure while steering. The pressure relief valve is set at 25 l/min [6.60 US gal/min] flow.

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



- A:** 170 +5/-0 bar [2465 +73/-0 psi]
- B:** 140 +5/-0 bar [2030 +73/-0 psi]
- Q:** 25 l/min [6.60 US gal/min]

**Shock valves**

The shock valves protect the steering unit and limit maximum external forces on the steering cylinder. The shock valves in the steering unit limit the maximum pressure drop from L to T and from R to T. The shock valves are set at 3 l/min [0.792 US gal/min].

The shock valves are of the direct acting type, so they react very quickly.

Settings: rated value +20 bar [290 psi], ex: 200 +20 bar [2900 +290 psi].

**Suction valves**

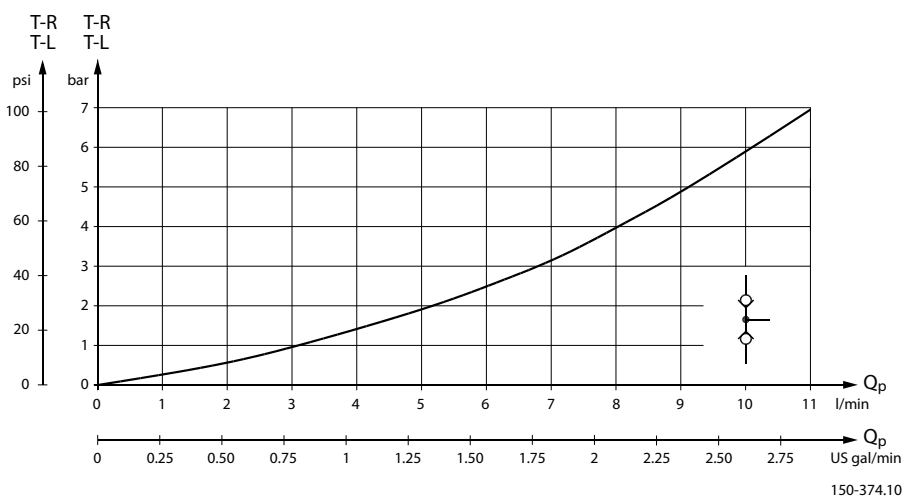
The suction valves ensure oil suction to avoid cavitation in the steering cylinder. To provide correct suction, a back pressure valve must be fitted in the tank line from the steering unit.

Generally we recommended a back pressure of 2 bar [29 psi], but on vehicles with strong selfstraightening tendencies, we recommend 5-10 bar [72-145 psi].

For further advice, please contact the Danfoss Sales Organisation.

A connection which incorporates a check valve must be established to allow oil flow to by-pass the back pressure valve (and filter) from the tank to steering unit.

### Steering units open center and closed center



#### Check valve

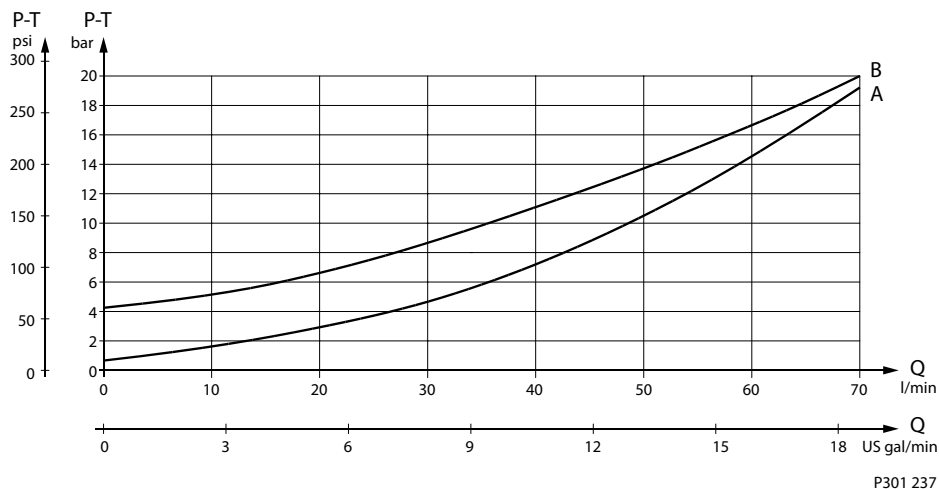
The check valve protects the driver against steering wheel jerks. The check valve prevents oil from flowing backwards into the pump line when steering against a high pressure on the cylinder side. The check valve is built into the steering unit P connection. The pressure drop across the check valve depends on the use of port adaptors with 11 mm [0.43 in] minimum bore and is indicated on the graph in [Pressure drop in neutral](#) on page 19.

#### Pressure drop in neutral

The pressure drop is measured on Open Center steering units, and with the steering unit in neutral position.

The pressure drop is measured from P to T.

The values are valid at an oil temperature of 50°C [122°F] and a viscosity of 21 mm<sup>2</sup>/s (100 SUS).



- A:** OSPB ON and OSPC ON/OR
- B:** OSPD ON/OR

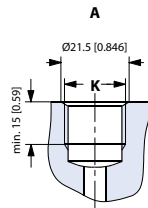
The pressure drop curves are solely valid for selected spool sets within the recommended flow range.

E.g. OSPC 50 ON with a spool set for 5-18 l/min [1.32-4.76 US gal/min], pressure drop curve A solely applies within the interval from 0-18 l/min [0-4.76 US gal/min]. A higher flow supply to the steering unit

**Steering units open center and closed center**

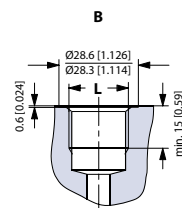
(e.g. 30 l/min [7.93 US gal/min]) will make the pressure drop exceed the value, which curve **A** shows at 30 l/min [7.93 US gal/min].

**Port thread versions**



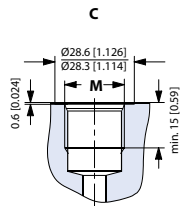
150-582.10\_A

- A:** G main ports  
**K:** DIN 3852-2 - G



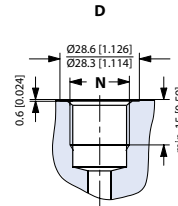
150-582.10\_B

- B:** G main ports w. spot-face  
**L:** DIN 3852-2 - G



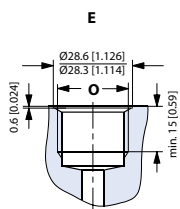
150-582.10\_C

- C:** Metric main ports w. spot-face and O-ring chamfer  
**M:** ISO 6149-1 – M18×1.5



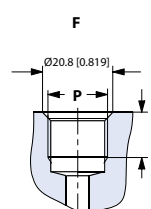
150-582.10\_D

- D:** Metric main ports w. spot-face  
**N:** DIN 3852-1 – M18×1.5



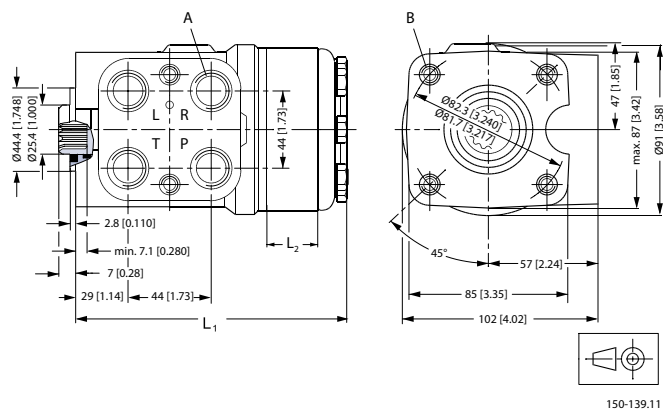
150-582.10\_E

- E:** Metric main ports w. spot-face  
**O:** DIN 3852-1 - M22×1.5



150-582.10\_F

- F:** UNF main ports w. O-ring chamfer  
**P:** ISO 11926-1 ¾-16UNF  
O-ring boss port

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

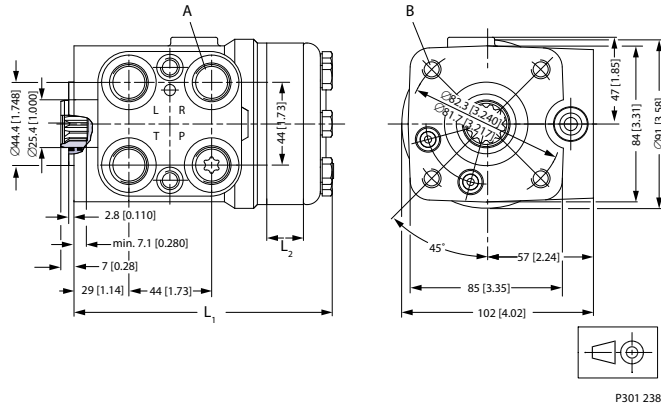
*OSPB ON and OSPB CN dimensions*

Type	L <sub>1</sub>		L <sub>2</sub>	
	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*

	<b>A</b>	<b>B</b>
<b>European version:</b>	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
<b>US version:</b>	3/4 - 16 UNF O-ring boss; 15 mm [0.59 in] deep	3/8 - 16 UNC, 16 mm [0.63 in] deep

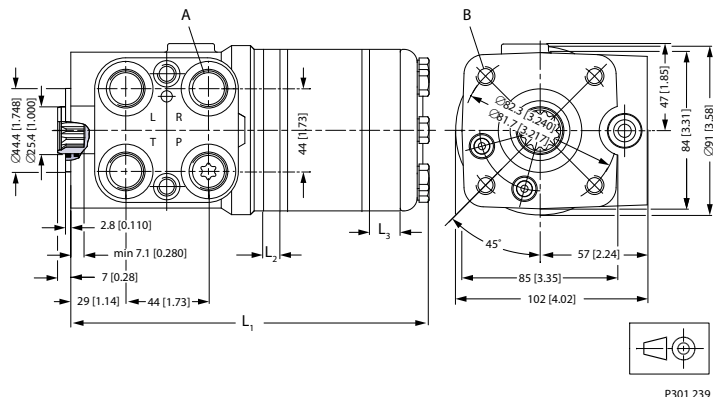
*OSPC ON and OSPC OR dimensions*

Type	L <sub>1</sub>		L <sub>2</sub>	
	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*

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

*OSPD ON and OSPD OR dimensions*

Type	L <sub>1</sub>		L <sub>2</sub>		L <sub>3</sub>	
	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]

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