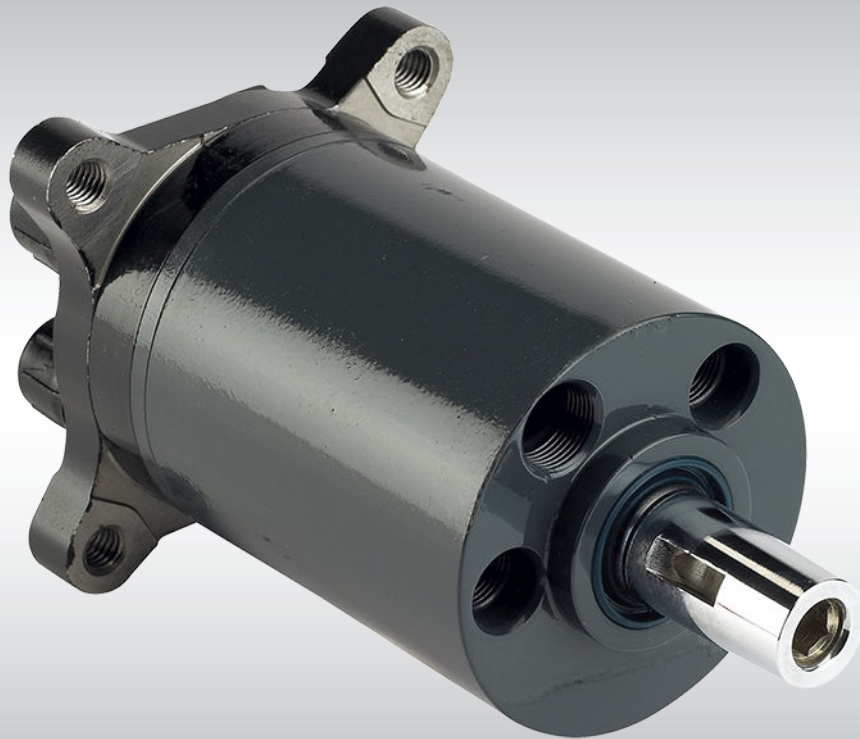


MAKING MODERN LIVING POSSIBLE



Service Manual
Steering
OSPM



Revision History*Table of Revisions*

Date	Changed	Rev
Mar 2014	Converted to Danfoss layout - DITA CMS	BA
Feb 1998	First edition	AA

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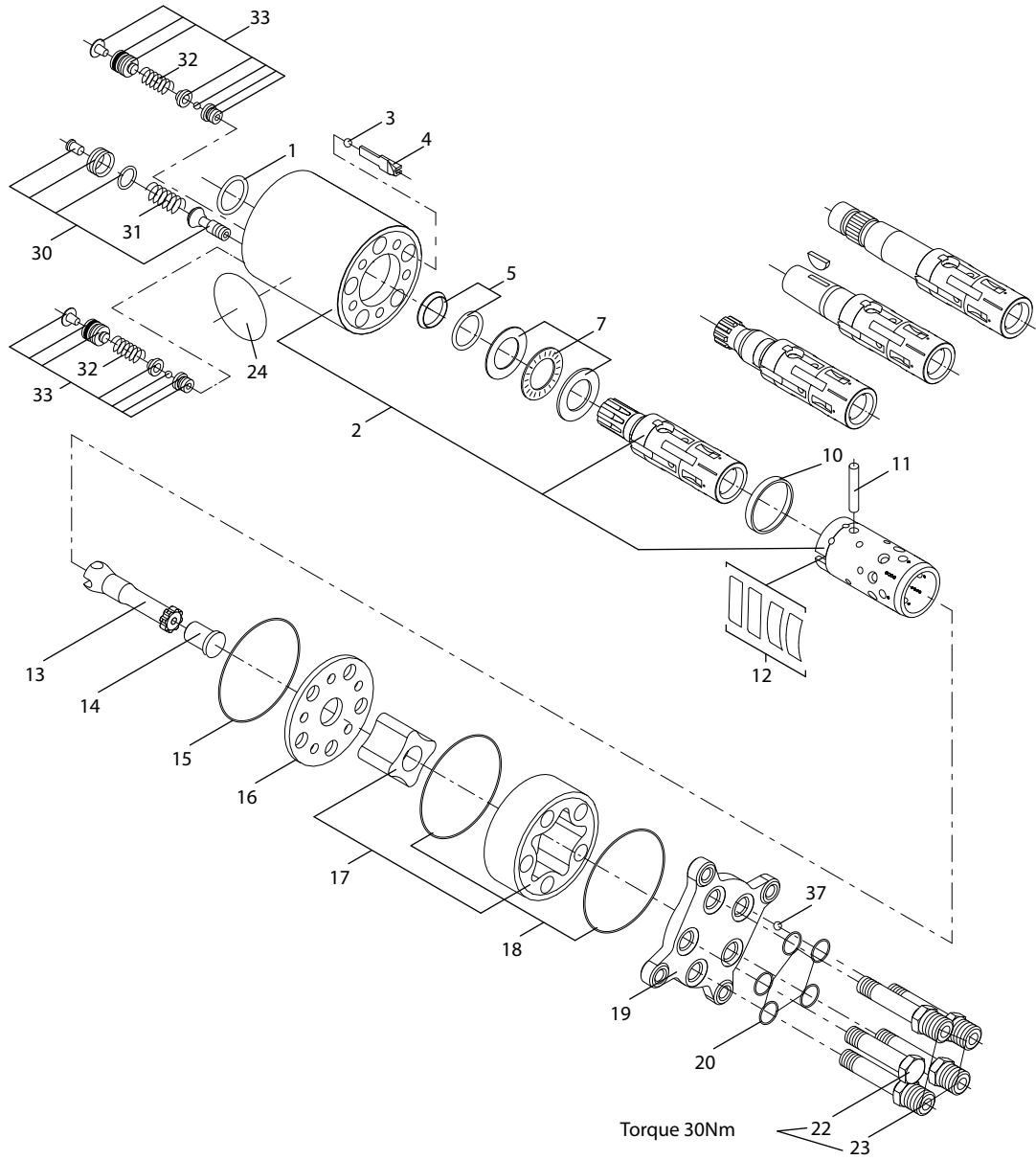
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Exploded View

Exploded view OSPM



A150-508.10

Spare Part List
Spare parts list OSPM

Item	Spare parts	Dimension	Code no.	Comments	Number per unit
1	Dust seal ring	26 x 19 x 4	150L0396	Integrated column	1
2	Housing spool and sleeve			(not sold separately)	1
3	Ball	ø3/16"	689X1005		1
4	Ball stop	29	150L0462	ON with check valve in P-port, item 37	1
		42	150L0463	PB with check valve in P-port, item 37	1
		34	150L0464	ON + PB, without check valve in P-port	1
5	Shaft seal	21,9 x 17,5 x 3,1	150L0411		1
		23,4 x 19 x 3	150L0412	Integrated column	1
7	Bearing		150L4046		1
10	RIng		150L0380		1
11	Cross pin		150L0381		1
12	Set of springs		150L0455		1
13	Cardan shaft	63,2	150L0323	ON units	1
		76,2	150L0324	PB units	1
14	Spacer	5,9	150L0444	32 cm ³	1
		12	150L0442	50 cm ³	1
		18,9	150L0447	70 cm ³	1
		22,3	150L0440	80 cm ³	1
		29,1	150L0443	100 cm ³	1
15	O-ring	60 x 1,5	633B0365		1
16	Distributor plate		150L0339		1
17	Gearwheel set	32 cm ³	11	150L4005	1
		50 cm ³	17,1	150L4003	1
		63 cm ³	21,6	150L4002	1
		70 cm ³	24	150L4007	1
		80 cm ³	27,4	150L4001	1
		100 cm ³	34,2	150L4009	1
18	O-ring	60 x 1,5	633B0365		2
19	End cover		150L0392		1
20	O-ring	10 x 1,5	633B1103		5
22	Special screw, incl. O-ring	32,1	150L4445	For OSPM 32 ON	1
		38,2	150L4443	For OSPM 50 ON	1
		42,7	150L4442	For OSPM 63 ON	1
		44,9	150L4435	For OSPM 70 ON	1
		47,6	150L4441	For OSPM 80 ON	1
		55,3	150L4432	For OSPM 100 ON	1
23	Special screw, incl. O-ring	32,1	150L4425	For OSPM 32 ON / PB	4/5
		38,2	150L4423	For OSPM 50 ON / PB	4/5
		42,7	150L4425	For OSPM 63 ON / PB	4/5
		44,9	150L4425	For OSPM 70 ON / PB	4/5
		47,6	150L4421	For OSPM 80 ON / PB	4/5

Spare Part List

Item	Spare parts	Dimension	Code no.	Comments	Number per unit
		55,3	150L4420	For OSPM 100 ON / PB	4/5
24	Name plate		150A6006		1
30	Complete relief valve		150L4056	(excl. spring)	1
31	Spring for relief valve				
	45-55 bar		663X6175		1
	54-70 bar		663X6177		1
	65-85bar		663X6176		1
	80-100 bar		663X6178		1

Set of seals 150L4054

Item	Spare parts	Dimension	Code no.	Comments	Number per unit
1	Dust seal	26 x 19 x 4	150L0396	Integrated column	1
5	Shaft seal	21,9x 17,5 x 3,1	150L4011		1
		23,4 x 19 x 3	150L4012	Integrated column	1
15	O-ring	60 x 1,5	633B0365		1
18	O-ring	60 x 1,5	633B0365		2
20	O-ring	10 x 1,5	633B1103		5
30	O-ring	12,4 x 1,78	633B11856	For relief valve adjusting screw	1

Tightening torque

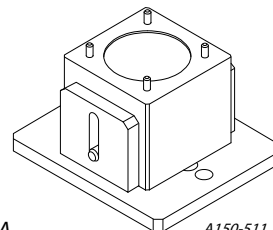
Item	Nm	lbf-in
22	30 ± 3	265 ± 25
33		

Tools

Tools for OSPM

A

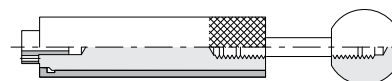
Holding tool, code no. SJ150L9001-01



A A150-511.10

B

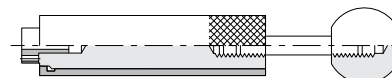
Assembly tool for shaft seal $\varnothing 17,5$, code no. code no. SJ150L4011 – 01



A150-512.10

C

Assembly tool for shaft seal $\varnothing 19,2$, code no. SJ150L4012 – 01



A150-513.10

D

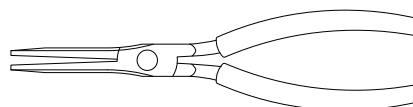
Assembly tool for dust seal ring, code no. SJ150L0396 -01



A150-514.10

E

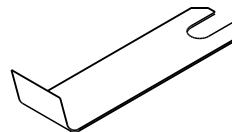
Pliers for piston in pressure relief valve, code no. SJ150-9000 -25



A150-515.10

F

Fork for fitting cardan shaft (OMM) SJ 151G9000 -1



151-1538.10

G

Ordinary hand tools. Cannot be bought from Danfoss Socket spanner (5/8 in) Ratchet spanner, 1/2" Torque wrench: 0-70 Nm (0-7 daNm) Allen keys: 5 & 8 mm a/flats Small screwdriver, ground sharp. Pincers

Tools

H

Lubricants: Vaseline

Dismantling
Dismantling the OSPM
Dismantling

Item	Part to remove	Action
	Column	If there is a steering column on OSPM, place the unit in the holding tool, on the four locating pins with steering column upwards. Dismantle the steering column.
30, 31	Pressure relief valve	If there is a pressure relief valve in OSPM, remove the plastic plug from the adjusting screw and unscrew with the 5 mm a/flats Allen key. Remove the spring and use special pliers-lift the valve cone out of the housing.
		Lift OPSM clear of the holding tool, turn it so that the output shaft points downwards and place it in the holding tool again. The locating pin in the tool must engage with the OSPM housing.
22, 23	Spec. screws	Remove the screws with a 16 mm a/flats (5/8") spanner.
19	End cover	Remove end cover sideways.
17, 18	Gear wheel set	Hold a hand under the gearwheel set to keep the gearwheel from falling out. Remove O-rings.
16	Distributor plate	Remove distributor plate.
13	Cardan shaft	Remove cardan shaft.
15	O-ring	Remove O-ring from housing.
3, 4, 37	Balls and ball stop	Shake out check valve ball (not in all units), ball stop and emergency steering ball. Use pincers if necessary.
		Place the OSPM in the tool again. Lift up steering unit and fixture in one piece and turn it 90° to horizontal.
2	Housing/spool/sleeve	Turn the spool set so that the pin in spool and sleeve is horizontal and push it out.
7	Bearing	Remove bearing from shaft end. The outer washer may sometimes adhere to the housing. If the washer does not come out with the shaft, it will come out when shaft seal item 5 is being pressed out.
10	Ring	Remove retaining ring for the neutral position springs.
11	Cross pin	Press the pin out of the spool set. Carefully press the spool out of the sleeve.
12	Spring	Press the neutral position springs out of the spool.
1	Dust seal	Remove the dust seal ring (with a "sharp" screwdriver).
5	Shaft seal	Remove the shaft seal (with a "sharp" screwdriver if necessary).

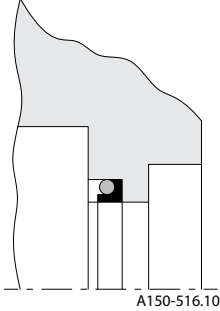
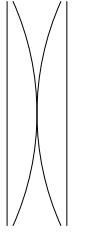
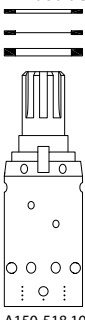
Cleaning, inspection, replacement, and lubrication

- Clean all parts carefully.
- Carefully check all parts and replace imperfect parts, if any.
- Always replace all sealing parts during a repair.
- Before assembly, lubricate all parts with hydraulic oil and grease rubber parts with vaseline.

Assembling

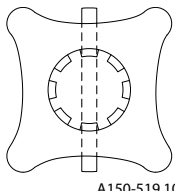
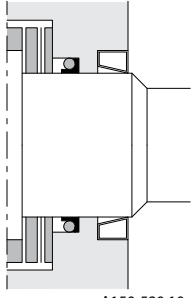
Assembly of the OSPM

Assembly of the OSPM

Item	Part to mount	Action
2	Housing	Place the OSPM housing horizontally in the holding tool, with the hole for the output shaft facing the tool. The locating pin in the tool must engage with in the OSPM housing.
5	Shaft seal 	With the assembly tool the shaft seal must into the housing. Note that the small guide piece at the front of the tool must remain in the hole for the output shaft when the tool itself is drawn out of the housing. Note, there are two different tools: One for housings for steering column mounting (SJ150L4011-01) One for housings with integrated steering column (SJ150L4012-01).
2	Spool/sleeve	Guide spool and sleeve together, turn the spools so that the key slots are opposite each other.
12	Springs 	Insert the curved springs between the flat springs and push them into place (see sketch).
10	Spring retaining ring	Center the springs in the spool/sleeve set and guide the ring down over the sleeve. The ring must be able to rotate unimpeded by the springs.
11	Cross pin	Fit the cross pin in the spool set.
7	Thrust bearing 	Fit the thick race, needle cage and thin race. Lubricate the output shaft on the inner spool with Molykote PG plastslip 75, on the surface in contact with the shaft seal.
2	Housing + spool/sleeve	With the housing still horizontal in the holding tool - secure it with one hand. With the other hand take the assembled spool/sleeve set, making sure two fingers hold the cross pin (11) in position. Guide the spool set into the housing with the cross pin (11) horizontal. Be careful with the small guide piece from mounting of the shaft seal. With it is pressed out by the shaft rotary. With housing and spool set remaining in the tool, lift the whole unit into vertical position. The pin

Assembling

Assembly of the OSPM (continued)

Item	Part to mount	Action
		in the spool set must now point towards port P in the housing, either at 6 o'clock or 12 o'clock.
3	Ball	Place the emergency steering ball in port P.
4	Ball stop	Place the ball stop in port P.
37	Ball	Place the check valve ball (if required) in port P.
15	O-ring	Fit the O-ring in the housing.
16	Distributor plate	Place the distributor plate on the housing. Turn it so that the holes line up.
13	Cardan shaft	Fit the cardan shaft into the inner spool and allow it to engage with the pin. If so required use fork SJ 151G9000-1 to retain the cardan shaft.
17	Gear wheel  A150-519.10	When fitting the gearwheel, it must be oriented correctly so that it engages with the cardan shaft. The cross pin (11) in the spool set must line up with the bottom of the teeth in the star (see sketch).
18	O-ring	Place the O-rings in the grooves on each side of the gearwheel rim.
17	Gear ring	Place the gearwheel rim over the distributor plate so that all holes are in line with each other.
14	Spacer	Place the spacer over the cardan shaft.
19	End cover	Place the cover so that the hole marked "P" lines up with port P in the housing ("6 o'clock" or "12 o'clock").
20, 22, 23	Special screws	Fit screws (with O-rings). Remove the retainer fork. Tighten all five screws (cross pattern) with 30 ± 3 Nm (3 daNm). With open center units, the screw with no oil flow connection must be fitted in port E. If the OSPM must be mounted with a pressure relief valve, lift it out of the tool and place it on the four pins with the axle journals upwards
30	Piston	Fit the piston.
31	Spring	Fit the spring.
30	Adjustment	Screw in the adjusting screw.
	Test	Lift OSPM out of the tool and prepare it for testing.
30		The pressure relief valve can be set either on a test panel or in a system with pressure-gauge read-off. Insert plastic plug.
1	Dust seal  A150-520.10	Guide the dust seal rings down over the shaft end and press into place in the housing with assembly tool. SJ 150L0396 - 01. The dust seal must be fitted after testing so that any leakage from the shaft seal can be detected.



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Local address:

Danfoss Power Solutions US Company
2800 East 13th Street
Ames, IA 50010, USA
Phone: +1 515 239 6000

Danfoss Power Solutions GmbH & Co. OHG
Krokamp 35
D-24539 Neumünster, Germany
Phone: +49 4321 871 0

Danfoss Power Solutions ApS
Nordborgvej 81
DK-6430 Nordborg, Denmark
Phone: +45 7488 2222

Danfoss Power Solutions (Shanghai) Co. Ltd.
Building #22, No. 1000 Jin Hai Rd
Jin Qiao, Pudong New District
Shanghai, China 201206
Phone: +86 21 3418 5200

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