MAKING MODERN LIVING POSSIBLE

Technical Information

Orbital Motor
OMSU Series 3

Revision history

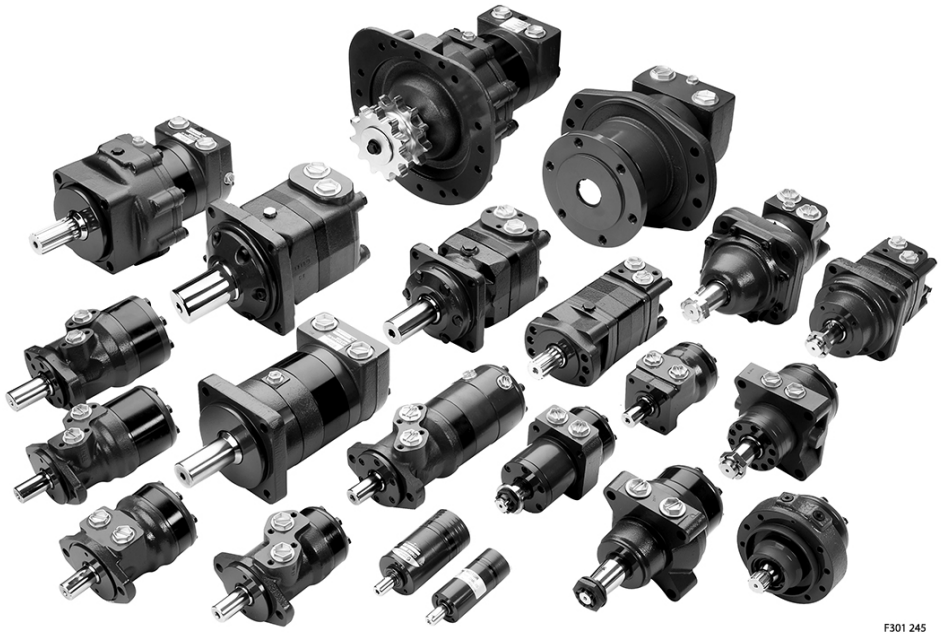
Table of revisions

Date	Changed	Rev
July 2014	Changed to Danfoss layout	BA
February 2013	Drawing dimension updated	AB
September 2012	First edition	AA

Contents

A wide range of Orbital Motors

Characteristic, features and application areas of Orbital Motors



Danfoss is a world leader within production of low speed orbital motors with high torque. We can offer more than 3,000 different orbital motors, categorised in types, variants and sizes (including different shaft versions).

The motors vary in size (rated displacement) from 8 cm^3 [0.50 in^3] to 800 cm^3 [48.9 in^3] per revolution.

Speeds range up to approximate 2,500 min^{-1} (rpm) for the smallest type and up to approximate 600 min^{-1} (rpm) for the largest type.

Maximum operating torques vary from 13 N•m [115 lbf•in] to 2700 N•m [24.000 lbf•in] (peak) and maximum outputs are from 2.0 kW [2.7 hp] to 70 kW [95 hp].

Characteristic features of Danfoss Orbital Motors

- Smooth running over the entire speed range
- Constant operating torque over a wide speed range
- High starting torque
- High return pressure without the use of drain line (High pressure shaft seal)
- High efficiency
- Long life under extreme operating conditions
- Robust and compact design
- High radial and axial bearing capacity
- For applications in both open and closed loop hydraulic systems
- Suitable for a wide variety of hydraulics fluids

Technical features of Danfoss Orbital Motor

The programme is characterised by technical features appealing to a large number of applications and a part of the programme is characterised by motors that can be adapted to a given application. Adaptions comprise the following variants among others:

A wide range of Orbital Motors

- Motors with corrosion resistant parts
- Wheel motors with recessed mounting flange
- OMP, OMR- motors with needle bearing
- OMR motor in low leakage version
- OMR motors in a super low leakage version
- Short motors without bearings
- Ultra short motors
- Motors with integrated positive holding brake
- Motors with integrated negative holding brake
- Motors with integrated flushing valve
- Motors with speed sensor
- Motors with tacho connection
- All motors are available with black finish paint

Survey of literature with technical data on Danfoss Orbital Motors

Detailed data on all Danfoss Orbital Motors can be found in our motor catalogue, which is divided into more individual subcatalogues:

- General information on Danfoss Orbital Motors: function, use, selection of orbital motor, hydraulic systems, etc.
- Technical data on small motors: OML and OMM
- Technical data on medium sized motors: OMP, OMR, OMH
- Technical data on medium sized motors: DH and DS
- Technical data on medium sized motors: OMEW
- Technical data on medium sized motors: VMP
- Technical data on medium sized motors: VMR
- Technical data on large motors: OMS, OMT and OMV
- Technical data on large motors: TMT
- Technical data on large motors: TMV

A general survey brochure on Danfoss Orbital Motors gives a quick motor reference based on power, torque, speed and capabilities.

Code numbers

OMSU Series 3 code numbers

Ultra-short motor

Without output shaft	OMSU 80	OMSU 100	OMSU 125	OMSU 160	OMSU 200	OMSU 250	OMSU 315	OMSU 400
	151F0578	151F0579	151F0580	151F0581	151F0582	151F0583	(*)	(*)

(*) Please contact the Danfoss sales Organization for the code numbers of these motors.

Technical data

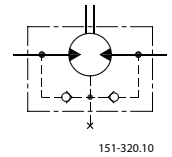
Motor size			OMSU 80	OMSU 100	OMSU 125	OMSU 160	OMSU 200	OMSU 250	OMSU 315	OMSU 400
Geometrical displacement	cm^3		80.5	100	125.7	159.7	200	250	314.9	393
Max. speed	min^{-1}	cont.	810	750	600	470	375	300	240	190
		int.(1)	1000	900	720	560	450	360	285	230
Max. torque	daNm	cont.	20	25	32	36	46	50	63	67
		int.(1)	24	30	38	48	60	63	79	79
		peak(2)	26	32	40	51	65	72	90	98
Max. output	kW	cont.	16	17.5	17.5	16	14	12.5	11.5	10.5
		int.(1)	19	21	21	21	17.5	15	13.5	12.5
Max. pressure drop	bar	cont.	175	175	175	160	160	140	140	120
		int.(1)	210	210	210	210	210	175	175	140
		peak(2)	225	225	225	225	225	200	200	175
Max. oil flow	l/min	cont.	65	75	75	75	75	75	75	75
		int.(1)	80	90	90	90	90	90	90	90
Max. starting pressure with unloaded shaft	bar		12	10	10	8	8	8	8	8
Min. starting torque	daNm	at max pressure cont.	15.5	19.5	24.5	28.5	35.5	39	49	53
		At max. pressure int.(1)	19	23.5	30	37.5	47	49	61	61
Min. speed(3)	min^{-1}		10	10	8	8	6	6	5	5
Max. Inlet pressure	bar	cont.	210	210	210	210	210	210	210	210
		Int.(1)	250	250	250	250	250	250	250	250
		peak(2)	300	300	300	300	300	300	300	300
Max. return pressure with drain line	bar	cont.	140	140	140	140	140	140	140	140
		Int.(1)	175	175	175	175	175	175	175	175
		peak(2)	210	210	210	210	210	210	210	210

(1) Intermittent operation: permissible values may occur for max. 10% of every minute.

(2) Peak load: permissible values may occur for max. 1% of every minute.

(3) At speeds lower than those given, the motor cannot be expected to run evenly.

Code numbers

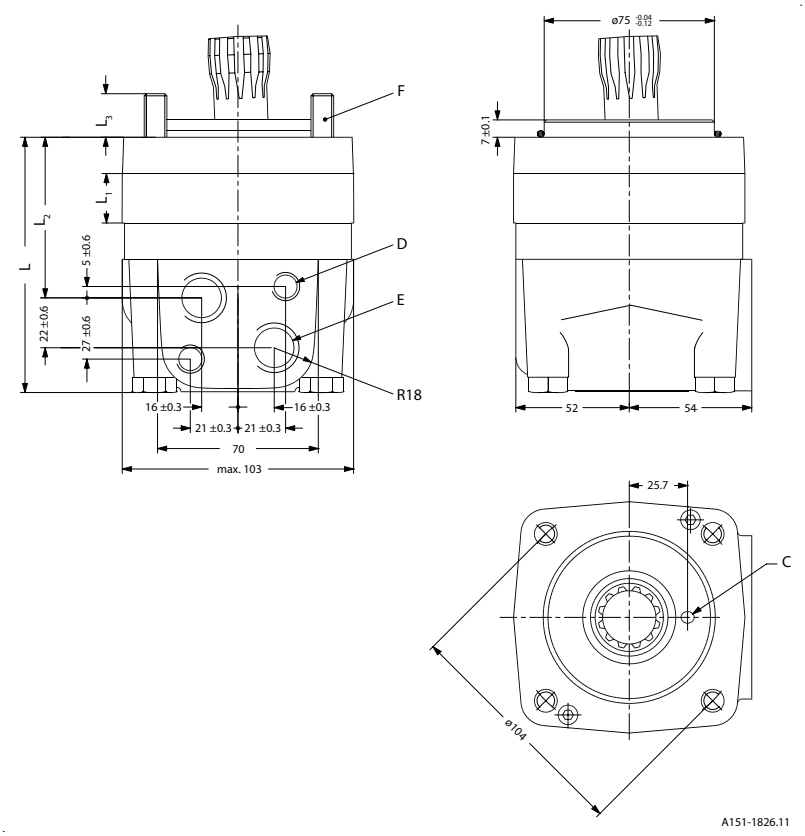


OMSU motors have built-in check valves.

(4) If no drain line is fitted, the built-in check valves ensure that the case pressure is equal to the pressure in the return line. The max. case pressure for OMSU is dictated by the technical data of the component to be attached.

Dimensions

OMSU dimensions



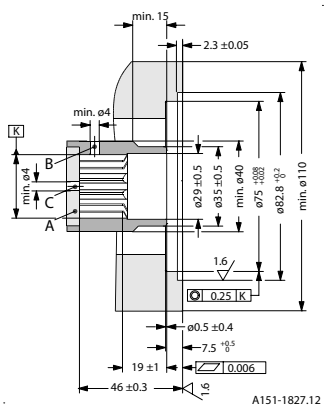
C: Drain hole ø5 +0.2 -0.1

D: M10; 11 mm deep

E: G 1/2; 15 mm deep

	L_{max}	L_1	L_2	L_3
OMSU 80	105	14.0	63	22.0
OMSU 100	109	17.4	67	18.6
OMSU 125	113	21.8	71	14.2
OMSU 160	119	27.8	77	18.2
OMSU 200	126	34.8	84	21.2
OMSU 250	135	43.5	93	22.5

Connection dimensions, attached component



A: Hardened stop plate

B or C: oil circulation holes

Internal spline data for the component to be attached

The attached component must have internal splines corresponding to the external splines on the motor cardan shaft (see drawing below).

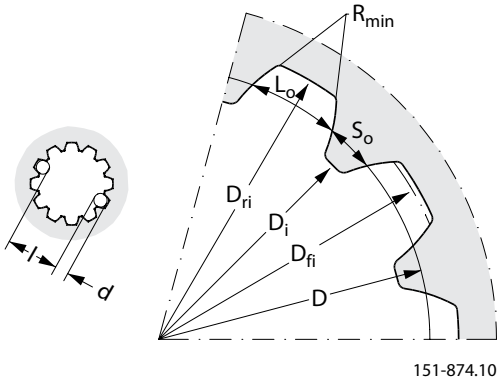
Material:

Case hardening steel with a tensile strength corresponding at least to 20 MoCr4 (900 N/mm^2).

See also SAE 8620 for further information on steel material.

Hardening specification:

- On the surface: HV = 750 ±50
- 7 ±2 mm under the surface: HV = 560



151-874.10

*Finished dimensions (when hardened)

Internal involute spline data
Standard ANS B92. 1-1970, class 5
(corrected m • x = 0.8; m = 2.1166)

Fillet root side fit		**mm [in]**
Number of teeth	z	12
Pitch	DP	12/24
Pressure angle	D	30°
Pitch dia.		25.4 [1.0]
Major dia.	D_{ri}	$28.0^{0}_{-0.1}$ [$1.10^{0}_{-0.1}$]
Form dia. (min.)	D_{fi}	27.6 [1.09]
Minor dia	D_i	$23.0^{0.033}_{0}$ [$0.9055^{+.0013}_{0}$]
Space width (circular)	L_o	4.308 ±0.020 [0.1696 ±0.0008]
Tooth thickness (circular)	S_o	2.341 [0.09217]
Fillet radius	$R_{min.}$	0.2 [0.008]
Max. measurement between pins*	l	$17.62^{+0.15}_{0}$ [$0.700^{0}_{-0.06}$]
Pin dia	d	4.835 ±0.001 [0.1903 ±0.00004]

General data

Drain connection on OMSU or attached component

The case pressure is released to the motor return pressure by the motor drain hole (ø 5 mm) and the incorporated check valves.

A drain line ought to be used when pressure in the return line can exceed the permissible pressure on the shaft seal of the attached component.

The drain line can only be connected to the drain connection of the attached component, i.e. the OMSU motor has no external drain connection.

The drain line on the attached component allows oil to flow freely between component and the motor.

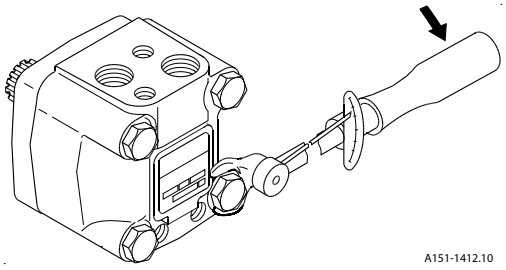
The drain line must be led to the tank in such a way that there is no risk of the motor and attached component being drained of oil during operational stop.

The maximum pressure in the drain line is limited by the attached component and its shaft seal.

Installing OMSU

To ensure that the splines connection of the cardan shaft receive sufficient oil, we recommended a conical sealing between shaft of the attached component and the motor intermediate plate as well as an oil circulation the attached component (see page 3). The conical sealing ring (code no. 633B9023) is supplied with the motor. We further recommend O-ring seal between motor and the counter part. The O-ring (code no. 633B1396) is supplied with the motor.

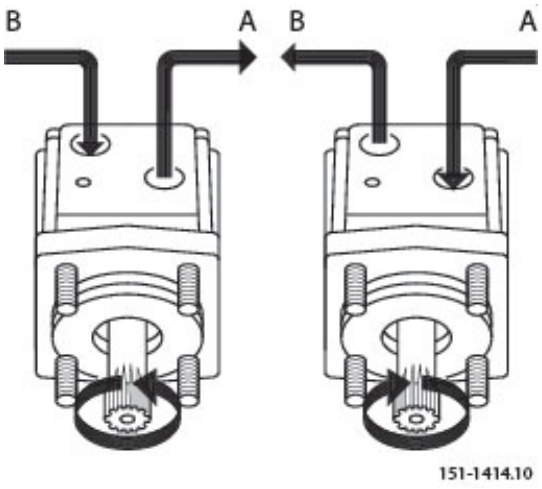
Mounting



Max. tightening torque	
75 $^{+5}_{0}$ Nm	[660 $^{+50}_{0}$ lbf•in]

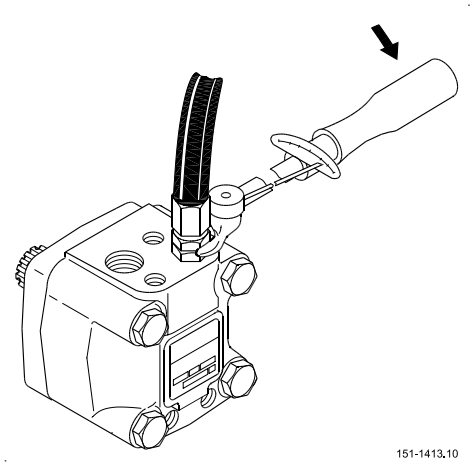
General data

Direction of rotation



Maximum tightening torque

Maximum tightening torque	
Screwed connection	G 1/2 [7/8-14 UNF]
with steel washer	130 N•m [1150 lbf•in]
with aluminium washer	70 N•m [620 lbf•in]
with cutting edge	130 N•m [1150 lbf•in]
with O-ring Boss port	70 N•m [620 lbf•in]



Checking OMSU

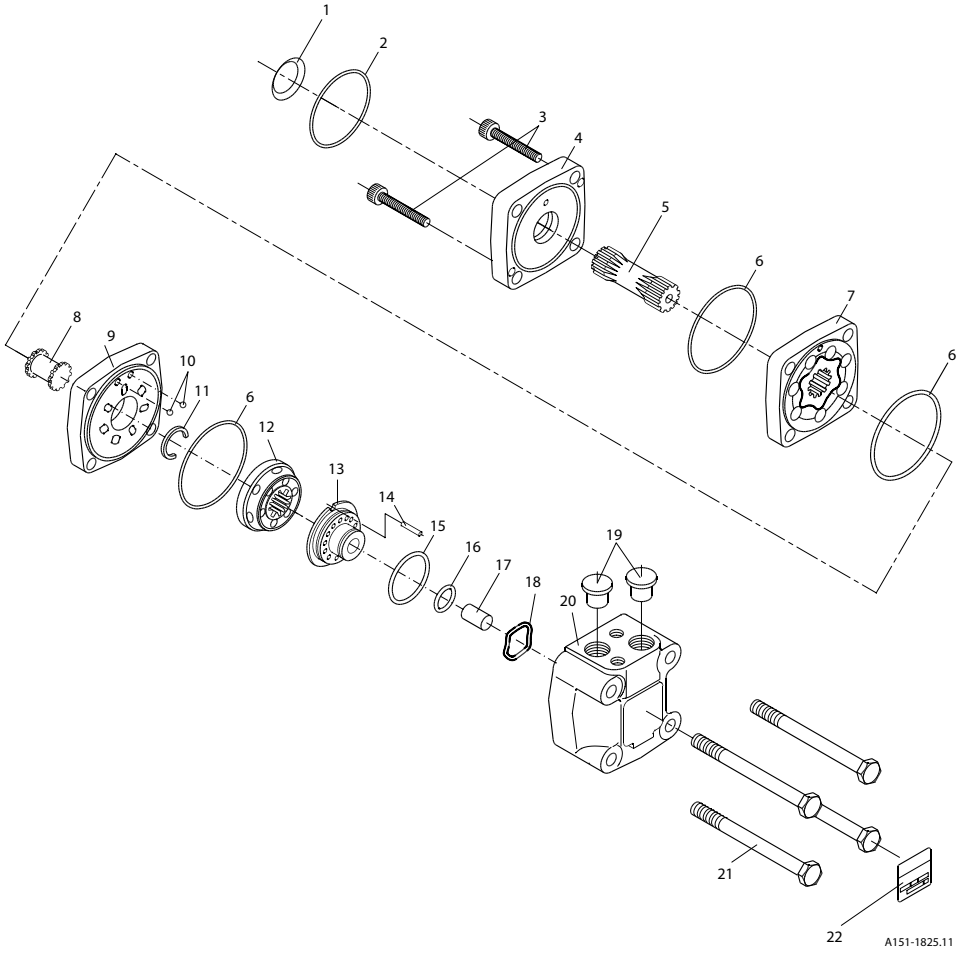
In order to make sure that the OMSU counterpart is correct, the drainflow should be messured on the first of each new application. Any subsequent modification of the counterpart should imply new checking. When the motor is fitted onto the counter part with the correct tightening torque, the drain flow is messured at Q = 30 l/min and an oil viscosity of 35 mm^2/s at differential pressure:

General data

Motor	Differential pressure
OMSU 80 - 160	140 bar
OMSU 200	110 bar
OMSU 250	90 bar
OMSU 315	70 bar
OMSU 400	55 bar

After minimum 5 min. of operation the drainflow shall be minimum 0.03 l/min and maximum 1.00 l/min at maximum pressure of bar 6 in the drain line during testing.

Exploded view OMSU



Tightening torque

Item 21:	75 - 80 Nm [660 - 705 lbf•in]

General data

OMSU spare parts list

OMSU spare parts list

Item	Spare parts			Code number	Number per motor
1	Seal ring			633B9023	1
2	O-ring	74 x 3 mm NBR ISO 1629		633B1396	1
3	Screw M5				
	OMSU 80		L = 45 mm	681X1512	2
	OMSU 100		L = 50 mm	681X1702	2
	OMSU 125		L = 55 mm	681X9282	2
	OMSU 160		L = 60 mm	681X1703	2
	OMSU 200		L = 70 mm	681X0354	2
	OMSU 250		L = 80 mm	681X0568	2
4	Intermidiate plate			151F1717	1
5	Cardan shaft				
	OMSU 80		l = 70 mm	11075495	1
	OMSU 100		l = 73 mm	11077519	1
	OMSU 125		l = 78 mm	11077838	1
	OMSU 160		l = 84 mm	11075528	1
	OMSU 200		l = 91 mm	11077921	1
	OMSU 250		l = 99.5 mm	11077919	1
6	O-ring	82.5 x 2 mm NBR ISO R 1629		633B1431	3
7	Gearwheel set				
	OMSU 80		w = 14 mm	151F1091	1
	OMSU 100		w = 17 mm	151F1092	1
	OMSU 125		w = 22 mm	151F1093	1
	OMSU 160		w = 28 mm	151F1094	1
	OMSU 200		w = 35 mm	151F1095	1
	OMSU 250		w = 44 mm	151F1096	1
8	Valve drive			11030924	1
9	Channel plate			151F1822	1
10	Check valve ball	ø 3/16 in		689X1005	2
11	Stop ring (only OMSU 200, 250, 315 and 400)			151F1542	1
12	Disc valve			151F1022	1
13	Balance plate			151F1738	1
14	Guide pin	ø 4 mm	l = 20 mm DIN 1481	682L9105	1
15	O-ring 45 x 2 mm				
	NBR, ISO R 1629			633B1429	1
	FPM, ISO R 1629			633B1455	1
16	O-ring 24 x 2 mm				
	NBR, ISO R 1629			633B1428	1
	FPM, ISO R 1629			633B1453	1
17	Spacer			151F1449	1
18	Spring washer			684X0097	1

General data

OMSU spare parts list (continued)

Item	Spare parts		Code number	Number per motor
19	Seal plug G 1/2		633X0074	2
20	Valve housing		151F1803	1
21	Screw M10			
	OMSU 80, 100, 125	l = 120 mm	681X1349	4
	OMSU 160	l = 130 mm	681X1350	4
	OMSU 200	l = 140 mm	681X1352	4
	OMSU 250	l = 150 mm	681X1353	4
22	Name plate			
A	Set of seals items 1, 6, 15, 16		151F0103	
B	Set of seals items 1, 2		151F1020	
NBR: (Buna N, Perbunan); FPM (Viton)				