

Technical Information
Orbital Motors
OML and OMM



Technical Information **OML and OMM Orbital Motors**

Revision History*Table of Revisions*

Date	Changed	Rev
Feb 2014	Converted to Danfoss layout - DITA CMS	BA
Nov 2012	Planetary Gears deleted	AI
Oct 2011	Dimensions added to drawing	AH
May 2011	Typos	AG
Sep 2010	New back page	AF
Mar 2010	Japan location	AE
Jul 2008	Text	AC
Apr 2008	Pictures, drawings and text	AB

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Technical Information OML and OMM Orbital Motors

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 3000 different orbital motors, categorised in types, variants and sizes (incl. different shaft versions).

The motors vary in size (rated displacement) from 8 cm³ [0.50 in³] to 800 cm³ [48.9 in³] per revolution.

Speeds range up to approx. 2500 min⁻¹ (rpm) for the smallest type and up to approx. 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:

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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

The Danfoss Orbital Motors are used in the following application areas:

- Construction equipment
- Agricultural equipment
- Material handling & Lifting equipment
- Forestry equipment
- Lawn and turf equipment
- Special purpose
- Machine tools and stationary equipment
- Marine equipment

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

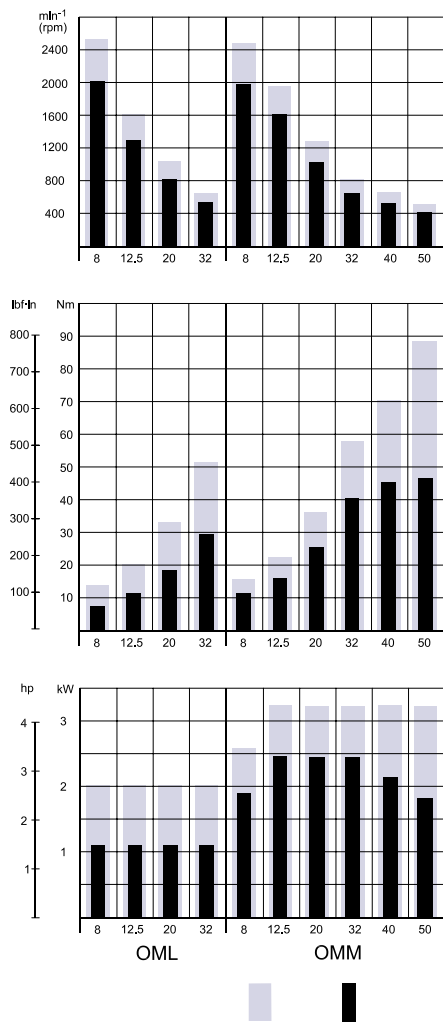
A general survey brochure on Danfoss Orbital Motors gives a quick motor reference based on power, torque, speed and capabilities.

Technical Information OML and OMM Orbital Motors
Speed, torque and output
Speed, torque and output

The following bar diagrams, are useful for a quick selection of relevant motor size for the application. The final motor size can be determined by using the function diagram for each motor size.

- OML can be found under [function diagrams](#).
- OMM can be found under [function diagrams](#).

The function diagrams are based on actual tests on a representative number of motors from our production. The diagrams apply to a return pressure between 5 and 10 bar [75 and 150 psi] when using mineral based hydraulic oil with a viscosity of 35 mm²/s [165 SUS] and a temperature of 50°C [120°F]. For further explanation concerning how to read and use the function diagrams, please consult the paragraph "Selection of motor size" in the technical information "General" DKMH.PK.100.G2.02 520L0232.



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Danfoss

Technical Information **OML and OMM Orbital Motors**

OML

Technical Information OML and OMM Orbital Motors

Versions
OML versions

Mounting	Shaft	Port size	European version	US version	Side port version	End port version	Standard shaft seal	Drain connection	Check valve	Main type designation	Config. code
Front, 4 × M5	Cyl. 16 mm	G 1/4	X			X	X	No	Yes	OML	1
Front, 4 × 10-32 UNF	Cyl. 5/8 in	7/16 - 20 UNF		X		X	X	No	Yes	OML	2

Features available (options) :

Painted

Code numbers

Config. code	Code number - displacement (cm ³)			
	8	12.5	20	32
1	2001	2002	2003	2004
2	2021	2022	2023	2024

Ordering

Add the four digit prefix "151G" to the four digit numbers from the chart for complete code number.

Example:

151G2001 for an OML 8 with front mounting (4 × M5), cyl. 16 mm shaft and port size G 1/4.

Orders will not be accepted without the four digit prefix.

Technical Information OML and OMM Orbital Motors
Technical data
Technical data for OML with 16 mm and 5/8 in cylindrical shaft

Type		OML	OML	OML	OML
Motor Size		8	12.5	20	32
Geometric displacement	cm ³ [in ³]	8.0 [0.49]	12.5 [0.77]	20.0 [1.22]	32.0 [1.96]
Max. speed	min ⁻¹ [rpm]	cont.	2000	1280	800
		int. ¹⁾	2500	1600	1000
Max. torque	Nm [lbf·in]	cont.	7 [60]	11 [100]	18 [160]
		int. ¹⁾	13 [120]	20 [180]	32 [280]
Max. output	kW [hp]	cont.	1.1 [1.5]	1.1 [1.5]	1.1 [1.5]
		int. ¹⁾	2.0 [2.7]	2.0 [2.7]	2.0 [2.7]
Max. pressure drop	bar [psi]	cont.	70 [1020]	70 [1020]	70 (55) ³ [1020] [800] ³
		int. ¹⁾	125 [1810]	125 [1810]	125 (55) ³ [1810] [800] ³
		peak ²⁾	140 [2030]	140 [2030]	125 (85) ³ [2030] [1230] ³
Max. oil flow	l/min [US gal/min]	cont.	16 [4.2]	16 [4.2]	16 [4.2]
		int. ¹⁾	20 [5.3]	20 [5.3]	20 [5.3]
Max. starting pressure with unloaded shaft	bar [psi]	4 [60]	4 [60]	4 [60]	6 [90]
Min. starting torque	at max. press. drop cont. Nm [lbf·in]	5 [45]	9 [80]	15 [135]	24 [210]
	at max. press. drop int. ¹⁾ Nm [lbf·in]	10 [90]	16 [140]	27 [240]	42 [370]
Min. speed ⁴⁾	min ⁻¹ [rpm]	50	50	50	50

Type	Max. inlet pressure		
OML 8 - 32	bar [psi]	cont.	125 [1810]
		int. ¹⁾	140 [2030]
		peak ²⁾	140 [2030]

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

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

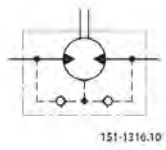
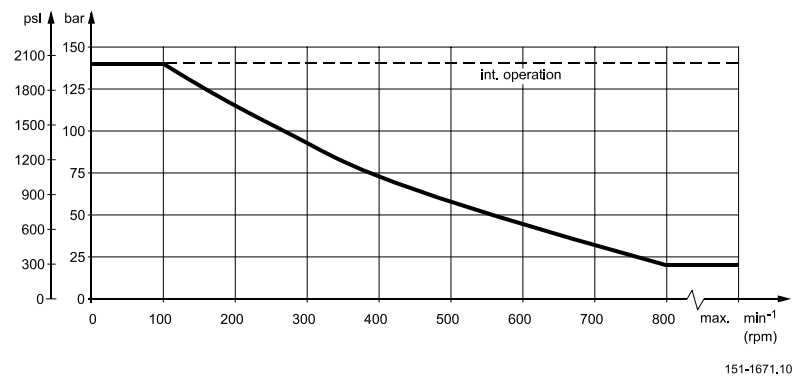
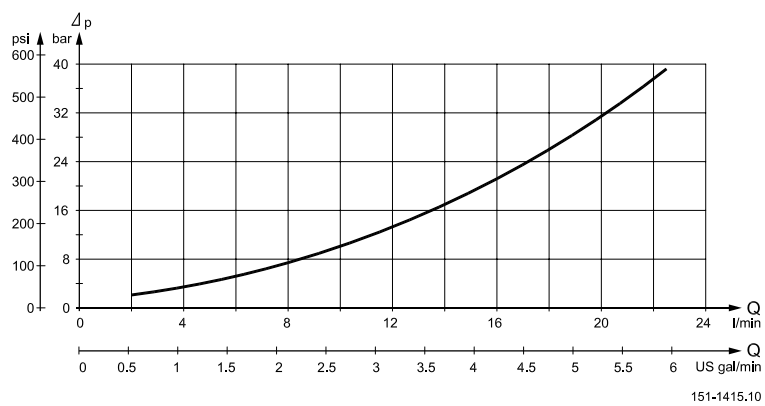
³⁾ Max. pressure drop in applications with a large moment of inertia and frequent stops or reversings.

⁴⁾ Operation at lower speed may be slightly less smooth.

Technical Information OML and OMM Orbital Motors
Shaft seal
Max. permissible shaft seal pressure

OML has incorporated check valves

which ensure that the pressure on the shaft seal never exceeds the pressure in the return line.

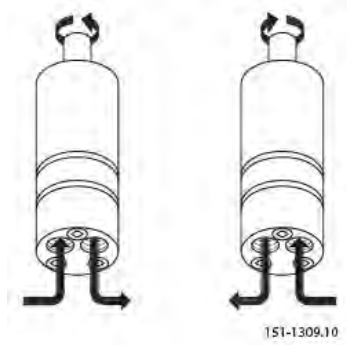

Max. return pressure (max. pressure on shaft seal)

Pressure Drop in Motor


The curve applies to an unloaded motor shaft and an oil viscosity of 35 mm²/s [165 SUS]

Technical Information OML and OMM Orbital Motors

Oil flow

Direction of shaft rotation



Technical Information OML and OMM Orbital Motors

Shaft load
Permissible shaft loads for OML

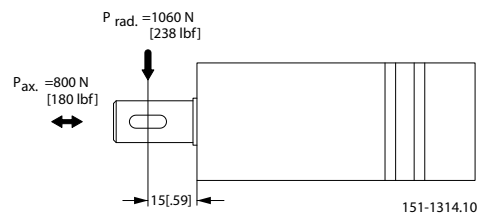
The permissible radial shaft load ($P_{rad.}$) is calculated from the distance (l) between the point of load and the mounting surface:

$$P_{rad.} = \frac{84500}{64.5 + l} \text{ N (l in mm; } l \leq 80)$$

$$P_{rad.} = \frac{748}{254 + l} \text{ lbf (l in inch; } l \leq 3.15)$$

The drawing shows the permissible radial load when $l = 15 \text{ mm [0.59 in]}$.

The calculated shaft load should never exceed the permissible value.



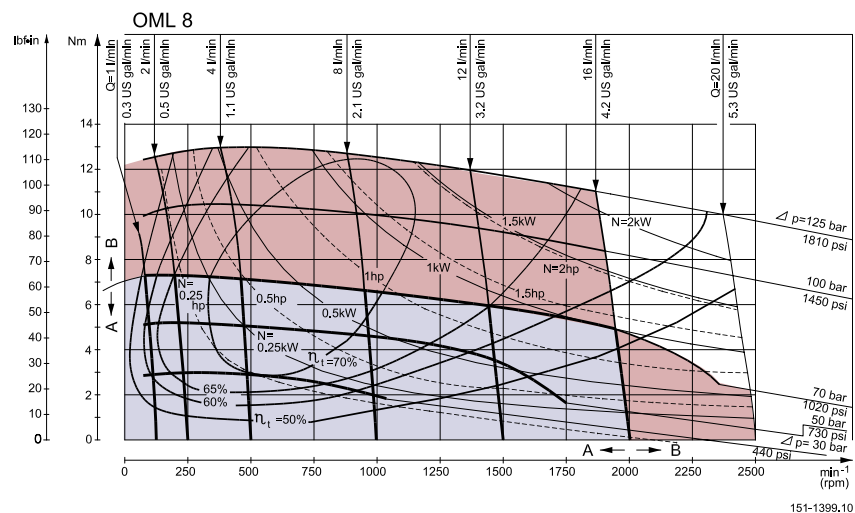
Technical Information OML and OMM Orbital Motors
Function diagrams
Function diagrams

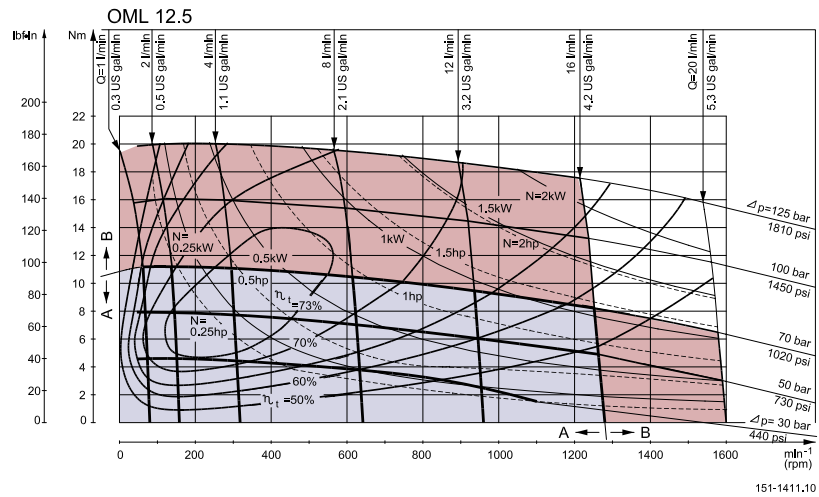
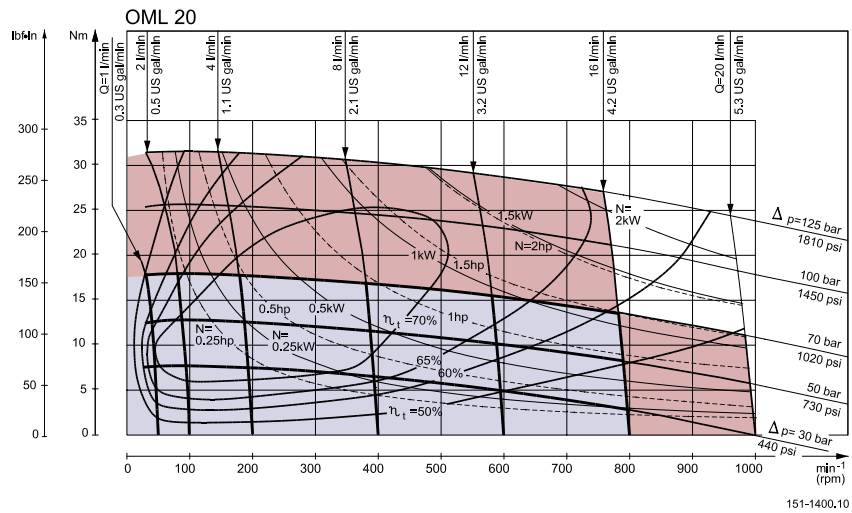
Explanation of function diagram use, basis and conditions can be found under [Speed, torque and output](#).

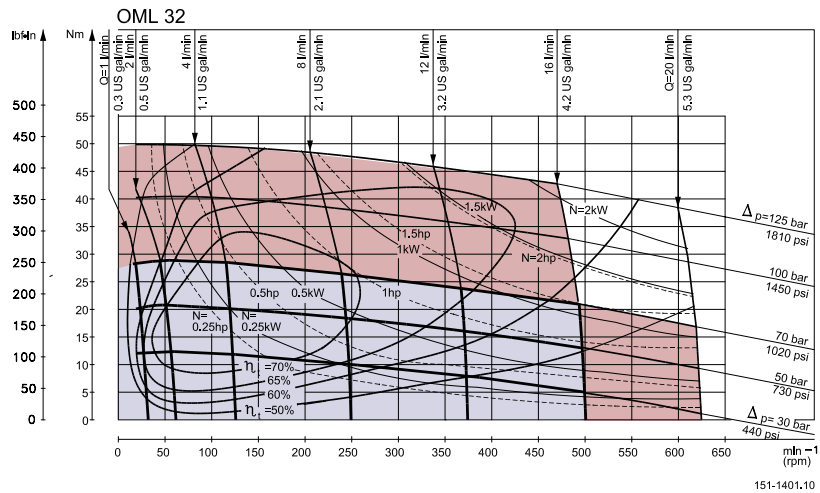
- A: Continuous range
- B: Intermittent range (max. 10% operation every minute)

Max. permissible continuous/intermittent pressure drop for the actual shaft version can be found under [Technical data](#).

Intermittent pressure drop and oil flow must not occur simultaneously.

OML 8 function diagram


Technical Information OML and OMM Orbital Motors
Function diagrams
OML 12.5 function diagram

OML 20 function diagram


Technical Information OML and OMM Orbital Motors
Function diagrams
OML 32 function diagram


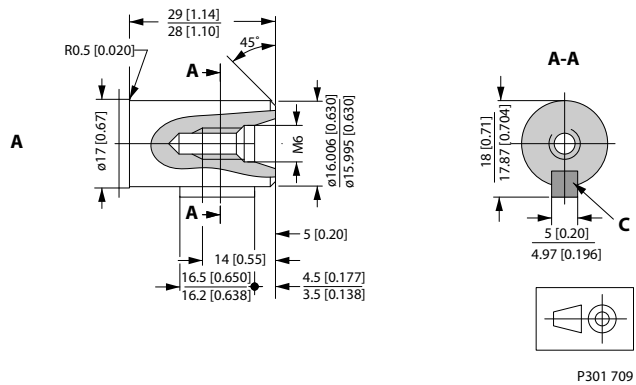
Technical Information OML and OMM Orbital Motors
Shaft
Shaft version
A: Cylindrical shaft

16 mm

C: Parallel key

A5 × 5 × 16

DIN 6885

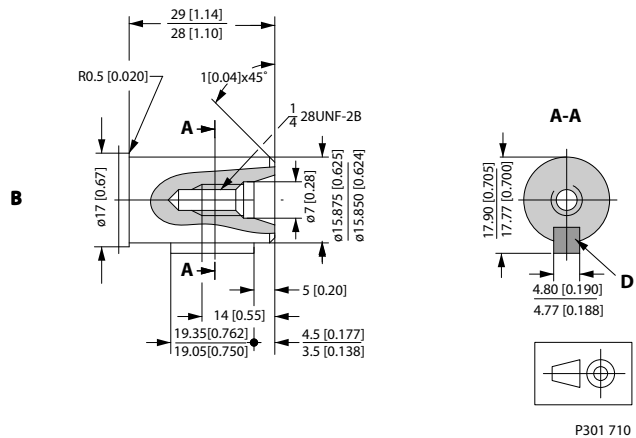

US version
B: Cylindrical shaft

5/8"

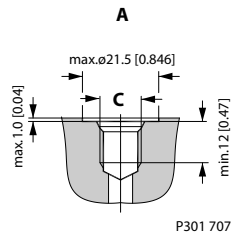
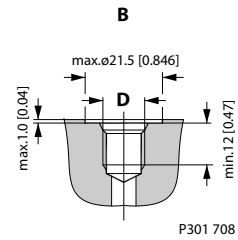
D: Parallel key

3/16 × 3/16 × 3/4 in

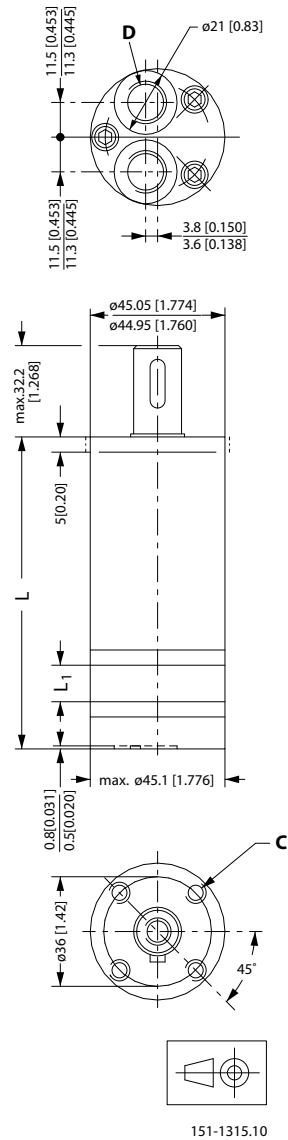
B.S. 46



Technical Information OML and OMM Orbital Motors

Port**Port thread versions****A:** G main ports**C:** ISO 228/1 - G1/4**B:** UNF main ports**D:** 7/16 - 20 UNF

O-ring boss port

Technical Information OML and OMM Orbital Motors
Dimensions, OML end port, European version
OML end port, European version


C: M5; 15 mm [0.59 in] deep

D: G 1/4; 12 mm [0.47 in]

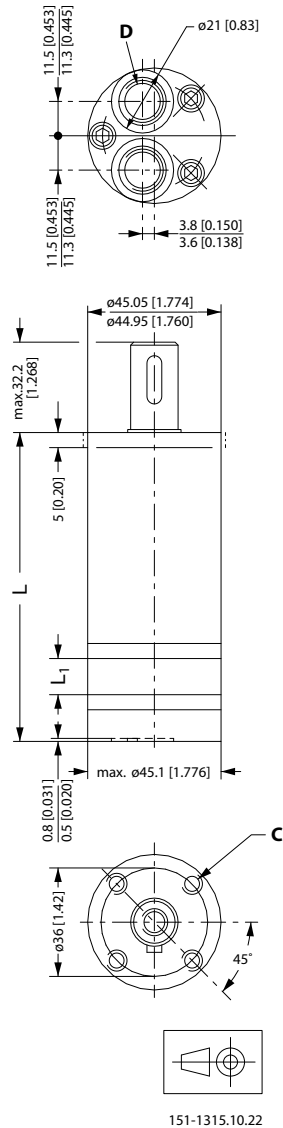
Weight and dimensions

Type	Length		Weight kg [lb]
	L _{max.}	L ₁ mm [in]	
OML 8	102.5 [4.04]	4.1 [0.16]	1.0 [2.2]
OML 12.5	104.8 [4.13]	6.4 [0.25]	1.0 [2.2]

Technical Information OML and OMM Orbital Motors

Dimensions, OML end port, European version

Type	Length		Weight kg [lb]
	L _{max.}	L ₁ mm [in]	
OML 20	108.6 [4.28]	10.2 [0.40]	1.1 [2.4]
OML 32	114.7 [4.53]	16.3 [0.64]	1.2 [2.6]

Technical Information OML and OMM Orbital Motors
Dimensions, OML end port, US version
OML end port, US version


C: 10 - 32 UNF; 15 mm [0.59 in] deep

D: 7/16 - UNF; 12 mm [0.47 in] deep

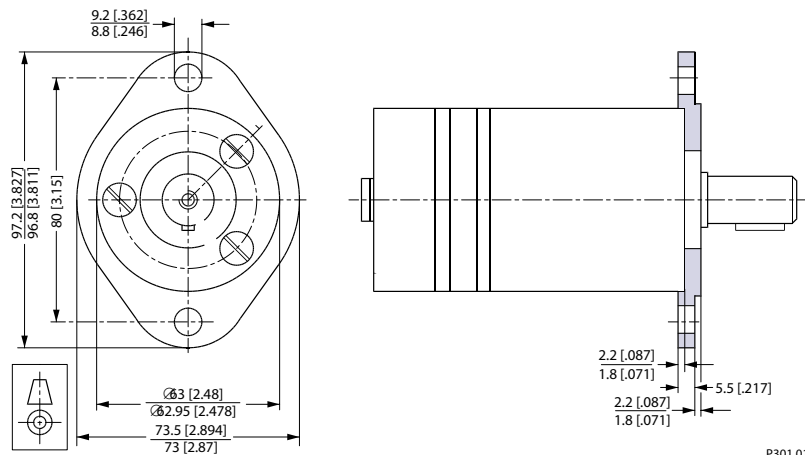
Weight and dimensions

Type	Length		Weight kg [lb]
	L _{max.}	L ₁ mm [in]	
OML 8	102.5 [4.04]	4.1 [0.16]	1.0 [2.2]
OML 12.5	104.8 [4.13]	6.4 [0.25]	1.0 [2.2]

Technical Information OML and OMM Orbital Motors

Dimensions, OML end port, US version

Type	Length		Weight kg [lb]
	L _{max.}	L ₁ mm [in]	
OML 20	108.6 [4.28]	10.2 [0.40]	1.1 [2.4]
OML 32	114.7 [4.53]	16.3 [0.64]	1.2 [2.6]

Technical Information OML and OMM Orbital Motors
Accessories
2 bolt flange kit, code no. 151G0211


Technical Information OML and OMM Orbital Motors

Hydraulic systems**Installation of the Danfoss Orbital Motors*****About the design***

- To ensure efficient operation all hydraulic components must be installed according to their individual instructions.
- The pump line must include a manometer connection.
- To ensure designed contact and minimise the tension all mounting flanges must be flate.

Hydraulic lines must be fitted correctly to prevent air entrapment.

About the assembly

- Follow the mounting instructions printed on the inside of the cardboard box.
- To prevent contamination, do not dismantle the plastic plugs from the connection ports until the fittings are ready to be assembled.
- Check that there is full face contact between the motor mounting flange and the mating part.
- Do not force the motor into place when tightening the mounting screws.
- Avoid unsuitable sealing material on fittings such as pack twine, teflon and others.
- Use only bonded seals, O-rings, steel washers and the like.
- When tightening the fittings never use a torque higher than the max. tightening torque stated in the instructions.
- Make sure that the cleanliness of the oil used is better than 20/16 (ISO 4406). Always use a filter for oil refilling.

Starting up and running in the hydraulic system

- Through a small-meshed filter fill up the tank with oil to the upper oil level mark.
- Start the drive engine, and if possible, let it work at its lowest speed. If the motor is provided with bleed screws, keep these open until the emerging oil is non-foaming.
- Check that all components are correctly connected (pump following the right direction of rotation etc.).
- In load-sensing systems, also make sure that the signal lines are bled.
- Indications of air in the hydraulic system:
 - oam in the tank
 - jerky movements of motor and cylinder
 - noise
- If so required, refill with oil.
- Connect the system to a separate tank that includes a filter (fineness max. 10 µm) with twice the capacity of the max. oil flow. Let the entire system run without load (no pressure) for about 30 minutes.
- Do not load the system until it is all bled and clean.
- Check the tightness of the system and make sure that its performance is satisfactory.
- Change the oil filter, and if so required, refill with oil.

Operation

- Do not expose the motor to pressures, pressure drops and speeds above the max. values stated in the catalogue.
- Filter the oil to ensure that the contamination level 20/16 (ISO 4406) or better.

Technical Information OML and OMM Orbital Motors

Hydraulic systems**Maintenance**

- When working with hydraulic systems, the main criteria of operating safety and endurance is careful maintenance.
- Always renew and replace oil, oil filters and air filters according to the instructions given by the respective manufacturers.
- Regularly check the condition of the oil.
- Frequently check system tightness and oil level.



Niehues

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