Technical Information

Orbital Motors

TMVW

powersolutions.danfoss.com
## Table of revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Changed</th>
<th>Rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2015</td>
<td>New curve for permissible shaft load</td>
<td>0201</td>
</tr>
<tr>
<td>November 2014</td>
<td>Converted to Danfoss layout - DITA CMS</td>
<td>CA</td>
</tr>
<tr>
<td>November 2012</td>
<td></td>
<td>BC</td>
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</table>
A wide range of Orbital Motors

Characteristic, features and application areas of Orbital Motors

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Technical features of Danfoss Orbital Motor

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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 cm³ [0.50 in³] to 800 cm³ [48.9 in³] 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 2,700 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. Adoptions 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: TMK
- Technical data on large motors: TMT
- Technical data on large motors: TMTHW
- Technical data on large motors: TMVW

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

*Speed and torque*

The bar diagrams above are useful for a quick selection of relevant motor size for the application.
## Technical Information  TMVW Orbital Motors

### Versions

<table>
<thead>
<tr>
<th>Mounting flange</th>
<th>Spigot diameter</th>
<th>Bolt circle diameter (BC)</th>
<th>Shaft Port size</th>
<th>European version</th>
<th>US version</th>
<th>Side port version</th>
<th>End port version</th>
<th>Standard shaft seal</th>
<th>Drain connection</th>
<th>Check valve</th>
<th>Main type designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel</td>
<td>223.9 mm</td>
<td>265 mm</td>
<td>Thread hole flange</td>
<td>G 1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>No</td>
<td>TMVW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>223.9 mm</td>
<td>265 mm</td>
<td>Thread hole flange</td>
<td>1 5/16 - 12 UN</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>No</td>
<td>TMVW</td>
<td></td>
</tr>
</tbody>
</table>

Motors are painted black.
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Code numbers

<table>
<thead>
<tr>
<th>Code numbers</th>
<th>Displacement (cm³)</th>
<th>400</th>
<th>500</th>
<th>630</th>
<th>800</th>
</tr>
</thead>
<tbody>
<tr>
<td>151Z</td>
<td></td>
<td>8205</td>
<td>8206</td>
<td>8207</td>
<td>8208</td>
</tr>
<tr>
<td>151Z</td>
<td></td>
<td>8210</td>
<td>8211</td>
<td>8212</td>
<td>8213</td>
</tr>
</tbody>
</table>

Ordering

Add the four digit prefix "151Z" to the four digit numbers from the chart for complete code number.
Example:
151Z8207 for a TMVW 630 with mounting flange Ø 223.9 mm, port size G 1 and side port version.

Orders will not be accepted without the four digit prefix.
**Technical data**

**Technical data for TMVW**

**TMVW technical data**

<table>
<thead>
<tr>
<th>Type</th>
<th>TMVW 400</th>
<th>TMVW 500</th>
<th>TMVW 630</th>
<th>TMVW 800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed</td>
<td>min⁻¹ [rpm]</td>
<td>500</td>
<td>400</td>
<td>315</td>
</tr>
<tr>
<td>Int.¹(1)</td>
<td>600</td>
<td>480</td>
<td>380</td>
<td>300</td>
</tr>
<tr>
<td>Int.¹(1)</td>
<td>2,000 [17,700]</td>
<td>2,600 [23,010]</td>
<td>3,100 [27,440]</td>
<td>3,400 [30,090]</td>
</tr>
<tr>
<td>Int.¹(1)</td>
<td>112 [150]</td>
<td>112 [150]</td>
<td>112 [150]</td>
<td>112 [150]</td>
</tr>
<tr>
<td>Peak²(2)</td>
<td>400 [5,800]</td>
<td>400 [5,800]</td>
<td>400 [5,800]</td>
<td>400 [5,800]</td>
</tr>
<tr>
<td>Int.¹(1)</td>
<td>240 [63.4]</td>
<td>240 [63.4]</td>
<td>240 [63.4]</td>
<td>240 [63.4]</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Maximum inlet pressure</th>
<th>Maximum return pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMVW 400 - 800</td>
<td>270 [3915]</td>
<td>140 [2030]</td>
</tr>
<tr>
<td>bar [psi] cont.</td>
<td>370 [5365]</td>
<td>175 [2540]</td>
</tr>
<tr>
<td>bar [psi] Int.¹(1) peak²(2)</td>
<td>420 [6090]</td>
<td>210 [3045]</td>
</tr>
</tbody>
</table>
**Technical Information**  
*TMVW Orbital Motors*

**Technical data**

**Maximum permissible shaft seal pressure**

TMVW with standard shaft seal and drain connection

The pressure on shaft seal equals the pressure in the drain line.

![Pressure graph](image)

[dotted] Intermittent operation: The permissible values may occur for max. 10% of every minute.

[solid] Continuous operation

⚠️ **Warning**

Drain line should always be used.

**Pressure drop in motor**

![Pressure drop graph](image)

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

### Oil flow in drain line

The table below shows the maximum oil flow in the drain line at a return pressure less than 5-10 bar [75-150 psi].

<table>
<thead>
<tr>
<th>Pressure drop</th>
<th>Viscosity</th>
<th>Oil flow in drain line</th>
</tr>
</thead>
<tbody>
<tr>
<td>bar [psi]</td>
<td>mm²/s [SUS]</td>
<td>l/min [US gal/min]</td>
</tr>
<tr>
<td>200 [2900]</td>
<td>20 [100]</td>
<td>2.5  [0.66]</td>
</tr>
<tr>
<td>35 [165]</td>
<td>20 [100]</td>
<td>1.5  [0.4]</td>
</tr>
<tr>
<td>275 [3990]</td>
<td>20 [100]</td>
<td>4.0  [1.1]</td>
</tr>
<tr>
<td>35 [165]</td>
<td>2.5  [0.66]</td>
<td></td>
</tr>
</tbody>
</table>

### Direction of shaft rotation

![Direction of shaft rotation diagram](image)

### Permissible shaft load for TMVW

**Permissible shaft load for TMVW**

![Permissible shaft load graph](image)

**Permissible radial shaft load**

The output shaft runs in tapered roller bearings that permit high axial and radial forces.
Technical data

The permissible radial load on the shaft is shown for an axial load of 0 N as a function of the distance from the mounting flange to the point of load application.

The curve is based on $B_{10}$ Bearing life (2000 hours or 12 000 000 shaft revolutions at 100 min$^{-1}$) at rated output torque, when mineral-based hydraulic oil with a sufficient content of anti-wear additives, is used.

Port thread versions

<table>
<thead>
<tr>
<th>A</th>
<th>G Main port</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>ISO 228/1 – G 1</td>
</tr>
<tr>
<td>B</td>
<td>UNF Main port</td>
</tr>
<tr>
<td>F</td>
<td>1 5/16 – 12 UN, O-ring boss port</td>
</tr>
<tr>
<td>C</td>
<td>G Drain port</td>
</tr>
<tr>
<td>G</td>
<td>ISO 228/1 – G 1/4</td>
</tr>
<tr>
<td>D</td>
<td>UNF Drain port</td>
</tr>
<tr>
<td>H</td>
<td>9/16 – 18 UNF, O-ring boss port</td>
</tr>
</tbody>
</table>
Technical Information  
TMVW Orbital Motors

Dimensions

TMVW dimensions

European version

Wheel flange-spigot diameter Ø 223.9 mm - BC Ø 265 mm

C: G 1 ; 18 mm [0.67 in] deep
D: Drain connection
G 1/4 ; 12 mm [0.47 in] deep
E: ∅ 17.6
F: 6 • M16 • 1.5
Dimensions

Wheel flange-spigot diameter Ø 223.9 mm - BC Ø 265 mm

<table>
<thead>
<tr>
<th>Type</th>
<th>L₁</th>
<th>[in]</th>
<th>L₂</th>
<th>[in]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMVW 400</td>
<td>293.4</td>
<td>11.6</td>
<td>116.5</td>
<td>4.6</td>
</tr>
<tr>
<td>TMVW 500</td>
<td>301.4</td>
<td>11.9</td>
<td>124.5</td>
<td>4.9</td>
</tr>
<tr>
<td>TMVW 630</td>
<td>311.9</td>
<td>12.3</td>
<td>135</td>
<td>5.3</td>
</tr>
<tr>
<td>TMVW 800</td>
<td>325.9</td>
<td>12.8</td>
<td>149</td>
<td>5.9</td>
</tr>
</tbody>
</table>

US version

Wheel flange-spigot diameter Ø 223.9 mm - BC Ø 265 mm

C: 1 5/16 - 12 UN; 19 mm [0.75 in] deep
Dimensions

D: Drain connection, 9/16 - 18 UNF; 13 mm [0.51 in] deep
E: ø 17.6
F: 6 • M16 • 1.5

*Wheel flange-spigot diameter ø 223.9 mm - BC ø 265 mm*

<table>
<thead>
<tr>
<th>Type</th>
<th>L₁</th>
<th>[in]</th>
<th>L₂</th>
<th>[in]</th>
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<tbody>
<tr>
<td>TMVW 400</td>
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<td>[11.6]</td>
<td>116.5</td>
<td>[4.6]</td>
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<tr>
<td>TMVW 500</td>
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<td>[11.9]</td>
<td>124.5</td>
<td>[4.9]</td>
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<tr>
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<td>311.9</td>
<td>[12.3]</td>
<td>135</td>
<td>[5.3]</td>
</tr>
<tr>
<td>TMVW 800</td>
<td>325.9</td>
<td>[12.8]</td>
<td>149</td>
<td>[5.9]</td>
</tr>
</tbody>
</table>
### Weight of TMVW motors

<table>
<thead>
<tr>
<th>Code number</th>
<th>Weight [kg]</th>
<th>Weight [lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>151Z8205</td>
<td>43.5</td>
<td>95.90</td>
</tr>
<tr>
<td>151Z8206</td>
<td>44.4</td>
<td>97.89</td>
</tr>
<tr>
<td>151Z8207</td>
<td>45.8</td>
<td>100.97</td>
</tr>
<tr>
<td>151Z8208</td>
<td>47.4</td>
<td>104.50</td>
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<tr>
<td>151Z8210</td>
<td>43.5</td>
<td>95.90</td>
</tr>
<tr>
<td>151Z8211</td>
<td>44.4</td>
<td>97.89</td>
</tr>
<tr>
<td>151Z8212</td>
<td>45.8</td>
<td>100.97</td>
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<tr>
<td>151Z8213</td>
<td>47.4</td>
<td>104.50</td>
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</tbody>
</table>
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- Hydraulic Power Steering
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- Joysticks and Control Handles
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520L0728 • Rev 0201 • September 2015