MAKING MODERN LIVING POSSIBLE

Technical Information

Orbital Motor

TMTHW

powersolutions.danfoss.com

Revision history

Table of revisions

Date	Changed	Rev
April 2015	Converted to Danfoss layout	BA
August 2013	First version	AA

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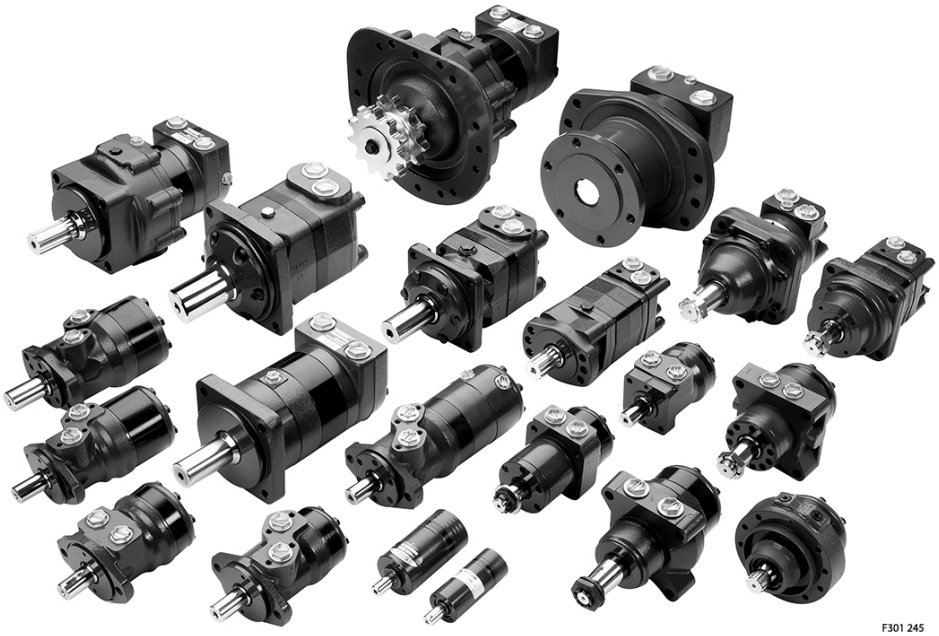
A wide range of Orbital Motors

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 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. 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

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. *http://files.danfoss.com/documents/520L0232.pdf*
- 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.

Introduction the Orbital Motor Series

By introducing the TMTHW, Danfoss is introducing the first Orbital Motor of a new Series. In order to meet the demands for motors that have the right duty cycle and efficiency capabilities for a given function. Danfoss now has 3 Orbital Motor Series:

T-Series – The Highest Torque

Leading performance with a long lifetime makes light work of the heaviest duties. Offering pressure capability up to 350 bar [5076 psi] and high starting torque, the T-Series is the energy-efficient choice for the toughest working environments.

O-Series – The Flexible Choice

The O-Series is flexible beyond compare. Delivering premium power across the board, these motors cover small to large, medium to heavy-duty needs with pressure capability up to 275 bar [3990 psi]. Robust, reliable and designed to fulfill the latest emissions standards.

V-Series – The Core Solution

The V-Series is your quality benchmark in the medium duty market. Based on proven technology, these reliable motors will reduce your overall system costs while adding value to your machine. Perfect for many tasks.

TMTHW features

- Robust bearing design
- Not sensitive towards return pressure
- Extra patented sealing design
- High pressure rating
- Excellent performance / weight
- Designed based on decades of experience with orbital motor-technology

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 diagrams* on page 12.

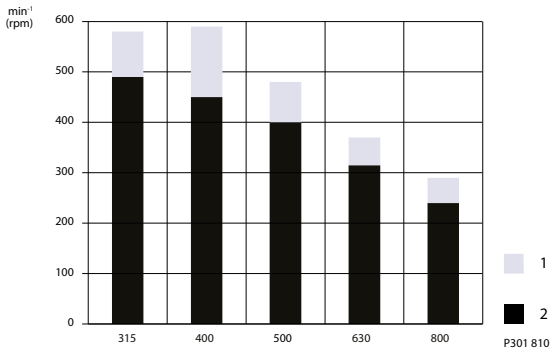
The function diagrams are based on actual tests on a representative number of motors from our production. The diagrams apply to a return pressure between 5 and 10 bar [75 and 150 psi] when using mineral based hydraulic oil with a viscosity of 35 mm^2/s [165 SUS] and a temperature of 50°C [120°F]. For further explanation concerning how to read and use the function diagrams, please consult the paragraph "Selection of motor size" in the technical information "General" 520L0232.

TMTHW speed, torque and output

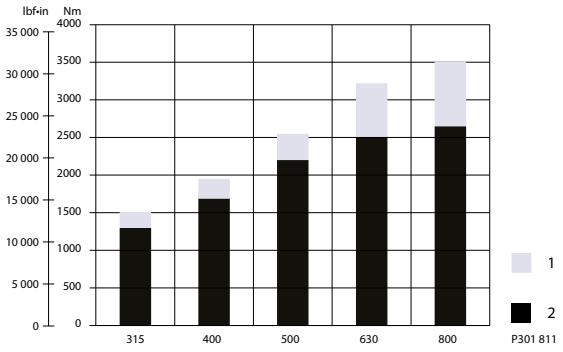
The bar diagrams shown are useful for a quick selection of relevant motor size for the application.

1. Intermittend values
2. Continuous values

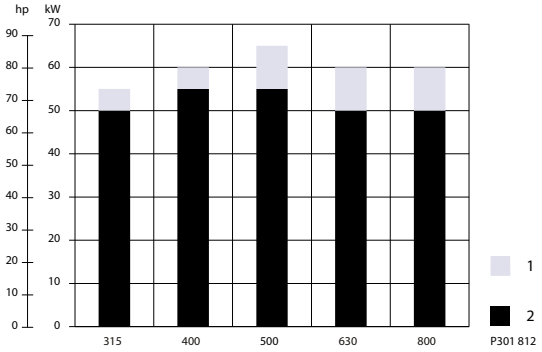
Maximum speed



Maximum torque



Maximum output



Versions and code numbers

TMTHW version and code numbers

TMTHW standard motor

Mounting flange: Wheel

Spigot diamer	Ø180 mm [7.09 in]								
Bolt circle diameter	Ø210 mm [8.27 in]								
Shaft	**Port size**	**Port Style**	**Drain Port size**	**Standard shaft seal**	**Metric version**	**Painted black**	**Check valve**	**Main type designation**	**Conf. code**
Thread hole Fl.	G 3/4	Side port	G 1/4	X	X	X	No	TMTHW	***A1***

Code numbers TMTHW wheel flange

Conf. code	Displacement				
	315	**400**	**500**	**630**	**800**
A1	11137330	11137331	11137342	11053388	11125392

Mounting flange: Wheel

Spigot diamer	Ø224 mm [8.82 in]								
Bolt circle diameter	Ø265 mm [10.4 in]								
Shaft	**Port size**	**Port Style**	**Drain port size**	**Standard shaft seal**	**Metric version**	**Painted black**	**Check valve**	**Main type designation**	**Conf. code**
Thread hole Fl.	G 3/4	Side port	G 1/4	X	X	X	No	TMTHW	***B1***

Code numbers TMTHW wheel flange

Conf. code	Displacement				
	315	**400**	**500**	**630**	**800**
B1	-	11089435	11089438	11089439	11089940

Technical data

Technical data for TMTHW

Type			TMTHW	TMTHW	TMTHW	TMTHW	TMTHW
Motor size			**315**	**400**	**500**	**630**	**800**
Geometric displacement	cm^3 [in^3]		314.9 [19.2]	393.1 [24.0]	495 [32.2]	630.7 [38.5]	802.2 [49.0]
Maximum speed	min^{-1} [rpm]	cont.	490	450	400	315	240
		int.[1)]	580	590	480	370	290
Maximum torque	N•m [lbf•in]	cont.	1300 [11 500]	1690 [14 960]	2200 [19 470]	2510 [22 215]	2650 [23 450]
		int.[1)]	1510 [13 365]	1950 [17 260]	2550 [22 570]	3220 [28 500]	3510 [31 065]
Maximum output	kW [hp]	cont.	50 [67]	55 [74]	55 [74]	50 [67]	50 [67]
		int.[1)]	55 [74]	60 [80]	65 [87]	60 [80]	60 [80]
Maximum pressure drop	bar [psi]	cont.	300 [4350]	300 [4350]	300 [4350]	275 [3990]	225 [3260]
		int.[1)]	350 [5075]	350 [5075]	350 [5075]	350 [5075]	300 [4350]
Maximum oil flow	l/min [US gal/min]	cont.	150 [39.6]	180 [47.6]	200 [52.8]	200 [52.8]	200 [52.8]
		int.[1)]	180 [47.6]	240 [63.4]	240 [63.4]	240 [63.4]	240 [63.4]
Max. starting pressure with unloaded shaft	bar [psi]		6 [87]	6 [87]	6 [87]	6 [87]	5 [72]
Minimum starting torque	N•m [lbf•in]	at max. press. drop cont.:	910 [8055]	1185 [10490]	1540 [13630]	1730 [15310]	1855 [16420]
		at max. press. drop int.[1)]:	1060 [9380]	1365 [12080]	1785 [15800]	2255 [19960]	2460 [21770]

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

Type			Maximum inlet pressure	Maximum return pressure with drain line
TMTHW 315-800	bar [psi]	Cont.	300 [4350]	140 [2031]
		Int.[1)]	380 [5510]	175 [2538]

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

Oil flow in drain line

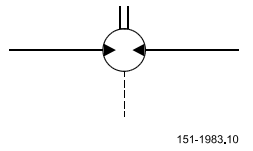
The table below shows the maximum oil flow in the drain line at a return pressure less than 5-10 bar [75-150 psi].

Pressure drop	Viscosity	Oil flow in drain line
bar [psi]	**mm^2/s [SUS]**	**l/min [US gal/min]**
200 [2900]	20 [100]	2.5 [0.66]
	35 [165]	1.5 [0.4]
275 [3990]	20 [100]	4.0 [1.1]
	35 [165]	2.5 [0.66]

Maximum permissible shaft seal pressure

TMTHW with standard shaft seal and drain connection. The pressure on shaft seal equals the pressure in the drain line.

Technical data



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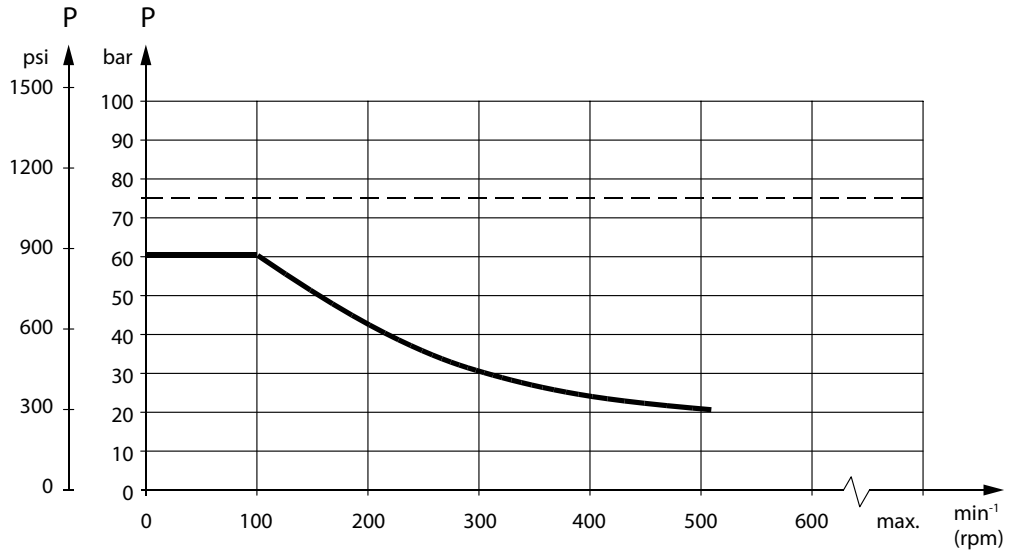

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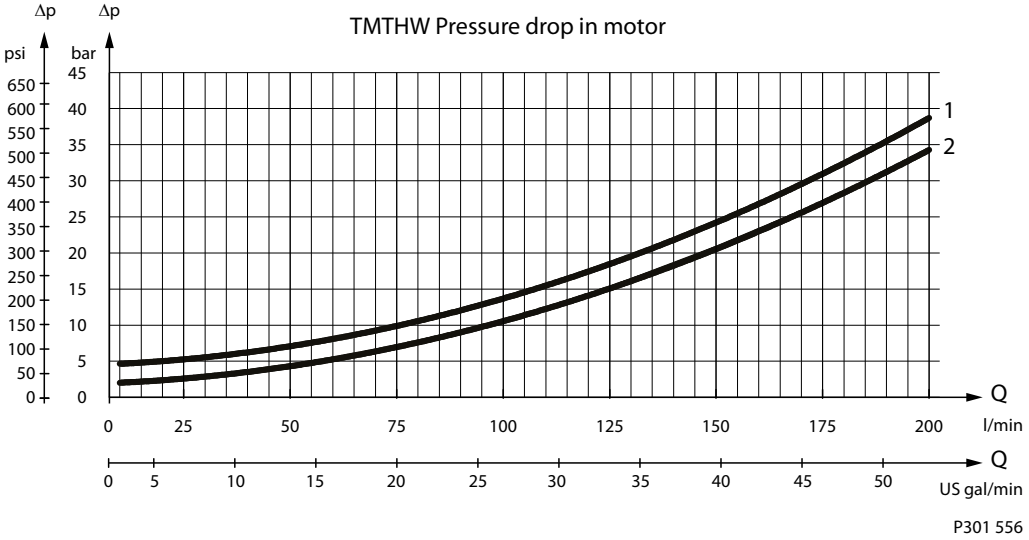
---- Intermittent operation: The permissible values may occur for maximum 10% of every minute.

____ Continuous operation

Drain line should always be used.

Pressure drop in motor



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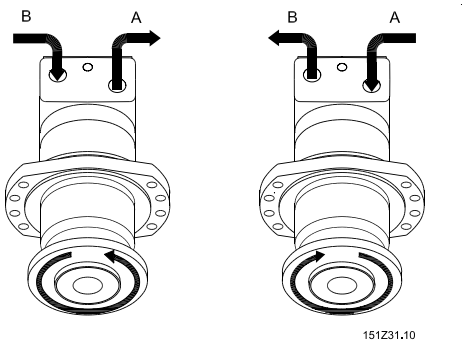
Technical data

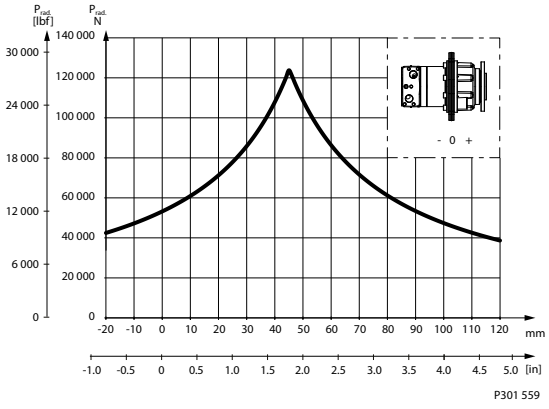
The curve applies to an unloaded motor shaft and an oil viscosity of 35 mm^2/s [165 SUS].

1. TMTHW 315
2. TMTHW 400, 500, 630 and 800

Direction of shaft



Permissible shaft load for TMTHW



Permissible radial shaft load

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

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 B10 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.

Function diagrams

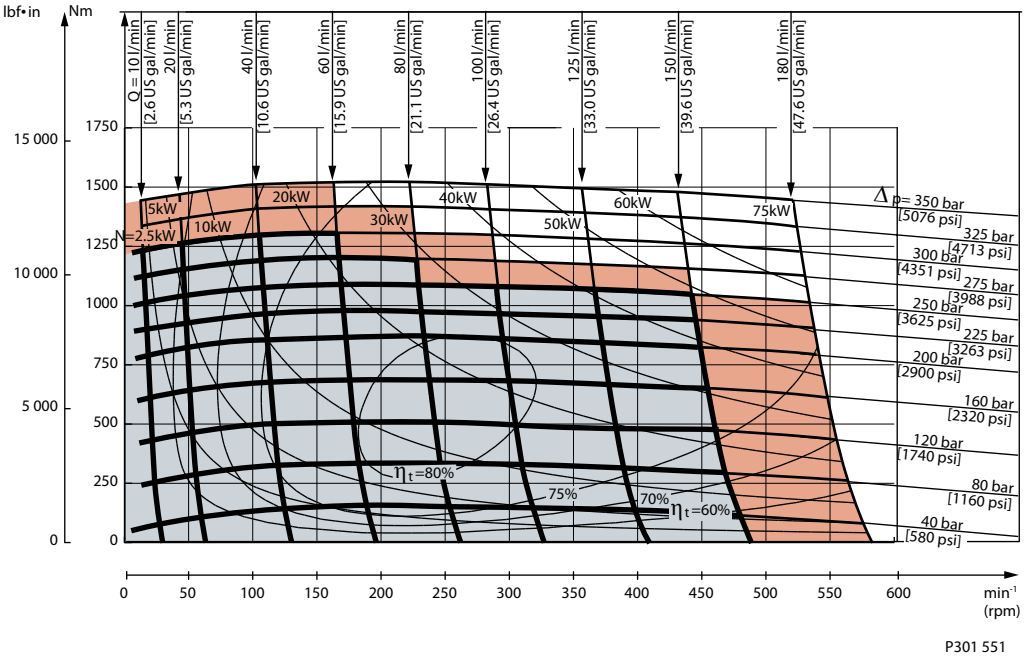
Explanation of function diagram use, basis and conditions can be found under *Speed and torque* Speed and torque

[blue] Continuous range

[pink] Intermittent range (max. 10% operation every minute)

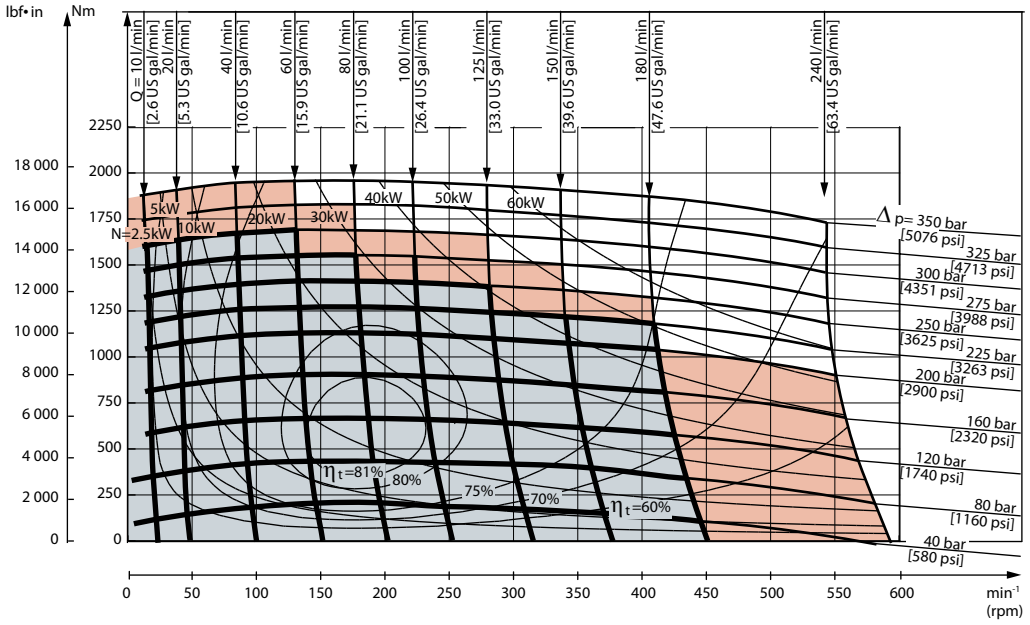
Intermittent pressure drop and oil flow must not occur simultaneously.

TMTHW 315



Function diagrams

TMTHW 400



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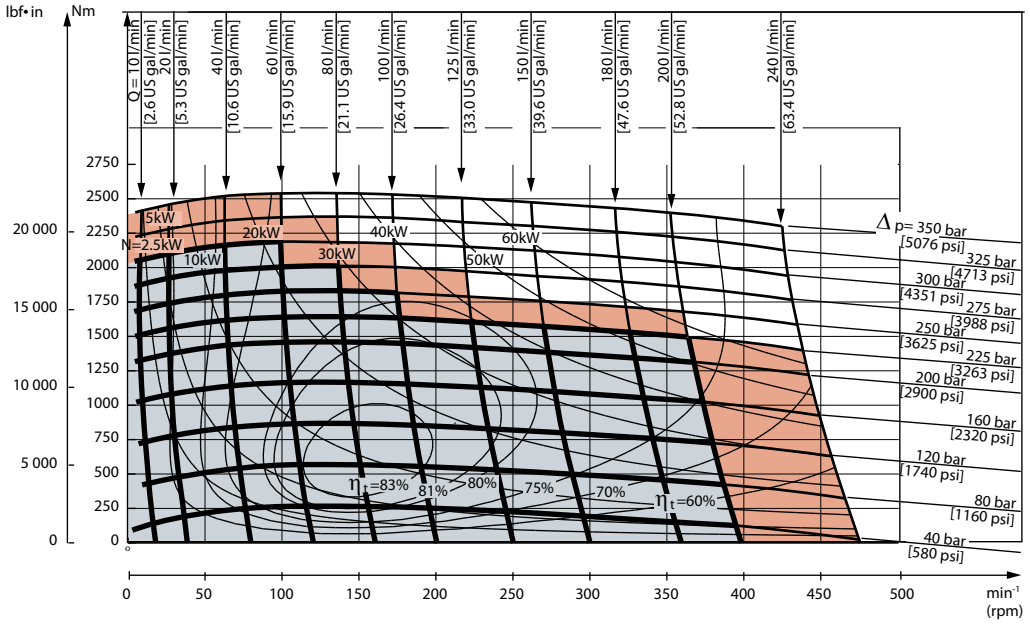
TMTHW 500



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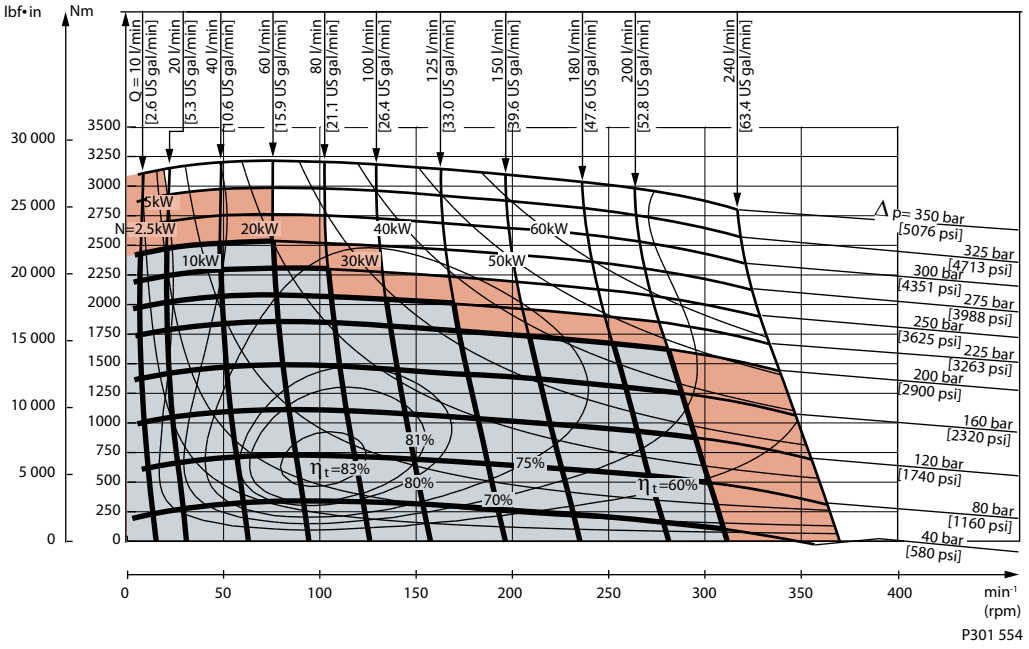
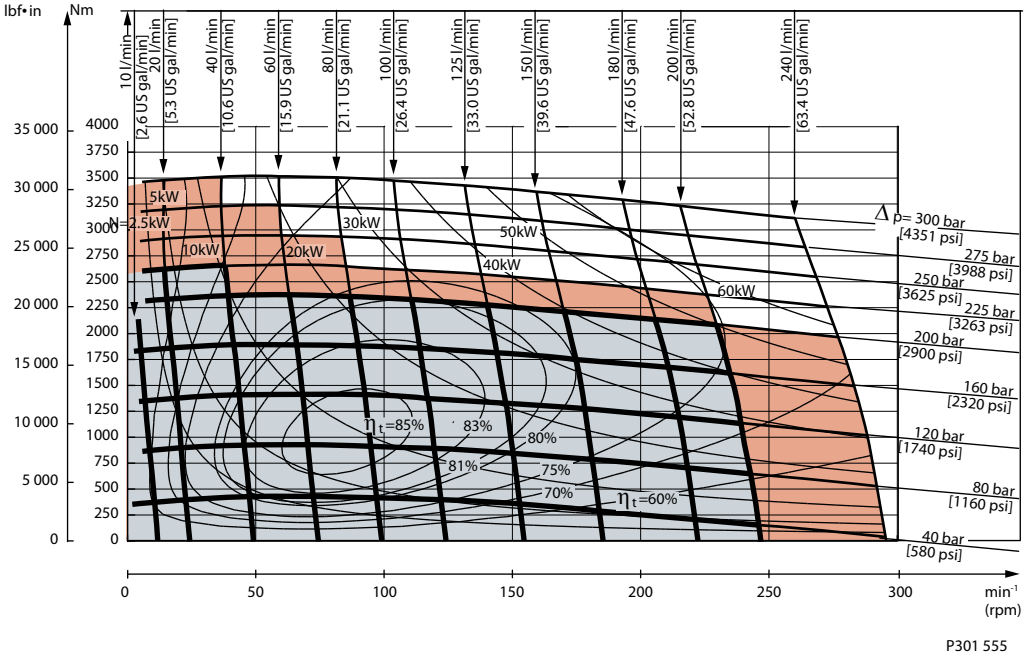
Function diagrams

TMTHW 630

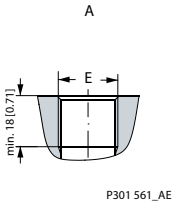


TMTHW 800



Technical data

Port thread versions



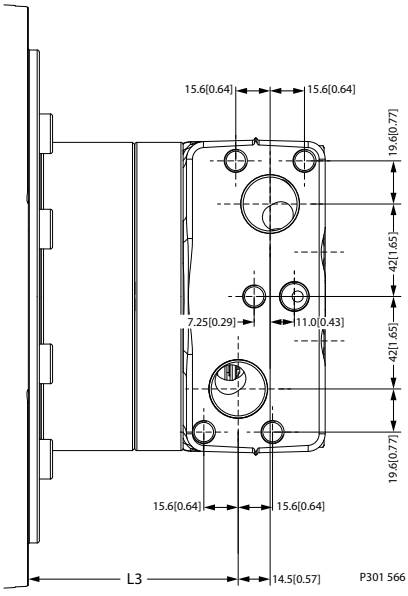
A: G Main port

E: ISO 228/1 – G 3/4

C: G Drain port

G: ISO 228/1 – G 1/4

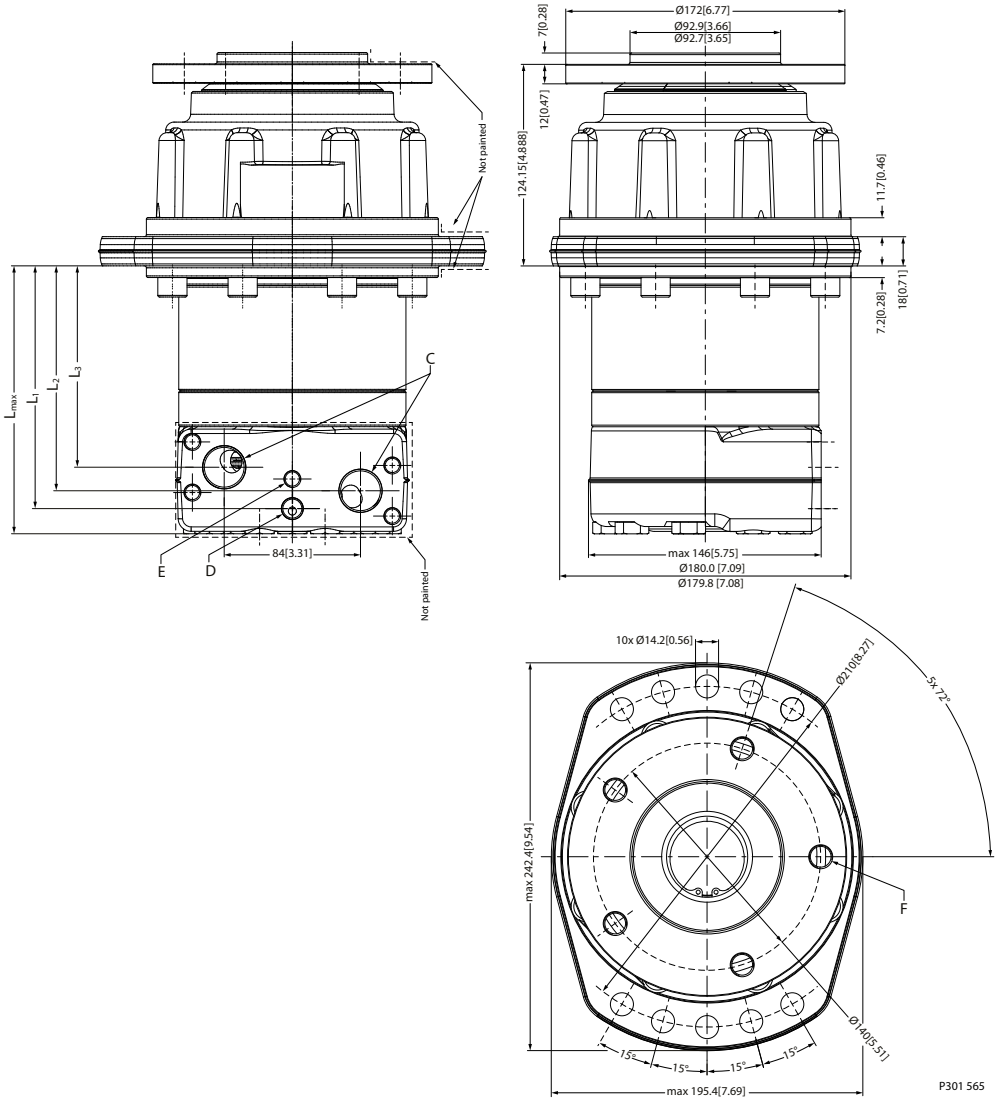
Manifold



L3: Dimentional for given TMTHW-motor see: *Dimensions* on page 16.

Dimensions

Wheel flange-spigot diameter Ø 180 mm - BC Ø 210 mm



C: G 3/4; 17 mm [0.66 in] deep

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

E: M10; 17 mm [0.66 in] deep

F: M14 × 1.5

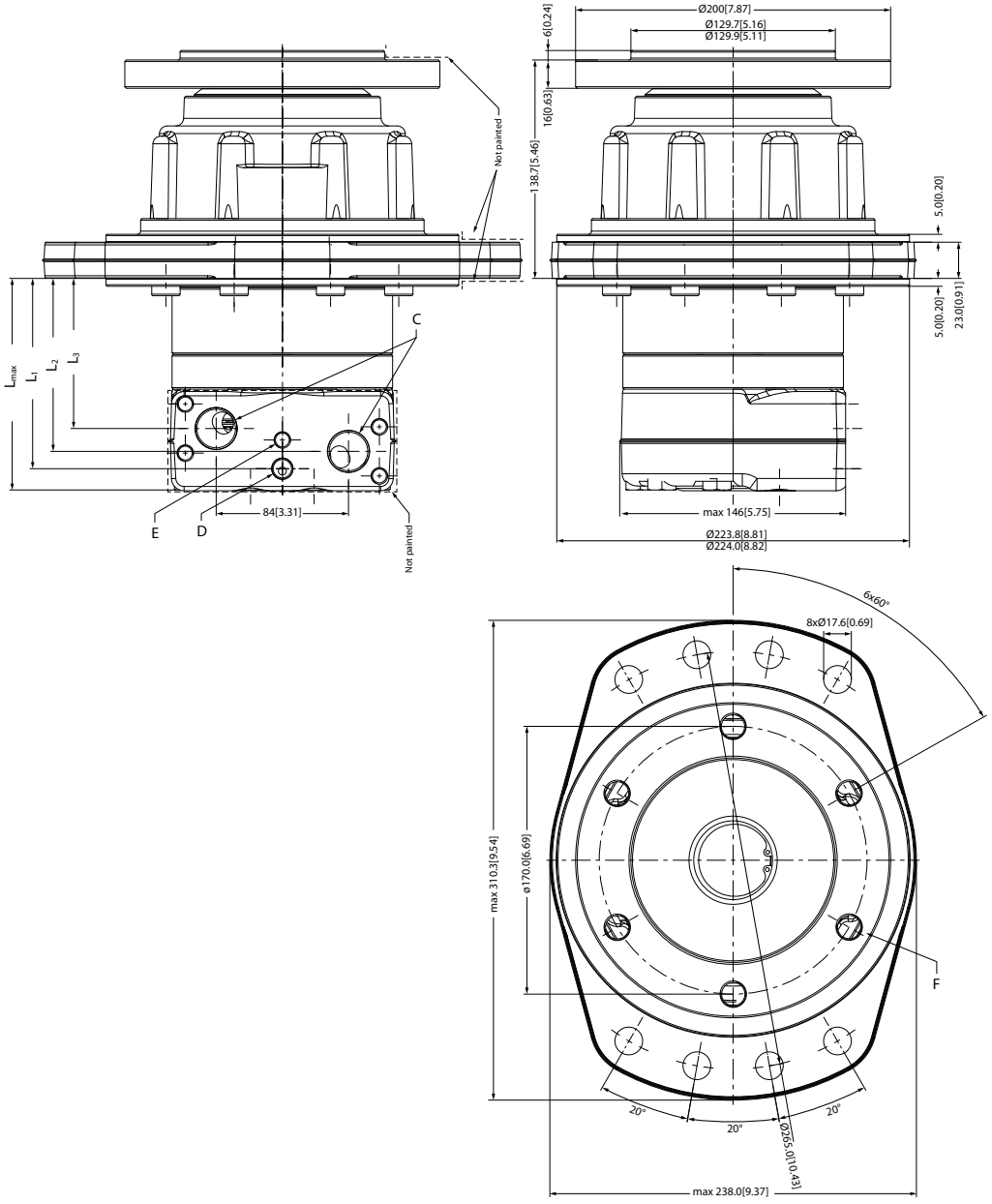
Size	315-800 cm^3
Weight	34-38 kg
Output shaft	F180/5xM14 BC ø140/PD.ø92.8
Mounting flange	Wheel 10x ø14 BC ø210/PD ø180

Dimensions

TMTHW dimensions

Size 315-800 cm³	L_{MAX}	L_1	L_2	L_3	Weight
	mm [in]	mm [in]	mm [in]	mm [in]	kg [lb]
TMTHW 315	135.1 [5.33]	117.1 [4.61]	106.1 [4.18]	91.6 [3.61]	33.7 [74.30]
TMTHW 400	143.3 [5.64]	125.1 [4.93]	114.1 [4.49]	99.6 [3.92]	34.8 [76.72]
TMTHW 500	153.8 [6.06]	135.6 [5.34]	124.6 [4.91]	110.1 [4.33]	35.7 [78.70]
TMTHW 630	167.8 [6.61]	149.6 [5.89]	138.6 [5.46]	124.1 [4.89]	37.2 [82.01]
TMTHW 800	167.8 [6.61]	149.6 [5.89]	138.6 [5.46]	124.1 [4.89]	37.2 [82.01]

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



Dimensions

C: G 3/4; 17 mm [0.66 in] deep

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

E: M10; 17 mm [0.66 in] deep

F: M16 × 1.5

Size	400-800 cm^3
Weight	42.1-44.5 kg
Output shaft	F200/6xM16 BC ø170/PD.ø130
Mounting flange	Wheel 8x ø17.5 BC ø265/PD ø224

TMTHW dimensions

Size 400-800 cm^3	**L_{MAX}**	**L_1**	**L_2**	**L_3**	**Weight**
	mm [in]	**mm [in]**	**mm [in]**	**mm [in]**	**kg [lb]**
TMTHW 400	139 [5.47]	120.8 [4.76]	109.8 [4.32]	95.3 [3.75]	42.1 [92.81]
TMTHW 500	147.6 [5.81]	129.4 [5.09]	118.4 [4.66]	103.9 [4.09]	43.0 [94.80]
TMTHW 630	161.6 [6.36]	143.4 [5.65]	132.4 [5.21]	117.9 [4.64]	44.5 [98.11]
TMTHW 800	161.6 [6.36]	143.4 [5.65]	132.4 [5.21]	117.9 [4.64]	44.5 [98.11]

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