# Danfoss TMK FL 250 11008911 orbital hydraulic motor

Manufacturer: Danfoss

Manufacturer part number / published order designation: 11008911

Published model: 11008911

## About this compilation

Prepared by Hydmaster from selected manufacturer documentation. Original technical pages follow without cropped drawings, rewritten data or altered units. This cover and index are Hydmaster editorial material, not a manufacturer-issued exact-execution datasheet.

Coverage: selected pages relevant to the identified size and configuration. Other options or neighbouring models retained on an original page apply only where explicitly identified.

## Execution notes and conditions

Factory model code: TMK-0250-E-BA-G30-EB-2D-G27-A-A-2B-0-B-NN-AAE19-NN-NN-NN-SP-NNN

Current exact factory article verified separately from the February 2014 technical reference.

Representative factory photograph; use the applicable execution drawings.

Separate catalogue limits; check operating point, shaft loading and drain requirements.

## Source-page index

Source page numbers below are physical pages of each complete original PDF. The original printed page labels and technical content remain unchanged. Compiled page numbers count this cover/index.

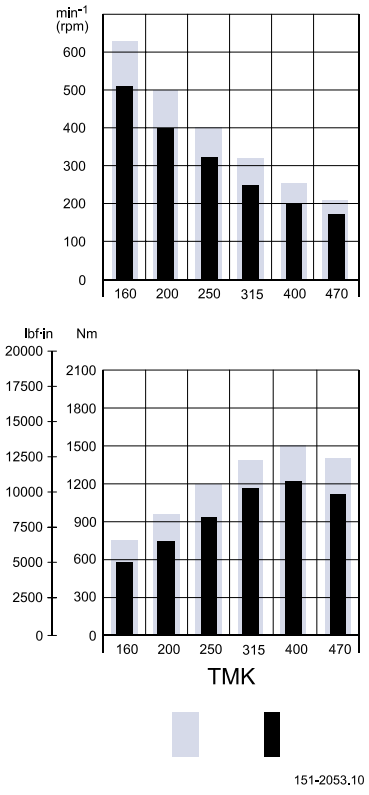
## Source A: Danfoss TMK technical information - February 2014


| Original pages | Compiled pages | Relevant content |
|---|---|---|
| 7-16 | 2-11 | Applicable original version, hydraulic limits, installation, shaft, ports or mounting drawing |
| 18 | 12 | Size-specific performance diagram |
| 22-23 | 13-14 | Applicable original version, hydraulic limits, installation, shaft, ports or mounting drawing |
| 34-35 | 15-16 | Applicable original version, hydraulic limits, installation, shaft, ports or mounting drawing |

## Data survey

### Speed and torque

*Max. speed / Max. torque*




[light] Intermittent values

[dark] Continuous values

The bar diagrams above 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.

- TMK 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 $mm^2/s$ [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" DHMH.PK.100.G2.02 520L0232.

## Versions

### Version

*Orbit motors US-versions, standard shaft seals, drain connections and painted black*

| Mount. flange | Spigot diameter front /rear end | Bolt circle diameter (BC) | Shaft | Port size | Side port version | End port version | Check valve | Main type design | Config.- code |
|---|---|---|---|---|---|---|---|---|---|
| Magneto | Ø 3.25 in | Ø 4.187 in | Cyl. 1.25 in | 1 1/16-12 UN | x | | x | TMK | *1* |
| | | | Spl. 1.25 in | 1 1/16-12 UN | x | | x | TMK | *2* |
| | | | Tap. 1.25 in | 1 1/16-12 UN | x | | x | TMK | *3* |
| SAE-C | Ø 5 in | Ø 6.375 in | Cyl. 1.25 in | 1 1/16-12 UN | x | | x | TMK | *4* |
| | | | Spl. 1.25 in | 1 1/16-12 UN | x | | x | TMK | *5* |
| | | | Tap. 1.25 in | 1 1/16-12 UN | x | | x | TMK | *6* |
| | | | Tap. 1.5 in | 1 1/16-12 UN | x | | x | TMK | *7* |
| | | | Tap. 1.625 in | 1 1/16-12 UN | x | | x | TMK | *8* |
| Wheel | Ø 4.25 in Ø 5 in (rear) | Ø 5.8 in | Tap. 1.5 in | 1 1/16-12 UN | x | | | TMKW | *9* |
| | | | | 7/8-14 UNF | | x | | TMKW | *10* |
| Brake std. | Ø 5.5 in (only rear) | Ø 6.375 in | Tap. 1.5 in | 1 1/16-12 UN | x | | | TMK-FL | *11* |
| | | | | 7/8-14 UNF | | x | | TMK-FL | *12* |

*Configuration code and code numbers*

| Config.- code | Code number - displacement ($cm^3$) | | | | | |
|---|---|---|---|---|---|---|
| | **160** | **200** | **250** | **315** | **400** | **470** |
| *1* | 151F6060 | 151F6061 | 151F6062 | 151F6063 | 151F6064 | 151F6065 |
| *2* | 151F6050 | 151F6051 | 151F6052 | 151F6053 | 151F6054 | 151F6055 |
| *3* | 151F6070 | 151F6071 | 151F6072 | 151F6073 | 151F6074 | 151F6075 |
| *4* | 151F6130 | 151F6131 | 151F6132 | 151F6133 | 151F6134 | 151F6135 |
| *5* | 151F6120 | 151F6121 | 151F6122 | 151F6123 | 151F6124 | 151F6125 |
| *6* | 151F6140 | 151F6141 | 151F6142 | 151F6143 | 151F6144 | 151F6145 |
| *7* | 151F6090 | 151F6091 | 151F6092 | 151F6093 | 151F6094 | 151F6095 |
| *8* | 151F6080 | 151F6081 | 151F6082 | 151F6083 | 151F6084 | 151F6085 |
| *9* | 151F6010 | 151F6011 | 151F6012 | 151F6013 | 151F6014 | 151F6015 |
| *10* | 151F6030 | 151F6031 | 151F6032 | 151F6033 | 151F6034 | 151F6035 |
| *11* | 11008903 | 11008904 | 11008905 | 11008906 | 11008907 | 11008908 |
| *12* | 11008909 | 11008910 | 11008911 | 11008912 | 11008913 | 11008914 |

### Features available (options)

Shaft options:

- Splined 1.5 in shaft
- Cyl. 40 mm shaft (not brake version)

Port option:

- Side port G 3/4
- End port G 1/2

Check valves

Flushing valves with different flushing flow

Motors are painted black

## Technical data

| Type | | | TMK TMKW TMK FL | TMK TMKW TMK FL | TMK TMKW TMK FL | TMK TMKW TMK FL | TMK TMKW TMK FL | TMK TMKW TMK FL |
|---|---|---|---|---|---|---|---|---|
| Motor size | | | 160 | 200 | 250 | 315 | 400 | 470 |
| Geometric displacement | $cm^3$ [$in^3$] | | 158.0 [9.64] | 201.5 [12.30] | 252.2 [15.39] | 315.3 [19.23] | 397.2 [24.24] | 471.1 [28.75] |
| Max. speed | $min^{-1}$ [rpm] | cont. | 505 | 400 | 320 | 255 | 200 | 170 |
| | | int. [1] | 630 | 500 | 400 | 315 | 250 | 210 |
| Max. torque* | | cont. | 570 [5045] | 720 [6370] | 910 [8055] | 1050 [9295] | 1070 [9470] | 1080 [9560] |
| | | int. [1] | 725 [6415] | 920 [8140] | 1070 [9470] | 1310 [11595] | 1400 [12390] | 1350 [11950] |
| Max. output | kW [hp] | cont. | 22.0 [29.5] | 22.0 [29.5] | 21.0 [28] | 20.0 [27] | 17.5 [23.5] | 13.0 [17.4] |
| | | int. [1] | 27.0 [36] | 27.0 [36] | 25.0 [33.5] | 23.5 [31.5] | 22.0 [29.5] | 17.0 [22.8] |
| Max. pressure drop* | bar [psi] | cont. | 250 [3625] | 250 [3625] | 250 [3625] | 250 [3625] | 200 [2900] | 160 [2320] |
| | | int. [1] | 325 [4715] | 325 [4715] | 300 [4350] | 300 [4350] | 250 [3625] | 200 [2900] |
| Max. oil flow | l/min [US gal/min] | cont. | 80 [21.1] | 80 [21.1] | 80 [21.1] | 80 [21.1] | 80 [21.1] | 80 [21.1] |
| | | int. [1] | 100 [26.4] | 100 [26.4] | 100 [26.4] | 100 [26.4] | 100 [26.4] | 100 [26.4] |
| Max. starting pressure with unloaded shaft | bar [psi] | | 8 [100] | 8 [100] | 7 [100] | 7 [100] | 7 [100] | 7 [100] |
| Min. starting torque | Nm [lbf•in] | at max. press. drop cont.: | 430 [3805] | 540 [4780] | 680 [6020] | 790 [6990] | 800 [7080] | 830 [7350] |
| | | at max. press. drop int.[1]: | 545 [4825] | 690 [6105] | 800 [7080] | 985 [8720] | 1050 [9290] | 1050 [9290] |

| Type | | Max. inlet pressure | | Max. return pressure with drain line | |
|---|---|---|---|---|---|
| TMK 160 - 470 | bar [psi] | cont. | 250 [3625] | cont. | 140 [2030] |
| | | max. | 350 [5075] | int. [1] | 175 [2540] |
| | | - - | | peak [2] | 210 [3045] |

| *Max. torque for shaft type | Tap. 1.25 in | Splined 1.25 in | Cyl. 1.25 in |
|---|---|---|---|
| Nm [lbf•in] | 900 [8000] | 900 [8000] | 900 [8000] |
| Max. values apply for applications were there is no external radial load. If radial load is present, please contact Danfoss for evaluation. | | | |

[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.

For max. permissible combination of flow and pressure, see function diagram for actual motor.

## Technical data

### Technical data for parking brake motor TMK FL

| Technical data for brake motor TMK FL | | |
|---|---|---|
| Holding torque[1)] | Nm [lbf•in] | 1050 [9295] |
| Min. release pressure[2)] | bar [psi] | 15 [215] |
| Max. pressure in drain/brake line | bar [psi] | 30 [435] |

[1)] This brake is to be used only as a passive parking brake. It may not be used for dynamic braking.

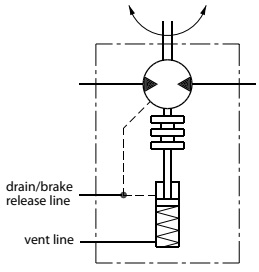
When release pressure[2)] is greater than zero, the holding torque depends inversely proportional on the actual release pressure.

At 0 bar - holding torque = 1050 Nm [9295 lbf•in]

At 15 bar [215 psi] or more - holding torque = 0 Nm

[2)] The release pressure is the difference between the pressure in the drain/brake release line and the pressure in the vent line. The vent port must always be connected to tank.

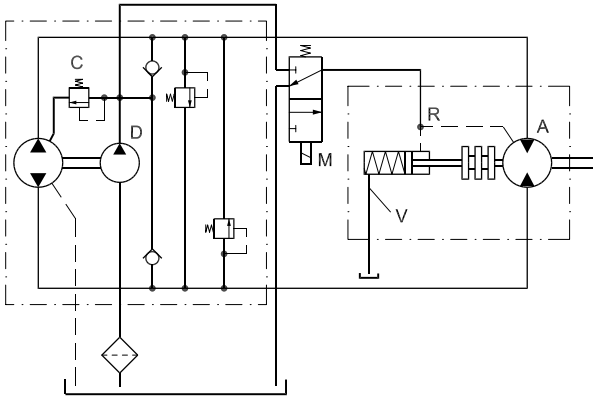
The brake will be fully released at 15 bar [215 psi].




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## Schematic diagram

### Schematic diagram




A: Motor

C: Charge pressure relief valve

(setting min 15 bar [215 psi])

D: Charge pump

M: Brake release valve

R: Drain and brake release port

V: Vent line

The drain/release port on the TMK FL motor must never remain plugged or be connected to the system A or B pressures, since the brake is a low pressure device. A common solution for controlling the brake is to use a two position valve to connect the drain port to hydrostatic charge pressure (brake released), or to reservoir pressure (brake holding).

The vent port must always be connected to tank.

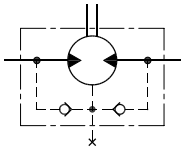
See the above schematic for details.

## Shaft seal

### Max. permissible shaft seal pressure

***TMK, TMKW and TMK FL with use of drain connection***

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



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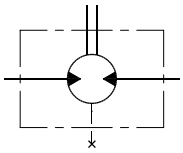
***TMK with check valves and without use of drain connection***

The pressure on the shaft seal never exceeds the pressure in the return line.

***TMKW / TMK FL without check valves and without use of drain connection***

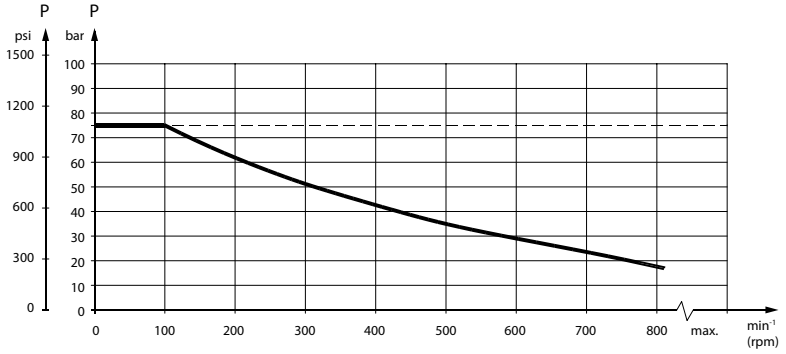
The shaft seal pressure equals the average of input pressure and return pressure.

TMK FL must always have a drainline.



151-1855.10

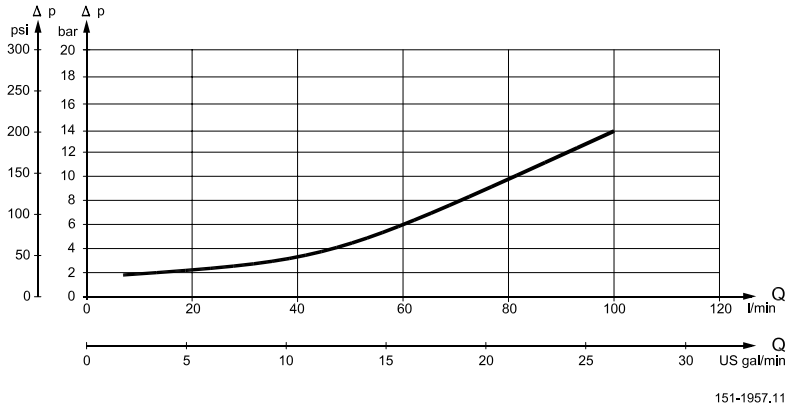
*Max. pressure on shaft seal*




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## Pressure drop

### Pressure drop in motor




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

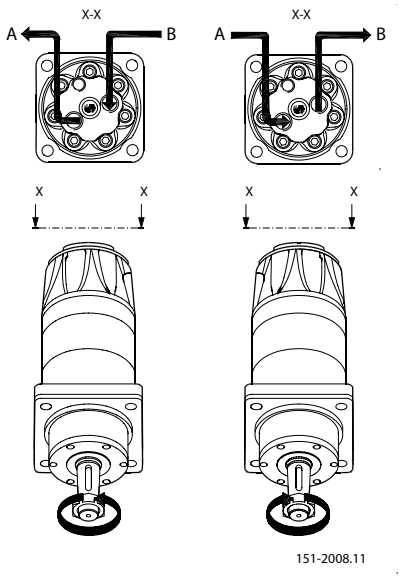
## Oil flow

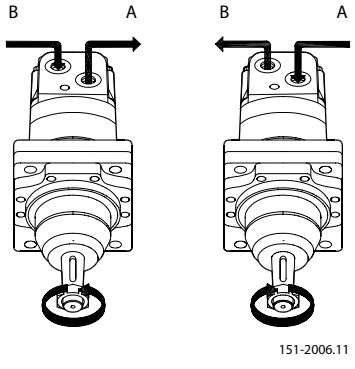
### Oil flow in drain line

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

| Pressure drop bar [psi] | Viscosity $mm^2/s$ [SUS] | Oil flow in drain line l/min [US gal/min] |
|---|---|---|
| 160 [2320] | 20 [100] | 1.7 [0.45] |
| | 35 [165] | 1.2 [0.32] |
| 325 [4713] | 20 [100] | 3.5 [0.92] |
| | 35 [165] | 2.5 [0.66] |

### Direction of shaft rotation

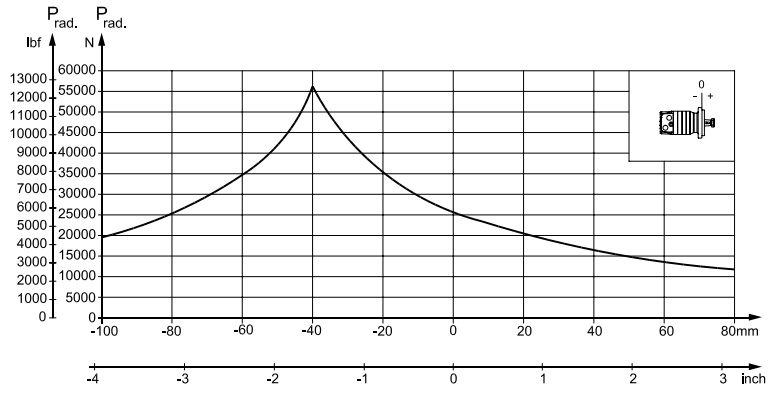


## Shaft load

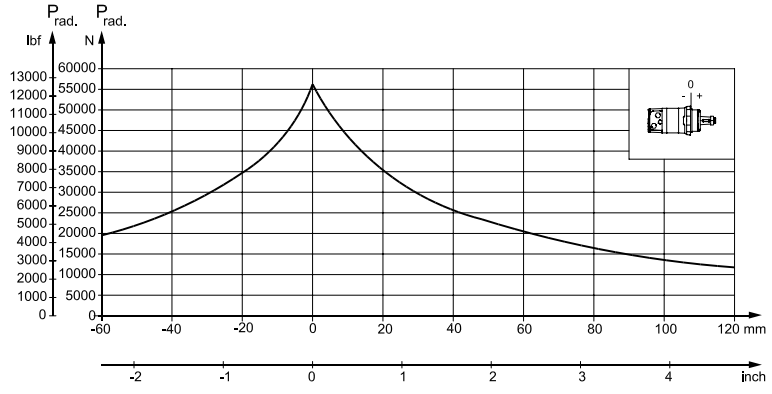
### Permissible shaft load for TMKW

***Mounting flange: Magneto, SAE-C***




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***Mounting flange: Wheel***




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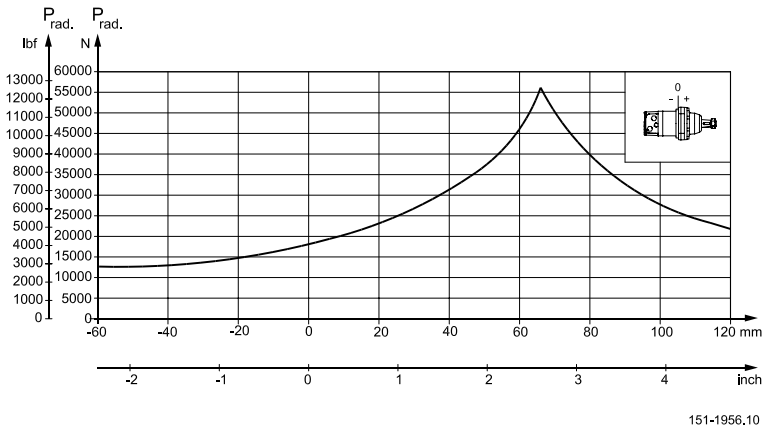
***Permissible radial shaft load***

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

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.

## Shaft load




***Permissible radial shaft load***

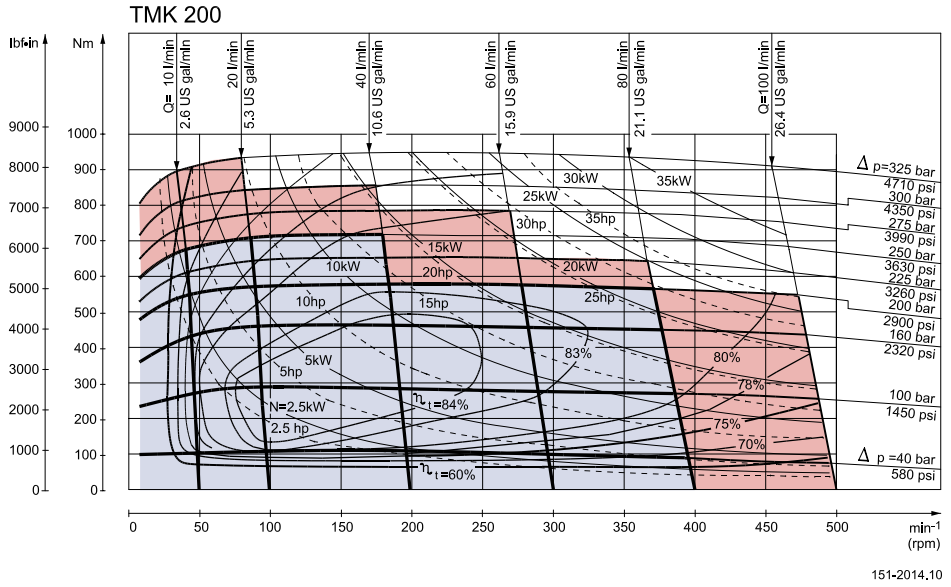
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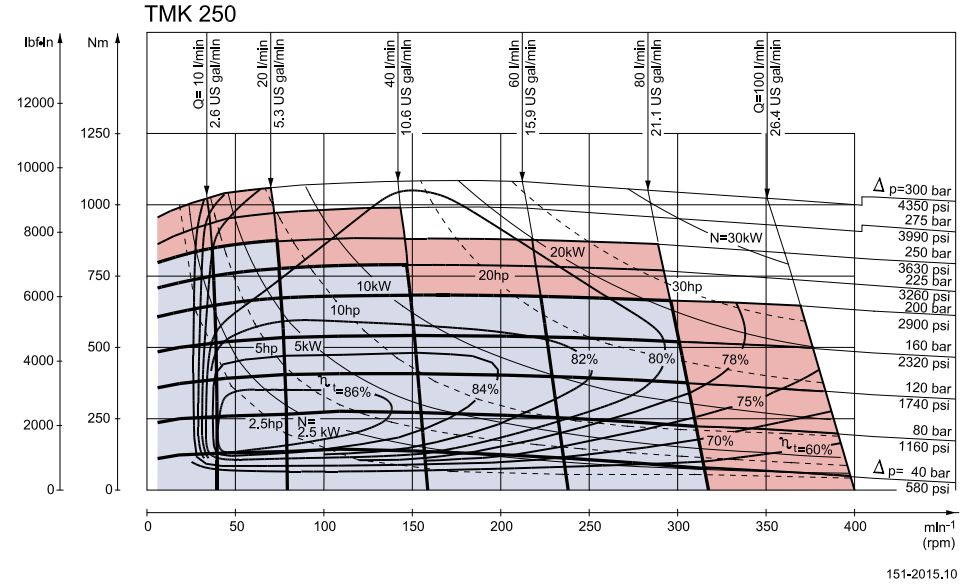
The curve is based on $B_{10}$ Bearing life (2000 hours or 12 000 000 shaft revolutions at 100 $min^{-1}$) at rated output torque, when mineral-based hydraulic oil with a sufficient content of anti-wear additives, is used.

## Function diagrams

### *TMK 200 function diagram*




### *TMK 250 function diagram*



## Shaft

**D:** Tapered shaft 1. 5 in

**J:** Cone 1 : 8

SAE J501

**K:** 1 - 20 UNEF

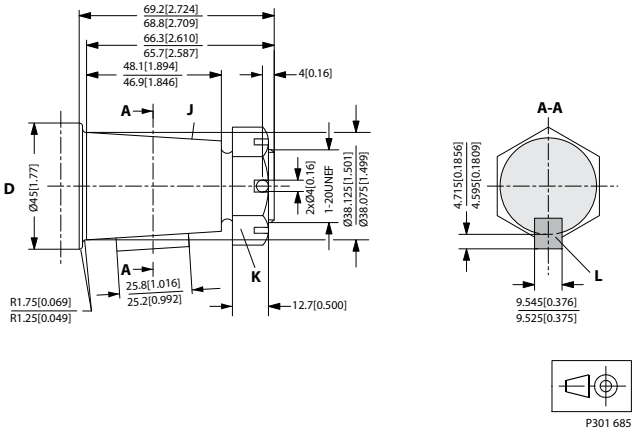
Across flats: 1 7/16 in

Tightening torque:

450 ± 10 Nm [3980 ± 85 lbf•in]

**L:** Parallel key 3/8 x 3/8 x 1 in

B.S. 46




**E:** Tapered shaft 1. 625 in

**M:** Cone 1 : 8

SAE J501

**N:** 1 1/4- 18 UNEF

Across flats: 2 3/16 in

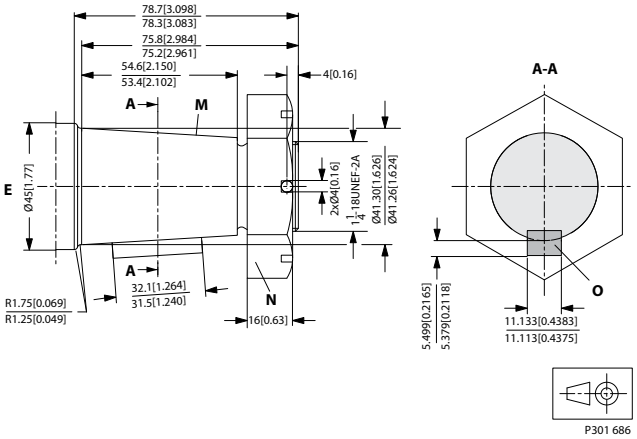
Tightening torque:

500 ± 10 Nm [4425 ± 85 lbf•in]

**O:** Parallel key

7/16 x 7/16 x 1 1/4 in

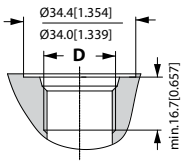
B.S. 46



## Port

### Port thread versions

A

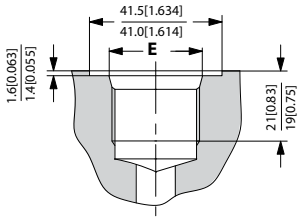



P301 687

A: UNF Main port

D: 7/8 - 14 UNF o-ring boss port

B

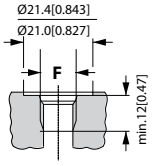



P301 688

B: UN Main port

E: 1 1/16 – 12 UN o-ring boss port

C



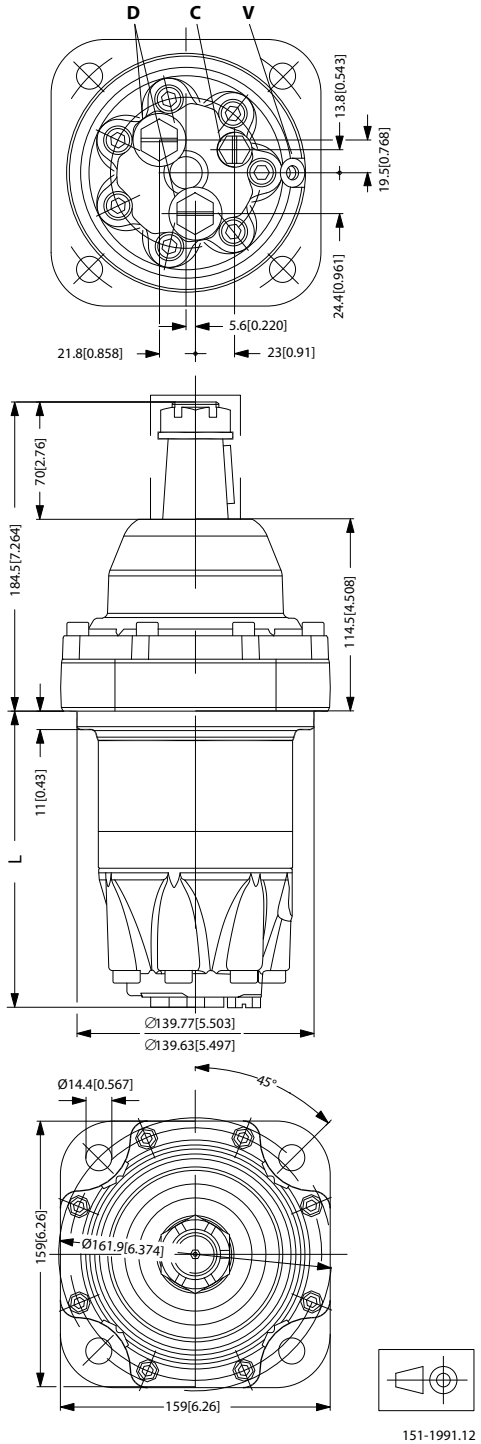

P301 689

C: UNF Drain/release port

F: 7/16 - 20 UNF o-ring boss port

## Dimension, US version, TMK FL with end port

### TMK FL with end port and drain connection




C: Drain connection and brake release port 7/16 - 20 UNF

D: 2 x 7/8 - 14 UNF

V: Vent port 7/16 - 20 UNF

---------Not Painted

## Dimension, US version, TMK FL with end port

***Dimensions***

| Type | L mm [in] |
|---|---|
| TMK FL 160 | 144.0 [5.67] |
| TMK FL 200 | 150.0 [5.91] |
| TMK FL 250 | 157.0 [6.18] |
| TMK FL 315 | 165.7 [6.52] |
| TMK FL 400 | 177.0 [6.97] |
| TMK FL 470 | 187.2 [7.37] |

The stated dimensions are without paint.