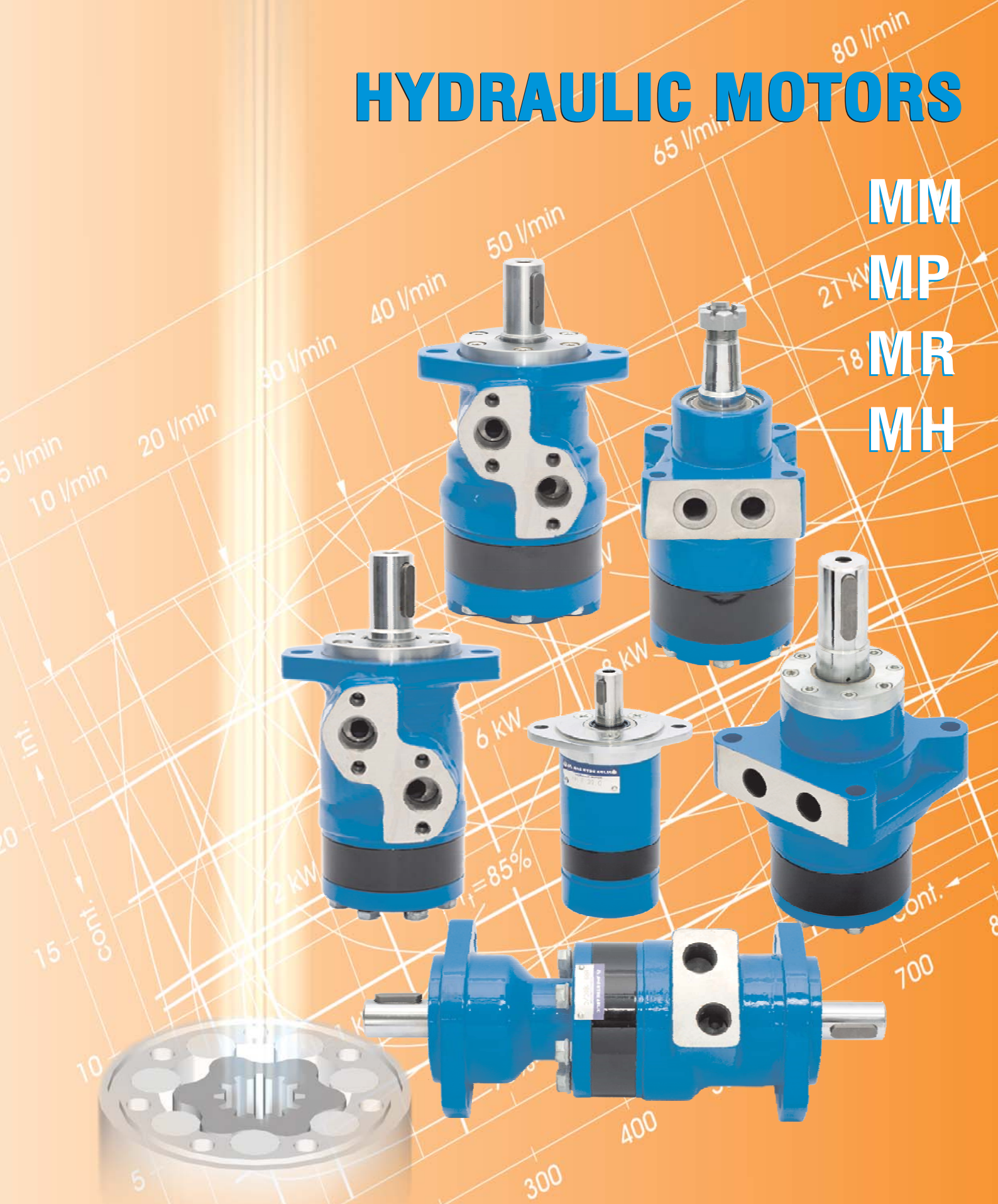




# M+S HYDRAULIC

## HYDRAULIC MOTORS

MM  
MP  
MR  
MH



# SPOOL VALVE HYDRAULIC MOTORS

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# SPOOL VALVE HYDRAULIC MOTORS

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## GENERAL INFORMATION:

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Orbit motors convert hydraulic energy (pressure, oil flow) into mechanical energy (torque, speed). Hydraulic orbit motors operate on the principle of an internal gear (rotor) rotating within a fixed external gear (stator). The internal gear transmits the torque generated by the application of pressure from hydraulic oil fed into motor which is then delivered via the motor's output shaft. Orbit motors have high starting torque and constant output torque at wide speed range.

### DISTRIBUTOR VALVE

MM, MP, MR, SP, SR, MH, PL, RL, PK, RK, RW, HW series motors have spool valve: the distributor valve has been integrated with the output shaft. The cardan shaft rotates distributor valve and transfers mechanical energy from gerotor set to output shaft. The valve has hydrodynamic bearings and has infinite life when load ratings are not exceeded.

### GEARWHEEL SET

There are two forms of gearwheel set:

- Gerotor set has plain teeth. These type of motors are suitable for long operating periods at moderate pressures or short operating periods at high pressures. MM, MP, SP, PL and PK series motors have gerotor set.

- Roll-gerotor set has teeth fitted with rollers. The rollers reduce local stress and the tangential reaction forces on the rotor reducing friction to a minimum. This gives long operating life and better efficiency even at continuous high pressures. Roll-gerotor sets are recommended for operation with thin oil and for applications with continually reversing loads. MR, SR, RL, RK, MH, RW and HW series motors have roll-gerotor set.

## FEATURES:

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### Standard Motor

The standard motor mounting flange is located as close to the output shaft as possible. This type of mounting supports the motor close to the shaft load. This mounting flange is also compatible with many standard gear boxes.

### Wheel Motor

W mounting flange makes the motors possible to fit a wheel hub or a winch drum so that the radial load acts closer to motor bearings. This gives the best utilization of the bearing capacity and is a very compact solution.

### Needle Bearing

MPN and MRN have an output shaft supported in needle bearing. These types motors are suitable for operating conditions such as frequent start and stops, vibration on the shaft, high static and dynamic radial loads in short operating terms.

### Low Leakage

LL Series hydraulic motors are designed to operate at the whole standard range of working conditions (pressure drop and frequency of rotation), but with considerable decreased volumetric losses in the drain ports. These motors are suitable for hydraulic systems with series-connected motors with demands for low leakage.

### Low Speed Valve

LSV feature optimizes the motor for low-speed performance. Motors with this valving provide very low speed while maintaining high torque. They are designed to run continuously at low speed (up to  $200 \text{ min}^{-1}$ ) at normal pressure drop and reduced flow. Optimal run is guaranteed at frequency of rotation from 20 to  $50 \text{ min}^{-1}$ . Motors with this valving have an increased starting pressure and are not recommended for using at pressure drop less than 40 bar.

### Free Running

FR motors are with increased clearance at all friction parts, allowing the shaft to rotate more freely with less mechanical drag. The increased clearance also improves lubrication of the wear surfaces of gear set and friction parts. Additional advantages of "FR" version are prolonging of the life of the hydraulic motors at high speeds, as well as the possibility to use them in systems with wide variation of the loading. FR Series motors are designed to operate with high speed /over than  $300 \text{ min}^{-1}$ / and low pressure drop. Volumetric efficiency may be reduced slightly.

### High Pressure Shaft Seal

The high pressure shaft seals allow the motors to withstand high case pressures at high speeds without external drain line.

### Motors with Speed Sensor

Motors are available with integrated inductive speed sensor. The output signal is a standardized voltage signal that can be used to control the speed of a motor. The torque and the radial load of the motor are not affected by the installation of speed sensor.

# HYDRAULIC MOTORS MM



## CONTENTS

Specification data ..... 5

Function diagrams ..... 6÷8

Dimensions and mounting ... 9÷10

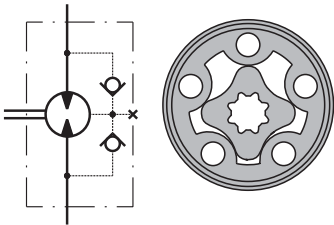
Shaft extensions ..... 11

Permissible shaft loads .....11

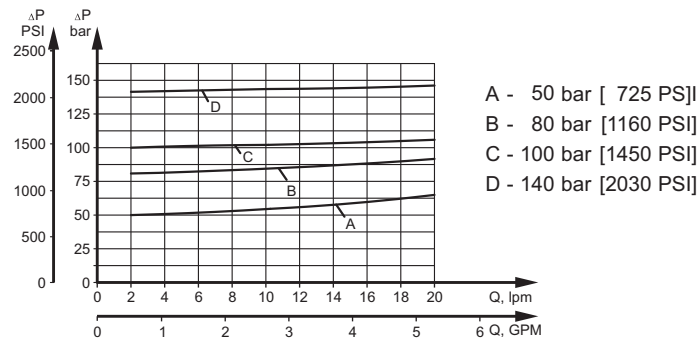
Order code ..... 12

## APPLICATION

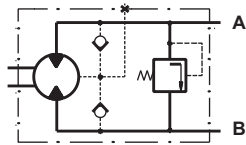
- » Conveyors
- » Textile machines
- » Mining machinery
- » Machine tools
- » Ventilators
- » Construction plant equipment and access platforms etc.



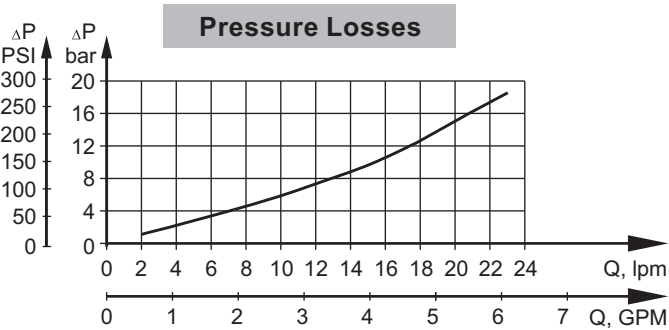
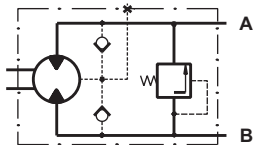
### Pressure Settings at Flow Q=.53 GPM [2 lpm], 150 SUS [32 mm²/s], 50°C [122°F]



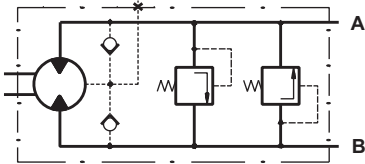
### MMP Series with Integrated Internal Crossover Relief Valve A→B, Δp=100 or 50 bar [1450 or 725 PSI]



### MMP Series with Integrated Internal Crossover Relief Valve B→A, Δp=100 or 50 bar [1450 or 725 PSI]



### MMD Series with Integrated Internal Crossover Relief Valves A↔B, Δp=100 or 50 bar [1450 or 725 PSI]



## GENERAL

|                          |                                                                  |                                         |
|--------------------------|------------------------------------------------------------------|-----------------------------------------|
| Max. Displacement,       | cm³/rev [in³/rev]                                                | 50 [3.05]                               |
| Max. Speed,              | [RPM]                                                            | 2440                                    |
| Max. Torque,             | daNm [lb-in]                                                     | cont.: 4,5 [398]      int.: 5,8 [513]   |
| Max. Output,             | kW [HP]                                                          | 3,2 [4.3]                               |
| Max. Pressure Drop,      | bar [PSI]                                                        | cont.: 105 [1500]      int.: 140 [2030] |
| Max. Oil Flow,           | lpm [GPM]                                                        | 25 [6.6]                                |
| Min. Speed,              | [RPM]                                                            | 20                                      |
| Pressure fluid           | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |                                         |
| Temperature range,       | °C [°F]                                                          | -40÷140 [-40÷284]                       |
| Optimal Viscosity range, | mm²/s [SUS]                                                      | 20÷75 [98÷347]                          |
| Filtration               | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |                                         |

SPECIFICATION DATA

| Type                                                                              |                           | MM 8       | MM 12.5    | MM 20       | MM 32       | MM 40       | MM 50      |
|-----------------------------------------------------------------------------------|---------------------------|------------|------------|-------------|-------------|-------------|------------|
| Displacement, cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                         |                           | 8,2 [50]   | 12,5 [77]  | 19,9 [1.22] | 31,6 [1.93] | 39,8 [2.43] | 50 [3.08]  |
| Max. Speed, [RPM]                                                                 | Cont.                     | 1950       | 1550       | 1000        | 630         | 500         | 400        |
|                                                                                   | Int.*                     | 2450       | 1940       | 1250        | 800         | 630         | 500        |
| Max. Torque daNm [lb-in]                                                          | Cont.                     | 1,1 [95]   | 1,6 [140]  | 2,5 [220]   | 4,0 [350]   | 4,5 [400]   | 4,6 [410]  |
|                                                                                   | Int.*                     | 1,5 [135]  | 2,3 [200]  | 3,5 [310]   | 5,7 [500]   | 7,0 [620]   | 8,8 [780]  |
|                                                                                   | Peak**                    | 2,1 [187]  | 3,3 [293]  | 5,1 [453]   | 6,4 [568]   | 8,2 [725]   | 10,0 [885] |
| Max. Output kW [HP]                                                               | Cont.                     | 1,8 [2.4]  | 2,4 [3.2]  | 2,4 [3.2]   | 2,4 [3.2]   | 2,2 [3.0]   | 1,8 [2.4]  |
|                                                                                   | Int.*                     | 2,6 [3.5]  | 3,2 [4.3]  | 3,2 [4.3]   | 3,2 [4.3]   | 3,2 [4.3]   | 3,2 [4.3]  |
| Max. Pressure Drop bar [PSI]                                                      | Cont.                     | 100 [1450] | 100 [1450] | 100 [1450]  | 100 [1450]  | 90 [1310]   | 70 [1020]  |
|                                                                                   | Int.*                     | 140 [2030] | 140 [2030] | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030] |
|                                                                                   | Peak**                    | 200 [2900] | 200 [2900] | 200 [2900]  | 160 [2320]  | 160 [2320]  | 160 [2320] |
| Max. Oil Flow lpm [GPM]                                                           | Cont.                     | 16 [4.2]   | 20 [5.3]   | 20 [5.3]    | 20 [5.3]    | 20 [5.3]    | 20 [5.3]   |
|                                                                                   | Int.*                     | 20 [5.3]   | 25 [6.6]   | 25 [6.6]    | 25 [6.6]    | 25 [6.6]    | 25 [6.6]   |
| Max. Inlet Pressure bar [PSI]                                                     | Cont.                     | 140 [2030] | 140 [2030] | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030] |
|                                                                                   | Int.*                     | 175 [2540] | 175 [2540] | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540] |
|                                                                                   | Peak**                    | 225 [3260] | 225 [3260] | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260] |
| Max. Return Pressure without Drain Line or Max. Pressure in Drain Line, bar [PSI] | Cont. 0-100 RPM           | 140 [2030] | 140 [2030] | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030] |
|                                                                                   | Cont. 100-400 RPM         | 105 [1500] | 105 [1500] | 105 [1500]  | 105 [1500]  | 105 [1500]  | 105 [1500] |
|                                                                                   | Cont. 400-800 RPM         | 50 [725]   | 50 [725]   | 50 [725]    | 50 [725]    | 50 [725]    | 50 [725]   |
|                                                                                   | Cont. >800 RPM            | 20 [290]   | 20 [290]   | 20 [290]    | -           | -           | -          |
|                                                                                   | Int.* 0-max. RPM          | 140 [2030] | 140 [2030] | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030] |
| Max. Return Pressure with Drain Line bar [PSI]                                    | Cont.                     | 140 [2030] | 140 [2030] | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030] |
|                                                                                   | Int.*                     | 175 [2540] | 175 [2540] | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540] |
|                                                                                   | Peak**                    | 225 [3260] | 225 [3260] | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI]                             |                           | 4 [60]     | 4 [60]     | 4 [60]      | 4 [60]      | 4 [60]      | 4 [60]     |
| Min. Starting Torque daNm [lb-in]                                                 | At max. press. drop Cont. | 0,7 [60]   | 1,2 [105]  | 2,1 [185]   | 3,4 [300]   | 3,8 [335]   | 4,1 [365]  |
|                                                                                   | At max. press. drop Int.* | 1,0 [90]   | 1,7 [150]  | 2,9 [255]   | 4,8 [425]   | 6,2 [550]   | 7,9 [700]  |
| Min. Speed***, [RPM]                                                              |                           | 50         | 40         | 30          | 30          | 25          | 20         |
| Weight, kg [lb]<br><br>For "F" flange:<br>+ 0,200 [.441]                          | MM                        | 1,9 [4.2]  | 2,0 [4.41] | 2,1 [4.63]  | 2,2 [4.85]  | 2,3 [5.07]  | 2,5 [5.51] |
|                                                                                   | MMF(S)                    | 2,0 [4.41] | 2,1 [4.63] | 2,2 [4.85]  | 2,3 [5.07]  | 2,4 [5.29]  | 2,6 [5.73] |
|                                                                                   | MMP                       | 2,2 [4.85] | 2,3 [5.07] | 2,4 [5.29]  | 2,5 [5.51]  | 2,6 [5.73]  | 2,8 [6.17] |
|                                                                                   | MMD                       | 2,6 [5.73] | 2,7 [5.95] | 2,8 [6.17]  | 2,9 [6.39]  | 3,0 [6.61]  | 3,2 [7.05] |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

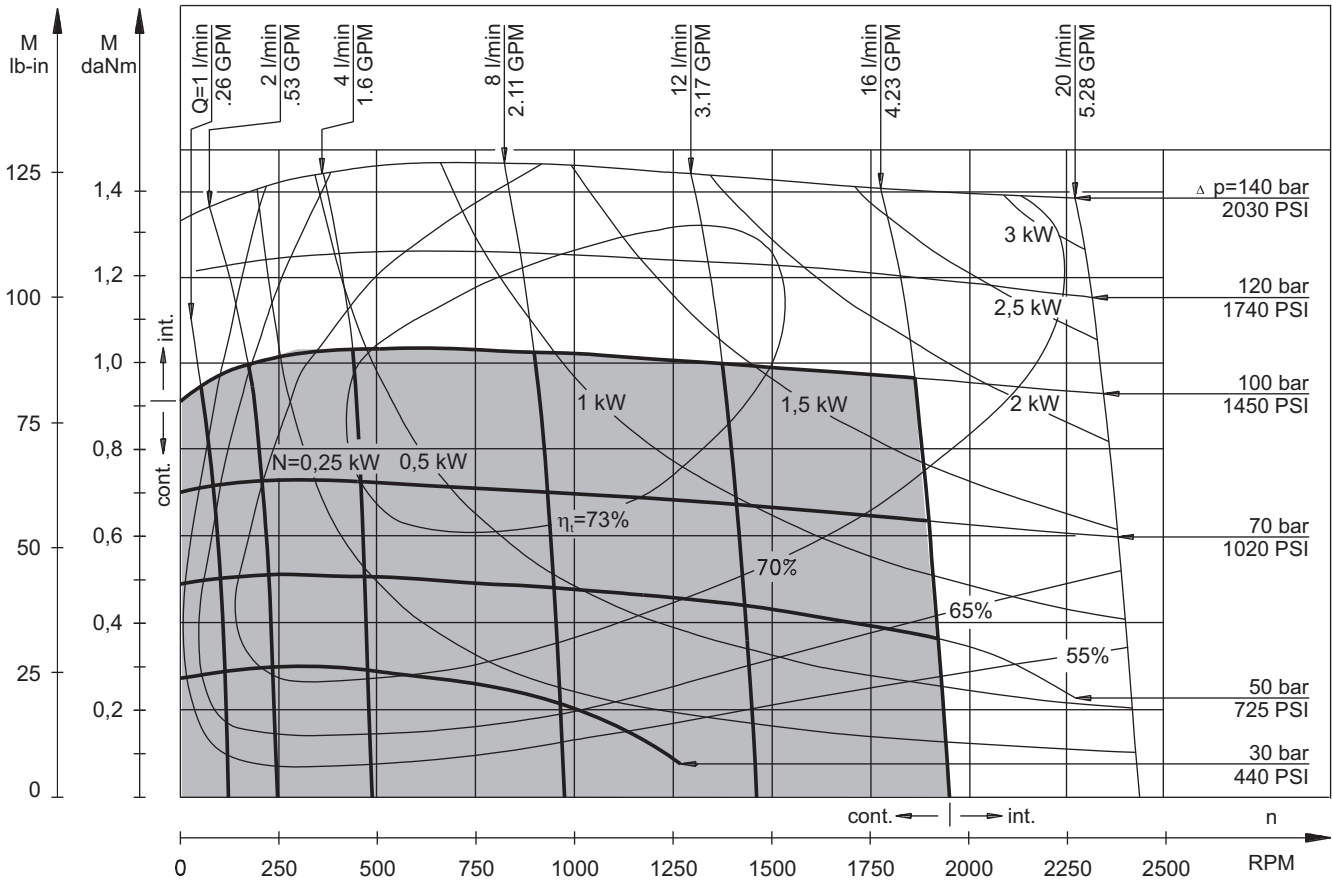
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm<sup>2</sup>/s [70 SUS] at 50°C [122°F].

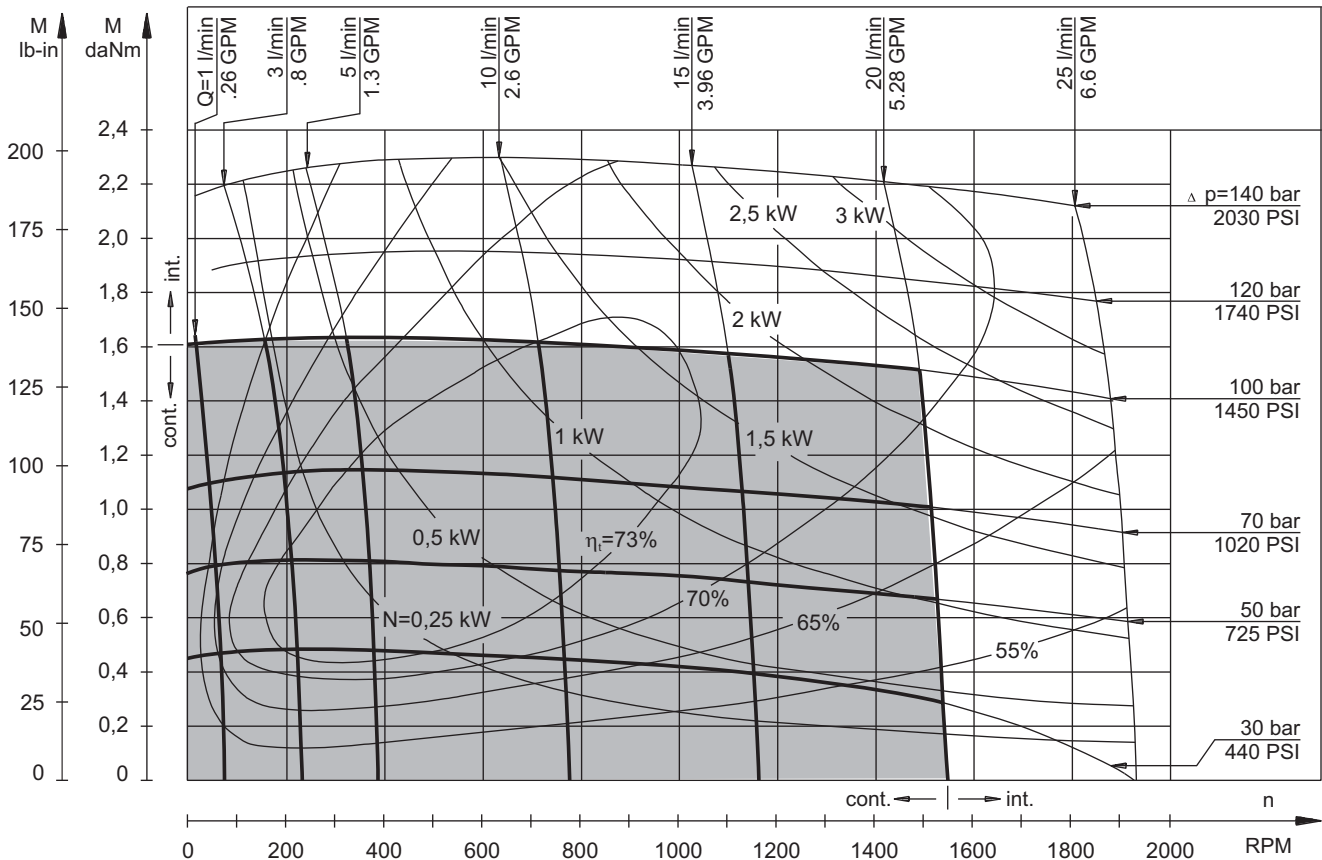
5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

MM 8

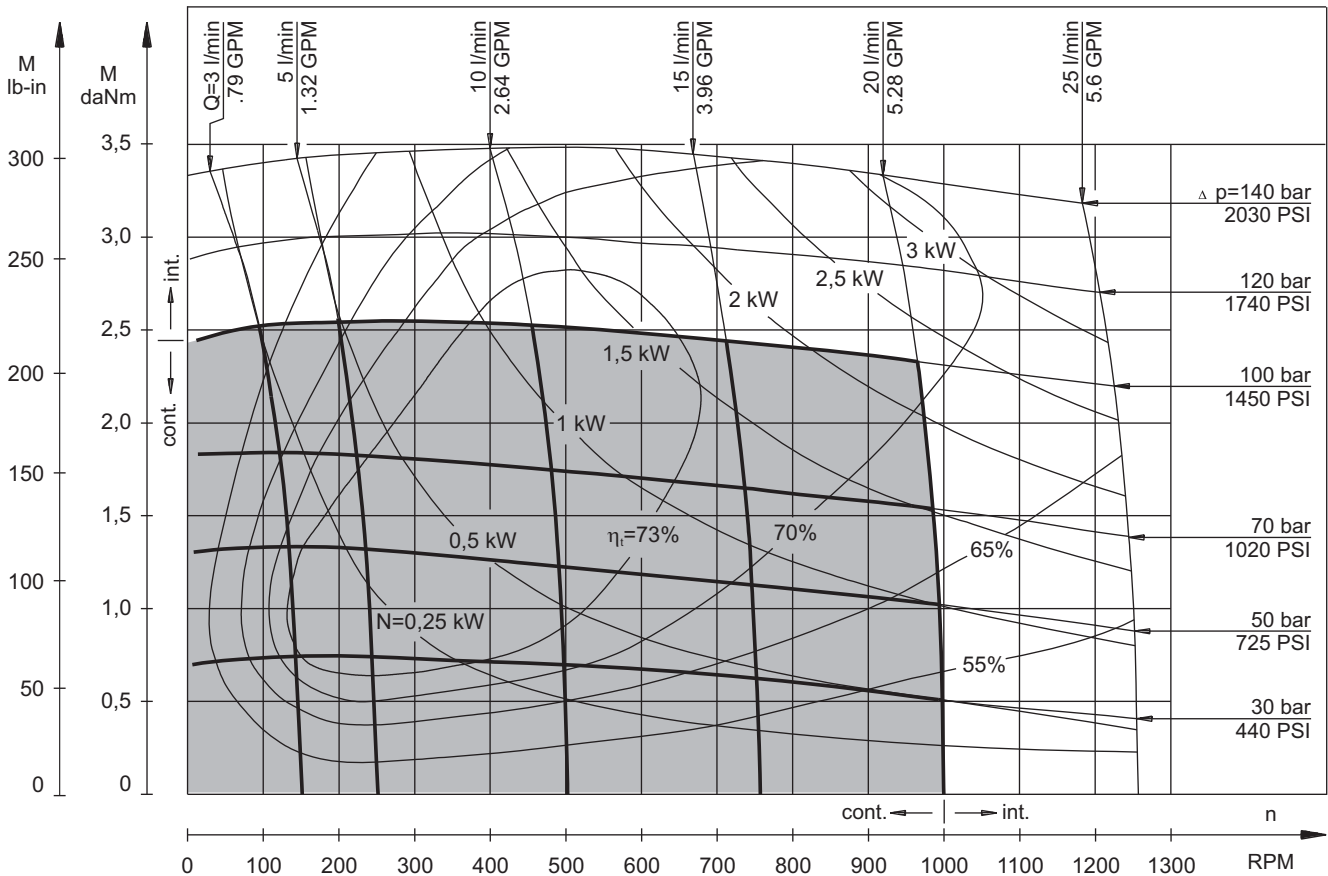


MM 12,5

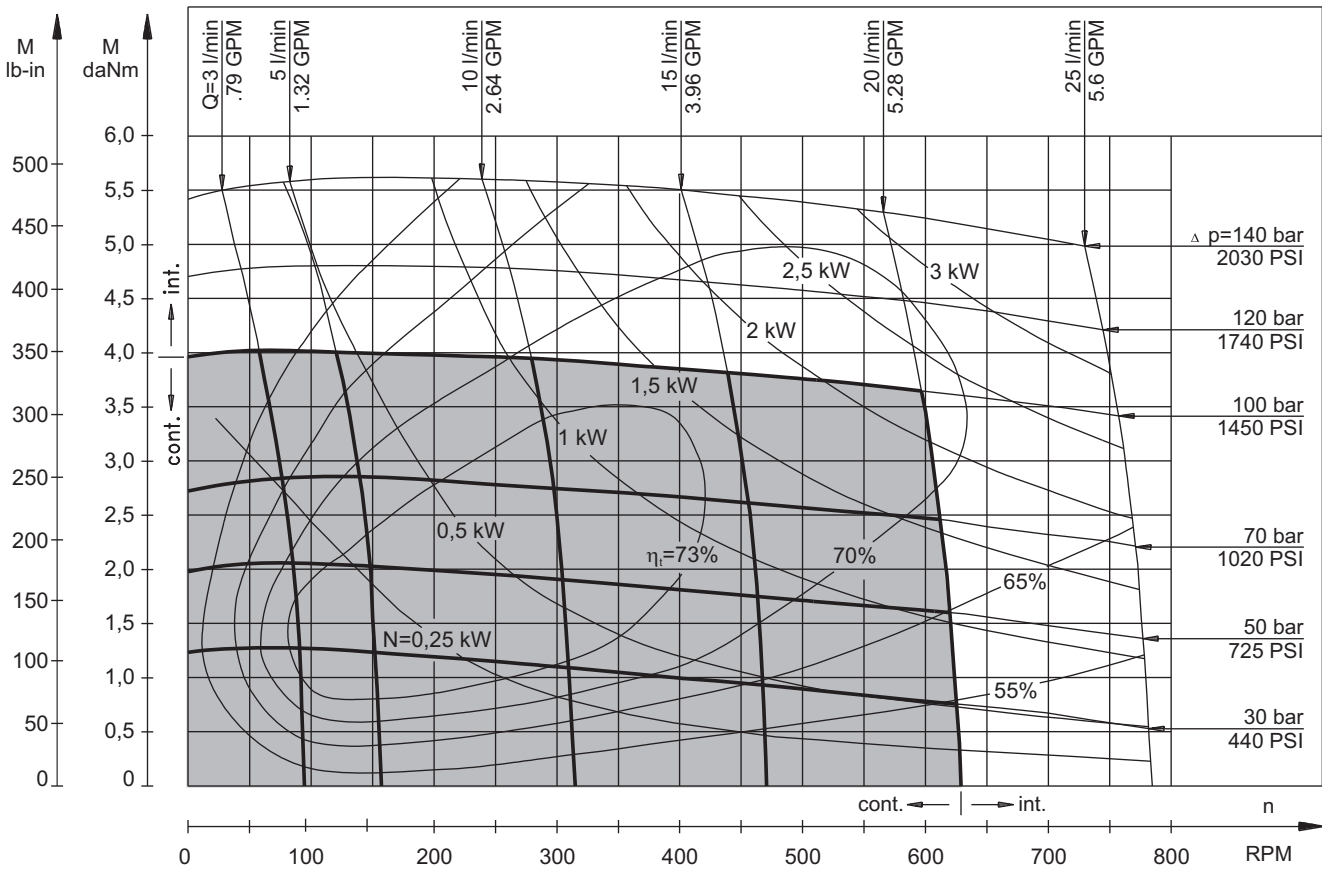


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

MM 20

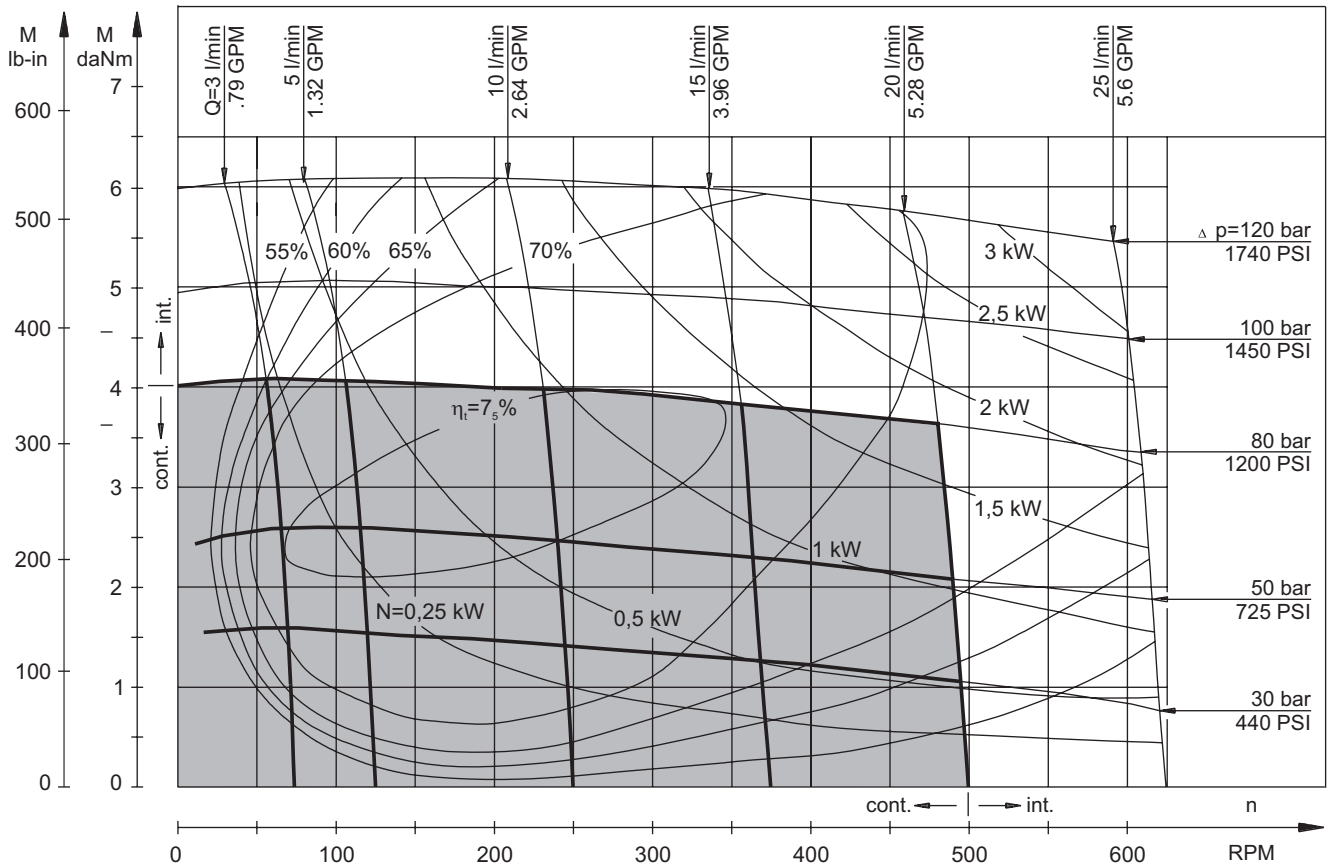


MM 32

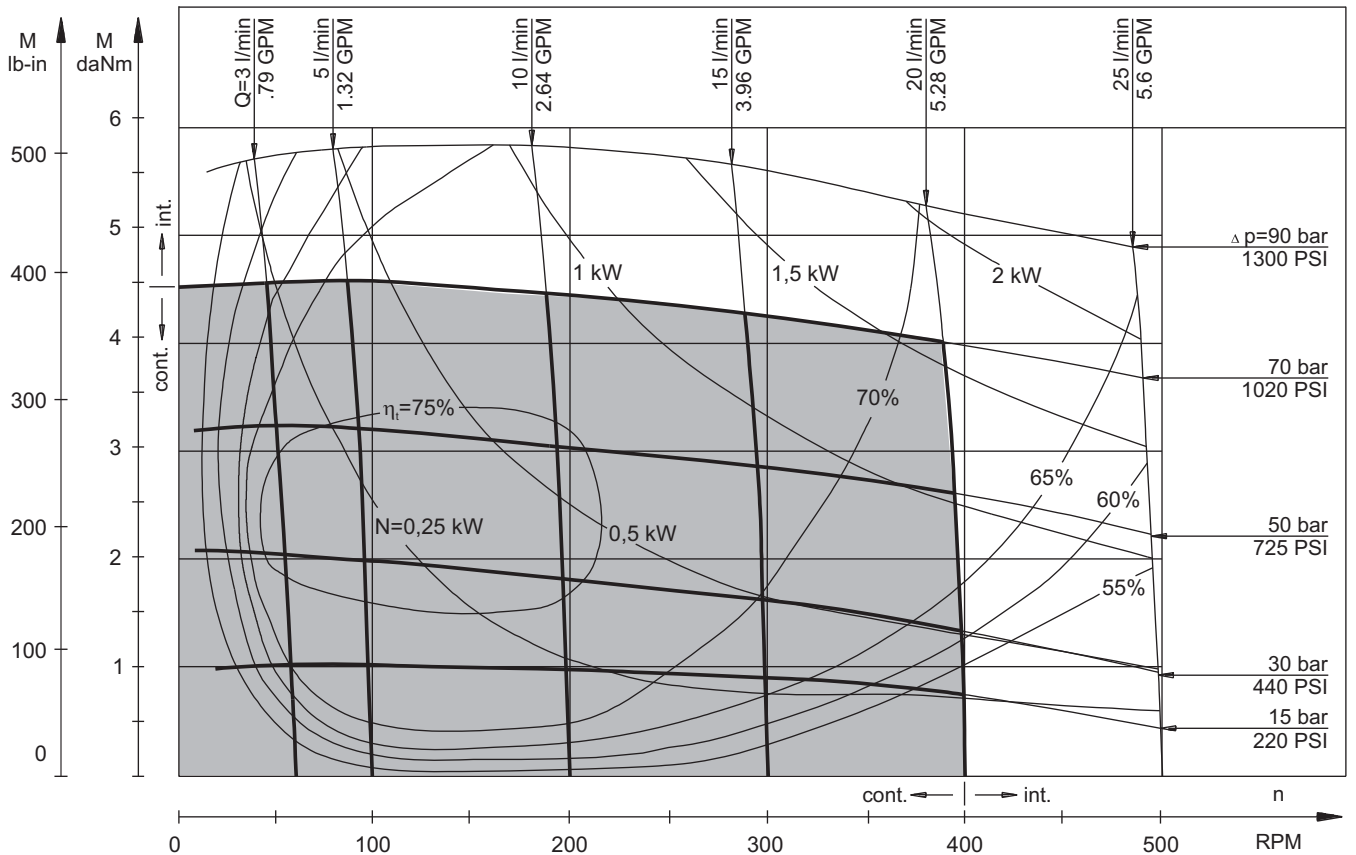


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

MM 40



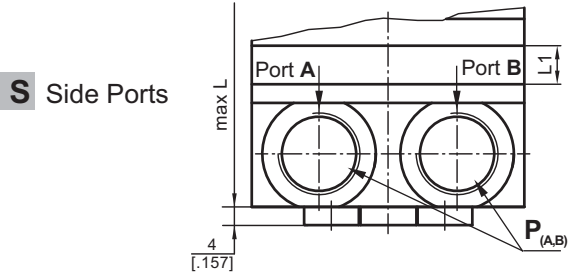
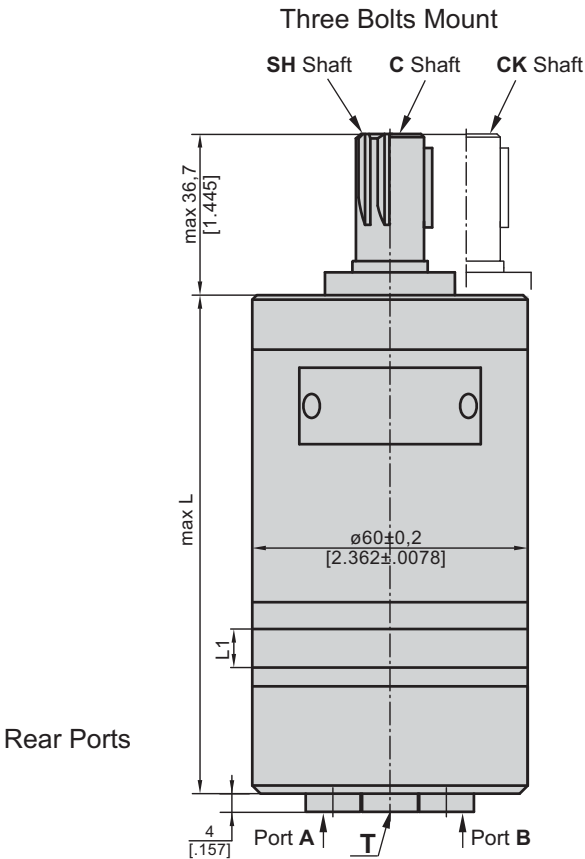
MM 50



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

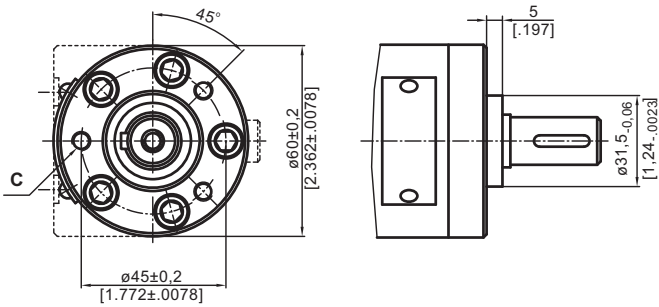
DIMENSIONS AND MOUNTING DATA

MM, MMS, MMP, MMD

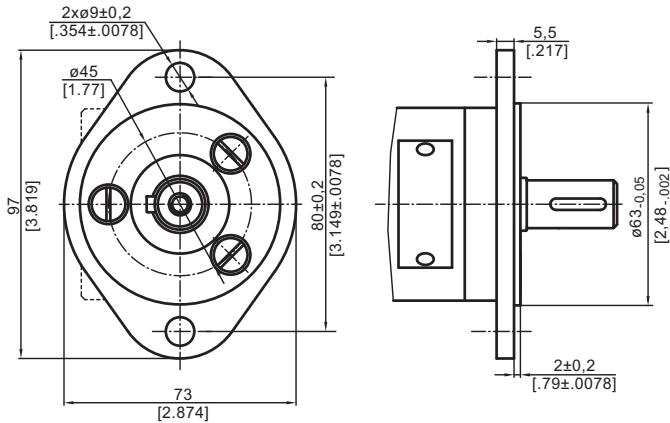


MOUNTING

Three Bolts Mount

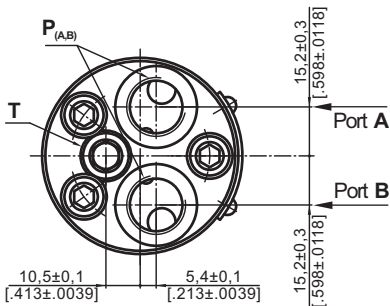


**F** Oval Mount (2 Holes)

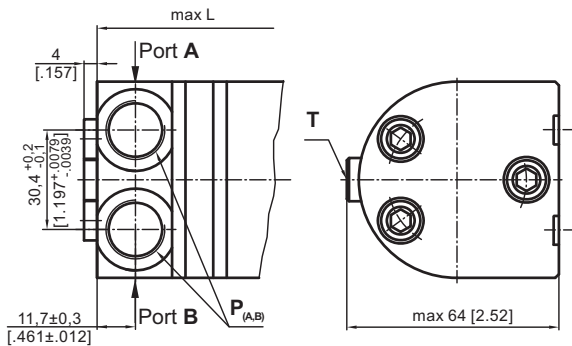


PORTS

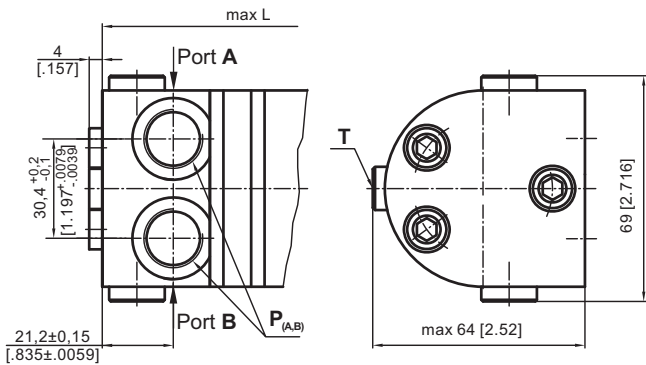
Rear Ports



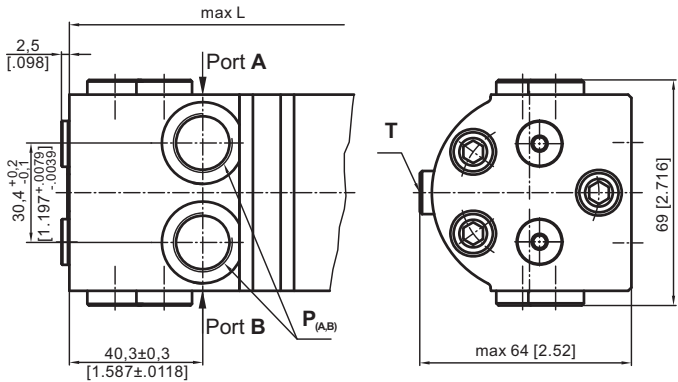
**S** Side Ports



**P** Side Ports with Single Crossover Relief Valve



**D** Side Ports with Dual Crossover Relief Valve



**Standard Rotation**  
Viewed from Shaft End  
Port A Pressurized - CW  
Port B Pressurized - CCW

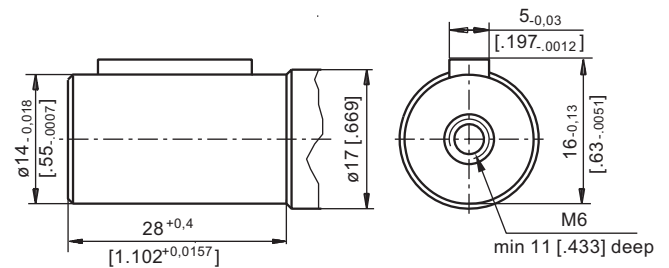
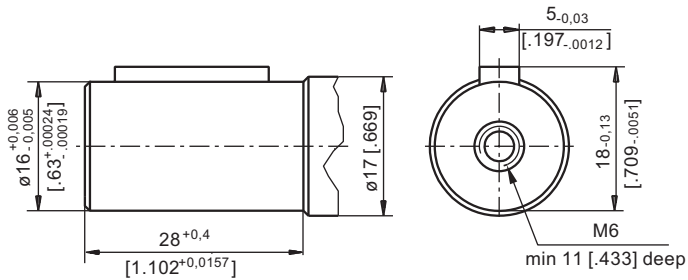
**Reverse Rotation**  
Viewed from Shaft End  
Port A Pressurized - CCW  
Port B Pressurized - CW

**C** : 3xM6 - 12 mm [.47 in] depth  
**P<sub>(A,B)</sub>** : 2xG3/8 or 2xM18x1,5 - 12 mm [.47 in] depth  
**T** : G1/8 or M10x1 - 10 mm [.39 in] depth

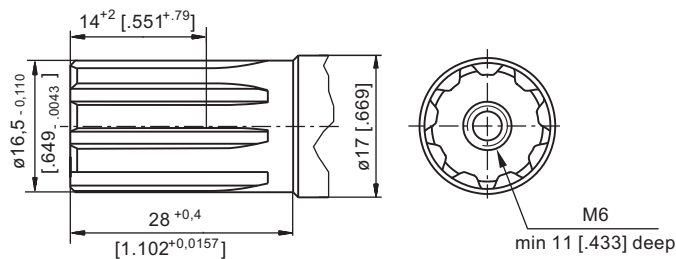
## SHAFT EXTENSIONS

**C** -  $\varnothing 16$  straight, Parallel key 5x5x16 DIN 6885  
Max. Torque 3,9 daNm [345 lb-in]

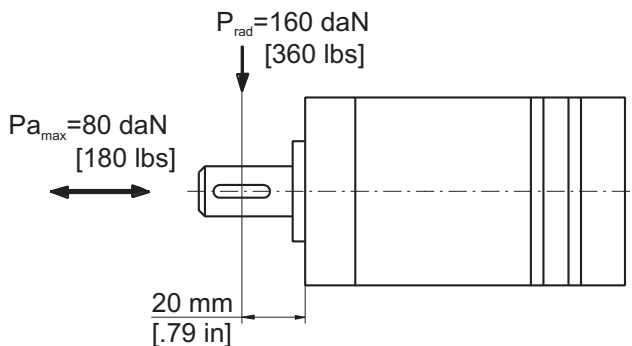
**CK** -  $\varnothing 14$  straight, Parallel key 5x5x16 DIN 6885  
Max. Torque 3 daNm [265 lb-in]



**SH** -  $\varnothing 16,5$  Splined, B17x14 DIN 5482  
Max. Torque 4,4 daNm [390 lb-in]



## PERMISSIBLE SHAFT LOAD



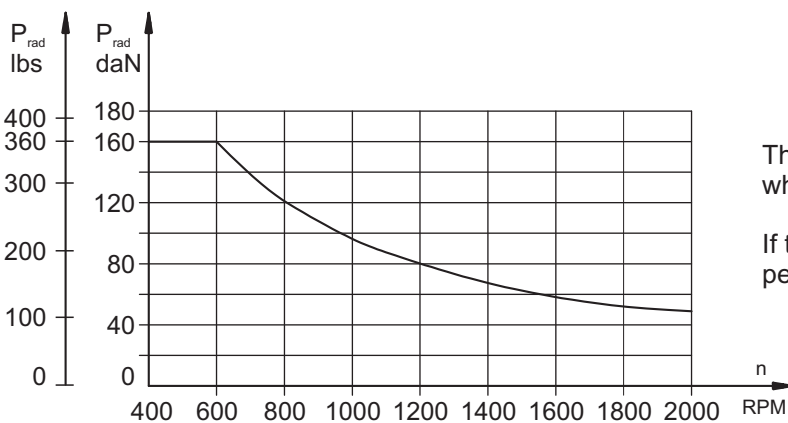
The permissible radial shaft load [Prad] is calculated from the distance [L] between the point of load application and the mounting surface:

$$P_{rad} = \frac{600}{n} \times \frac{13040}{61.5 + L}, [\text{daN}]$$

[L in mm;  $L \leq 80$  mm]

$$P_{rad} = \frac{600}{n} \times \frac{1155}{2.42 + L}, [\text{lbs}]$$

[L in inch;  $L \leq 3.15$  in]



The drawing shows the permissible radial load when  $L=20$  mm [0.79 in].

If the calculated shaft load exceeds the permissible, a flexible coupling must be used.

ORDER CODE

|     |   |   |   |   |   |   |   |   |   |    |
|-----|---|---|---|---|---|---|---|---|---|----|
|     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| M M |   |   |   |   |   |   |   |   |   |    |

Pos.1 - Adjustment Option

- omit - without valve
- P\* - Side ports with single crossover relief valve
- D\* - Side ports with dual crossover relief valve

Pos.2 - Mounting Flange

- omit - Three bolts mount
- F - Oval mount, two holes

Pos.3 - Port type (not valid for P and D version)

- omit - Rear ports
- S - Side ports

Pos.4 - Displacement code

- 8 - 8,2 cm³/rev [ .5 in³/rev]
- 12.5 - 12,9 cm³/rev [ .79 in³/rev]
- 20 - 20,0 cm³/rev [ 1.22 in³/rev]
- 32 - 31,8 cm³/rev [ 1.93 in³/rev]
- 40 - 40,0 cm³/rev [ 2.44 in³/rev]
- 50 - 50,0 cm³/rev [ 3.05 in³/rev]

Pos. 5 - Shaft Extensions\*

- C - ø16 straight, Parallel key A5x5x16 DIN6885
- VC - ø16 straight, Parallel key A5x5x16 DIN6885 with corrosion resistant bushing
- CK - ø14 straight, Parallel key 5x5x16 DIN6885
- SH - ø16,5 splined, B17x14 DIN 5482

Pos. 6 - Ports

- omit - BSPP (ISO 228)
- M - Metric (ISO 262)

Pos. 7 - Line to control\*\* (see page 4)

- /L - B → A (left running)
- /R - A → B (right running)

Pos. 8 - Valve Rated Pressure\*\*\*

- /50 - Δp=50 bar [725 PSI]
- /80 - Δp=80 bar [1160 PSI]
- /100 - Δp=100 bar [1450 PSI]
- /140 - Δp=140 bar [2030 PSI]

Pos. 9 - Special Features (see page 119)

Pos.10 - Design Series

- omit - Factory specified

NOTES:

- \* The permissible output torque for shafts must not be exceeded!
- \*\* For P option useful only.
- \*\*\* For P and D option useful only.

⚠

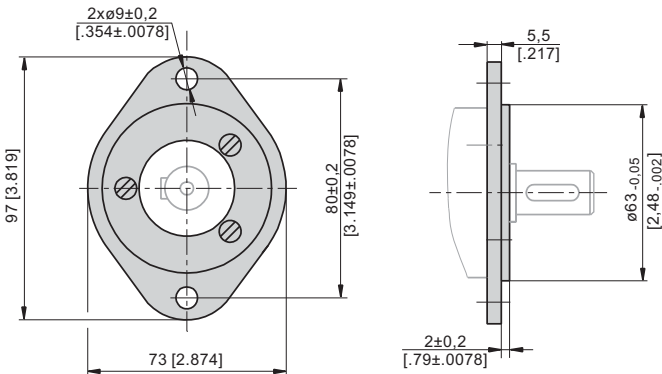
MMP and MMD are available with new crossover relief valves with improved characteristics. The new valves allow easier pressure setting in a wider range: from 50 bar [725 PSI] to 140 bar [2030 PSI]. For more information about MMP and MMD - series 2 please contact with "M+S Hydraulic".

The Valve pressure setting must be at flow rate of 2 lpm [.53 GPM].

The hydraulic motors are mangano - phosphatized as standard.

F - FLANGE (2 Holes)

Order No for Flange:48443 014 00



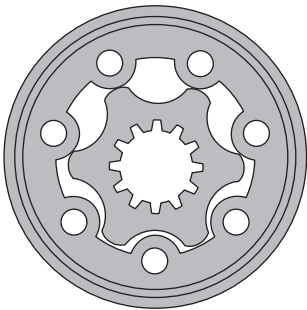
F Flange is mounted to the motor with 3 screws - M6x14. Tightening Torque: 5-6 Nm [44-53 lb-in].

# HYDRAULIC MOTORS MP



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Grass cutting machinery etc.



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## OPTIONS

- » Model - Spool valve, gerotor
- » Flange and wheel mount
- » Motor with needle bearing
- » Side and rear ports
- » Shafts - straight, splined and tapered
- » Shaft seal for high and low pressure
- » Metric and BSPP ports
- » Speed sensing
- » Other special features

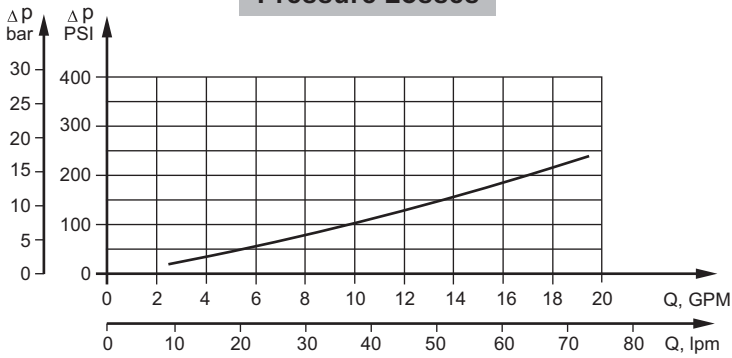
## GENERAL

|                                                                |                                                                  |
|----------------------------------------------------------------|------------------------------------------------------------------|
| Max. Displacement, cm <sup>3</sup> /rev [in <sup>3</sup> /rev] | 623,6 [38.05]                                                    |
| Max. Speed, [RPM]                                              | 1815                                                             |
| Max. Torque, daNm [lb-in]                                      | cont.:50 [4415] int.: 64 [5565]                                  |
| Max. Output, kW [HP]                                           | 12,8 [17.1]                                                      |
| Max. Pressure Drop, bar [PSI]                                  | cont.:140 [2030] int.: [175 [2540]                               |
| Max. Oil Flow, lpm [GPM]                                       | 75 [19.8]                                                        |
| Min. Speed, [RPM]                                              | 10                                                               |
| Pressure fluid                                                 | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |
| Temperature range, °C [°F]                                     | -40÷140 [-40÷284]                                                |
| Optimal Viscosity range, mm <sup>2</sup> /s [SUS]              | 20÷75 [98÷347]                                                   |
| Filtration                                                     | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



SPECIFICATION DATA

Specification Data for MP... motors with **C**, **CO**, **SH**, **K** and **SA** shafts.  
(ø28,56 sealing diameter)

| Type                                                  |                          | MP 25       | MP 32      | MP 40       | MP 50       | MP 80       | MP 100      | MP 125       |
|-------------------------------------------------------|--------------------------|-------------|------------|-------------|-------------|-------------|-------------|--------------|
| Displacement, cm³/rev [in³/rev]                       |                          | 28,4 [1.73] | 34,5 [2,1] | 40,5 [2.47] | 49,5 [3.02] | 79,2 [4.83] | 99 [6.04]   | 123,8 [7.55] |
| Max. Speed, [RPM]                                     | Cont.                    | 1408        | 1450       | 1480        | 1210        | 755         | 605         | 486          |
|                                                       | Int.*                    | 1584        | 1594       | 1555        | 1515        | 945         | 755         | 605          |
| Max. Torque daNm [lb-in]                              | Cont.                    | 3,3 [290]   | 4,3 [380]  | 6,2 [550]   | 9,4 [835]   | 15,1 [1340] | 19,3 [1710] | 23,7 [2100]  |
|                                                       | Int.*                    | 4,7 [415]   | 6,1 [540]  | 8,2 [730]   | 11,9 [1050] | 19,5 [1725] | 23,7 [2100] | 29,8 [2640]  |
|                                                       | Peak**                   | 6,7 [595]   | 8,6 [760]  | 10,7 [950]  | 14,3 [1285] | 22,4 [1985] | 27,5 [2435] | 36,5 [3235]  |
| Max. Output kW [HP]                                   | Cont.                    | 4,5 [6.0]   | 5,8 [7.8]  | 8,4 [11.5]  | 10,1 [13.5] | 10,2 [13.7] | 10,5 [14.1] | 10,2 [13.7]  |
|                                                       | Int.*                    | 6,1 [8.2]   | 7,8 [10.5] | 11,6 [15.5] | 12,2 [16.1] | 12,5 [16.8] | 12,8 [17.1] | 12 [16.1]    |
| Max. Pressure Drop bar [PSI]                          | Cont.                    | 100 [1450]  | 100 [1450] | 120 [1750]  | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]   |
|                                                       | Int.*                    | 140 [2030]  | 140 [2030] | 155 [2250]  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   |
|                                                       | Peak**                   | 225 [3260]  | 225 [3260] | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   |
| Max. Oil Flow lpm [GPM]                               | Cont.                    | 40 [10.5]   | 50 [13.2]  | 60 [15.9]   | 60 [15.9]   | 60 [15.9]   | 60 [15.9]   | 60 [15.9]    |
|                                                       | Int.*                    | 45 [11.9]   | 55 [14.5]  | 70 [18.5]   | 75 [19.8]   | 75 [19.8]   | 75 [19.8]   | 75 [19.8]    |
| Max. Inlet Pressure bar [PSI]                         | Cont.                    | 175 [2540]  | 175 [2540] | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   |
|                                                       | Int.*                    | 200 [2900]  | 200 [2900] | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   |
|                                                       | Peak**                   | 225 [3260]  | 225 [3260] | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   |
| Max. Return Pressure with Drain Line bar [PSI]        | Cont.                    | 175 [2540]  | 175 [2540] | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   |
|                                                       | Int.*                    | 200 [2900]  | 200 [2900] | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   |
|                                                       | Peak**                   | 225 [3260]  | 225 [3260] | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] |                          | 10 [145]    | 10 [145]   | 10 [145]    | 10 [145]    | 10 [145]    | 10 [145]    | 9 [131]      |
| Min. Starting Torque daNm [lb-in]                     | At max.press. drop Cont. | 3,0 [265]   | 4,0 [355]  | 5,4 [480]   | 7,8 [690]   | 13,2 [1170] | 16,6 [1470] | 20,7 [1830]  |
|                                                       | At max.press. drop Int.* | 4,2 [370]   | 5,6 [500]  | 6,8 [600]   | 10 [885]    | 16,8 [1490] | 21 [1860]   | 26,6 [2360]  |
| Min. Speed***, [RPM]                                  |                          | 20          | 15         | 10          | 10          | 10          | 10          | 10           |
| Weight, kg [lb]<br>For rear ports<br>+0,450 [-.992]   | MP(F)(N)                 | 5,6 [12.3]  | 5,6 [12.3] | 5,7 [12.6]  | 5,8 [12.8]  | 5,9 [13.2]  | 6,1 [13.5]  | 6,2 [13.7]   |
|                                                       | MPW(N)                   | 5,3 [11.7]  | 5,3 [11.7] | 5,4 [11.9]  | 5,5 [12.1]  | 5,6 [12.4]  | 5,8 [12.8]  | 5,9 [13]     |
|                                                       | MPQ(N)                   | 5,0 [11.1]  | 5,0 [11.1] | 5,1 [11.2]  | 5,2 [11.5]  | 5,3 [11.7]  | 5,5 [12.1]  | 5,6 [12.3]   |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

**SPECIFICATION DATA (continued)**

Specification Data for MP... motors with **C, CO, SH, K** and **SA** shafts.  
(ø28,56 sealing diameter)

| Type                                                     |                          | MP<br>160    | MP<br>200   | MP<br>250    | MP<br>315    | MP<br>400   | MP<br>500  | MP<br>630     |
|----------------------------------------------------------|--------------------------|--------------|-------------|--------------|--------------|-------------|------------|---------------|
| Displacement, cm³/rev [in³/rev]                          |                          | 158,4 [9.66] | 198 [12.1]  | 247,5 [15.1] | 316,8 [19.3] | 396 [24.16] | 495 [30.2] | 623,6 [38.05] |
| Max. Speed,<br>[RPM]                                     | Cont.                    | 378          | 303         | 242          | 190          | 150         | 120        | 95            |
|                                                          | Int.*                    | 472          | 378         | 303          | 236          | 189         | 150        | 120           |
| Max. Torque<br>daNm [lb-in]                              | Cont.                    | 31,3 [2770]  | 36,6 [3240] | 38 [3360]    | 38 [3360]    | 36 [3190]   | 39 [3452]  | 44 [3895]     |
|                                                          | Int.*                    | 37,8 [3345]  | 45,6 [4035] | 58,3 [5160]  | 56 [4960]    | 59 [5240]   | 57 [5045]  | 64 [5665]     |
|                                                          | Peak**                   | 43,8 [3880]  | 55 [4870]   | 68,5 [6060]  | 85 [7505]    | 85,4 [7560] | 78 [6903]  | 82 [7257]     |
| Max. Output<br>kW [HP]                                   | Cont.                    | 10,1 [13.5]  | 10 [13.5]   | 7,5 [10]     | 5,8 [7.9]    | 4,6 [6.2]   | 3,5 [4.7]  | 3,3 [4.4]     |
|                                                          | Int.*                    | 12,1 [16.2]  | 12 [16.1]   | 12 [16.1]    | 9 [12.1]     | 7,8 [10.5]  | 7,2 [9.7]  | 5,6 [7.5]     |
| Max. Pressure Drop<br>bar [PSI]                          | Cont.                    | 140 [2030]   | 140 [2030]  | 110 [1600]   | 90 [1300]    | 70 [1015]   | 60 [870]   | 55 [800]      |
|                                                          | Int.*                    | 175 [2540]   | 175 [2540]  | 175 [2540]   | 140 [2030]   | 115 [1665]  | 90 [1305]  | 80 [1160]     |
|                                                          | Peak**                   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 180 [2610]  | 130 [1885] | 110 [1740]    |
| Max. Oil Flow<br>lpm [GPM]                               | Cont.                    | 60 [15.9]    | 60 [15.9]   | 60 [15.9]    | 60 [15.9]    | 60 [15.9]   | 60 [15.9]  | 60 [15.9]     |
|                                                          | Int.*                    | 75 [19.8]    | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]   | 75 [19.8]  | 75 [19.8]     |
| Max. Inlet Pressure<br>bar [PSI]                         | Cont.                    | 175 [2540]   | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 140 [2030] | 140 [2030]    |
|                                                          | Int.*                    | 200 [2900]   | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  | 175 [2540] | 175 [2540]    |
|                                                          | Peak**                   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260] | 225 [3260]    |
| Max. Return Pressure<br>with Drain Line<br>bar [PSI]     | Cont.                    | 175 [2540]   | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 140 [2030] | 140 [2030]    |
|                                                          | Int.*                    | 200 [2900]   | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  | 175 [2540] | 175 [2540]    |
|                                                          | Peak**                   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260] | 225 [3260]    |
| Max. Starting Pressure with<br>Unloaded Shaft, bar [PSI] |                          | 8 [116]      | 7 [100]     | 6 [87]       | 5 [73]       | 5 [73]      | 5 [73]     | 5 [73]        |
| Min. Starting Torque<br>daNm [lb-in]                     | At max.press. drop Cont. | 28,2 [2500]  | 33,5 [2950] | 33,6 [2970]  | 34,4 [3045]  | 34,5 [3050] | 36 [3180]  | 41,5 [3670]   |
|                                                          | At max.press. drop Int.* | 35,5 [3140]  | 42,6 [3770] | 54,2 [4795]  | 61,9 [5480]  | 60,8 [5390] | 54 [4780]  | 62 [5480]     |
| Min. Speed***, [RPM]                                     |                          | 10           | 10          | 10           | 10           | 10          | 10         | 10            |
| Weight, kg [lb]<br>For rear ports<br>+0,450 [.992]       | MP(F)(N)                 | 6,4 [14.1]   | 6,6 [14.6]  | 6,8 [15]     | 7,1 [15.6]   | 7,6 [16.8]  | 8,9 [20]   | 9,5 [21.4]    |
|                                                          | MPW(N)                   | 6,1 [13.5]   | 6,3 [13.9]  | 6,5 [14.3]   | 6,8 [15]     | 7,2 [15.9]  | 8,6 [19]   | 9,2 [20.3]    |
|                                                          | MPQ(N)                   | 5,8 [12.8]   | 6 [13.2]    | 6,2 [13.7]   | 6,5 [14.3]   | 6,8 [15]    | 8,3 [18.3] | 9 [19.8]      |

\* Intermittent operation: the permissible values may occur for max. 10% of every minute.  
\*\* Peak load: the permissible values may occur for max. 1% of every minute.  
\*\*\* For speeds lower than given, consult factory or your regional manager.  
1. Intermittent speed and intermittent pressure must not occur simultaneously.  
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.  
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.  
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].  
5. Recommended maximum system operating temperature is 82°C [180°F].  
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

**SPECIFICATION DATA (continued)**

Specification Data for MP... motors with **CB, KB, OB** and **HB** shafts.  
(ø35 sealing diameter)

| Type                                                     |                          | MP 80                 | MP 100      | MP 125       | MP 160       | MP 200      |
|----------------------------------------------------------|--------------------------|-----------------------|-------------|--------------|--------------|-------------|
| Displacement, cm³/rev [in³/rev]                          |                          | 79,2 [4.83]           | 99 [6.04]   | 123,8 [7.55] | 158,4 [9.66] | 198 [12.1]  |
| Max. Speed,<br>[RPM]                                     | Cont.                    | 755                   | 605         | 486          | 378          | 303         |
|                                                          | Int.*                    | 945                   | 755         | 605          | 472          | 378         |
| Max. Torque<br>daNm [lb-in]                              | Cont.                    | 15,1 [1340]           | 19,3 [1710] | 23,7 [2100]  | 31,3 [2770]  | 36,6 [3240] |
|                                                          | Int.*                    | 19,5 [1725]           | 23,7 [2100] | 29,8 [2640]  | 37,8 [3345]  | 45,6 [4035] |
|                                                          | Peak**                   | 22,4 [1985]           | 27,5 [2435] | 36,5 [3235]  | 43,8 [3880]  | 55 [4870]   |
| Max. Output<br>kW [HP]                                   | Cont.                    | 10,2 [13.7]           | 10,5 [14.1] | 10,2 [13.7]  | 10,1 [13.5]  | 10 [13.5]   |
|                                                          | Int.*                    | 12,5 [16.8]           | 12,8 [17.1] | 12 [16.1]    | 12,1 [16.2]  | 12 [16.1]   |
| Max. Pressure Drop<br>bar [PSI]                          | Cont.                    | 140 [2030]            | 140 [2030]  | 140 [2030]   | 140 [2030]   | 140 [2030]  |
|                                                          | Int.*                    | 175 [2540]            | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                          | Peak**                   | 225 [3260]            | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Oil Flow<br>lpm [GPM]                               | Cont.                    | 60 [15.9]             | 60 [15.9]   | 60 [15.9]    | 60 [15.9]    | 60 [15.9]   |
|                                                          | Int.*                    | 75 [19.8]             | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]   |
| Max. Inlet Pressure<br>bar [PSI]                         | Cont.                    | 175 [2540]            | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                          | Int.*                    | 200 [2900]            | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  |
|                                                          | Peak**                   | 225 [3260]            | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Return Pressure<br>with Drain Line<br>bar [PSI]     | Cont.                    | 175 [2540]            | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                          | Int.*                    | 200 [2900]            | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  |
|                                                          | Peak**                   | 225 [3260]            | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Starting Pressure with<br>Unloaded Shaft, bar [PSI] |                          | 10 [145]              | 10 [145]    | 9 [131]      | 8 [116]      | 7 [100]     |
| Min. Starting Torque<br>daNm [lb-in]                     | At max.press. drop Cont. | 13,2 [1170]           | 16,6 [1470] | 20,7 [1830]  | 28,2 [2500]  | 33,5 [2950] |
|                                                          | At max.press. drop Int.* | 16,8 [1490]           | 21 [1860]   | 26,6 [2360]  | 35,5 [3140]  | 42,6 [3770] |
| Min. Speed***, [RPM]                                     |                          | 10                    | 10          | 10           | 10           | 10          |
| Weight, kg [lb]<br>For rear ports +0,450 [.992]          |                          | MP(F)...B<br>6 [13.2] | 6,2 [13.7]  | 6,3 [13.9]   | 6,5 [14.3]   | 6,7 [14.8]  |

\* Intermittent operation: the permissible values may occur for max. 10% of every minute.  
\*\* Peak load: the permissible values may occur for max. 1% of every minute.  
\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.  
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.  
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.  
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].  
5. Recommended maximum system operating temperature is 82°C [180°F].  
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA (continued)

Specification Data for MP... motors with **CB, KB, OB** and **HB** shafts.  
(ø35 sealing diameter)

| Type                                                  |                          | MP 250                  | MP 315       | MP 400      | MP 500     | MP 630        |
|-------------------------------------------------------|--------------------------|-------------------------|--------------|-------------|------------|---------------|
| Displacement, cm³/rev [in³/rev]                       |                          | 247,5 [15.1]            | 316,8 [19.3] | 396 [24.16] | 495 [30.2] | 623,6 [38.05] |
| Max. Speed, [RPM]                                     | Cont.                    | 242                     | 190          | 150         | 120        | 95            |
|                                                       | Int.*                    | 303                     | 236          | 189         | 150        | 120           |
| Max. Torque daNm [lb-in]                              | Cont.                    | 47 [4160]               | 48 [4360]    | 50 [4415]   | 39 [3452]  | 44 [3895]     |
|                                                       | Int.*                    | 58,3 [5160]             | 56 [4960]    | 59 [5240]   | 57 [5045]  | 64 [5665]     |
|                                                       | Peak**                   | 68,5 [6060]             | 85 [7505]    | 85,4 [7560] | 78 [6903]  | 82 [7257]     |
| Max. Output kW [HP]                                   | Cont.                    | 9 [12.1]                | 7,6 [10.2]   | 6,2 [8.3]   | 3,5 [4.7]  | 3,3 [4.4]     |
|                                                       | Int.*                    | 12 [16.1]               | 9 [12.1]     | 7,8 [10.5]  | 7,2 [9.7]  | 5,6 [7.5]     |
| Max. Pressure Drop bar [PSI]                          | Cont.                    | 140 [2030]              | 120 [1740]   | 95 [1400]   | 60 [870]   | 55 [800]      |
|                                                       | Int.*                    | 175 [2540]              | 140 [2030]   | 115 [1670]  | 90 [1305]  | 80 [1160]     |
|                                                       | Peak**                   | 225 [3260]              | 225 [3260]   | 180 [2610]  | 130 [1885] | 110 [1740]    |
| Max. Oil Flow lpm [GPM]                               | Cont.                    | 60 [15.9]               | 60 [15.9]    | 60 [15.9]   | 60 [15.9]  | 60 [15.9]     |
|                                                       | Int.*                    | 75 [19.8]               | 75 [19.8]    | 75 [19.8]   | 75 [19.8]  | 75 [19.8]     |
| Max. Inlet Pressure bar [PSI]                         | Cont.                    | 175 [2540]              | 175 [2540]   | 175 [2540]  | 140 [2030] | 140 [2030]    |
|                                                       | Int.*                    | 200 [2900]              | 200 [2900]   | 200 [2900]  | 175 [2540] | 175 [2540]    |
|                                                       | Peak**                   | 225 [3260]              | 225 [3260]   | 225 [3260]  | 225 [3260] | 225 [3260]    |
| Max. Return Pressure with Drain Line bar [PSI]        | Cont.                    | 175 [2540]              | 175 [2540]   | 175 [2540]  | 140 [2030] | 140 [2030]    |
|                                                       | Int.*                    | 200 [2900]              | 200 [2900]   | 200 [2900]  | 175 [2540] | 175 [2540]    |
|                                                       | Peak**                   | 225 [3260]              | 225 [3260]   | 225 [3260]  | 225 [3260] | 225 [3260]    |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] |                          | 6 [87]                  | 5 [73]       | 5 [73]      | 5 [73]     | 5 [73]        |
| Min. Starting Torque daNm [lb-in]                     | At max.press. drop Cont. | 42,8 [3790]             | 4050 [45,8]  | 46,8 [4140] | 36 [3180]  | 41,5 [3670]   |
|                                                       | At max.press. drop Int.* | 54,2 [4795]             | 5480 [61,9]  | 60,8 [5390] | 54 [4780]  | 62 [5480]     |
| Min. Speed***, [RPM]                                  |                          | 10                      | 10           | 10          | 10         | 10            |
| Weight, kg [lb]<br>For rear ports +0,450 [.992]       |                          | MP(F)...B<br>6,9 [15.2] | 7,2 [15.9]   | 7,7 [17]    | 9,0 [19.9] | 9,6 [21.2]    |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

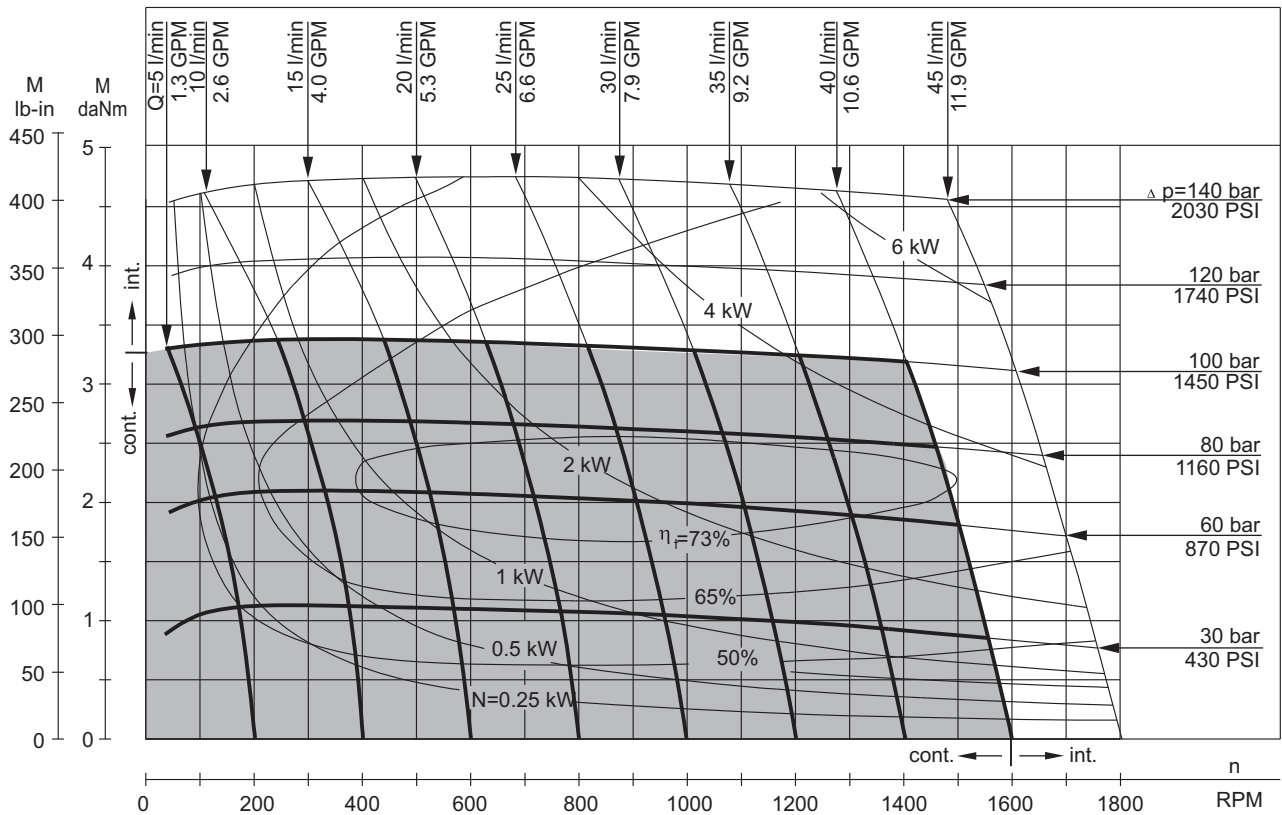
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

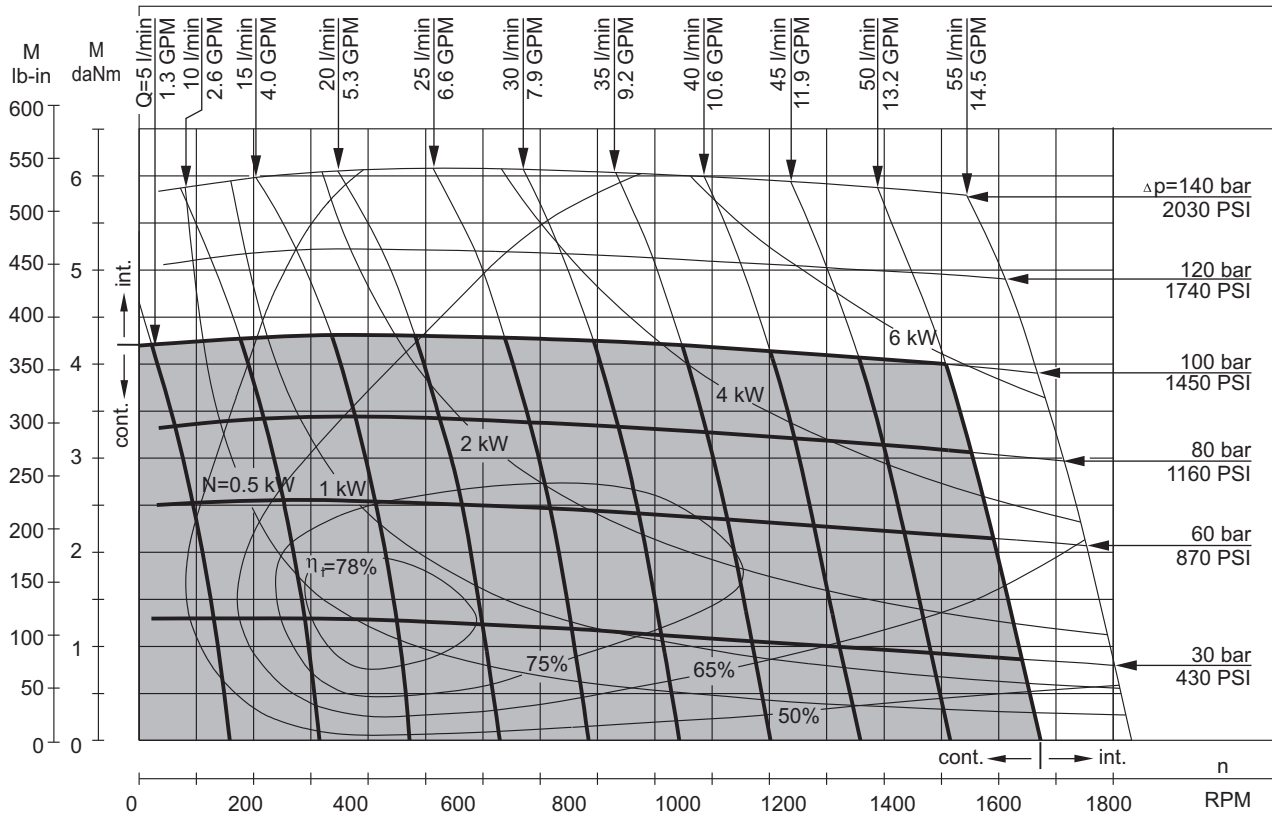
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

FUNCTION DIAGRAMS

MP 25



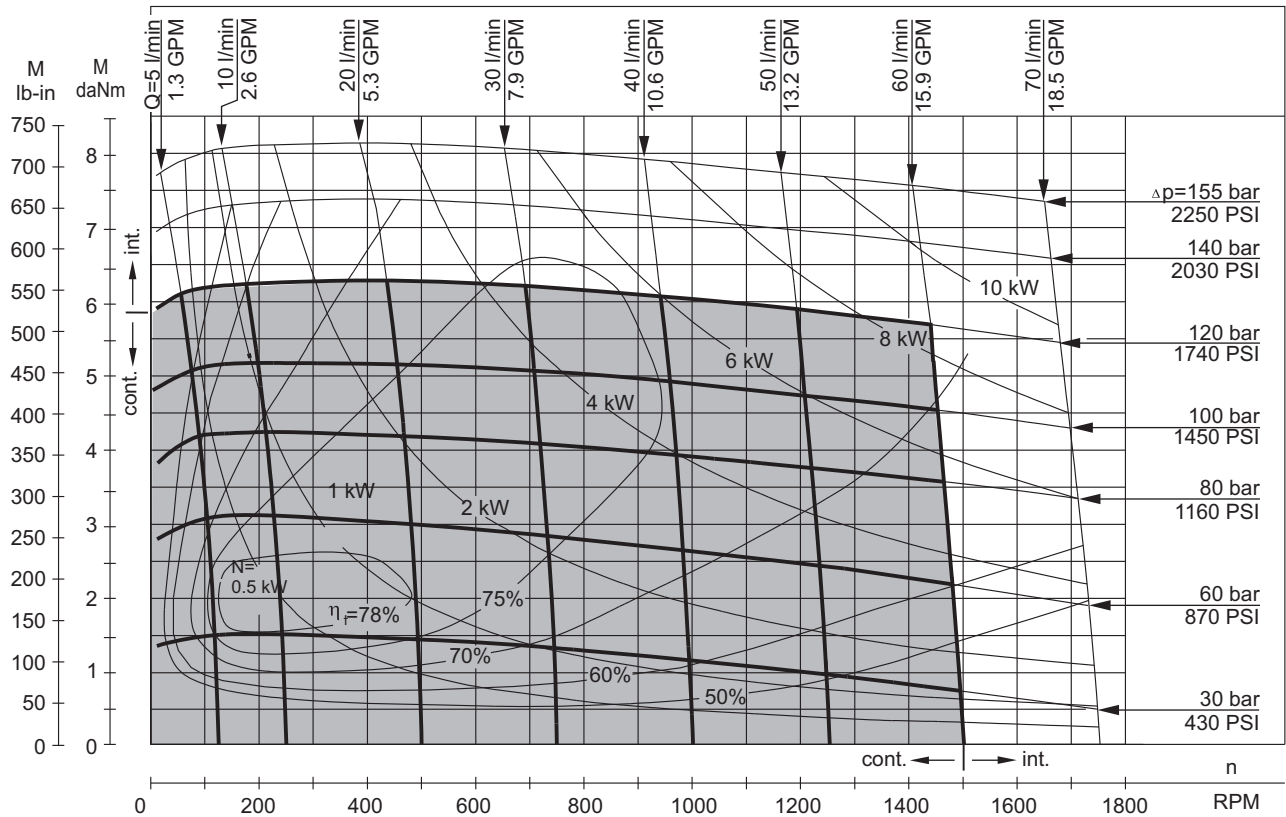
MP 32



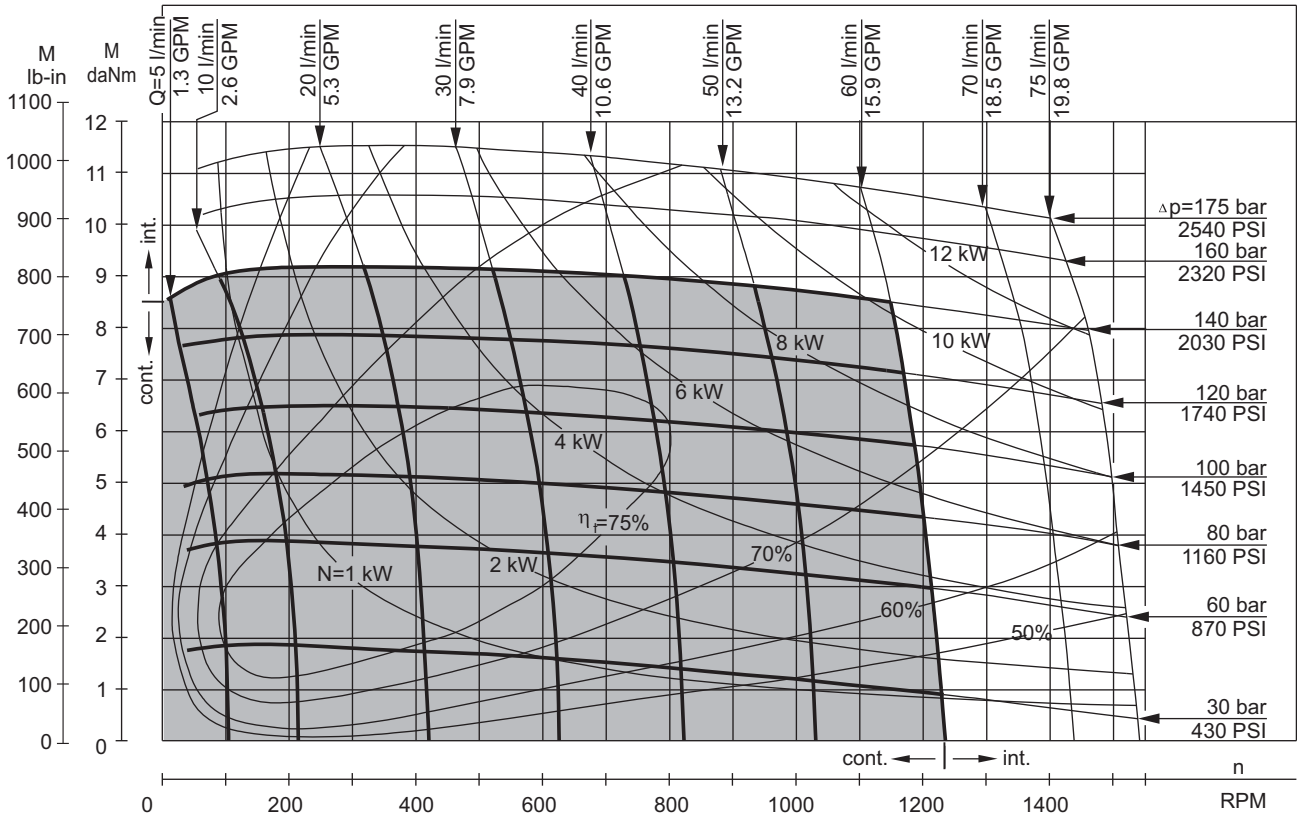
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MP 40

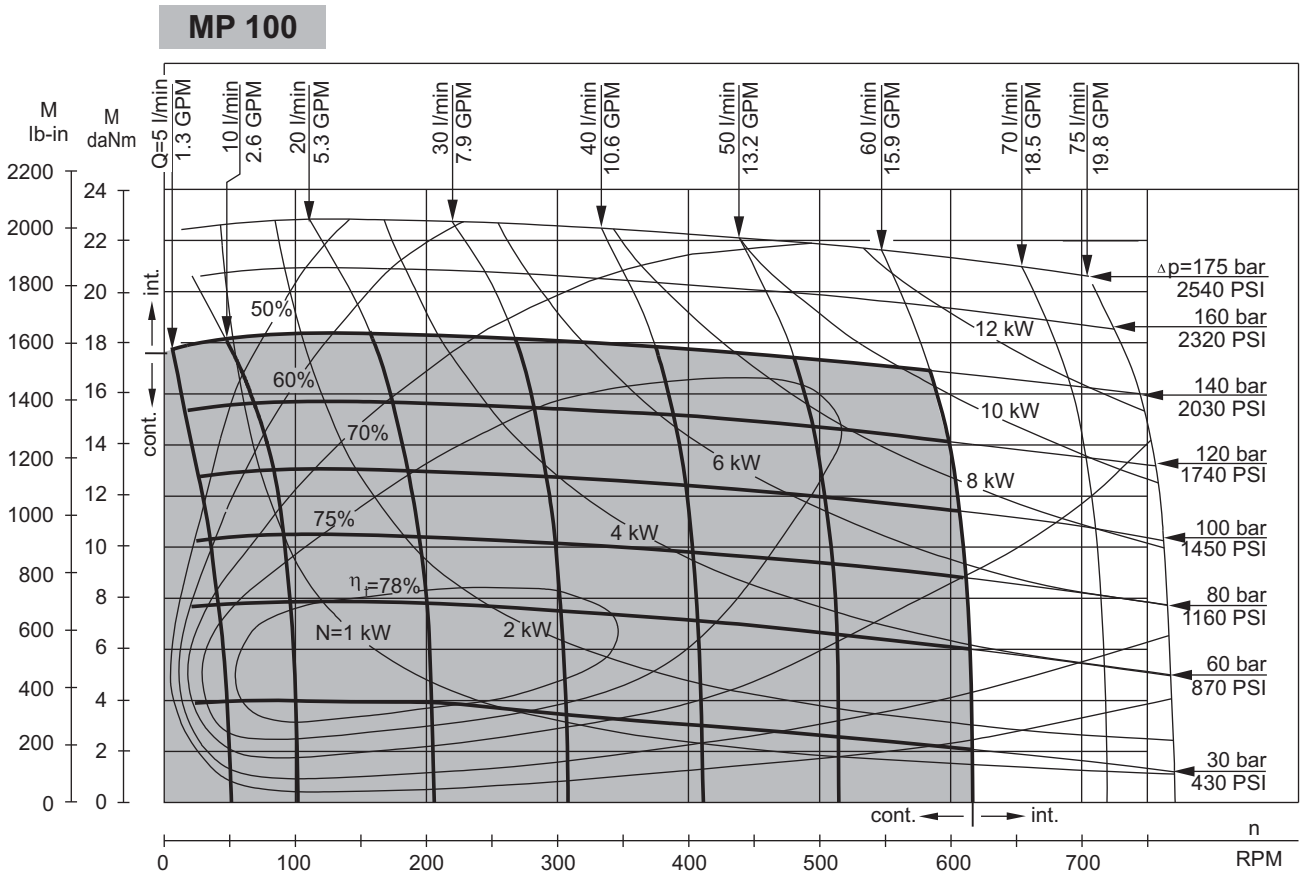
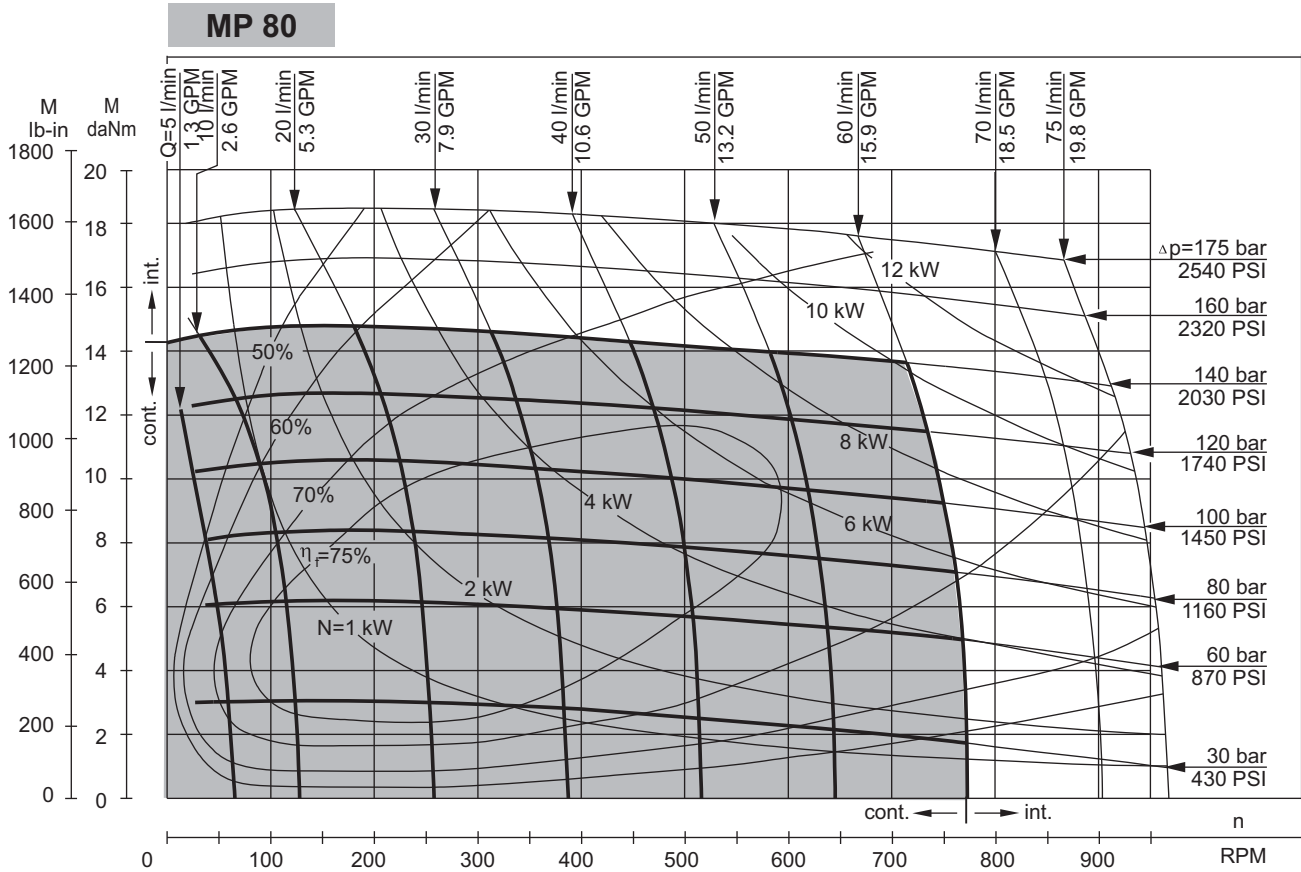


MP 50



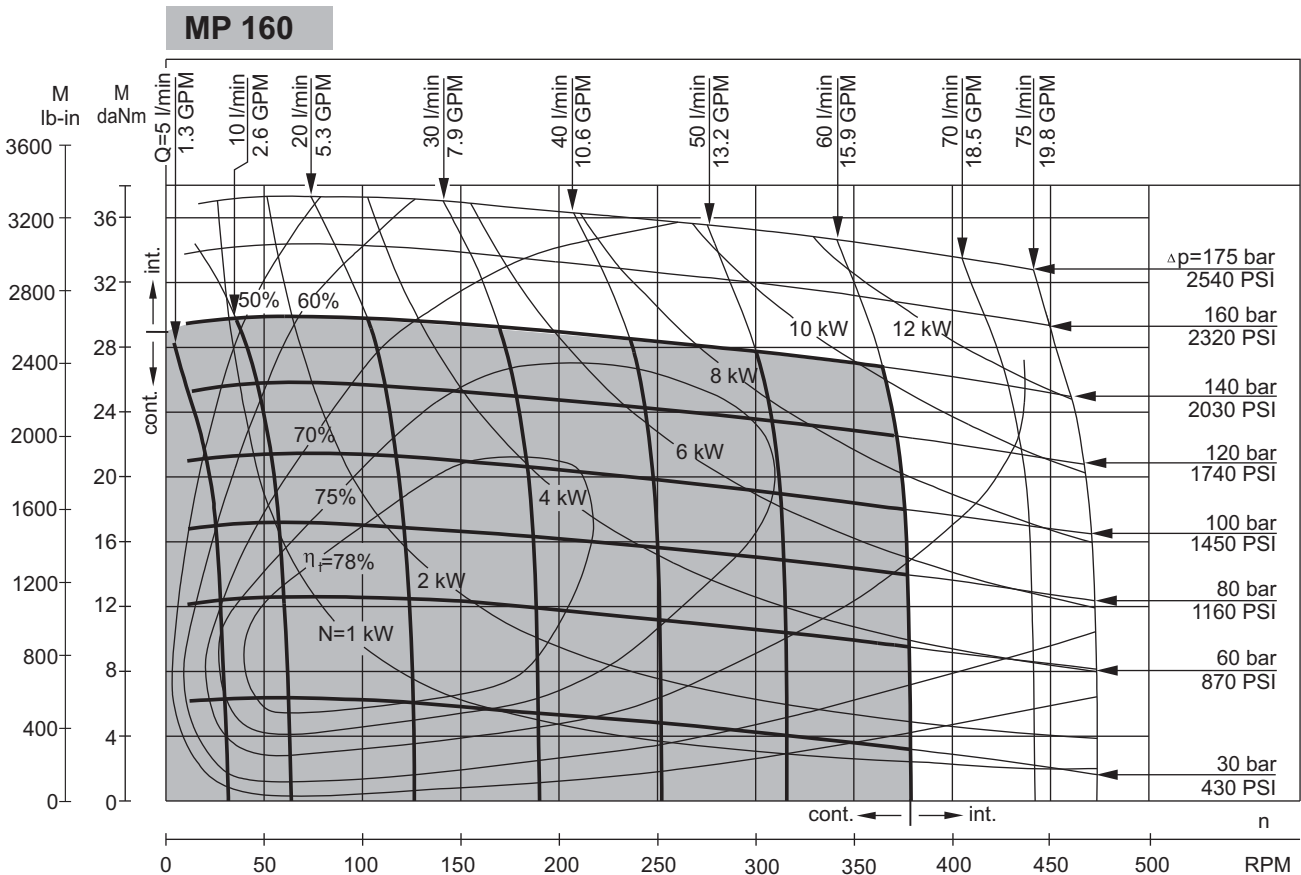
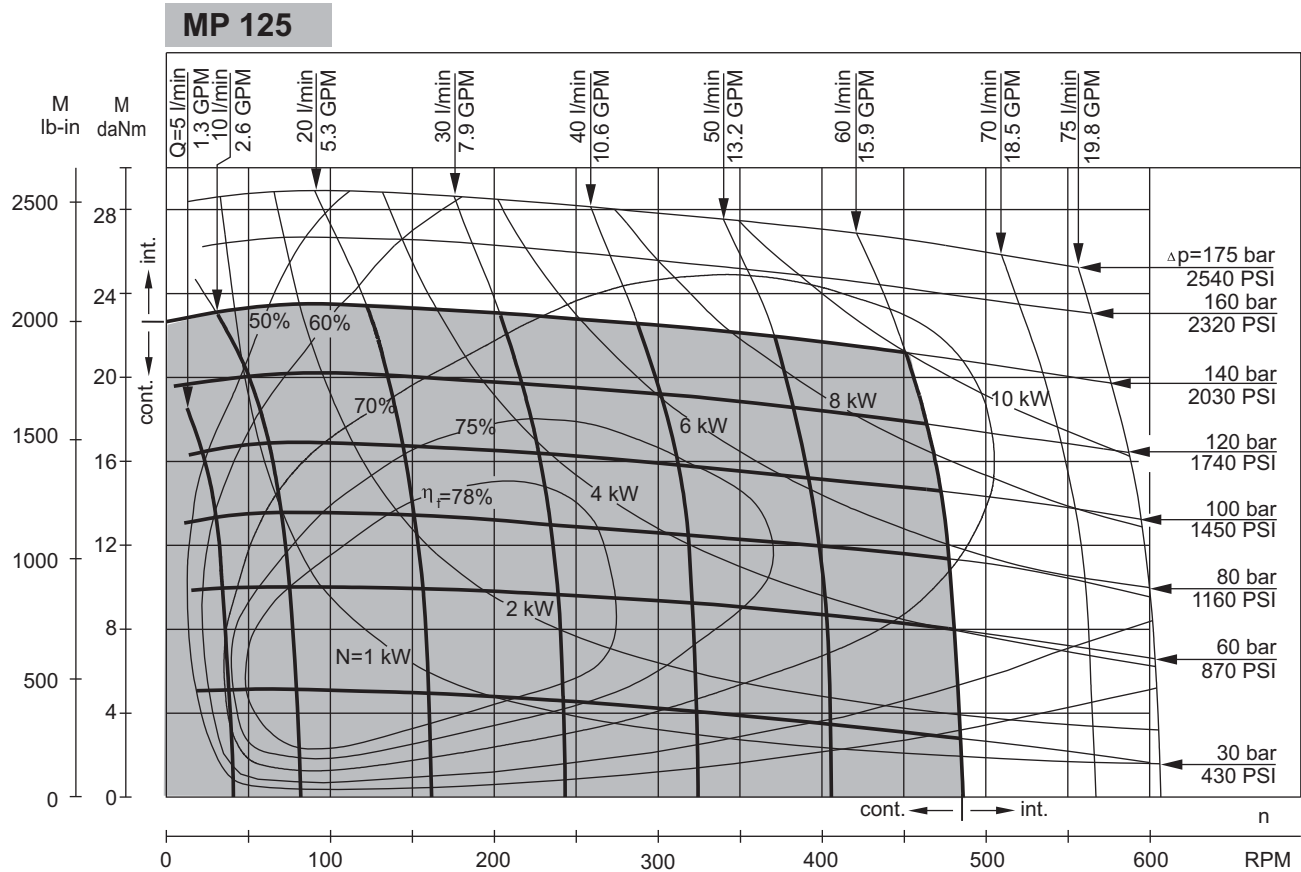
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS



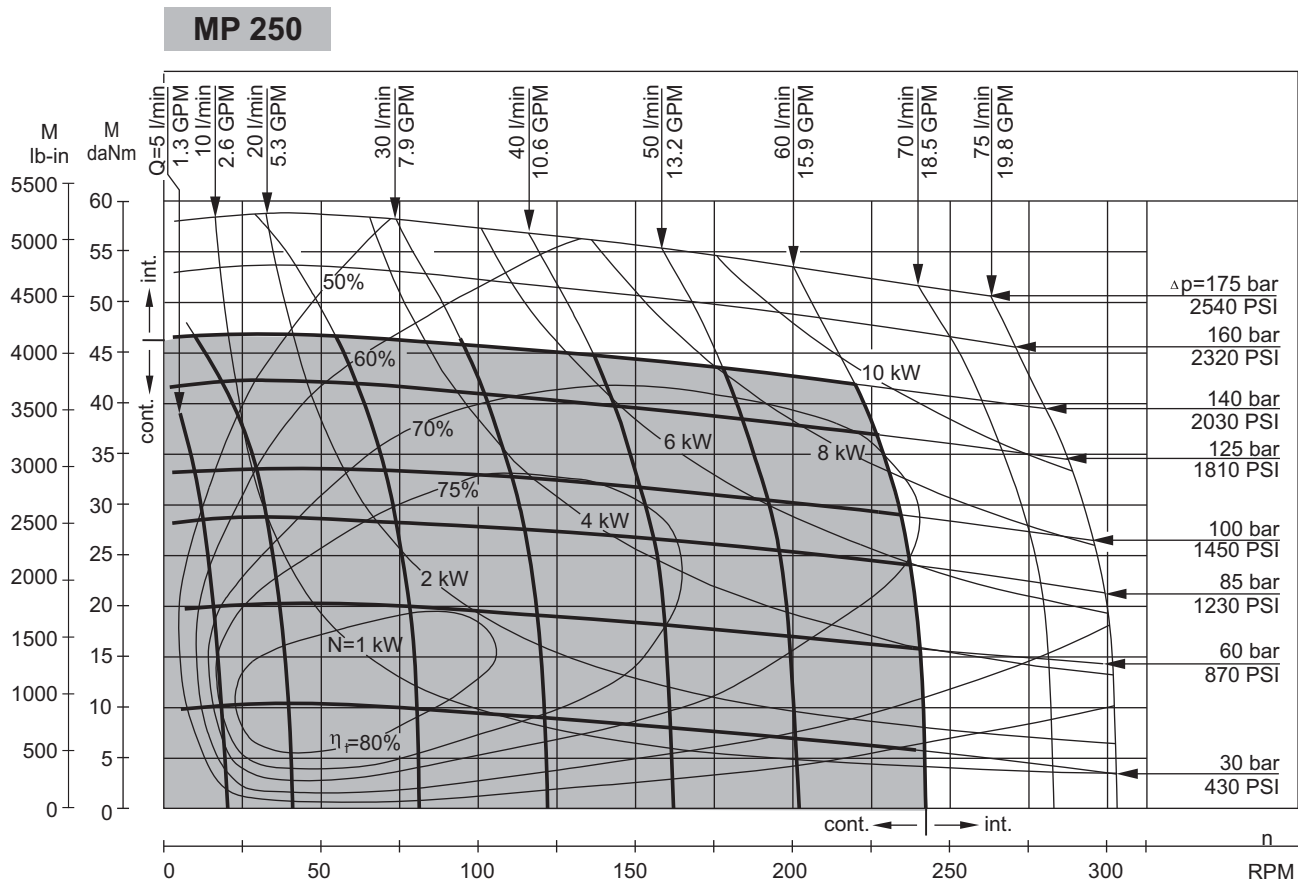
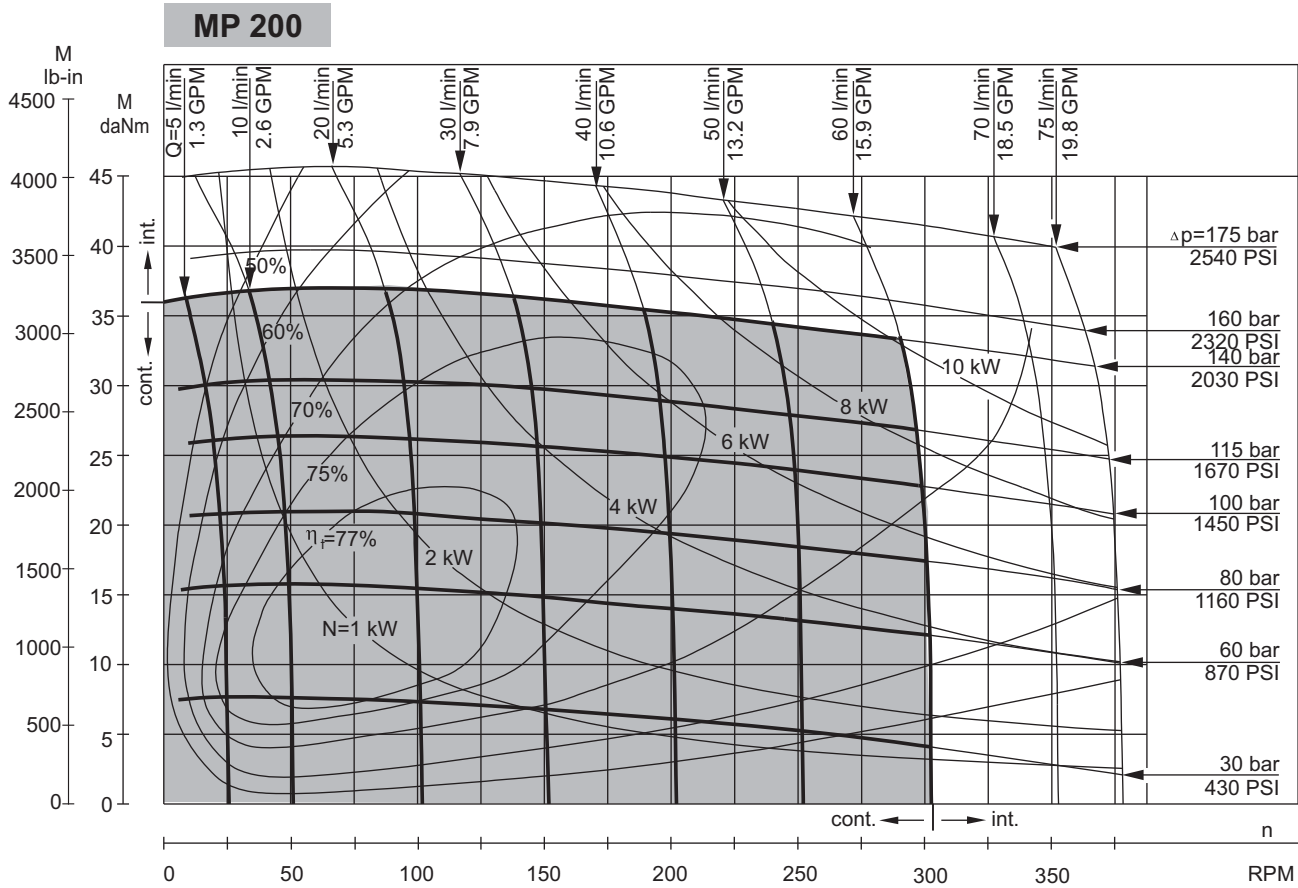
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

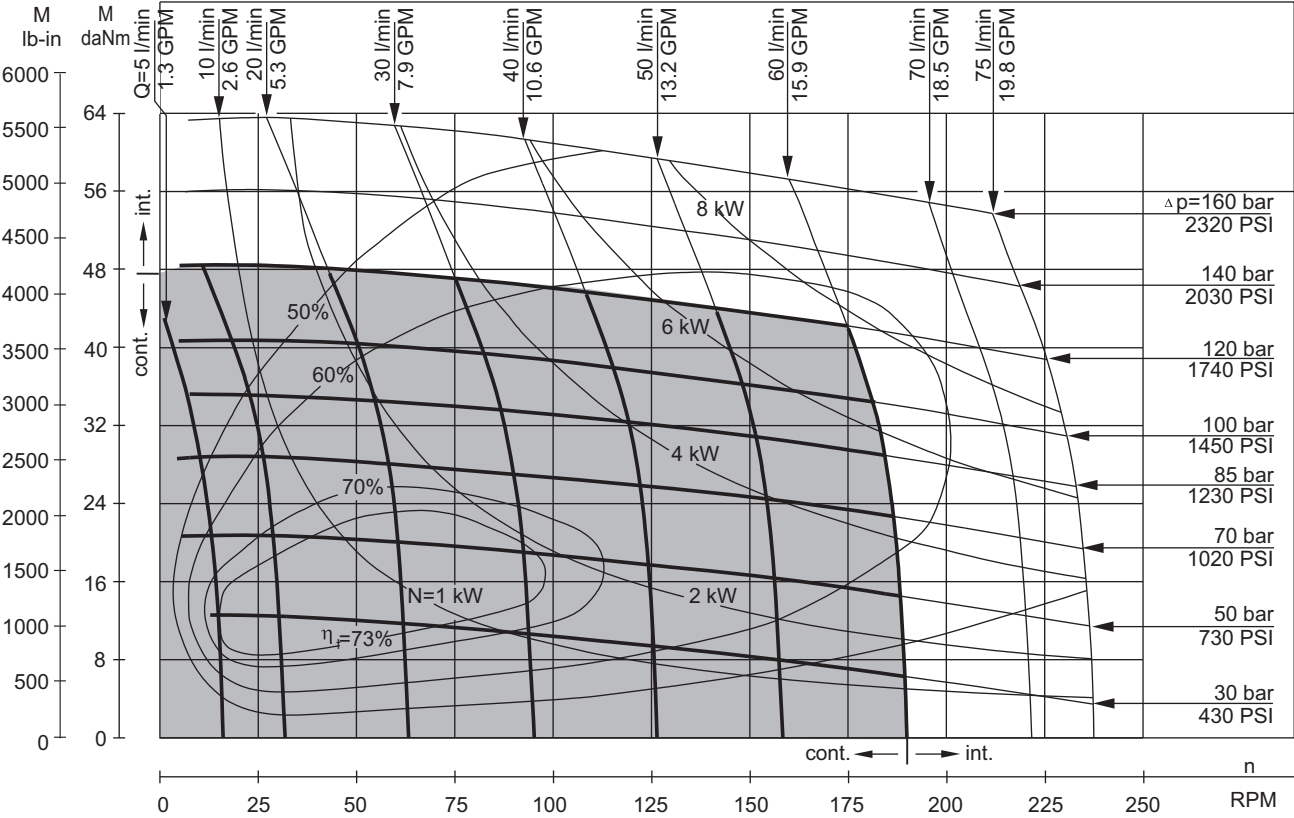
FUNCTION DIAGRAMS



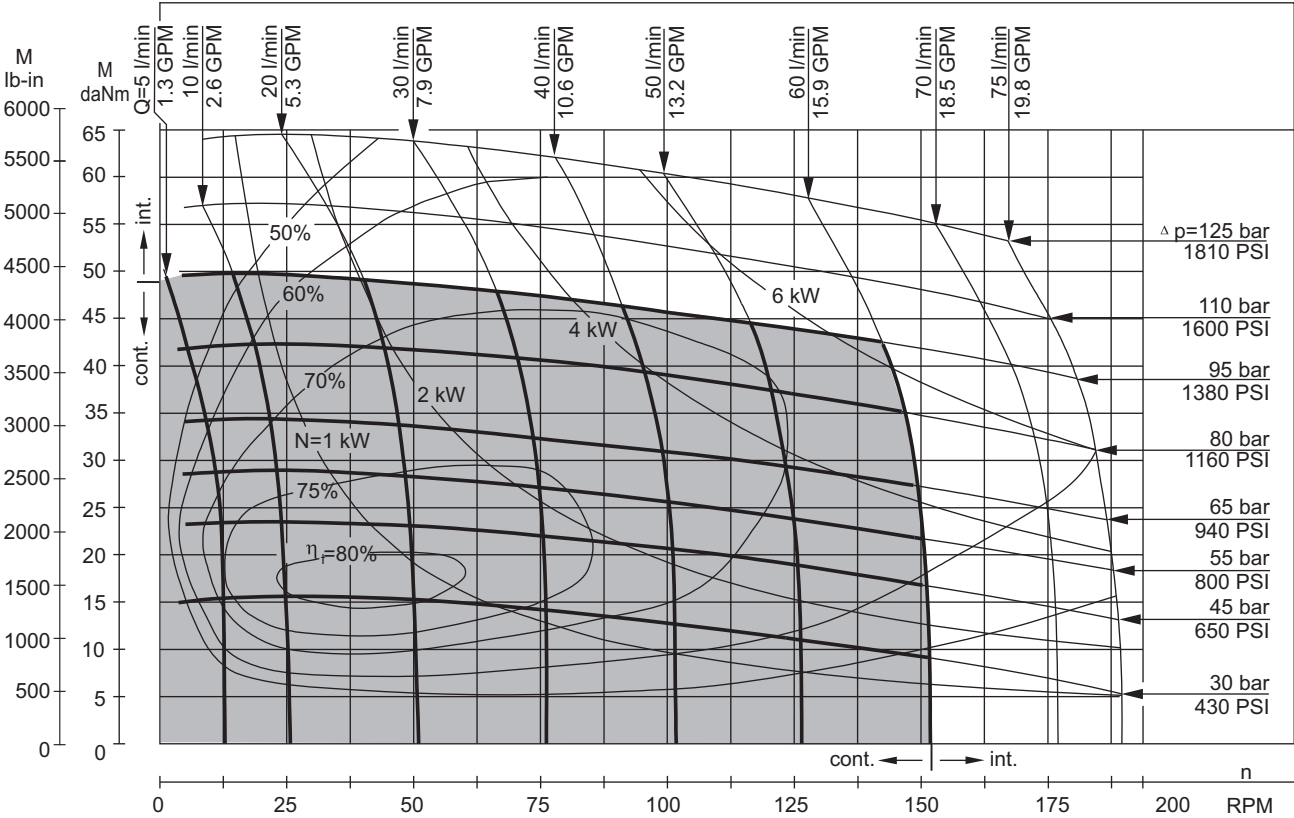
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MP 315



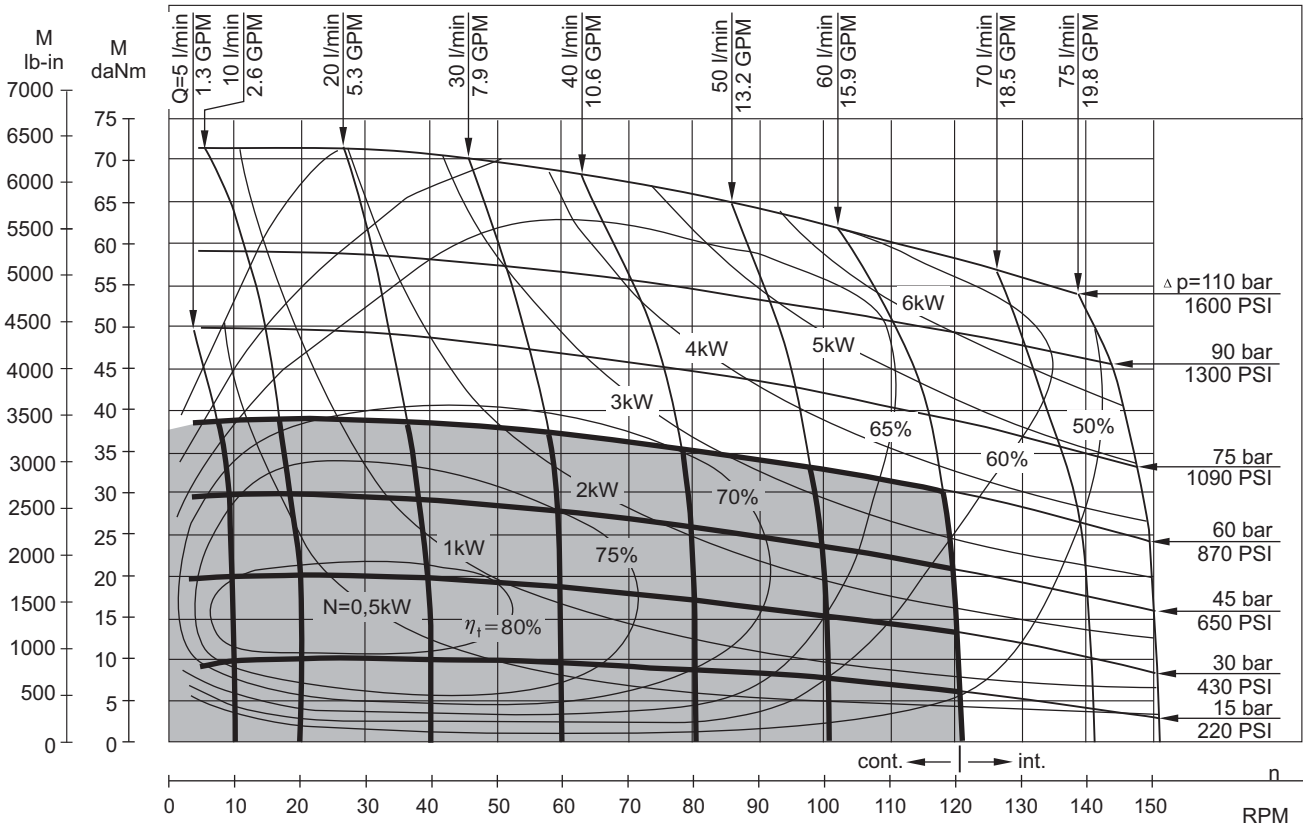
MP 400



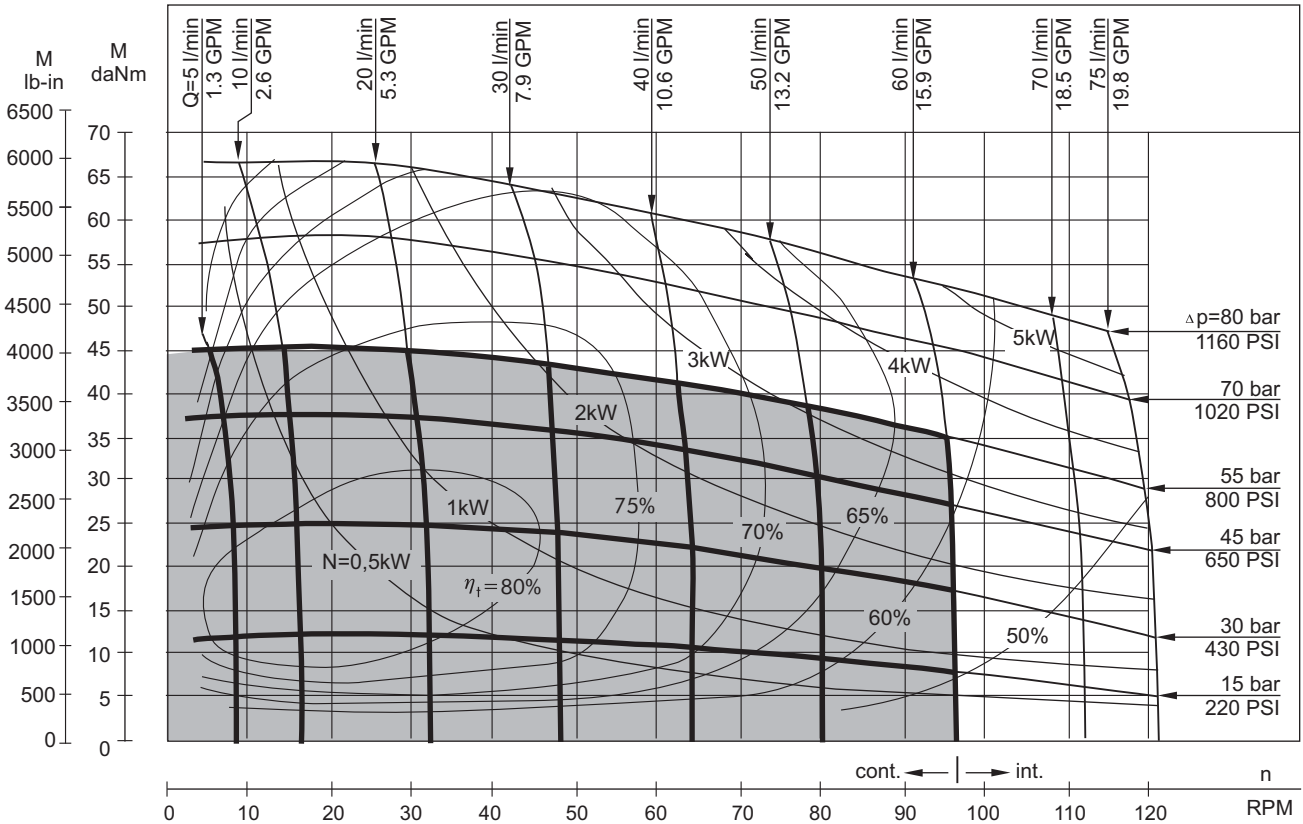
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MP 500

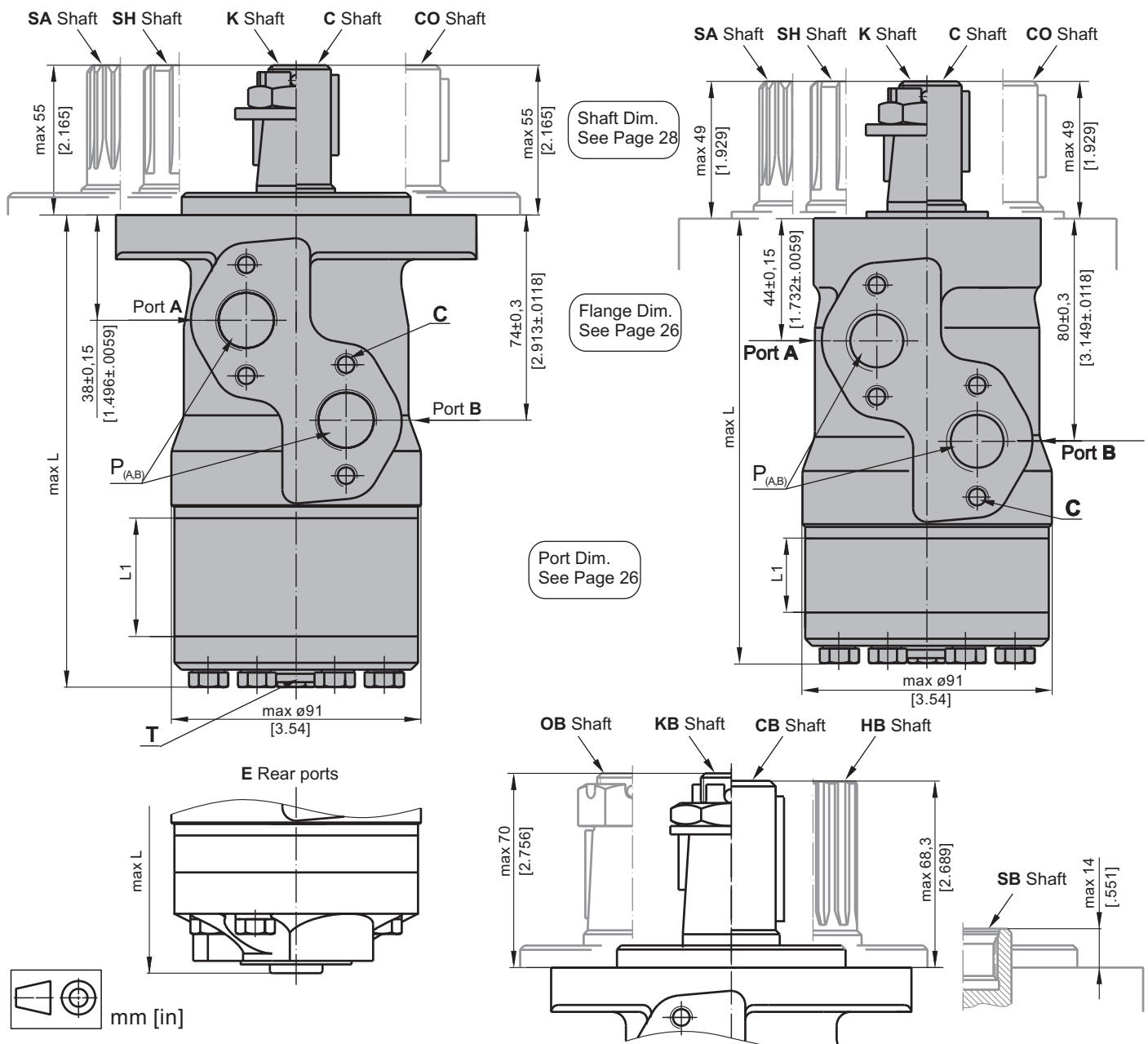


MP 630



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

DIMENSIONS AND MOUNTING DATA



**C** : 4xM8 - 13 mm [.51 in] depth  
**P<sub>(A,B)</sub>** : 2xG1/2 or 2xM22x1,5 - 15 mm [.59 in] depth  
**T** : G1/4 or M14x1,5 - 12 mm [.47 in] depth (plugged)

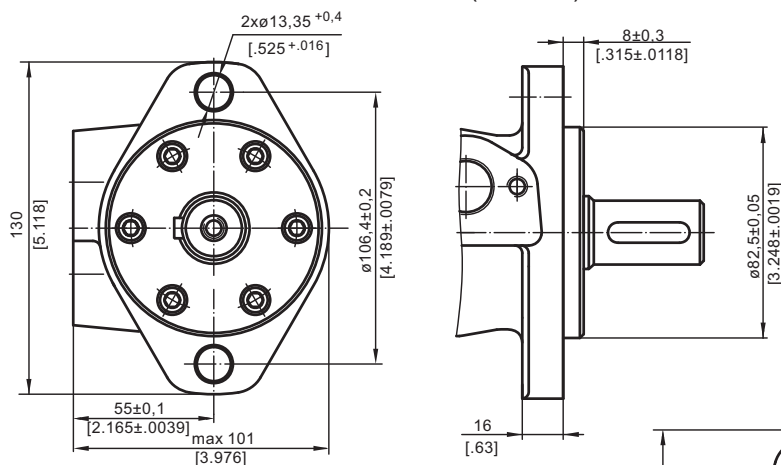
**Standard Rotation**  
Viewed from Shaft End  
Port **A** Pressurized - **CW**  
Port **B** Pressurized - **CCW**

**Reverse Rotation**  
Viewed from Shaft End  
Port **A** Pressurized - **CCW**  
Port **B** Pressurized - **CW**

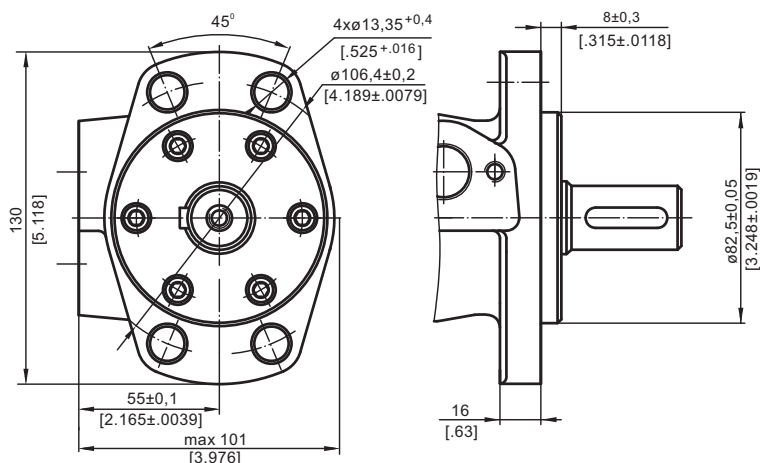
| Type      | L, mm [in]   | Type    | L, mm [in]   | Type       | L, mm [in]   | Type     | L, mm [in]   | L <sub>1</sub> , mm [in] |
|-----------|--------------|---------|--------------|------------|--------------|----------|--------------|--------------------------|
| MP(F) 25  | 134,0 [5.28] | MPQ 25  | 140,5 [5.53] | MP(F)E 25  | 150,0 [5.91] | MPQE 25  | 156,5 [6.16] | 5,20 [.21]               |
| MP(F) 32  | 135,0 [5.31] | MPQ 32  | 141,5 [5.57] | MP(F)E 32  | 151,5 [5.96] | MPQE 32  | 157,5 [6.20] | 6,30 [.25]               |
| MP(F) 40  | 136,5 [5.37] | MPQ 40  | 142,5 [5.61] | MP(F)E 40  | 152,5 [6.00] | MPQE 40  | 158,5 [6.24] | 7,40 [.29]               |
| MP(F) 50  | 135,5 [5.33] | MPQ 50  | 142,0 [5.59] | MP(F)E 50  | 151,5 [5.96] | MPQE 50  | 158,0 [6.22] | 6,67 [.26]               |
| MP(F) 80  | 139,5 [5.49] | MPQ 80  | 146,0 [5.75] | MP(F)E 80  | 155,5 [6.12] | MPQE 80  | 162,0 [6.38] | 10,67 [.42]              |
| MP(F) 100 | 142,0 [5.59] | MPQ 100 | 148,5 [5.85] | MP(F)E 100 | 158,5 [6.24] | MPQE 100 | 164,5 [6.48] | 13,33 [.52]              |
| MP(F) 125 | 145,5 [5.73] | MPQ 125 | 152,0 [5.98] | MP(F)E 125 | 161,5 [6.36] | MPQE 125 | 168,0 [6.61] | 16,67 [.66]              |
| MP(F) 160 | 150,0 [5.91] | MPQ 160 | 156,5 [6.16] | MP(F)E 160 | 166,5 [6.56] | MPQE 160 | 172,5 [6.79] | 21,33 [.84]              |
| MP(F) 200 | 155,5 [6.12] | MPQ 200 | 162,0 [6.38] | MP(F)E 200 | 171,5 [6.75] | MPQE 200 | 178,0 [7.01] | 26,67 [1.05]             |
| MP(F) 250 | 162,0 [6.38] | MPQ 250 | 168,5 [6.63] | MP(F)E 250 | 178,5 [7.03] | MPQE 250 | 184,5 [7.26] | 33,33 [1.31]             |
| MP(F) 315 | 171,5 [6.75] | MPQ 315 | 178,0 [7.01] | MP(F)E 315 | 187,5 [7.38] | MPQE 315 | 194,0 [7.64] | 42,67 [1.68]             |
| MP(F) 400 | 182,0 [7.17] | MPQ 400 | 188,5 [7.42] | MP(F)E 400 | 198,5 [7.81] | MPQE 400 | 204,5 [8.05] | 53,33 [2.10]             |
| MP(F) 500 | 195,5 [7.70] | MPQ 500 | 202,0 [7.95] | MP(F)E 500 | 211,5 [8.33] | MPQE 500 | 218,0 [8.58] | 66,63 [2.62]             |
| MP(F) 630 | 213,0 [8.39] | MPQ 630 | 219,0 [8.62] | MP(F)E 630 | 229,0 [9.02] | MPQE 630 | 235,0 [9.25] | 84,00 [3.31]             |

## MOUNTING

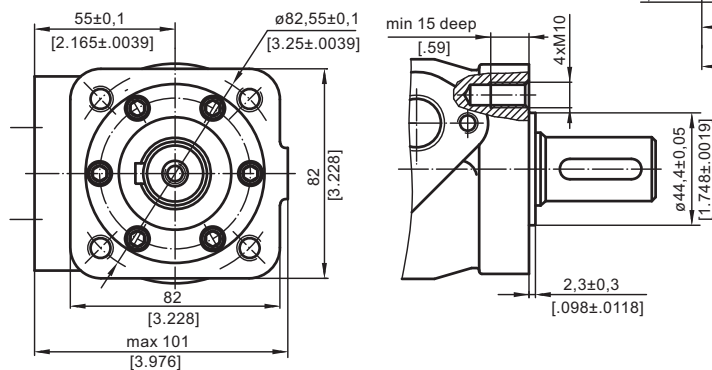
Oval Mount (2 Holes)



**F** - Oval Mount (4 Holes)

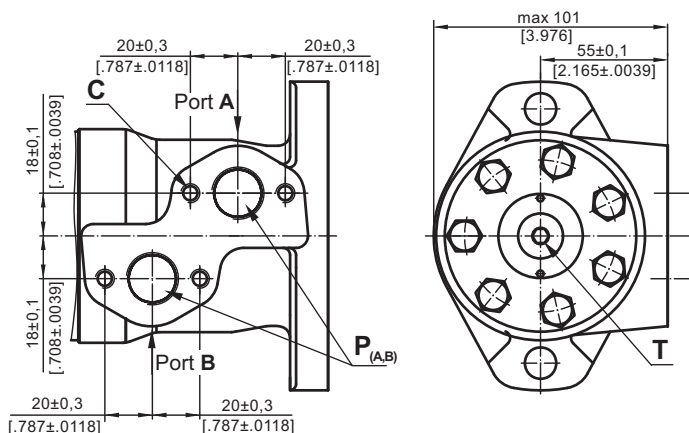


**Q** - Square Mount (4 Bolts)

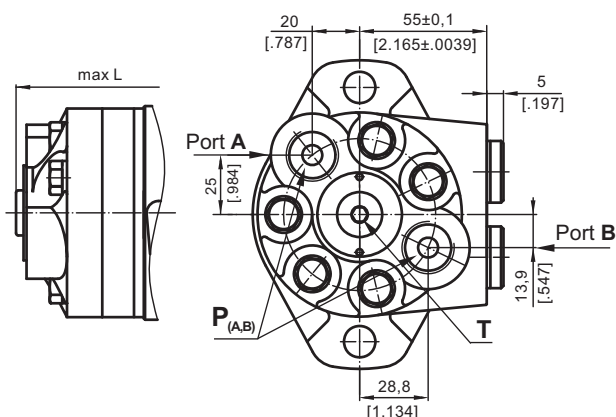


## PORTS

Side Ports



**E** Rear Ports



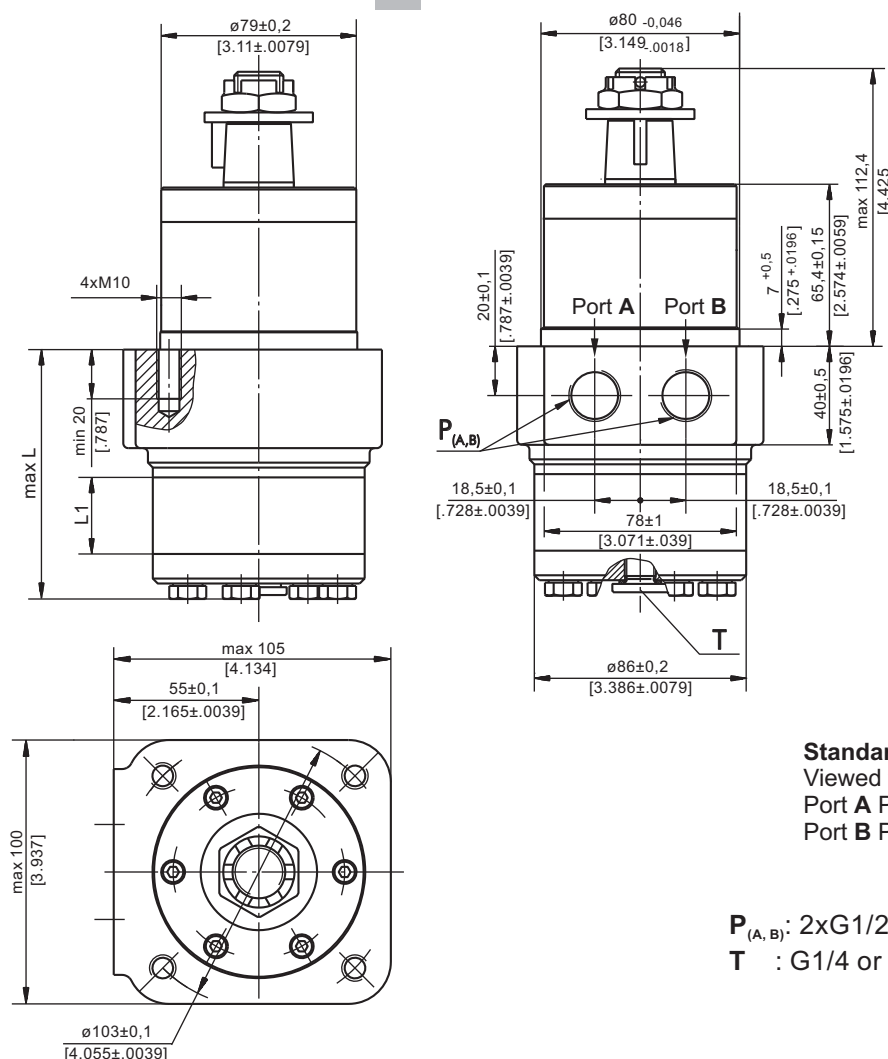
- C** : 4xM8 - 13 mm [.51 in] depth  
**P<sub>(A,B)</sub>** : 2xG1/2 or 2xM22x1,5 - 15 mm [.59 in] depth  
**T** : G1/4 or M14x1,5 - 12 mm [.47 in] depth (plugged)

**Standard Rotation**  
 Viewed from Shaft End  
 Port A Pressurized - CW  
 Port B Pressurized - CCW

**Reverse Rotation**  
 Viewed from Shaft End  
 Port A Pressurized - CCW  
 Port B Pressurized - CW

## DIMENSIONS AND MOUNTING DATA - MPW

**W** - Wheel Mount



| Type    | L, mm [in]   | L <sub>1</sub> , mm [in] |
|---------|--------------|--------------------------|
| MPW 25  | 77,0 [3.03]  | 5,20 [.21]               |
| MPW 32  | 78,0 [3.07]  | 6,30 [.25]               |
| MPW 40  | 79,5 [3.13]  | 7,40 [.29]               |
| MPW 50  | 78,5 [3.09]  | 6,67 [.26]               |
| MPW 80  | 82,5 [3.25]  | 10,67 [.42]              |
| MPW 100 | 85,0 [3.35]  | 13,33 [.52]              |
| MPW 125 | 88,5 [3.48]  | 16,67 [.66]              |
| MPW 160 | 93,0 [3.66]  | 21,33 [.84]              |
| MPW 200 | 98,5 [3.88]  | 26,67 [1.05]             |
| MPW 250 | 105,0 [4.13] | 33,33 [1.31]             |
| MPW 315 | 114,5 [4.51] | 42,67 [1.68]             |
| MPW 400 | 125,0 [4.92] | 53,33 [2.10]             |
| MPW 500 | 138,5 [5.45] | 66,63 [2.62]             |
| MPW 630 | 156,0 [6.14] | 84,00 [3.31]             |



### Standard Rotation

Viewed from Shaft End

Port **A** Pressurized - **CW**  
Port **B** Pressurized - **CCW**

## Reverse Rotation

Viewed from Shaft End

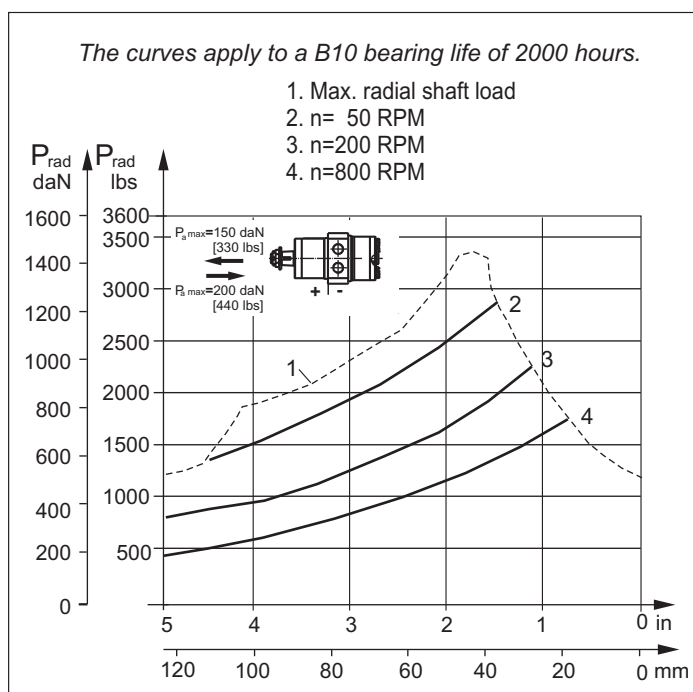
Port **A** Pressurized - **CCW**  
Port **B** Pressurized - **CW**

**P<sub>(A, B)</sub>**: 2xG1/2 or 2xM22x1,5 - 15 mm [.59 in] depth

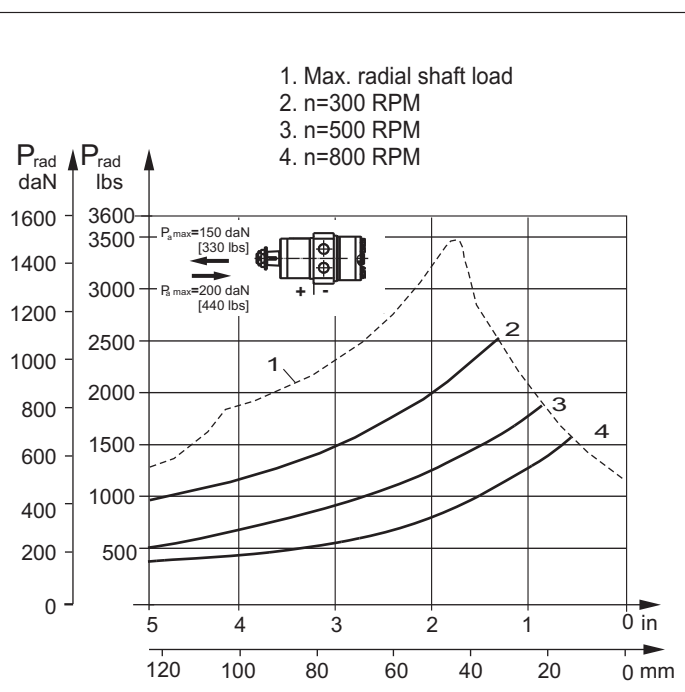
**T** : G1/4 or M14x1,5 - 12 mm [.47 in] depth (plugged)

## PERMISSIBLE SHAFT LOADS

## MPWN

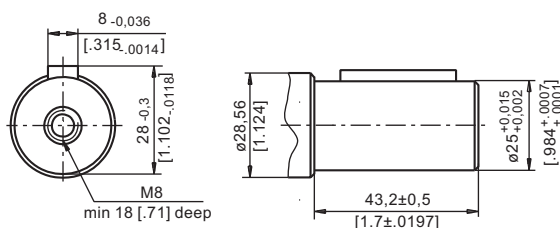


## MPW

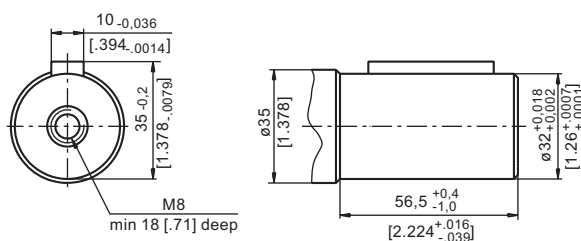


**SHAFT EXTENSIONS FOR MP AND MR MOTORS**

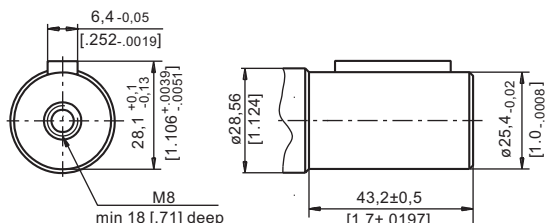
**C** -  $\varnothing 25$  straight, Parallel key A8x7x32 DIN 6885  
Max. Torque 34 daNm [3010 lb-in]



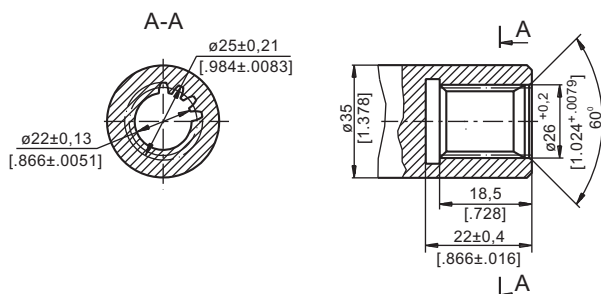
**CB** -  $\varnothing 32$  straight, Parallel key A10x8x45 DIN 6885  
Max. Torque 77 daNm [6815 lb-in]



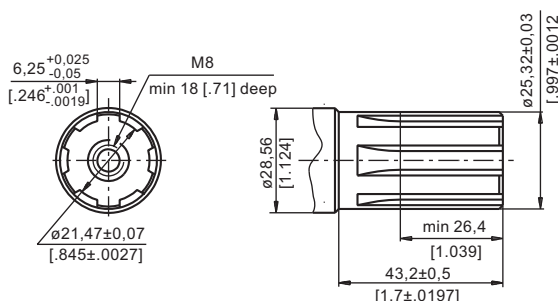
**CO** -  $\varnothing 1"$  straight, Parallel key  $\frac{1}{4}" \times \frac{1}{4}" \times 1\frac{1}{4}"$  BS46  
Max. Torque 34 daNm [3010 lb-in]



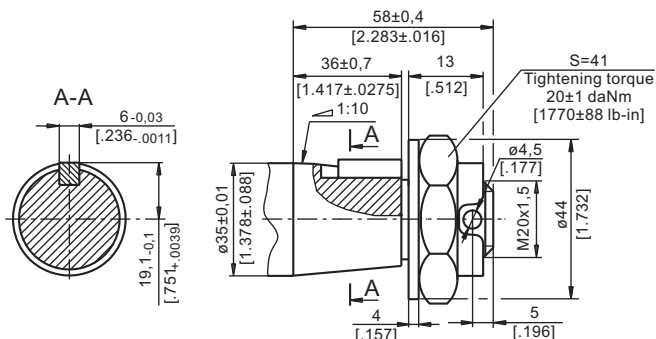
**SB** - splined A25x22xH10 DIN 5482  
Max. Torque 34 daNm [3010 lb-in]



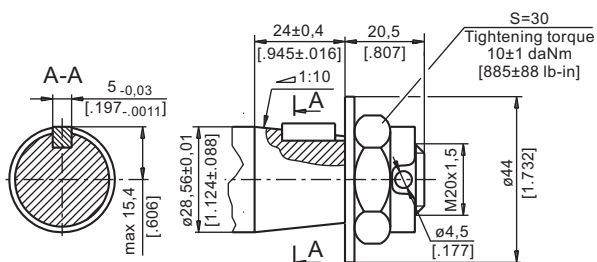
**SH** - splined, BS 2059 (SAE 6B)  
Max. Torque 40 daNm [3540 lb-in]



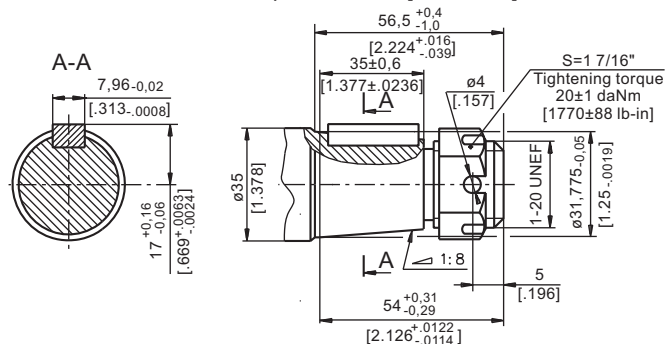
**KB** - tapered 1:10, Parallel key B6x6x20 DIN 6885  
Max. Torque 77 daNm [6815 lb-in]



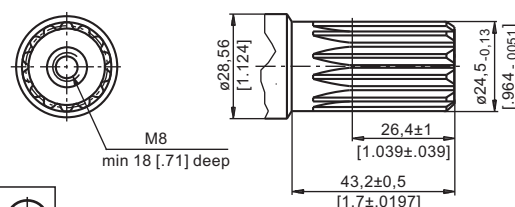
**K** - tapered 1:10, Parallel key B5x5x14 DIN 6885  
Max. Torque 40 daNm [3540 lb-in]



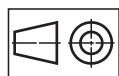
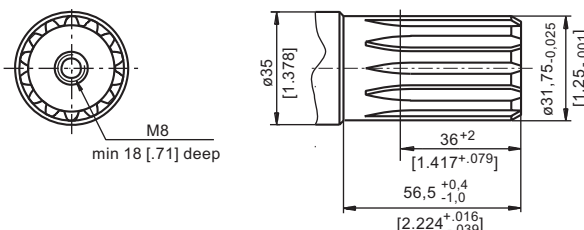
**OB** - tapered 1:8 SAEJ 501, Parallel key  $\frac{5}{16}" \times \frac{5}{16}" \times 1\frac{1}{4}"$  BS46  
Max. Torque 77 daNm [6815 lb-in]



**SA** - splined, B25x22h9 DIN 5482  
Max. Torque 40 daNm [3540 lb-in]



**HB** -  $\varnothing 1\frac{1}{4}"$  splined 14T, ANSI B92.1-1976 Norm  
Max. Torque 77 daNm [6815 lb-in]



mm [in]

## PERMISSIBLE SHAFT LOADS FOR MP AND MR MOTORS

The permissible radial shaft load  $P_{rad}$  depends on the speed  $n$ , RPM , distance  $L$  from the point of load to the mounting flange and shaft version.

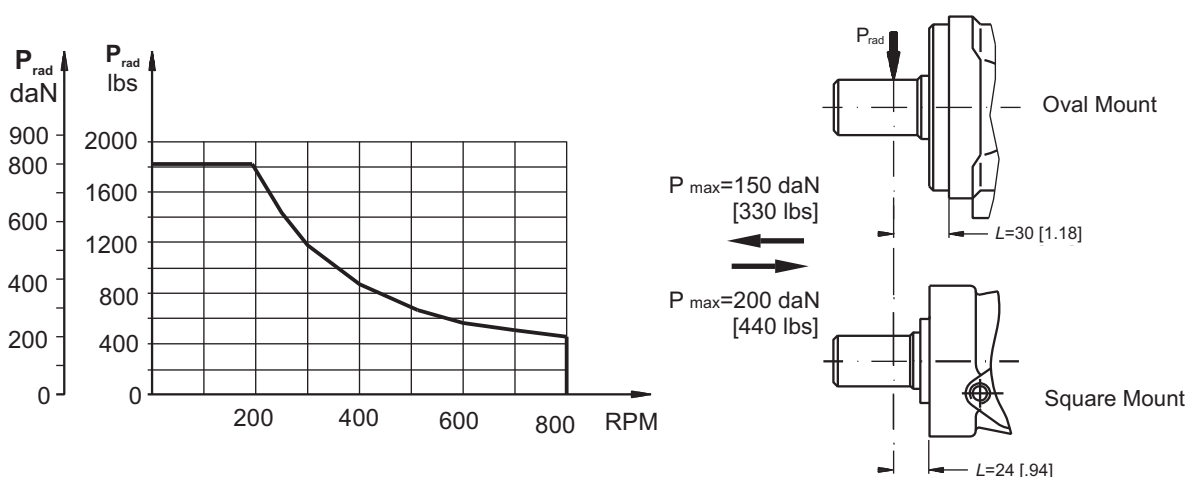
| Mounting Flange                              |  |  |  |
|----------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Shaft Version                                | cylindrical - C, CO<br>tapered - K, splined - SH                                  | splined - HB<br>cylindrical - CB                                                   | cylindrical - C, CO                                                                 |
| Radial Shaft Load P <sub>rad</sub> , in mm   | $\frac{800}{n} \times \frac{25000}{95+L}, \text{ daN}^*$                          | $\frac{800}{n} \times \frac{18750}{95+L}, \text{ daN}^*$                           | $\frac{800}{n} \times \frac{25000}{101+L}, \text{ daN}^*$                           |
| Radial Shaft Load P <sub>rad</sub> , in inch | $\frac{800}{\text{RPM}} \times \frac{2215}{3.74+L}, \text{ lbs}^*$                | $\frac{800}{\text{RPM}} \times \frac{1660}{3.74+L}, \text{ lbs}^*$                 | $\frac{800}{\text{RPM}} \times \frac{2215}{3.98+L}, \text{ lbs}^*$                  |

\*  $n < 200$  RPM; max Prad=800 daN [1800 lbs]

 $n \geq 200 \text{ RPM}; L < 55 \text{ mm [2.2 in]}$ 

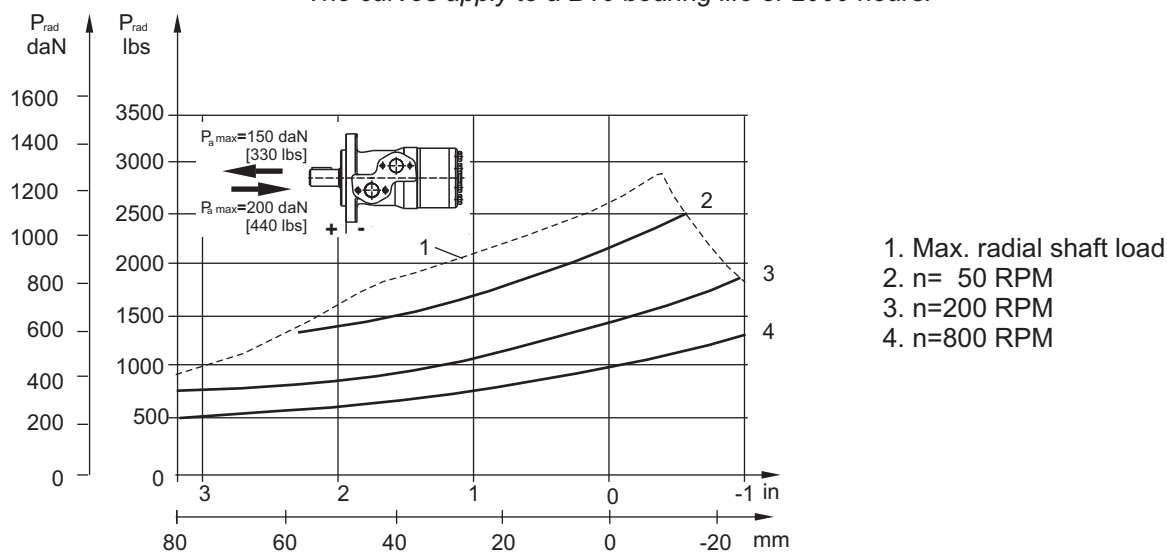
## MP AND MR

Radial Shaft Load  $P_{rad}$  for C, CO Shaft Extensions by L=30 mm [1.18 in] (24 mm [.94 in])



## MPN AND MRN

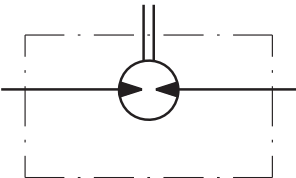
*The curves apply to a B10 bearing life of 2000 hours.*



MAX. PERMISSIBLE SHAFT SEAL PRESSURE  
FOR MP AND MR MOTORS

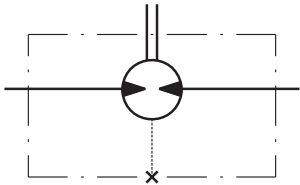
MP/MR...U1 motors with high pressure seal  
and without drain connection:

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

$$P_{\text{seal}} = \frac{P_{\text{input}} + P_{\text{return}}}{2}$$


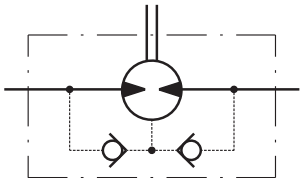
MP/MR...U motors with high pressure seal  
and drain connection:

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



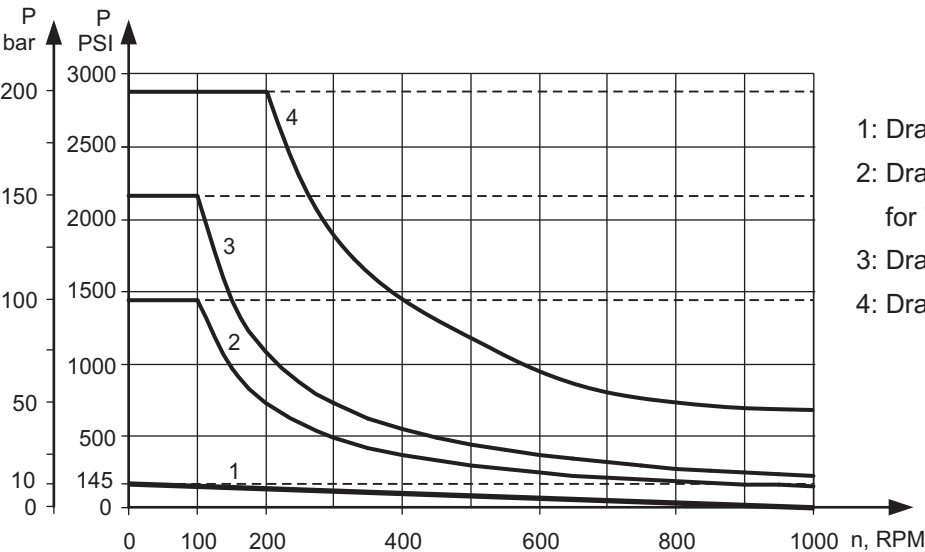
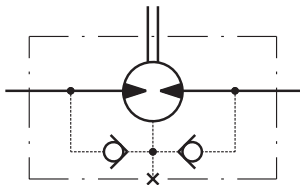
MP/MR...1 motors with low pressure seal  
or standard shaft seal  
and without drain connection:

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



MP/MR... motors with low pressure seal  
or standard shaft seal  
and with drain connection:

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



- 1: Drawing for Low Pressure Seal

2: Drawing for Standard Shaft Seal for "...B" shafts

3: Drawing for Standard Shaft Seal ("D" Seal)

4: Drawing for High Pressure Seal ("U" Seal)

— - continuous operations

- - - - - intermittent operations

ORDER CODE

|     |   |   |   |   |   |   |   |   |   |    |
|-----|---|---|---|---|---|---|---|---|---|----|
|     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| M P |   |   |   |   |   |   |   |   |   |    |

Pos.1 - Mounting Flange

- omit - Oval mount, two holes
- F - Oval mount, four holes
- Q - Square mount, four bolts
- W - Wheel mount

Pos.2 - Option (needle bearings)

- omit - none
- N - with needle bearings

Pos.3 - Port type

- omit - Side ports
- E - Rear ports

Pos.4 - Displacement code

- 25\* - 25,0 cm³/rev [ 1.52 in³/rev]
- 32\* - 32,0 cm³/rev [ 1.95 in³/rev]
- 40\* - 40,0 cm³/rev [ 2.44 in³/rev]
- 50 - 49,5 cm³/rev [ 3.02 in³/rev]
- 80 - 79,2 cm³/rev [ 4.83 in³/rev]
- 100 - 99,0 cm³/rev [ 6.04 in³/rev]
- 125 - 123,8 cm³/rev [ 7.55 in³/rev]
- 160 - 158,4 cm³/rev [ 9.66 in³/rev]
- 200 - 198,0 cm³/rev [12.10 in³/rev]
- 250 - 247,5 cm³/rev [15.10 in³/rev]
- 315 - 316,8 cm³/rev [19.30 in³/rev]
- 400 - 396,0 cm³/rev [24.16 in³/rev]
- 500 - 495,0 cm³/rev [30.20 in³/rev]
- 630 - 623,6 cm³/rev [38.05 in³/rev]

Pos. 5 - Shaft Extensions\*\*(see page 28)

- C - ø25 straight, Parallel key A8x7x32 DIN6885
- VC - ø25 straight, Parallel key A8x7x32 DIN6885 with corrosion resistant bushing
- CO - ø1" straight, Parallel key ¼"x¼"x1¼" BS46
- VCO - ø1" straight, Parallel key ¼"x¼"x1¼" BS46 with corrosion resistant bushing
- SH - ø25,32 splined BS 2059 (SAE 6B)
- VSH - ø25,32 splined BS 2059 (SAE 6B) with corrosion resistant bushing
- K - ø28,56 tapered 1:10, Parallel key B5x5x14 DIN6885
- SA - ø24,5 splined B 25x22 DIN 5482
- VSA - ø24,5 splined B 25x22 DIN 5482 with corrosion resistant bushing
- CB - ø32 straight, Parallel key A10x8x45 DIN6885
- KB - ø35 tapered 1:10, Parallel key B6x6x20 DIN6885
- SB - splined A 25x22 DIN 5482
- OB - ø1¼" tapered1:8, Parallel key 5/16"x5/16"x1¼" BS46
- HB - ø1¼" splined 14T ANSI B92.1 - 1976

Pos. 6 - Shaft Seal Version (see page 30)

- omit - Low pressure shaft seal or Standard shaft seal for "...B" shaft
- D - Standard shaft seal
- U - High pressure shaft seal (without check valves)

Pos. 7 - Drain Port

- omit - with drain port
- 1 - without drain port

Pos. 8 - Ports

- omit - BSPP (ISO 228)
- M - Metric (ISO 262)

Pos. 9 - Special Features (see page 119)

Pos.10 - Design Series

- omit - Factory specified

NOTES:

- \* Not with Low Pressure Seal
- \*\* The permissible output torque for shafts must not be exceeded!
- The following combinations are not allowed: - Q flange with "...B" shafts;
- W flange with "...B" shafts or E rear ports;
- N option with "...B" shafts, Low Pressure Seal or U option;
- "...B" shafts with D and U shaft seals.

Displacement codes 25, 32,40 and 50 are not allowed with B, K, L, R shafts!

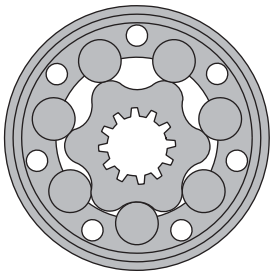
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS MR



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Grass cutting machinery etc.



## CONTENTS

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Function diagrams .....31÷39

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Shaft extensions ..... 28

Permissible shaft loads ..... 29

Permissible shaft Seal Pressure ... 30

Order code ..... 42

## OPTIONS

- » Model - Spool valve, roll-gerotor
- » Flange mount
- » Motor with needle bearing
- » Side and rear ports
- » Shafts - straight, splined and tapered
- » Shaft seal for high and low pressure
- » Metric and BSPP ports
- » Speed sensing
- » Other special features

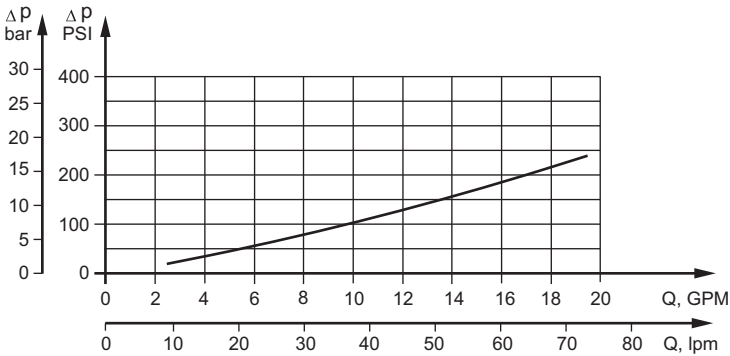
## GENERAL

|                                      |                                                                  |
|--------------------------------------|------------------------------------------------------------------|
| Max. Displacement, cm³/rev [in³/rev] | 397 [24.4]                                                       |
| Max. Speed, [RPM]                    | 970                                                              |
| Max. Torque, daNm [lb-in]            | cont.: 61 [5400] int.: 69 [6100]                                 |
| Max. Output, kW [HP]                 | 15 [20.1]                                                        |
| Max. Pressure Drop, bar [PSI]        | cont.: 175 [2540] int.: 200 [2900]                               |
| Max. Oil Flow, lpm [GPM]             | 75 [20]                                                          |
| Min. Speed, [RPM]                    | 10                                                               |
| Pressure fluid                       | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |
| Temperature range, °C [°F]           | -40÷140 [-40÷284]                                                |
| Optimal Viscosity range, mm²/s [SUS] | 20÷75 [98÷347]                                                   |
| Filtration                           | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |

### Oil flow in drain line

| Pressure drop bar [PSI] | Viscosity mm²/s [SUS] | Oil flow in drain line lpm [GPM] |
|-------------------------|-----------------------|----------------------------------|
| 100 [1450]              | 20 [98]               | 2,5 [.660]                       |
|                         | 35 [164]              | 1,8 [.476]                       |
| 140 [2030]              | 20 [98]               | 3,5 [.925]                       |
|                         | 35 [164]              | 2,8 [.740]                       |

### Pressure Losses



SPECIFICATION DATA

Specification Data for MR... motors with **C**, **CO**, **SH**, **K** and **SA** shafts.  
(ø28,56 sealing diameter)

| Type                                                     |               | MR 50          | MR 80          | MR 100         | MR 125          | MR 160          | MR 200           | MR 250           | MR 315           | MR 400        |
|----------------------------------------------------------|---------------|----------------|----------------|----------------|-----------------|-----------------|------------------|------------------|------------------|---------------|
| Displacement, cm³/rev<br>[in³/rev]                       |               | 51,5<br>[3.14] | 80,3<br>[4.90] | 99,8<br>[6.09] | 125,7<br>[7.67] | 159,6<br>[9.74] | 199,8<br>[12.19] | 250,1<br>[15.26] | 315,7<br>[19.26] | 397<br>[24.4] |
| Max. Speed,<br>[RPM]                                     | Cont.         | 775            | 750            | 600            | 475             | 375             | 300              | 240              | 190              | 150           |
|                                                          | Int.*         | 970            | 940            | 750            | 600             | 470             | 375              | 300              | 240              | 190           |
| Max. Torque<br>daNm [in-lb]                              | Cont.         | 10 [900]       | 20 [1770]      | 24 [2125]      | 30 [2655]       | 39 [3450]       | 38,5[3410]       | 39 [3450]        | 36 [3185]        | 38 [3360]     |
|                                                          | Int.*         | 13 [1150]      | 22 [1947]      | 28 [2480]      | 34 [3010]       | 43 [3805]       | 46 [4070]        | 47 [4160]        | 47 [4160]        | 47 [4160]     |
|                                                          | Peak**        | 17 [1505]      | 27 [2390]      | 32 [2832]      | 37 [3275]       | 46 [4070]       | 56 [4960]        | 60 [5310]        | 61 [5400]        | 61 [5400]     |
| Max. Output<br>kW [HP]                                   | Cont.         | 7 [9.5]        | 12,5 [17]      | 13 [17.4]      | 12,5[16.8]      | 11,5[15.4]      | 9 [12]           | 8 [10.7]         | 5 [6.7]          | 4,8 [6.4]     |
|                                                          | Int.*         | 8,5 [11.9]     | 15 [20.1]      | 15 [20.1]      | 14,5[19.5]      | 14 [18.8]       | 12 [16.1]        | 9,5 [12.7]       | 8 [10.7]         | 6,8 [9.1]     |
| Max. Pressure Drop<br>bar [PSI]                          | Cont.         | 140[2030]      | 175[2540]      | 175[2540]      | 175[2540]       | 175[2540]       | 140[2030]        | 110[1600]        | 85 [1230]        | 65 [940]      |
|                                                          | Int.*         | 175[2540]      | 200[2900]      | 200[2900]      | 200[2900]       | 200[2900]       | 175[2540]        | 140[2030]        | 115[1670]        | 90 [1300]     |
|                                                          | Peak**        | 225[3260]      | 225[3260]      | 225[3260]      | 225[3260]       | 225[3260]       | 225[3260]        | 200[2900]        | 150[2175]        | 115[1670]     |
| Max. Oil Flow<br>lpm [GPM]                               | Cont.         | 40 [10.5]      | 60 [15.8]      | 60 [15.8]      | 60 [15.8]       | 60 [15.8]       | 60 [15.8]        | 60 [15.8]        | 60 [15.8]        | 60 [15.8]     |
|                                                          | Int.*         | 50 [13.2]      | 75 [19.8]      | 75 [19.8]      | 75 [19.8]       | 75 [19.8]       | 75 [19.8]        | 75 [19.8]        | 75 [19.8]        | 75 [19.8]     |
| Max. Inlet Pressure<br>bar [PSI]                         | Cont.         | 175[2540]      | 175[2540]      | 175[2540]      | 175[2540]       | 175[2540]       | 175[2540]        | 175[2540]        | 175[2540]        | 175[2540]     |
|                                                          | Int.*         | 200[2900]      | 200[2900]      | 200[2900]      | 200[2900]       | 200[2900]       | 200[2900]        | 200[2900]        | 200[2900]        | 200[2900]     |
|                                                          | Peak**        | 225[3260]      | 225[3260]      | 225[3260]      | 225[3260]       | 225[3260]       | 225[3260]        | 225[3260]        | 225[3260]        | 225[3260]     |
| Max. Return Pres-<br>sure with Drain Line<br>bar [PSI]   | Cont.         | 175[2540]      | 175[2540]      | 175[2540]      | 175[2540]       | 175[2540]       | 175[2540]        | 175[2540]        | 175[2540]        | 175[2540]     |
|                                                          | Int.*         | 200[2900]      | 200[2900]      | 200[2900]      | 200[2900]       | 200[2900]       | 200[2900]        | 200[2900]        | 200[2900]        | 200[2900]     |
|                                                          | Peak**        | 225[3260]      | 225[3260]      | 225[3260]      | 225[3260]       | 225[3260]       | 225[3260]        | 225[3260]        | 225[3260]        | 225[3260]     |
| Max. Starting Pressure with<br>Unloaded Shaft, bar [PSI] |               | 10 [145]       | 10 [145]       | 10 [145]       | 9 [130]         | 7 [102]         | 5 [73]           | 4 [58]           | 3 [44]           | 3 [44]        |
| Min. Starting Torque<br>daNm [in-lb]                     | At max.press. |                |                |                |                 |                 |                  |                  |                  |               |
|                                                          | drop Cont.    | 8 [710]        | 15 [1330]      | 20 [1770]      | 25 [2215]       | 32 [2832]       | 33 [2920]        | 31 [2740]        | 31,5[2875]       | 31,5[2875]    |
|                                                          | At max.press. |                |                |                |                 |                 |                  |                  |                  |               |
|                                                          | drop Int.*    | 10 [85]        | 17 [1505]      | 23 [2035]      | 28 [2480]       | 37 [3275]       | 40 [3540]        | 48 [4250]        | 58 [5220]        | 50 [4425]     |
| Min. Speed***, [RPM]                                     |               | 10             | 10             | 10             | 10              | 10              | 10               | 10               | 10               | 10            |
| Weight, kg [lb]                                          | MR(F)         | 6,8 [15]       | 6,9 [15,2]     | 7,2 [15.9]     | 7,3 [16.1]      | 7,5 [15.2]      | 8 [17.6]         | 8,4 [18.5]       | 9,1 [20]         | 9,8 [21.6]    |
|                                                          | MRQ(N)        | 6,2 [13.7]     | 6,3 [13.9]     | 6,6 [14.6]     | 6,8 [15]        | 7,2 [14.7]      | 7,6 [15.4]       | 7,8 [17.2]       | 8,6 [19]         | 9,3 [20.5]    |
| For rear ports: +0,650 [1.433]                           |               |                |                |                |                 |                 |                  |                  |                  |               |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA (continued)

Specification Data for MR... motors with CB, KB, OB and HB shafts.  
(ø35 sealing diameter)

| Type                           |               | MR 50      | MR 80     | MR 100     | MR 125     | MR 160     | MR 200     | MR 250     | MR 315     | MR 400     |
|--------------------------------|---------------|------------|-----------|------------|------------|------------|------------|------------|------------|------------|
| Displacement, cm³/rev          |               | 51,5       | 80,3      | 99,8       | 125,7      | 159,6      | 199,8      | 250,1      | 315,7      | 397        |
| [in³/rev ]                     |               | [3.14]     | [4.90]    | [6.09]     | [7.67]     | [9.74]     | [12.19]    | [15.26]    | [19.26]    | [24.4]     |
| Max. Speed,                    | Cont.         | 775        | 750       | 600        | 475        | 375        | 300        | 240        | 190        | 150        |
| [RPM]                          | Int.*         | 970        | 940       | 750        | 600        | 470        | 375        | 300        | 240        | 190        |
| Max. Torque                    | Cont.         | 10 [900]   | 20 [1770] | 24 [2125]  | 30 [2655]  | 39 [3450]  | 45 [4000]  | 54 [4780]  | 55 [4870]  | 61 [5400]  |
| daNm [in-lb]                   | Int.*         | 13 [1150]  | 22 [1947] | 28 [2480]  | 34 [3010]  | 43 [3805]  | 50 [4425]  | 61 [5400]  | 69 [6110]  | 69 [6110]  |
|                                | Peak**        | 17 [1505]  | 27 [2390] | 32 [2832]  | 37 [3275]  | 46 [4070]  | 56 [4960]  | 71 [6280]  | 84 [7435]  | 87 [7700]  |
| Max. Output                    | Cont.         | 7 [9.5]    | 12,5 [17] | 13 [17.4]  | 12,5[16.8] | 11,5[15.4] | 11 [14.8]  | 10 [13.4]  | 9 [12]     | 7,8 [10.5] |
| kW [HP]                        | Int.*         | 8,5 [11.9] | 15 [20.1] | 15 [20.1]  | 14,5[19.5] | 14 [18.8]  | 13 [17.4]  | 12 [16.1]  | 10 [13.4]  | 10,6[14.2] |
| Max. Pressure Drop             | Cont.         | 140[2030]  | 175[2540] | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 135[1960]  | 110[1600]  |
| bar [PSI]                      | Int.*         | 175[2540]  | 200[2900] | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 175[2540]  | 140[2030]  |
|                                | Peak**        | 225[3260]  | 225[3260] | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 210[3045]  | 175[2540]  |
| Max. Oil Flow                  | Cont.         | 40 [10.5]  | 60 [15.8] | 60 [15.8]  | 60 [15.8]  | 60 [15.8]  | 60 [15.8]  | 60 [15.8]  | 60 [15.8]  | 60 [15.8]  |
| lpm [GPM]                      | Int.*         | 50 [13.2]  | 75 [19.8] | 75 [19.8]  | 75 [19.8]  | 75 [19.8]  | 75 [19.8]  | 75 [19.8]  | 75 [19.8]  | 75 [19.8]  |
| Max. Inlet Pressure            | Cont.         | 175[2540]  | 175[2540] | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  |
| bar [PSI]                      | Int.*         | 200[2900]  | 200[2900] | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  |
|                                | Peak**        | 225[3260]  | 225[3260] | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  |
| Max. Return Pres-              | Cont.         | 175[2540]  | 175[2540] | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  | 175[2540]  |
| sure with Drain Line           | Int.*         | 200[2900]  | 200[2900] | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  | 200[2900]  |
| bar [PSI]                      | Peak**        | 225[3260]  | 225[3260] | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  | 225[3260]  |
| Max. Starting Pressure with    |               |            |           |            |            |            |            |            |            |            |
| Unloaded Shaft, bar [PSI]      |               | 10 [145]   | 10 [145]  | 10 [145]   | 9 [130]    | 7 [102]    | 5 [73]     | 4 [58]     | 3 [44]     | 3 [44]     |
| Min. Starting Torque           | At max.press. |            |           |            |            |            |            |            |            |            |
| daNm [in-lb]                   | drop Cont.    | 8 [710]    | 15 [1330] | 20 [1770]  | 25 [2215]  | 32 [2832]  | 41 [3630]  | 50 [4425]  | 50 [4425]  | 50 [4425]  |
|                                | At max.press. |            |           |            |            |            |            |            |            |            |
|                                | drop Int.*    | 10 [885]   | 17 [1505] | 23 [2035]  | 28 [2480]  | 37 [3275]  | 46 [4070]  | 55 [4870]  | 66 [5840]  | 61 [5400]  |
| Min. Speed***, [RPM]           |               | 10         | 10        | 10         | 10         | 10         | 10         | 10         | 10         | 10         |
| Weight, kg [lb]                |               |            |           |            |            |            |            |            |            |            |
| For rear ports: +0,650 [1.433] |               | 6,9 [15,2] | 7 [15,4]  | 7,3 [16.1] | 7,4 [16.3] | 7,6 [15.4] | 8,1 [18.9] | 8,5 [18.7] | 9,2 [20.3] | 9,9 [21.8] |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).

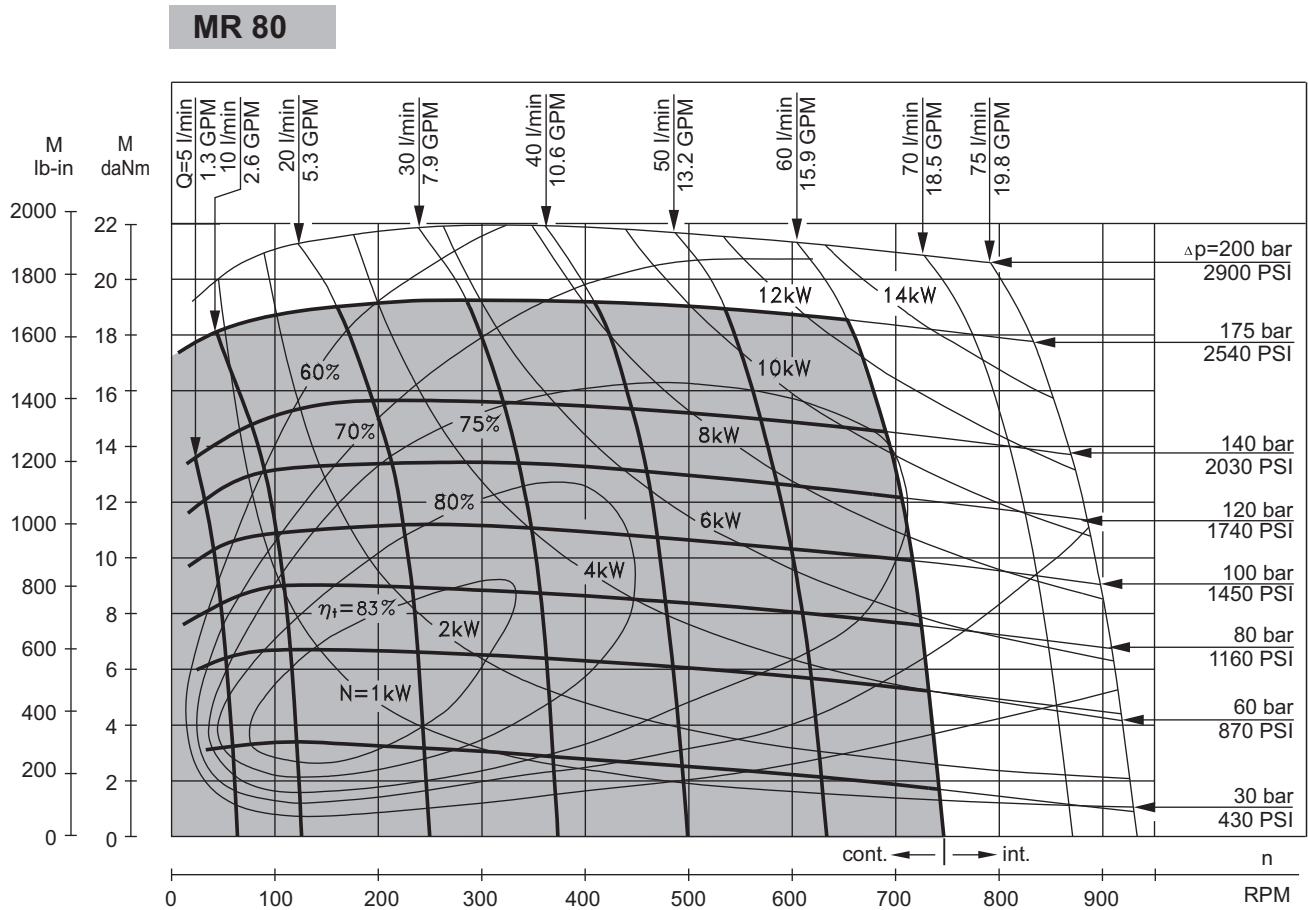
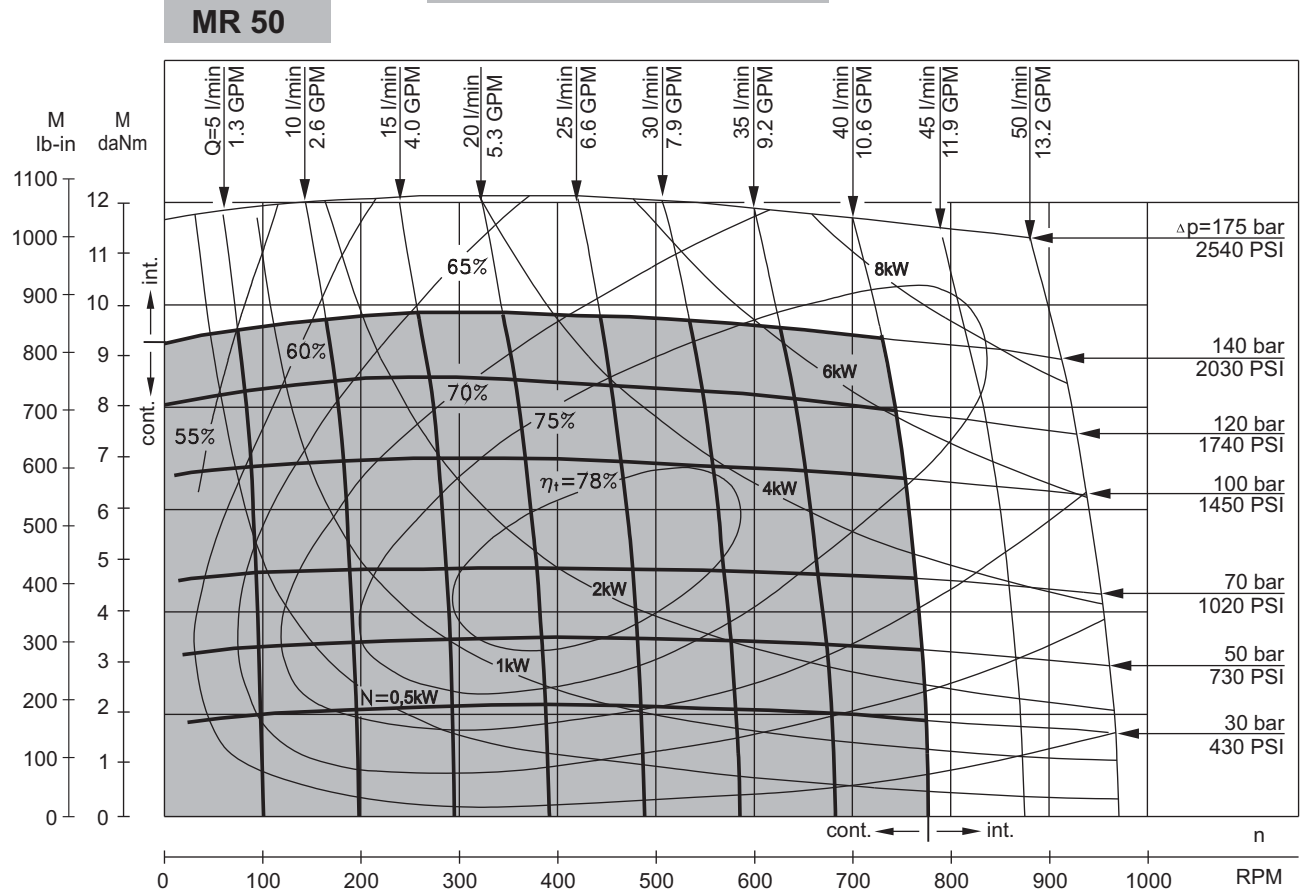
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

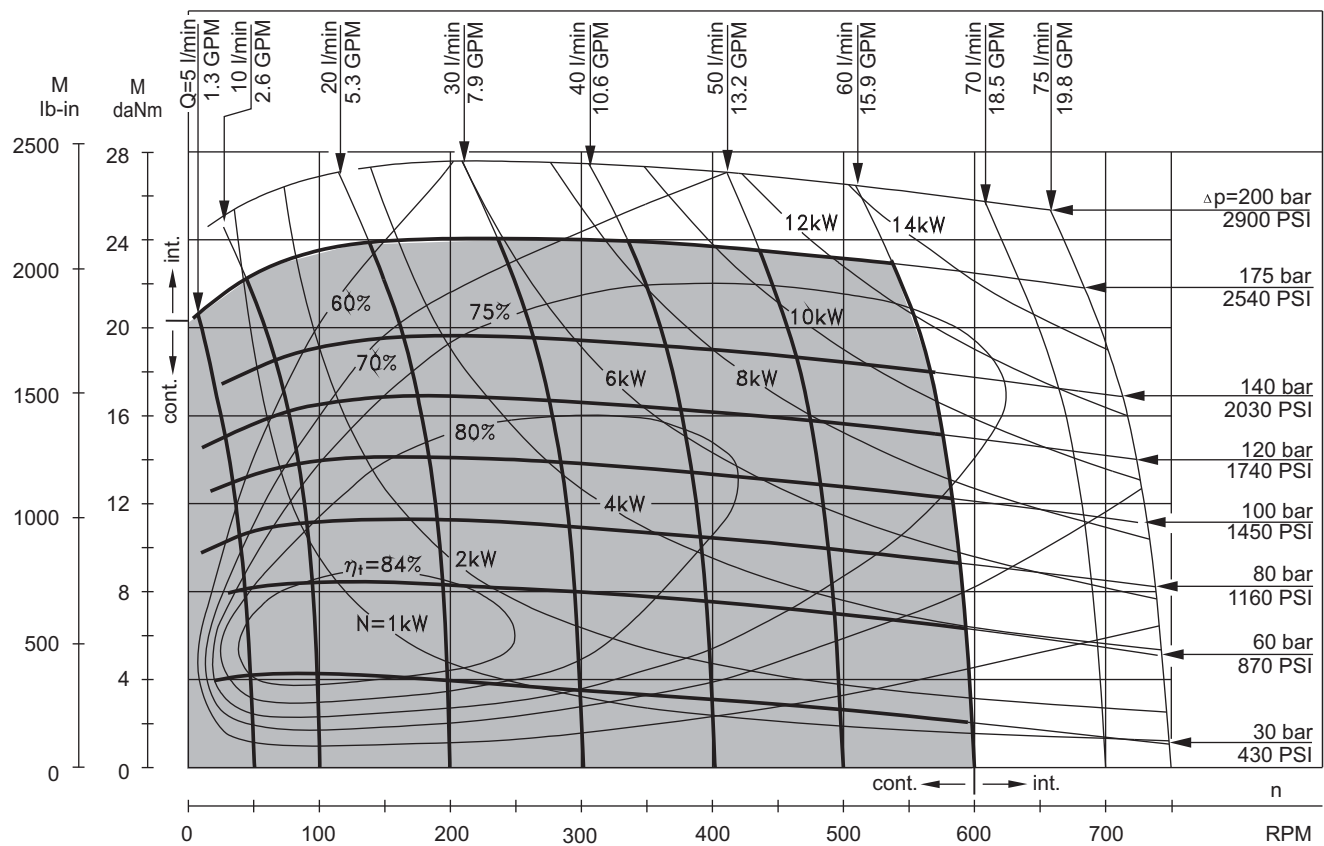
FUNCTION DIAGRAMS



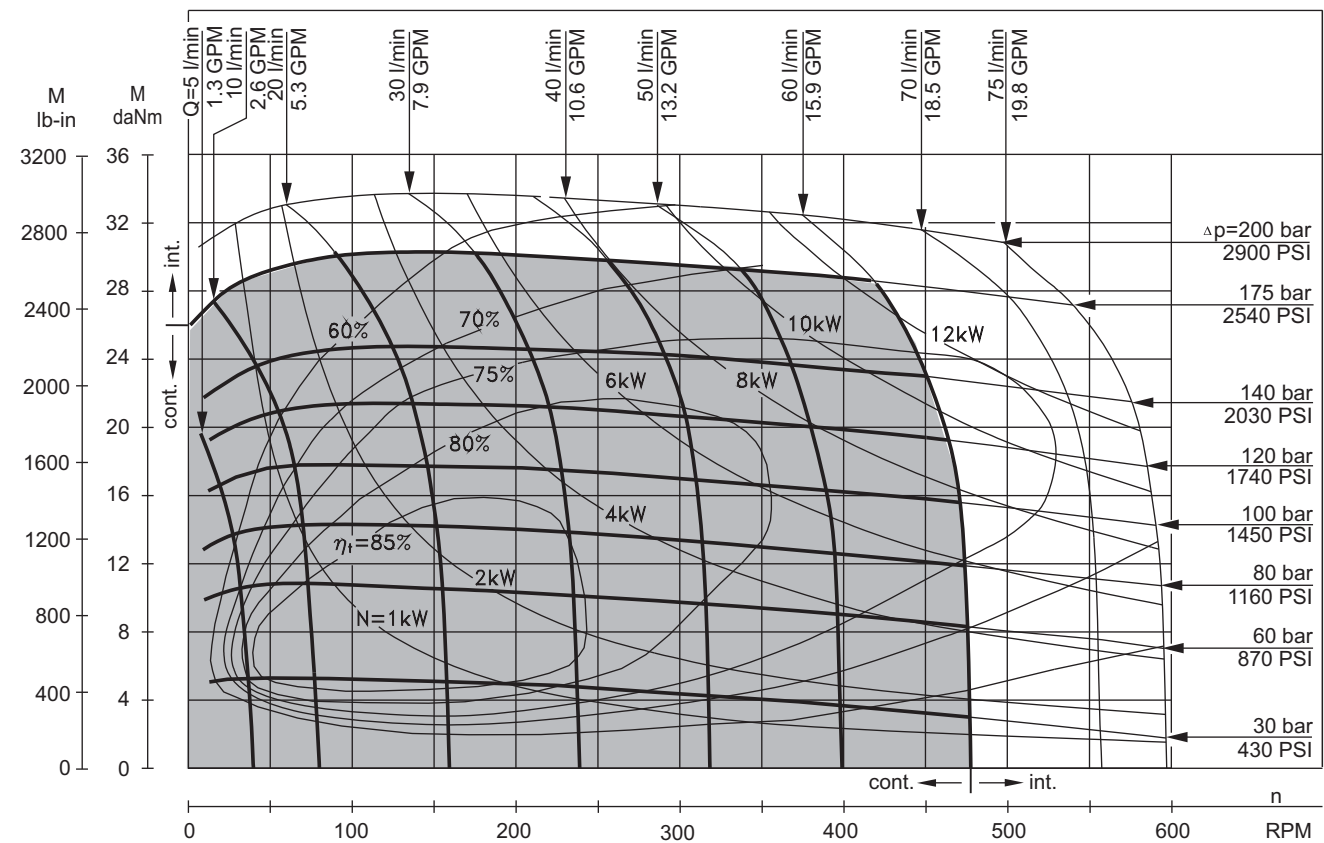
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm<sup>2</sup>/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MR 100



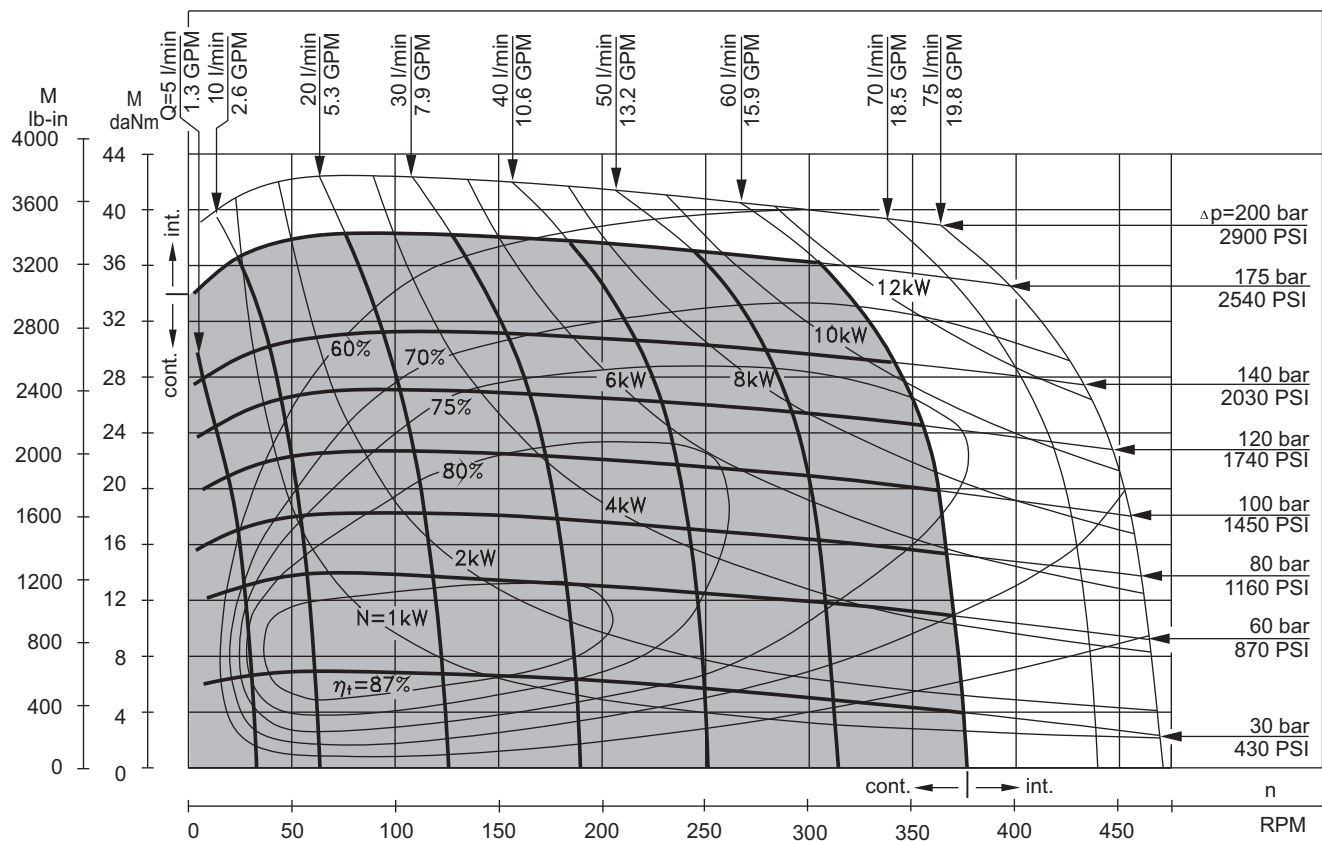
MR 125



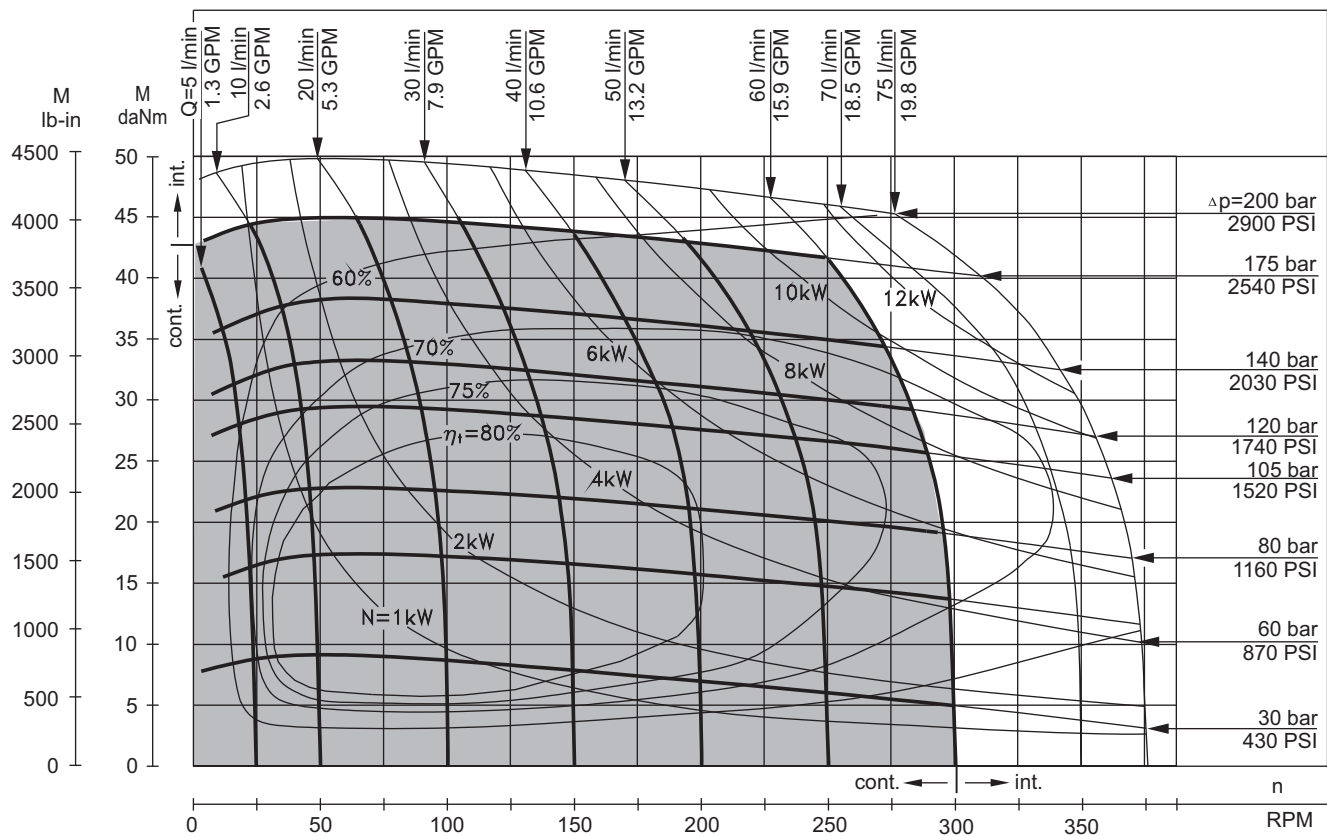
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MR 160



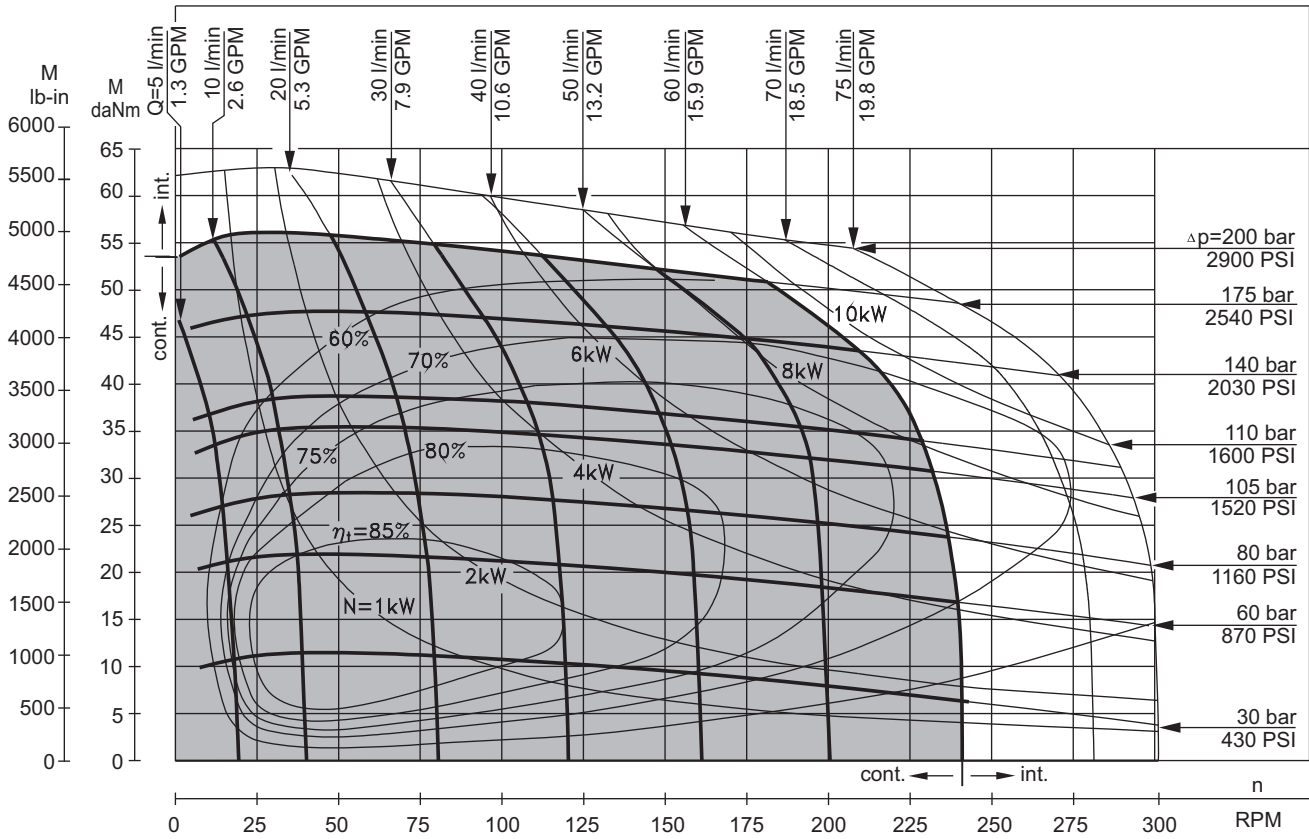
MR 200



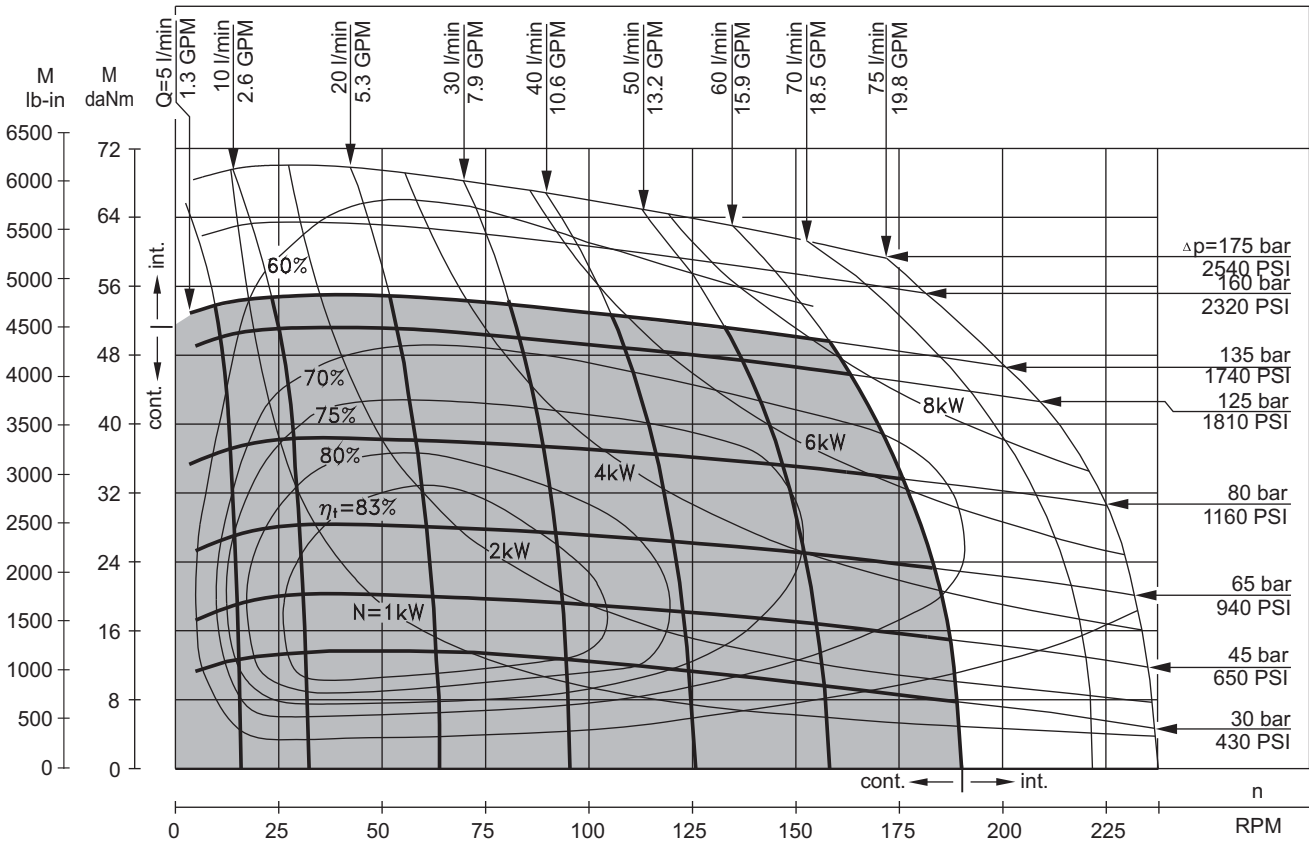
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MR 250



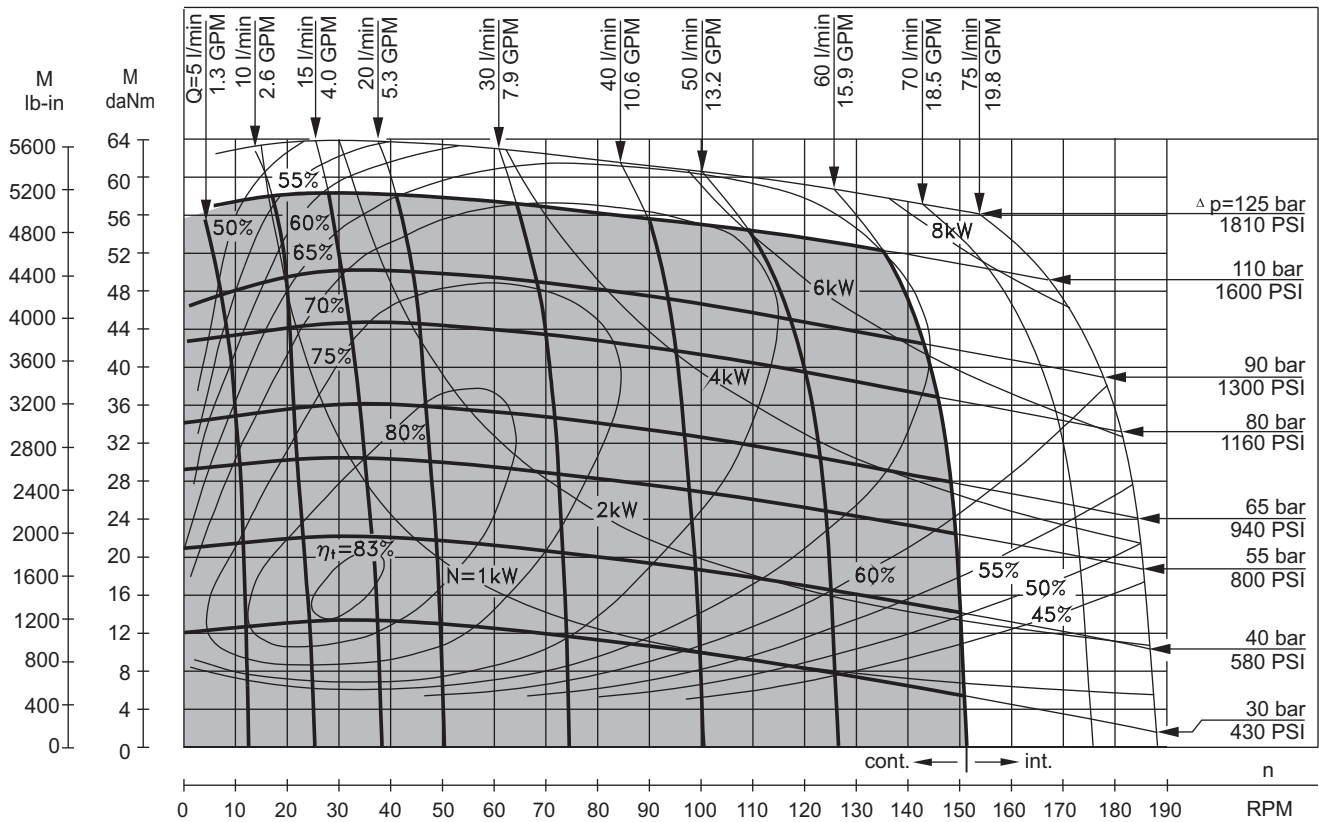
MR 315



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

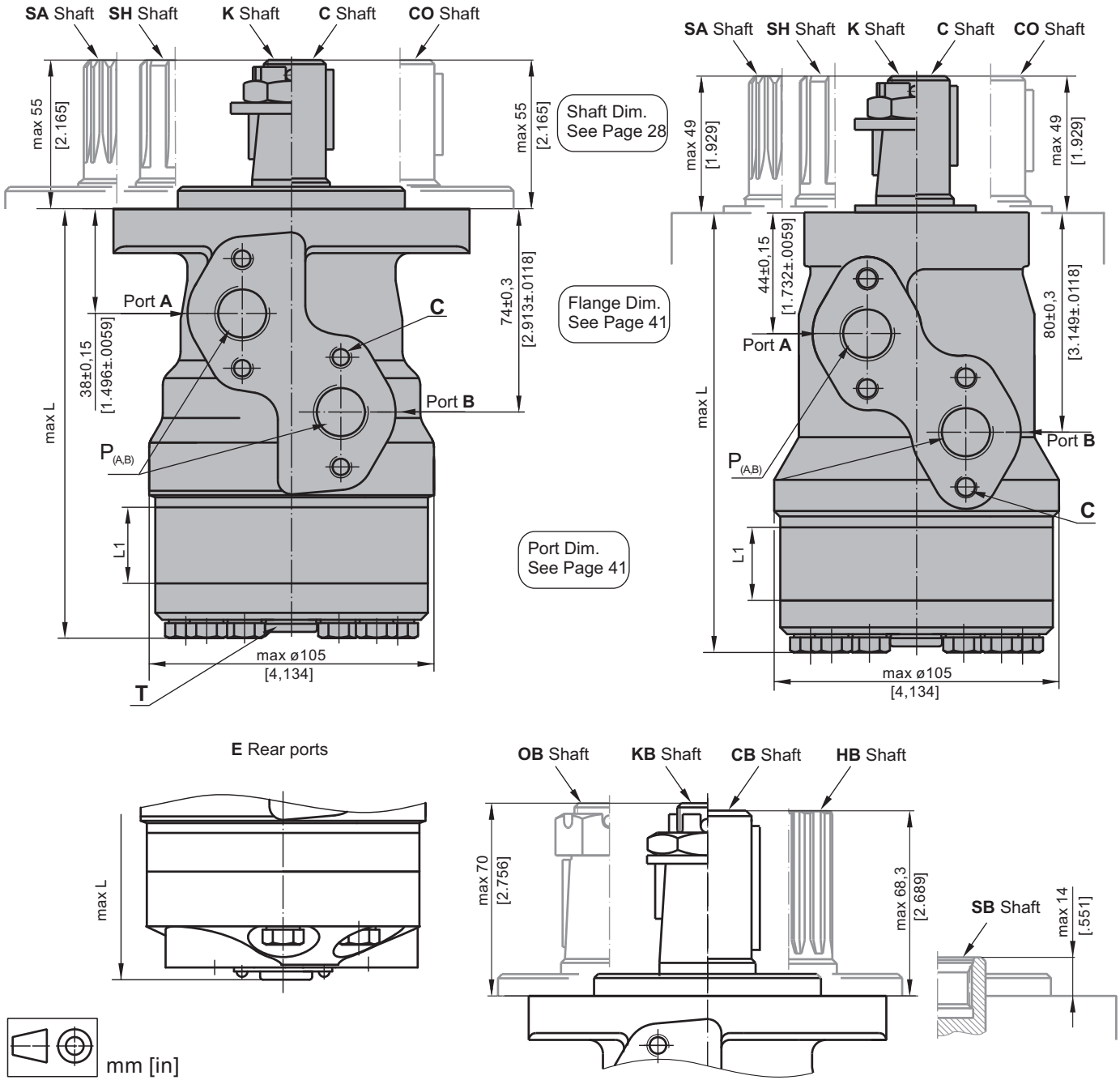
FUNCTION DIAGRAMS

MR 400



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

DIMENSIONS AND MOUNTING DATA



**C** : 4xM8 - 13 mm [.51 in] depth  
**P<sub>(A, B)</sub>** : 2xG1/2 or 2xM22x1,5 - 15 mm [.59 in] depth  
**T** : G1/4 or M14x1,5 - 12 mm [.47 in] depth (plugged)

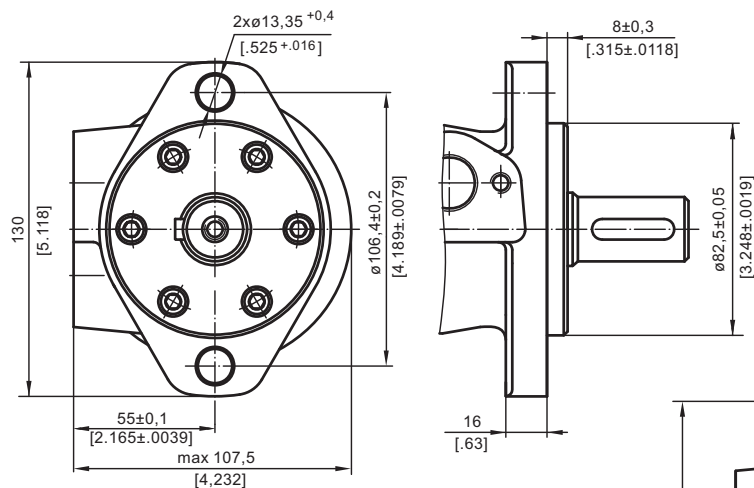
**Standard Rotation**  
 Viewed from Shaft End  
 Port A Pressurized - **CW**  
 Port B Pressurized - **CCW**

**Reverse Rotation**  
 Viewed from Shaft End  
 Port A Pressurized - **CCW**  
 Port B Pressurized - **CW**

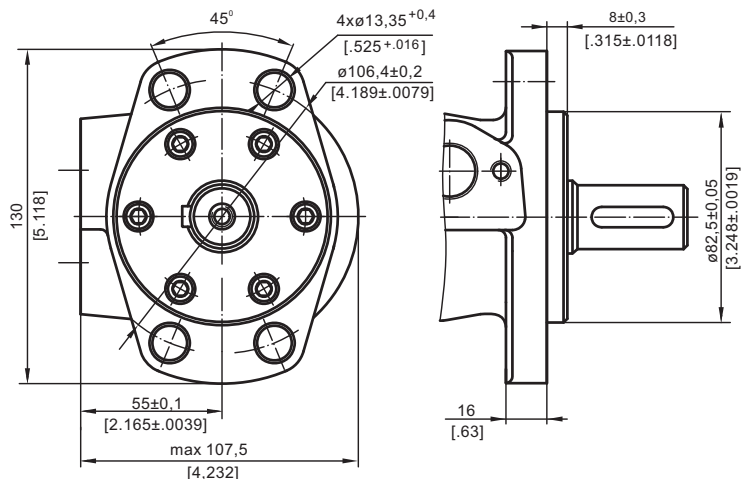
| Type      | L, mm [in]   | Type    | L, mm [in]   | Type       | L, mm [in]   | Type     | L, mm [in]   | L <sub>1</sub> , mm [in] |
|-----------|--------------|---------|--------------|------------|--------------|----------|--------------|--------------------------|
| MR(F) 50  | 138,0 [5.43] | MRQ 50  | 143,5 [5.65] | MR(F)E 50  | 157,5 [6.20] | MRQE 50  | 163,5 [6.44] | 9,0 [.35]                |
| MR(F) 80  | 143,0 [5.63] | MRQ 80  | 148,5 [5.85] | MR(F)E 80  | 162,5 [6.40] | MRQE 80  | 168,5 [6.63] | 14,0 [.55]               |
| MR(F) 100 | 146,0 [5.75] | MRQ 100 | 152,0 [5.98] | MR(F)E 100 | 165,5 [6.52] | MRQE 100 | 171,5 [6.75] | 17,4 [.69]               |
| MR(F) 125 | 150,5 [5.93] | MRQ 125 | 156,5 [6.16] | MR(F)E 125 | 170,0 [6.69] | MRQE 125 | 176,0 [6.93] | 21,8 [.86]               |
| MR(F) 160 | 156,5 [6.16] | MRQ 160 | 162,5 [6.40] | MR(F)E 160 | 176,0 [6.93] | MRQE 160 | 182,0 [7.17] | 27,8 [1.09]              |
| MR(F) 200 | 163,5 [6.44] | MRQ 200 | 169,5 [6.67] | MR(F)E 200 | 183,0 [7.20] | MRQE 200 | 189,0 [7.44] | 34,8 [1.37]              |
| MR(F) 250 | 172,0 [6.77] | MRQ 250 | 179,0 [7.05] | MR(F)E 250 | 192,0 [7.56] | MRQE 250 | 198,0 [7.80] | 43,5 [1.71]              |
| MR(F) 315 | 183,0 [7.20] | MRQ 315 | 189,0 [7.44] | MR(F)E 315 | 204,0 [8.03] | MRQE 315 | 210,0 [8.27] | 54,8 [2.16]              |
| MR(F) 400 | 198,0 [7.80] | MRQ 400 | 204,0 [8.03] | MR(F)E 400 | 218,0 [8.58] | MRQE 400 | 224,0 [8.82] | 69,4 [2.73]              |

## MOUNTING

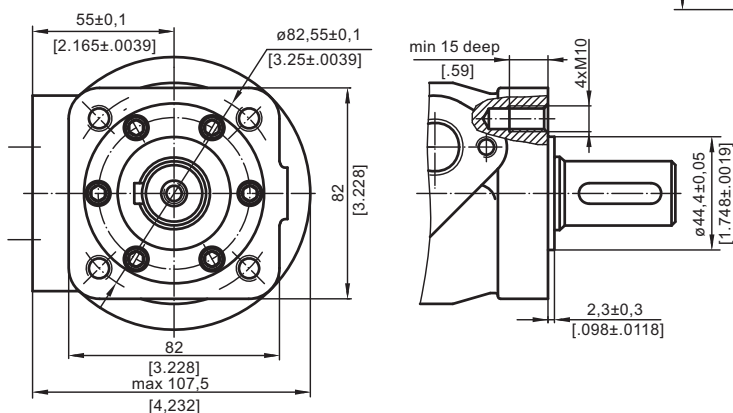
### Oval Mount (2 Holes)



### F - Oval Mount (4 Holes)

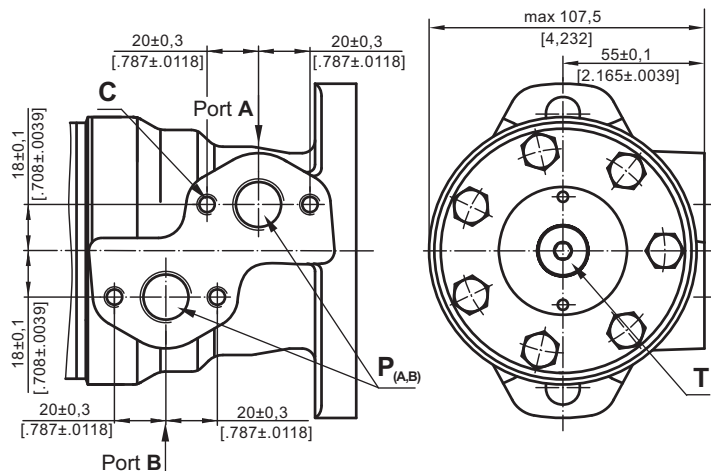


### Q - Square Mount (4 Bolts)

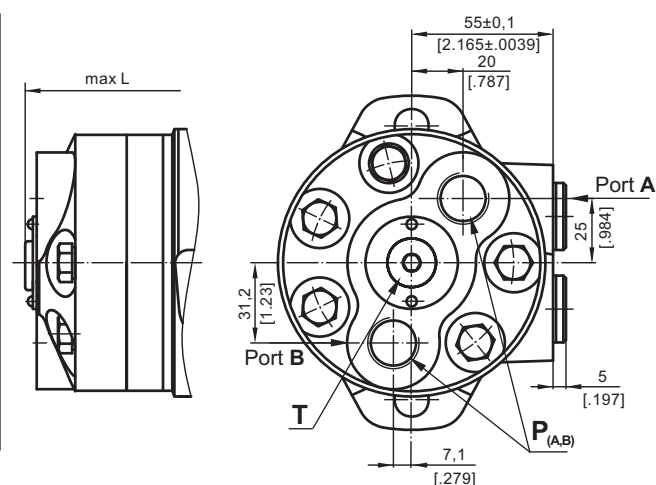


## PORTS

### Side Ports



### E Rear Ports



- C** : 4xM8 - 13 mm [.51 in] depth  
**P<sub>(A,B)</sub>** : 2xG1/2 or 2xM22x1,5 - 15 mm [.59 in] depth  
**T** : G1/4 or M14x1,5 - 12 mm [.47 in] depth (plugged)

**Standard Rotation**  
 Viewed from Shaft End  
 Port A Pressurized - **CW**  
 Port B Pressurized - **CCW**

**Reverse Rotation**  
 Viewed from Shaft End  
 Port A Pressurized - **CCW**  
 Port B Pressurized - **CW**

ORDER CODE

|    |   |   |   |   |   |   |   |   |   |    |
|----|---|---|---|---|---|---|---|---|---|----|
|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| MR |   |   |   |   |   |   |   |   |   |    |

Pos.1 - Mounting Flange

omit - Oval mount, two holes

F - Oval mount, four holes

Q - Square mount, four bolts

Pos.2 - Option (needle bearings)

omit - none

N - with needle bearings

Pos.3 - Port type

omit - Side ports

E - Rear ports

Pos.4 - Displacement code

50 - 51,5 cm³/rev [ 3.14 in³/rev]

80 - 80,3 cm³/rev [ 4.90 in³/rev]

100 - 99,8 cm³/rev [ 6.09 in³/rev]

125 - 125,7 cm³/rev [ 7.67 in³/rev]

160 - 159,6 cm³/rev [ 9.74 in³/rev]

200 - 199,8 cm³/rev [12.19 in³/rev]

250 - 250,1 cm³/rev [15.26 in³/rev]

315 - 315,7 cm³/rev [19.26 in³/rev]

400 - 397,0 cm³/rev [24.40 in³/rev]

Pos.5 - Shaft Extensions\*(see page 28)

C - ø25 straight, Parallel key A8x7x32 DIN6885

VC - ø25 straight, Parallel key A8x7x32 DIN6885 with corrosion resistant bushing

CO - ø1" straight, Parallel key ¼"x¼"x1¼" BS46

VCO - ø1" straight, Parallel key ¼"x¼"x1¼" BS46 with corrosion resistant bushing

SH - ø25,32 splined BS 2059 (SAE 6B)

VSH - ø25,32 splined BS 2059 (SAE 6B) with corrosion resistant bushing

K - ø28,56 tapered 1:10, Parallel key B5x5x14 DIN6885

SA - ø24,5 splined B 25x22 DIN 5482

VSA - ø24,5 splined B 25x22 DIN 5482 with corrosion resistant bushing

CB - ø32 straight, Parallel key A10x8x45 DIN6885

KB - ø35 tapered 1:10, Parallel key B6x6x20 DIN6885

SB - splined A 25x22 DIN 5482

OB - ø1¼" tapered1:8, Parallel key ⅝"x⅝"x1¼" BS46

HB - ø1¼" splined 14T ANSI B92.1 - 1976

Pos. 6 - Shaft Seal Version (see page 30)

omit - Low pressure shaft seal or Standard shaft seal for "...B" shaft

D - Standard shaft seal

U - High pressure shaft seal (without check valves)

Pos. 7 - Drain Port

omit - with drain port

1 - without drain port

Pos. 8 - Ports

omit - BSPP (ISO 228)

M - Metric (ISO 262)

Pos. 9 - Special Features (see page 119)

Pos.10 - Design Series

omit - Factory specified

**NOTES:** The following combinations are not allowed:
 

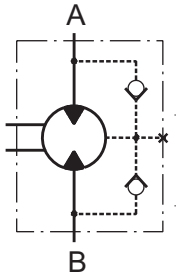
- **Q** flange with “...**B**” shafts;
- **N** option with “...**B**” shafts, Low Pressure Seal or **U** option;
- “...**B**” shafts with **D** and **U** shaft seals.

\* The permissible output torque for shafts must not be exceeded!

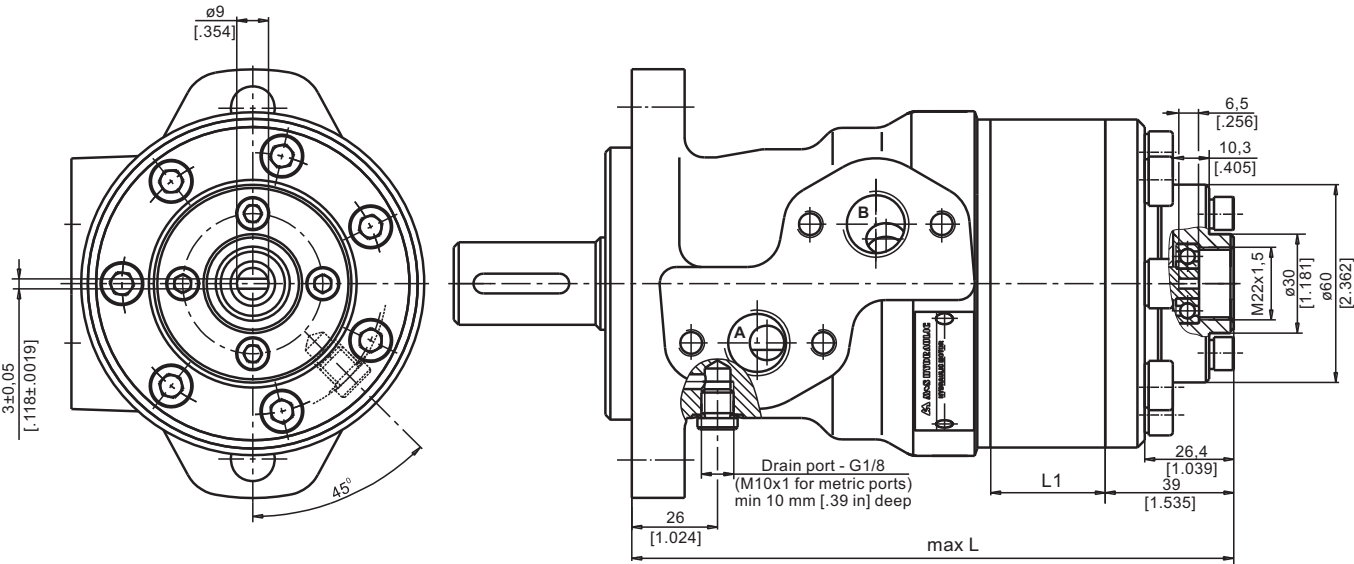
The hydraulic motors are mangano-phosphatized as standard.

# Hydraulic motors type MR...T with tacho connection

MR motors are available in version with tacho drive shaft. With tacho connection the speed of the motor can be registered. Tacho shaft has a 6 times higher revolution speed than output shaft and opposite direction of rotation.



## OUTLINE DIMENSIONS REFERENCE



| Type   | L, mm [in] | L <sub>1</sub> , mm [in] |
|--------|------------|--------------------------|
| MR 50  | 157 [6.18] | 9,0 [.35]                |
| MR 80  | 162 [6.38] | 14,0 [.55]               |
| MR 100 | 165 [6.50] | 17,4 [.69]               |
| MR 125 | 170 [6.69] | 21,8 [.86]               |
| MR 160 | 176 [6.93] | 27,8 [1.09]              |
| MR 200 | 183 [7.20] | 34,8 [1.37]              |
| MR 250 | 192 [7.56] | 43,5 [1.71]              |
| MR 315 | 204 [8.03] | 54,8 [2.16]              |
| MR 400 | 218 [8.58] | 69,4 [2.73]              |



### Notes:

- Radial or axial load on tacho shaft must be avoided. Max. torque on tacho shaft 0,1 daNm [.885 lb-in].
- Max. cont. return pressure without drain line 20 bar [290 PSI].
- Tacho option for MR motor is available only for shafts with sealing diameter  $\varnothing 28,56$  with shaft seal type **D** (up to 150 bar).
- It is not allowed for Q-flange.

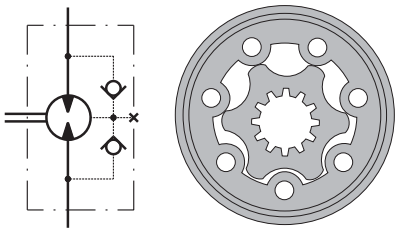
The main technical features correspond to the standard motors series MR. There are no changes in the overall and mounting dimensions. For detail technical and mounting data please refer to MR catalogue.

# HYDRAULIC MOTORS SP

M+S Hydraulic introduces a new version of hydraulic motors, type SP with new housing, integrated output shaft to the spool valve, check valves, high pressure shaft seal. The SP motors are suitable for a wide range of applications where compact and high efficient motors are required.

## CONTENTS

|                                     |       |
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| Specification data .....            | 45÷46 |
| Function diagrams .....             | 18÷24 |
| Dimensions and mounting .....       | 47÷48 |
| Shaft extensions .....              | 48    |
| Permissible shaft Seal Pressure ... | 48    |
| Permissible shaft loads .....       | 49    |
| Order code .....                    | 49    |



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agriculture machines
- » Food industries
- » Grass cutting machinery etc.

## OPTIONS

- » Model- Spool valve, gerotor
- » Flange mount - 2 hole oval flange; square flange
- » Side BSPP ports
- » Shafts- straight and splined
- » Shaft seal for high and low pressure
- » Other special features

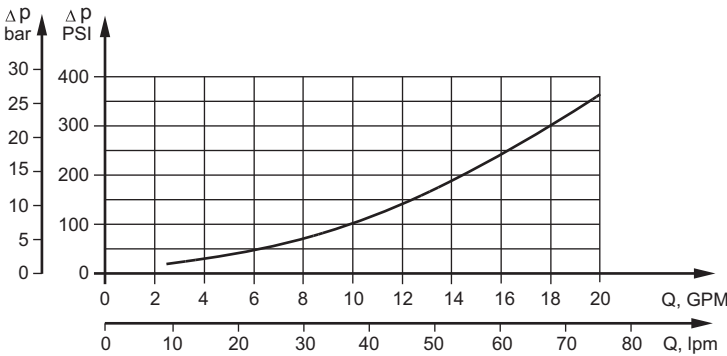
## GENERAL

|                                                   |                                                                 |                                       |
|---------------------------------------------------|-----------------------------------------------------------------|---------------------------------------|
| Max. Displacement,                                | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                     | 396 [24.16]                           |
| Max. Speed,                                       | [RPM]                                                           | 1515                                  |
| Max. Torque,                                      | daNm [lb-in]                                                    | cont.:38 [3360]      int.: 46 [3240]  |
| Max. Output,                                      | kW [HP]                                                         | 17,5 [23.5]                           |
| Max. Pressure Drop,                               | bar [PSI]                                                       | cont.:140 [2030]      int.:175 [2540] |
| Max. Oil Flow,                                    | lpm [GPM]                                                       | 75 [19.8]                             |
| Min. Speed,                                       | [RPM]                                                           | 10                                    |
| Pressure fluid                                    | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                 |                                       |
| Temperature range,                                | °C [°F]                                                         | -30÷90 [-22÷194]                      |
| Optimal Viscosity range, mm <sup>2</sup> /s [SUS] | 20÷75 [98÷347]                                                  |                                       |
| Filtration                                        | ISO code 20/16 (Min. recommended fluid filtration of 25 micron) |                                       |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



SPECIFICATION DATA

Specification Data for SP... motors with C and CO shafts.

| Type                                                     |        | SP<br>50    | SP<br>80    | SP<br>100   | SP<br>125    | SP<br>160    | SP<br>200   | SP<br>250    | SP<br>315    | SP<br>400   |
|----------------------------------------------------------|--------|-------------|-------------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|
| Displacement, cm³/rev [in³/rev]                          |        | 49,5 [3.0]  | 79,2 [4.83] | 99 [6.04]   | 123,8 [7.55] | 158,4 [9.66] | 198 [12.1]  | 247,5 [15.1] | 316,8 [19.3] | 396 [2416]  |
| Max. Speed,<br>[RPM]                                     | Cont.  | 1210        | 755         | 605         | 486          | 378          | 303         | 242          | 190          | 150         |
|                                                          | Int.*  | 1515        | 945         | 755         | 605          | 472          | 378         | 303          | 236          | 189         |
| Max. Torque<br>daNm [lb-in]                              | Cont.  | 9,4 [835]   | 15,1 [1340] | 19,3 [1710] | 23,7 [2100]  | 30 [2655]    | 30 [2655]   | 27,6 [2442]  | 29,5 [2610]  | 28,5 [2522] |
|                                                          | Int.*  | 11,9 [1050] | 19,5 [1725] | 23,7 [2100] | 29,8 [2640]  | 37,8 [3345]  | 36,5 [3230] | 35,5 [3142]  | 36,6 [4070]  | 36 [3185]   |
|                                                          | Peak** | 14 [1240]   | 22 [1950]   | 27 [2390]   | 36,5 [3230]  | 42 [3717]    | 53 [4690]   | 54 [4780]    | 59 [5222]    | 59 [5222]   |
| Max. Output<br>kW [HP]                                   | Cont.  | 9,9 [13.3]  | 9,9 [13.3]  | 9,9 [13.3]  | 9,9 [13.3]   | 9,9 [13.3]   | 9,5 [12.7]  | 6 [8.1]      | 4 [5.4]      | 3 [4]       |
|                                                          | Int.*  | 12,5 [16.8] | 12,5 [16.8] | 12,5 [16.8] | 12,5 [16.8]  | 12,5 [16.8]  | 12,5 [16.8] | 13,2 [17.7]  | 5,8 [7.8]    | 5 [6.7]     |
| Max. Pressure Drop<br>bar [PSI]                          | Cont.  | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]   | 140 [2030]   | 115 [1670]  | 85 [1233]    | 70 [1015]    | 55 [798]    |
|                                                          | Int.*  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 140 [2030]  | 110 [1450]   | 90 [1305]    | 70 [1015]   |
|                                                          | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 180 [2610]   | 160 [2320]   | 130 [1885]  |
| Max. Oil Flow<br>lpm [GPM]                               | Cont.  | 60 [15.9]   | 60 [15.9]   | 60 [15.9]   | 60 [15.9]    | 60 [15.9]    | 60 [15.9]   | 60 [15.9]    | 60 [15.9]    | 60 [15.9]   |
|                                                          | Int.*  | 75 [19.8]   | 75 [19.8]   | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]   |
| Max. Starting Pressure with<br>Unloaded Shaft, bar [PSI] |        | 10 [145]    | 10 [145]    | 10 [145]    | 9 [131]      | 8 [116]      | 7 [100]     | 6 [87]       | 5 [73]       | 5 [73]      |
| Min. Starting Torque, daNm [lb-in]                       |        | 7,7 [682]   | 14 [1240]   | 16,8 [1490] | 21 [1860]    | 28 [2478]    | 28,5 [2522] | 26,5 [2345]  | 26,5 [2345]  | 26,5 [2345] |
| Max. Inlet Pressure<br>bar [PSI]                         | Cont.  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                          | Int.*  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  |
|                                                          | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

- Intermittent speed and intermittent pressure must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
- Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.
- Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
- Recommended maximum system operating temperature is 82°C [180°F].
- To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA

Specification Data for SP... motors with SH shafts.

| Type                                                  |        | SP 50       | SP 80       | SP 100      | SP 125       | SP 160       | SP 200      | SP 250       | SP 315       | SP 400     |
|-------------------------------------------------------|--------|-------------|-------------|-------------|--------------|--------------|-------------|--------------|--------------|------------|
| Displacement, cm³/rev [in³/rev]                       |        | 49,5 [3.0]  | 79,2 [4.83] | 99 [6.04]   | 123,8 [7.55] | 158,4 [9.66] | 198 [12.1]  | 247,5 [15.1] | 316,8 [19.3] | 396 [2416] |
| Max. Speed, [RPM]                                     | Cont.  | 1210        | 755         | 605         | 486          | 378          | 303         | 242          | 190          | 150        |
|                                                       | Int.*  | 1515        | 945         | 755         | 605          | 472          | 378         | 303          | 236          | 189        |
| Max. Torque daNm [lb-in]                              | Cont.  | 9,4 [835]   | 15,1 [1340] | 19,3 [1710] | 23,7 [2100]  | 30 [2655]    | 36,6 [3240] | 38 [3360]    | 38 [3360]    | 36 [3190]  |
|                                                       | Int.*  | 11,9 [1050] | 19,5 [1725] | 23,7 [2100] | 29,8 [2640]  | 37,8 [3345]  | 45,6 [4035] | 45 [3980]    | 46 [3240]    | 46 [3240]  |
|                                                       | Peak** | 14 [1240]   | 22 [1950]   | 27 [2390]   | 36,5 [3230]  | 42 [3717]    | 53 [4690]   | 67 [5930]    | 85 [7523]    | 85 [7523]  |
| Max. Output kW [HP]                                   | Cont.  | 9,9 [13.3]  | 9,9 [13.3]  | 9,9 [13.3]  | 9,9 [13.3]   | 9,9 [13.3]   | 10,3 [13.8] | 8 [10.7]     | 6 [8.1]      | 4,8 [6.4]  |
|                                                       | Int.*  | 12,5 [16.8] | 12,5 [16.8] | 12,5 [16.8] | 12,5 [16.8]  | 12,5 [16.8]  | 15,3 [20.5] | 17,5 [23.5]  | 8,2 [10.9]   | 9,2 [12.3] |
| Max. Pressure Drop bar [PSI]                          | Cont.  | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]   | 140 [2030]   | 140 [2030]  | 110 [1450]   | 90 [1305]    | 70 [1015]  |
|                                                       | Int.*  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 140 [2030]   | 140 [2030]   | 90 [1305]  |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 180 [2610] |
| Max. Oil Flow lpm [GPM]                               | Cont.  | 60 [15.9]   | 60 [15.9]   | 60 [15.9]   | 60 [15.9]    | 60 [15.9]    | 60 [15.9]   | 60 [15.9]    | 60 [15.9]    | 60 [15.9]  |
|                                                       | Int.*  | 75 [19.8]   | 75 [19.8]   | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]  |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] |        | 10 [145]    | 10 [145]    | 10 [145]    | 9 [131]      | 8 [116]      | 7 [100]     | 6 [87]       | 5 [73]       | 5 [73]     |
| Min. Starting Torque, daNm [lb-in]                    |        | 7,7 [682]   | 14 [1240]   | 16,8 [1490] | 21 [1860]    | 28 [2478]    | 34,6 [3062] | 34,5 [3050]  | 35 [3098]    | 35 [3098]  |
| Max. Inlet Pressure bar [PSI]                         | Cont.  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540] |
|                                                       | Int.*  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900] |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260] |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

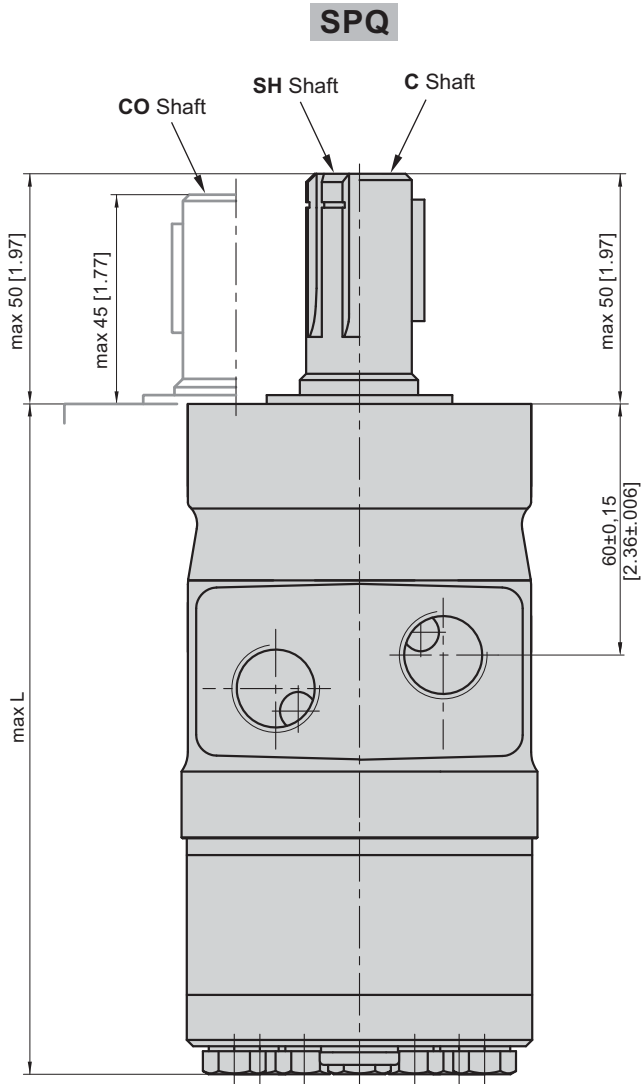
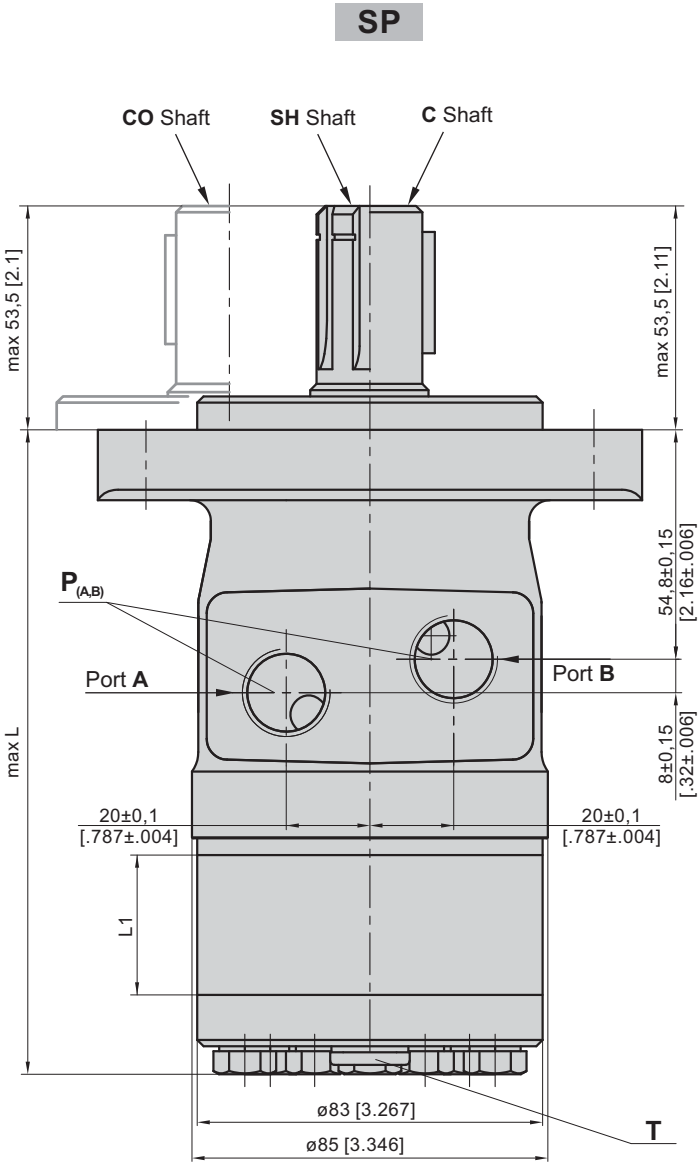
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS AND MOUNTING DATA



P<sub>(A,B)</sub>: 2xG1/2 - 18 mm [.709 in] depth

T : G1/4 - 12 mm [.47 in] depth

| Type   | L <sub>max</sub> , mm [in] | Type    | L <sub>max</sub> , mm [in] | L <sub>1</sub> , mm [in] |
|--------|----------------------------|---------|----------------------------|--------------------------|
| SP 50  | 128 [5.04]                 | SPQ 50  | 134 [5.28]                 | 6,67 [.26]               |
| SP 80  | 132 [5.19]                 | SPQ 80  | 138 [5.43]                 | 10,67 [.42]              |
| SP 100 | 134,5 [5.29]               | SPQ 100 | 140,9 [5.55]               | 13,33 [.52]              |
| SP 125 | 138 [5.43]                 | SPQ 125 | 144 [5.67]                 | 16,67 [.66]              |
| SP 160 | 142,5 [5.61]               | SPQ 160 | 148,9 [5.86]               | 21,33 [.84]              |
| SP 200 | 148 [5.83]                 | SPQ 200 | 154 [6.06]                 | 26,67 [1.05]             |
| SP 250 | 154,5 [6.08]               | SPQ 250 | 160,9 [6.33]               | 33,33 [1.31]             |
| SP 315 | 164 [6.46]                 | SPQ 315 | 170 [6.69]                 | 42,67 [1.68]             |
| SP 400 | 174,5 [6.87]               | SPQ 400 | 180,9 [7.12]               | 53,33 [2.10]             |

Standard Rotation

Viewed from Shaft End

Port A Pressurized - CW

Port B Pressurized - CCW

Reverse Rotation

Viewed from Shaft End

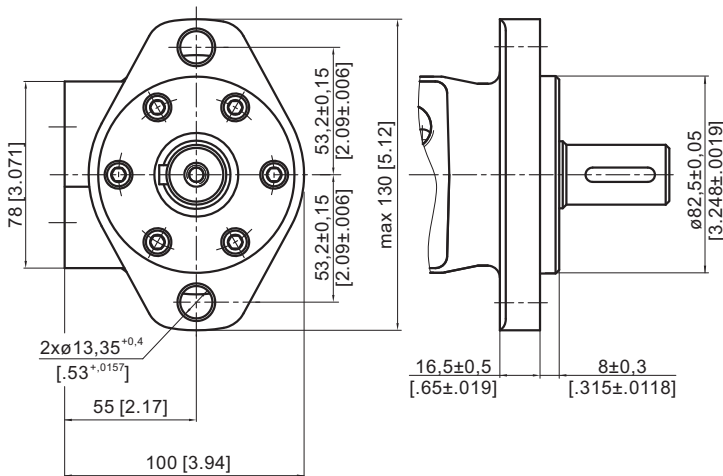
Port A Pressurized - CCW

Port B Pressurized - CW

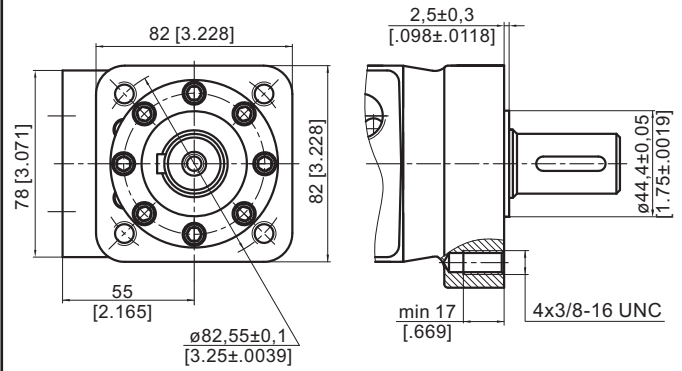


## MOUNTING

Oval Mount (2 Holes)

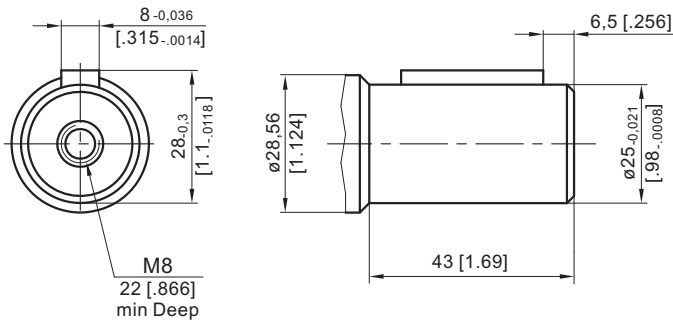


**Q** Square Mount  
(4 bolts)

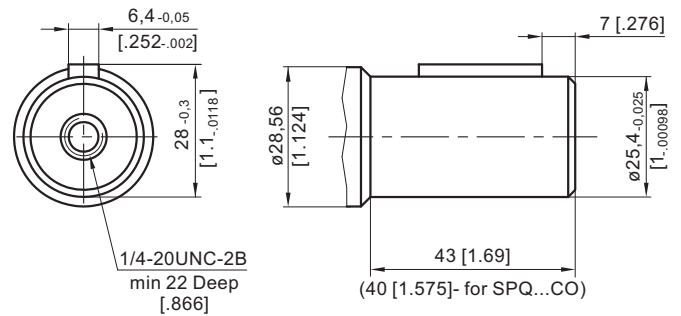


## SHAFT EXTENSIONS

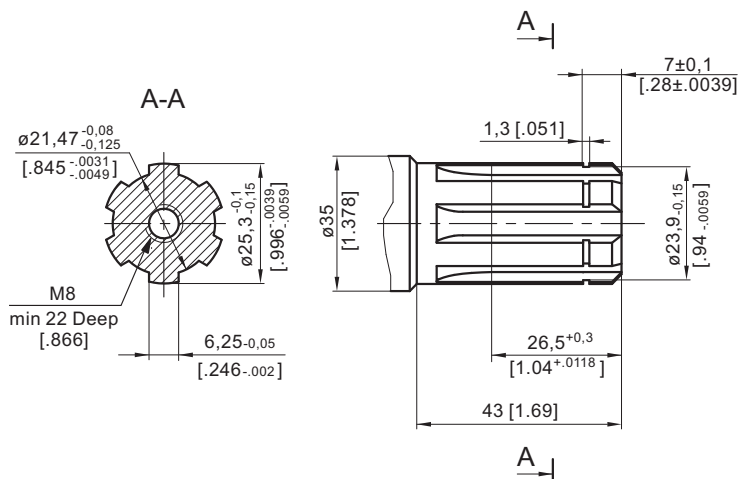
**C** - ø25 straight, Parallel key A8x7x30 DIN 6885  
Max. Torque 34 daNm [3010 lb-in]



**CO** - ø1" straight, Parallel key 1/4"x1/4"x1" BS46  
Max. Torque 34 daNm [3010 lb-in]

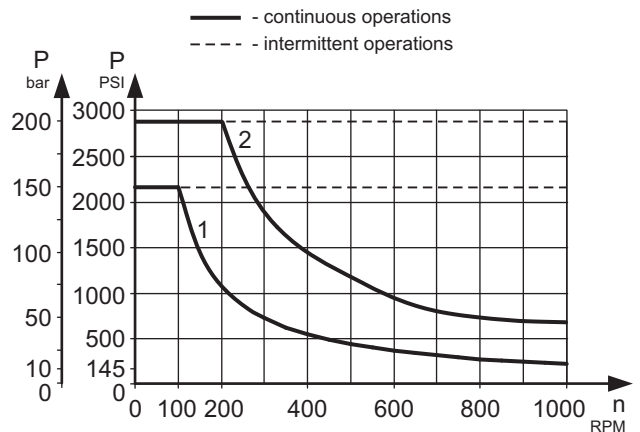


**SH** - splined, BS 2059 (SAE 6B)  
Max. Torque 40 daNm [3540 lb-in]



## MAX. PERMISSIBLE SHAFT SEAL PRESSURE

Max return pressure without drain line or  
max. pressure in drain line



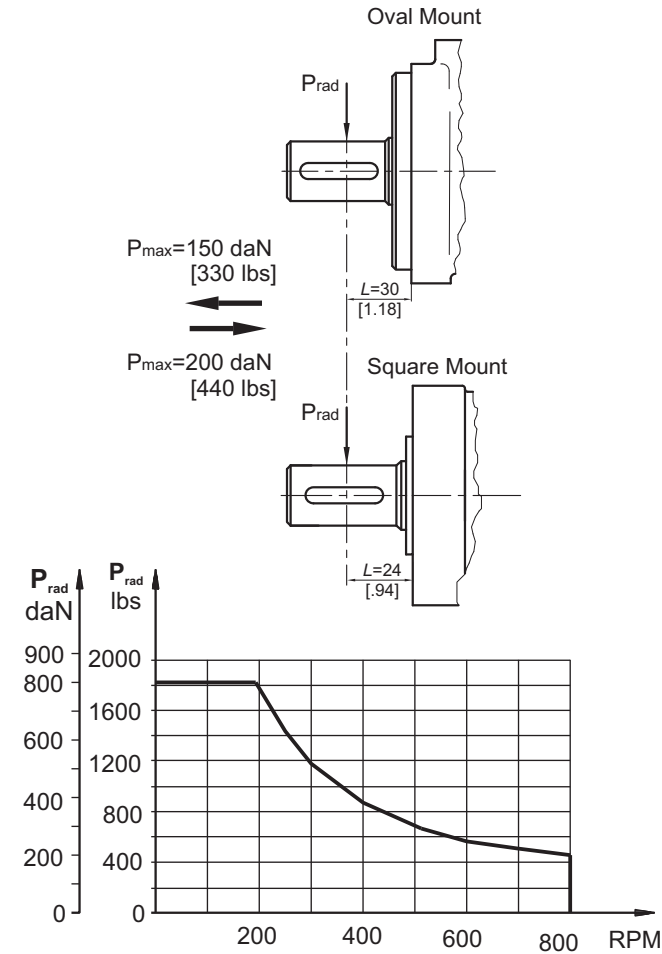
1: Curve for Standard Shaft Seal

2: Curve for High Pressure Seal ("U" Seal)



mm [in]

PERMISSIBLE SHAFT LOADS



Radial Shaft Load  $P_{rad}$  for C, CO Shaft Extensions  
by  $L=30\text{ mm}$  [1.18 in] (24 mm [.94 in])

The permissible radial shaft load depends on

- Speed (n)
- Distance (L) from the pointload to the mounting flange
- Mounting flange version

Oval mount: 
$$P_{rad} = \frac{800}{n} \times \frac{24300}{91,5+L} \text{ [daN]}^*$$

$$\left[ \frac{800}{\text{RPM}} \times \frac{2150}{3.6+L} \text{ [lbs]} \right]$$

Square mount: 
$$P_{rad} = \frac{800}{n} \times \frac{24300}{97,5+L} \text{ [daN]}^*$$

$$\left[ \frac{800}{\text{RPM}} \times \frac{2150}{3.84+L} \text{ [lbs]} \right]$$

\* $n \leq 200\text{RPM}$ ; max  $P_{rad}=800\text{ daN}$  [1800lbs]  
 $n \geq 200\text{RPM}$ ;  $L < 55\text{ mm}$  [2.2 in]

ORDER CODE

|    |   |   |   |   |   |   |
|----|---|---|---|---|---|---|
|    | 1 | 2 | 3 | 4 | 5 | 6 |
| SP |   |   |   |   |   |   |

Pos.1 - Mounting Flange

- omit
- Oval mount, two holes
- Q
- Square mount, four bolts - 3/8-16 UNC

Pos.2 - Displacement code\*

|     |                                 |
|-----|---------------------------------|
| 50  | - 49,5 cm³/rev [ 3.02 in³/rev]  |
| 80  | - 79,2 cm³/rev [ 4.83 in³/rev]  |
| 100 | - 99,0 cm³/rev [ 6.04 in³/rev]  |
| 125 | - 123,8 cm³/rev [ 7.55 in³/rev] |
| 160 | - 158,4 cm³/rev [ 9.66 in³/rev] |
| 200 | - 198,0 cm³/rev [12.10 in³/rev] |
| 250 | - 247,5 cm³/rev [15.10 in³/rev] |
| 315 | - 316,8 cm³/rev [19.30 in³/rev] |
| 400 | - 396,0 cm³/rev [24.16 in³/rev] |

Pos.3 - Shaft Extensions\*\*

- C
- ø25 straight, Parallel key A8x7x30 DIN6885
- CO
- ø1" straight, Parallel key 1/4"x1/4"x1 1/4" BS46
- SH
- ø25,3 splined, BS 2059 (SAE 6B)

Pos.4 - Shaft Seal Version

- omit
- Standard shaft seal
- U
- High pressure shaft seal

Pos.5 - Special Features (see page 119)

Pos.6 - Design Series

- omit
- Factory specified

NOTES:

- \* For the Function Diagrams data please look at "M+S Hydraulic" Catalogue for MP motors, pages 18÷24.
- \*\* The permissible output torque for shafts must not be exceeded!

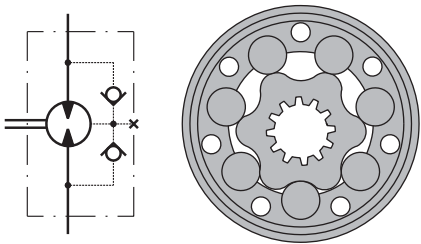
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS SR

M+S Hydraulic introduces a new version of hydraulic motors, type SR with new housing, integrated output shaft to the spool valve, check valves, high pressure shaft seal. The SR motors are suitable for a wide range of applications where compact and high efficient motors are required.

## CONTENTS

|                                     |       |
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| Specification data .....            | 51÷53 |
| Function diagrams .....             | 35 39 |
| Dimensions and mounting .....       | 54÷56 |
| Shaft extensions .....              | 57    |
| Permissible shaft Seal Pressure ... | 57    |
| Permissible shaft loads .....       | 58    |
| Order code .....                    | 58    |



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agriculture machines
- » Food industries
- » Grass cutting machinery etc.

## OPTIONS

- » Model - Spool valve, geroller
- » Flange mount - 2 hole oval flange; 6 hole oval flange; square flange
- » Side BSPP ports
- » Shafts- straight, splined and tapered
- » Shaft seal for high and low pressure
- » Other special features

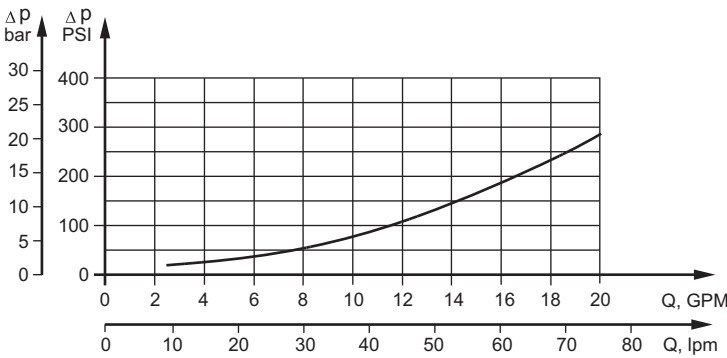
## GENERAL

|                                                   |                                                                 |                                    |
|---------------------------------------------------|-----------------------------------------------------------------|------------------------------------|
| Max. Displacement,                                | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                     | 397 [24.4]                         |
| Max. Speed,                                       | [RPM]                                                           | 970                                |
| Max. Torque,                                      | daNm [lb-in]                                                    | cont.: 60 [5310] int.: 69 [6107]   |
| Max. Output,                                      | kW [HP]                                                         | 15 [20.1]                          |
| Max. Pressure Drop,                               | bar [PSI]                                                       | cont.: 175 [2540] int.: 200 [2900] |
| Max. Oil Flow,                                    | lpm [GPM]                                                       | 75 [19.8]                          |
| Min. Speed,                                       | [RPM]                                                           | 10                                 |
| Pressure fluid                                    | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                 |                                    |
| Temperature range,                                | °C [°F]                                                         | -30÷90 [-22÷194]                   |
| Optimal Viscosity range, mm <sup>2</sup> /s [SUS] | 20÷75 [98÷347]                                                  |                                    |
| Filtration                                        | ISO code 20/16 (Min. recommended fluid filtration of 25 micron) |                                    |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



SPECIFICATION DATA

Specification Data for SR... motors with **C** and **CO** shafts.

| Type                                                  |        | SR 50       | SR 80       | SR 100      | SR 125       | SR 160       | SR 200        | SR 250        | SR 315        | SR 400     |
|-------------------------------------------------------|--------|-------------|-------------|-------------|--------------|--------------|---------------|---------------|---------------|------------|
| Displacement, cm³/rev [in³/rev]                       |        | 51,5 [3.14] | 80,3 [4.90] | 99,8 [6.09] | 125,7 [7.67] | 159,6 [9.74] | 199,8 [12.19] | 250,1 [15.26] | 315,7 [19.26] | 397 [24.4] |
| Max. Speed, [RPM]                                     | Cont.  | 775         | 750         | 600         | 475          | 375          | 300           | 240           | 190           | 150        |
|                                                       | Int.*  | 970         | 940         | 750         | 600          | 470          | 375           | 300           | 240           | 190        |
| Max. Torque daNm [lb-in]                              | Cont.  | 10 [900]    | 20 [1770]   | 24 [2125]   | 30 [2655]    | 29 [2566]    | 29 [2566]     | 30 [2655]     | 30 [2655]     | 30 [2655]  |
|                                                       | Int.*  | 13 [1150]   | 22 [1947]   | 28 [2480]   | 34 [3010]    | 39 [3450]    | 39 [3450]     | 39 [3450]     | 42 [3717]     | 40 [3540]  |
|                                                       | Peak** | 17 [1505]   | 27 [2390]   | 32 [2832]   | 37 [3275]    | 46 [4070]    | 56 [4960]     | 60 [5310]     | 61 [5400]     | 61 [5400]  |
| Max. Output kW [HP]                                   | Cont.  | 7 [9,4]     | 12,5 [17]   | 13 [17.4]   | 12,5 [17]    | 9 [12]       | 7,5 [10]      | 6 [8.1]       | 5 [6.7]       | 3,8 [5.1]  |
|                                                       | Int.*  | 8,5 [11,4]  | 15 [20.1]   | 15 [20.1]   | 14,5 [19.5]  | 12,5 [17]    | 10 [13.4]     | 8 [10.7]      | 6,5 [8.7]     | 6,1 [8.2]  |
| Max. Pressure Drop bar [PSI]                          | Cont.  | 140 [2030]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 120 [1740]   | 105 [1520]    | 80 [1160]     | 70 [1015]     | 55 [798]   |
|                                                       | Int.*  | 175 [2540]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 175 [2540]   | 140 [2030]    | 110 [1600]    | 100 [1450]    | 70 [1015]  |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]    | 200 [2900]    | 150 [2175]    | 115 [1668] |
| Max. Oil Flow lpm [GPM]                               | Cont.  | 40 [10.5]   | 60 [15.8]   | 60 [15.8]   | 60 [15.8]    | 60 [15.8]    | 60 [15.8]     | 60 [15.8]     | 60 [15.8]     | 60 [15.8]  |
|                                                       | Int.*  | 50 [13.2]   | 75 [19.8]   | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]     | 75 [19.8]     | 75 [19.8]     | 75 [19.8]  |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] |        | 10 [145]    | 10 [145]    | 10 [145]    | 9 [130]      | 7 [102]      | 5 [73]        | 4 [58]        | 3 [43.5]      | 3 [43.5]   |
| Min. Starting Torque, daNm [lb-in]                    |        | 8 [710]     | 15 [1330]   | 20 [1770]   | 24 [2124]    | 23 [2035]    | 23 [2035]     | 24 [2124]     | 26 [2300]     | 26 [2300]  |
| Max. Inlet Pressure bar [PSI]                         | Cont.  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]    | 175 [2540]    | 175 [2540]    | 175 [2540] |
|                                                       | Int.*  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]    | 200 [2900]    | 200 [2900]    | 200 [2900] |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]    | 225 [3260]    | 225 [3260]    | 225 [3260] |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA

Specification Data for SR... motors with **SH** shafts.

| Type                                                  |        | SR 50       | SR 80       | SR 100      | SR 125       | SR 160       | SR 200        | SR 250        | SR 315        | SR 400      |
|-------------------------------------------------------|--------|-------------|-------------|-------------|--------------|--------------|---------------|---------------|---------------|-------------|
| Displacement, cm³/rev [in³/rev]                       |        | 51,5 [3.14] | 80,3 [4.90] | 99,8 [6.09] | 125,7 [7.67] | 159,6 [9.74] | 199,8 [12.19] | 250,1 [15.26] | 315,7 [19.26] | 397 [24.4]  |
| Max. Speed, [RPM]                                     | Cont.  | 775         | 750         | 600         | 475          | 375          | 300           | 240           | 190           | 150         |
|                                                       | Int.*  | 970         | 940         | 750         | 600          | 470          | 375           | 300           | 240           | 190         |
| Max. Torque daNm [lb-in]                              | Cont.  | 10 [900]    | 20 [1770]   | 24 [2125]   | 30 [2655]    | 39 [3450]    | 38,5 [3410]   | 38 [3360]     | 39 [3450]     | 38 [3360]   |
|                                                       | Int.*  | 13 [1150]   | 22 [1947]   | 28 [2480]   | 34 [3010]    | 43 [3805]    | 46 [4070]     | 47 [4160]     | 48 [4248]     | 47 [4160]   |
|                                                       | Peak** | 17 [1505]   | 27 [2390]   | 32 [2832]   | 37 [3275]    | 46 [4070]    | 56 [4960]     | 60 [5310]     | 61 [5400]     | 61 [5400]   |
| Max. Output kW [HP]                                   | Cont.  | 7 [9,4]     | 12,5 [17]   | 13 [17.4]   | 12,5 [17]    | 11,5 [15.4]  | 9 [12]        | 8 [10.7]      | 5 [6.7]       | 4,8 [6.4]   |
|                                                       | Int.*  | 8,5 [11,4]  | 15 [20.1]   | 15 [20.1]   | 14,5 [19.5]  | 14 [18.8]    | 12 [16.1]     | 9,5 [12.7]    | 8 [10.7]      | 6,8 [9.1]   |
| Max. Pressure Drop bar [PSI]                          | Cont.  | 140 [2030]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 140 [2030]    | 110 [1600]    | 85 [1232]     | 70 [1015]   |
|                                                       | Int.*  | 175 [2540]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 175 [2540]    | 140 [2030]    | 115 [1668]    | 90 [1305]   |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]    | 200 [2900]    | 150 [2175]    | 115 [1668]  |
| Max. Oil Flow lpm [GPM]                               | Cont.  | 40 [10.5]   | 60 [15.8]   | 60 [15.8]   | 60 [15.8]    | 60 [15.8]    | 60 [15.8]     | 60 [15.8]     | 60 [15.8]     | 60 [15.8]   |
|                                                       | Int.*  | 50 [13.2]   | 75 [19.8]   | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]     | 75 [19.8]     | 75 [19.8]     | 75 [19.8]   |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] |        | 10 [145]    | 10 [145]    | 10 [145]    | 9 [130]      | 7 [102]      | 5 [73]        | 4 [58]        | 3 [43.5]      | 3 [43.5]    |
| Min. Starting Torque, daNm [lb-in]                    |        | 8 [710]     | 15 [1330]   | 20 [1770]   | 24 [2124]    | 32 [2832]    | 33 [2920]     | 31 [2740]     | 31,5 [2788]   | 31,5 [2788] |
| Max. Inlet Pressure bar [PSI]                         | Cont.  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]    | 175 [2540]    | 175 [2540]    | 175 [2540]  |
|                                                       | Int.*  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]    | 200 [2900]    | 200 [2900]    | 200 [2900]  |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]    | 225 [3260]    | 225 [3260]    | 225 [3260]  |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA

Specification Data for SR... motors with **K, CB, CA** shafts.

| Type                                                  |        | SR 50       | SR 80       | SR 100      | SR 125       | SR 160       | SR 200        | SR 250        | SR 315        | SR 400      |
|-------------------------------------------------------|--------|-------------|-------------|-------------|--------------|--------------|---------------|---------------|---------------|-------------|
| Displacement, cm³/rev [in³/rev]                       |        | 51,5 [3.14] | 80,3 [4.90] | 99,8 [6.09] | 125,7 [7.67] | 159,6 [9.74] | 199,8 [12.19] | 250,1 [15.26] | 315,7 [19.26] | 397 [24.4]  |
| Max. Speed, [RPM]                                     | Cont.  | 775         | 750         | 600         | 475          | 375          | 300           | 240           | 190           | 150         |
|                                                       | Int.*  | 970         | 940         | 750         | 600          | 470          | 375           | 300           | 240           | 190         |
| Max. Torque daNm [lb-in]                              | Cont.  | 10 [900]    | 20 [1770]   | 24 [2125]   | 30 [2655]    | 39 [3450]    | 45 [3983]     | 57 [5045]     | 57 [5045]     | 60 [5310]   |
|                                                       | Int.*  | 13 [1150]   | 22 [1947]   | 28 [2480]   | 34 [3010]    | 43 [3805]    | 50 [4425]     | 61 [5400]     | 69 [6107]     | 69 [6107]   |
|                                                       | Peak** | 17 [1505]   | 27 [2390]   | 32 [2832]   | 37 [3275]    | 46 [4070]    | 56 [4960]     | 71 [6284]     | 84 [7434]     | 87 [8700]   |
| Max. Output kW [HP]                                   | Cont.  | 7 [9,4]     | 12,5 [17]   | 13 [17.4]   | 12,5 [17]    | 11,5 [15.4]  | 11 [14.7]     | 10 [13.4]     | 9 [12]        | 7,8 [10.5]  |
|                                                       | Int.*  | 8,5 [11,4]  | 15 [20.1]   | 15 [20.1]   | 14,5 [19.5]  | 14 [18.8]    | 13 [17.4]     | 12 [16.1]     | 10 [13.4]     | 10,6 [14.2] |
| Max. Pressure Drop bar [PSI]                          | Cont.  | 140 [2030]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]    | 175 [2540]    | 135 [1958]    | 110 [1600]  |
|                                                       | Int.*  | 175 [2540]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]    | 200 [2900]    | 175 [2540]    | 140 [2030]  |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]    | 225 [3260]    | 210 [3045]    | 175 [2540]  |
| Max. Oil Flow lpm [GPM]                               | Cont.  | 40 [10.5]   | 60 [15.8]   | 60 [15.8]   | 60 [15.8]    | 60 [15.8]    | 60 [15.8]     | 60 [15.8]     | 60 [15.8]     | 60 [15.8]   |
|                                                       | Int.*  | 50 [13.2]   | 75 [19.8]   | 75 [19.8]   | 75 [19.8]    | 75 [19.8]    | 75 [19.8]     | 75 [19.8]     | 75 [19.8]     | 75 [19.8]   |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] |        | 10 [145]    | 10 [145]    | 10 [145]    | 9 [130]      | 7 [102]      | 5 [73]        | 4 [58]        | 3 [43.5]      | 3 [43.5]    |
| Min. Starting Torque, daNm [lb-in]                    |        | 8 [710]     | 15 [1330]   | 20 [1770]   | 24 [2124]    | 32 [2832]    | 41 [3630]     | 50 [4425]     | 50 [4425]     | 50 [4425]   |
| Max. Inlet Pressure bar [PSI]                         | Cont.  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]    | 175 [2540]    | 175 [2540]    | 175 [2540]  |
|                                                       | Int.*  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]    | 200 [2900]    | 200 [2900]    | 200 [2900]  |
|                                                       | Peak** | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]    | 225 [3260]    | 225 [3260]    | 225 [3260]  |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

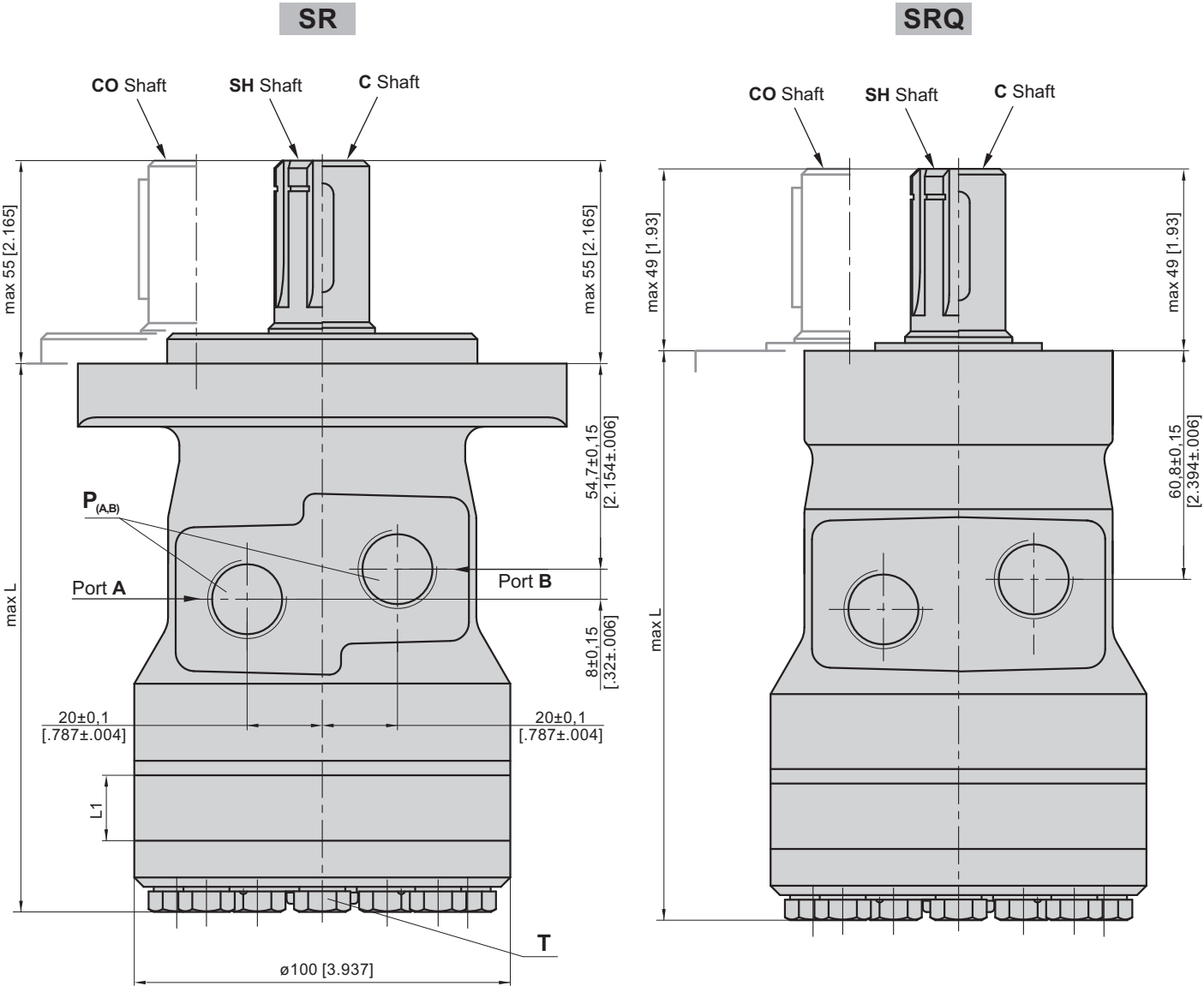
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS AND MOUNTING DATA



**P<sub>(A,B)</sub>**: 2xG1/2 - 18 mm [.709 in] depth  
**T** : G1/4 - 12 mm [.47 in] depth

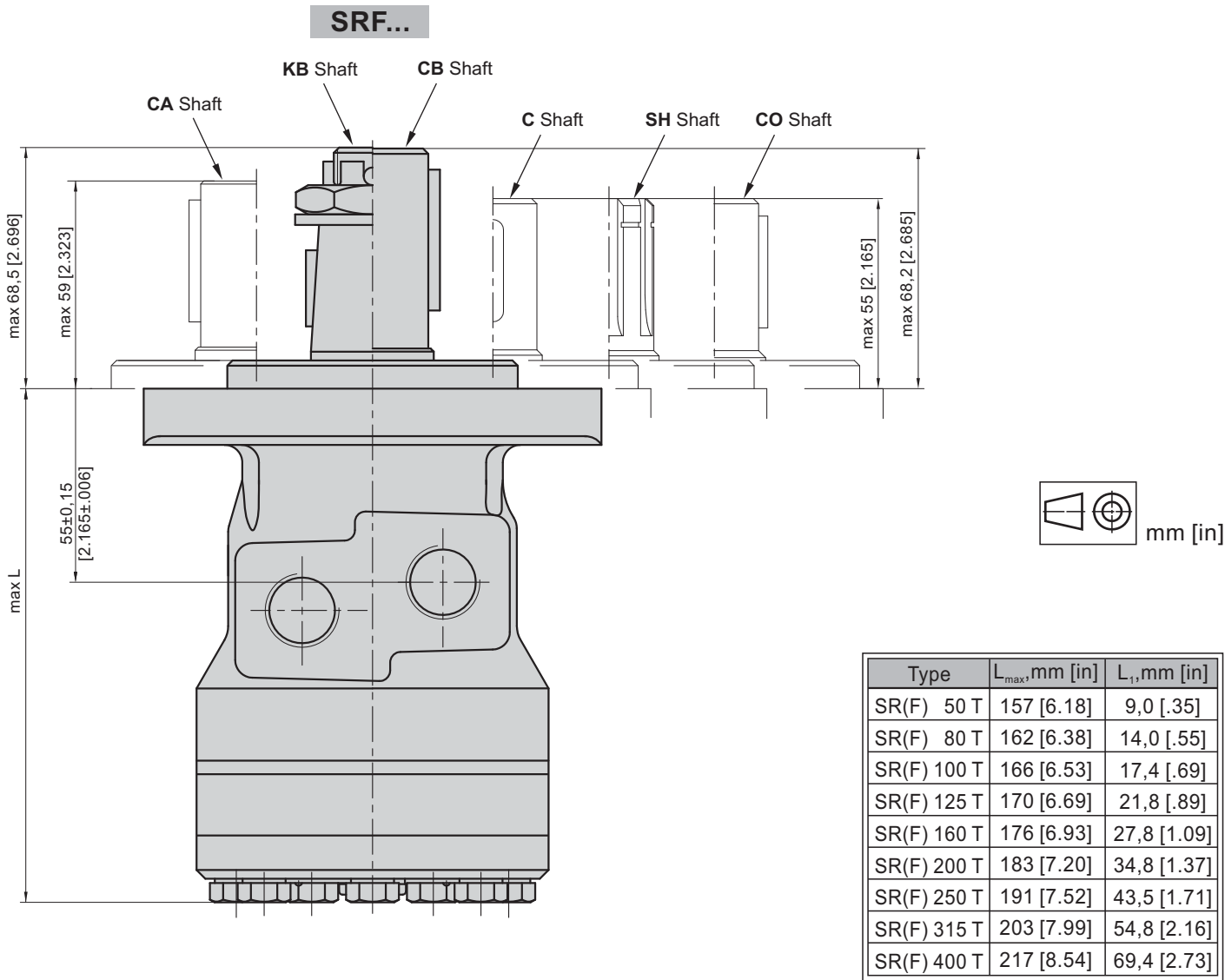
**Standard Rotation**  
 Viewed from Shaft End  
 Port **A** Pressurized - **CW**  
 Port **B** Pressurized - **CCW**

**Reverse Rotation**  
 Viewed from Shaft End  
 Port **A** Pressurized - **CCW**  
 Port **B** Pressurized - **CW**

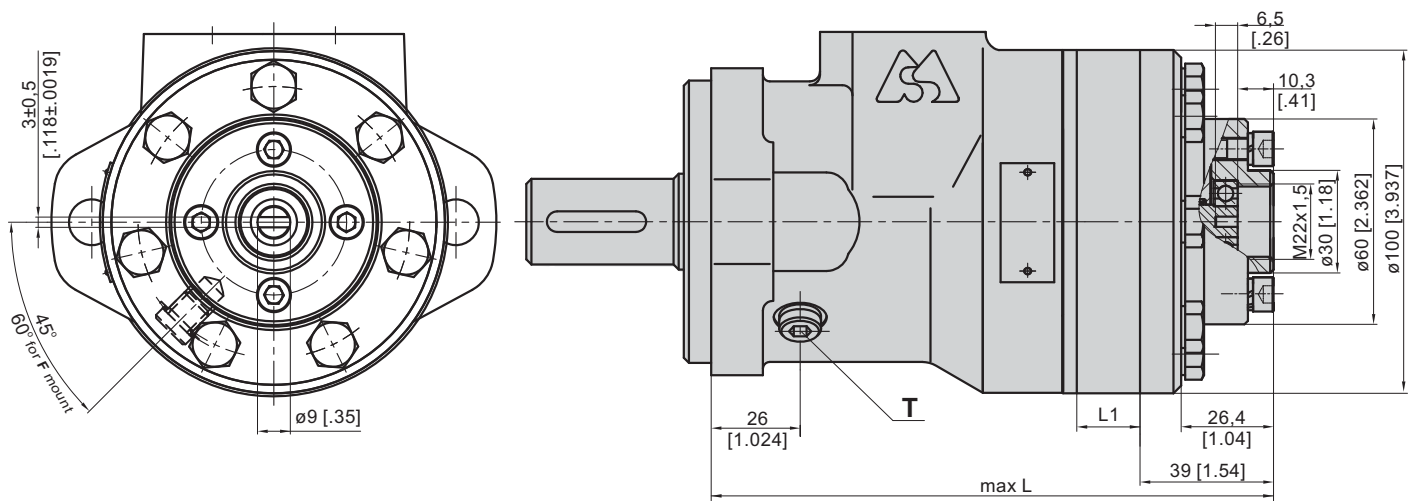
| Type      | L <sub>max</sub> ,mm [in] | Type    | L <sub>max</sub> ,mm [in] | L <sub>1</sub> ,mm [in] |
|-----------|---------------------------|---------|---------------------------|-------------------------|
| SR(F) 50  | 138 [5.43]                | SRQ 50  | 144 [5.67]                | 9,0 [.35]               |
| SR(F) 80  | 143 [5.63]                | SRQ 80  | 149 [5.87]                | 14,0 [.55]              |
| SR(F) 100 | 146,5 [5.77]              | SRQ 100 | 152,6 [6.0]               | 17,4 [.69]              |
| SR(F) 125 | 151 [5.94]                | SRQ 125 | 157 [6.18]                | 21,8 [.89]              |
| SR(F) 160 | 157 [6.18]                | SRQ 160 | 163 [6.42]                | 27,8 [1.09]             |
| SR(F) 200 | 164 [6.46]                | SRQ 200 | 170 [6.69]                | 34,8 [1.37]             |
| SR(F) 250 | 172,5 [6.79]              | SRQ 250 | 178,5 [7.03]              | 43,5 [1.71]             |
| SR(F) 315 | 184 [7.24]                | SRQ 315 | 190 [7.48]                | 54,8 [2.16]             |
| SR(F) 400 | 198,5 [7.81]              | SRQ 400 | 205,5 [8.9]               | 69,4 [2.73]             |



DIMENSIONS AND MOUNTING DATA

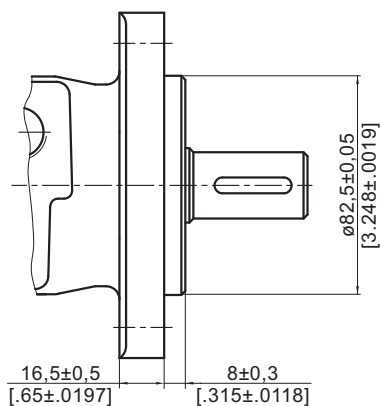
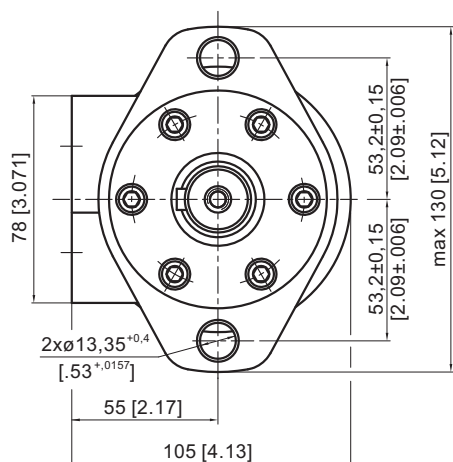


SR(F)...T

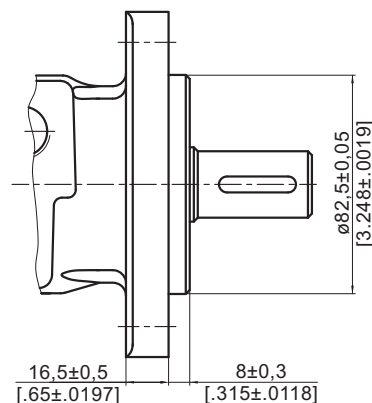
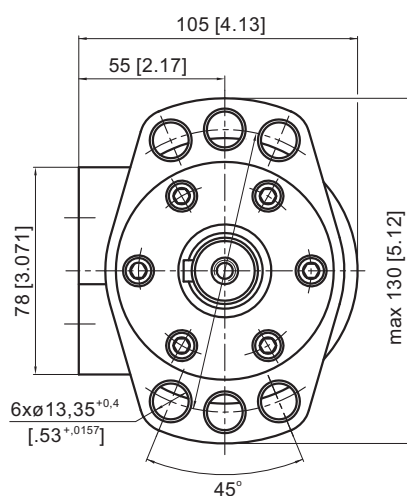


T : G1/8 - 10 mm [.39 in] depth for SR(F)...T

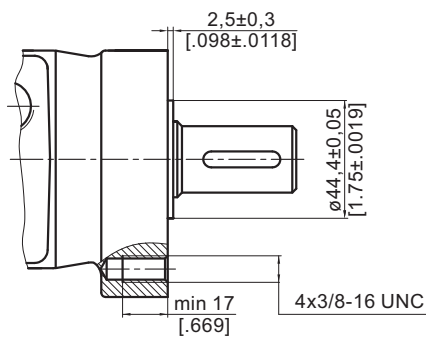
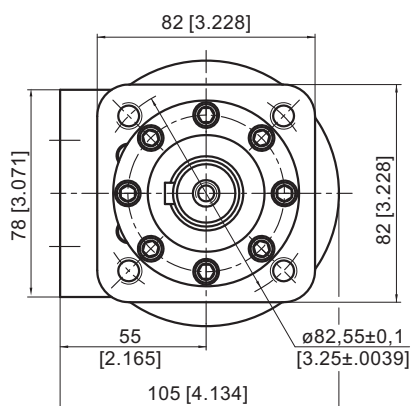
### Oval Mount (2 Holes)



**F** Oval Mount (6 holes)

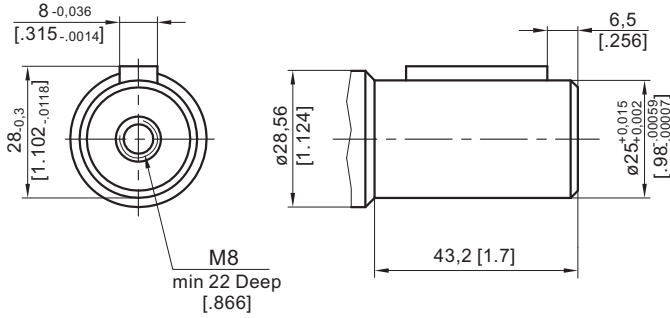


**Q** Square Mount  
(4 bolts)

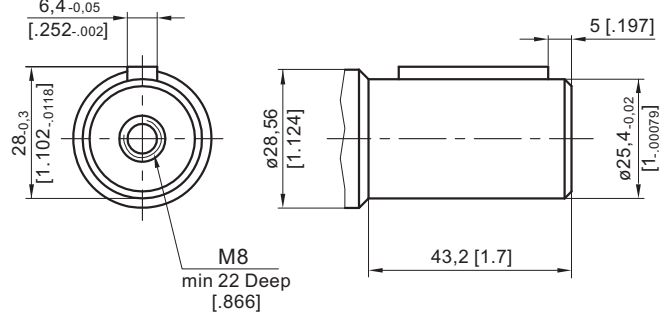


## SHAFT EXTENSIONS

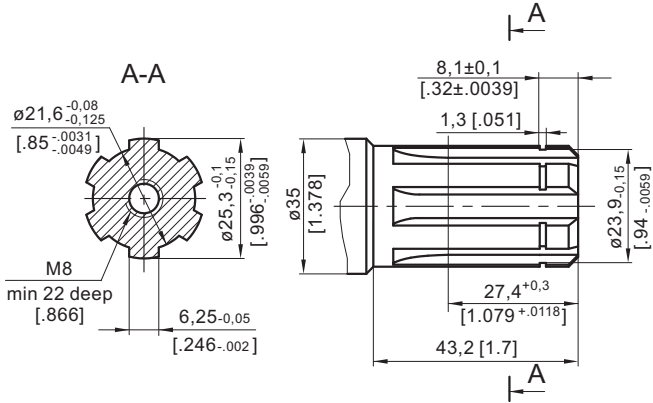
**C** -  $\varnothing 25$  straight, Parallel key A8x7x30 DIN 6885  
Max. Torque 34 daNm [3010 lb-in]



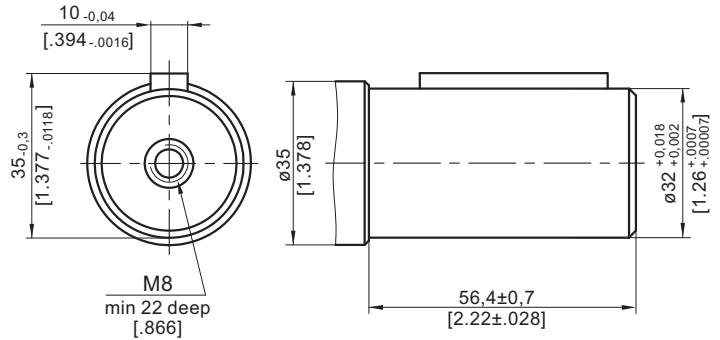
**CO** -  $\varnothing 1"$  straight, Parallel key  $\frac{1}{4} \times \frac{1}{4} \times 1\frac{1}{4}$  BS46  
Max. Torque 34 daNm [3010 lb-in]



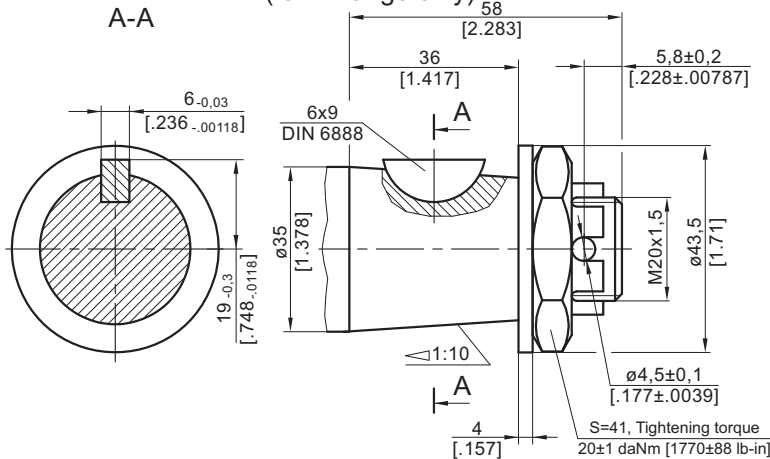
**SH** - splined, BS 2059 (SAE 6B)  
Max. Torque 40 daNm [3540 lb-in]



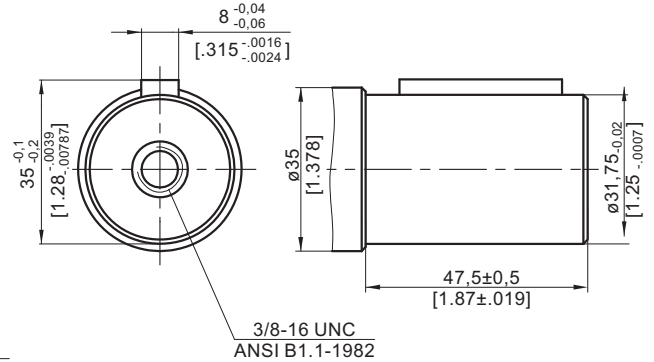
**CB** -  $\varnothing 32$  straight, Parallel key 10x8x40 DIN 6885  
Max. Torque 77 daNm [6815 lb-in]  
(for F-flange only)



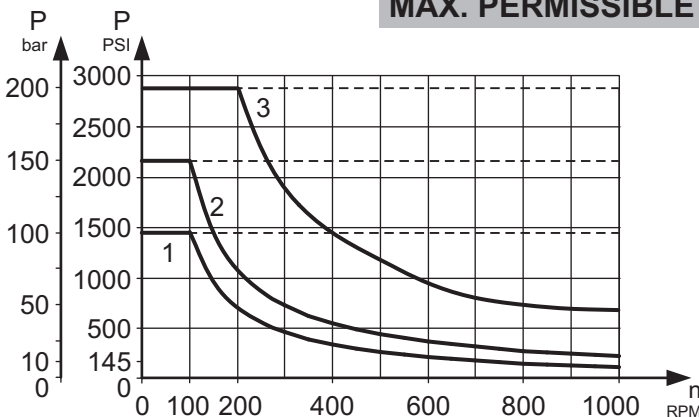
**K** - tapered 1:10, Woodruff key 6x9 DIN 6888  
Max. Torque 95 daNm [8410 lb-in]  
(for F-flange only)



**CA** -  $\varnothing 1\frac{1}{4}"$  straight, Parallel key  $\frac{5}{16} \times \frac{5}{16} \times 1\frac{1}{4}$  BS46  
Max. Torque 77 daNm [6815 lb-in]  
(for F-flange only)



## MAX. PERMISSIBLE SHAFT SEAL PRESSURE



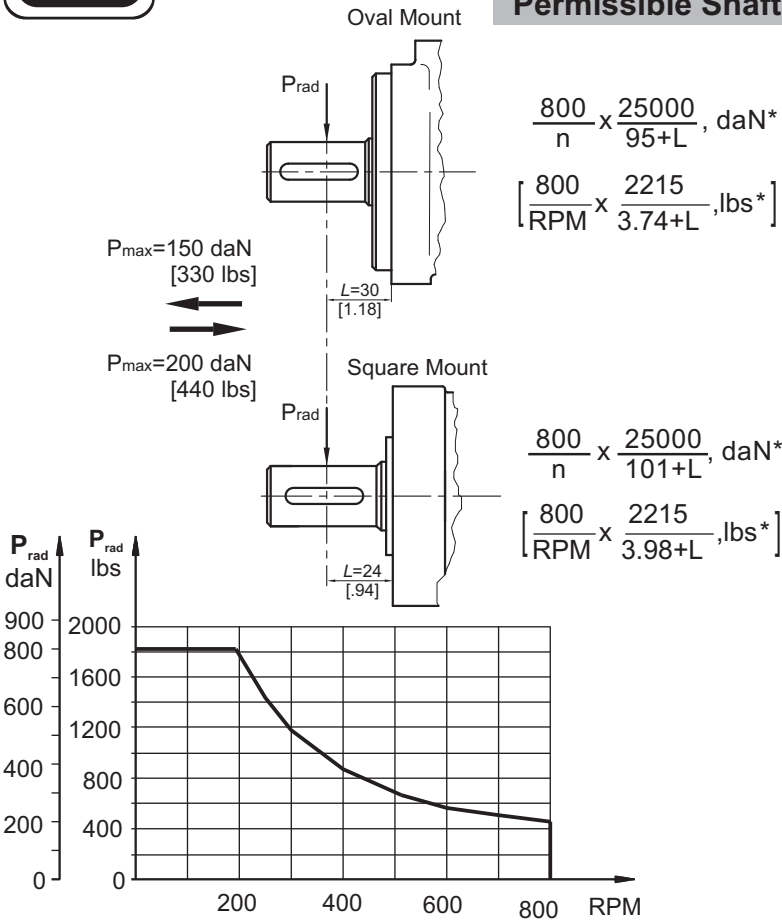
Max return pressure without drain line or max. pressure in drain line

— - continuous operations  
- - - - intermittent operations

- 1: Curve for Standard Shaft Seal for **K**, **CA**, **CB** shafts
- 2: Curve for Standard Shaft Seal for **C**, **CO**, **SH** shafts
- 3: Curve for High Pressure Seal ("U" Seal) for **C**, **CO**, **SH** shafts. Not applicable for **K**, **CA** and **CB** shafts!



Permissible Shaft Loads SR



Radial Shaft Load  $P_{rad}$  for C, CO Shaft Extensions  
by  $L=30\text{ mm}$  [1.18 in] (24 mm [.94 in])

The permissible radial shaft load  $P_{rad}$  depends on  
the speed  $n$ , RPM , distance  $L$  from the point of  
load to the mounting flange and shaft version.

\*  $n \leq 200\text{ RPM}$ ; max  $P_{rad}=800\text{ daN}$  [1800 lbs]  
 $n \geq 200\text{ RPM}$ ;  $L < 55\text{ mm}$  [2.2 in]

ORDER CODE

|    |   |   |   |   |   |   |   |
|----|---|---|---|---|---|---|---|
|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SR |   |   |   |   |   |   |   |

Pos.1 - Mounting Flange

- omit - Oval mount, two holes
- F - Oval mount, six holes
- Q - Square mount, four bolts - 3/8-16 UNC

Pos.2 - Displacement code\*\*

|     |                                 |
|-----|---------------------------------|
| 50  | - 51,5 cm³/rev [ 3.14 in³/rev]  |
| 80  | - 80,3 cm³/rev [ 4.90 in³/rev]  |
| 100 | - 99,8 cm³/rev [ 6.09 in³/rev]  |
| 125 | - 125,7 cm³/rev [ 7.67 in³/rev] |
| 160 | - 159,6 cm³/rev [ 9.74 in³/rev] |
| 200 | - 199,8 cm³/rev [12.19 in³/rev] |
| 250 | - 250,1 cm³/rev [15.26 in³/rev] |
| 315 | - 315,7 cm³/rev [19.26 in³/rev] |
| 400 | - 397,0 cm³/rev [24.40 in³/rev] |

Pos.3 - Shaft Extensions\*\*

|     |                                                          |
|-----|----------------------------------------------------------|
| C   | - ø25 straight, Parallel key A8x7x30 DIN6885             |
| CO  | - ø1" straight, Parallel key 1/4"x1/4"x1 1/4" BS46       |
| SH  | - ø25,3 splined, BS 2059 (SAE 6B)                        |
| K*  | - tapered 1:10, Woodruff key 6x9 DIN 6888                |
| CA* | - ø1 1/4" straight, Parallel key 5/16"x5/16"x1 1/4" Bs46 |
| CB* | - ø32 straight, Parallel key 10x8x40 DIN 6885            |

Pos.4 - Shaft Seal Version

- omit - Standad shaft seal
- U - High pressure shaft seal (Not for K,CA,CB Shafts)

Pos.5 - Tacho Connection\*\*\*

- omit - Without Tacho Connection
- T - With Tacho Connection (Not for Q flange and K, CA, CB shafts)

Pos.6 - Special Features (see page 119)

Pos.7 - Design Series

- omit - Factory specified

NOTES:

- \* For "F"-flange only!
- \*\* The permissible output torque for shafts must not be exceeded!
- \*\*\* Radial or axial load on tacho shaft must be avoided. Max. torque on tacho shaft 0,1 daNm [.885 lb-in]. Max. cont. return pressure without drain line 20 bar [290 PSI].

For the Function Diagrams data please look at  
"M+S Hydraulic" Catalogue for MR motors, pages 35÷39.

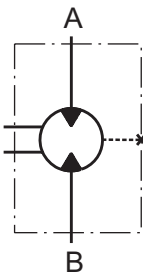
The hydraulic motors are mangano-phosphatized  
as standard.

# HYDRAULIC MOTORS MRNA



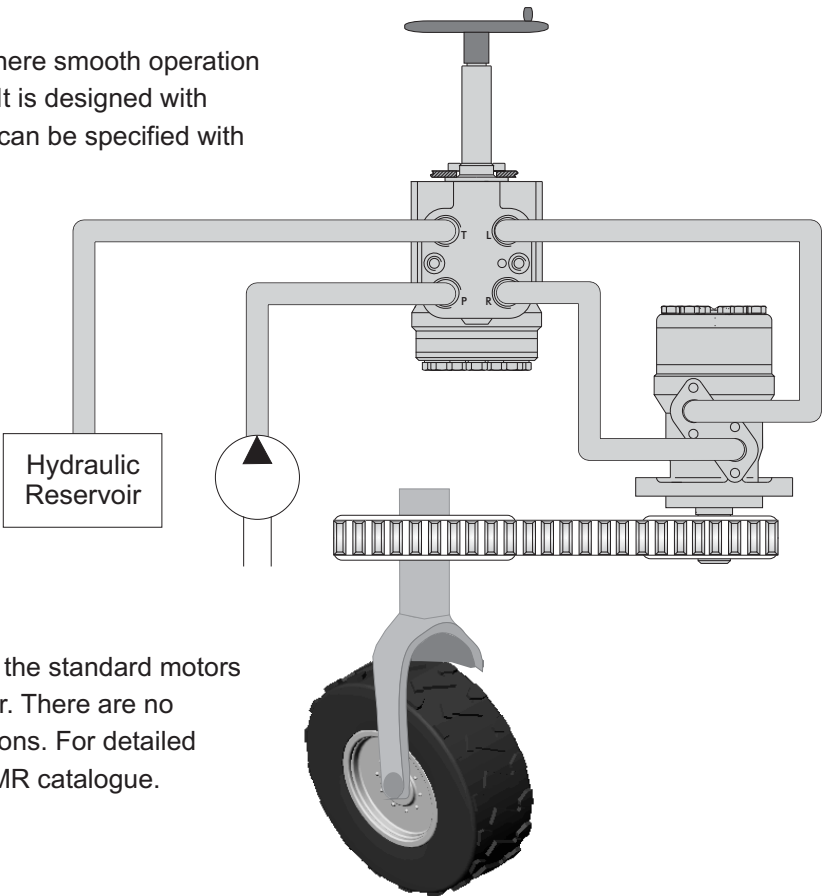
## APPLICATION

- » Actuator motor as driving-motor for steering mechanism of the the three-wheel vehicles;
- » For conveyors (series connection);
- » Dosing motor etc.



MRNA is suitable for driven mechanism where smooth operation low speed and high pressure is demanded. It is designed with separated output shaft and spool valve and can be specified with low internal leakage.

- » Good start-up characteristics;
- » Precise control of the Torque at low small flow.
- » Smooth operation at high pressure and small oil flow;
- » High volumetric efficiency.



The main technical features correspond to the standard motors series MR ø28,56 [1.124 in.] sealing diameter. There are no changes in the overall and mounting dimensions. For detailed technical and mounting data please refer to MR catalogue.

## SPECIFICATION DATA

| Code     | Displacement<br>cm <sup>3</sup> /rev<br>[in <sup>3</sup> /rev] | Max. Speed<br>[RPM] | Max. Torque<br>daNm [lb-in] |                |                |              | Max. Output<br>kW [HP] |                |               |                | Max. Pressure<br>Drop, bar [PSI] |               |               |               | Max. Oil<br>Flow, lpm<br>[GPM] |
|----------|----------------------------------------------------------------|---------------------|-----------------------------|----------------|----------------|--------------|------------------------|----------------|---------------|----------------|----------------------------------|---------------|---------------|---------------|--------------------------------|
|          |                                                                |                     | C, CO shafts                |                | SH, SA shafts  |              | C, CO shafts           |                | SH, SA shafts |                | C, CO shafts                     |               | SH, SA shafts |               |                                |
|          |                                                                |                     | cont.                       | int*           | cont.          | int*         | cont.                  | int*           | cont.         | int*           | cont.                            | int*          | cont.         | int*          |                                |
| MRNA 50  | 51,5<br>[3.14]                                                 | 200                 | 10<br>[885]                 | 13<br>[1150]   | 10<br>[885]    | 13<br>[1150] | 2,0<br>[2.68]          | 2,5<br>[3.35]  | 2,0<br>[2.68] | 2,5<br>[3.35]  | 140<br>[2030]                    | 175<br>[2540] | 140<br>[2030] | 175<br>[2540] | 10,5<br>[2.8]                  |
| MRNA 80  | 80,3<br>[4.9]                                                  | 200                 | 20<br>[1770]                | 22<br>[1940]   | 20<br>[1770]   | 22<br>[1940] | 3,0<br>[4.02]          | 3,5<br>[4.69]  | 3,0<br>[4.02] | 3,5<br>[4.69]  | 175<br>[2540]                    | 200<br>[2900] | 175<br>[2540] | 200<br>[2900] | 16<br>[4.2]                    |
| MRNA 100 | 99,8<br>[6.09]                                                 | 200                 | 24<br>2120                  | 28<br>[2480]   | 24<br>2120     | 28<br>[2480] | 4,5<br>[6.03]          | 5,0<br>[6.71]  | 4,5<br>[6.03] | 5,0<br>[6.71]  | 175<br>[2540]                    | 200<br>[2900] | 175<br>[2540] | 200<br>[2900] | 20<br>[5.3]                    |
| MRNA 125 | 125,7<br>[7.67]                                                | 200                 | 30<br>[2650]                | 34<br>[3000]   | 30<br>[2650]   | 34<br>[3000] | 5,5<br>[7.37]          | 6,0<br>[8.05]  | 5,5<br>[7.37] | 6,0<br>[8.05]  | 175<br>[2540]                    | 200<br>[2900] | 175<br>[2540] | 200<br>[2900] | 25<br>[6.6]                    |
| MRNA 160 | 159,6<br>[9.74]                                                | 200                 | 29<br>[2560]                | 39<br>[3450]   | 39<br>[3450]   | 43<br>[3800] | 5,0<br>[6.71]          | 6,5<br>[8.05]  | 6,0<br>[8.05] | 7,5<br>[10.05] | 120<br>[1740]                    | 175<br>[2540] | 175<br>[2540] | 200<br>[2900] | 32<br>[8.5]                    |
| MRNA 200 | 199,8<br>[12.19]                                               | 200                 | 29<br>[2560]                | 38,5<br>[3400] | 38,5<br>[3400] | 46<br>[4070] | 5,0<br>[6.71]          | 7,0<br>[9.39]  | 6,5<br>[8.72] | 9,0<br>[12.06] | 105<br>[1520]                    | 140<br>[2030] | 140<br>[2030] | 175<br>[2540] | 40<br>[10.5]                   |
| MRNA 250 | 250,1<br>[15.26]                                               | 200                 | 30<br>[2650]                | 39<br>[3450]   | 39<br>[3450]   | 47<br>[4160] | 5,0<br>[6.71]          | 7,0<br>[9.39]  | 6,0<br>[8.05] | 9,0<br>[12.06] | 80<br>[1160]                     | 110<br>[1600] | 110<br>[1600] | 140<br>[2030] | 50<br>[13.2]                   |
| MRNA 315 | 315,7<br>[19.26]                                               | 190                 | 30<br>[2650]                | 42<br>[3720]   | 36<br>[3450]   | 47<br>[4160] | 5,0<br>[6.71]          | 7,5<br>[10.05] | 6,0<br>[8.05] | 8,5<br>[11.4]  | 70<br>[1020]                     | 100<br>[1450] | 85<br>[1230]  | 115<br>[1670] | 65<br>[17.2]                   |
| MRNA 400 | 397,0<br>[24.4]                                                | 150                 | 30<br>[2650]                | 40<br>[3540]   | 38<br>[3260]   | 47<br>[4160] | 4,0<br>[5.36]          | 6,5<br>[8.72]  | 6,0<br>[8.05] | 7,0<br>[9.39]  | 55<br>[800]                      | 70<br>[1015]  | 65<br>[940]   | 90<br>[1300]  | 60<br>[15.8]                   |

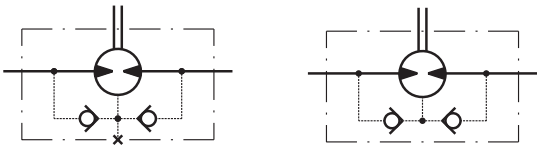
\* Intermittent operation: the permissible values may occur for max. 10% of every minute.

# HYDRAULIC MOTORS MRFL

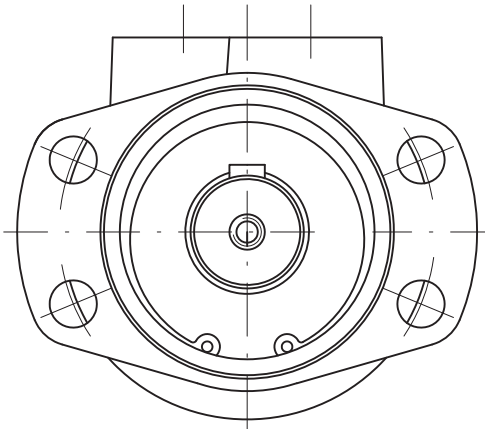
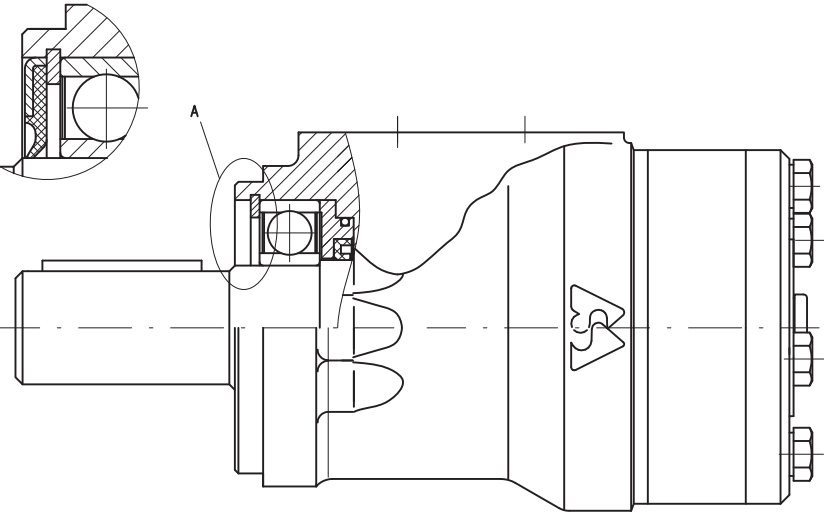
The hydraulic motors type MRFL... and MLHRFL... are designed to be used in operating modes with peak radial loads of the output shaft (especially at starting and stopping) at direct drive of wheels or mechanisms (without clutch or gearbox).

The radial loads are borne by a radial ball bearing which is mounted on the shaft of the hydraulic motor.

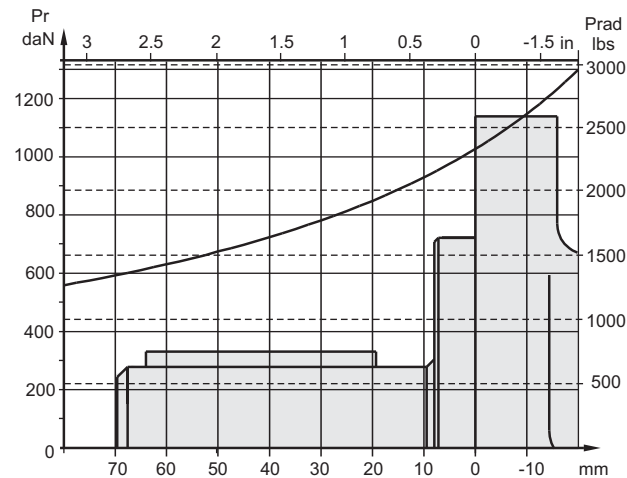
The main technical features correspond to the standard motors series MRF  $\varnothing 35$  mm [1.378 in] sealing diameter. There are no changes in the overall and mounting dimensions. For detailed technical and mounting data please refer to MR catalogue.



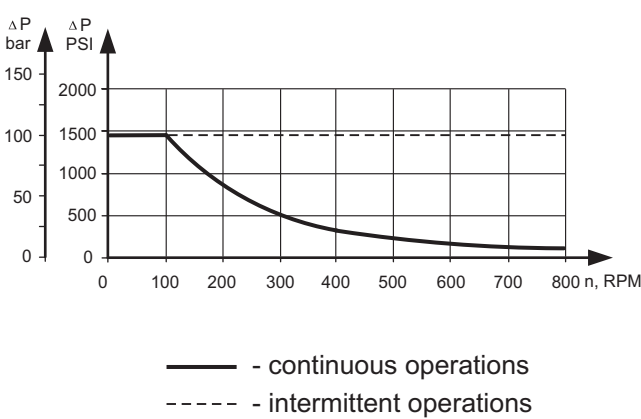
A  
Version D  
With Dust Seal



## PERMISSIBLE SHAFT LOADS



## MAX. PERMISSIBLE SHAFT SEAL PRESSURE



ORDER CODE

|    |   |   |   |   |   |   |   |   |   |    |
|----|---|---|---|---|---|---|---|---|---|----|
|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| MR |   |   |   |   |   |   |   |   |   |    |

Pos.1 - Mounting Flange

F

- Oval mount, four holes

Pos.2 - Option (bearings)

L

- with ball bearing

Pos.3 - Port type

omit

- Side ports

E

- Rear ports

Pos.4 - Displacement code

- |     |                                                           |
|-----|-----------------------------------------------------------|
| 50  | - 51,5 cm <sup>3</sup> /rev [ 3.14 in <sup>3</sup> /rev]  |
| 80  | - 80,3 cm <sup>3</sup> /rev [ 4.90 in <sup>3</sup> /rev]  |
| 100 | - 99,8 cm <sup>3</sup> /rev [ 6.09 in <sup>3</sup> /rev]  |
| 125 | - 125,7 cm <sup>3</sup> /rev [ 7.67 in <sup>3</sup> /rev] |
| 160 | - 159,6 cm <sup>3</sup> /rev [ 9.74 in <sup>3</sup> /rev] |
| 200 | - 199,8 cm <sup>3</sup> /rev [12.19 in <sup>3</sup> /rev] |
| 250 | - 250,1 cm <sup>3</sup> /rev [15.26 in <sup>3</sup> /rev] |
| 315 | - 315,7 cm <sup>3</sup> /rev [19.26 in <sup>3</sup> /rev] |
| 400 | - 397,0 cm <sup>3</sup> /rev [24.40 in <sup>3</sup> /rev] |

Pos. 5 - Shaft Extensions\*(see page 28)

- |    |                                                      |
|----|------------------------------------------------------|
| CB | - ø32 straight, Parallel key A10x8x45 DIN6885        |
| KB | - ø35 tapered 1:10, Parallel key B6x6x20 DIN6885     |
| SB | - splined A 25x22 DIN 5482                           |
| OB | - ø1¼" tapered1:8, Parallel key 5⁄16"x5⁄16"x1¼" BS46 |
| HB | - ø1¼" splined 14T ANSI B92.1 - 1976                 |

Pos. 6 - Dust Seal

omit

- without dust seal

D

- with dust seal

Pos. 7 - Drain Port

omit

- with drain port

1

- without drain port

Pos. 8 - Ports

omit

- BSPP (ISO 228)

M

- Metric (ISO 262)

Pos. 9 - Design Series

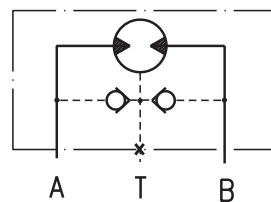
omit

- Factory specified

\* The permissible output torque for shafts must not be exceeded!

The hydraulic motors are mangano-phosphatized as standard.

## Hydraulic motors with Dual shaft type MRB...



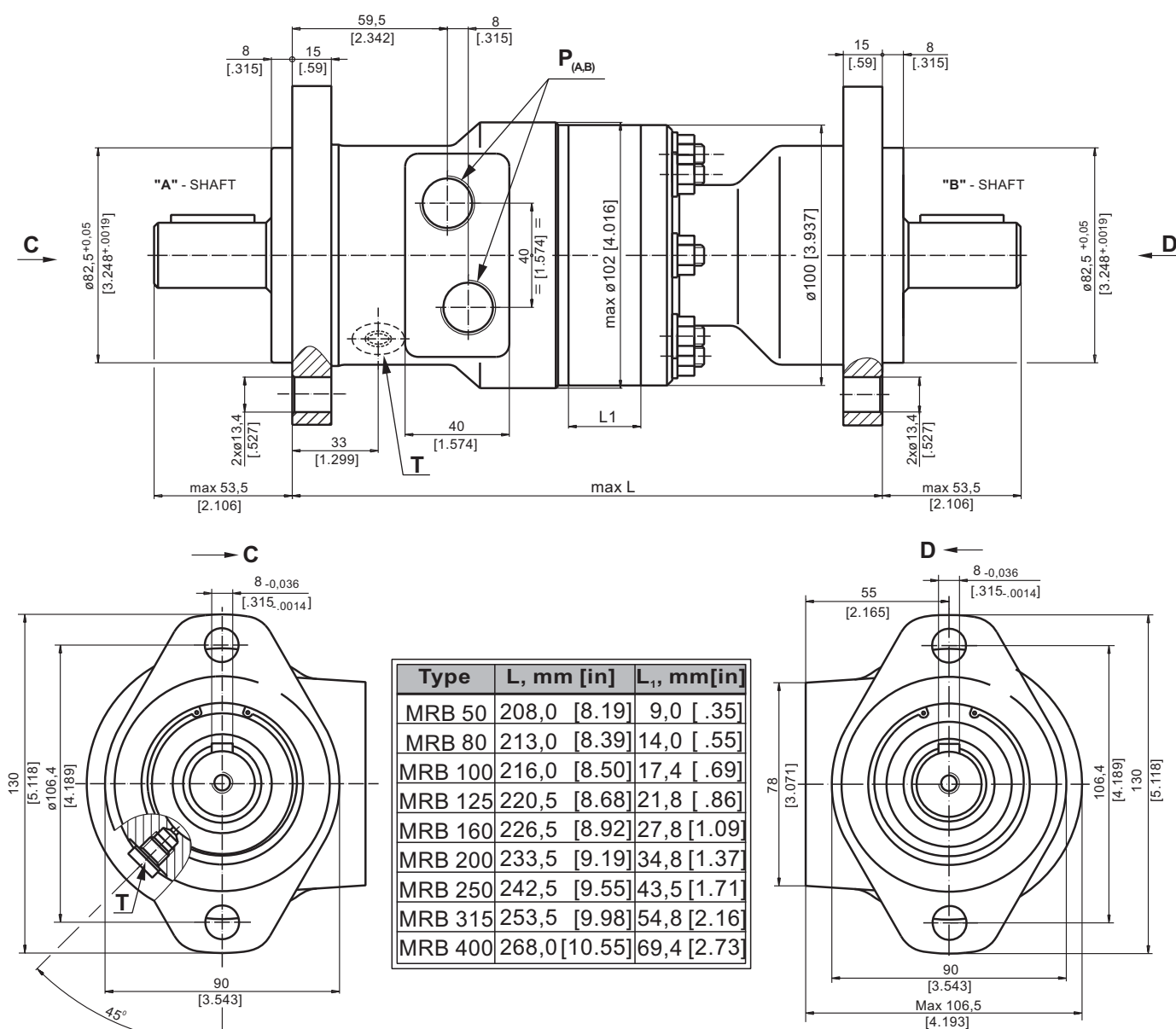
## OPTIONS

- » Model- Spool valve, roll-gerotor;
- » Dual shaft;
- » Oval flange;
- » Side port;
- » Straight shafts;
- » BSPP ports;
- » Other special features.

## APPLICATION

- » Conveyors;
- » Feeding mechanism of robots and manipulators;
- » Metal working machines;
- » Textile machines;
- » Agricultural machines;
- » Food industries;
- » Mining machinery etc.

## OUTLINE DIMENSINS REFERENCE



**P<sub>(A, B)</sub>**: 2xG1/2 - 18 mm [.71 in] depth

**T** : G1/8 - 9 mm [.35 in] depth (plugged)



SPECIFICATION DATA

| Type                                                     |                   | MRB<br>50 C/C | MRB<br>80 C/C | MRB<br>100 C/C | MRB<br>125 C/C | MRB<br>160 C/C | MRB<br>200 C/C | MRB<br>250 C/C | MRB<br>315 C/C | MRB<br>400 C/C |
|----------------------------------------------------------|-------------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Displacement, cm³/rev [in³/rev]                          |                   | 51,5[3.14]    | 80,3[4.9]     | 99,8[6.09]     | 125,7[7.67]    | 159,6[9.74]    | 199,8[12.19]   | 250,1[15.26]   | 315,7[19.26]   | 397 [24.4]     |
| Max. Speed,<br>RPM                                       | cont.             | 775           | 750           | 600            | 475            | 375            | 300            | 240            | 190            | 150            |
|                                                          | int.*             | 970           | 940           | 750            | 600            | 470            | 375            | 300            | 240            | 190            |
| Max. Torque,<br>daNm [lb-in]                             | cont.             | 10 [885]      | 19,5 [1725]   | 24 [2125]      | 30 [2655]      | 30 [2655]      | 30 [2655]      | 30 [2655]      | 30 [2655]      | 30 [2655]      |
|                                                          | int.*             | 13 [1150]     | 22 [1947]     | 28 [2480]      | 34 [3010]      | 39 [3450]      | 39 [3450]      | 38 [3360]      | 42 [3720]      | 43 [3805]      |
| Max. Torque "A" Shaft,<br>daNm [lb-in]                   | cont.             | 8 [710]       | 11,5 [1000]   | 12 [1060]      | 20 [1770]      | 20 [1770]      | 20 [1770]      | 20 [1770]      | 20 [1770]      | 20 [1770]      |
|                                                          | int.*             | 9,5 [840]     | 13 [1150]     | 14 [1240]      | 23 [2035]      | 23 [2035]      | 23 [2035]      | 23 [2035]      | 23 [2035]      | 23 [2035]      |
| Max. Torque "B" Shaft,<br>daNm [lb-in]                   | cont.             | 4 [355]       | 11,5 [1000]   | 12 [1060]      | 20 [1770]      | 20 [1770]      | 20 [1770]      | 20 [1770]      | 20 [1770]      | 20 [1770]      |
|                                                          | int.*             | 5 [440]       | 13 [1150]     | 14 [1240]      | 23 [2035]      | 23 [2035]      | 23 [2035]      | 23 [2035]      | 23 [2035]      | 23 [2035]      |
| Max. Output,<br>[kW] [HP]                                | cont.             | 7 [9.5]       | 12,5 [17]     | 13 [1150]      | 12,5 [17]      | 10 [13.4]      | 8 [10.7]       | 6 [8.0]        | 5 [6.7]        | 4 [5.4]        |
|                                                          | int.*             | 8,5 [11.9]    | 15 [20.1]     | 15 [20.1]      | 14,5           | 12,5 [17]      | 10 [13.4]      | 8 [10.7]       | 6,5 [8.7]      | 6 [8.0]        |
| Max. Pressure Drop,<br>bar [PSI]                         | cont.             | 140 [2030]    | 175 [2540]    | 175 [2540]     | 175 [2540]     | 130 [1885]     | 110 [1600]     | 80 [1160]      | 70 [1020]      | 55 [800]       |
|                                                          | int.*             | 175 [2540]    | 200 [2900]    | 200 [2900]     | 200 [2900]     | 175 [2540]     | 140 [2030]     | 110 [1600]     | 100 [1450]     | 80 [1160]      |
| Max. Oil Flow,<br>lpm [GPM]                              | cont.             | 40 [10.5]     | 60 [15.9]     | 60 [15.9]      | 60 [15.9]      | 60 [15.9]      | 60 [15.9]      | 60 [15.9]      | 60 [15.9]      | 60 [15.9]      |
|                                                          | int.*             | 50 [13.2]     | 75 [18.5]     | 75 [18.5]      | 75 [18.5]      | 75 [18.5]      | 75 [18.5]      | 75 [18.5]      | 75 [18.5]      | 75 [18.5]      |
| Max. Return<br>Pressure without<br>Drain Line, bar [PSI] | cont. 0 - 100 RPM | 75 [1090]     | 75 [1090]     | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      |
|                                                          | cont. 100-200 RPM | 50 [730]      | 50 [730]      | 50 [730]       | 50 [730]       | 50 [730]       | 50 [730]       | 50 [730]       | 50 [730]       | 50 [730]       |
|                                                          | cont. 200-500 RPM | 20 [290]      | 20 [290]      | 20 [290]       | 20 [290]       | 20 [290]       | 20 [290]       | 20 [290]       | 20 [290]       | 20 [290]       |
|                                                          | int.* 0 - max RPM | 75 [1090]     | 75 [1090]     | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      | 75 [1090]      |

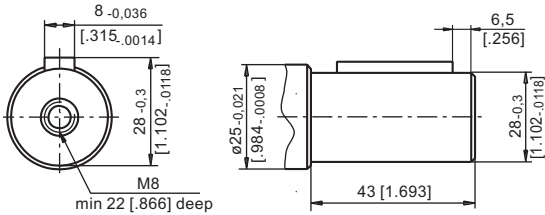
- \* Intermittent operation: the permissible values may occur for max. 10% of every minute.
- 1. Intermittent speed and intermittent pressure must not occur simultaneously.
  - 2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
  - 3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.
  - 4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
  - 5. Recommended maximum system operating temperature is 82°C [180°F].
  - 6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SHAFT EXTENSIONS

C

ø25 straight, Parallel key A8x7x30 DIN 6885

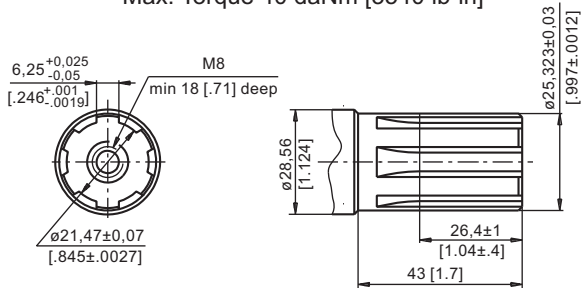
Max. Torque 34 daNm [3010 lb-in]



SH

1" splined, BS 2059 (SAE 6B)

Max. Torque 40 daNm [3540 lb-in]

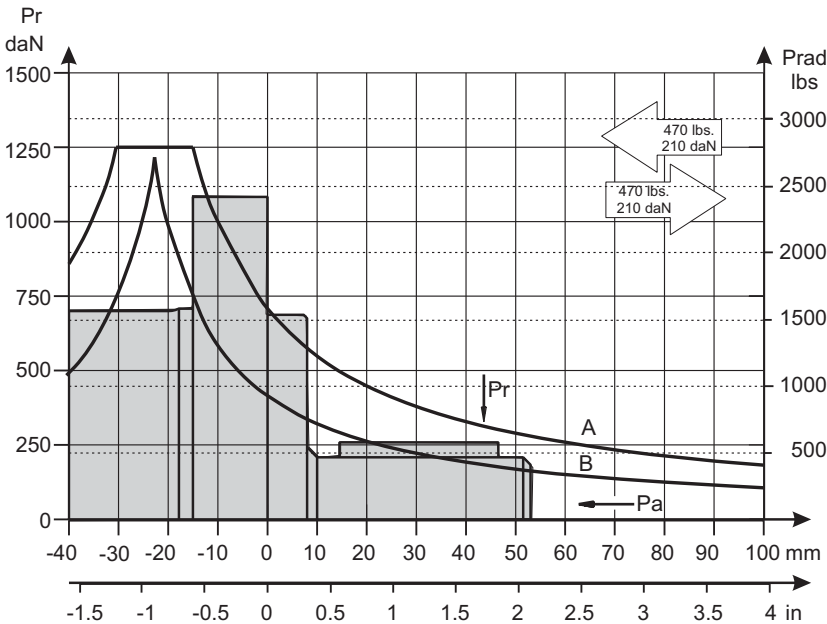


PERMISSIBLE SHAFT LOADS

The load diagrams are valid for an average bearings life of 1600 hrs at 200 r.p.m. with mineral base lubricating containing antiwear additives (ref.ISO 281 (3.3)standard).

The "A" curve gives the maximum static load affordable by the bearings.

The "B" curve gives the radial load top limit without axial load of 200 daN.



ORDER CODE

1

2

3

4

5

MRB

/

| Pos.1 | Displacement code             |
|-------|-------------------------------|
| 50    | 51,5 cm³/rev [3.14 in³/rev]   |
| 80    | 80,3 cm³/rev [4.90 in³/rev]   |
| 100   | 99,8 cm³/rev [6.09 in³/rev]   |
| 125   | 125,7 cm³/rev [7.67 in³/rev]  |
| 160   | 159,6 cm³/rev [9.74 in³/rev]  |
| 200   | 199,8 cm³/rev [12.19 in³/rev] |
| 250   | 250,1 cm³/rev [15.26 in³/rev] |
| 315   | 315,7 cm³/rev [19.26 in³/rev] |
| 400   | 397,0 cm³/rev [24.40 in³/rev] |

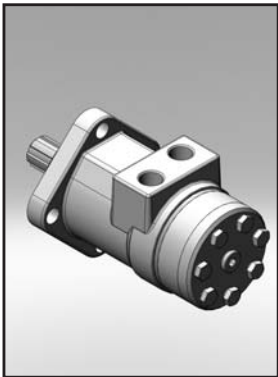
| Pos.2 | "A" Shaft Extensions*                      |
|-------|--------------------------------------------|
| C     | ø25 straight, Parallel key A8x7x30 DIN6885 |
| SH    | 1" splined, BS 2059 (SAE 6B)               |
| Pos.3 | "B" Shaft Extensions*                      |
| C     | ø25 straight, Parallel key A8x7x30 DIN6885 |
| SH    | 1" splined, BS 2059 (SAE 6B)               |
| Pos.4 | Special Features (see page 119)            |
| Pos.5 | Design Series                              |
| omit  | Factory specified                          |

NOTES: \* For other shaft extensions please contact with "M+S Hydraulic".

\*\* Color at customer's request.

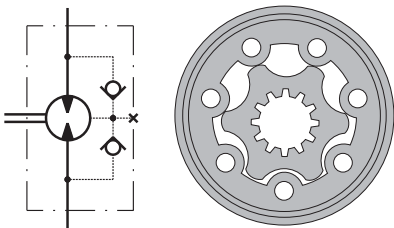
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS PL



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Mining machinery etc.



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## OPTIONS

- » Model - Spool valve, gerotor
- » Antifriction conical bearing
- » Flange mount
- » Shafts - straight, splined and tapered
- » Metric and BSPP ports
- » Other special features

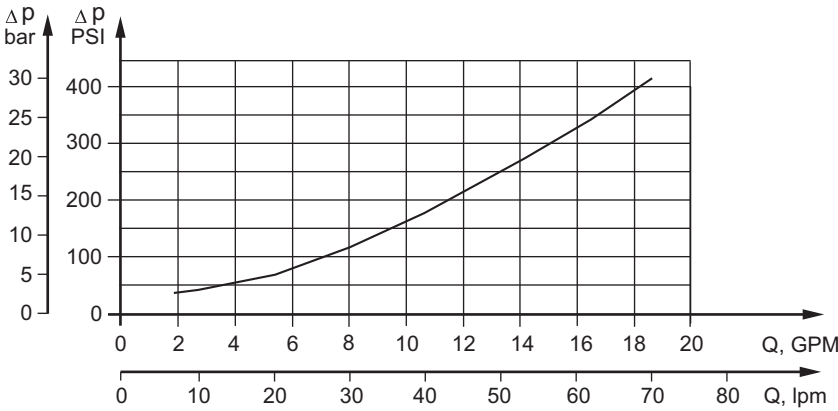
## GENERAL

|                                                   |                                                                  |                                    |
|---------------------------------------------------|------------------------------------------------------------------|------------------------------------|
| Max Displacement,                                 | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                      | 396 [24.16]                        |
| Max. Speed,                                       | [RPM]                                                            | 1515                               |
| Max. Torque,                                      | daNm [lb-in]                                                     | cont.: 50 [4415] int.: 59 [5222]   |
| Max. Output,                                      | kW [HP]                                                          | 17,5 [23.5]                        |
| Max. Pressure Drop,                               | bar [PSI]                                                        | cont.: 140 [2030] int.: 175 [2540] |
| Max. Oil Flow,                                    | lpm [GPM]                                                        | 75 [20]                            |
| Min. Speed,                                       | [RPM]                                                            | 10                                 |
| Pressure fluid                                    | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |                                    |
| Temperature range,                                | °C [°F]                                                          | -40÷140 [-40÷284]                  |
| Optimal Viscosity range, mm <sup>2</sup> /s [SUS] | 20÷75 [98÷347]                                                   |                                    |
| Filtration                                        | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |                                    |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



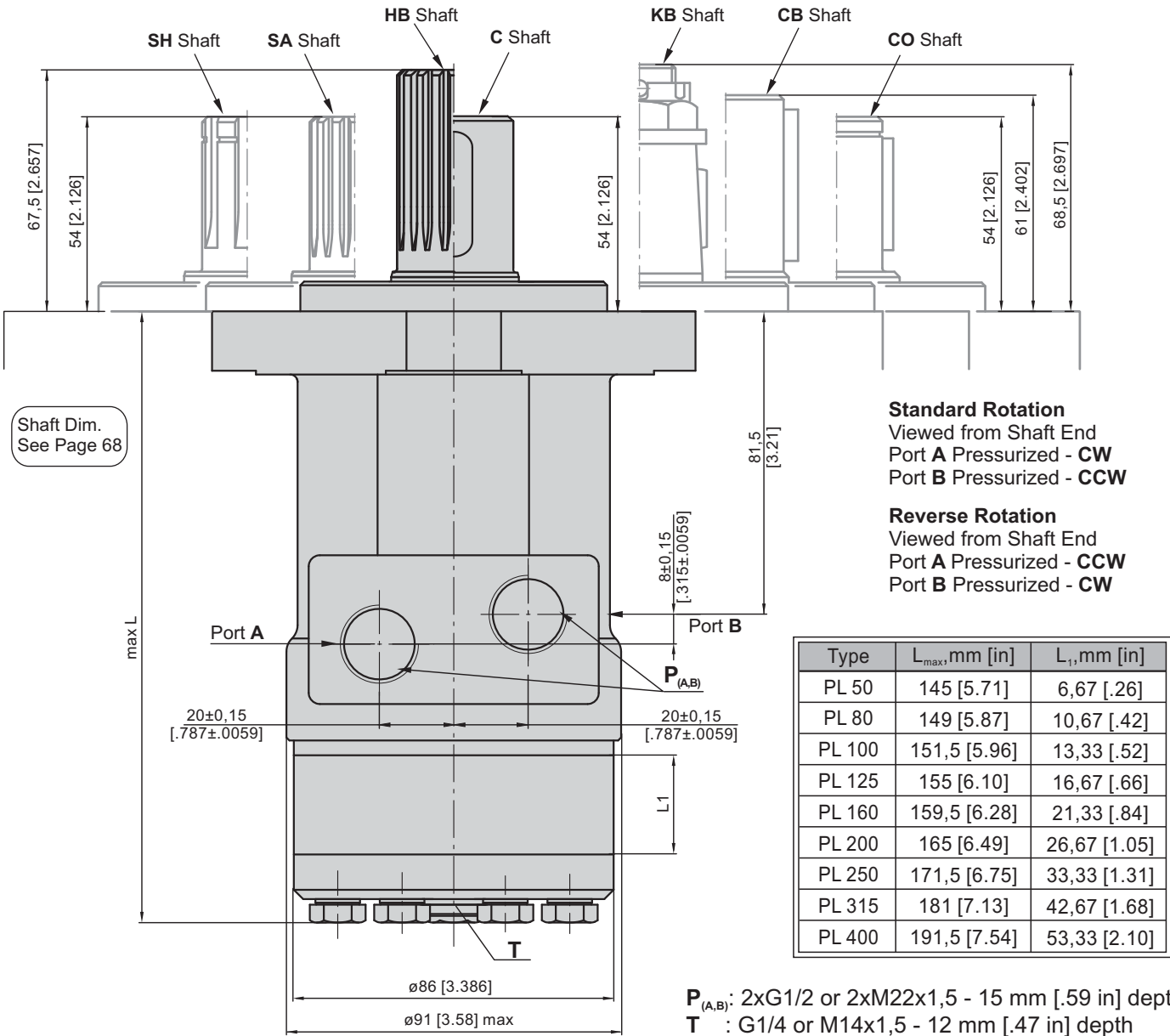
SPECIFICATION DATA

| Type                                                                                              |                   | PL 50       | PL 80       | PL 100      | PL 125       | PL 160       | PL 200      | PL 250       | PL 315       | PL 400      |
|---------------------------------------------------------------------------------------------------|-------------------|-------------|-------------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|
| Displacement, cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                                         |                   | 49,5 [3.02] | 79,2 [4.83] | 99 [6.04]   | 123,8 [7.55] | 158,4 [9.66] | 198 [12.1]  | 247,5 [15.1] | 316,8 [19.3] | 396 [24.16] |
| Max. Speed,<br>[RPM]                                                                              | Cont.             | 1210        | 755         | 605         | 485          | 378          | 303         | 242          | 190          | 150         |
|                                                                                                   | Int.*             | 1515        | 945         | 755         | 605          | 472          | 378         | 303          | 236          | 189         |
| Max. Torque<br>daNm [lb-in]                                                                       | Cont.             | 9,4 [832]   | 15,1 [1336] | 19,3 [1708] | 23,7 [2100]  | 31,3 [2770]  | 36,6 [3240] | 47 [4160]    | 48,6 [4300]  | 50 [4425]   |
|                                                                                                   | Int.*             | 11,9 [1054] | 19,5 [1725] | 23,7 [2097] | 29,8 [2637]  | 37,8 [3345]  | 45,6 [4035] | 58,3 [5160]  | 56 [4956]    | 59 [5222]   |
|                                                                                                   | Peak**            | 14,0 [1240] | 22,0 [1947] | 27,0 [2390] | 36,5 [3230]  | 42 [3717]    | 53 [4700]   | 67 [5930]    | 85 [7523]    | 85,4 [7560] |
| Max. Output<br>kW [HP]                                                                            | Cont.             | 9,9 [13.3]  | 9,9 [13.3]  | 9,9 [13.3]  | 9,9 [13.3]   | 11,7 [15.7]  | 10,3 [13.8] | 9,8 [13.1]   | 7,6 [10.2]   | 6,6 [8.9]   |
|                                                                                                   | Int.*             | 12,5 [16.8] | 12,5 [16.8] | 12,5 [16.8] | 12,5 [16.8]  | 12,5 [16.8]  | 12,5 [16.8] | 12,5 [16.8]  | 10,5 [14]    | 8,5 [11.4]  |
| Max. Pressure Drop<br>bar [PSI]                                                                   | Cont.             | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]   | 140 [2030]   | 140 [2030]  | 140 [2030]   | 120 [1300]   | 95 [1015]   |
|                                                                                                   | Int.*             | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 175 [2540]   | 140 [2030]   | 115 [1665]  |
|                                                                                                   | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 180 [2610]  |
| Max. Oil Flow<br>lpm [GPM]                                                                        | Cont.             | 60 [16]     | 60 [16]     | 60 [16]     | 60 [16]      | 60 [16]      | 60 [16]     | 60 [16]      | 60 [16]      | 60 [16]     |
|                                                                                                   | Int.*             | 75 [20]     | 75 [20]     | 75 [20]     | 75 [20]      | 75 [20]      | 75 [20]     | 75 [20]      | 75 [20]      | 75 [20]     |
| Max. Inlet Pressure<br>bar [PSI]                                                                  | Cont.             | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                                                                   | Int.*             | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  |
|                                                                                                   | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Return Pres-<br>sure without Drain<br>Line or Max. Pres-<br>sure in Drain Line,<br>bar [PSI] | Cont. 0-100 RPM   | 100 [1450]  | 100 [1450]  | 100 [1450]  | 100 [1450]   | 100 [1450]   | 100 [1450]  | 100 [1450]   | 100 [1450]   | 100 [1450]  |
|                                                                                                   | Cont. 100-300 RPM | 50 [725]    | 50 [725]    | 50 [725]    | 50 [725]     | 50 [725]     | 50 [725]    | 50 [725]     | 50 [725]     | 50 [725]    |
|                                                                                                   | Cont. 300-600 RPM | 25 [365]    | 25 [365]    | 25 [365]    | 25 [365]     | 25 [365]     | 25 [365]    | 25 [365]     | 25 [365]     | 25 [365]    |
|                                                                                                   | Cont. >600 RPM    | 15 [220]    | 15 [220]    | 15 [220]    | 15 [220]     | 15 [220]     | 15 [220]    | 15 [220]     | 15 [220]     | 15 [220]    |
|                                                                                                   | Int.* 0-max. RPM  | 100 [1450]  | 100 [1450]  | 100 [1450]  | 100 [1450]   | 100 [1450]   | 100 [1450]  | 100 [1450]   | 100 [1450]   | 100 [1450]  |
| Max. Return Pres-<br>sure with Drain Line<br>bar [PSI]                                            | Cont.             | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                                                                   | Int.*             | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]  |
|                                                                                                   | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Starting Pressure with<br>Unloaded Shaft, bar [PSI]                                          |                   | 10 [145]    | 10 [145]    | 10 [145]    | 9 [131]      | 8 [116]      | 7 [100]     | 6 [87]       | 5 [73]       | 5 [73]      |
| Min. Starting Torque, daNm [lb-in]                                                                |                   | 7,7 [681]   | 13 [1150]   | 16,8 [1487] | 21,0 [1860]  | 28,0 [2478]  | 32,2 [2850] | 41,4 [3665]  | 43,0 [3805]  | 44,0 [3900] |
| Min. Speed***, [RPM]                                                                              |                   | 10          | 10          | 10          | 10           | 10           | 10          | 10           | 10           | 10          |
| Weight, kg [lb]                                                                                   |                   | 6,8 [15]    | 7,0 [15.4]  | 7,1 [15.7]  | 7,2 [15.9]   | 7,4 [16.3]   | 7,6 [16.8]  | 7,8 [17.2]   | 8,2 [18]     | 8,6 [18.9]  |

\* Intermittent operation: the permissible values may occur for max. 10% of every minute.  
\*\* Peak load: the permissible values may occur for max. 1% of every minute.  
\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.  
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.  
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.  
4. Recommended minimum oil viscosity 13 mm<sup>2</sup>/s [70 SUS] at 50°C [122°F].  
5. Recommended maximum system operating temperature is 82°C [180°F].  
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

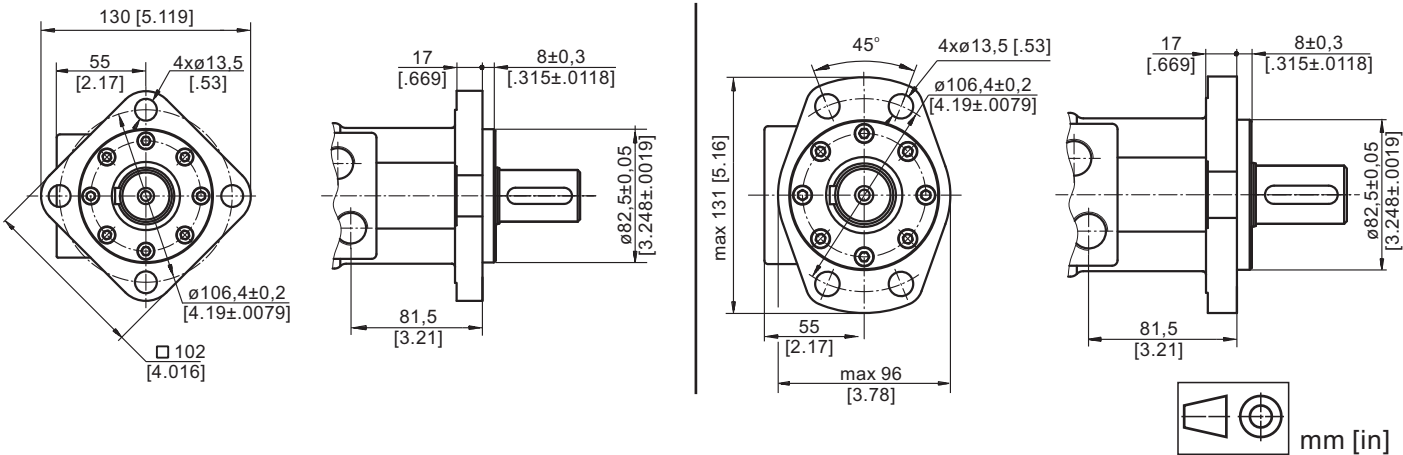
DIMENSIONS AND MOUNTING DATA



MOUNTING

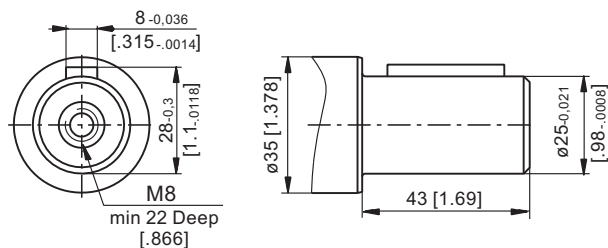
Square Mount (4 Holes)

F Oval Mount (4 Holes)

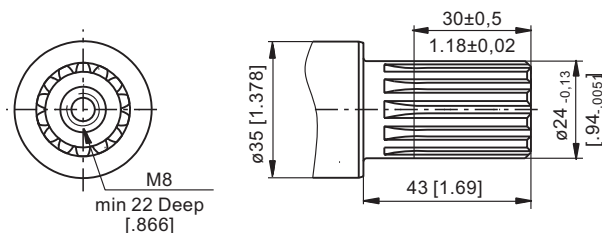


## SHAFT EXTENSIONS

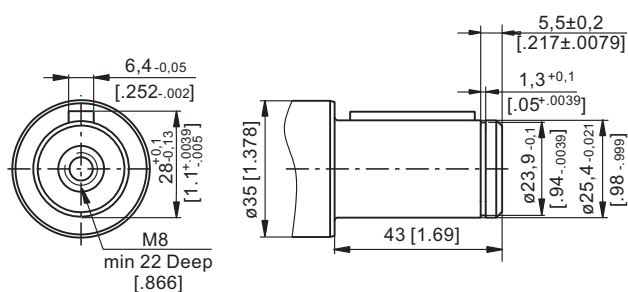
**C** - ø25 straight, Parallel key A8x7x30 DIN 6885  
Max. Torque 34 daNm [3010 lb-in]



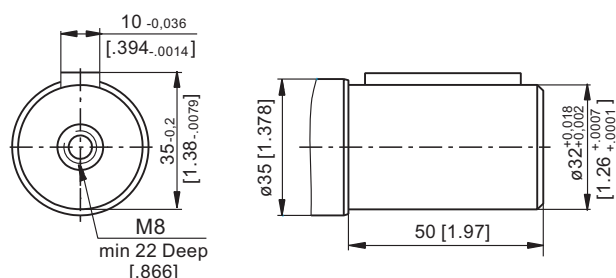
**SA** - splined B25x22 DIN 5482  
Max. Torque 40 daNm [3540 lb-in]



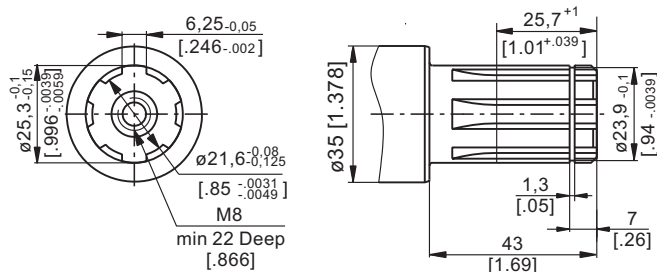
**CO** - ø1" straight, Parallel key 1/4"x1/4"x1 1/4" BS46  
Max. Torque 34 daNm [3010 lb-in]



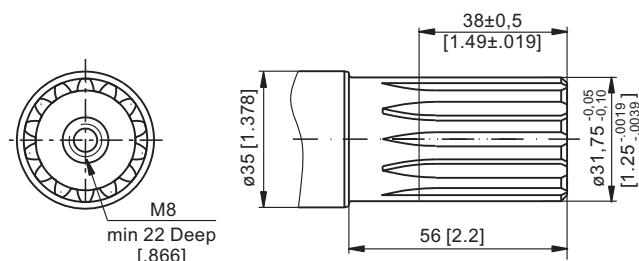
**CB** - ø32 straight, Parallel key A10x8x40 DIN 6885  
Max. Torque 77 daNm [6815 lb-in]



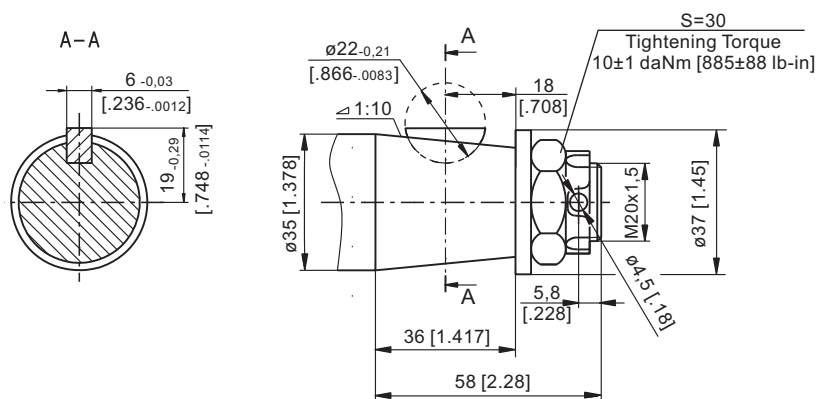
**SH** - splined, BS 2059 (SAE 6B)  
Max. Torque 40 daNm [3540 lb-in]



**HB** -  $\varnothing 1\frac{1}{4}$ " splined 14T, DP12/24 ANSI B92.1-1976  
Max. Torque 95 daNm [8410 lb-in]

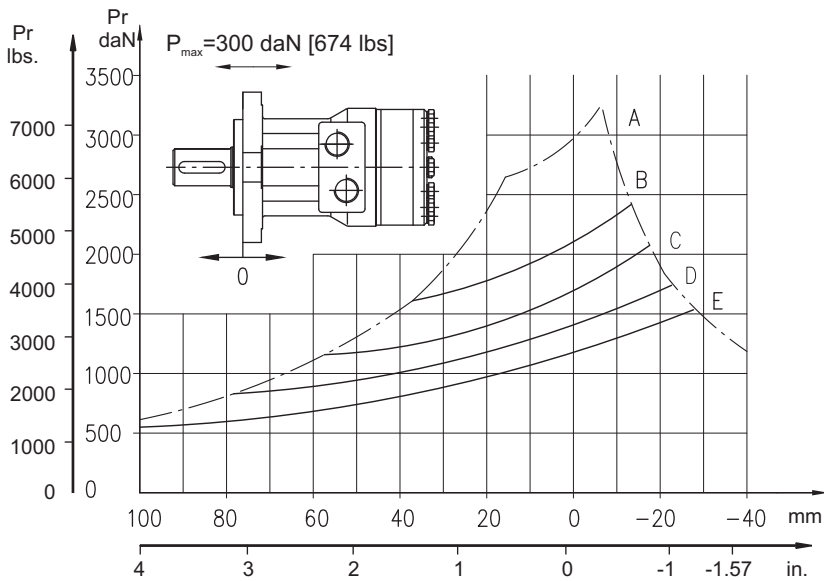


**KB** - tapered 1:10, Woodruff key 6x9 DIN6888  
Max. Torque 95 daNm [8410 lb-in]



Permissible Shaft Loads PL and RL

The curves apply to a B10 bearings life of 2000 hrs



- A - Max. radial shaft load.
- B -  $n=50\text{ min}^{-1}$
- C -  $n=100\text{ min}^{-1}$
- D -  $n=200\text{ min}^{-1}$
- E -  $n=400\text{ min}^{-1}$

ORDER CODE

|    |   |   |   |   |   |   |   |
|----|---|---|---|---|---|---|---|
|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| PL |   |   |   |   |   |   |   |

Pos.1 - Mounting Flange

- omit - Square mount, four holes
- F - Oval mount, four holes

Pos.2 - Displacement code\*

|     |                                                           |
|-----|-----------------------------------------------------------|
| 50  | - 49,5 cm <sup>3</sup> /rev [3.02 in <sup>3</sup> /rev]   |
| 80  | - 79,2 cm <sup>3</sup> /rev [4.83 in <sup>3</sup> /rev]   |
| 100 | - 99,0 cm <sup>3</sup> /rev [6.04 in <sup>3</sup> /rev]   |
| 125 | - 123,8 cm <sup>3</sup> /rev [7.55 in <sup>3</sup> /rev]  |
| 160 | - 158,4 cm <sup>3</sup> /rev [9.66 in <sup>3</sup> /rev]  |
| 200 | - 198,0 cm <sup>3</sup> /rev [12.10 in <sup>3</sup> /rev] |
| 250 | - 247,5 cm <sup>3</sup> /rev [15.10 in <sup>3</sup> /rev] |
| 315 | - 316,8 cm <sup>3</sup> /rev [19.30 in <sup>3</sup> /rev] |
| 400 | - 396,0 cm <sup>3</sup> /rev [24.16 in <sup>3</sup> /rev] |

Pos.3 - Shaft Extensions\*\*

- C -  $\varnothing 25$  straight, Parallel key A8x7x30 DIN6885
- CO -  $\varnothing 1"$  straight, Parallel key  $\frac{1}{4}" \times \frac{1}{4}" \times 1\frac{1}{4}"$  BS46
- SH -  $\varnothing 25,3$  splined, BS 2059 (SAE 6B)
- SA -  $\varnothing 24$  splined, B 25x22 DIN 5482
- CB -  $\varnothing 32$  straight, Parallel key A10x8x40 DIN6885
- HB -  $\varnothing 1\frac{1}{4}"$  splined 14T ANSI B92.1-1976
- KB -  $\varnothing 35$  tapered 1:10, Woodruff key 6x9 DIN6888

Pos.4 - Shaft Seal Version

- omit - Standad shaft seal
- U - High pressure shaft seal

Pos.5 - Ports

- omit - BSPP (ISO 228)
- M - Metric (ISO 262)

Pos.6 - Special Features (see page 119)

Pos.7 - Design Series

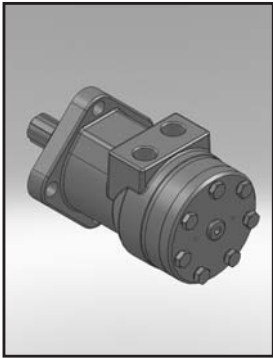
- omit - Factory specified

NOTES:

- \* For the Function Diagrams data please look at "M+S Hydraulic" Catalogue for MP motors, pages 19÷23.
- \*\* The permissible output torque for shafts must not be exceeded!

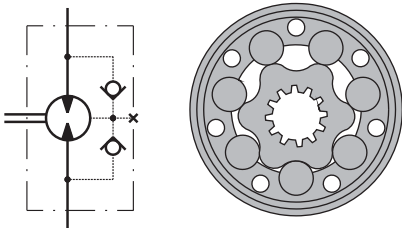
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS RL



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Mining machinery etc.



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## OPTIONS

- » Model - Spool valve, roll-gerotor
- » Antifriction conical bearings
- » Flange mount
- » Shafts - straight, splined and tapered
- » Metric and BSPP ports
- » Other special features

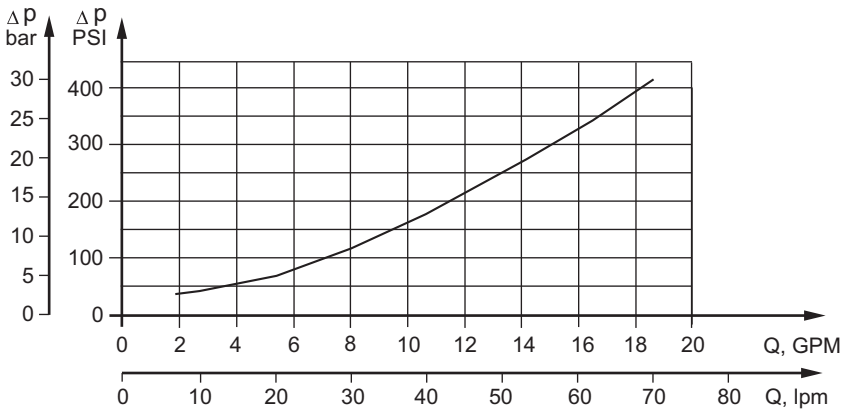
## GENERAL

|                          |                                                                  |                                   |
|--------------------------|------------------------------------------------------------------|-----------------------------------|
| Max. Displacement,       | cm <sup>3</sup> /rev. [in <sup>3</sup> /rev.]                    | 397 [24.4]                        |
| Max. Speed,              | [RPM]                                                            | 970                               |
| Max. Torque,             | daNm [lb-in]                                                     | cont.: 61 [5400] int.: 69 [6100]  |
| Max. Output,             | kW [HP]                                                          | 16 [21.5]                         |
| Max. Pressure Drop,      | bar [PSI]                                                        | cont.:175 [2540] int.: 200 [2900] |
| Max. Oil Flow,           | lpm [GPM]                                                        | 75 [20]                           |
| Min. Speed,              | [RPM]                                                            | 10                                |
| Permissible Shaft Loads, | daN [lbs]                                                        | P <sub>a</sub> =500 [1124]        |
| Pressure fluid           | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |                                   |
| Temperature range,       | °C [°F]                                                          | -40÷140 [-40÷284]                 |
| Optimal Viscosity range, | mm <sup>2</sup> /s [SUS]                                         | 20÷75 [98÷347]                    |
| Filtration               | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |                                   |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



SPECIFICATION DATA

| Type                                                                              |                   | RL 50       | RL 80       | RL 100      | RL 125       | RL 160       | RL 200       | RL 250       | RL 315       | RL 400      |
|-----------------------------------------------------------------------------------|-------------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|-------------|
| Displacement, cm³/rev [in³/rev]                                                   |                   | 51,5 [3.14] | 80,3 [4.90] | 99,8 [6.09] | 125,7 [7.67] | 159,6 [9.74] | 199,8[12.19] | 250,1[15.26] | 315,7[19.26] | 397 [24.4]  |
| Max. Speed, [RPM]                                                                 | Cont.             | 775         | 750         | 600         | 475          | 375          | 300          | 240          | 190          | 150         |
|                                                                                   | Int.*             | 970         | 940         | 750         | 600          | 470          | 375          | 300          | 240          | 190         |
| Max. Torque, daNm [lb-in]                                                         | Cont.             | 10 [885]    | 19,5 [1725] | 24 [2125]   | 30 [2655]    | 38 [3360]    | 45 [4000]    | 54 [4780]    | 55 [4870]    | 61 [5400]   |
|                                                                                   | Int.*             | 13 [1150]   | 22 [1947]   | 28 [2480]   | 34 [3010]    | 43 [3805]    | 50 [4425]    | 61 [5400]    | 69 [6100]    | 69 [6100]   |
|                                                                                   | Peak**            | 17 [1505]   | 27 [2390]   | 32 [2832]   | 37 [3275]    | 46 [4070]    | 56 [4960]    | 71 [6280]    | 84 [77430]   | 87 [7700]   |
| Max. Output kW [HP]                                                               | Cont.             | 7 [9.5]     | 12,5 [17]   | 13 [17.4]   | 12,5 [16.8]  | 12,5 [16.8]  | 11 [14.8]    | 10 [13.4]    | 9 [12]       | 7,5 [10]    |
|                                                                                   | Int.*             | 8,5 [11.9]  | 15 [20.1]   | 15 [20.1]   | 14,5 [19]    | 14 [18.8]    | 13 [17.4]    | 12 [16.1]    | 10 [13.4]    | 9 [12]      |
| Max. Pressure Drop bar [PSI]                                                      | Cont.             | 140 [2030]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540]   | 135 [1960]   | 110 [1600]  |
|                                                                                   | Int.*             | 175 [2540]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900]   | 175 [2540]   | 140 [2030]  |
|                                                                                   | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260]   | 210 [3045]   | 175 [2540]  |
| Max. Oil Flow lpm [GPM]                                                           | Cont.             | 40 [11]     | 60 [16]     | 60 [16]     | 60 [16]      | 60 [16]      | 60 [16]      | 60 [16]      | 60 [16]      | 60 [16]     |
|                                                                                   | Int.*             | 50 [13]     | 75 [20]     | 75 [20]     | 75 [20]      | 75 [20]      | 75 [20]      | 75 [20]      | 75 [20]      | 75 [20]     |
| Max. Inlet Pressure bar [PSI]                                                     | Cont.             | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                                                   | Int.*             | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900]  |
|                                                                                   | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Return Pressure without Drain Line or Max. Pressure in Drain Line, bar [PSI] | Cont. 0-100 RPM   | 100 [1450]  | 100 [1450]  | 100 [1450]  | 100 [1450]   | 100 [1450]   | 100 [1450]   | 100 [1450]   | 100 [1450]   | 100 [1450]  |
|                                                                                   | Cont. 100-300 RPM | 50 [725]    | 50 [725]    | 50 [725]    | 50 [725]     | 50 [725]     | 50 [725]     | 50 [725]     | 50 [725]     | 50 [725]    |
|                                                                                   | Cont. 300-600 RPM | 25 [365]    | 25 [365]    | 25 [365]    | 25 [365]     | 25 [365]     | 25 [365]     | 25 [365]     | 25 [365]     | 25 [365]    |
|                                                                                   | Cont. >600 RPM    | 15 [220]    | 15 [220]    | 15 [220]    | 15 [220]     | 15 [220]     | 15 [220]     | 15 [220]     | 15 [220]     | 15 [220]    |
|                                                                                   | Int.* 0-max. RPM  | 100 [1450]  | 100 [1450]  | 100 [1450]  | 100 [1450]   | 100 [1450]   | 100 [1450]   | 100 [1450]   | 100 [1450]   | 100 [1450]  |
| Max. Return Pressure with Drain Line bar [PSI]                                    | Cont.             | 140 [2030]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                                                   | Int.*             | 175 [2540]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900]  |
|                                                                                   | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI]                             |                   | 10 [145]    | 10 [145]    | 10 [145]    | 9 [130]      | 7 [102]      | 5 [73]       | 5 [73]       | 5 [73]       | 5 [73]      |
| Min. Starting Torque daNm [lb-in]                                                 |                   | 8 [710]     | 15 [1330]   | 20 [1770]   | 25 [2215]    | 32 [2835]    | 37 [3275]    | 45 [3983]    | 45 [3983]    | 49 [4335]   |
| Min. Speed***, [RPM]                                                              |                   | 10          | 10          | 10          | 10           | 10           | 10           | 10           | 10           | 10          |
| Weight, kg [lb]                                                                   |                   | 7,7 [17]    | 7,8 [17.2]  | 8,1 [17.8]  | 8,2 [18]     | 8,4 [18.5]   | 8,9 [19.6]   | 9,3 [20.5]   | 10,0 [22]    | 10,7 [23.6] |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

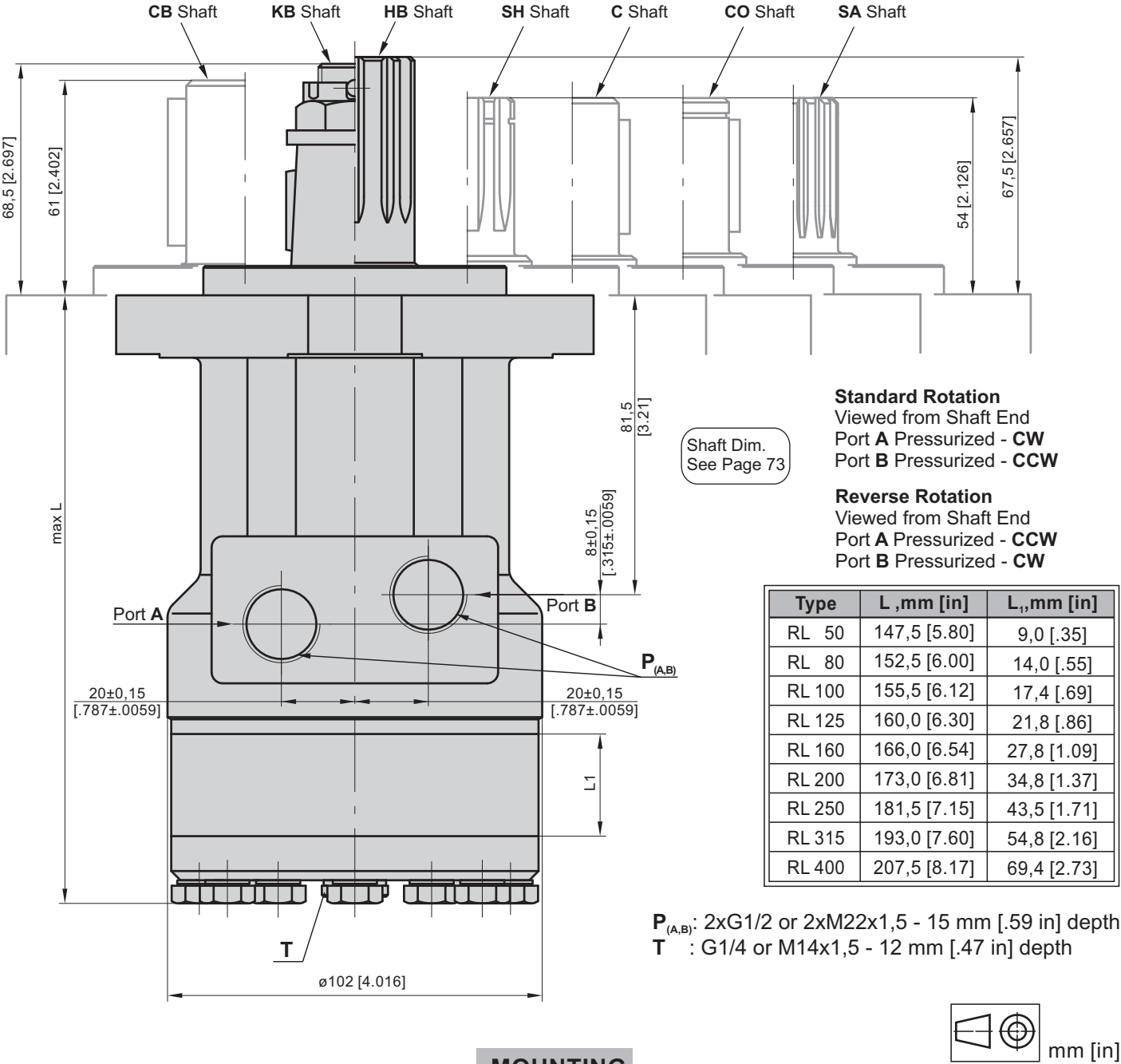
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

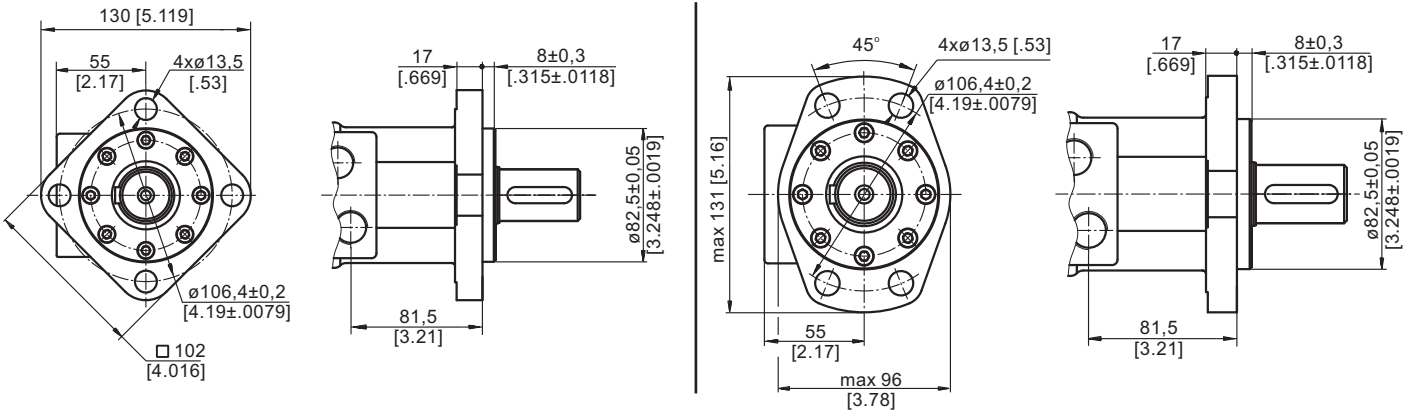
DIMENSIONS AND MOUNTING DATA



MOUNTING

Square Mount (4 Holes)

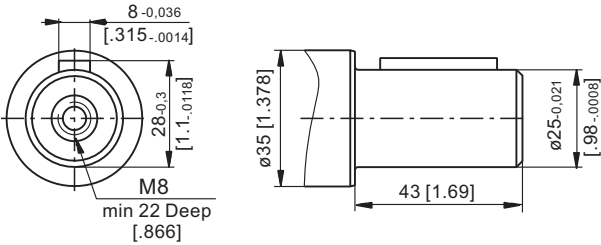
F Oval Mount (4 Holes)



SHAFT EXTENSIONS

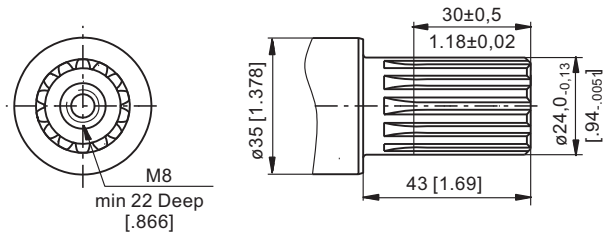
C

-  $\varnothing 25$  straight, Parallel key A8x7x30 DIN 6885  
 Max. Torque 34 daNm [3010 lb-in]



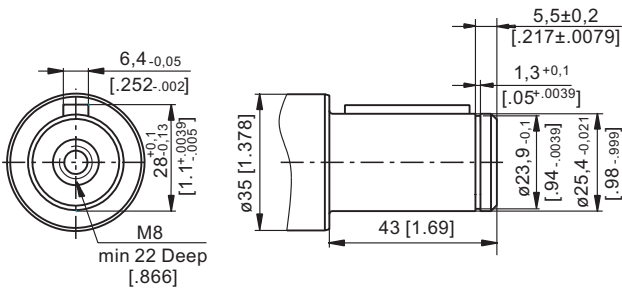
SA

- splined B25x22 DIN 5482  
 Max. Torque 40 daNm [3540 lb-in]



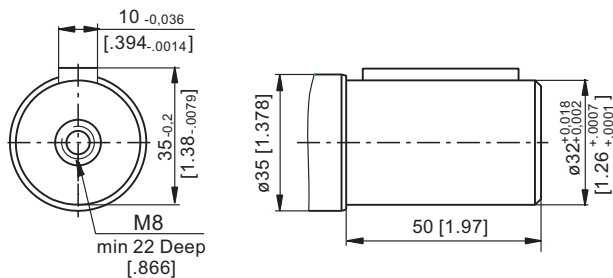
CO

-  $\varnothing 1"$  straight, Parallel key  $\frac{1}{4}" \times \frac{1}{4}" \times 1\frac{1}{4}"$  BS46  
 Max. Torque 34 daNm [3010 lb-in]



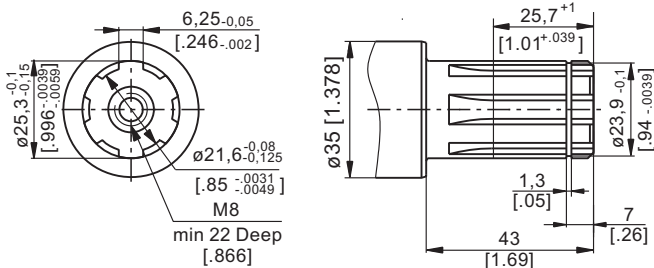
CB

-  $\varnothing 32$  straight, Parallel key A10x8x40 DIN 6885  
 Max. Torque 77 daNm [6815 lb-in]



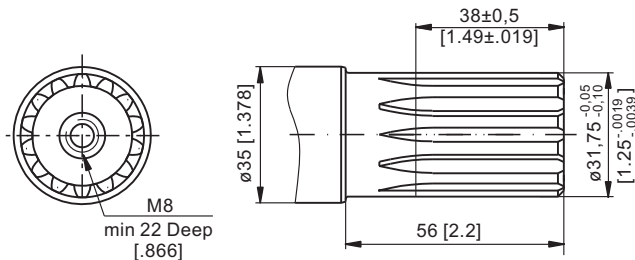
SH

- splined, BS 2059 (SAE 6B)  
 Max. Torque 40 daNm [3540 lb-in]



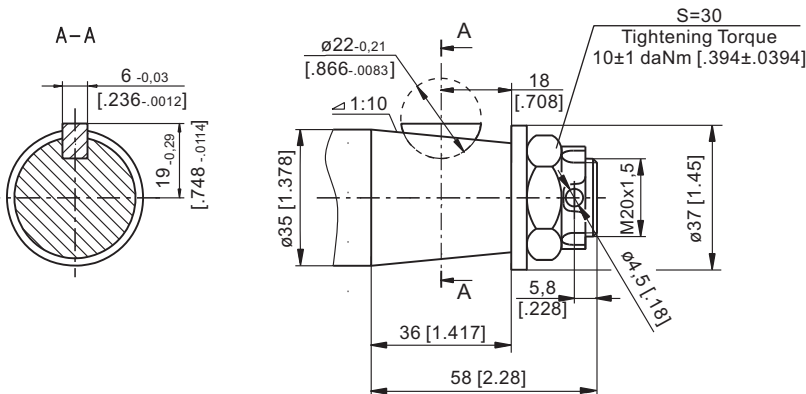
HB

-  $\varnothing 1\frac{1}{4}"$  splined 14T, DP12/24 ANSI B92.1-1976  
 Max. Torque 95 daNm [8410 lb-in]



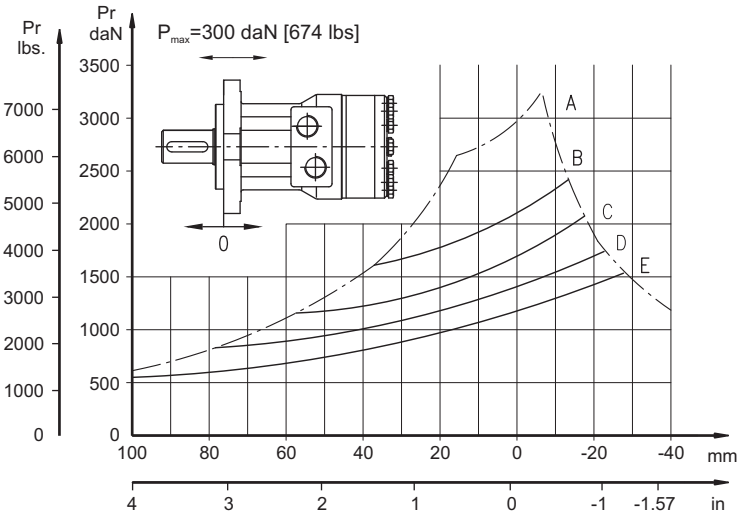
KB

- tapered 1:10, Woodruff key 6x9 DIN6888  
 Max. Torque 95 daNm [8410 lb-in]



### Permissible Shaft Loads PL and RL

The curves apply to a B10 bearings life of 2000 hrs

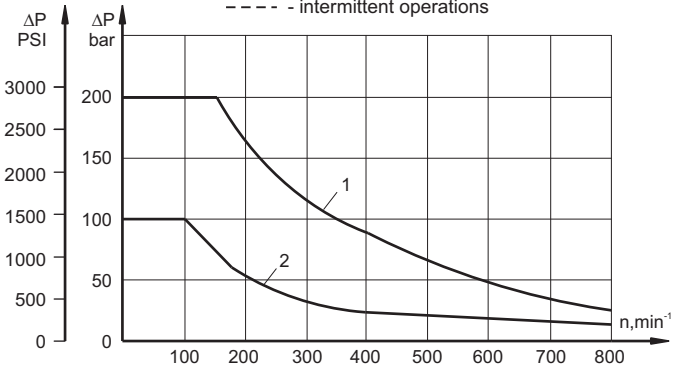


- A - Max. radial shaft load.
- B -  $n=50\text{ min}^{-1}$
- C -  $n=100\text{ min}^{-1}$
- D -  $n=200\text{ min}^{-1}$
- E -  $n=400\text{ min}^{-1}$

### MAX. PERMISSIBLE SHAFT SEAL PRESSURE

Max return pressure without drain line or max. pressure in drain line

— - continuous operations  
 - - - - intermittent operations



### ORDER CODE

|    |   |   |   |   |   |   |
|----|---|---|---|---|---|---|
|    | 1 | 2 | 3 | 4 | 5 | 6 |
| RL |   |   |   |   |   |   |

#### Pos.1 - Mounting Flange

- omit - Square mount, four holes
- F - Oval mount, four holes

#### Pos.2 - Displacement code\*

|     |                                                           |
|-----|-----------------------------------------------------------|
| 50  | - 51,5 cm <sup>3</sup> /rev [3.14 in <sup>3</sup> /rev]   |
| 80  | - 80,3 cm <sup>3</sup> /rev [4.90 in <sup>3</sup> /rev]   |
| 100 | - 99,8 cm <sup>3</sup> /rev [6.09 in <sup>3</sup> /rev]   |
| 125 | - 125,7 cm <sup>3</sup> /rev [7.67 in <sup>3</sup> /rev]  |
| 160 | - 159,6 cm <sup>3</sup> /rev [9.74 in <sup>3</sup> /rev]  |
| 200 | - 199,8 cm <sup>3</sup> /rev [12.19 in <sup>3</sup> /rev] |
| 250 | - 250,1 cm <sup>3</sup> /rev [15.26 in <sup>3</sup> /rev] |
| 315 | - 315,7 cm <sup>3</sup> /rev [19.26 in <sup>3</sup> /rev] |
| 400 | - 397,0 cm <sup>3</sup> /rev [24.40 in <sup>3</sup> /rev] |

#### Pos.3 - Shaft Extensions\*\*

|    |                                                    |
|----|----------------------------------------------------|
| C  | - ø25 straight, Parallel key A8x7x35 DIN6885       |
| CO | - ø1" straight, Parallel key 1/4"x1/4"x1 1/4" BS46 |
| SH | - ø25,3 splined, BS 2059 (SAE 6B)                  |
| SA | - ø24 splined, B 25x22 DIN 5482                    |
| CB | - ø32 straight, Parallel key A10x8x40 DIN6885      |
| HB | - ø1 1/4" splined 14T ANSI B92.1-1976              |
| KB | - ø35 tapered 1:10, Woodruff key 6x9 DIN6888       |

#### Pos.4 - Shaft Seal Version

- omit - Standad shaft seal
- U - High pressure shaft seal

#### Pos.4 - Ports

- omit - BSPP (ISO 228)
- M - Metric (ISO 262)

#### Pos.5 - Special Features (see page 119)

#### Pos.6 - Design Series

- omit - Factory specified

**NOTES:**

\* For the Function Diagrams data please look at "M+S Hydraulic" Catalogue for MR motors, pages 35÷39.

\*\* The permissible output torque for shafts must not be exceeded!

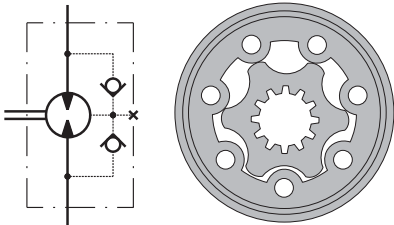
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS PK



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Mining machinery etc.



## CONTENTS

Specification data ..... 76

Dimensions and mounting ... 77

Shaft extensions ..... 78

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## OPTIONS

- » Model - Spool valve, gerotor
- » Antifriction conical bearing
- » Flange mount
- » Shafts - straight, splined and tapered
- » Metric and BSPP ports
- » Other special features

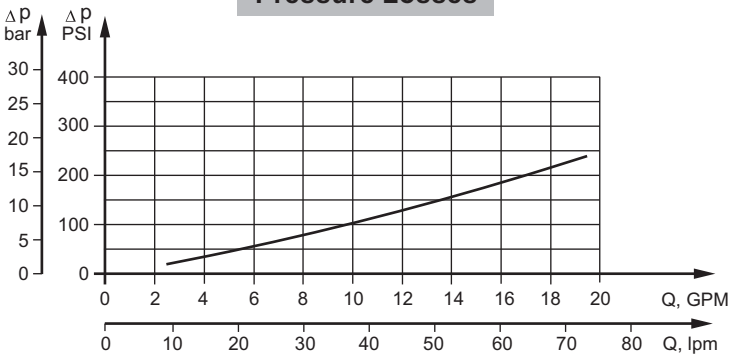
## GENERAL

|                          |                                                                  |                                         |
|--------------------------|------------------------------------------------------------------|-----------------------------------------|
| Max. Displacement,       | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                      | 396 [24.16]                             |
| Max. Speed,              | [RPM]                                                            | 1010                                    |
| Max. Torque,             | daNm [lb-in]                                                     | cont.: 40,8 [3611]    int.: 55,6 [4921] |
| Max. Output,             | kW [HP]                                                          | 8,6 [11.5]                              |
| Max. Pressure Drop,      | bar [PSI]                                                        | cont.:105 [1520]    int.: 140 [2030]    |
| Max. Oil Flow,           | lpm [GPM]                                                        | 50 [13.2]                               |
| Min. Speed,              | [RPM]                                                            | 10                                      |
| Pressure fluid           | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |                                         |
| Temperature range,       | °C [°F]                                                          | -40÷140 [-40÷284]                       |
| Optimal Viscosity range, | mm <sup>2</sup> /s [SUS]                                         | 20÷75 [98÷347]                          |
| Filtration               | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |                                         |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



SPECIFICATION DATA

| Type                                                                           |                   | PK 50       | PK 80       | PK 100      | PK 125       | PK 160      | PK 200      | PK 250       | PK 315       | PK 400      |
|--------------------------------------------------------------------------------|-------------------|-------------|-------------|-------------|--------------|-------------|-------------|--------------|--------------|-------------|
| Displacement, cm³/rev [in³/rev]                                                |                   | 49,5[3.02]  | 79,2 [4.83] | 99 [6.04]   | 123,8 [7.55] | 158,4 [966] | 198 [12.1]  | 247,5 [15.1] | 316,8 [19.3] | 396 [24.16] |
| Max. Speed, [RPM]                                                              | Cont.             | 808         | 505         | 404         | 323          | 252         | 202         | 160          | 126          | 100         |
|                                                                                | Int.*             | 1010        | 630         | 505         | 403          | 315         | 252         | 202          | 157          | 126         |
| Max. Torque daNm [lb-in]                                                       | Cont.             | 7 [619]     | 10,8 [956]  | 14,4 [1274] | 17 [1504]    | 22 [1974]   | 27,5 [2434] | 30,1 [2664]  | 31,7 [2805]  | 40,8 [3611] |
|                                                                                | Int.*             | 9,2 [814]   | 14,6 [1292] | 18,3 [1619] | 22,9 [2026]  | 29,3 [2593] | 36,6 [3239] | 37,6 [3328]  | 44 [3894]    | 55,6 [4921] |
|                                                                                | Peak**            | 13,6 [1203] | 21,4 [1894] | 26,1 [2310] | 32,6 [2885]  | 41,8 [3700] | 52,2 [4620] | 51,5 [4558]  | 64,3 [5691]  | 80 [7080]   |
| Max. Output kW [HP]                                                            | Cont.             | 5,2 [7.0]   | 5,2 [7.0]   | 5,2 [7.0]   | 5,2 [7.0]    | 5,2 [7.0]   | 5,2 [7.0]   | 4,6 [6.2]    | 3,4 [4.6]    | 3,4 [4.6]   |
|                                                                                | Int.*             | 8,6 [11.5]  | 8,6 [11.5]  | 8,6 [11.5]  | 8,6 [11.5]   | 8,6 [11.5]  | 8,6 [11.5]  | 7 [9.3]      | 5,8 [7.8]    | 5,8 [7.8]   |
| Max. Pressure Drop bar [PSI]                                                   | Cont.             | 105 [1520]  | 105 [1520]  | 105 [1520]  | 105 [1520]   | 105 [1520]  | 105 [1520]  | 90 [1305]    | 70 [1015]    | 70 [1015]   |
|                                                                                | Int.*             | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]   | 140 [2030]  | 140 [2030]  | 115 [1665]   | 105 [1520]   | 105 [1520]  |
|                                                                                | Peak**            | 215 [3120]  | 215 [3120]  | 215 [3120]  | 215 [3120]   | 215 [3120]  | 215 [3120]  | 170 [2470]   | 170 [2470]   | 170 [2470]  |
| Max. Oil Flow lpm [GPM]                                                        | Cont.             | 40 [10.5]   | 40 [10.5]   | 40 [10.5]   | 40 [10.5]    | 40 [10.5]   | 40 [10.5]   | 40 [10.5]    | 40 [10.5]    | 40 [10.5]   |
|                                                                                | Int.*             | 50 [13.2]   | 50 [13.2]   | 50 [13.2]   | 50 [13.2]    | 50 [13.2]   | 50 [13.2]   | 50 [13.2]    | 50 [13.2]    | 50 [13.2]   |
| Max. Inlet Pressure bar [PSI]                                                  | Cont.             | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]   | 140 [2030]  | 140 [2030]  | 140 [2030]   | 140 [2030]   | 140 [2030]  |
|                                                                                | Int.*             | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]  |
|                                                                                | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]  |
| Max. Return Pressure with Drain Line or Max. Pressure in Drain Line, bar [PSI] | Cont. 0-100 RPM   | 150 [2180]  | 150 [2180]  | 150 [2180]  | 150 [2180]   | 150 [2180]  | 150 [2180]  | 150 [2180]   | 150 [2180]   | 150 [2180]  |
|                                                                                | Cont. 100-300 RPM | 75 [1090]   | 75 [1090]   | 75 [1090]   | 75 [1090]    | 75 [1090]   | 75 [1090]   | 75 [1090]    | 75 [1090]    | 75 [1090]   |
|                                                                                | Cont. 300-600 RPM | 50 [725]    | 50 [725]    | 50 [725]    | 50 [725]     | 50 [725]    | 50 [725]    | 50 [725]     | 50 [725]     | 50 [725]    |
|                                                                                | Cont. >600 RPM    | 20 [290]    | 20 [290]    | 20 [290]    | 20 [290]     | 20 [290]    | 20 [290]    | 20 [290]     | 20 [290]     | 20 [290]    |
|                                                                                | Int.* 0-max. RPM  | 15 [220]    | 15 [220]    | 15 [220]    | 15 [220]     | 15 [220]    | 15 [220]    | 15 [220]     | 15 [220]     | 15 [220]    |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI]                          |                   | 10 [145]    | 10 [145]    | 10 [145]    | 10 [145]     | 10 [145]    | 10 [145]    | 10 [145]     | 10 [145]     | 10 [145]    |
| Min. Starting Torque, daNm [lb-in]                                             |                   | 5,8 [513]   | 9,1 [805]   | 12,2 [1079] | 14,5 [1283]  | 19,5 [1725] | 24,8 [2195] | 27,5 [2433]  | 29 [2567]    | 35,9 [3278] |
| Min. Speed***, [RPM]                                                           |                   | 10          | 10          | 10          | 10           | 10          | 10          | 10           | 10           | 10          |
| Weight, kg [lb]                                                                |                   | 5 [11.1]    | 5,1 [11.2]  | 5,3 [11.7]  | 5,4 [11.9]   | 5,6 [12.3]  | 5,8 [12.8]  | 6 [13.2]     | 6,3 [13.9]   | 6,8 [15]    |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

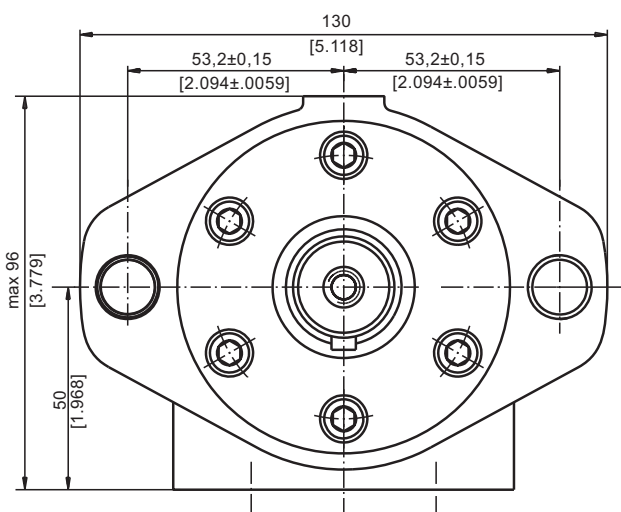
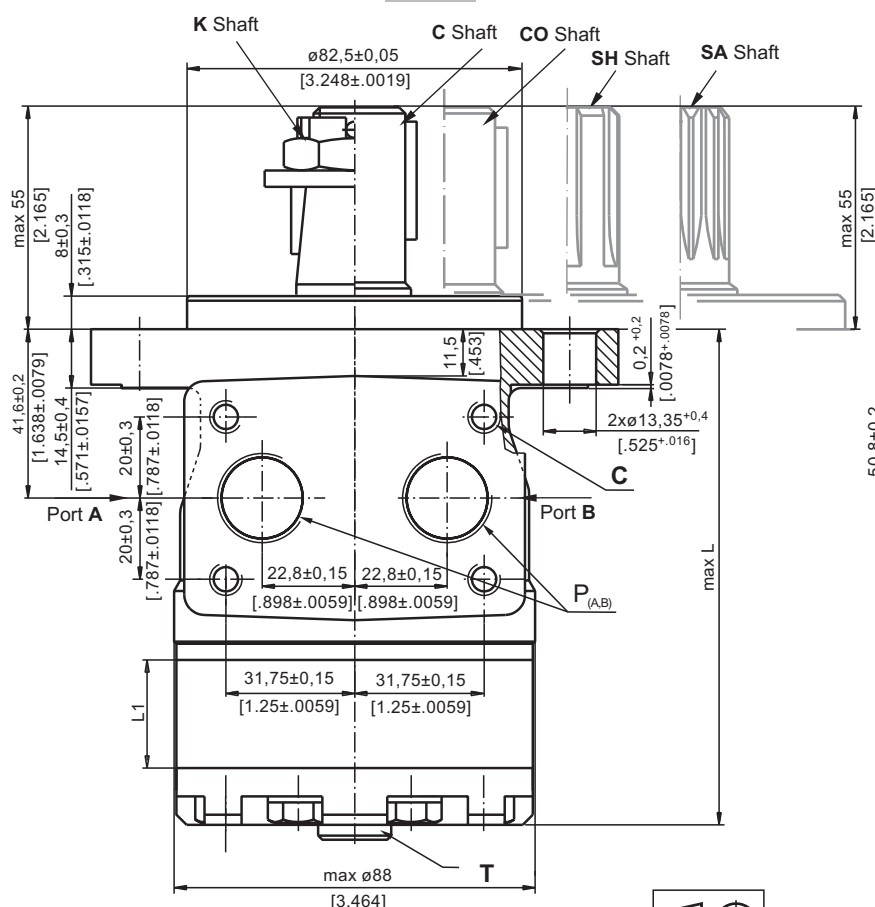
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

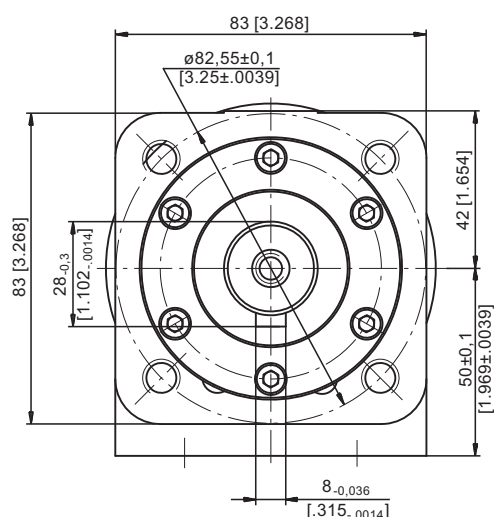
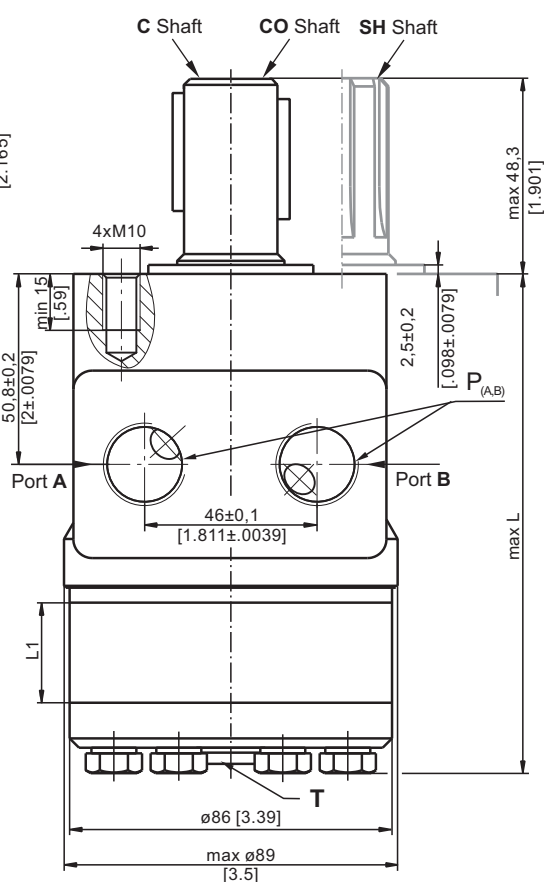
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

## DIMENSIONS AND MOUNTING DATA

## PK



**PKQ**



| Type   | L, mm [in]   | Type    | L, mm [in]   | L <sub>1</sub> , mm [in] |
|--------|--------------|---------|--------------|--------------------------|
| PK 50  | 102,5 [4.04] | PKQ 50  | 113,5 [4.47] | 6,67 [.26]               |
| PK 80  | 106,5 [4.19] | PKQ 80  | 117,5 [4.63] | 10,67 [.42]              |
| PK 100 | 109,0 [4.29] | PKQ 100 | 120,0 [4.72] | 13,33 [.52]              |
| PK 125 | 112,5 [4.43] | PKQ 125 | 123,5 [4.86] | 16,67 [.66]              |
| PK 160 | 117,0 [4.61] | PKQ 160 | 128,0 [5.04] | 21,33 [.84]              |
| PK 200 | 122,5 [4.82] | PKQ 200 | 133,5 [5.26] | 26,67 [1.05]             |
| PK 250 | 129,0 [5.08] | PKQ 250 | 140,0 [5.51] | 33,33 [1.31]             |
| PK 315 | 138,5 [5.45] | PKQ 315 | 149,5 [5.89] | 42,67 [1.68]             |
| PK 400 | 149,0 [5.87] | PKQ 400 | 160,0 [6.30] | 53,33 [2.10]             |

**C** : 4xM8 - 13 mm [.51 in] depth  
**P<sub>(A,B)</sub>** : 2xG1/2 or 2xM22x1,5 - 15 mm [.59 in] depth  
**T** : G1/4 or M14x1,5 - 8,5 mm [.33 in] depth  
 (plugged)

**Standard Rotation**  
Viewed from Shaft End  
Port **A** Pressurized - **CW**  
Port **B** Pressurized - **CCW**

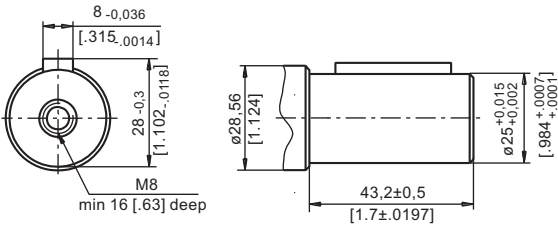
**Reverse Rotation**  
Viewed from Shaft End  
Port **A** Pressurized - **CCW**  
Port **B** Pressurized - **CW**

SHAFT EXTENSIONS

C

- ø25 straight, Parallel key A8x7x32 DIN 6885

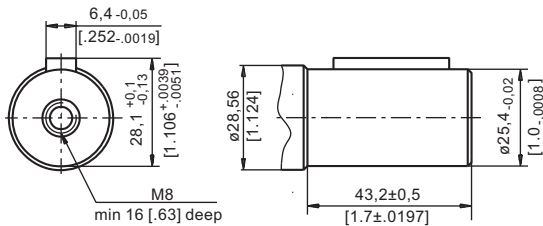
Max. Torque 34 daNm [3010 lb-in]



CO

- ø1" straight, Parallel key ¼"x¼"x1¼" BS46

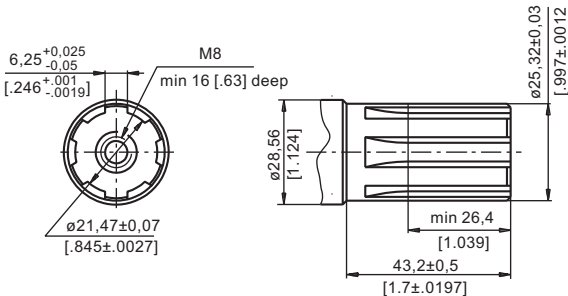
Max. Torque 34 daNm [3010 lb-in]



SH

- splined, BS 2059 (SAE 6B)

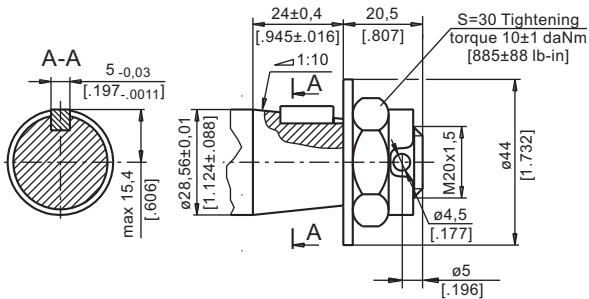
Max. Torque 40 daNm [3540 lb-in]



K

- tapered 1:10, Parallel key B5x5x14 DIN 6885

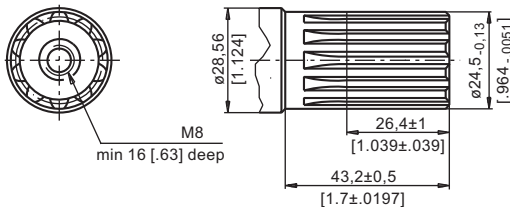
Max. Torque 40 daNm [3540 lb-in]



SA

- splined, B25x22h9 DIN 5482

Max. Torque 40 daNm [3540 lb-in]



ORDER CODE

1

2

3

4

5

6

PK

Pos.1- Mounting Flange

- omit - Oval mount, two holes
- Q - Square mount, four bolts

Pos.2- Displacement code

- 50 - 49,5 cm<sup>3</sup>/rev [3.02 in<sup>3</sup>/rev]
- 80 - 79,2 cm<sup>3</sup>/rev [4.83 in<sup>3</sup>/rev]
- 100 - 99,0 cm<sup>3</sup>/rev [6.04 in<sup>3</sup>/rev]
- 125 - 123,8 cm<sup>3</sup>/rev [7.55 in<sup>3</sup>/rev]
- 160 - 158,4 cm<sup>3</sup>/rev [9.66 in<sup>3</sup>/rev]
- 200 - 198,0 cm<sup>3</sup>/rev [12.10 in<sup>3</sup>/rev]
- 250 - 247,5 cm<sup>3</sup>/rev [15.10 in<sup>3</sup>/rev]
- 315 - 316,8 cm<sup>3</sup>/rev [19.30 in<sup>3</sup>/rev]
- 400 - 396,0 cm<sup>3</sup>/rev [24.16 in<sup>3</sup>/rev]

Pos.3- Shaft Extensions\*

- C - ø25 straight, Parallel key A8x7x32 DIN6885
- CO - ø25,4 straight, Parallel key ¼"x¼"x1¼" BS46
- SH - ø25,32 splined BS 2059 (SAE 6B)
- K - ø28,56 tapered 1:10, Parallel key, B5x5x14 DIN6885
- SA - ø24,5 splined B25x22h9 DIN 5482

Pos.4- Ports

- omit - BSPP (ISO 228)
- M - Metric (ISO 262)

Pos.5- Special Features (see page 119)

Pos.6- Design Series

- omit - Factory specified

NOTE:

\* The permissible output torque for shafts must not be exceeded!

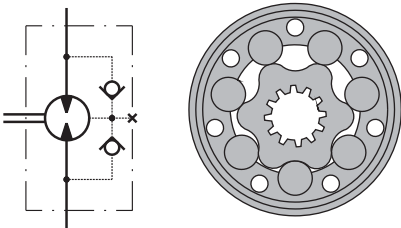
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS RK



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Mining machinery etc.



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## OPTIONS

- » Model - Spool valve, gerotor
- » Antifriction conical bearing
- » Flange mount
- » Shafts - straight, splined and tapered
- » Metric and BSPP ports
- » Other special features

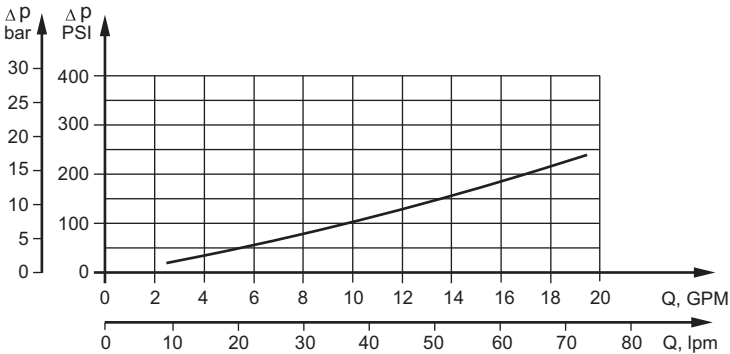
## GENERAL

|                          |                                                                  |                                    |
|--------------------------|------------------------------------------------------------------|------------------------------------|
| Max. Displacement,       | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                      | 397 [24.4]                         |
| Max. Speed,              | [RPM]                                                            | 970                                |
| Max. Torque,             | daNm [lb-in]                                                     | cont.: 40 [3540] int.: 50 [4425]   |
| Max. Output,             | kW [HP]                                                          | 12,8 [17.2]                        |
| Max. Pressure Drop,      | bar [PSI]                                                        | cont.: 140 [2030] int.: 175 [2540] |
| Max. Oil Flow,           | lpm [GPM]                                                        | 75 [18.5]                          |
| Min. Speed,              | [RPM]                                                            | 10                                 |
| Pressure fluid           | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |                                    |
| Temperature range,       | °C [°F]                                                          | -40÷140 [-40÷284]                  |
| Optimal Viscosity range, | mm <sup>2</sup> /s [SUS]                                         | 20÷75 [98÷347]                     |
| Filtration               | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |                                    |

### Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

### Pressure Losses



SPECIFICATION DATA

| Type                                                                           |                   | RK 50       | RK 80       | RK 100      | RK 125      | RK 160      | RK 200       | RK 250       | RK 315       | RK 400     |
|--------------------------------------------------------------------------------|-------------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|------------|
| Displacement, cm³/rev [in³/rev]                                                |                   | 51,5 [3.14] | 80,3 [4.9]  | 99,8 [6.09] | 125,5[7.67] | 159,6[9.74] | 199,8[12.19] | 250,1[15.26] | 315,7[19.26] | 397 [24.4] |
| Max. Speed, [RPM]                                                              | Cont.             | 775         | 750         | 600         | 475         | 375         | 300          | 240          | 190          | 150        |
|                                                                                | Int.*             | 970         | 940         | 750         | 600         | 470         | 375          | 300          | 240          | 185        |
| Max. Torque daNm [lb-in]                                                       | Cont.             | 10 [850]    | 15,7 [1390] | 19,8 [1750] | 25 [2210]   | 32 [2830]   | 34 [3010]    | 40 [3540]    | 40 [3540]    | 40 [3540]  |
|                                                                                | Int.*             | 13 [1150]   | 19,5 [1725] | 24 [2125]   | 30 [2655]   | 39 [3450]   | 42 [3717]    | 47 [4160]    | 50 [4425]    | 50 [4425]  |
|                                                                                | Peak**            | 17 [1505]   | 27 [2390]   | 32 [2830]   | 37 [3275]   | 46 [4070]   | 56 [4960]    | 64 [5665]    | 65 [5755]    | 65 [5755]  |
| Max. Output kW [HP]                                                            | Cont.             | 9 [12.1]    | 10,4 [13.9] | 10,8 [14.4] | 10,8 [14.4] | 10,4 [13.9] | 8,8 [11.8]   | 8,1 [10.9]   | 7,4 [9.9]    | 6,2 [8.3]  |
|                                                                                | Int.*             | 10,4 [13.9] | 12,6 [16.9] | 12,8 [17.2] | 12,5 [16.8] | 11,5 [15.4] | 10,2 [13.7]  | 9,4 [12.6]   | 7,8 [10.5]   | 7,1 [9.5]  |
| Max. Pressure Drop bar [PSI]                                                   | Cont.             | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]  | 140 [2030]  | 125 [1810]   | 110 [1600]   | 90 [1300]    | 75 [1090]  |
|                                                                                | Int.*             | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 155 [2250]   | 140 [2030]   | 125 [1810]   | 90 [1305]  |
|                                                                                | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 200 [2900]   | 150 [2175]   | 120 [1740] |
| Max. Oil Flow lpm [GPM]                                                        | Cont.             | 40 [10.5]   | 60 [15.9]   | 60 [15.9]   | 60 [15.9]   | 60 [15.9]   | 60 [15.9]    | 60 [15.9]    | 60 [15.9]    | 60 [15.9]  |
|                                                                                | Int.*             | 50 [13.2]   | 75 [18.5]   | 75 [18.5]   | 75 [18.5]   | 75 [18.5]   | 75 [18.5]    | 75 [18.5]    | 75 [18.5]    | 75 [18.5]  |
| Max. Inlet Pressure bar [PSI]                                                  | Cont.             | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]  | 175 [2540]   | 175 [2540]   | 175 [2540]   | 175 [2540] |
|                                                                                | Int.*             | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]   | 200 [2900] |
|                                                                                | Peak**            | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]   | 225 [3260] |
| Max. Return Pressure with Drain Line or Max. Pressure in Drain Line, bar [PSI] | Cont. 0-100 RPM   | 150 [2180]  | 150 [2180]  | 150 [2180]  | 150 [2180]  | 150 [2180]  | 150 [2180]   | 150 [2180]   | 150 [2180]   | 150 [2180] |
|                                                                                | Cont. 100-300 RPM | 75 [1090]   | 75 [1090]   | 75 [1090]   | 75 [1090]   | 75 [1090]   | 75 [1090]    | 75 [1090]    | 75 [1090]    | 75 [1090]  |
|                                                                                | Cont. 300-600 RPM | 50 [725]    | 50 [725]    | 50 [725]    | 50 [725]    | 50 [725]    | 50 [725]     | 50 [725]     | 50 [725]     | 50 [725]   |
|                                                                                | Cont. >600 RPM    | 20 [290]    | 20 [290]    | 20 [290]    | 20 [290]    | 20 [290]    | 20 [290]     | 20 [290]     | 20 [290]     | 20 [290]   |
|                                                                                | Int.* 0-max. RPM  | 15 [220]    | 15 [220]    | 15 [220]    | 15 [220]    | 15 [220]    | 15 [220]     | 15 [220]     | 15 [220]     | 15 [220]   |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI]                          |                   | 10 [145]    | 10 [145]    | 10 [145]    | 10 [145]    | 10 [145]    | 10 [145]     | 10 [145]     | 10 [145]     | 10 [145]   |
| Min. Starting Torque, daNm [lb-in]                                             |                   | 8 [710]     | 12 [1060]   | 16 [1420]   | 20 [1770]   | 25 [2215]   | 29 [2570]    | 28 [2480]    | 32 [2832]    | 35 [3100]  |
| Min. Speed***, [RPM]                                                           |                   | 10          | 10          | 10          | 10          | 10          | 10           | 10           | 10           | 10         |
| Weight, kg [lb]                                                                |                   | 6,2 [13.7]  | 6,3 [13.9]  | 6,6 [14.6]  | 6,7 [14.8]  | 6,9 [15.2]  | 7,4 [16.3]   | 7,8 [17.2]   | 8,5 [18.7]   | 9,3 [20.5] |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

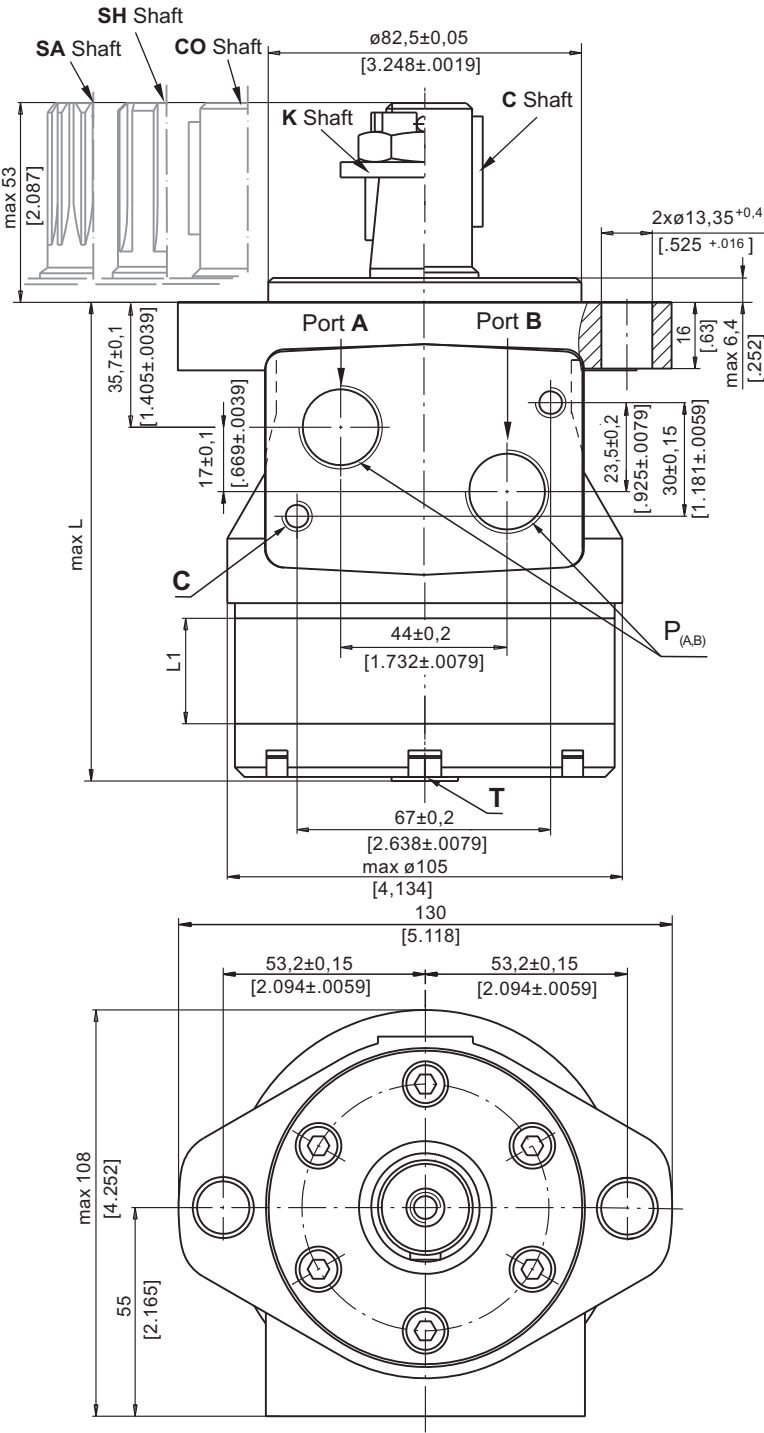
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS AND MOUNTING DATA

Oval Mount (2 Holes)



- C : 4xM8 - 13 mm [.51 in] depth

P<sub>(A, B)</sub>: 2xG1/2 or 2xM22x1,5 - 15 mm [.59 in] depth

T : G1/4 or M14x1,5 - 8,5 mm [.33 in] depth (plugged)

Standard Rotation

Viewed from Shaft End

Port A Pressurized - CW

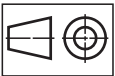
Port B Pressurized - CCW

Reverse Rotation

Viewed from Shaft End

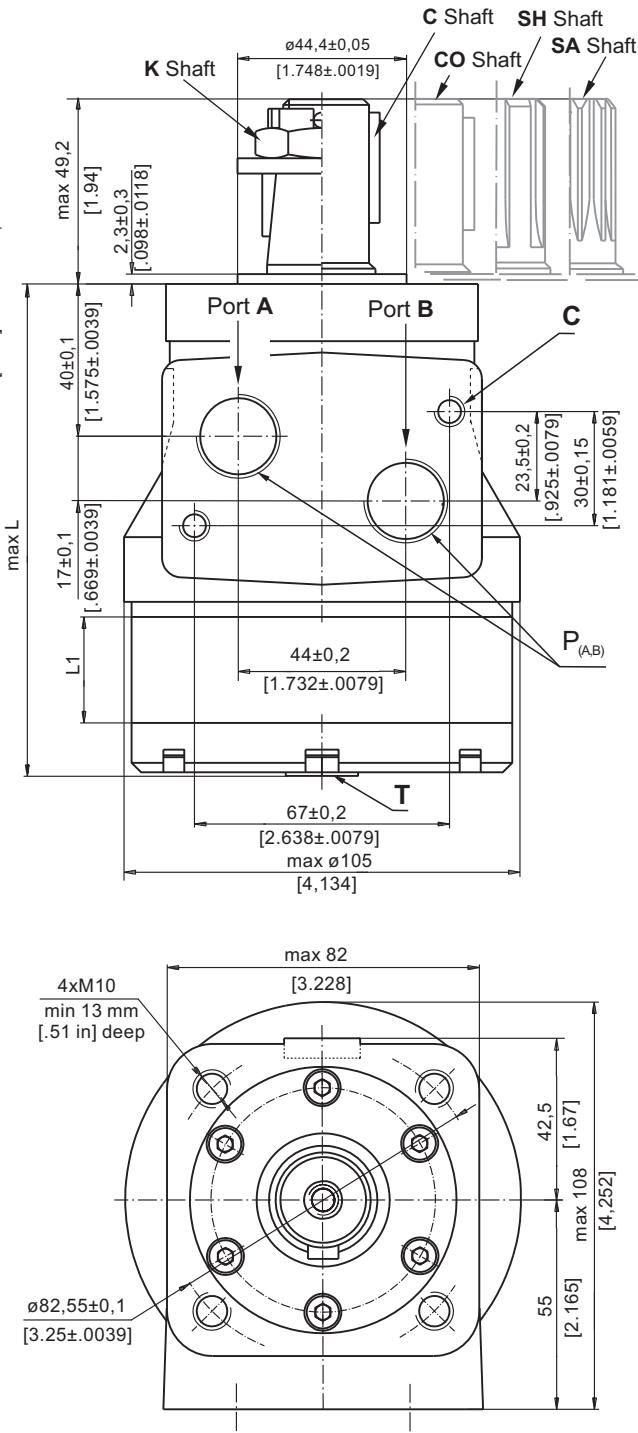
Port A Pressurized - CCW

Port B Pressurized - CW



mm [in]

Q - Square Mount (4 Bolts)

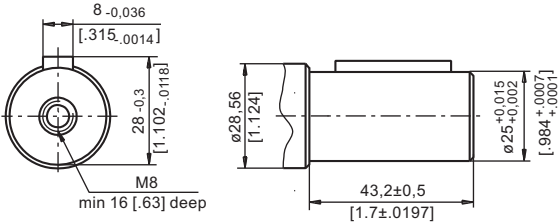


| Type   | L, mm [in]  | Type    | L, mm [in]   | L <sub>1</sub> , mm [in] |
|--------|-------------|---------|--------------|--------------------------|
| RK 50  | 109,5[4.31] | RKQ 50  | 113,8 [4.48] | 9,0 [.35]                |
| RK 80  | 114,5[4.51] | RKQ 80  | 118,8 [4.68] | 14,0 [.55]               |
| RK 100 | 118,0[4.65] | RKQ 100 | 122,3 [4.82] | 17,4 [.69]               |
| RK 125 | 122,5[4.82] | RKQ 125 | 126,8 [4.99] | 21,8 [.86]               |
| RK 160 | 128,5[5.06] | RKQ 160 | 132,8 [5.23] | 27,8 [1.09]              |
| RK 200 | 135,5[5.33] | RKQ 200 | 139,8 [5.50] | 34,8 [1.37]              |
| RK 250 | 144,0[5.67] | RKQ 250 | 148,3 [5.84] | 43,5 [1.71]              |
| RK 315 | 155,5[6.12] | RKQ 315 | 159,8 [6.29] | 54,8 [2.16]              |
| RK 400 | 170,0[6.69] | RKQ 400 | 174,3 [6.86] | 69,4 [2.73]              |

SHAFT EXTENSIONS

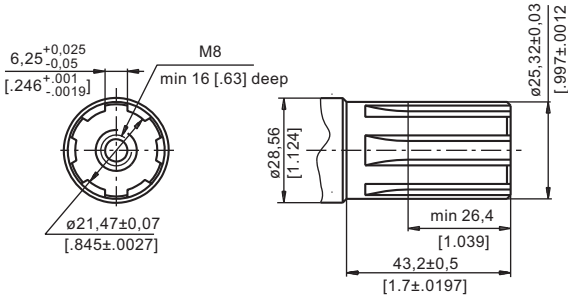
C

- ø25 straight, Parallel key A8x7x32 DIN 6885  
Max. Torque 34 daNm [3010 lb-in]



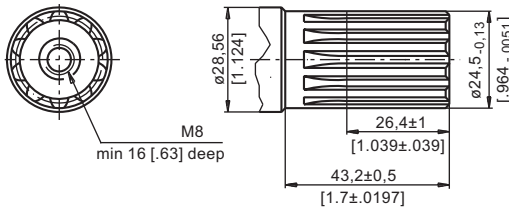
SH

- splined, BS 2059 (SAE 6B)  
Max. Torque 40 daNm [3540 lb-in]



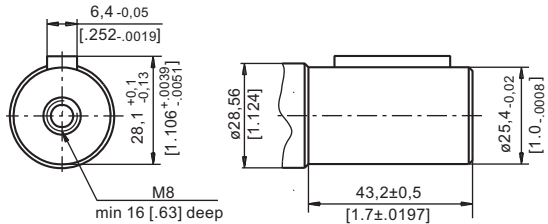
SA

- splined, B25x22h9 DIN 5482  
Max. Torque 40 daNm [3540 lb-in]



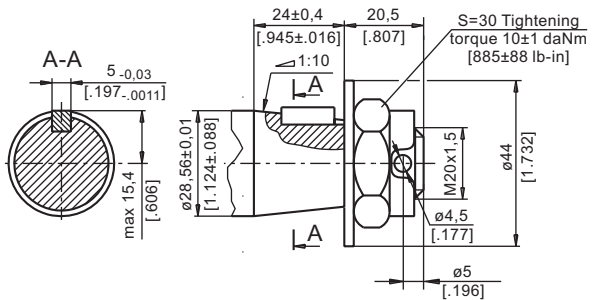
CO

- ø1" straight, Parallel key 1/4"x1/4"x1/4" BS46  
Max. Torque 34 daNm [3010 lb-in]



K

- tapered 1:10, Parallel key B5x5x14 DIN 6885  
Max. Torque 40 daNm [3540 lb-in]



ORDER CODE

1

2

3

4

5

6

RK

Pos.1 - Mounting Flange

- omit - Oval mount, two holes
- Q - Square mount, four bolts

Pos.2 - Displacement code

|     |                                                           |
|-----|-----------------------------------------------------------|
| 50  | - 51,5 cm <sup>3</sup> /rev [3.14 in <sup>3</sup> /rev]   |
| 80  | - 80,3 cm <sup>3</sup> /rev [4.90 in <sup>3</sup> /rev]   |
| 100 | - 99,8 cm <sup>3</sup> /rev [6.09 in <sup>3</sup> /rev]   |
| 125 | - 125,7 cm <sup>3</sup> /rev [7.67 in <sup>3</sup> /rev]  |
| 160 | - 159,6 cm <sup>3</sup> /rev [9.74 in <sup>3</sup> /rev]  |
| 200 | - 199,8 cm <sup>3</sup> /rev [12.19 in <sup>3</sup> /rev] |
| 250 | - 250,1 cm <sup>3</sup> /rev [15.26 in <sup>3</sup> /rev] |
| 315 | - 315,7 cm <sup>3</sup> /rev [19.26 in <sup>3</sup> /rev] |
| 400 | - 397,0 cm <sup>3</sup> /rev [24.40 in <sup>3</sup> /rev] |

Pos.3 - Shaft Extensions\*

- C - ø25 straight, Parallel key A8x7x32 DIN6885
- CO - ø25,4 straight, Parallel key 1/4"x1/4"x1/4" BS46
- SH - ø25,32 splined BS 2059 (SAE 6B)
- K - ø28,56 tapered 1:10, Parallel key, B5x5x14 DIN6885
- SA - ø24,5 splined B25x22h9 DIN 5482

Pos.4 - Ports

- omit - BSPP (ISO 228)
- M - Metric (ISO 262)

Pos.5 - Special Features (see page 119)

Pos.6 - Design Series

- omit - Factory specified

NOTE:

\* The permissible output torque for shafts must not be exceeded!

The hydraulic motors are mangano-phosphatized as standard.

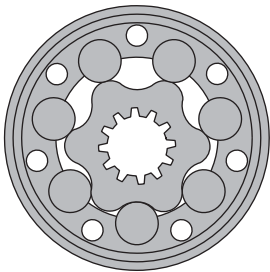


# HYDRAULIC MOTORS RW



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Grass cutting machinery etc.



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Permissible shaft loads ..... 91

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## OPTIONS

- » Model - Spool valve, roll-gerotor
- » Wheel mount
- » Shafts - straight and tapered
- » Shaft seal for high and low pressure
- » Metric and BSPP ports
- » Other special features

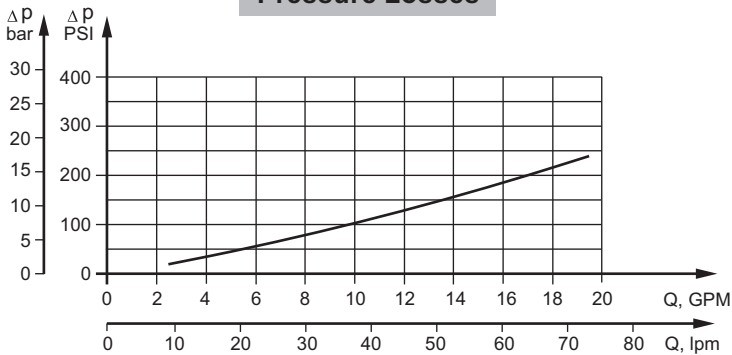
## GENERAL

|                                                   |                                                                  |                                    |
|---------------------------------------------------|------------------------------------------------------------------|------------------------------------|
| Max. Displacement,                                | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                      | 397 [24.4]                         |
| Max. Speed,                                       | [RPM]                                                            | 1029                               |
| Max. Torque,                                      | daNm [lb-in]                                                     | cont.: 61 [5400] int.: 69 [6100]   |
| Max. Output,                                      | kW [HP]                                                          | 15 [20.1]                          |
| Max. Pressure Drop,                               | bar [PSI]                                                        | cont.: 175 [2540] int.: 200 [2900] |
| Max. Oil Flow,                                    | lpm [GPM]                                                        | 90 [23.8]                          |
| Min. Speed,                                       | [RPM]                                                            | 10                                 |
| Pressure fluid                                    | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |                                    |
| Temperature range,                                | °C [°F]                                                          | -40÷140 [-40÷284]                  |
| Optimal Viscosity range, mm <sup>2</sup> /s [SUS] | 20÷75 [98÷347]                                                   |                                    |
| Filtration                                        | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |                                    |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



SPECIFICATION DATA

| Type                                                     |                             | RW 50          | RW 80          | RW 100         | RW 125          | RW 160          | RW 200           | RW 250           | RW 315           | RW 400          |
|----------------------------------------------------------|-----------------------------|----------------|----------------|----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------|
| Displacement, cm³/rev<br>[in³/rev]                       |                             | 51,5<br>[3.14] | 80,3<br>[4.90] | 99,8<br>[6.09] | 125,7<br>[7.67] | 159,6<br>[9.74] | 199,8<br>[12.19] | 250,1<br>[15.26] | 315,7<br>[19.26] | 397<br>[24.4]   |
| Max. Speed,<br>[RPM]                                     | Cont.                       | 775            | 750            | 600            | 475             | 375             | 300              | 300              | 240              | 190             |
|                                                          | Int.*                       | 1029           | 940            | 750            | 600             | 470             | 375              | 360              | 285              | 226             |
| Max. Torque<br>daNm [lb-in]                              | Cont.                       | 10 [900]       | 20 [1770]      | 24 [2125]      | 30 [2655]       | 39 [3450]       | 45 [4000]        | 54 [4780]        | 55 [4870]        | 61 [5400]       |
|                                                          | Int.*                       | 13 [1150]      | 22 [1947]      | 28 [2480]      | 34 [3010]       | 43 [3805]       | 50 [4425]        | 61 [5400]        | 69 [6100]        | 69 [6100]       |
|                                                          | Peak**                      | 17 [1505]      | 27 [2390]      | 32 [2832]      | 37 [3275]       | 46 [4070]       | 56 [4960]        | 71 [6280]        | 84 [7430]        | 87 [7700]       |
| Max. Output<br>kW [HP]                                   | Cont.                       | 7 [9.5]        | 12,5 [17]      | 13 [17.4]      | 12,5 [16.8]     | 11,5 [15.4]     | 11 [14.8]        | 10 [13.4]        | 9 [12]           | 7,8 [10.5]      |
|                                                          | Int.*                       | 8,5 [11.9]     | 15 [20.1]      | 15 [20.1]      | 14,5 [19.5]     | 14 [18.8]       | 13 [17.4]        | 12 [16.1]        | 10 [13.4]        | 10,6 [14.2]     |
| Max. Pressure Drop<br>bar [PSI]                          | Cont.                       | 140 [2030]     | 175 [2540]     | 175 [2540]     | 175 [2540]      | 175 [2540]      | 175 [2540]       | 175 [2540]       | 135 [1960]       | 110 [1600]      |
|                                                          | Int.*                       | 175 [2540]     | 200 [2900]     | 200 [2900]     | 200 [2900]      | 200 [2900]      | 200 [2900]       | 200 [2900]       | 175 [2540]       | 140 [2030]      |
|                                                          | Peak**                      | 225 [3260]     | 225 [3260]     | 225 [3260]     | 225 [3260]      | 225 [3260]      | 225 [3260]       | 225 [3260]       | 210 [3045]       | 175 [2540]      |
| Max. Oil Flow<br>lpm [GPM]                               | Cont.                       | 40 [10,6]      | 60 [15,9]      | 60 [15,9]      | 60 [15,9]       | 60 [15,9]       | 60 [15,9]        | 75 [19,8]        | 75 [19,8]        | 75 [19,8]       |
|                                                          | Int.*                       | 50 [13,2]      | 75 [19,8]      | 75 [19,8]      | 75 [19,8]       | 75 [19,8]       | 75 [19,8]        | 90 [23,8]        | 90 [23,8]        | 90 [23,8]       |
| Max. Inlet Pressure<br>bar [PSI]                         | Cont.                       | 175 [2540]     | 175 [2540]     | 175 [2540]     | 175 [2540]      | 175 [2540]      | 175 [2540]       | 175 [2540]       | 175 [2540]       | 175 [2540]      |
|                                                          | Int.*                       | 200 [2900]     | 200 [2900]     | 200 [2900]     | 200 [2900]      | 200 [2900]      | 200 [2900]       | 200 [2900]       | 200 [2900]       | 200 [2900]      |
|                                                          | Peak**                      | 225 [3260]     | 225 [3260]     | 225 [3260]     | 225 [3260]      | 225 [3260]      | 225 [3260]       | 225 [3260]       | 225 [3260]       | 225 [3260]      |
| Max. Return Pres-<br>sure with Drain Line<br>bar [PSI]   | Cont.                       | 175 [2540]     | 175 [2540]     | 175 [2540]     | 175 [2540]      | 175 [2540]      | 175 [2540]       | 175 [2540]       | 175 [2540]       | 175 [2540]      |
|                                                          | Int.*                       | 200 [2900]     | 200 [2900]     | 200 [2900]     | 200 [2900]      | 200 [2900]      | 200 [2900]       | 200 [2900]       | 200 [2900]       | 200 [2900]      |
|                                                          | Peak**                      | 225 [3260]     | 225 [3260]     | 225 [3260]     | 225 [3260]      | 225 [3260]      | 225 [3260]       | 225 [3260]       | 225 [3260]       | 225 [3260]      |
| Max. Starting Pressure with<br>Unloaded Shaft, bar [PSI] |                             | 10 [145]       | 10 [145]       | 10 [145]       | 9 [130]         | 7 [102]         | 5 [73]           | 5 [73]           | 5 [73]           | 5 [73]          |
| Min. Starting Torque<br>daNm [lb-in]                     | At max.press.               |                |                |                |                 |                 |                  |                  |                  |                 |
|                                                          | drop Cont.                  | 8 [710]        | 15 [1330]      | 20 [1770]      | 25 [2215]       | 32 [2832]       | 41 [3630]        | 50 [4425]        | 50 [4425]        | 50 [4425]       |
|                                                          | At max.press.<br>drop Int.* | 10 [885]       | 17 [1505]      | 23 [2035]      | 28 [2480]       | 37 [3275]       | 46 [4070]        | 55 [4870]        | 66 [5840]        | 61 [5400]       |
| Min. Speed***, [RPM]                                     |                             | 10             | 10             | 10             | 10              | 10              | 10               | 10               | 10               | 10              |
| Weight, kg [lb]                                          |                             | 9,6<br>[21.2]  | 9,7<br>[21.4]  | 9.8<br>[21.7]  | 10,0<br>[22.1]  | 10,3<br>[22.7]  | 10,8<br>[23.8]   | 11,3<br>[24.9]   | 11,8<br>[26]     | 12,5<br>[27.63] |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

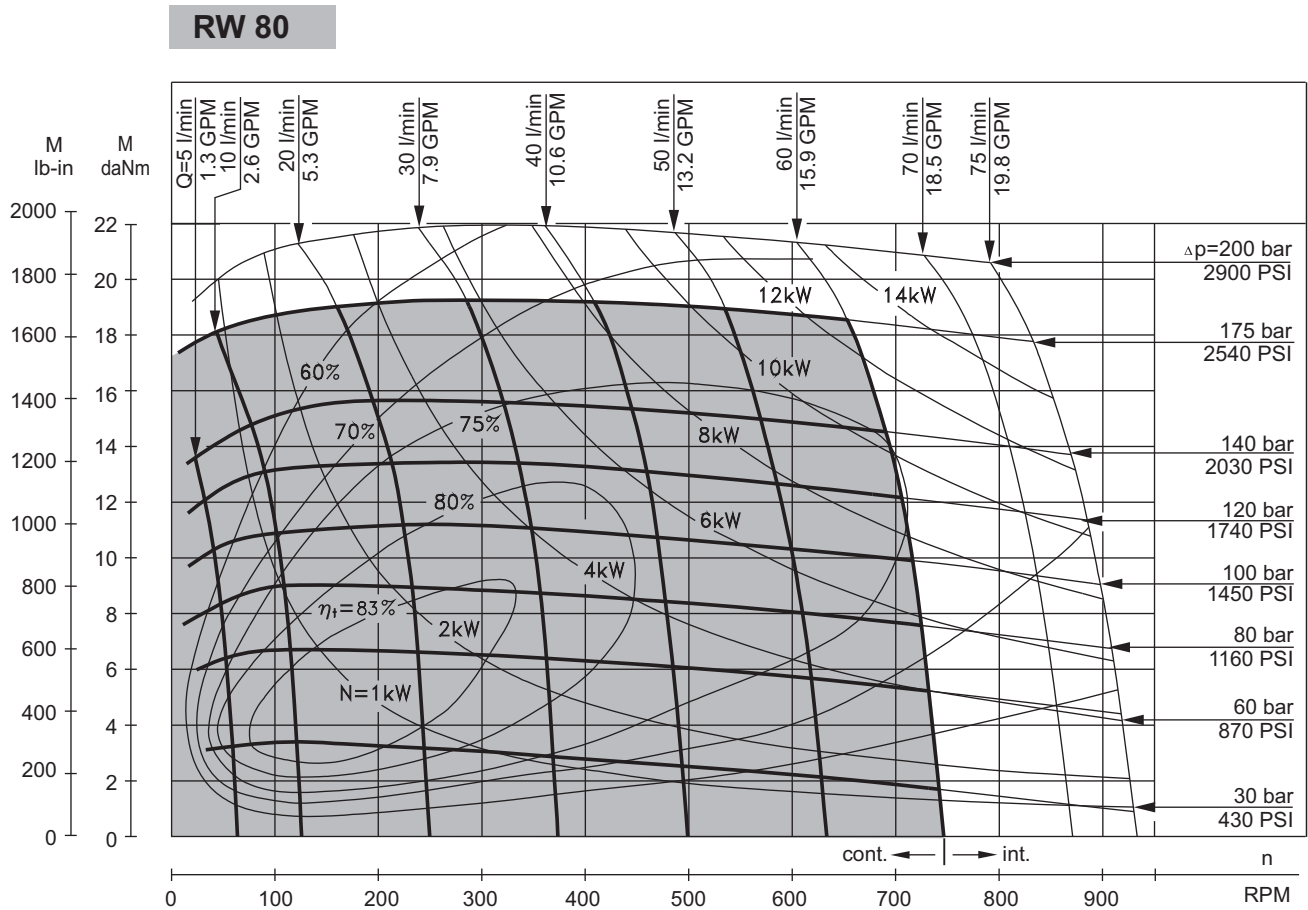
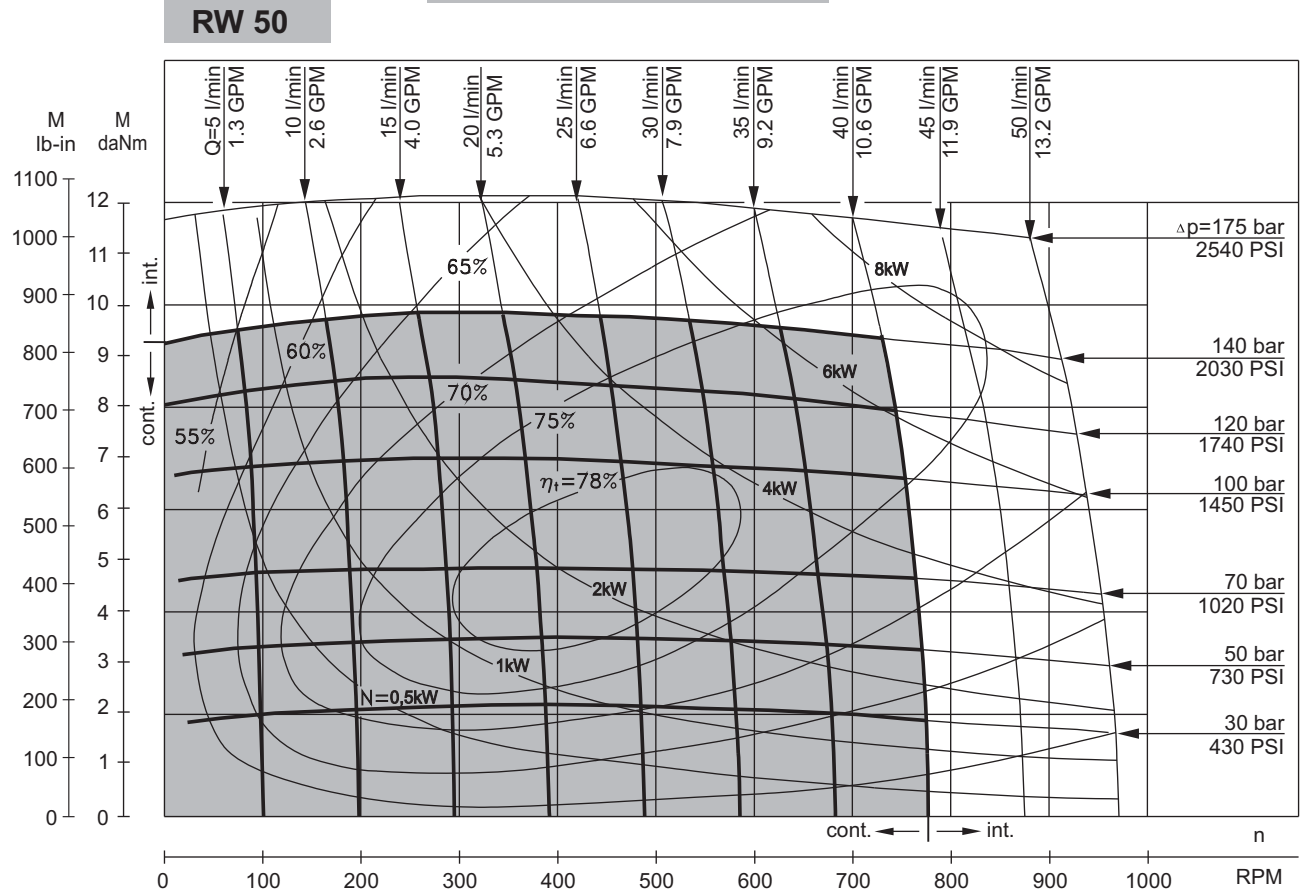
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

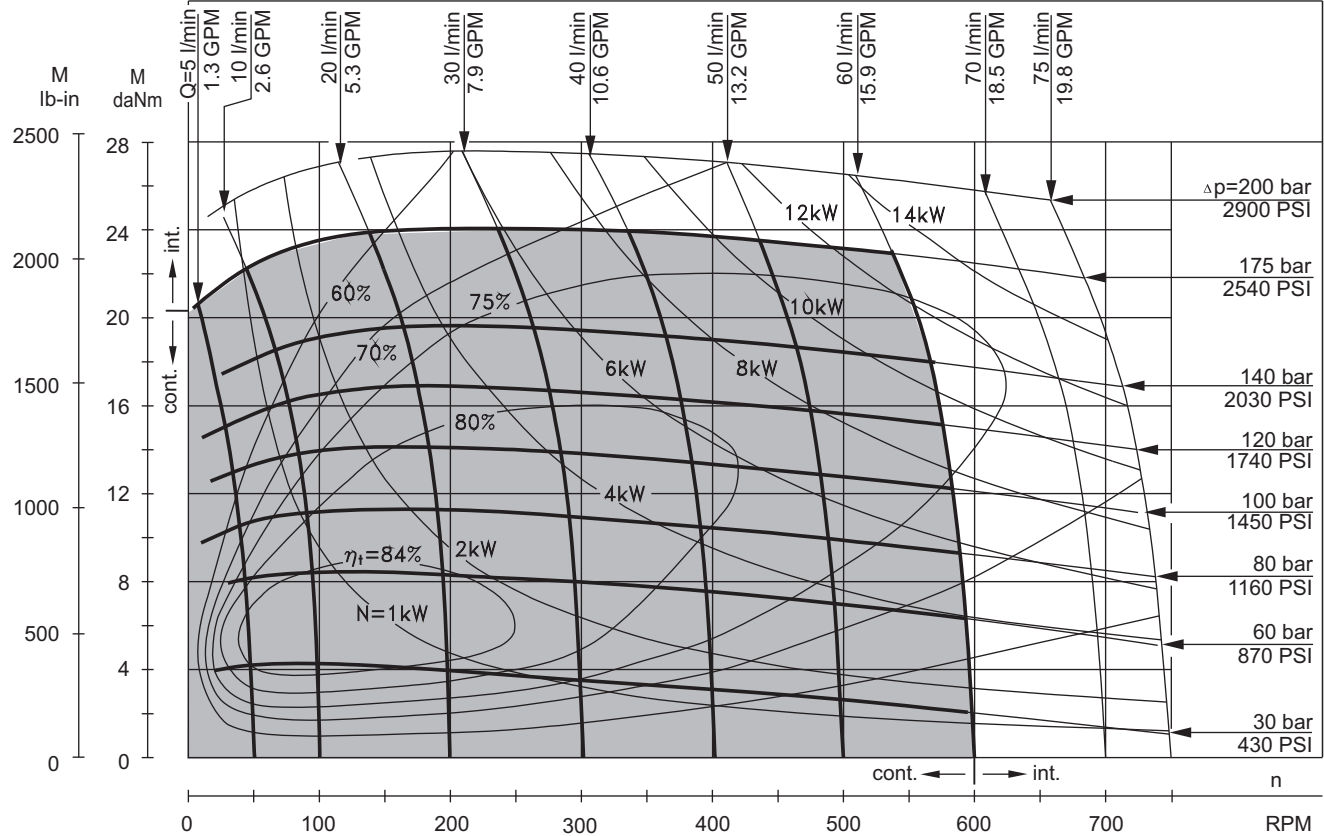
FUNCTION DIAGRAMS



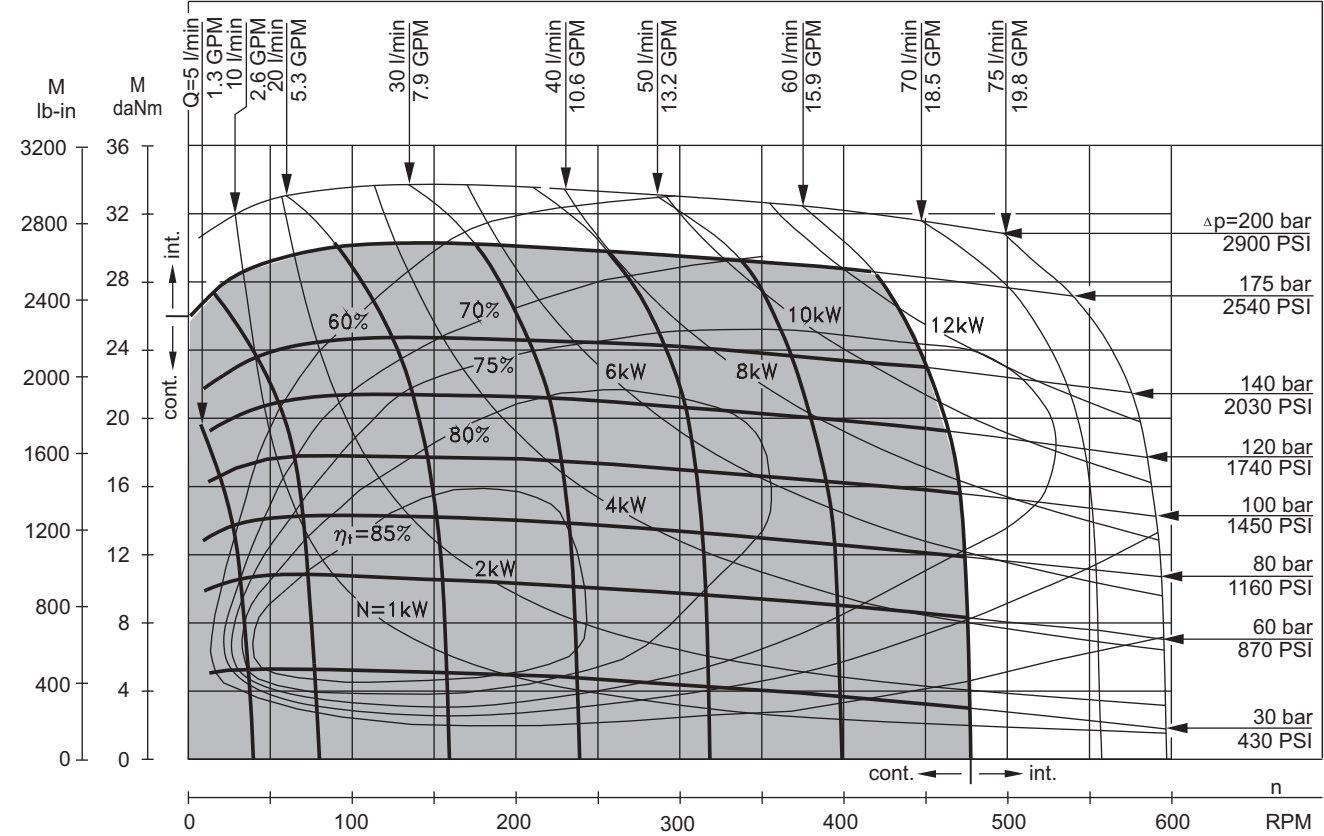
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

RW 100



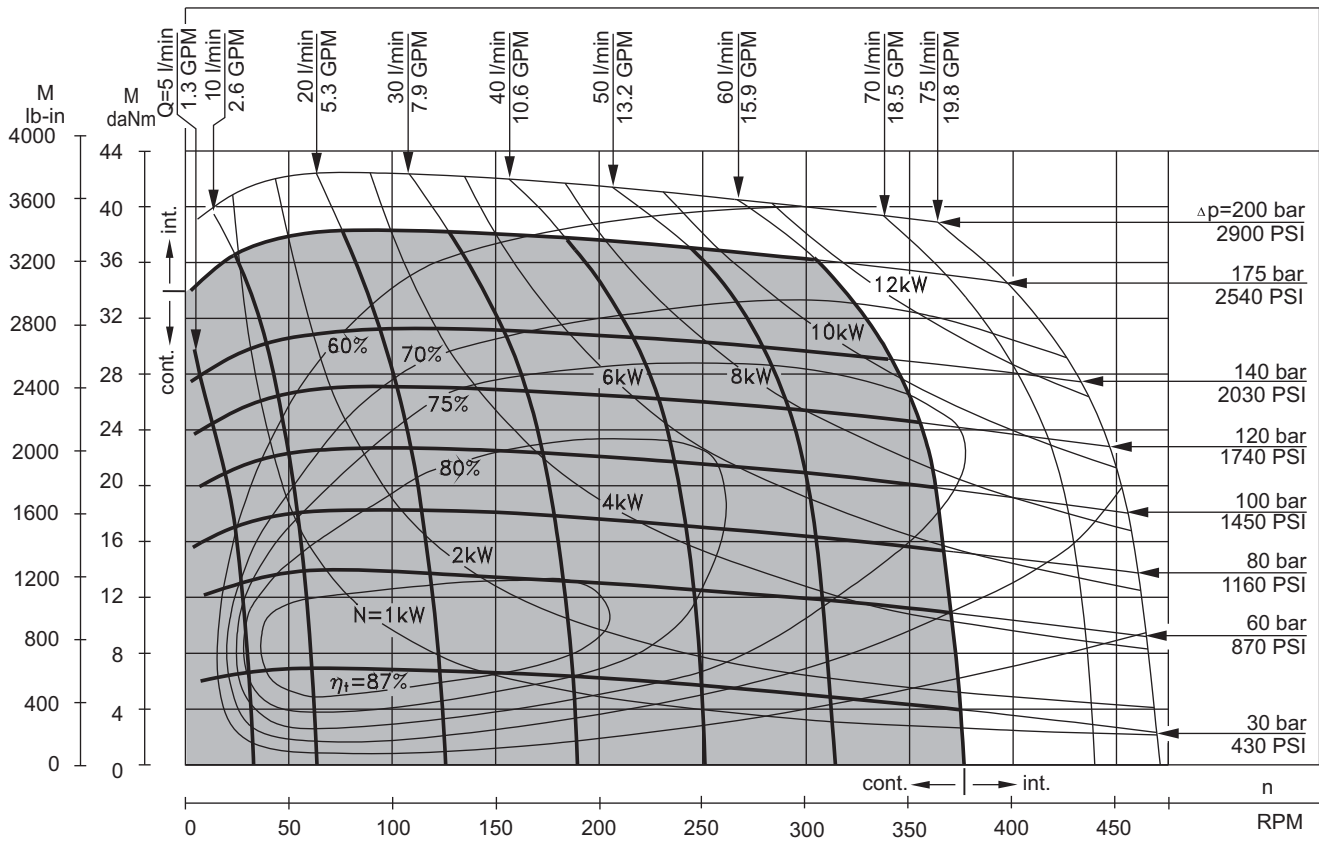
RW 125



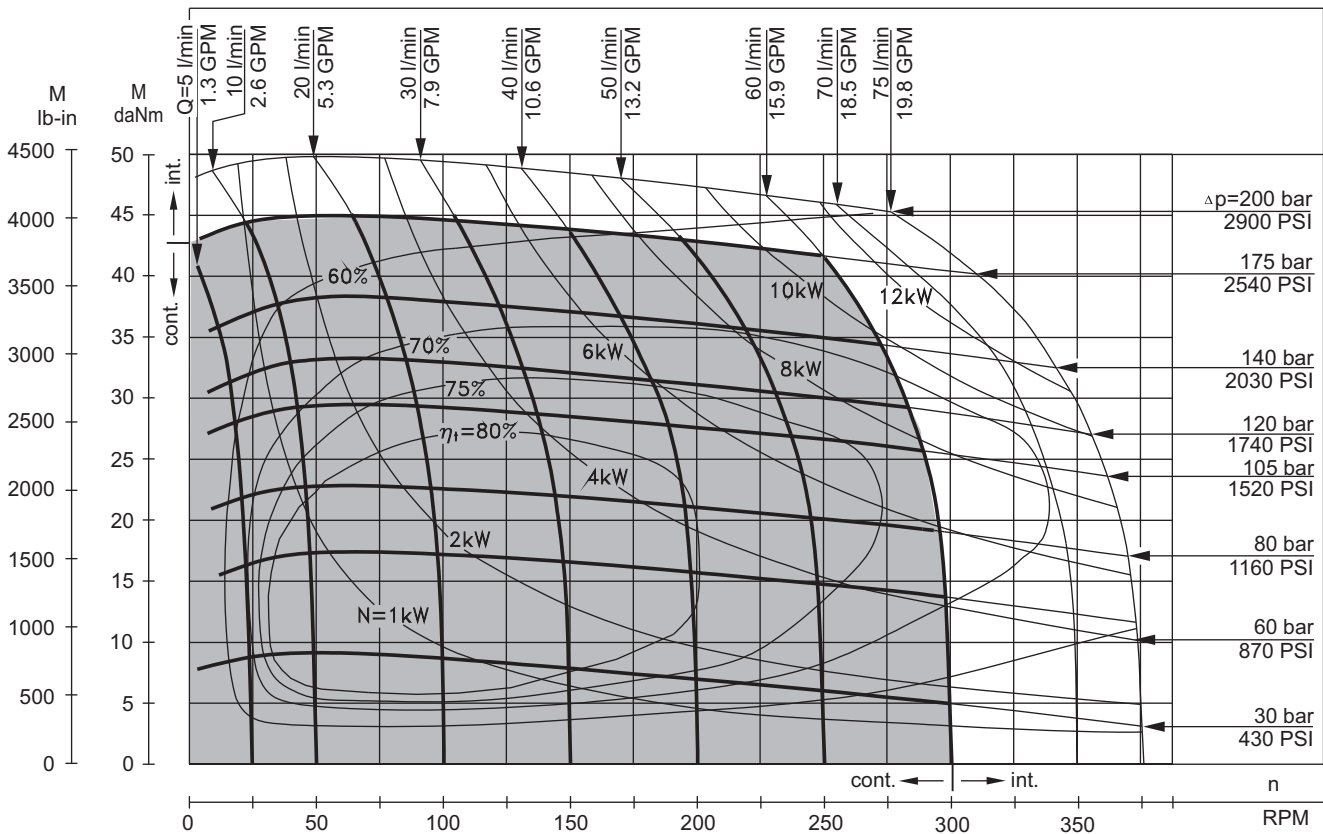
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

RW 160



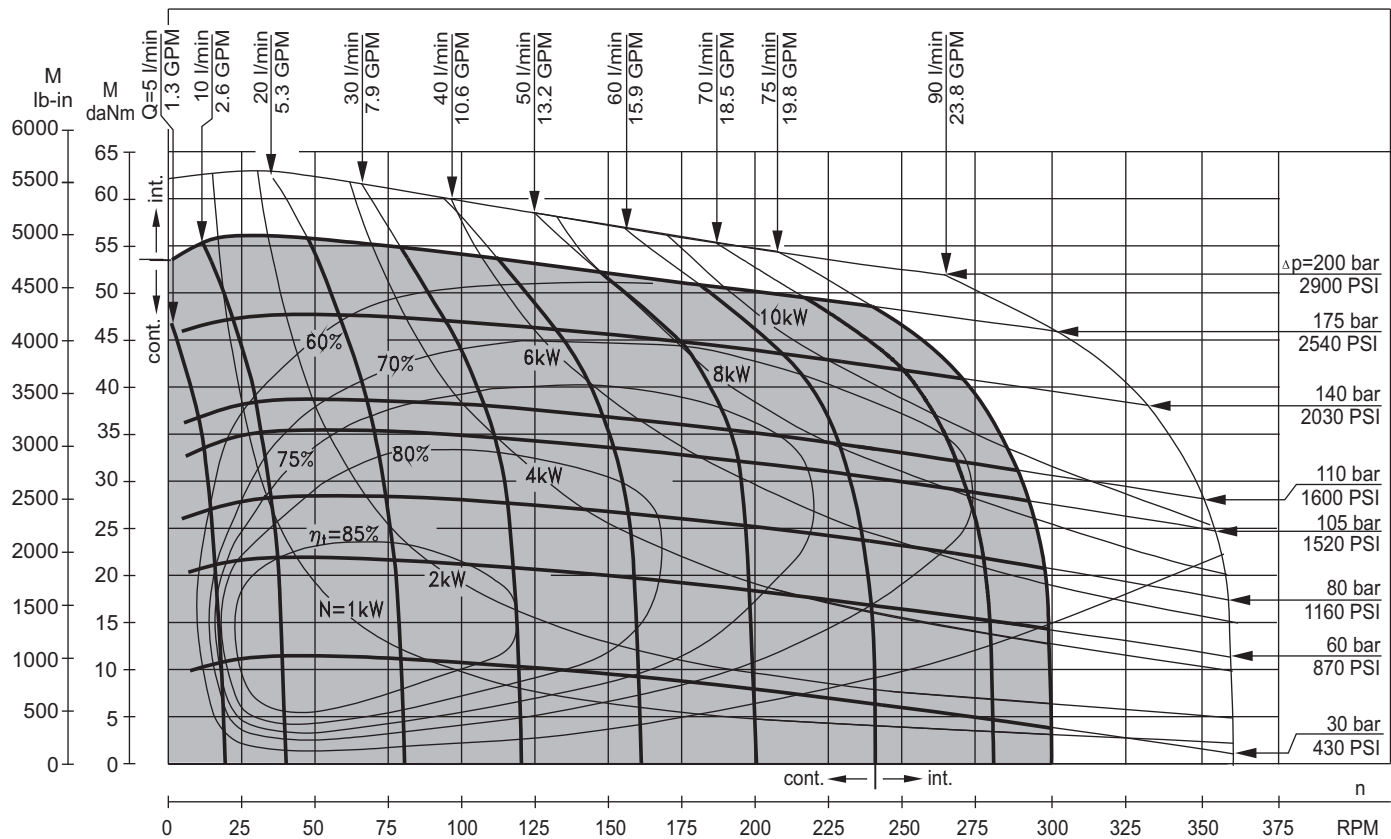
RW 200



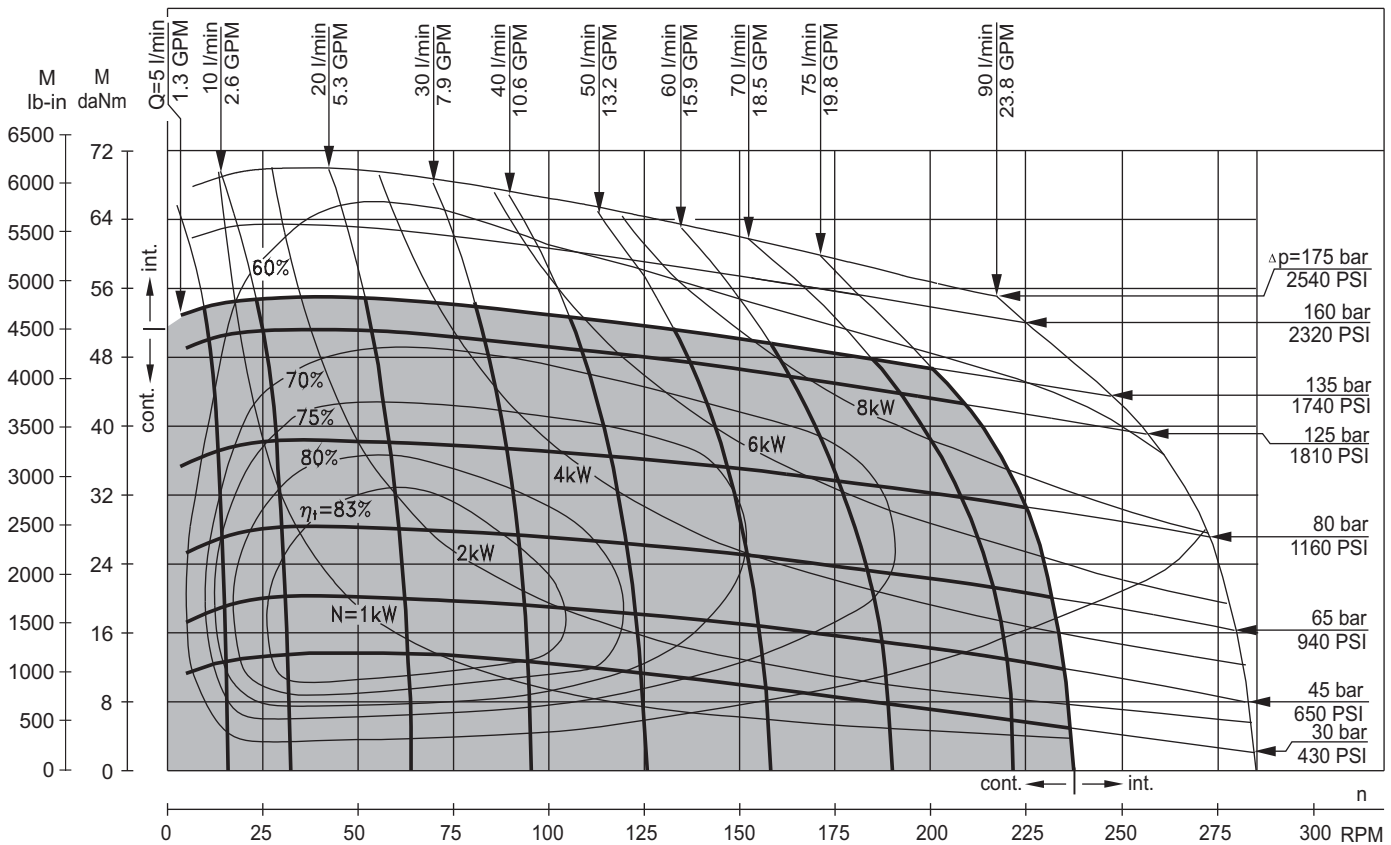
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

RW 250



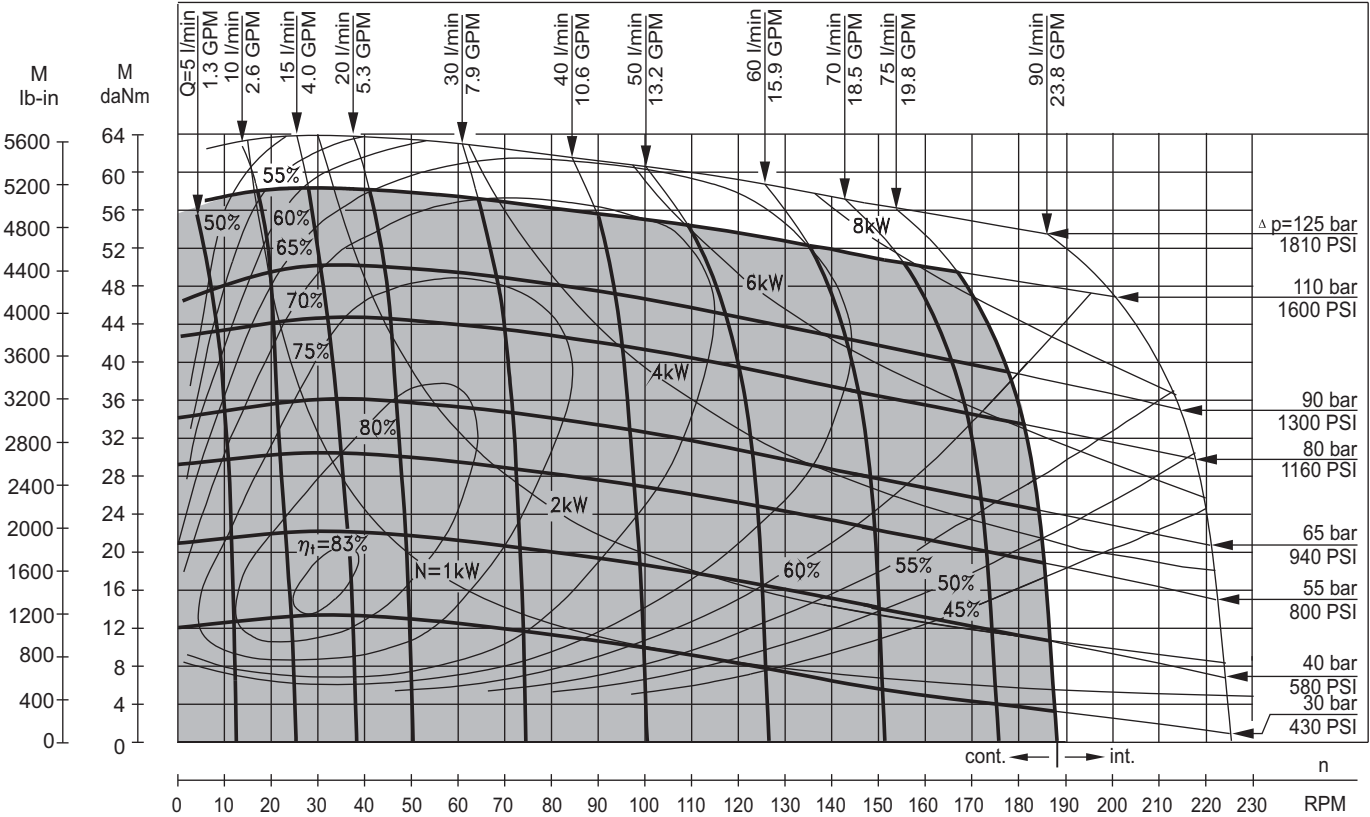
RW 315



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

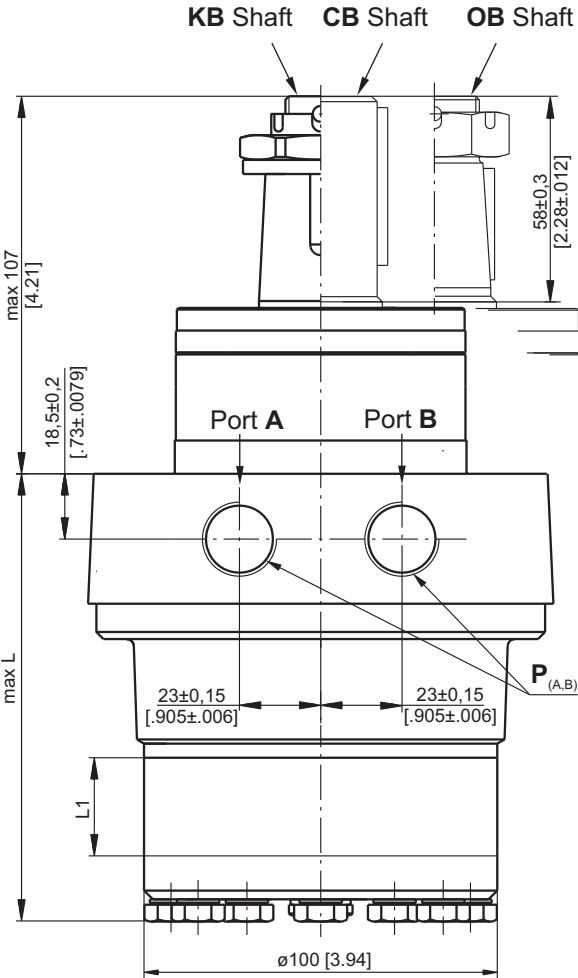
FUNCTION DIAGRAMS

RW 400

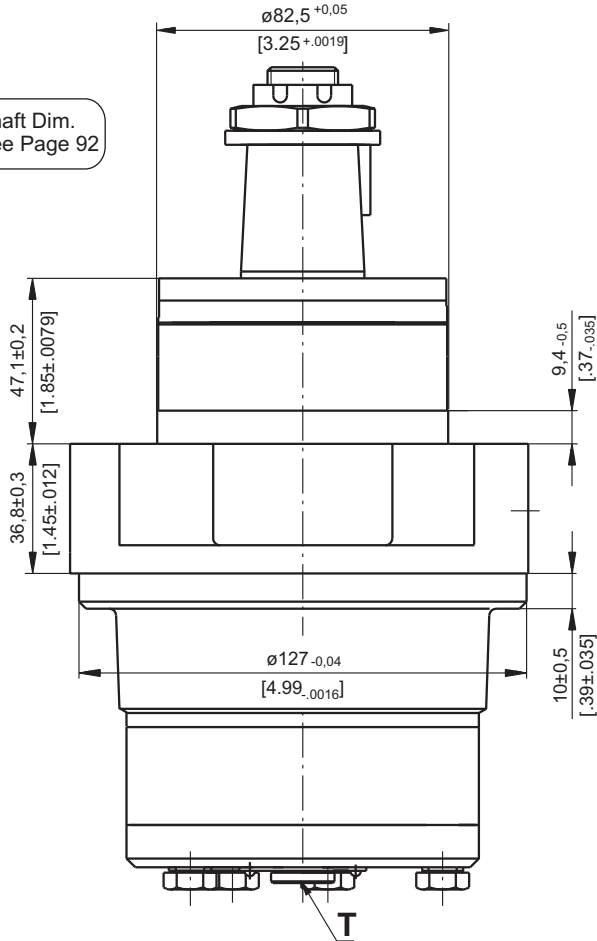


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

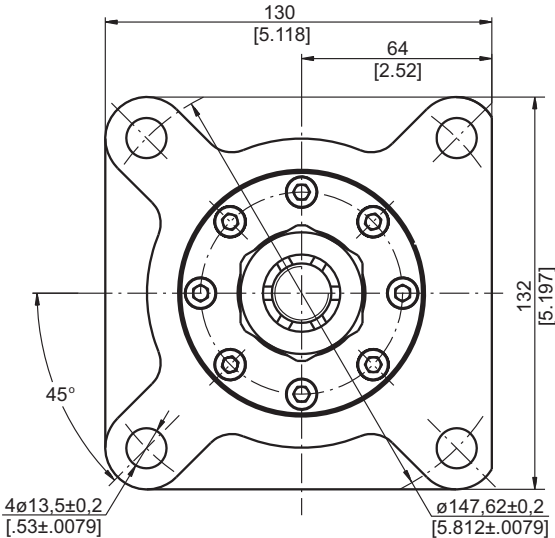
DIMENSIONS AND MOUNTING DATA



Shaft Dim.  
See Page 92



| Type   | L, mm [in]   | L <sub>1</sub> , mm [in] |
|--------|--------------|--------------------------|
| RW 50  | 108,0 [4.25] | 9,0 [.35]                |
| RW 80  | 113,0 [4.45] | 14,0 [.55]               |
| RW 100 | 116,5 [4.59] | 17,4 [.69]               |
| RW 125 | 120,5 [4.74] | 21,8 [.86]               |
| RW 160 | 126,5 [4.98] | 27,8 [1.09]              |
| RW 200 | 133,5 [5.26] | 34,8 [1.37]              |
| RW 250 | 142,5 [5.61] | 43,5 [1.71]              |
| RW 315 | 153,5 [6.04] | 54,8 [2.16]              |
| RW 400 | 168,5 [6.63] | 69,4 [2.73]              |



P<sub>(A,B)</sub>: 2xG1/2 or 2xM22x1,5 - 17 mm [.67 in.] depth

T : G1/4 or M14x1,5 - 12 mm [.47 in.] depth (plugged)

**Standard Rotation**  
Viewed from Shaft End  
Port A Pressurized - **CW**  
Port B Pressurized - **CCW**

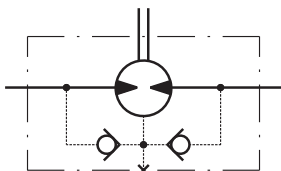
**Reverse Rotation**  
Viewed from Shaft End  
Port A Pressurized - **CCW**  
Port B Pressurized - **CW**



## MAX. PERMISSIBLE SHAFT SEAL PRESSURE

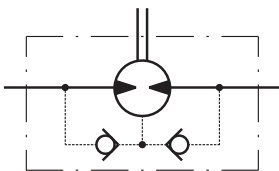
**RW...; RW...UK motors  
with drain connection:**

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



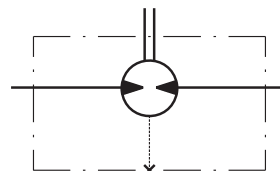
**RW...1 motors without drain connection:**

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

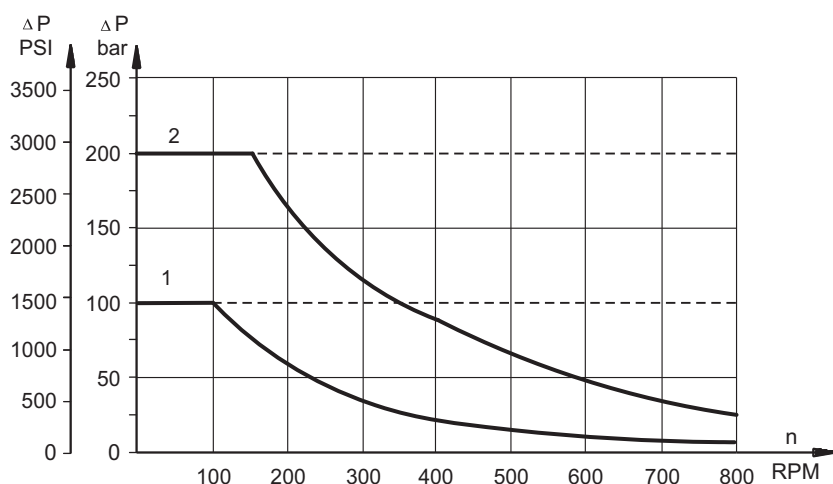


***RW...U motors with  
high pressure seal  
and drain connection:***

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



**Max. return pressure without drain line or  
max. pressure in the drain line**



### 1: Drawing for Standard Shaft Seal

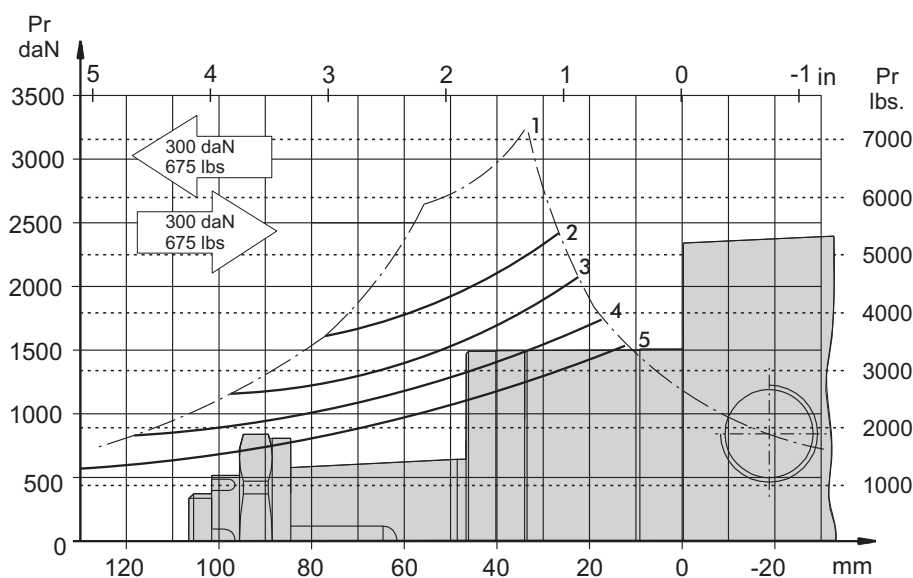
## 2: Drawing for High Pressure Seal ("U" Seal)

—— - continuous operations

----- - intermittent operations

## PERMISSIBLE SHAFT LOADS

The curve applies to a B10 bearing life of 2000 hours.



### 1. Permissible radial shaft load

2. Drawing by  $n = 50$  rpm

3. Drawing by  $n=100$  rpm

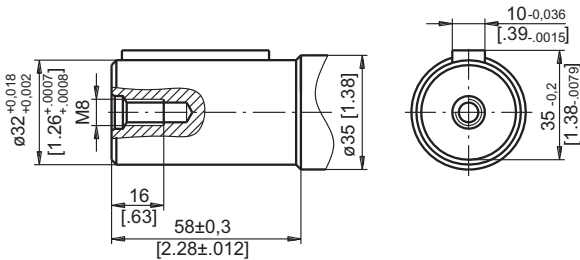
4. Drawing by  $n=200$  rpm

5. Drawing by  $n=400$  rpm

SHAFT EXTENSIONS

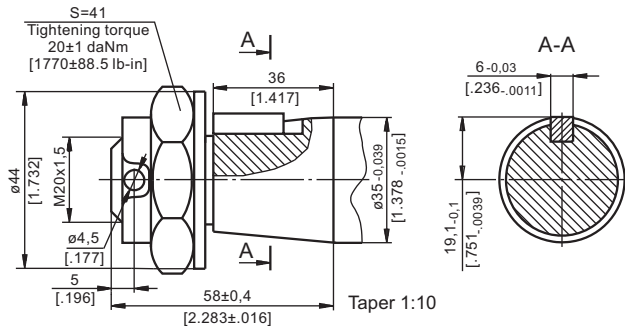
CB

- ø32 straight, Parallel key A10x8x45 DIN 6885  
Max. Torque 77 daNm [6815 lb-in]



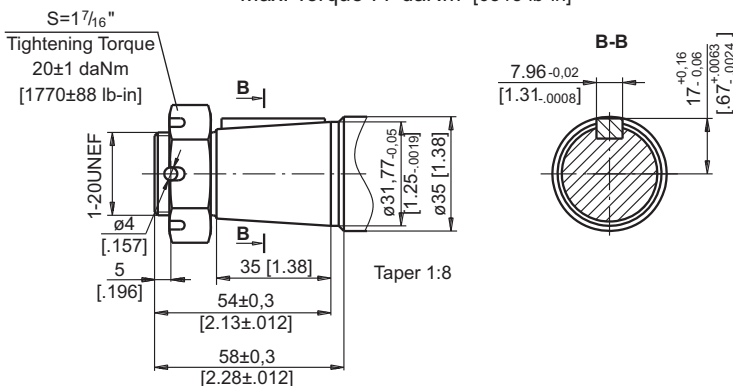
KB

- tapered 1:10, Parallel key B6x6x20 DIN 6885  
Max. Torque 95 daNm [8400 lb-in]



OB

- tapered 1:8 SAEJ 501, Parallel key 5/16"x5/16"x1 1/4" BS46  
Max. Torque 77 daNm [6815 lb-in]



ORDER CODE

|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----|---|---|---|---|---|---|---|
| RW |   |   |   |   |   |   |   |

| Pos.1 | Displacement code                                          |
|-------|------------------------------------------------------------|
| 50    | - 51,5 cm³/rev [ 3.14 in³/rev]                             |
| 80    | - 80,3 cm³/rev [ 4.90 in³/rev]                             |
| 100   | - 99,8 cm³/rev [ 6.09 in³/rev]                             |
| 125   | - 125,7 cm³/rev [ 7.67 in³/rev]                            |
| 160   | - 159,6 cm³/rev [ 9.74 in³/rev]                            |
| 200   | - 199,8 cm³/rev [12.19 in³/rev]                            |
| 250   | - 250,1 cm³/rev [15.26 in³/rev]                            |
| 315   | - 315,7 cm³/rev [19.26 in³/rev]                            |
| 400   | - 397,0 cm³/rev [24.40 in³/rev]                            |
| Pos.2 | Shaft Extensions*                                          |
| CB    | - ø32 straight, Parallel key A10x8x45 DIN6885              |
| KB    | - ø35 tapered 1:10, Parallel key B6x6x20 DIN6888           |
| OB    | - ø1 1/4" tapered1:8, Parallel key 5/16"x5/16"x1 1/4" BS46 |

| Pos.3 | Shaft Seal Pressure                             |
|-------|-------------------------------------------------|
| omit  | - Standard shaft seal                           |
| U     | - High pressure shaft seal without check valves |
| UK    | - High pressure shaft seal with check valve     |
| Pos.4 | Drain Port                                      |
| omit  | - with drain port                               |
| 1     | - without drain port                            |
| Pos.5 | Ports                                           |
| omit  | - BSPP (ISO 228)                                |
| M     | - Metric (ISO 262)                              |
| Pos.6 | Special Features (see page 119)                 |
| Pos.7 | Design Series                                   |
| omit  | - Factory specified                             |

NOTE:

\* The permissible output torque for shafts must not be exceeded!

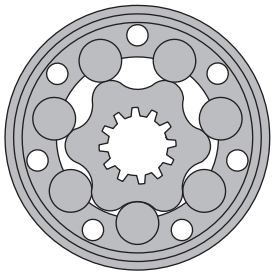
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS MH



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Mining machinery etc.



## CONTENTS

|                                      |       |
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| Permissible shaft seal pressure..... | 99    |
| Tacho connection.....                | 100   |
| Shaft extensions .....               | 100   |
| Order code .....                     | 101   |

## OPTIONS

- » Model - Spool valve, roll-gerotor
- » Flange mount
- » Shafts - straight, splined and tapered
- » Metric and BSPP ports
- » Other special features

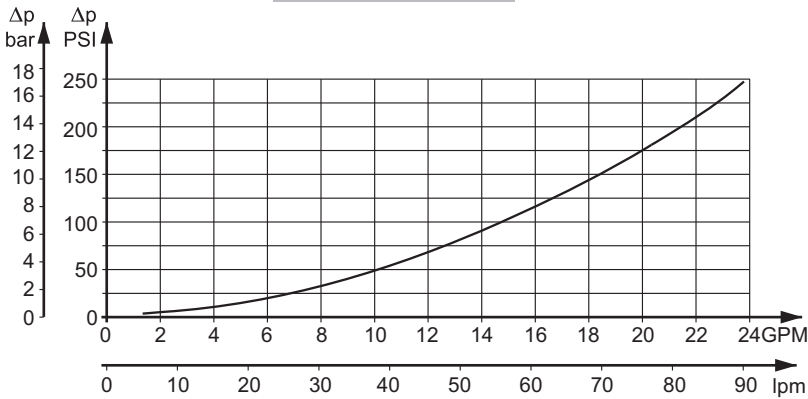
## GENERAL

|                                                                |                                                                  |
|----------------------------------------------------------------|------------------------------------------------------------------|
| Max. Displacement, cm <sup>3</sup> /rev [in <sup>3</sup> /rev] | 502,4 [30.7]                                                     |
| Max. Speed, [RPM]                                              | 445                                                              |
| Max. Torque, daNm [lb-in]                                      | cont.: 84 [7434] int.: 104 [9204]                                |
| Max. Output, kW [HP]                                           | 18,5 [24.8]                                                      |
| Max. Pressure Drop, bar [PSI]                                  | cont.: 175 [2540] int.: 200 [2900]                               |
| Max. Oil Flow, lpm [GPM]                                       | 90 [23.78]                                                       |
| Min. Speed, [RPM]                                              | 5                                                                |
| Pressure fluid                                                 | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |
| Temperature range, °C [°F]                                     | -40÷140 [-40÷284]                                                |
| Optimal Viscosity range, mm <sup>2</sup> /s [SUS]              | 20÷75 [98÷347]                                                   |
| Filtration                                                     | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |

Oil flow in drain line

| Pressure drop bar [PSI] | Viscosity mm <sup>2</sup> /s [SUS] | Oil flow in drain line lpm [GPM] |
|-------------------------|------------------------------------|----------------------------------|
| 100 [1450]              | 20 [98]                            | 2,5 [.660]                       |
|                         | 35 [164]                           | 1,8 [.476]                       |
| 140 [2030]              | 20 [98]                            | 3,5 [.925]                       |
|                         | 35 [164]                           | 2,8 [.740]                       |

Pressure Losses



SPECIFICATION DATA

| Type                                                  |                         | MH 200       | MH 250      | MH 315       | MH 400       | MH 500       |
|-------------------------------------------------------|-------------------------|--------------|-------------|--------------|--------------|--------------|
| Displacement, cm³/rev [in³/rev]                       |                         | 201,3 [12.3] | 252 [15.4]  | 314,9 [19.2] | 396,8 [24.2] | 502,4 [30.7] |
| Max. Speed, [RPM]                                     | Cont.                   | 370          | 295         | 235          | 185          | 150          |
|                                                       | Int.*                   | 445          | 350         | 285          | 225          | 180          |
| Max. Torque daNm [lb-in]                              | Cont.                   | 51 [4510]    | 61 [5398]   | 74 [6548]    | 84 [7434]    | 82 [7257]    |
|                                                       | Int.*                   | 58 [5130]    | 70 [6195]   | 82 [7257]    | 98 [8673]    | 104 [9204]   |
|                                                       | Peak**                  | 64 [5064]    | 79 [6992]   | 98 [8673]    | 109 [9647]   | 117 [10350]  |
| Max. Output kW [HP]                                   | Cont.                   | 16 [21]      | 16 [21]     | 14 [18.7]    | 12,5 [16.7]  | 11 [14.7]    |
|                                                       | Int.*                   | 18,5 [24.8]  | 18,5 [24.8] | 15,5 [20.7]  | 15 [20.1]    | 14 [18.7]    |
| Max. Pressure Drop bar [PSI]                          | Cont.                   | 175 [2540]   | 175 [2540]  | 175 [2540]   | 155 [2240]   | 125 [1810]   |
|                                                       | Int.*                   | 200 [2900]   | 200 [2900]  | 200 [2900]   | 190 [2750]   | 160 [2320]   |
|                                                       | Peak**                  | 225 [3260]   | 225 [3260]  | 225 [3260]   | 210 [3045]   | 180 [2610]   |
| Max. Oil Flow lpm [GPM]                               | Cont.                   | 75 [19.81]   | 75 [19.81]  | 75 [19.81]   | 75 [19.81]   | 75 [19.81]   |
|                                                       | Int.*                   | 90 [23.78]   | 90 [23.78]  | 90 [23.78]   | 90 [23.78]   | 90 [23.78]   |
| Max. Inlet Pressure bar [PSI]                         | Cont.                   | 200 [2900]   | 200 [2900]  | 200 [2900]   | 200 [2900]   | 200 [2900]   |
|                                                       | Int.*                   | 225 [3260]   | 225 [3260]  | 225 [3260]   | 225 [3260]   | 225 [3260]   |
|                                                       | Peak**                  | 250 [3626]   | 250 [3626]  | 250 [3626]   | 250 [3626]   | 250 [3626]   |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] |                         | 5 [72]       | 5 [72]      | 5 [72]       | 5 [72]       | 5 [72]       |
| Min. Starting Torque, daNm [lb-in]                    | At max.press.dropCont   | 39 [3450]    | 52 [4600]   | 66 [5840]    | 72 [6370]    | 72 [6370]    |
|                                                       | At max.press.drop Int.* | 45 [3980]    | 59 [5221]   | 73 [6460]    | 88 [7788]    | 88 [7788]    |
| Min. Speed***, [RPM]                                  |                         | 10           | 10          | 8            | 5            | 5            |
| Weight, kg [lb]                                       |                         | 10,5 [23.2]  | 11 [24.3]   | 11,5 [25.4]  | 12,3 [27.1]  | 13 [28.7]    |

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

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

\*\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM ( ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

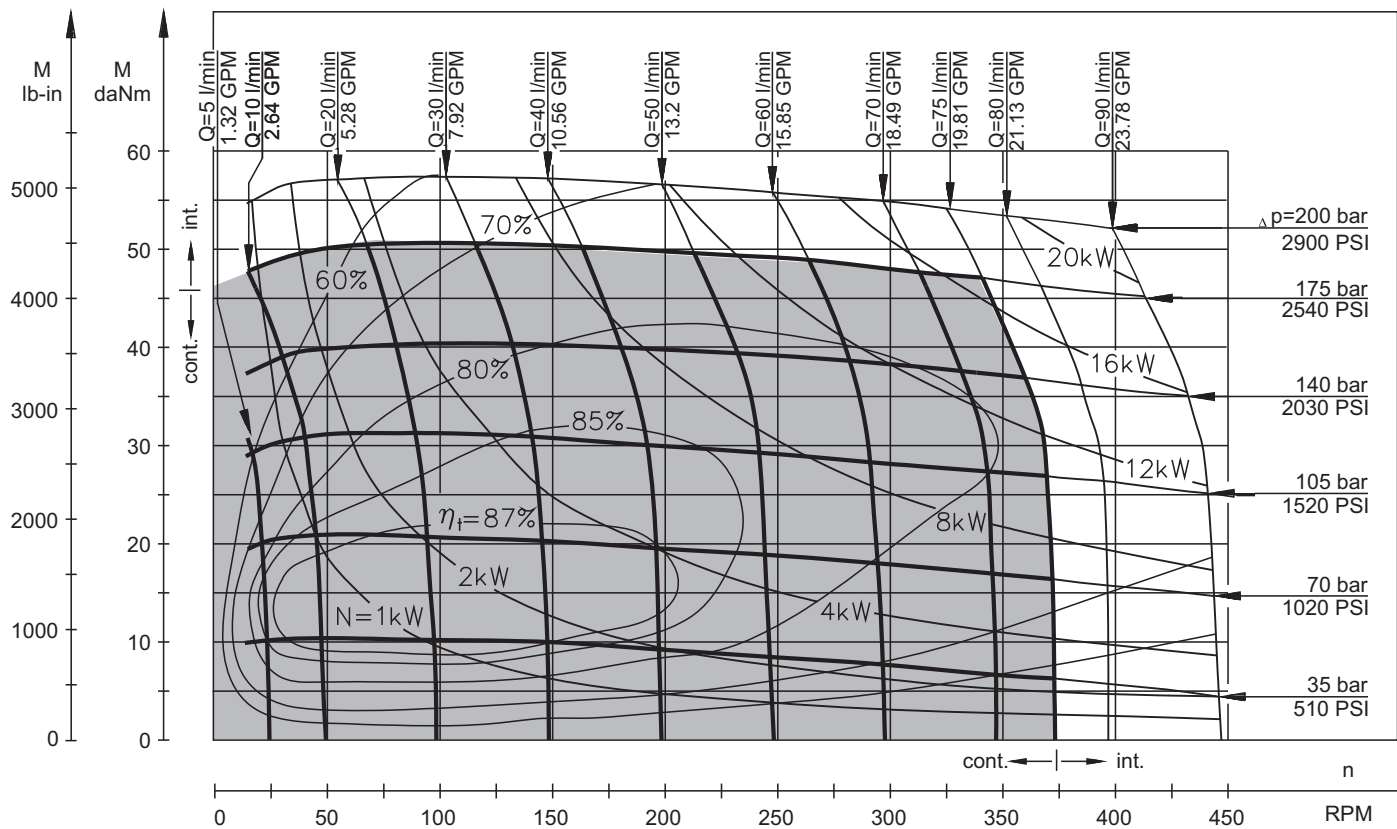
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

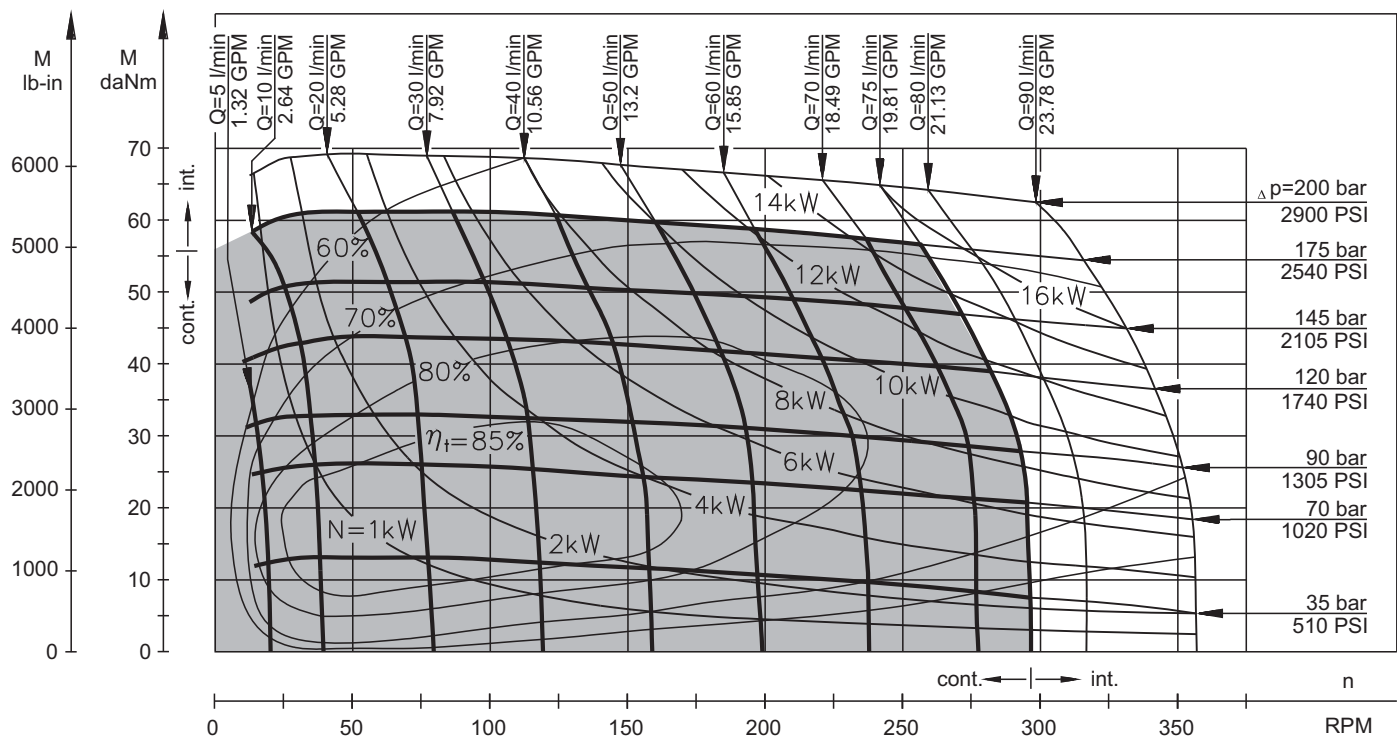
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

FUNCTION DIAGRAMS

MH 200



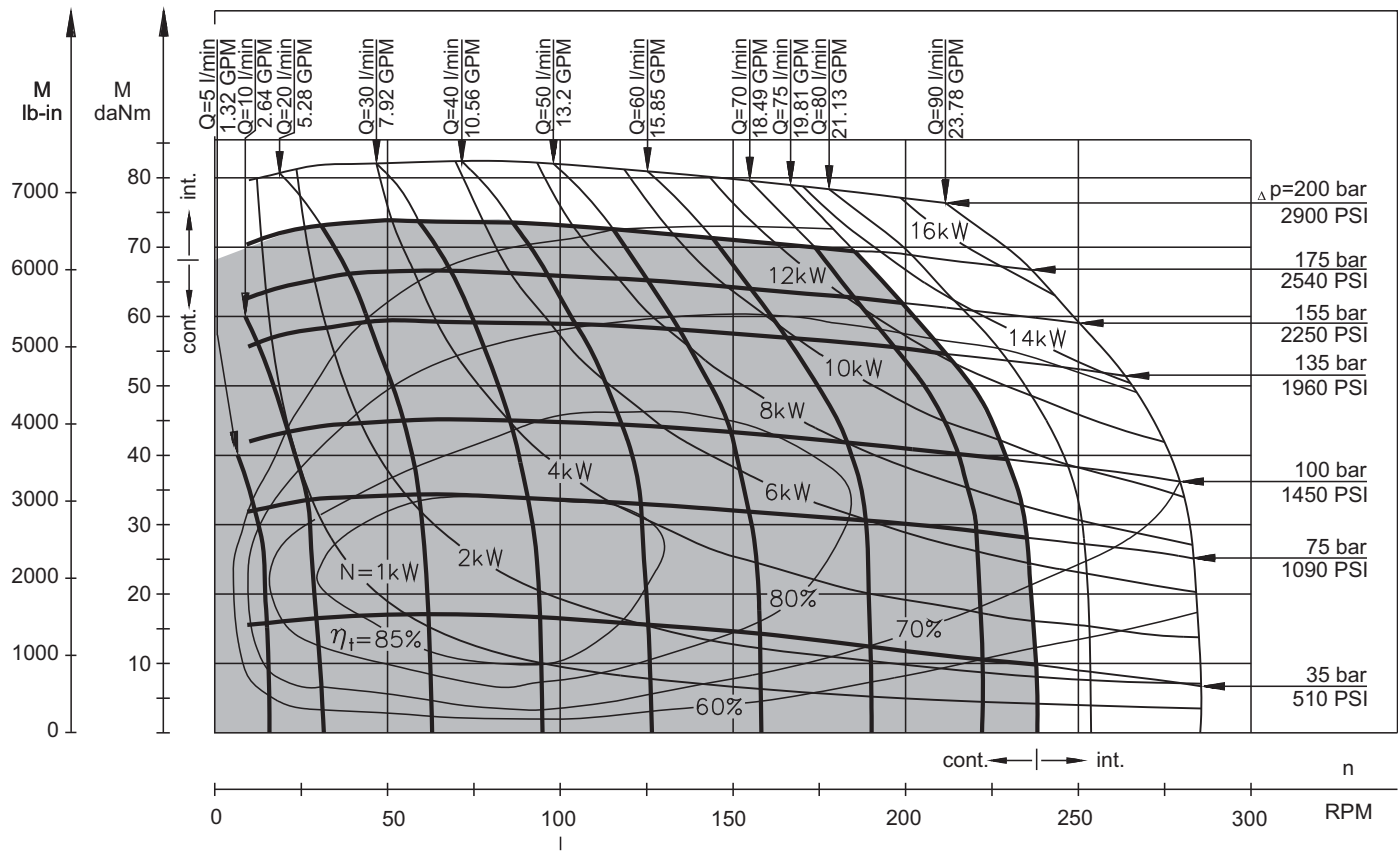
MH 250



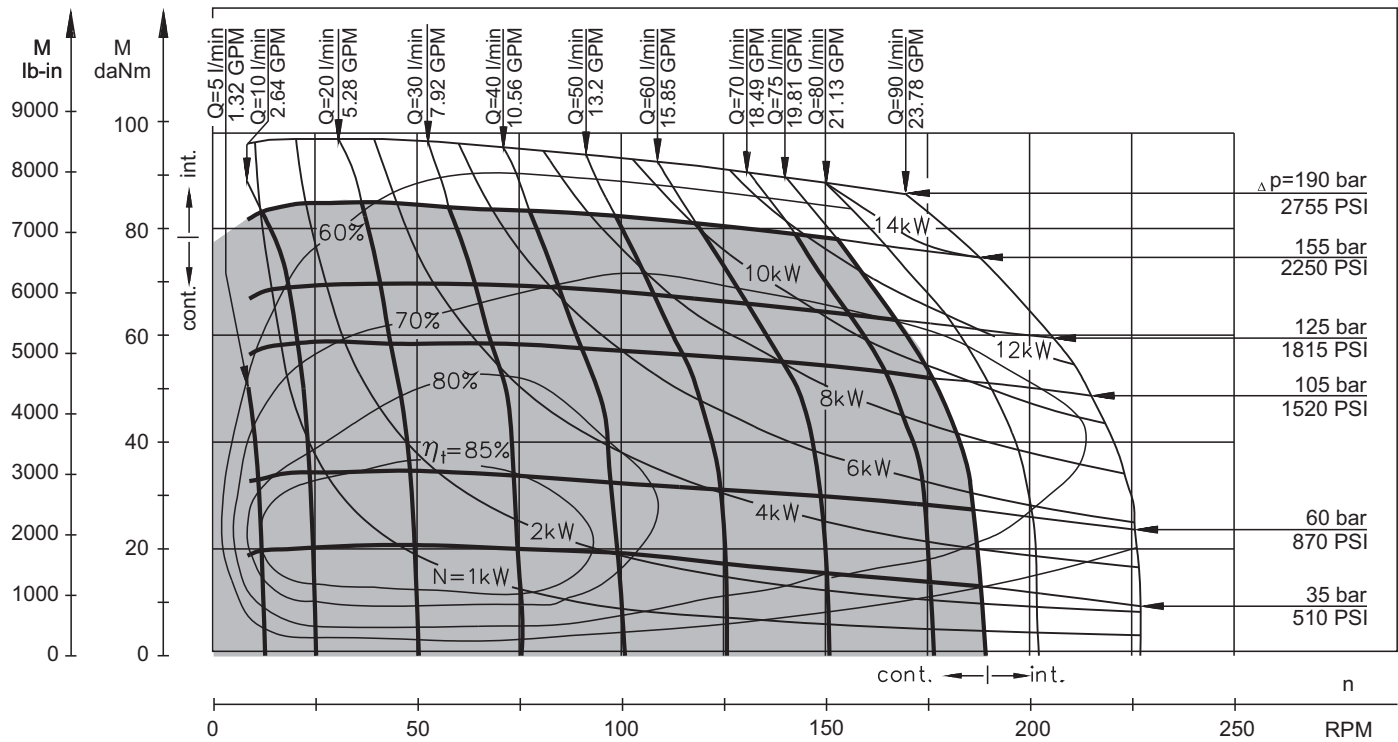
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MH 315



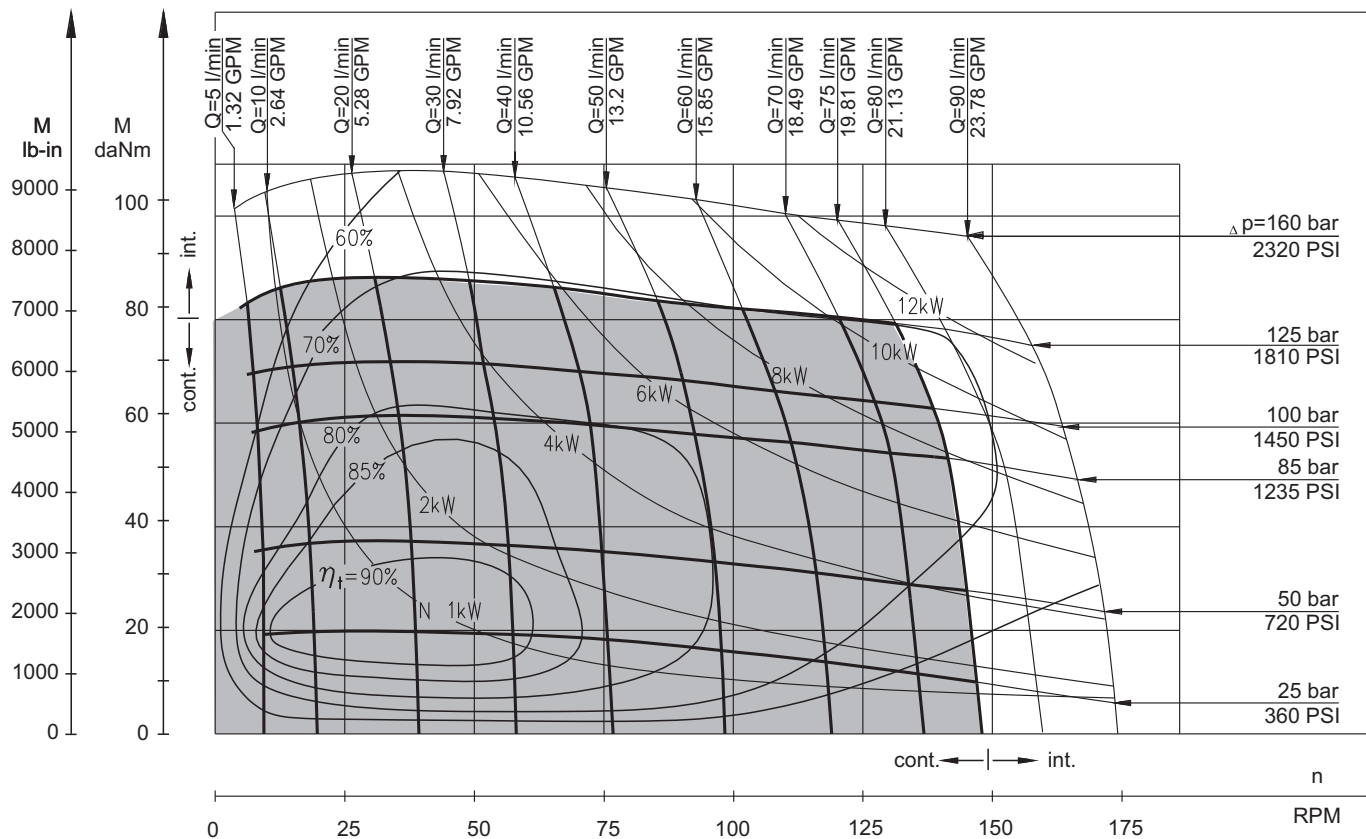
MH 400



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MH 500



The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

PERMISSIBLE SHAFT LOADS FOR MH MOTORS

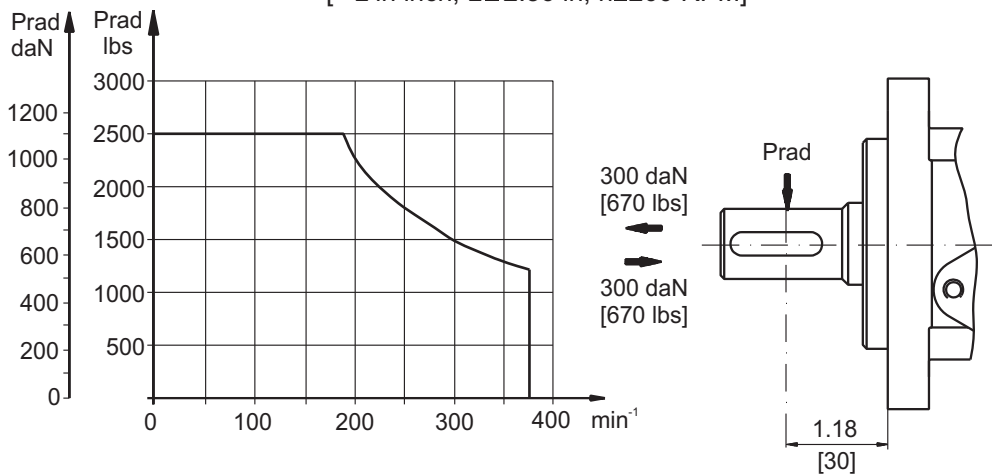
The permissible radial shaft load  $P_{rad}$  depends on the speed (RPM) and distance (L) from the point of load to the mounting flange.

$$\text{Radial Shaft Load } P_{rad} = \frac{1100}{n} \times \frac{25000}{103,5+L}, \text{ daN}^*$$

[\*L in mm; L ≤ 60 mm; n ≥ 200 RPM]

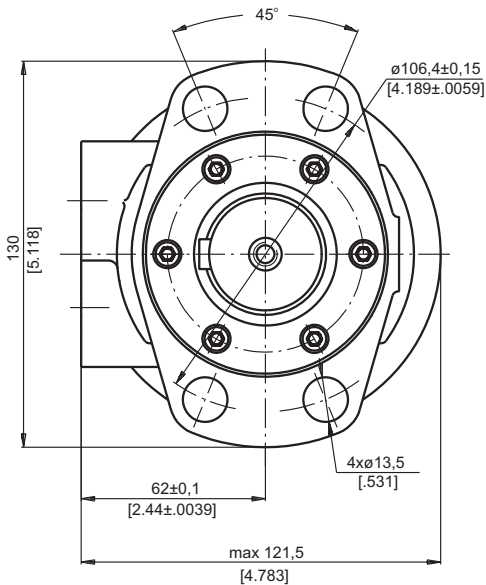
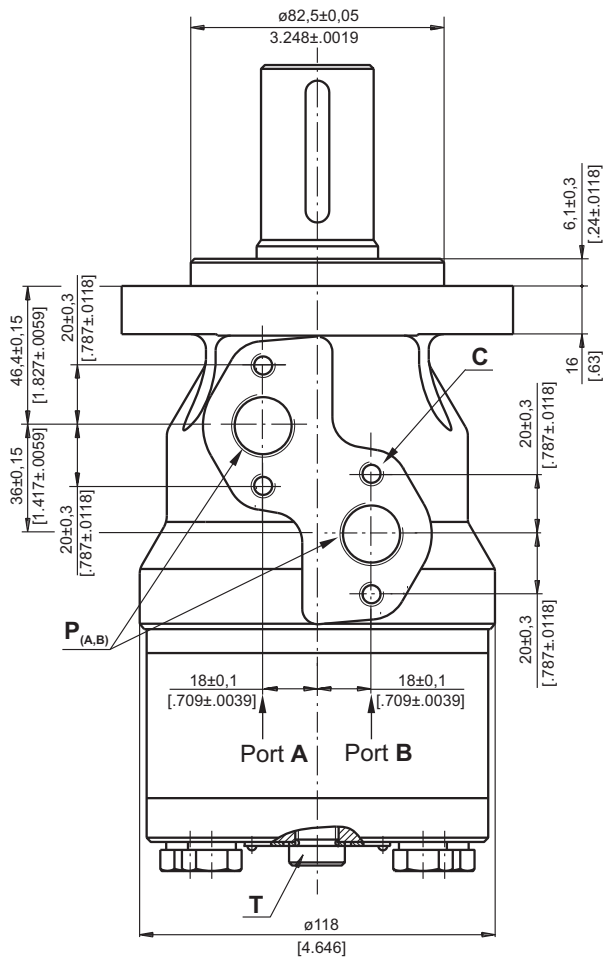
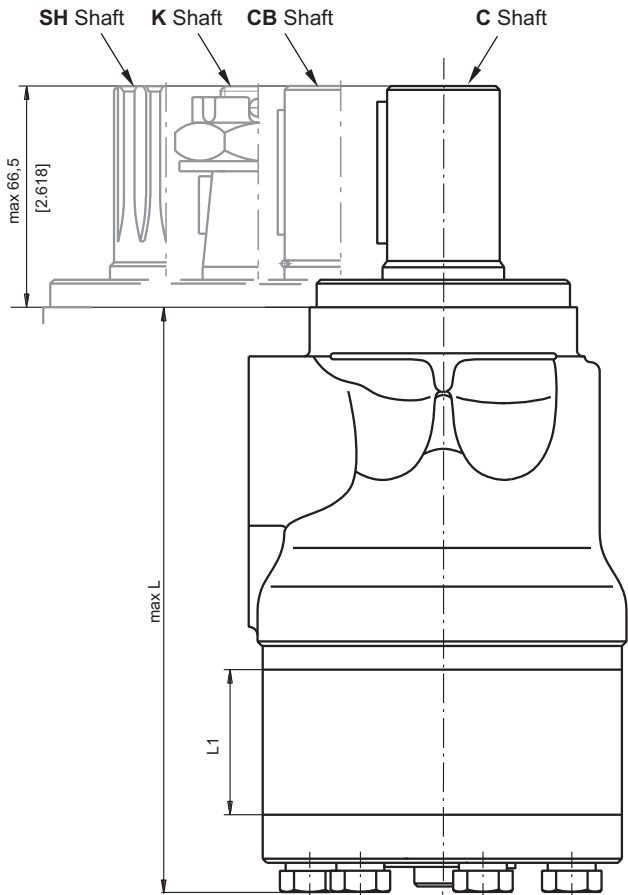
$$\text{Radial Shaft Load } P_{rad} = \frac{1100}{\text{RPM}} \times \frac{2215}{4.075+L}, \text{ lbs}^{**}$$

[\*\*L in inch; L ≤ 2.36 in; n ≥ 200 RPM]



DIMENSIONS AND MOUNTING DATA

Magneto Mount (4 holes)



| Type   | L, mm [in.] | L <sub>1</sub> , mm [in.] |
|--------|-------------|---------------------------|
| MH 200 | 169 [6.65]  | 27,8 [1.09]               |
| MH 250 | 176 [6.93]  | 34,8 [1.37]               |
| MH 315 | 184 [7.24]  | 43,5 [1.71]               |
| MH 400 | 196 [7.72]  | 54,8 [2.16]               |
| MH 500 | 211 [8.31]  | 69,4 [2.73]               |

- C : 4xM8-13 mm [.51 in] depth

P<sub>(A,B)</sub> : 2xG1/2 or 2xM22x1,5-15 mm [.59 in] depth

T : G1/4 or M14x1,5-12 mm [.47 in] depth (plugged)

Standard Rotation

Viewed from Shaft End

Port A Pressurized - CW

Port B Pressurized - CCW

Reverse Rotation

Viewed from Shaft End

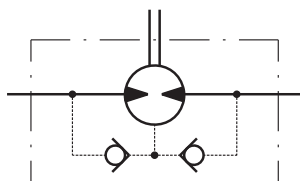
Port A Pressurized - CCW

Port B Pressurized - CW

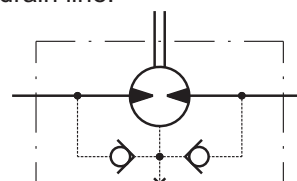


The shaft seal pressure equals the average of input pressure and return pressure.

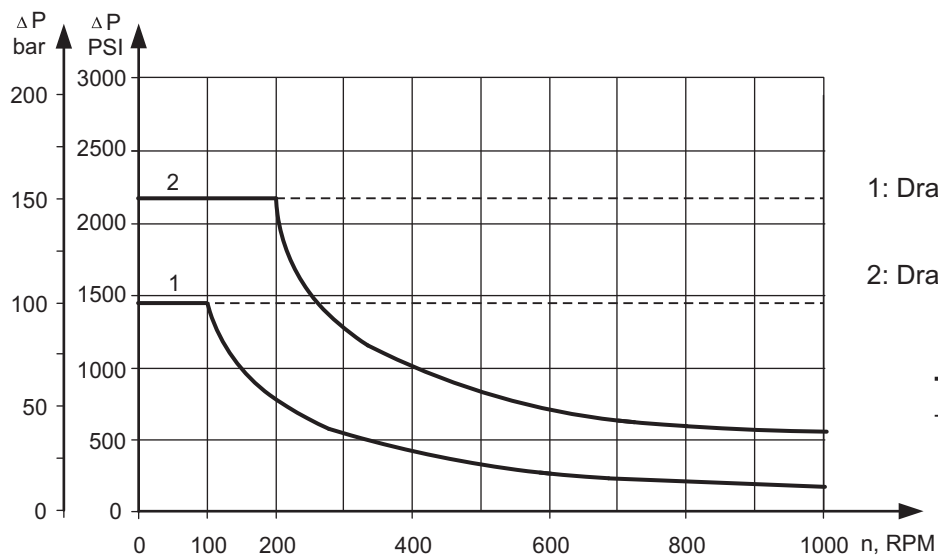
The shaft seal pressure never exceeds the pressure in the return line.



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

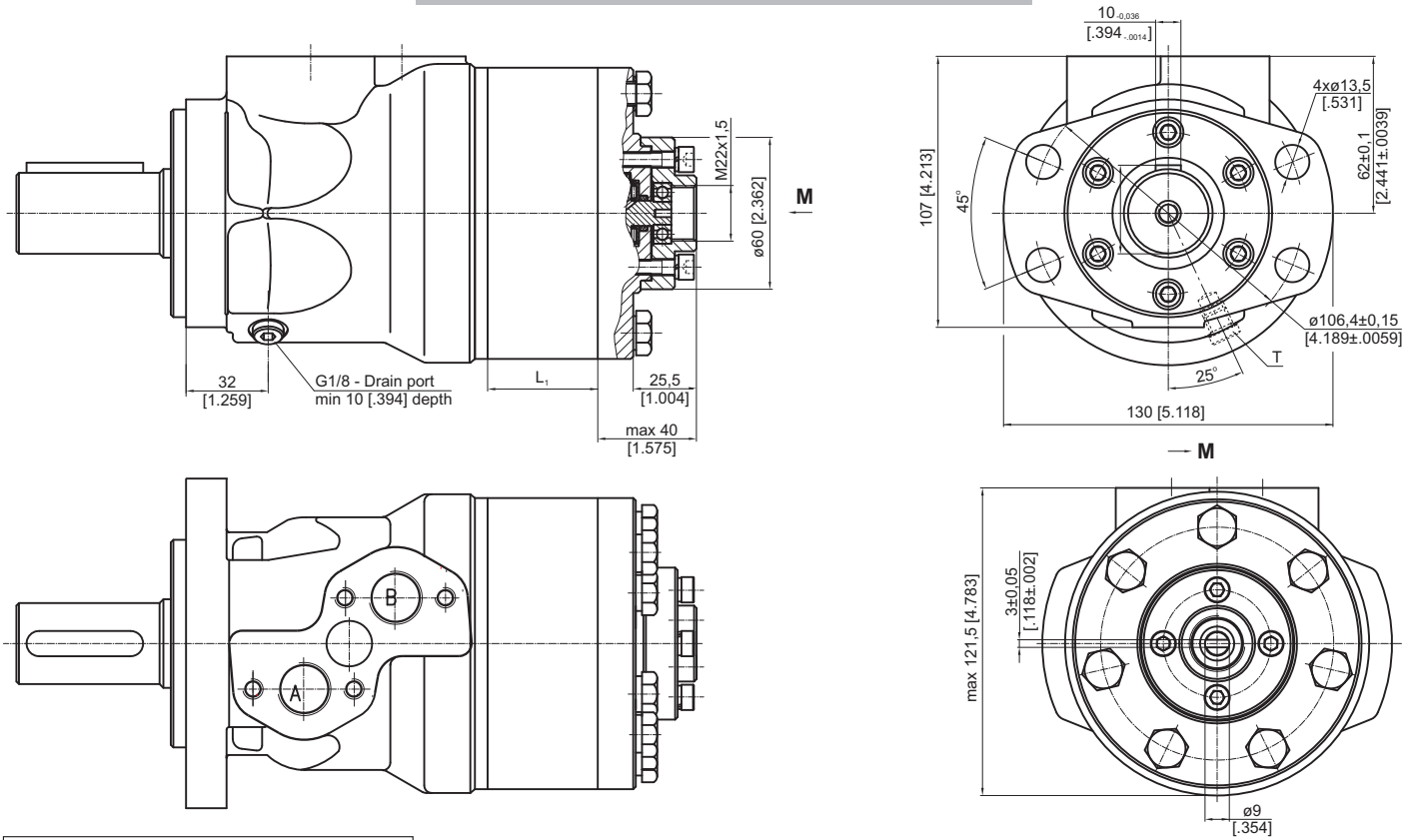


**Max. return pressure without drain line or  
max. pressure in the drain line**



— - continuous operations  
- - - - - intermittent operations

MOTORS WITH TACHO CONNECTION

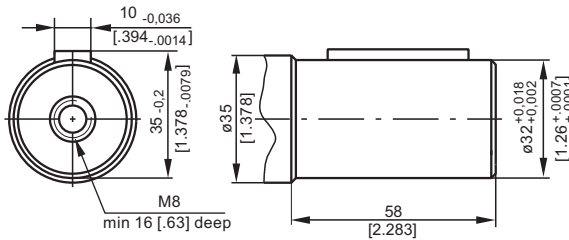


| Type   | L, mm [in] | L <sub>1</sub> , mm [in] |
|--------|------------|--------------------------|
| MH 200 | 191 [7.52] | 27,8 [1.09]              |
| MH 250 | 198 [7.79] | 34,8 [1.37]              |
| MH 315 | 207 [8.15] | 43,5 [1.71]              |
| MH 400 | 218 [8.58] | 54,8 [2.16]              |
| MH 500 | 233 [9.17] | 69,4 [2.73]              |

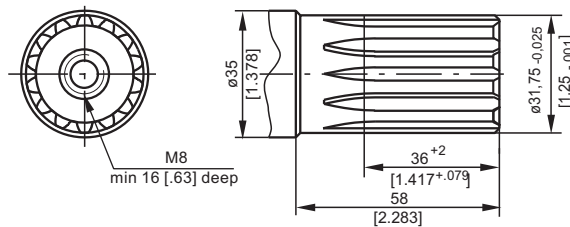


SHAFT EXTENSIONS

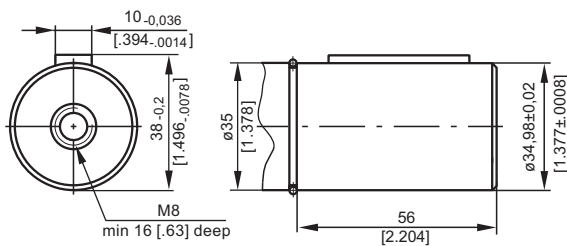
**C** -  $\varnothing 32$  straight, Parallel key A10x8x45 DIN 6885  
Max. Torque 77 daNm [6815 lb-in]



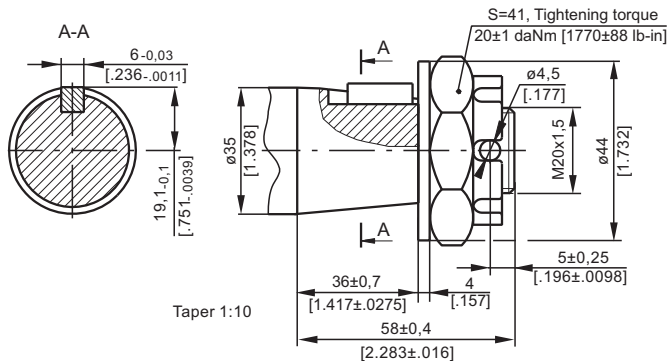
**SH** -  $\varnothing 1\frac{1}{4}$ " splined 14T, DP 12/24 ANSI B92.1-1976  
Max. Torque 95 daNm [8400 lb-in]



**CB** -  $\varnothing 35$  straight, Parallel key A10x8x45 DIN 6885  
Max. Torque 95 daNm [8400 lb-in]



**K** - tapered 1:10, Parallel key B6x6x20 DIN 6885  
Max. Torque 95 daNm [8400 lb-in]



ORDER CODE

|     |   |   |   |   |   |   |   |
|-----|---|---|---|---|---|---|---|
|     | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| M H |   |   |   |   |   |   |   |

Pos.1 - Displacement code

|     |                                |
|-----|--------------------------------|
| 200 | - 201,3 cm³/rev [12.3 in³/rev] |
| 250 | - 252,0 cm³/rev [15.4 in³/rev] |
| 315 | - 314,9 cm³/rev [16.4 in³/rev] |
| 400 | - 396,8 cm³/rev [24.2 in³/rev] |
| 500 | - 502,4 cm³/rev [30.7 in³/rev] |

Pos.2 - Shaft Extensions\*

|      |                                                   |
|------|---------------------------------------------------|
| C    | - ø32 straight, Parallel key A10x8x45 DIN 6885    |
| SH   | - ø1¼" splined 14T ANSI B92.1-1970                |
| CB** | - ø35 straight, Parallel key A10x8x45 DIN 6885    |
| K    | - ø35 tapered 1:10, Parallel key B6x6x20 DIN 6885 |

Pos.3 - Shaft Seal Version

|      |                                                   |
|------|---------------------------------------------------|
| omit | - Standard shaft seal                             |
| U    | - High pressure shaft seal (without check valves) |

Pos.4 - Drain Port

|      |                      |
|------|----------------------|
| omit | - with drain port    |
| 1    | - without drain port |

Pos.5 - Ports

|      |                    |
|------|--------------------|
| omit | - BSPP (ISO 228)   |
| M    | - Metric (ISO 262) |

Pos.6 - Special Features (see page 119)

Pos.7 - Design Series

|      |                     |
|------|---------------------|
| omit | - Factory specified |
|------|---------------------|

NOTES: \* The permissible output torque for shafts must not be exceeded!  
\*\* The following combination is not allowed: “CB” shaft with U shaft seal.

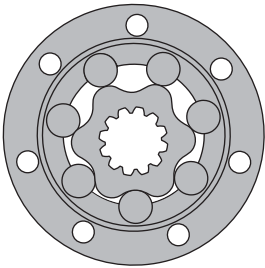
The hydraulic motors are mangano-phosphatized as standard.

# HYDRAULIC MOTORS HW



## APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Grass cutting machinery etc.



## CONTENTS

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Permissible shaft Seal Pressure ...115

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## OPTIONS

- » Model - Spool valve, roll-gerotor
- » Wheel and flange mount
- » Shafts - straight, splined and tapered
- » BSPP ports
- » Other special features

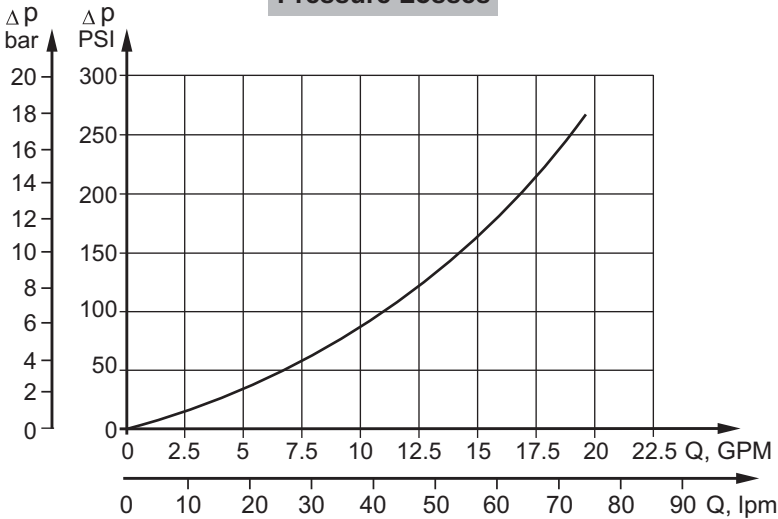
## GENERAL

|                          |                                                                  |                                       |
|--------------------------|------------------------------------------------------------------|---------------------------------------|
| Max. Displacement,       | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                      | 550 [33.55]                           |
| Max. Speed,              | [RPM]                                                            | 497                                   |
| Max. Torque,             | daNm [in-lb]                                                     | cont.: 96 [8500]    int.: 105 [9293]  |
| Max. Output,             | kW [HP]                                                          | 23,1 [31]                             |
| Max. Pressure Drop,      | bar [PSI]                                                        | cont.: 205 [3000]    int.: 225 [3260] |
| Max. Oil Flow,           | lpm [GPM]                                                        | 115 [30.4]                            |
| Min. Speed,              | [RPM]                                                            | 10                                    |
| Pressure fluid           | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)                  |                                       |
| Temperature range,       | °C [°F]                                                          | -40÷140 [-40÷284]                     |
| Optimal Viscosity range, | mm <sup>2</sup> /s [SUS]                                         | 20÷75 [98÷347]                        |
| Filtration               | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) |                                       |

Oil flow in drain line

| Pressure drop<br>bar [PSI] | Viscosity<br>mm <sup>2</sup> /s [SUS] | Oil flow in<br>drain line<br>lpm [GPM] |
|----------------------------|---------------------------------------|----------------------------------------|
| 100 [1450]                 | 20 [98]                               | 2,5 [.660]                             |
|                            | 35 [164]                              | 1,8 [.476]                             |
| 140 [2030]                 | 20 [98]                               | 3,5 [.925]                             |
|                            | 35 [164]                              | 2,8 [.740]                             |

Pressure Losses



SPECIFICATION DATA

| Type                                                      |                              | HW<br>125   | HW<br>160    | HW<br>200     | HW<br>235     | HW<br>250   | HW<br>300   | HW<br>315     |
|-----------------------------------------------------------|------------------------------|-------------|--------------|---------------|---------------|-------------|-------------|---------------|
| Displacement, cm <sup>3</sup> /rev [in <sup>3</sup> /rev] |                              | 126 [7.69]  | 157,8 [9.64] | 201,3 [12.28] | 235,3 [14.33] | 252 [15.37] | 300 [18.3]  | 314,9 [19.21] |
| Max. Speed,<br>[RPM]                                      | cont.                        | 357         | 380          | 373           | 319           | 298         | 250         | 238           |
|                                                           | int.*                        | 476         | 475          | 497           | 425           | 397         | 333         | 318           |
| Max. Torque<br>daNm [in-lb]                               | cont.                        | 35 [3098]   | 44 [3894]    | 55 [4868]     | 64,5 [5710]   | 69 [6107]   | 81 [7170]   | 85 [7523]     |
|                                                           | int.*                        | 38,5 [3408] | 48 [4248]    | 60 [5310]     | 70 [6196]     | 75 [6638]   | 89 [7877]   | 93 [8230]     |
| Max. Output,<br>kW [HP]                                   | cont.                        | 16,2 [21.7] | 17,6 [23.6]  | 18,6 [24.9]   | 18,2 [24.4]   | 16,8 [22.5] | 16,5 [22]   | 16,4 [21.9]   |
|                                                           | int.*                        | 19,8 [26.6] | 21,6 [29]    | 23,1 [31]     | 22,6 [30.3]   | 20,8 [27.9] | 20,8 [27.9] | 20,8 [27.9]   |
| Max. Pressure<br>Drop, bar [PSI]                          | cont.                        | 205 [2970]  | 205 [2970]   | 205 [2970]    | 205 [2970]    | 205 [2970]  | 205 [2970]  | 205 [2970]    |
|                                                           | int.*                        | 225 [3260]  | 225 [3260]   | 225 [3260]    | 225 [3260]    | 225 [3260]  | 225 [3260]  | 225 [3260]    |
| Max. Oil Flow<br>lpm [GPM]                                | cont.                        | 45 [12]     | 60 [16]      | 75 [20]       | 75 [20]       | 75 [20]     | 75 [20]     | 75 [20]       |
|                                                           | int.*                        | 60 [16]     | 75 [20]      | 100 [26.4]    | 100 [26.4]    | 100 [26.4]  | 100 [26.4]  | 100 [26.4]    |
| Max. Inlet Pressure,<br>bar [PSI]                         | cont.                        | 210 [3050]  | 210 [3050]   | 210 [3050]    | 210 [3050]    | 210 [3050]  | 210 [3050]  | 210 [3050]    |
|                                                           | int.*                        | 250 [3625]  | 250 [3625]   | 250 [3625]    | 250 [3625]    | 250 [3625]  | 250 [3625]  | 250 [3625]    |
| Max. Starting Pressure<br>with Unloaded Shaft, bar [PSI]  |                              | 10 [145]    | 10 [145]     | 10 [145]      | 10 [145]      | 10 [145]    | 10 [145]    | 10 [145]      |
| Min. Starting Torque<br>daNm [in-lb]                      | at max. press.<br>drop cont. | 28,7 [2540] | 36 [3186]    | 45,1 [3991]   | 52,8 [4673]   | 56,5 [5000] | 66,4 [5877] | 69,7 [6169]   |
|                                                           | at max. press.<br>drop int.* | 31,5 [2788] | 39,3 [3478]  | 49,2 [4355]   | 57,4 [5080]   | 61,5 [5443] | 72,9 [6452] | 76,2 [6744]   |
| Min. Speed**, [RPM]                                       |                              | 10          | 10           | 10            | 10            | 10          | 10          | 10            |
| Weight, avg. kg [lb]                                      | HW                           | 14,3 [31.5] | 14,6 [32.2]  | 15,1 [33.3]   | 15,5 [34.2]   | 15,7 [34.6] | 16,1 [35.5] | 16,3 [35.9]   |
|                                                           | HWF                          | 12,8 [28.2] | 13,1 [28.9]  | 13,6 [30]     | 14,0 [30.9]   | 14,2 [31.3] | 14,6 [32.2] | 14,8 [32.6]   |
|                                                           | HWS                          | 14 [30.9]   | 14,3 [31.5]  | 14,8 [32.6]   | 15,2 [33.5]   | 15,4 [34]   | 15,8 [34.8] | 16 [35.3]     |

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

\*\* For speeds lower than given, consult factory or your regional manager.

- 1. Intermittent speed and intermittent pressure drop must not occur simultaneously.
- 2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
- 3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.
- 4. Recommended minimum oil viscosity 13 mm<sup>2</sup>/s [70 SUS] at 50°C [122°F].
- 5. Recommended maximum system operating temperature is 82°C [180°F].
- 6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA

| Type                                                     |                              | HW<br>350     | HW<br>370     | HW<br>400    | HW<br>470     | HW<br>500     | HW<br>535   | HW<br>550   |
|----------------------------------------------------------|------------------------------|---------------|---------------|--------------|---------------|---------------|-------------|-------------|
| Displacement, cm³/rev [in³/rev]                          |                              | 347,8 [21.21] | 369,2 [22.51] | 396,8 [24.2] | 470,6 [28.71] | 502,4 [30.65] | 535 [32.7]  | 550 [33.55] |
| Max. Speed,<br>[RPM]                                     | cont.                        | 216           | 203           | 189          | 159           | 149           | 140         | 136         |
|                                                          | int.*                        | 288           | 271           | 252          | 244           | 229           | 215         | 209         |
| Max. Torque<br>daNm [in-lb]                              | cont.                        | 94 [8320]     | 96 [8497]     | 96 [8497]    | 92 [8143]     | 91 [8054]     | 90 [7966]   | 89 [7877]   |
|                                                          | int.*                        | 102 [9028]    | 105 [9293]    | 98 [8674]    | 101 [8939]    | 101 [8939]    | 104 [9205]  | 105 [9293]  |
| Max. Output,<br>kW [HP]                                  | cont.                        | 16,5 [22]     | 13,2 [17.7]   | 12,5 [16.8]  | 10,6 [14.2]   | 10,8 [14.5]   | 9,4 [12.6]  | 9 [12]      |
|                                                          | int.*                        | 20,8 [27.9]   | 19,2 [25.7]   | 18,5 [24.8]  | 17,4 [23.3]   | 17,8 [23.9]   | 16,4 [22]   | 15,8 [21.2] |
| Max. Pressure<br>Drop, bar [PSI]                         | cont.                        | 205 [2970]    | 205 [2970]    | 185 [2680]   | 150 [2180]    | 140 [2030]    | 130 [1885]  | 125 [1815]  |
|                                                          | int.*                        | 225 [3260]    | 225 [3260]    | 190 [2760]   | 165 [2390]    | 155 [2250]    | 150 [2180]  | 145 [2105]  |
| Max. Oil Flow<br>lpm [GPM]                               | cont.                        | 75 [20]       | 75 [20]       | 75 [20]      | 75 [20]       | 75 [20]       | 75 [20]     | 75 [20]     |
|                                                          | int.*                        | 100 [26.4]    | 100 [26.4]    | 100 [26.4]   | 115 [30.4]    | 115 [30.4]    | 115 [30.4]  | 115 [30.4]  |
| Max. Inlet Pressure,<br>bar [PSI]                        | cont.                        | 210 [3050]    | 210 [3050]    | 210 [3050]   | 210 [3050]    | 210 [3050]    | 210 [3050]  | 210 [3050]  |
|                                                          | int.*                        | 250 [3625]    | 250 [3625]    | 250 [3625]   | 250 [3625]    | 250 [3625]    | 250 [3625]  | 250 [3625]  |
| Max. Starting Pressure<br>with Unloaded Shaft, bar [PSI] |                              | 10 [145]      | 10 [145]      | 10 [145]     | 10 [145]      | 10 [145]      | 10 [145]    | 10 [145]    |
| Min. Starting Torque<br>daNm [in-lb]                     | at max. press.<br>drop cont. | 77 [6815]     | 79,5 [7036]   | 78,7 [6966]  | 75,4 [6674]   | 74,6 [6603]   | 73,8 [6532] | 72,9 [6452] |
|                                                          | at max. press.<br>drop int.* | 83,6 [7400]   | 86 [7612]     | 80,3 [7107]  | 82,8 [7328]   | 82,8 [7328]   | 85,2 [7540] | 84,4 [7470] |
| Min. Speed**, [RPM]                                      |                              | 8             | 8             | 8            | 8             | 8             | 5           | 5           |
| Weight, avg. kg [lb]                                     | HW                           | 16,7 [36.8]   | 16,9 [37.3]   | 17,3 [38.1]  | 18,1 [39.9]   | 18,4 [40.6]   | 18,8 [41.5] | 18,9 [41.7] |
|                                                          | HWF                          | 15,2 [33.5]   | 15,4 [34]     | 15,8 [34.8]  | 16,6 [36.6]   | 16,9 [37.3]   | 17,3 [38.1] | 17,4 [38.3] |
|                                                          | HWS                          | 16,4 [36.2]   | 16,6 [36.6]   | 17 [37.5]    | 17,8 [39.2]   | 18.1 [39.9]   | 18,5 [40.8] | 18,6 [41]   |

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

\*\* For speeds lower than given, consult factory or your regional manager.

1. Intermittent speed and intermittent pressure drop must not occur simultaneously.

2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.

3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).  
If using synthetic fluids consult the factory for alternative seal materials.

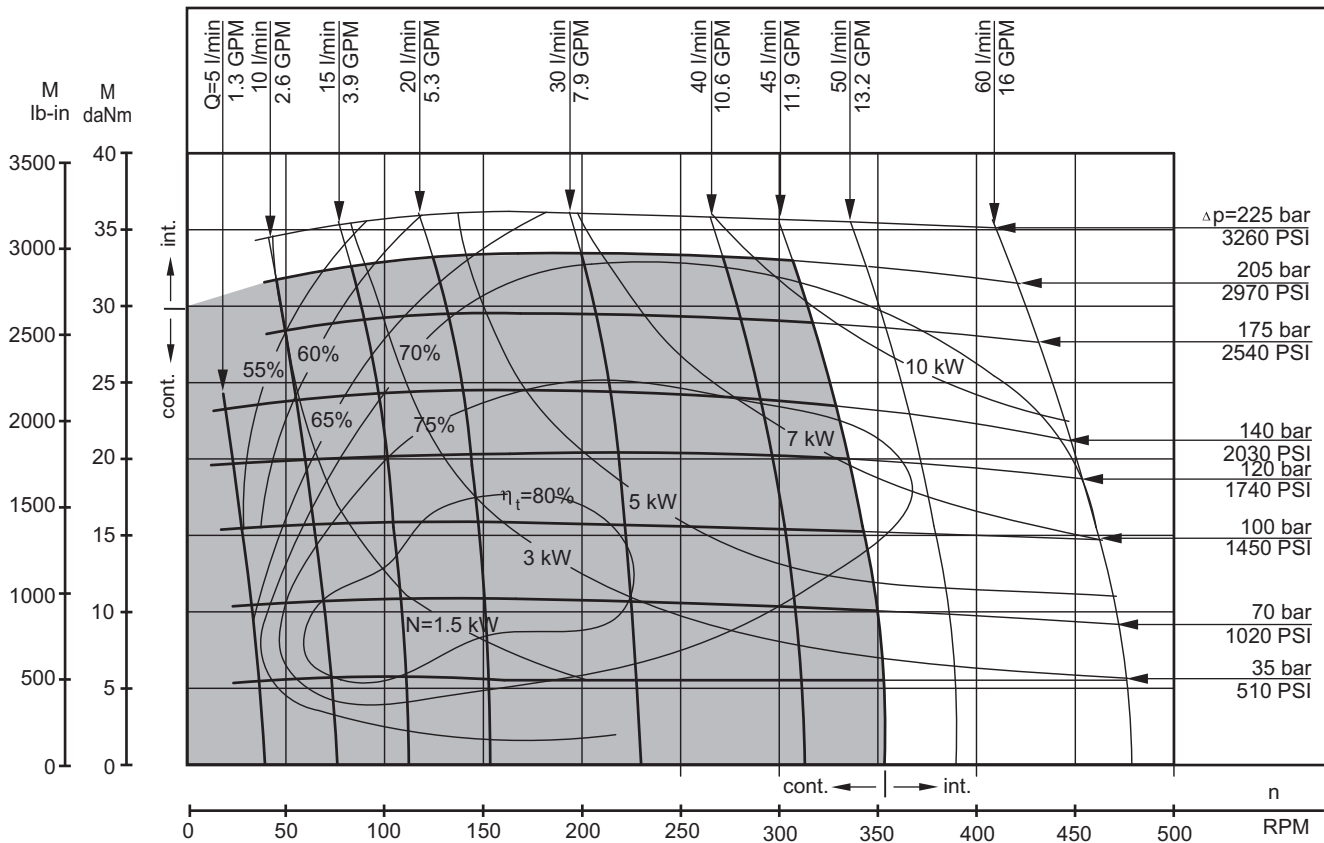
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].

5. Recommended maximum system operating temperature is 82°C [180°F].

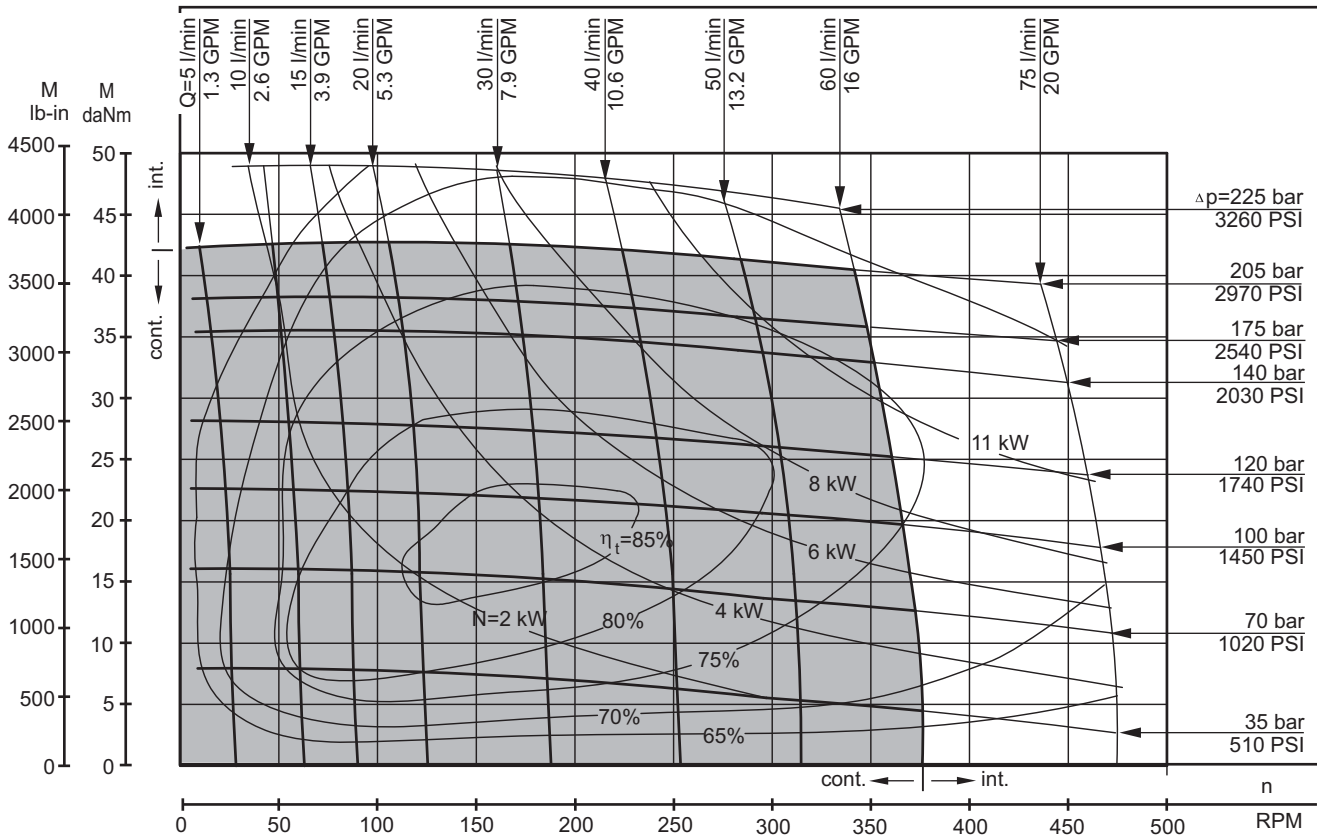
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

FUNCTION DIAGRAMS

HW 125



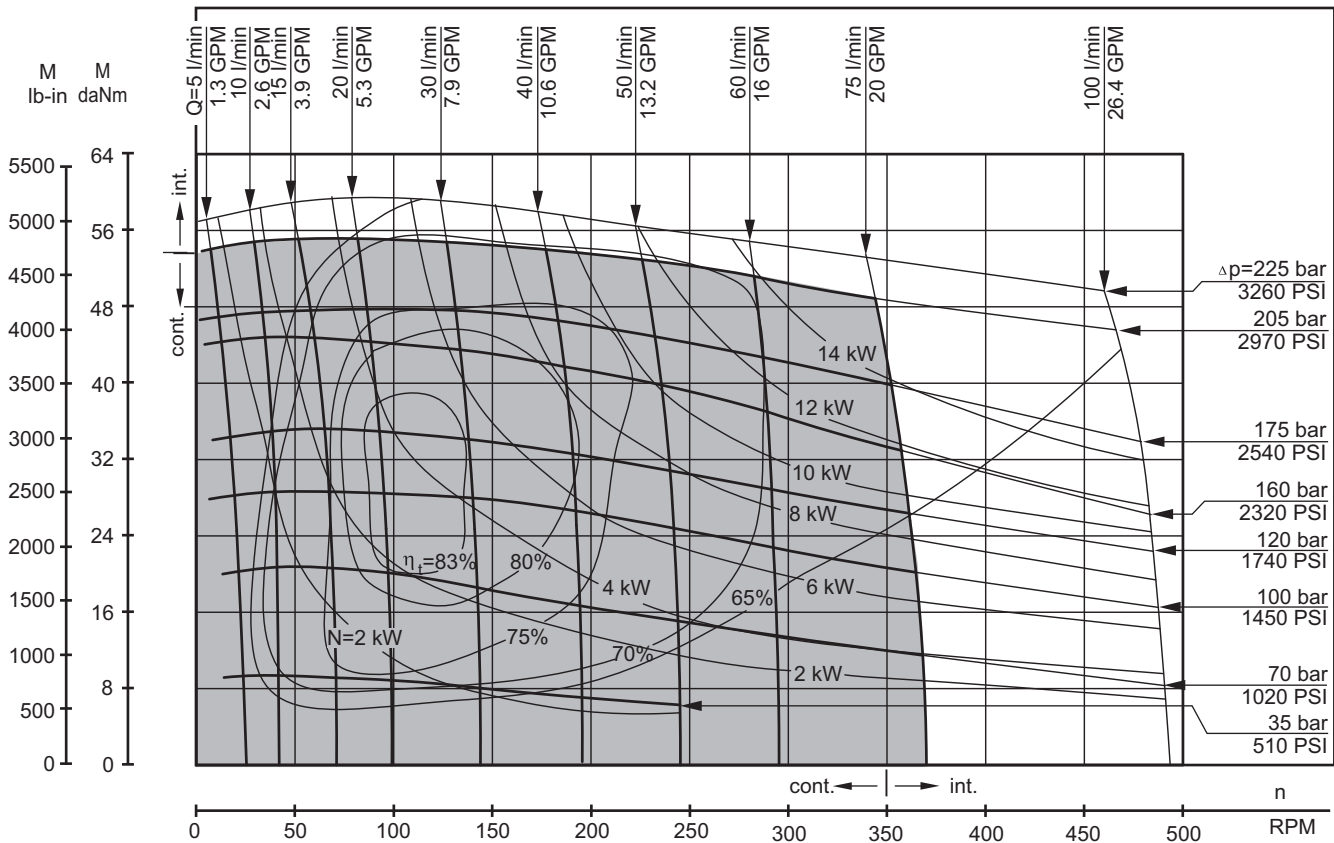
HW 160



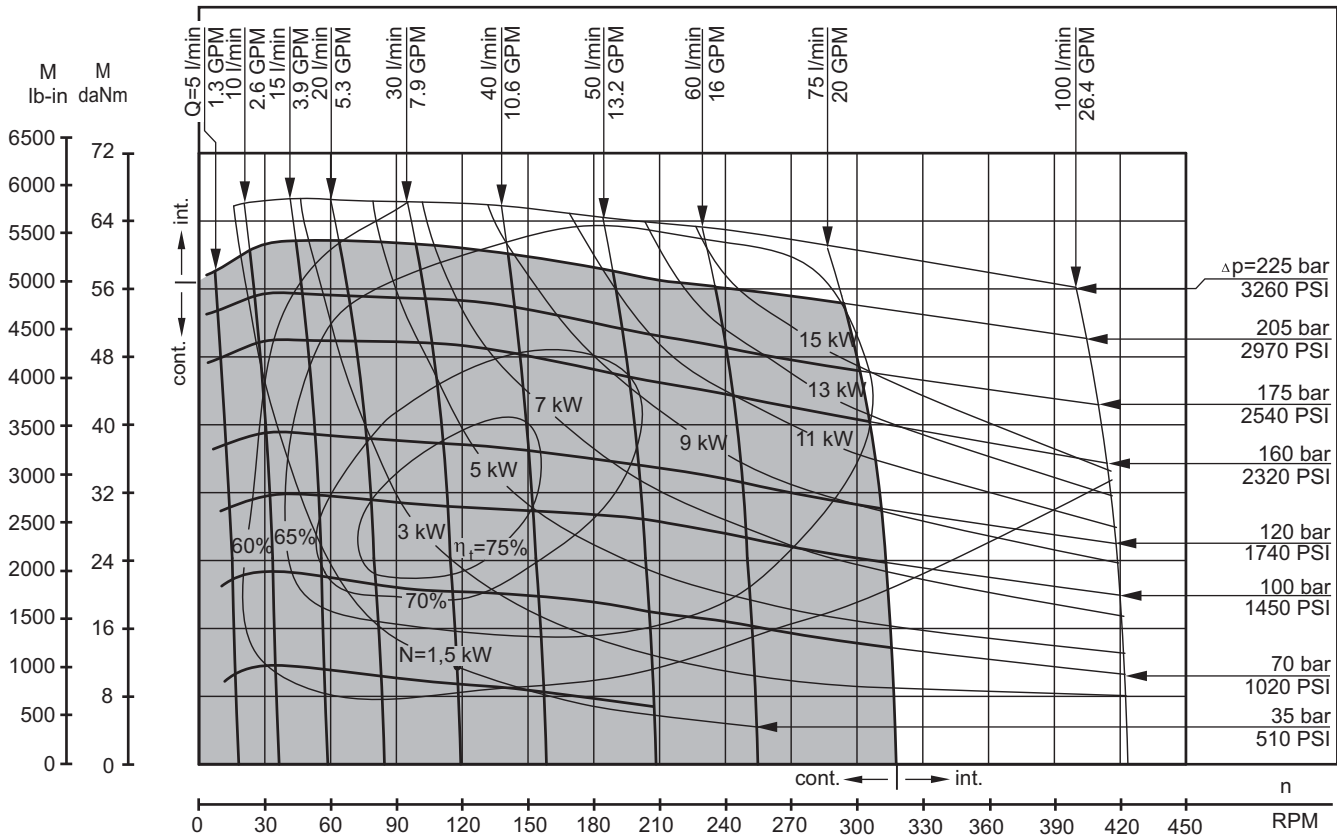
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

HW 200



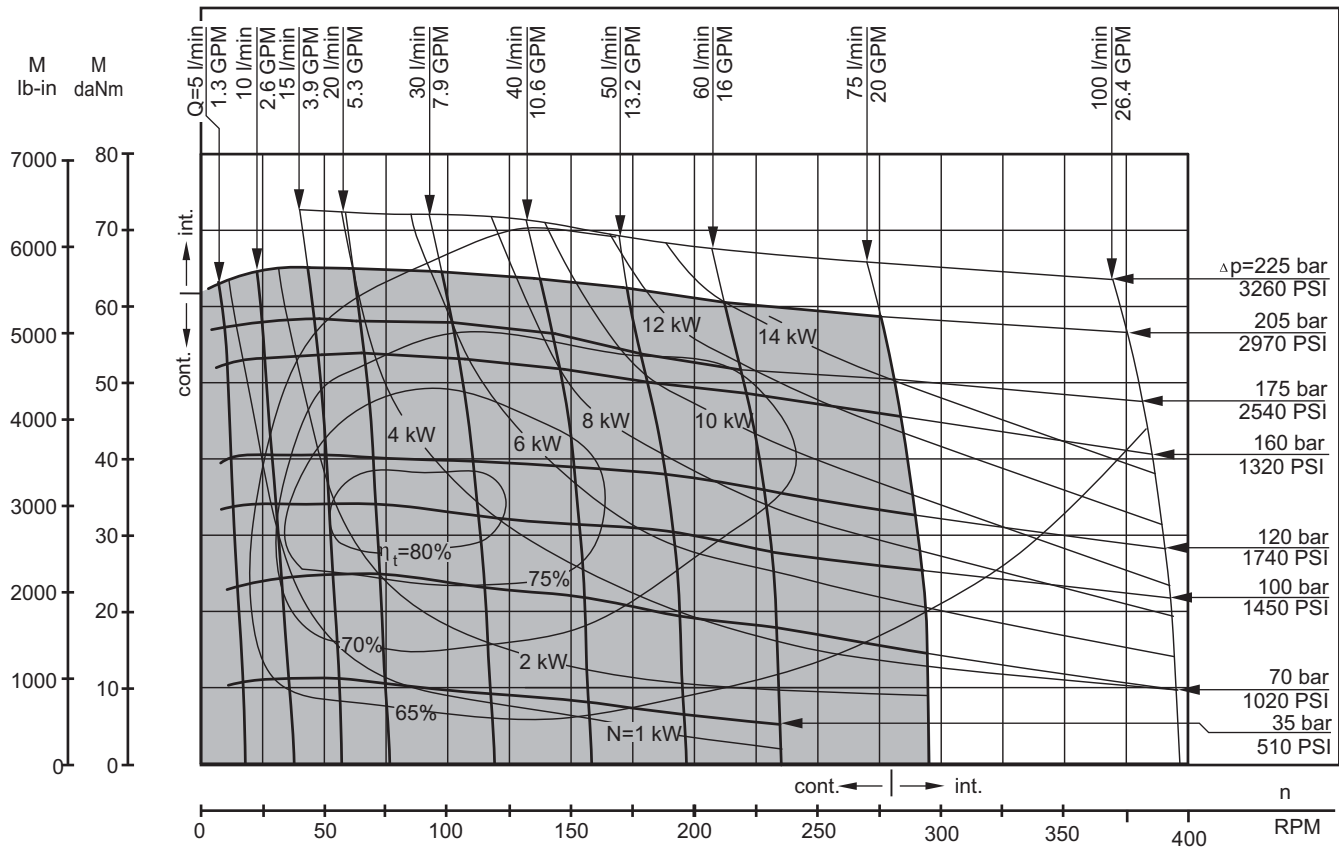
HW 235



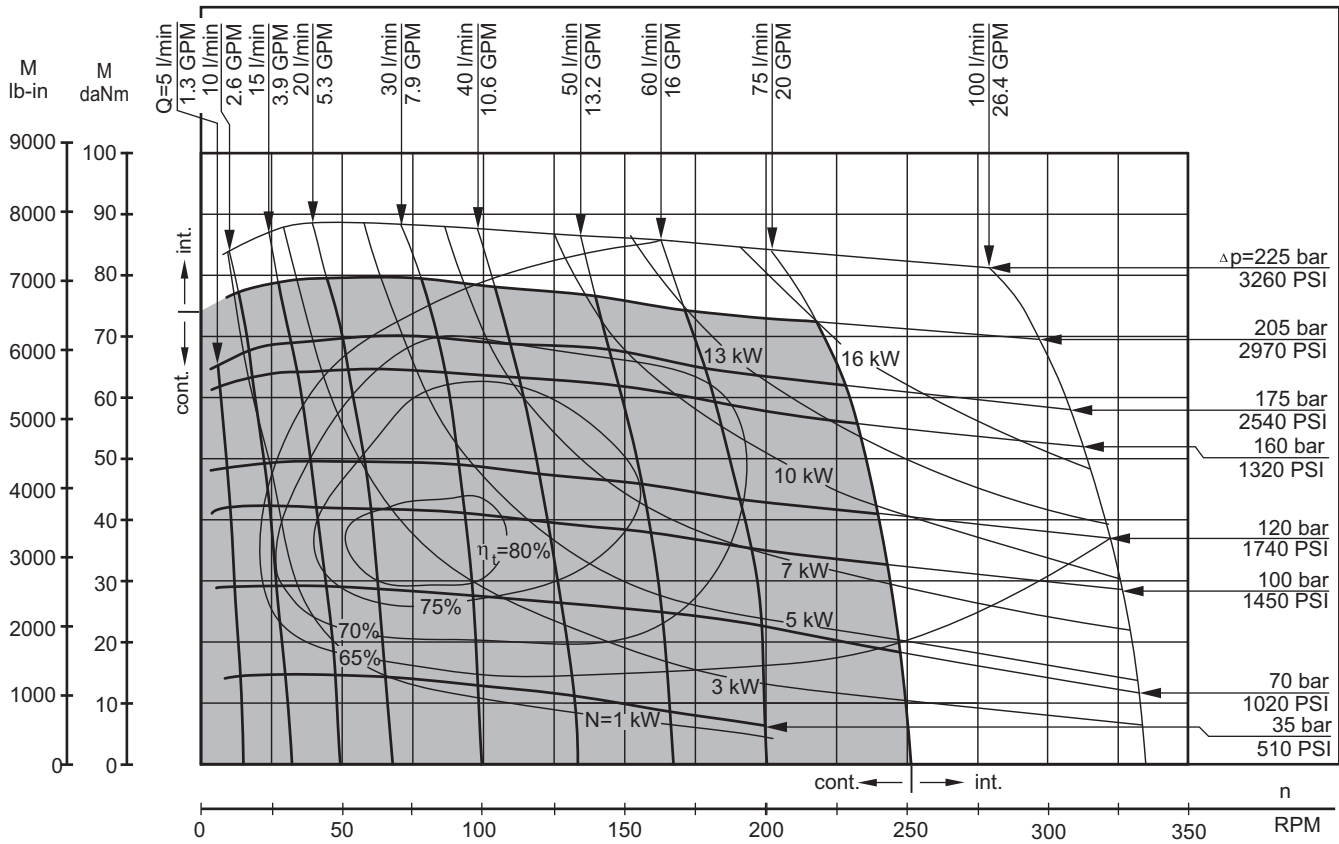
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

HW 250



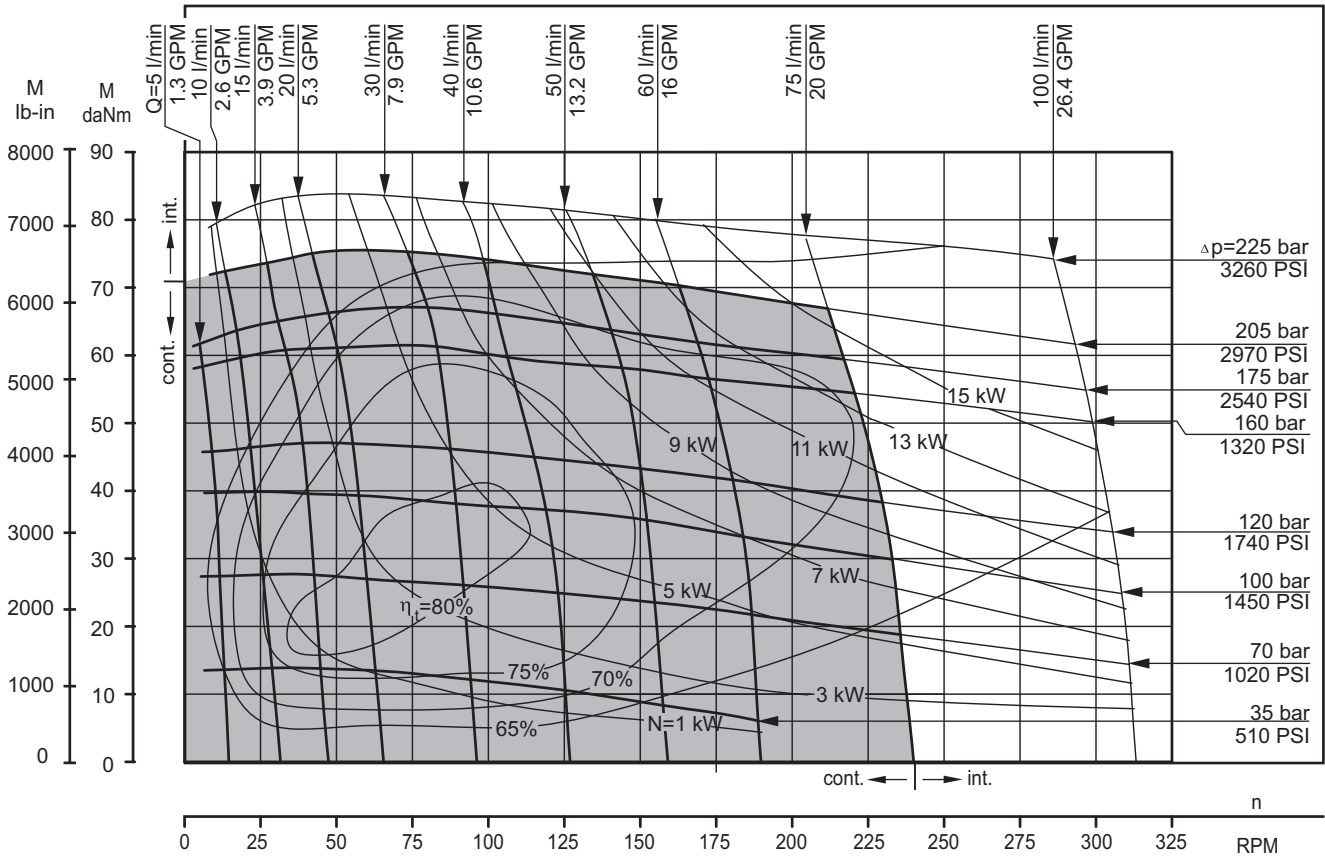
HW 300



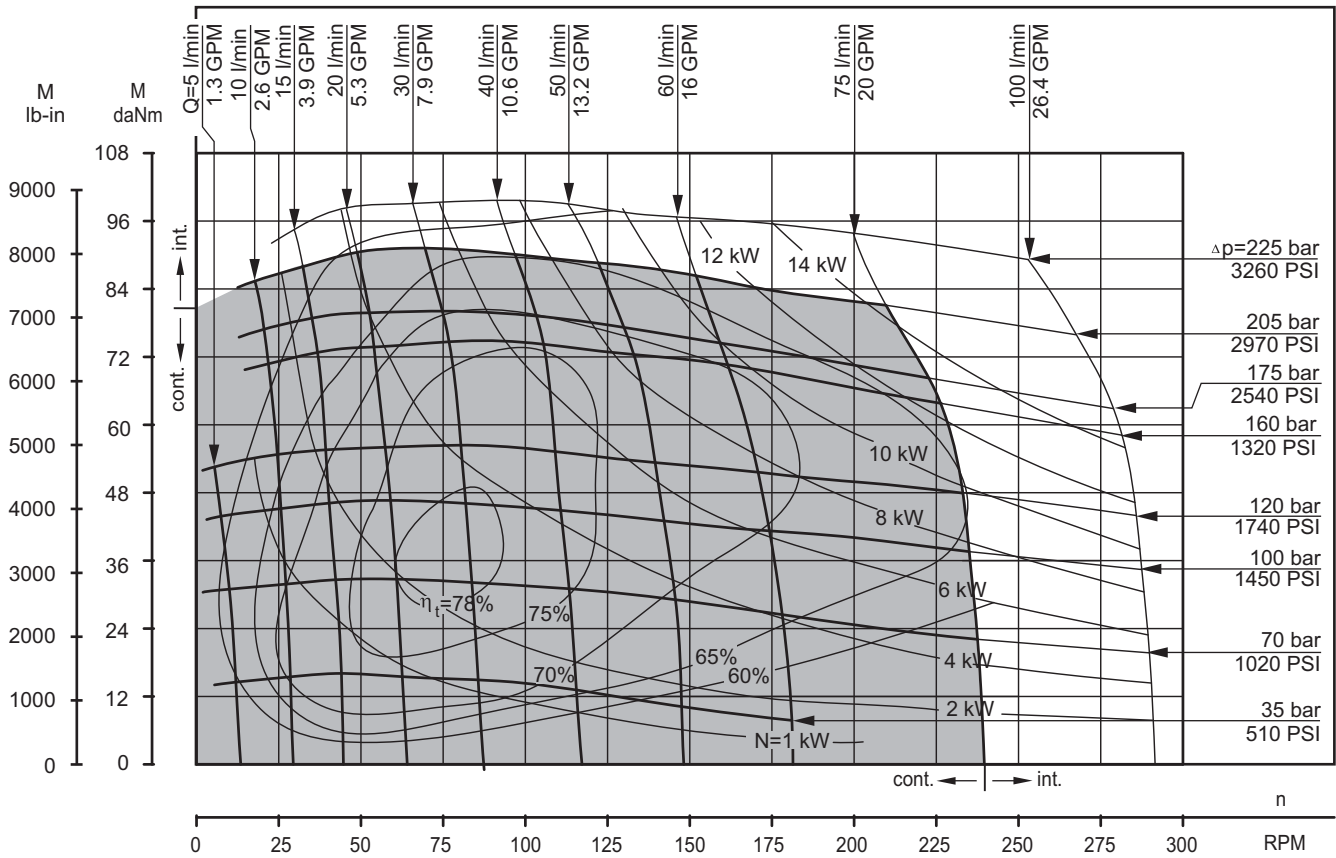
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

HW 315



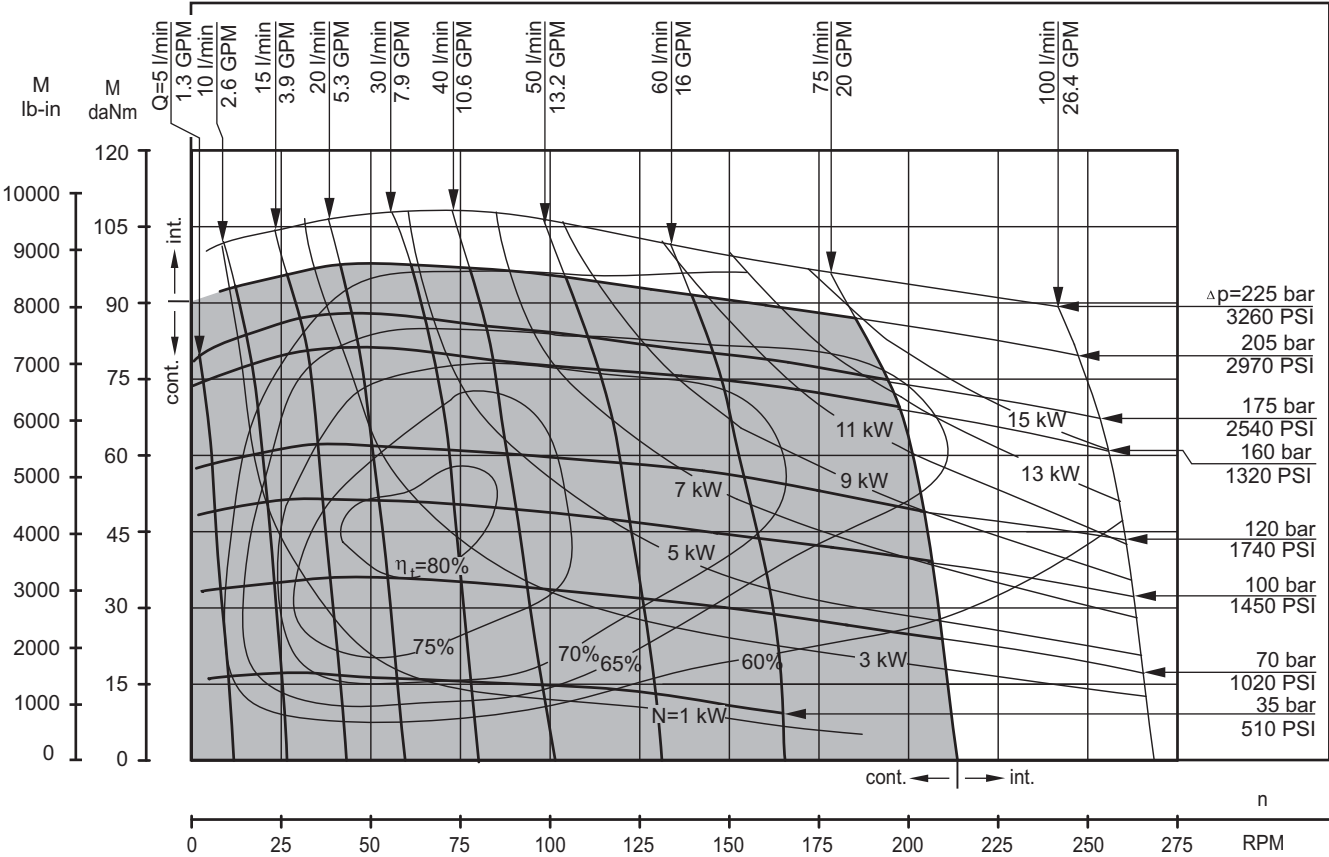
HW 350



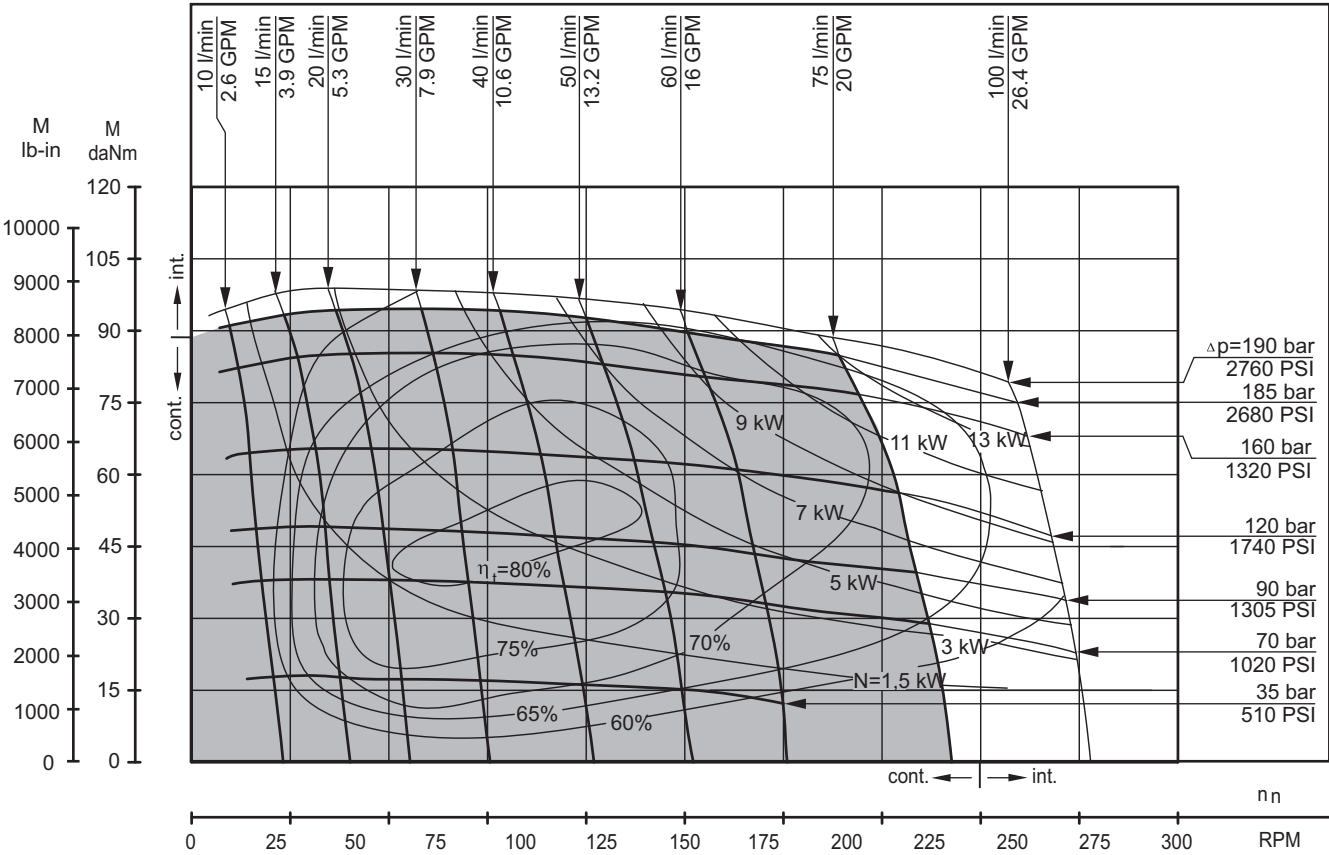
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

HW 370



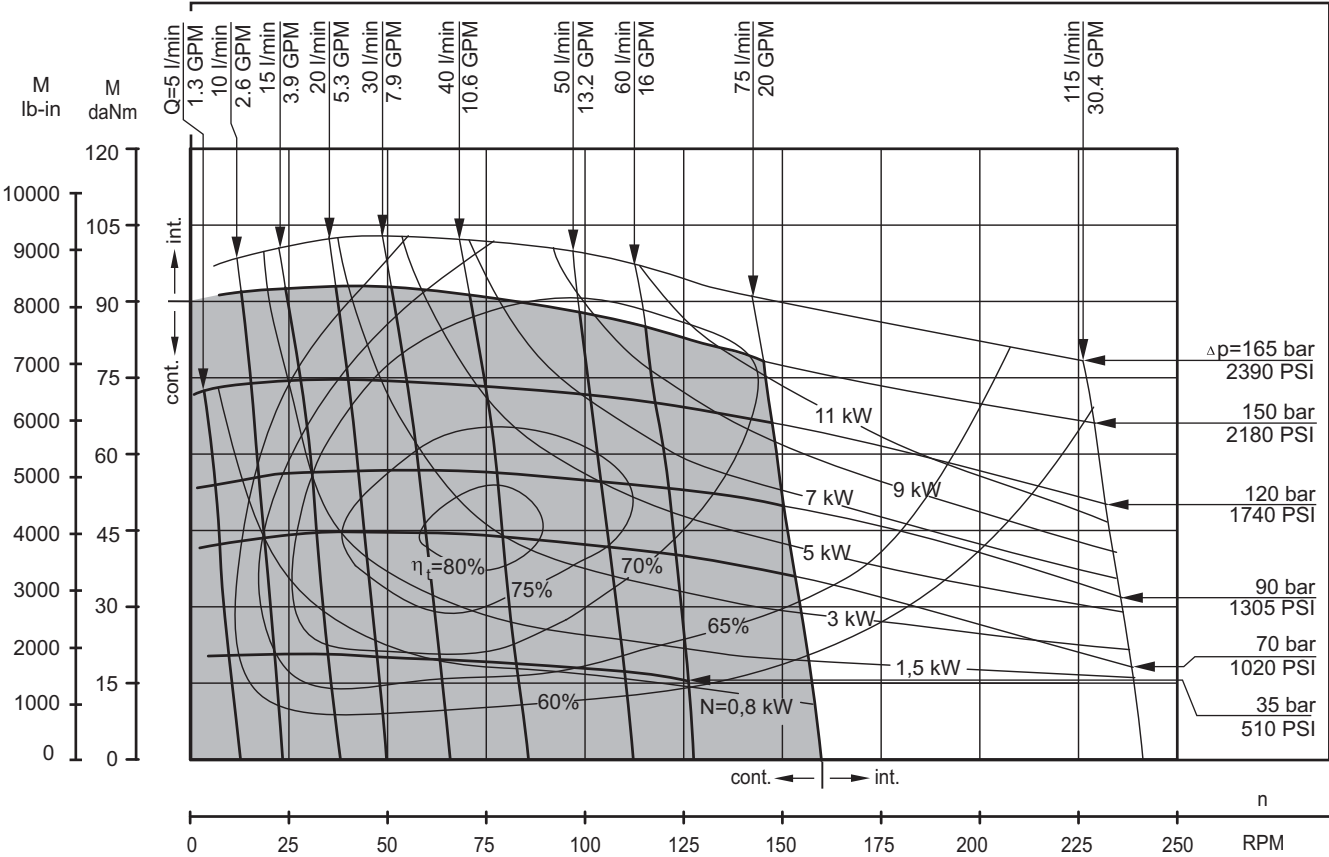
HW 400



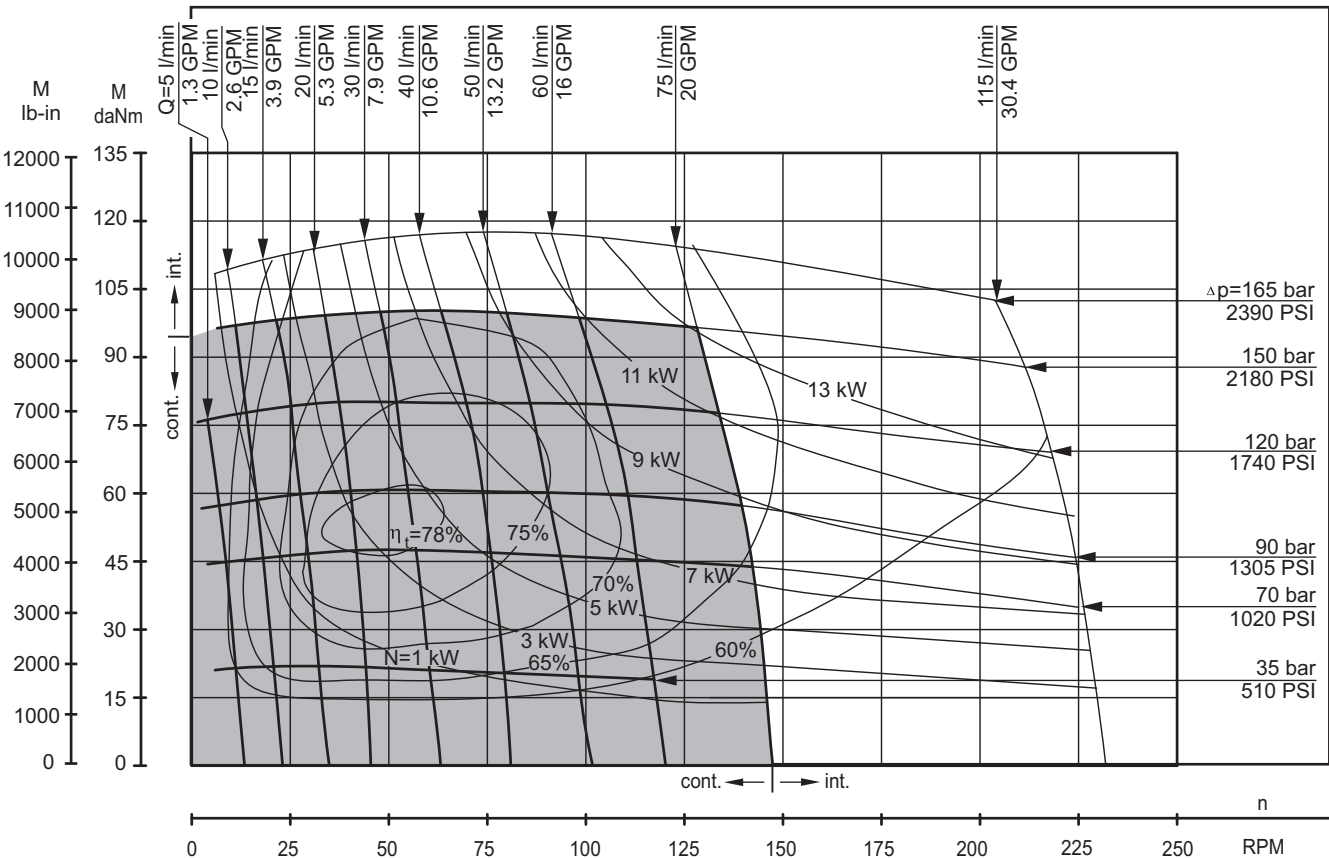
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

HW 470



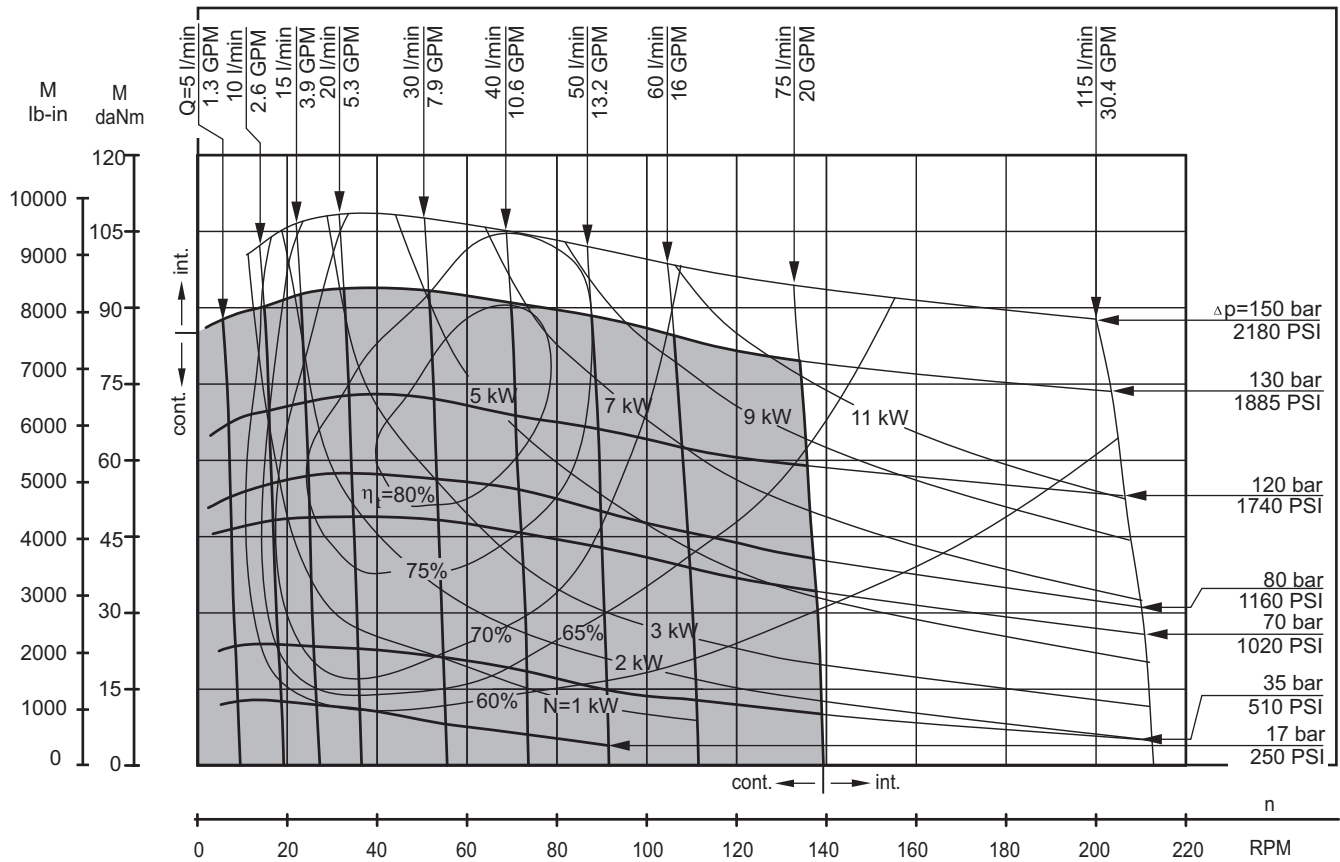
HW 500



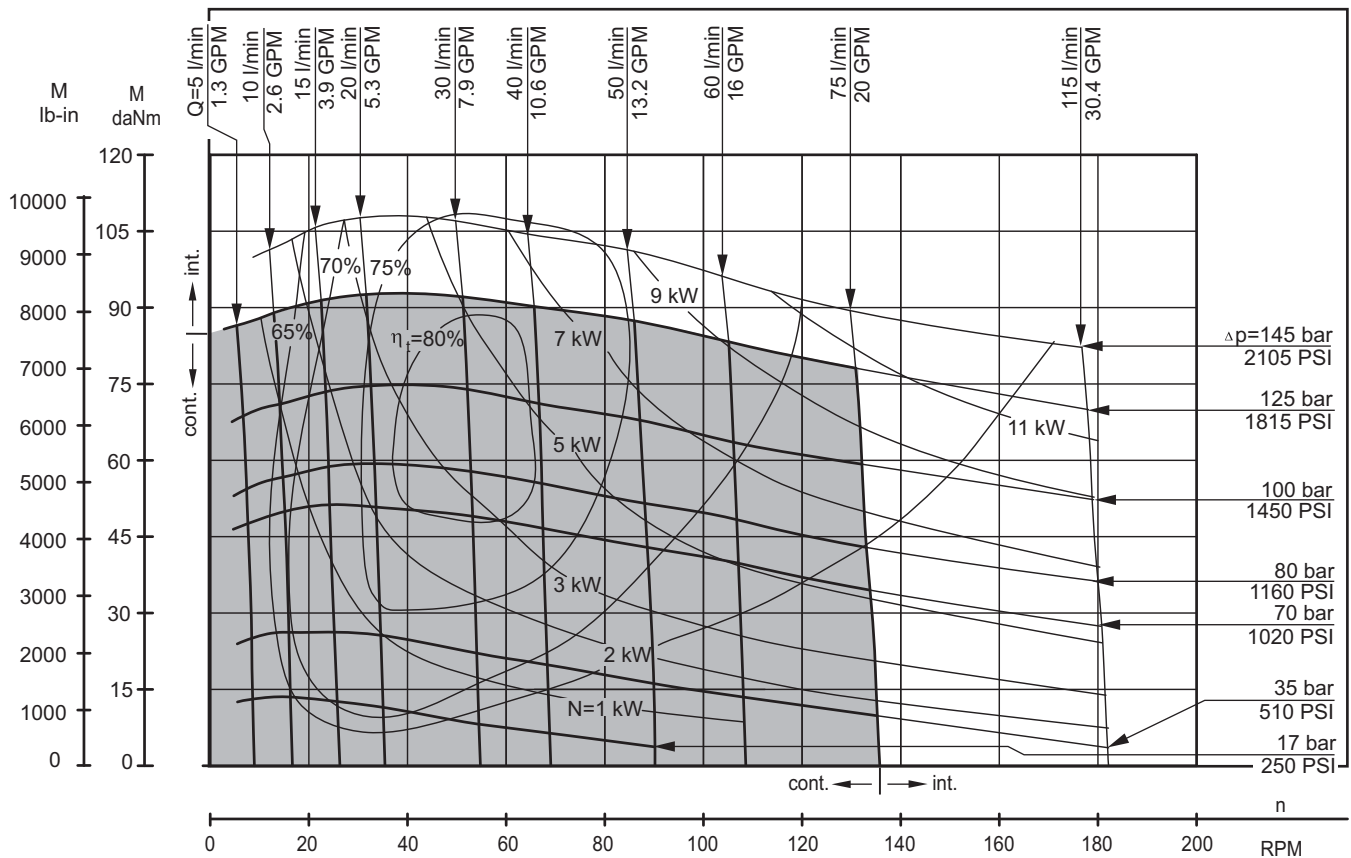
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

HW 535



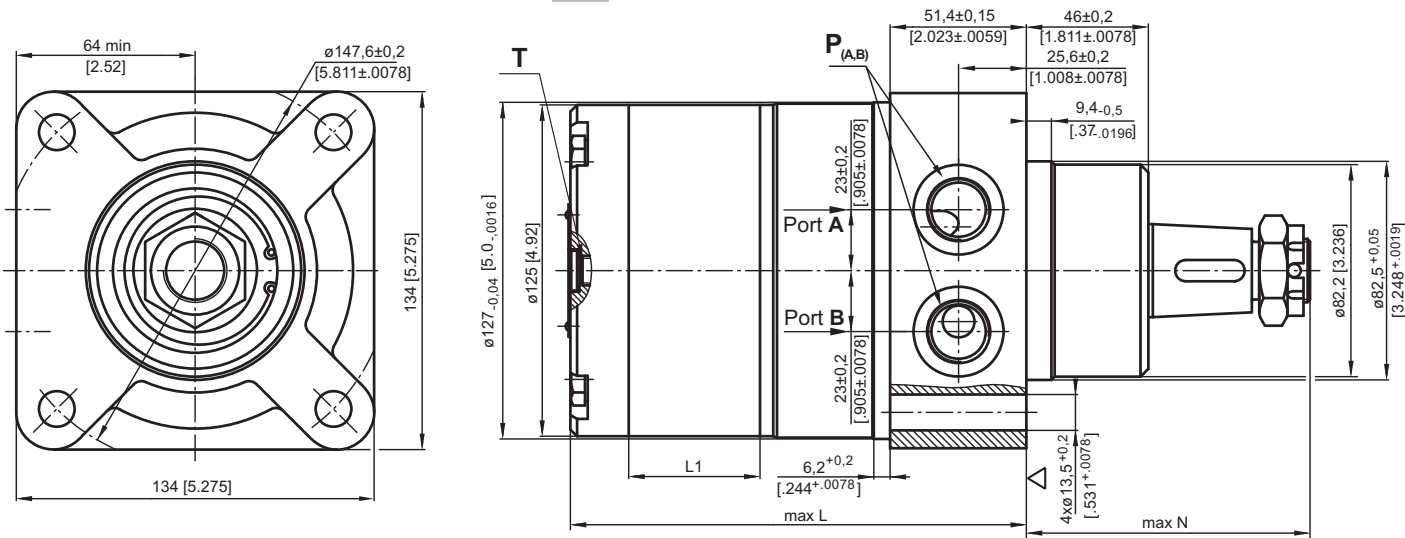
HW 550



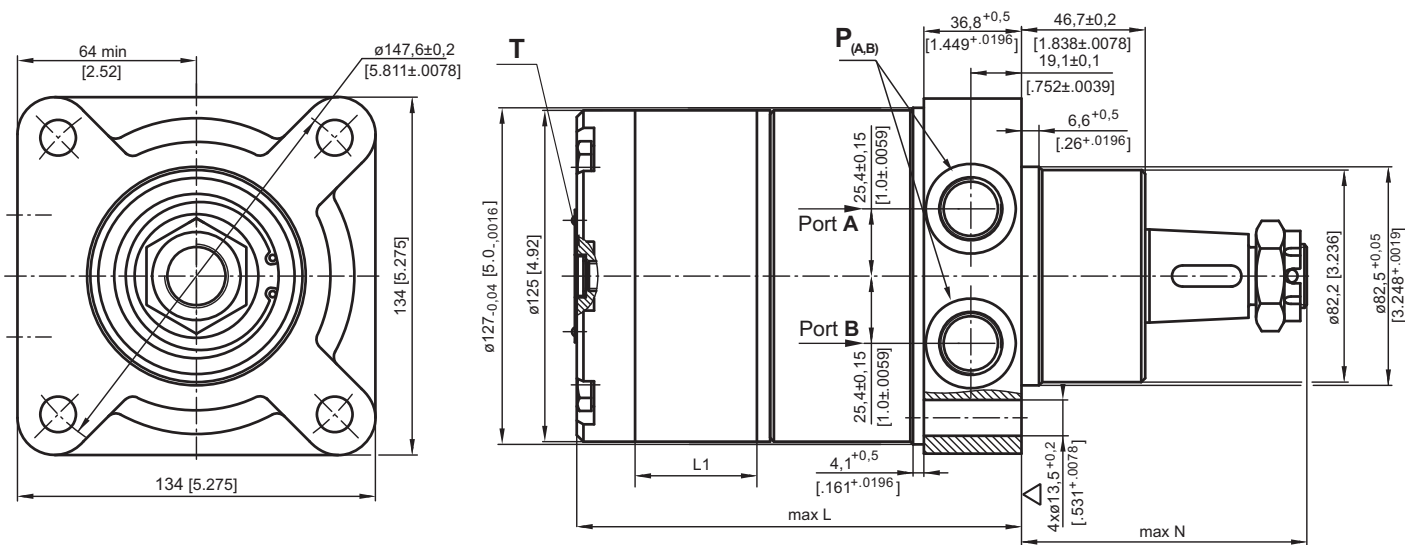
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm<sup>2</sup>/s [150 SUS] at 50°C [122°F].

DIMENSIONS AND MOUNTING DATA

HW - Wheel Mount



HWS - Wheel Mount



| Type   | *L, mm [in.] | L <sub>1</sub> , mm [in.] |
|--------|--------------|---------------------------|
| HW 125 | 140,5 [5.51] | 17,4 [.68]                |
| HW 160 | 145,0 [5.71] | 21,8 [.86]                |
| HW 200 | 151,0 [5.95] | 27,8 [1.09]               |
| HW 235 | 155,5 [6.12] | 32,5 [1.28]               |
| HW 250 | 158,0 [6.22] | 34,8 [1.37]               |
| HW 300 | 164,5 [6.48] | 41,4 [1.63]               |
| HW 315 | 166,5 [6.56] | 43,5 [1.71]               |
| HW 350 | 171,0 [6.73] | 48,0 [1.89]               |
| HW 370 | 174,0 [6.85] | 51,0 [2.01]               |
| HW 400 | 178,0 [7.01] | 54,8 [2.16]               |
| HW 470 | 188,0 [7.40] | 65,0 [2.56]               |
| HW 500 | 192,5 [7.58] | 69,4 [2.73]               |
| HW 535 | 197,0 [7.76] | 74,1 [2.92]               |
| HW 550 | 199,0 [7.84] | 76,0 [2.99]               |

▽ - Motor Mounting Surface

|                    | Versions          |                                 |
|--------------------|-------------------|---------------------------------|
|                    | 2                 | 4                               |
| P <sub>(A,B)</sub> | 2xG $\frac{1}{2}$ | 2x $\frac{7}{8}$ -14UNF, O-ring |
| T                  | G $\frac{1}{4}$   | $\frac{7}{16}$ -20UNF, O-ring   |

Note: For N see pages 116 and 117.

**Standard Rotation**  
Viewed from Shaft End  
Port A Pressurized - **CW**  
Port B Pressurized - **CCW**

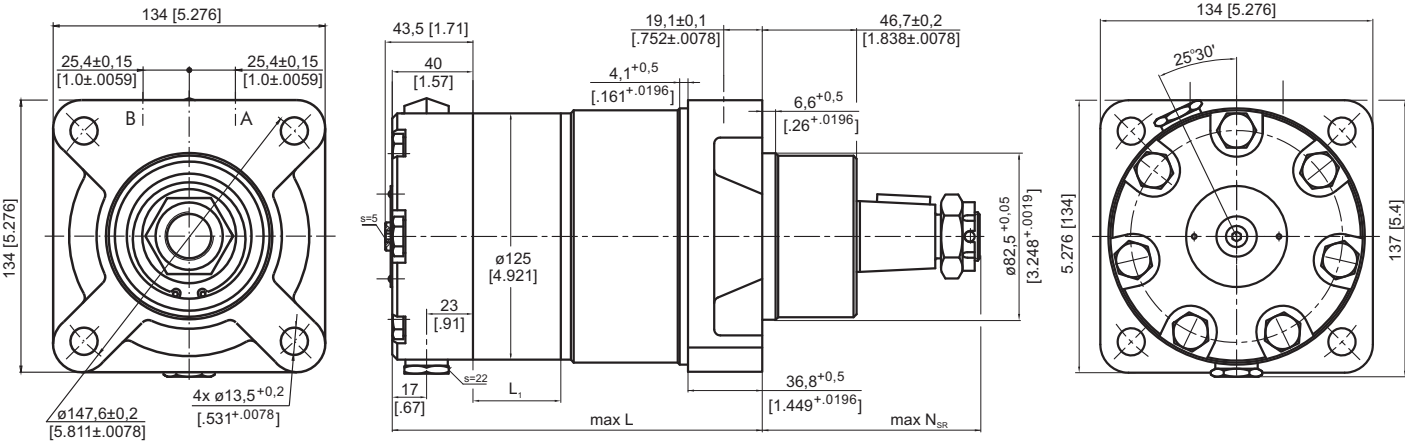
**Reverse Rotation**  
Viewed from Shaft End  
Port A Pressurized - **CCW**  
Port B Pressurized - **CW**



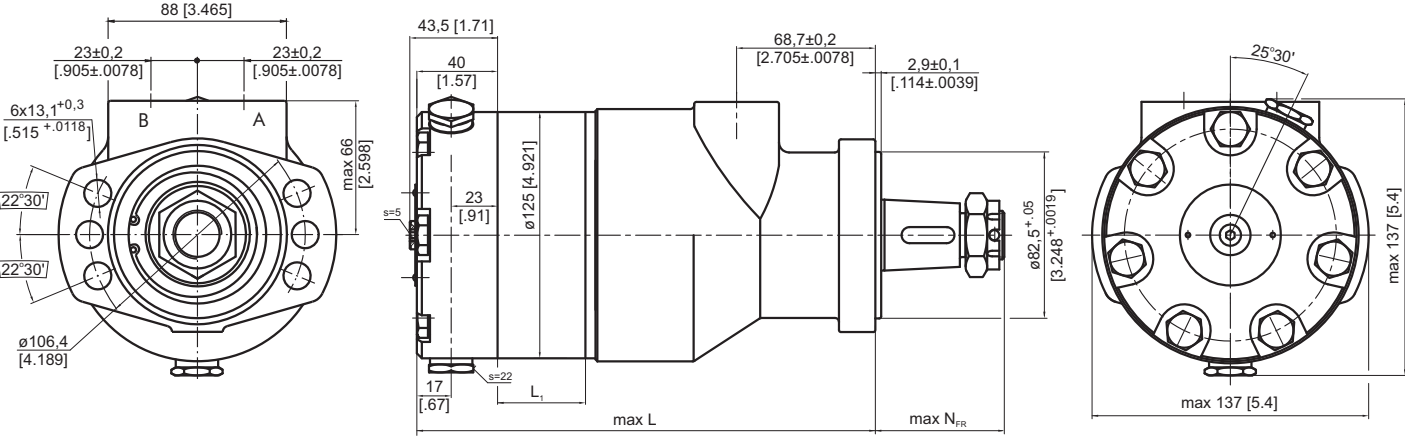
\* For LSV option the dimension L is 3 mm [1.18 in] greater.

DIMENSIONS AND MOUNTING DATA

HWSR - Wheel mount, relief valves



HWFR - Wheel mount, six holes, relief valves



| Type      | *L, mm [in]  |               | L <sub>1</sub> , mm [in] |
|-----------|--------------|---------------|--------------------------|
|           | HWSR         | HWFR          |                          |
| HW... 125 | 158,5 [6.24] | 202,0 [7.95]  | 17,4 [6.8]               |
| HW... 160 | 163,0 [6.42] | 206,5 [8.13]  | 21,8 [8.6]               |
| HW... 200 | 169,0 [6.65] | 212,5 [8.37]  | 27,8 [1.09]              |
| HW... 235 | 173,5 [6.83] | 217,0 [8.54]  | 32,5 [1.28]              |
| HW... 250 | 176,0 [6.93] | 219,5 [8.64]  | 34,8 [1.37]              |
| HW... 300 | 182,5 [7.19] | 226,0 [8.89]  | 41,4 [1.63]              |
| HW... 315 | 184,5 [7.26] | 228,0 [8.98]  | 43,5 [1.71]              |
| HW... 350 | 189,0 [7.44] | 232,5 [9.15]  | 48,0 [1.89]              |
| HW... 370 | 192,0 [7.56] | 235,5 [9.27]  | 51,0 [2.01]              |
| HW... 400 | 196,0 [7.72] | 239,5 [9.43]  | 54,8 [2.16]              |
| HW... 470 | 206,0 [8.11] | 249,5 [9.82]  | 65,0 [2.56]              |
| HW... 500 | 210,5 [8.29] | 254,0 [10.00] | 69,4 [2.73]              |
| HW... 535 | 215,0 [8.46] | 258,8 [10.19] | 74,1 [2.92]              |
| HW... 550 | 217,0 [8.54] | 260,5 [10.26] | 76,0 [2.99]              |

▽

Motor Mounting Surface

|                    | Versions |                        |
|--------------------|----------|------------------------|
|                    | 2        | 4                      |
| P <sub>(A,B)</sub> | 2xG½     | 2x7/8-14UNF,<br>O-ring |

Note: For N<sub>FR</sub> and N<sub>SR</sub> see pages 116 and 117.

Standard Rotation

Viewed from Shaft End

Port A Pressurized - CW

Port B Pressurized - CCW

Reverse Rotation

Viewed from Shaft End

Port A Pressurized - CCW

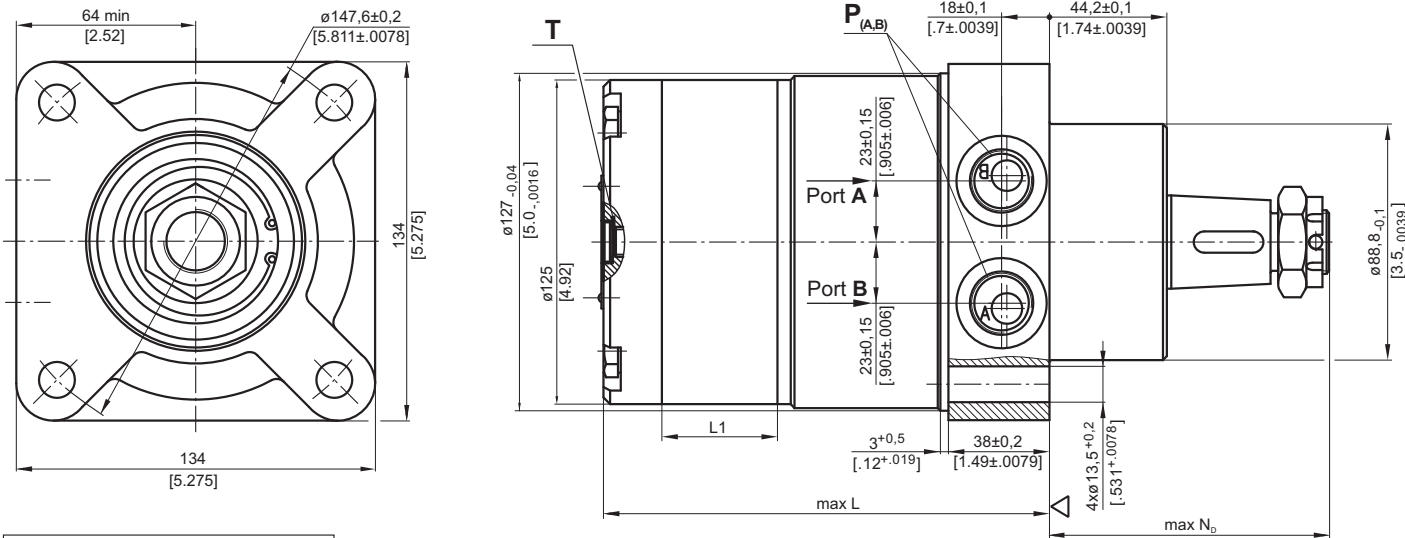
Port B Pressurized - CW



\* For LSV option the dimension L is 3 mm [1.18 in] greater.

DIMENSIONS AND MOUNTING DATA

HWD Wheel Mount



| Versions           |                   |                                  |
|--------------------|-------------------|----------------------------------|
|                    | 2                 | 4                                |
| P <sub>(A,B)</sub> | 2xG $\frac{1}{2}$ | 2x $\frac{7}{16}$ -14UNF, O-ring |
| T                  | G $\frac{1}{4}$   | $\frac{7}{16}$ -20UNF, O-ring    |

\* For LSV option the dimension L is 3 mm [0.118 in] greater.

| Type      | *L, mm [in]  |              | L <sub>1</sub> , mm [in] |
|-----------|--------------|--------------|--------------------------|
|           | HWD          | HWV          |                          |
| HW... 125 | 142,0 [5.59] | 140,5 [5.53] | 17,4 [0.68]              |
| HW... 160 | 147,0 [5.79] | 145,0 [5.71] | 21,8 [0.86]              |
| HW... 200 | 153,0 [6.02] | 151,0 [5.94] | 27,8 [1.09]              |
| HW... 235 | 158,0 [6.22] | 155,5 [6.12] | 32,5 [1.28]              |
| HW... 250 | 160,0 [6.30] | 158,0 [6.22] | 34,8 [1.37]              |
| HW... 300 | 166,5 [6.56] | 164,5 [6.46] | 41,4 [1.63]              |
| HW... 315 | 169,0 [6.65] | 166,5 [6.56] | 43,5 [1.71]              |
| HW... 350 | 173,5 [6.83] | 171,0 [6.73] | 48,0 [1.89]              |
| HW... 370 | 176,5 [6.95] | 174,0 [6.85] | 51,0 [2.01]              |
| HW... 400 | 180,0 [7.09] | 178,0 [7.01] | 54,8 [2.16]              |
| HW... 470 | 190,5 [7.50] | 188,0 [7.40] | 65,0 [2.56]              |
| HW... 500 | 194,5 [7.66] | 192,5 [7.58] | 69,4 [2.73]              |
| HW... 535 | 199,5 [7.85] | 197,0 [7.76] | 74,1 [2.92]              |
| HW... 550 | 201,5 [7.93] | 199,0 [7.83] | 76,0 [2.99]              |

**Note:** For N<sub>D</sub> and N<sub>V</sub> see pages 116 and 117.

▽ - Motor Mounting Surface

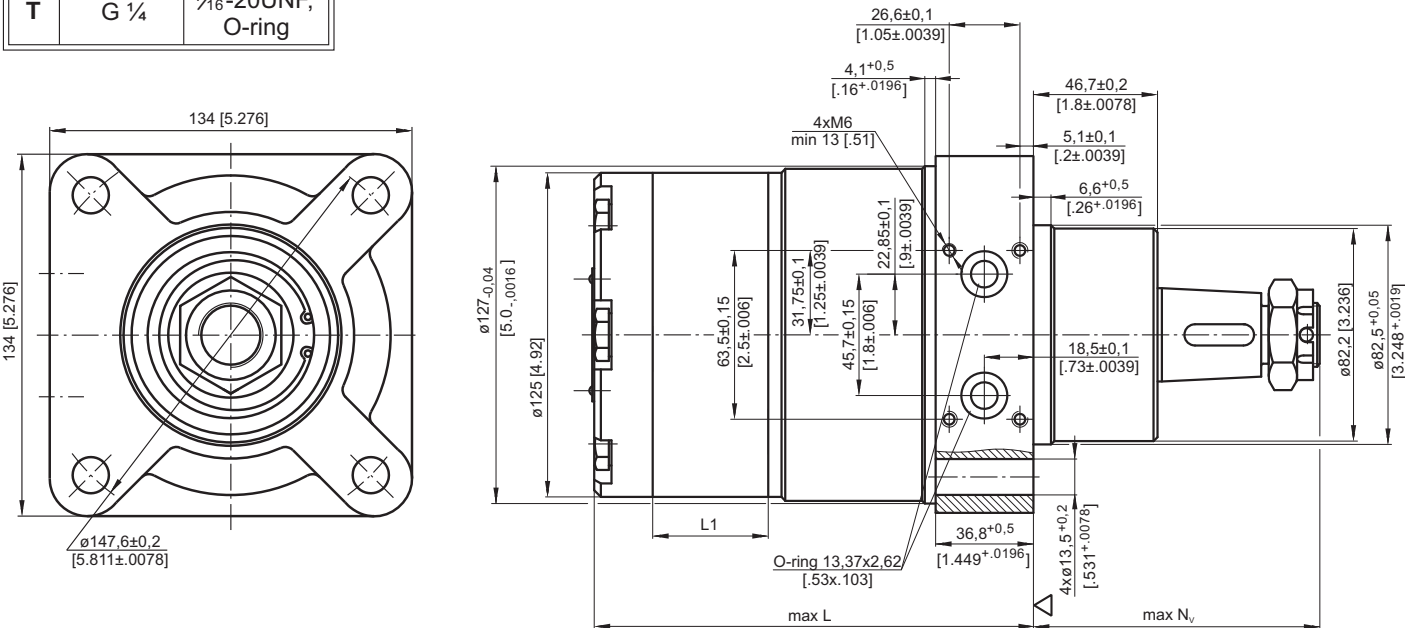


**Standard Rotation**  
Viewed from Shaft End  
Port A Pressurized - CW  
Port B Pressurized - CCW

**Reverse Rotation**  
Viewed from Shaft End  
Port A Pressurized - CCW  
Port B Pressurized - CW

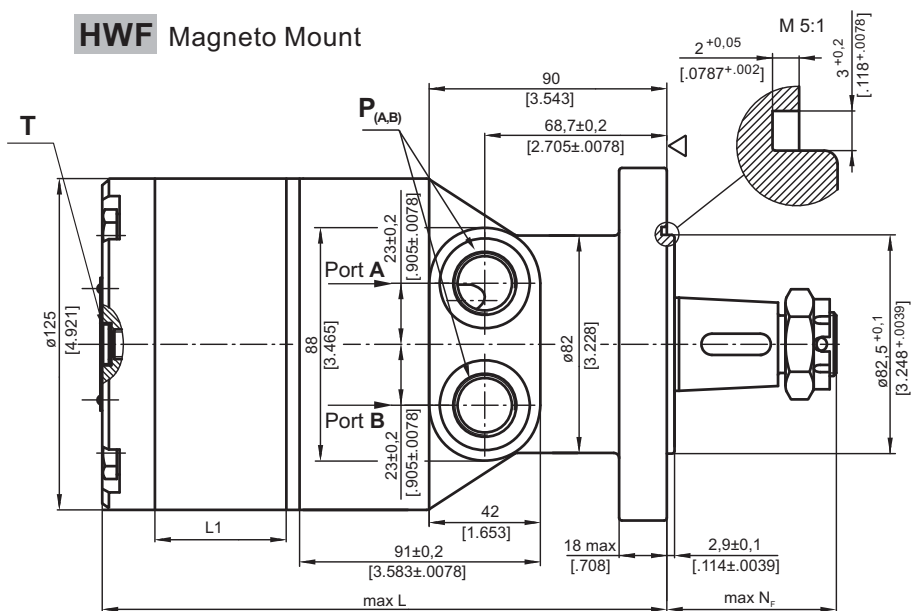
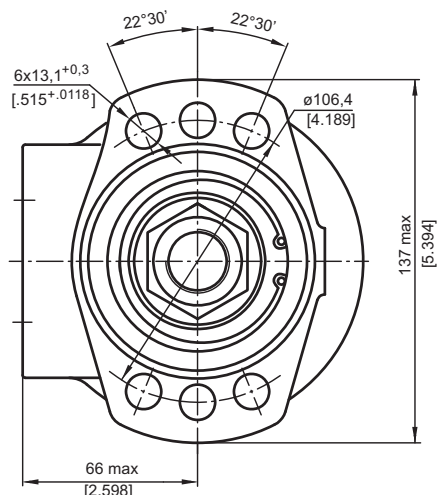
| Versions |                 |                               |
|----------|-----------------|-------------------------------|
|          | 2               | 4                             |
| T        | G $\frac{1}{4}$ | $\frac{7}{16}$ -20UNF, O-ring |

HWV Wheel Mount



## DIMENSIONS AND MOUNTING DATA

## HWF Magneto Mount

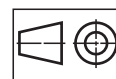


| Type    | *L, mm [in]  | L <sub>1</sub> , mm [in] |
|---------|--------------|--------------------------|
| HWF 125 | 184,0 [7.24] | 17,4 [.68]               |
| HWF 160 | 188,5 [7.42] | 21,8 [.86]               |
| HWF 200 | 194,5 [7.66] | 27,8 [1.09]              |
| HWF 235 | 199,0 [7.84] | 32,5 [1.28]              |
| HWF 250 | 201,5 [7.93] | 34,8 [1.37]              |
| HWF 300 | 208,0 [8.20] | 41,4 [1.63]              |
| HWF 315 | 210,0 [8.27] | 43,5 [1.71]              |
| HWF 350 | 214,5 [8.45] | 48,0 [1.89]              |
| HWF 370 | 217,5 [8.56] | 51,0 [2.01]              |
| HWF 400 | 221,5 [8.72] | 54,8 [2.16]              |
| HWF 470 | 231,5 [9.11] | 65,0 [2.56]              |
| HWF 500 | 236,0 [9.29] | 69,4 [2.73]              |
| HWF 535 | 240,5 [9.47] | 74,1 [2.92]              |
| HWF 550 | 242,5 [9.55] | 76,0 [2.99]              |

|                           | Versions          |                                    |
|---------------------------|-------------------|------------------------------------|
|                           | 2                 | 4                                  |
| <b>P</b> <sub>(A,B)</sub> | 2xG $\frac{1}{2}$ | 2x $\frac{7}{8}$ -14UNF,<br>O-ring |
| <b>T</b>                  | G $\frac{1}{4}$   | $\frac{7}{16}$ -20UNF,<br>O-ring   |

Note: For  $N_F$  see pages 116 and 117.

▽ - Motor Mounting Surface



mm [in]

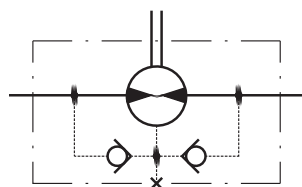
**Standard Rotation**  
Viewed from Shaft End  
Port **A** Pressurized - **CW**  
Port **B** Pressurized - **CCW**

**Reverse Rotation**  
Viewed from Shaft End  
Port **A** Pressurized - **CCW**  
Port **B** Pressurized - **CW**

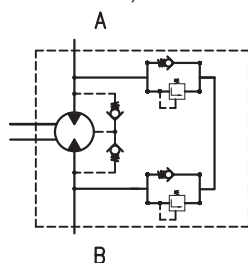
\* For **LSV** option the dimension **L** is 3 mm [.118 in] greater.

## MAX. PERMISSIBLE SHAFT SEAL PRESSURE

HW, HWF, HWS, HWD, HWV

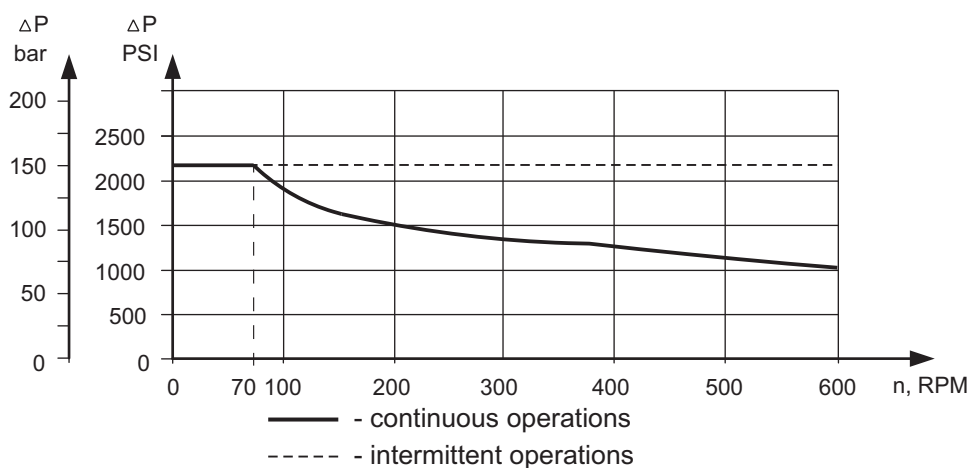


HWFR, HWSR



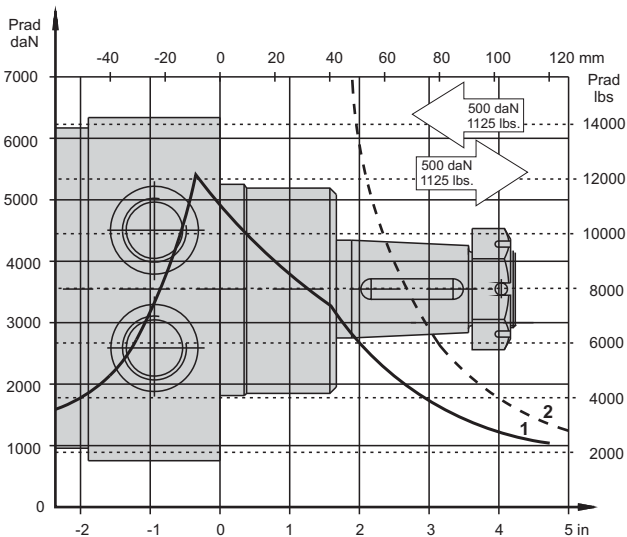
**HW... motors with drain connection:**

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

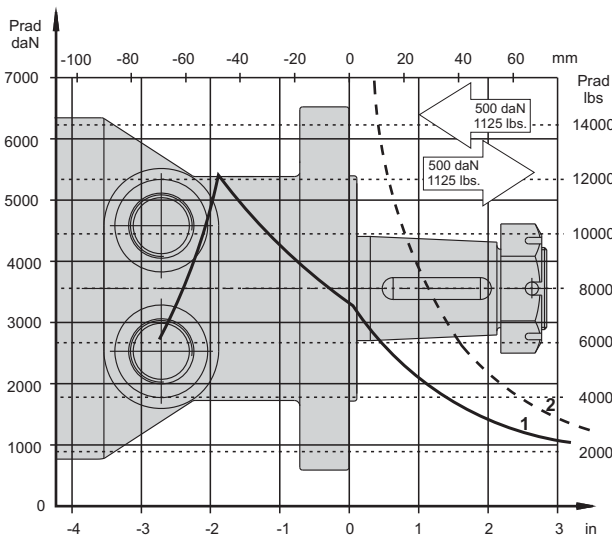


PERMISSIBLE SHAFT LOADS

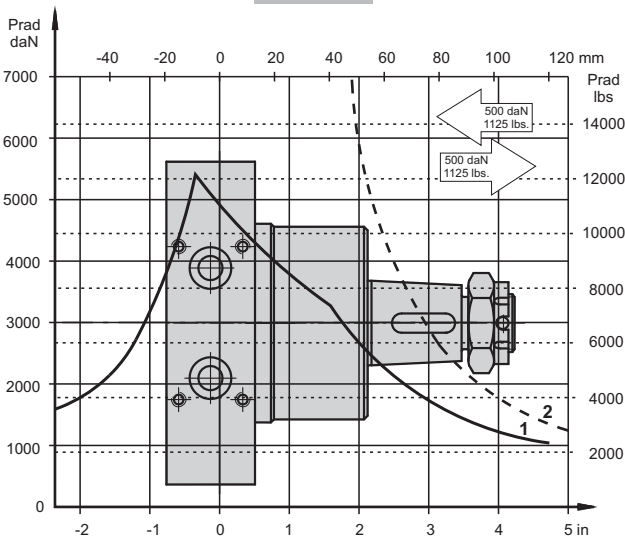
HW...



HWF...



HWV...



- 1 - Bearing curve: The curve applies to a B10 bearing life of 2000 hours at 100 RPM.

2 - Shaft curve: The curve represents Max. permissible radial shaft load with safety factor 3:1.

SHAFT EXTENSIONS

C

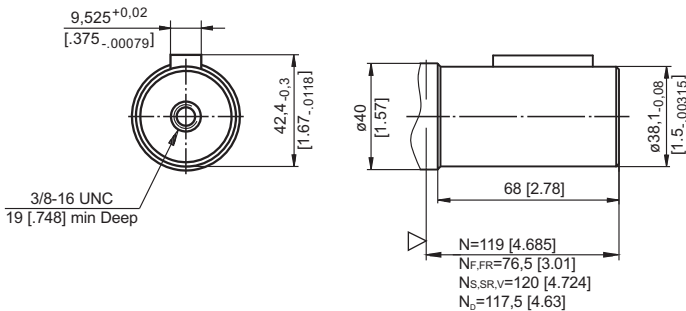
- 1½"[38,1] straight, Parallel key ⅜"x ⅜"x1½" BS46

Max. Torque 120 daNm [10630 lb-in]

CO

- ø25, straight, Parallel key A8x7x32 DIN 6885

Max. Torque 40 daNm [3540 lb-in]



N - for standard flange

N<sub>F</sub> - for F flange

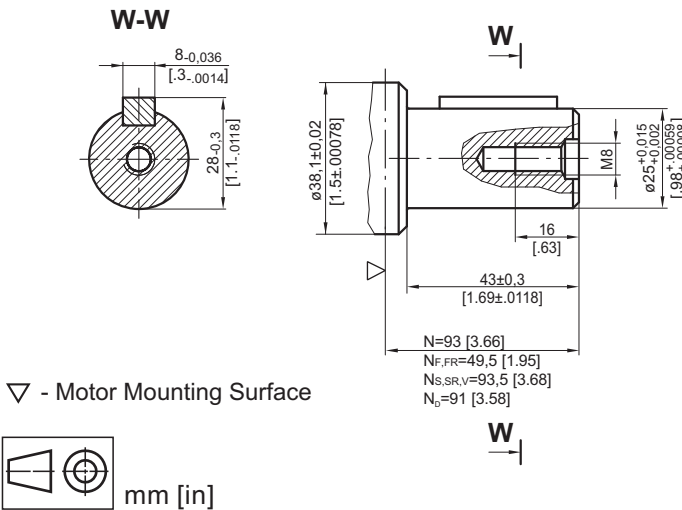
N<sub>FR</sub> - for FR flange

N<sub>S</sub> - for S flange

N<sub>SR</sub> - for SR flange

N<sub>D</sub> - for D flange

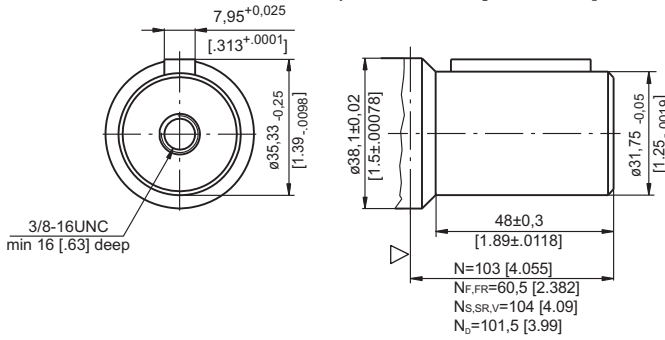
N<sub>V</sub> - for V flange



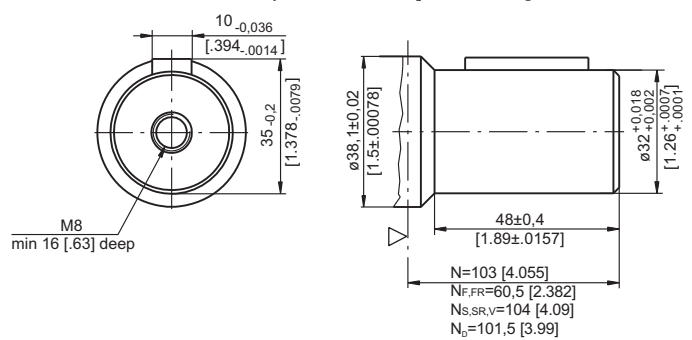
▽ - Motor Mounting Surface



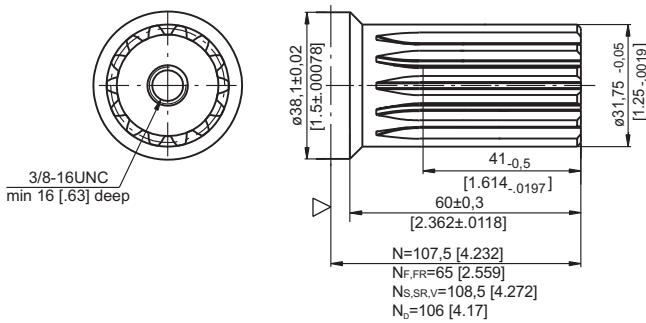
**K** - 1 1/4" straight, Parallel key 5/16"x5/16"x1 1/2" BS46  
Max. Torque 77 daNm [6815 lb-in]



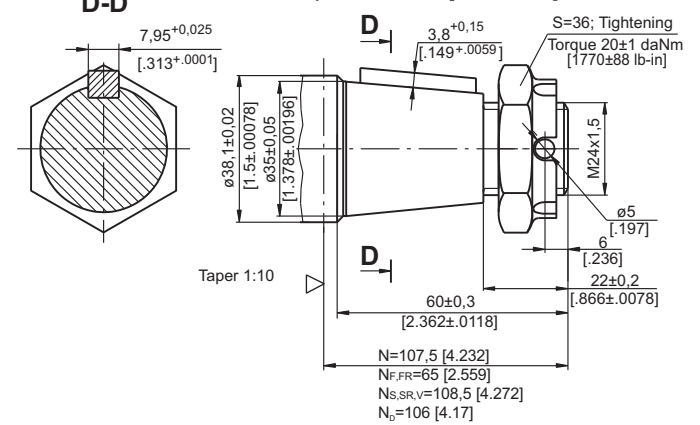
**M** - 32 straight, Parallel key A10x8x32 DIN 6885  
Max. Torque 77 daNm [6815 lb-in]



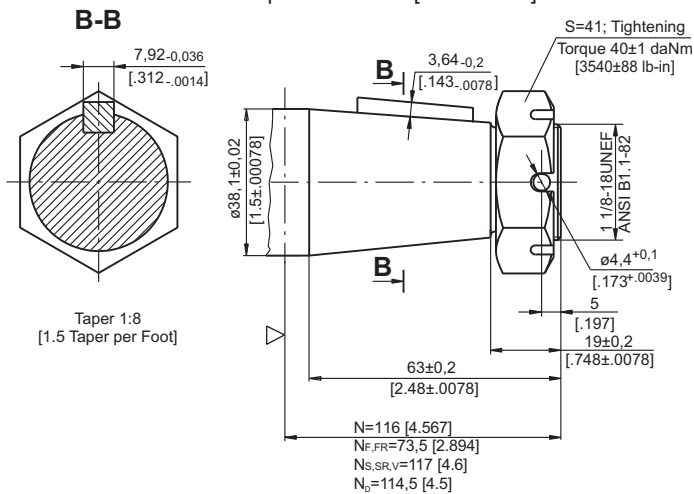
**L** - 1 1/4" splined 14T, DP12/24 ANSI B92.1-1976 Norm  
Max. Torque 95 daNm [8410 lb-in]



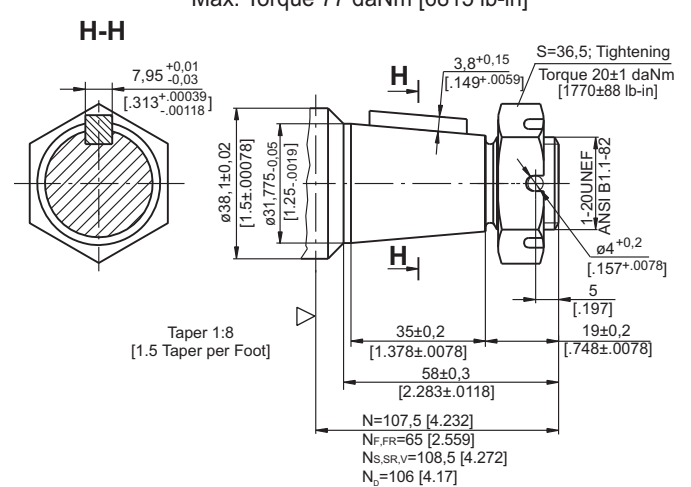
**KB** - 35 tapered 1:10, Parallel key 5/16"x5/16"x1 1/4" BS46  
Max. Torque 95 daNm [8410 lb-in]



**T** - 1 1/2" tapered 1:8, Parallel key 5/16"x5/16"x1 1/4" BS46  
Max. Torque 120 daNm [10620 lb-in]



**R** - 1 1/4" tapered 1:8, Parallel key 5/16"x5/16"x1" BS46  
Max. Torque 77 daNm [6815 lb-in]

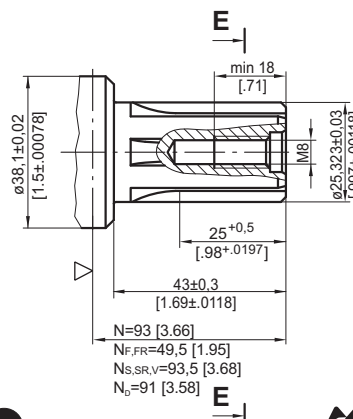
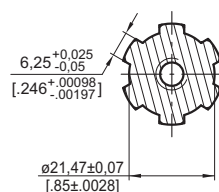


**SH** - 1" splined BS 2059, SAE 6B  
Max. Torque 40 daNm [3540 lb-in]



**E-E**

N - for standard flange  
N<sub>F</sub> - for F flange  
N<sub>FR</sub> - for FR flange  
N<sub>S</sub> - for S flange  
N<sub>SR</sub> - for SR flange  
N<sub>D</sub> - for D flange  
N<sub>V</sub> - for V flange



▽ - Motor Mounting Surface

ORDER CODE

|    |   |   |   |   |   |   |   |
|----|---|---|---|---|---|---|---|
|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| HW |   |   |   |   |   | / |   |

|       |                                                    |
|-------|----------------------------------------------------|
| Pos.1 | - Mounting Flange                                  |
| omit  | - Wheel mount, four holes                          |
| F     | - Oval mount, six holes                            |
| FR    | - Oval mount, six holes, relief valves             |
| S     | - Wheel mount, four holes                          |
| SR    | - Wheel mount, four holes, relief valves           |
| D     | - Wheel mount, four holes; mounting on ø88,8 [3.5] |
| V*    | - Wheel mount, four holes, valves                  |

|       |                                 |
|-------|---------------------------------|
| Pos.2 | - Displacement code             |
| 125   | - 126,0 cm³/rev [ 7.69 in³/rev] |
| 160   | - 158,0 cm³/rev [ 9.64 in³/rev] |
| 200   | - 201,3 cm³/rev [12.28 in³/rev] |
| 235   | - 235,0 cm³/rev [14.33 in³/rev] |
| 250   | - 252,0 cm³/rev [15.37 in³/rev] |
| 300   | - 300,0 cm³/rev [18.30 in³/rev] |
| 315   | - 314,9 cm³/rev [19.21 in³/rev] |
| 350   | - 347,8 cm³/rev [21.21 in³/rev] |
| 370   | - 369,0 cm³/rev [22.51 in³/rev] |
| 400   | - 396,8 cm³/rev [24.20 in³/rev] |
| 470   | - 470,6 cm³/rev [28.71 in³/rev] |
| 500   | - 502,4 cm³/rev [30.65 in³/rev] |
| 535   | - 536,0 cm³/rev [32.70 in³/rev] |
| 550   | - 550,0 cm³/rev [33.55 in³/rev] |

|       |                                                                                                                |
|-------|----------------------------------------------------------------------------------------------------------------|
| Pos.3 | - Shaft Extensions**                                                                                           |
| K     | - 1¼" [31,75] straight, Parallel key <sup>5</sup> / <sub>16</sub> "x <sup>5</sup> / <sub>16</sub> "x1½" BS46   |
| KB    | - ø35 tapered 1:10, Parallel key <sup>5</sup> / <sub>16</sub> "x <sup>5</sup> / <sub>16</sub> "x1½" BS46       |
| L     | - 1¼"[31,75] splined 14T, ANSI B92.1-1976                                                                      |
| M     | - ø32 straight, Parallel key A10x8x32 DIN 6885                                                                 |
| R     | - 1¼"[31,75] Tapered 1:8, Parallel key <sup>5</sup> / <sub>16</sub> "x <sup>5</sup> / <sub>16</sub> "x1½" BS46 |
| T     | - 1½"[38,1] Tapered 1:8, Parallel key <sup>5</sup> / <sub>16</sub> "x <sup>5</sup> / <sub>16</sub> "x1½" BS46  |
| C     | - 1.57" [40] straight, Parallel key <sup>3</sup> / <sub>8</sub> "x <sup>3</sup> / <sub>8</sub> "x1½" BS46      |
| CO    | - ø25, straight, Parallel key A8x7x32 DIN 6885                                                                 |
| SH    | - ø1" splined BS 2059, SAE 6B                                                                                  |

|       |                                                 |
|-------|-------------------------------------------------|
| Pos.4 | - Ports                                         |
| 2     | - side ports, 2xG1/2, G1/4, BSP thread, ISO 228 |
| 4     | - side ports, 2x7/8-14 UNF, O-ring, 7/16-20 UNF |

|       |                                      |
|-------|--------------------------------------|
| Pos.5 | - Special Features*** [see page 119] |
|-------|--------------------------------------|

|       |                                  |
|-------|----------------------------------|
| Pos.6 | - Valves Pressure Range, bar**** |
| /     | - 70, 100, 140, 170, 210         |

|       |                     |
|-------|---------------------|
| Pos.7 | - Design Series     |
| omit  | - Factory specified |

NOTES:

- \*

Flange V is for versions 2 and 4 - drainage only!
- \*\*

The permissible output torque for shafts must not be exceeded!
- \*\*\*

If the code on pos.5 is not specified in the order, it will be considered as LL-option.
- \*\*\*\*

For SR and FR only!

The hydraulic motors are mangano-phosphatized as standard.

# MOTOR SPECIAL FEATURES

| Special Feature Description | Order Code | Motor type |       |       |        |       |     |     |        |    |    |       |    |       |       |    |
|-----------------------------|------------|------------|-------|-------|--------|-------|-----|-----|--------|----|----|-------|----|-------|-------|----|
|                             |            | MM         | MP    | MPW   | MP(W)N | MR    | MRN | MRB | SP, SR | PL | RL | PK(Q) | RK | RW    | MH    | HW |
| Speed Sensor*               | RS         | O          | O     | -     | -      | O     | -   | -   | -      | -  | -  | -     | -  | -     | O     | -  |
| Tacho connection            | T          | -          | -     | -     | -      | O     | O   | -   | -      | -  | -  | -     | -  | -     | O     | -  |
| Low Leakage                 | LL         | O          | -     | -     | -      | O     | O   | -   | -      | -  | O  | -     | O  | O     | O     | O  |
| Low Speed Valving           | LSV        | -          | -     | -     | -      | O     | -   | -   | -      | -  | -  | -     | -  | -     | O     | O  |
| Free Running                | FR         | O          | O     | O     | O      | O     | O   | -   | -      | O  | O  | O     | O  | O     | O     | -  |
| Reverse Rotation            | R          | O          | O     | O     | O      | O     | O   | O   | O      | O  | O  | O     | O  | O     | O     | O  |
| Paint**                     | P          | O          | O     | O     | O      | O     | O   | O   | O      | O  | O  | O     | O  | O     | O     | O  |
| Corrosion Protected Paint** | PC         | O          | O     | O     | O      | O     | O   | O   | O      | O  | O  | O     | O  | O     | O     | O  |
| Special Paint***            | PS         | O          | O     | O     | O      | O     | O   | O   | -      | O  | O  | O     | O  | O     | O     | O  |
|                             | PCS        |            |       |       |        |       |     |     |        |    |    |       |    |       |       |    |
| Check Valves                |            | S          | S**** | S**** | S      | S**** | S   | S   | S      | S  | S  | S     | S  | S**** | S**** | S  |

|   |                |
|---|----------------|
| O | Optional       |
| - | Not applicable |
| S | Standard       |

\*

For sensor ordering see pages 120÷121.

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Colour at customer's request.

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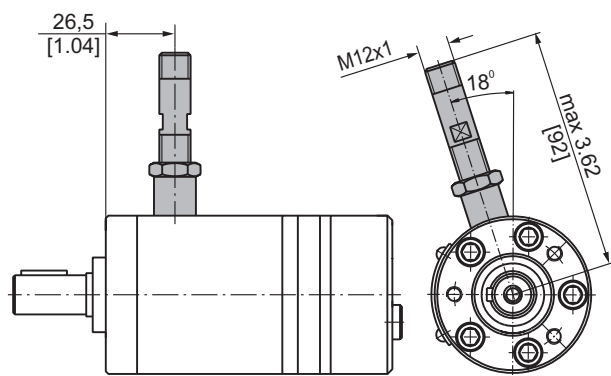
Non painted feeding surfaces, colour at customer's request.

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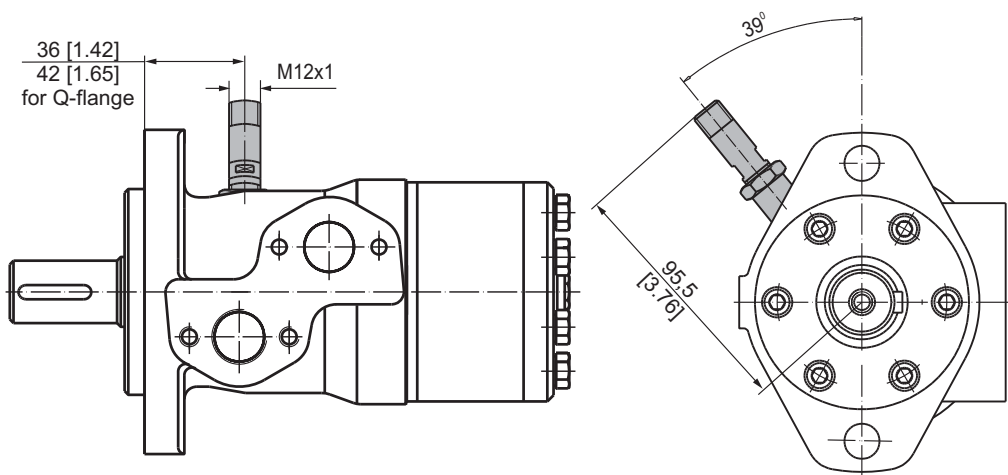
Without check valves for "U" shaft seal versions.

# MOTORS WITH SPEED SENSOR

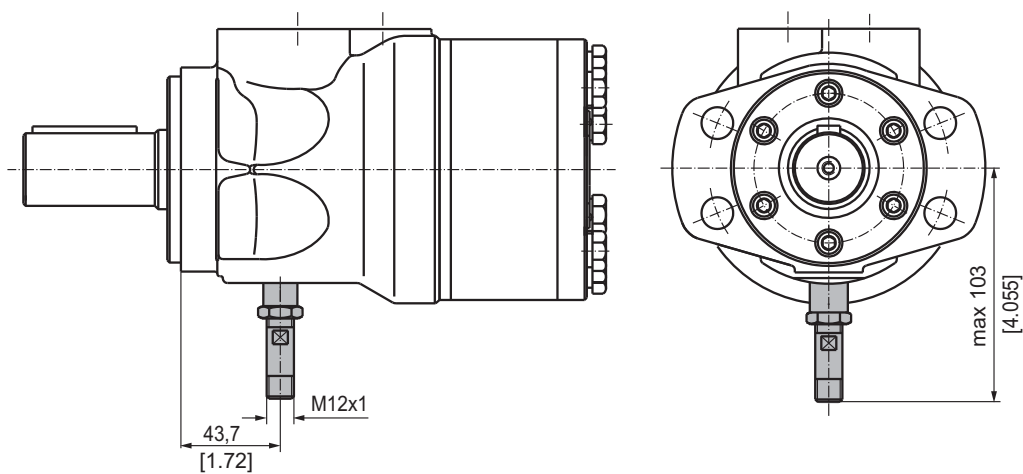
## MM...RS



## MP...RS and MR...RS



## MH...RS

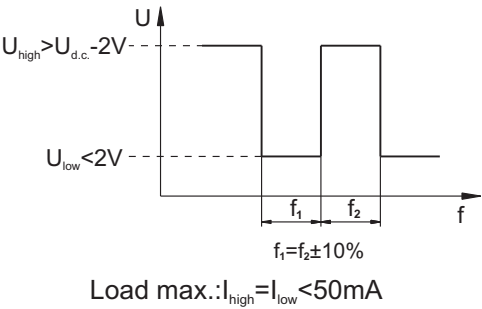


TECHNICAL DATA OF THE SPEED SENSOR

Technical data

|                     |                             |
|---------------------|-----------------------------|
| Frequency range     | 0...15 000 Hz               |
| Output              | PNP, NPN                    |
| Power supply        | 10...36 VDC                 |
| Current input       | 20 mA (@24 VDC)             |
| Ambient Temperature | -40...+125°C [-40...+257°F] |
| Protection          | IP 67                       |
| Plug connector      | M12-Series                  |
| Mounting principle  | ISO 6149                    |

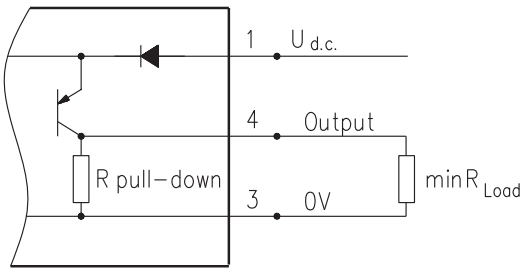
Output signal



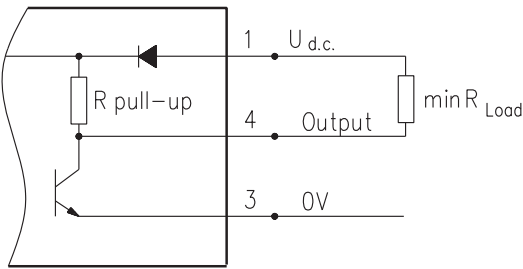
|                       |    |    |    |    |
|-----------------------|----|----|----|----|
| Motor type            | MM | MP | MR | MH |
| Pulses per revolution | 30 | 36 | 36 | 42 |

Wiring diagrams

PNP

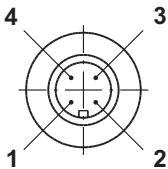


NPN



$R_{Load} \text{ [k}\Omega\text{]} = U_{d.c.} \text{ [V]} / I_{max} \text{ [mA]}$

Stick type



| Terminal No. | Connection    | Cable Output |
|--------------|---------------|--------------|
| 1            | $U_{d.c.}$    | Brown        |
| 2            | No connection | White        |
| 3            | 0V            | Blue         |
| 4            | Output signal | Black        |

Order Code for Speed Sensor

| Sensor Code | Output type | Electric connection                    |
|-------------|-------------|----------------------------------------|
| RSN         | NPN         | Connector BINDER 713 series            |
| RSP         | PNP         | Connector BINDER 713 series            |
| RSNL5       | NPN         | Cable output 3x0,25; 5 m [196 in] long |
| RSPL5       | PNP         | Cable output 3x0,25; 5 m [196 in] long |

**NOTE:** \*- The speed sensor is not fitted at the factory, but is supplied in a plastic bag with the motor.  
For installation see enclosed instructions.

# APPLICATION CALCULATION

## VEHICLE DRIVE CALCULATIONS

### 1.Motor speed: n, RPM

$$n = \frac{2,65 \times v_{km} \times i}{R_m} \quad n = \frac{168 \times v_{mi} \times i}{R_{in}}$$

$v_{km}$ - vehicle speed, km/h;

$v_{mi}$ - vehicle speed, mil/h;

$R_m$ - wheel rolling radius, m;

$R_{in}$ - wheel rolling radius, in;

$i$ - gear ratio between motor and wheels.

If no gearbox, use  $i=1$ .

### 2.Rolling resistance: RR, daN [lbs]

The resistance force resulted in wheels contact with different surfaces:

$$RR = G \times \rho$$

$G$ - total weight loaded on vehicle, daN [lbs];

$\rho$ - rolling resistance coefficient (Table 1).

Table 1

| Rolling resistance coefficient<br>In case of rubber tire rolling on different surfaces |             |
|----------------------------------------------------------------------------------------|-------------|
| Surface                                                                                | $\rho$      |
| Concrete- faultless                                                                    | 0.010       |
| Concrete- good                                                                         | 0.015       |
| Concrete- bad                                                                          | 0.020       |
| Asphalt- faultless                                                                     | 0.012       |
| Asphalt- good                                                                          | 0.017       |
| Asphalt- bad                                                                           | 0.022       |
| Macadam- faultless                                                                     | 0.015       |
| Macadam- good                                                                          | 0.022       |
| Macadam- bad                                                                           | 0.037       |
| Snow- 5 cm                                                                             | 0.025       |
| Snow- 10 cm                                                                            | 0.037       |
| Polluted covering- smooth                                                              | 0.025       |
| Polluted covering- sandy                                                               | 0.040       |
| Mud                                                                                    | 0.037÷0.150 |
| Sand- Gravel                                                                           | 0.060÷0.150 |
| Sand- loose                                                                            | 0.160÷0.300 |

### 3.Grade resistance: GR, daN [lbs]

$$GR = G \times (\sin \alpha + \rho \times \cos \alpha)$$

$\alpha$ - gradient negotiation angle (Table 2)

Table 2

| Grade % | $\alpha$ Degrees | Grade % | $\alpha$ Degrees |
|---------|------------------|---------|------------------|
| 1%      | 0° 35'           | 12%     | 6° 5'            |
| 2%      | 1° 9'            | 15%     | 8° 31'           |
| 5%      | 2° 51'           | 20%     | 11° 19'          |
| 6%      | 3° 26'           | 25%     | 14° 3'           |
| 8%      | 4° 35'           | 32%     | 18°              |
| 10%     | 5° 43'           | 60%     | 31°              |

### 4. Acceleration force: FA, daN [lbs]

Force **FA** necessary for acceleration from 0 to maximum speed **v** and time **t** can be calculated with a formula:

$$FA = \frac{v_{km} \times G}{3,6 \times t}, [daN] \quad FA = \frac{v_{mi} \times G}{22 \times t}, [lbs];$$

**FA**- acceleration force, daN [lbs];

**t**- time, [s].

### 5.Tractive effort: DP, daN [lbs]

Tractive effort **DP** is the additional force of trailer. This value will be established as follows:

-acc.to constructor's assessment;

-as calculating forces in items 2, 3 and 4 of trailer; the calculated sum corresponds to the tractive effort requested.

### 6.Total tractive effort: TE, daN [lbs]

Total tractive effort **TE** is total effort necessary for vehicle motion; that the sum of forces calculated in items from 2 to 5 and increased with 10 % because of air resistance.

$$TE = 1,1 \times (RR + GR + FA + DP)$$

**RR** - force acquired to overcome the rolling resistance;

**GR**- force acquired to slope upwards;

**FA**- force acquired to accelerate (acceleration force);

**DP**- additional tractive effort (trailer).

### 7.Motor Torque moment: M, daNm [in-lb]

Necessary torque moment for every hydraulic motor:

$$M = \frac{TE \times R_{in} [R_m]}{N \times i \times h_m}$$

**N**- motor numbers;

$h_m$ - mechanical gear efficiency (if it is available).

### 8.Cohesion between tire and road covering: Mw, daNm [in-lb]

$$M_w = \frac{G_w \times f \times R_{in} [R_m]}{i \times h_m}$$

To avoid wheel slipping, the following condition should be observed  $M_w > M$

**f** - frictional factor;

**G<sub>w</sub>**- total weight over the wheels, daN [lbs].

Table 3

| Surface                         | Frictional factor<br>$f$ |
|---------------------------------|--------------------------|
| Steel on steel                  | 0.15 ÷ 0.20              |
| Rubber tire on polluted surface | 0.5 ÷ 0.7                |
| Rubber tire on asphalt          | 0.8 ÷ 1.0                |
| Rubber tire on concrete         | 0.8 ÷ 1.0                |
| Rubber tire on grass            | 0.4                      |

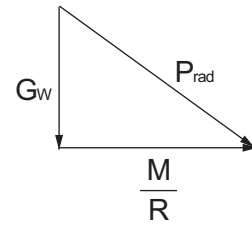
### 9.Radial motor loading: $P_{rad}$ , daN [lbs]

When motor is used for vehicle motion with wheels mounted directly on motor shaft, the total radial loading of motor shaft  $P_{rad}$  is a sum of motion force and weight force acting on one wheel.

$G_w$  - Weight held by wheel;

$P_{rad}$  - Total radial loading of motor shaft;

$M/R$ - Motion force.

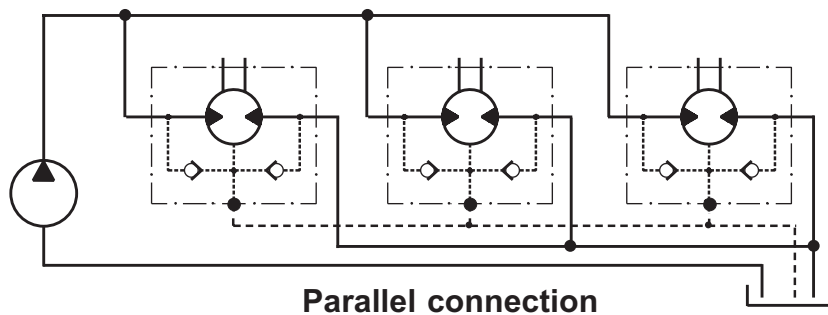
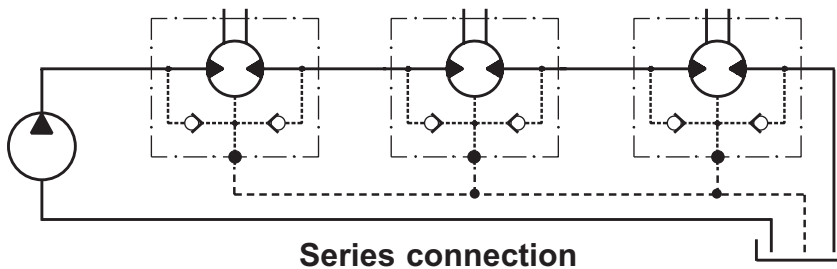


$$P_{rad} = \sqrt{G_w^2 + \left(\frac{M}{R}\right)^2}$$

In accordance with calculated loadings the suitable motor from the catalogue is selected.

## DRAINAGE SPACE AND DRAINAGE PRESSURE

Advantages in oil drainage from drain space: Cleaning; Cooling and Seal lifetime prolonging.



# WARRANTY

M+S Hydraulic warrants, that its products, supplied directly to original equipment manufacturer, authorized distributor or other customer, will be free of defects in material or workmanship at the time of shipment from M+S Hydraulic and will conform to the products technical documentation (drawings and specifications) under sale agreement with Buyer.

This warranty will apply only to defects appearing within applicable Warranty period, mentioned below. If Buyer notifies M+S Hydraulic within the Warranty period about any such defects, M+S, at its sole option will replace or repair the defective products or their parts found by M+S Hydraulic to be defective in material or workmanship.

THE FOREGOING LIMITED WARRANTY IS AVAILABLE ONLY IF "M+S HYDRAULIC" IS PROMPTLY NOTIFIED IN WRITTEN OF THE ALLEGED DEFECT AND DOES NOT COVER FAILURE TO FUNCTION CAUSED BY DAMAGE TO THE PRODUCT, IMPROPER INSTALLATION, UNREASONABLE USE OR ABUSE OF THE PRODUCT, FAILURE TO PROVIDE OR USE OF IMPROPER MAINTENANCE OR USUAL, DEGRADATION OF THE PRODUCT DUE TO PHYSICAL ENVIRONMENTS OF AN USUAL NATURE. THE FOREGOING REMEDIES ARE THE SOLE AND EXCLUSIVE REMEDIES AVAILABLE TO CUSTOMER. To facilitate the inspection, M+S Hydraulic may require return of the product/part, which Buyer claims to be defective.

M+S Hydraulic shall not be liable for labor costs or any other expenses incurred during the disassembling or reinstalling of the product/part.

In case the claimed products are returned to M+S Hydraulic in bad condition: dirty, disassembled, with damaged or missing parts during transportation, the warranty will be considered as not applicable and the products will not be liable to repair.

## Warranty periods

**New products:** The Warranty period is limited to 24 consecutive months (2 years) from the date of production of the product.

**Repaired products:** If the product is repaired in M+S Hydraulic during its warranty period, the warranty period of the repaired item shall continue for the balance of original Warranty period or for a period equal to 50% of the original new product Warranty period, whichever is later.

**Spare parts:** The Warranty period for Spare parts is 12 consecutive months (1 year) from the dispatch date of such parts from M+S Hydraulic.

**LIMITATION OF LIABILITY** M+S Hydraulic's liability for claim of any kind, for loss or damage arising out of, connected with or resulting from an order, or from the performance or branch thereof, or from the design, manufacture, sale delivery, operation or use of any of its products shall be limited to, at M+S 's sole option, replacement, repair of any defective product or the issuance of a credit to Customer against any future purchases. Cash refunds will not be made under any circumstances and Customer will not be entitled to recover any damages of any kind against M+S Hydraulic, including but not limited to incidental or consequential damages, whether direct or indirect, known or unknown, foreseen or unforeseen.



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