



M+S HYDRAULIC

SPOOL VALVE HYDRAULIC MOTORS



TYPE MM
MP
MR
MH

ISO 9001
CERTIFIED BY TÜV-CERT

SPOOL VALVE HYDRAULIC MOTORS

The operating principle of the motors is based on an internal gear design, consisting of a stator and rotor through which the output torque and speed are transmitted. The distributor valve is driven synchronously by the rotor through a cardan shaft ensuring that each one of the chambers of the motor are filled and emptied precisely.
MM, MP, MR and MH motors have a Spool Valve.

SPOOL VALVE - The distributor valve has been integrated with the output shaft. The valve has hydrodynamic bearings, and has infinite life when load ratings are not exceeded.

GEAR SET - There are two forms of stator, hence and of gear set:

MM and MP have plain teeth. These types motors are suitable for long operating periods at moderate pressures- or short operating periods at high pressures.

MR and MH have 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. Roller Gear Sets are recommended for operation with thin oil and for applications having continually reversing loads.

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

Needle Bearing MP and MR have an output shaft supported in needle bearing. These types motors are suitable for absorbing static and dynamic radial loads.

Low Leakage **LL** Series hydraulic motors have been 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 drainage ports. Their main purpose is to operate as series-connected motors in hydraulic systems. For this version is permissible decreasing of the maximal torque with up to 5% (at middle speed) and up to 10 % (at high speed) in comparison to the standard versions of motors.

Low Speed Valve **LSV** Series hydraulic motors have been designed to operate with normal pressure drop and to ensure smooth run at low speed (up to 200 min⁻¹), as the best security for operation is guaranteed at frequency of rotation 20 ÷ 50 min⁻¹. They have an increased starting pressure drop and are not recommended for using at pressure less than 40 bar.

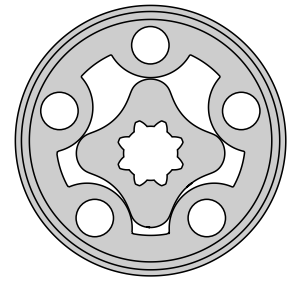
Free Running **FR** Series hydraulic motors have been designed to operate with high frequencies of rotation /over than 300 min⁻¹/ and low pressure drop. These motors are produced with increased clearance at all friction parts. Additional advantages of "FR" version are prolonging of the life of the hydraulic motors at high frequencies of rotation, as well as the possibility to use them in systems with big variation of the loading. Volumetric efficiency can be affected.

HYDRAULIC MOTORS MM



APPLICATION

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



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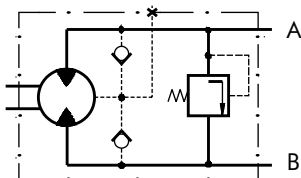
OPTIONS

- » Model- Spool valve, gerotor
- » With or without flange
- » Side and rear ports
- » Series with pressure valve(s)
- » Shafts- straight and splined
- » Metric and BSPP ports
- » Speed sensing;

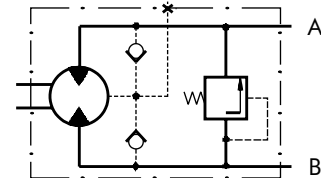
GENERAL

| | |
|---|---|
| Displacement, [cm ³ /rev.] | 8,2 ÷ 50 |
| Max. Speed, [RPM] | 400 ÷ 1950 |
| Max. Torque, [daNm] | 1,1 ÷ 4,5 |
| Max. Output, [kW] | 1,8 ÷ 2,4 |
| Max. Pressure Drop, [bar] | 70 ÷ 100 |
| Max. Oil Flow, [l/min] | 16 ÷ 20 |
| Min. Speed, [RPM] | 20 ÷ 50 |
| Pressure fluid | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4) |
| Temperature range, [°C] | -30 ÷ 90 |
| Optimal Viscosity range, [mm ² /s] | 20 ÷ 75 |
| Filtration | ISO code 20/16 (Min. recommended fluid filtration of 25 micron) |

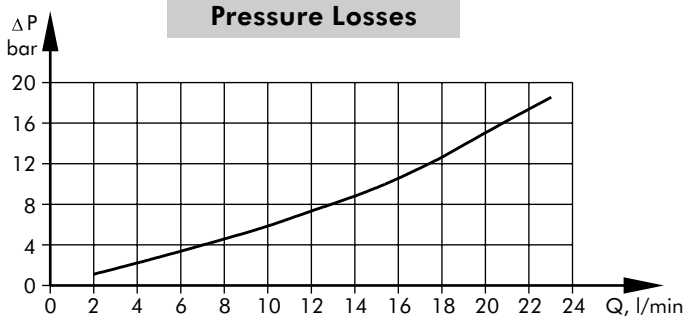
MMP Series with Integrated Internal Crossover Relief Valve
 A → B, Δp = 100 bar (50 bar)



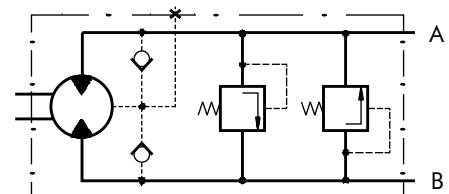
MMP Series with Integrated Internal Crossover Relief Valve
 B → A, Δp = 100 bar (50 bar)



Pressure Losses



MMD Series with Integrated Internal Crossover Relief Valves
 A ↔ B, Δp = 100 bar (50 bar)



SPECIFICATION DATA

| Type | MM 8 | MM 12,5 | MM 20 | MM 32 | MM 40 | MM 50 | |
|---|---------------------------|---------|-------|-------|-------|-------|-----|
| Displacement [cm ³ /rev.] | 8,2 | 12,9 | 20 | 31,8 | 40 | 50 | |
| Max. Speed, [RPM] | cont. | 1950 | 1550 | 1000 | 630 | 500 | 400 |
| | int.* | 2440 | 1940 | 1250 | 790 | 625 | 500 |
| Max. Torque [daNm] | cont. | 1,1 | 1,6 | 2,5 | 4 | 4,1 | 4,5 |
| | int.* | 1,5 | 2,3 | 3,5 | 5,7 | 5,7 | 5,8 |
| | peak** | 2,1 | 3,3 | 5,1 | 6,4 | 6,6 | 8 |
| Max. Output [kW] | cont. | 1,8 | 2,4 | 2,4 | 2,4 | 1,8 | 1,7 |
| | int.* | 2,6 | 3,2 | 3,2 | 3,2 | 3,0 | 2,1 |
| Max. Pressure Drop [bar] | cont. | 100 | 100 | 100 | 100 | 80 | 70 |
| | int.* | 140 | 140 | 140 | 140 | 110 | 90 |
| | peak** | 200 | 200 | 200 | 200 | 140 | 125 |
| Max. Oil Flow [l/min] | cont. | 16 | 20 | 20 | 20 | 20 | 20 |
| | int.* | 20 | 25 | 25 | 25 | 25 | 25 |
| Max. Inlet Pressure, [bar] | cont. | 140 | 140 | 140 | 140 | 140 | 140 |
| | int.* | 175 | 175 | 175 | 175 | 175 | 175 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Return Pressure w/o Drain Line or Max. Pressure in Drain Line, [bar] | cont. 0-100 RPM | 140 | 140 | 140 | 140 | 140 | 140 |
| | cont. 100-400 RPM | 100 | 100 | 100 | 100 | 100 | 100 |
| | cont. 400-800 RPM | 50 | 50 | 50 | 50 | 50 | - |
| | cont. >800 RPM | 20 | 20 | 20 | - | - | - |
| | int.* 0-max. RPM | 140 | 140 | 140 | 140 | 140 | 140 |
| Max. Return Pressure with Drain Line [bar] | cont. | 140 | 140 | 140 | 140 | 140 | 140 |
| | int.* | 175 | 175 | 175 | 175 | 175 | 175 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Starting Pressure with Unloaded Shift, [bar] | 4 | 4 | 4 | 4 | 4 | 4 | |
| Min. Starting Torque [daNm] | at max. press. drop cont. | 0,7 | 1,2 | 2,1 | 3,4 | 3,3 | 3,7 |
| | at max. press. drop int.* | 1,0 | 1,7 | 2,9 | 4,8 | 4,6 | 4,8 |
| Min. Speed***, [RPM] | 50 | 40 | 30 | 30 | 25 | 20 | |
| Weight, avg. [kg] | MM | 1,9 | 2 | 2,1 | 2,2 | 2,3 | 2,5 |
| | MMF(S) | 2,3 | 2,4 | 2,5 | 2,6 | 2,7 | 2,9 |
| | MMFS | 2,7 | 2,8 | 2,9 | 3,0 | 3,1 | 3,3 |
| | MMP | 2,5 | 2,6 | 2,7 | 2,8 | 2,9 | 3,1 |
| | MMPF | 2,7 | 2,8 | 2,9 | 3,0 | 3,1 | 3,3 |
| | MMD | 2,6 | 2,7 | 2,8 | 2,9 | 3,0 | 3,2 |
| | MMDF | 2,8 | 2,9 | 3,0 | 3,1 | 3,2 | 3,4 |

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

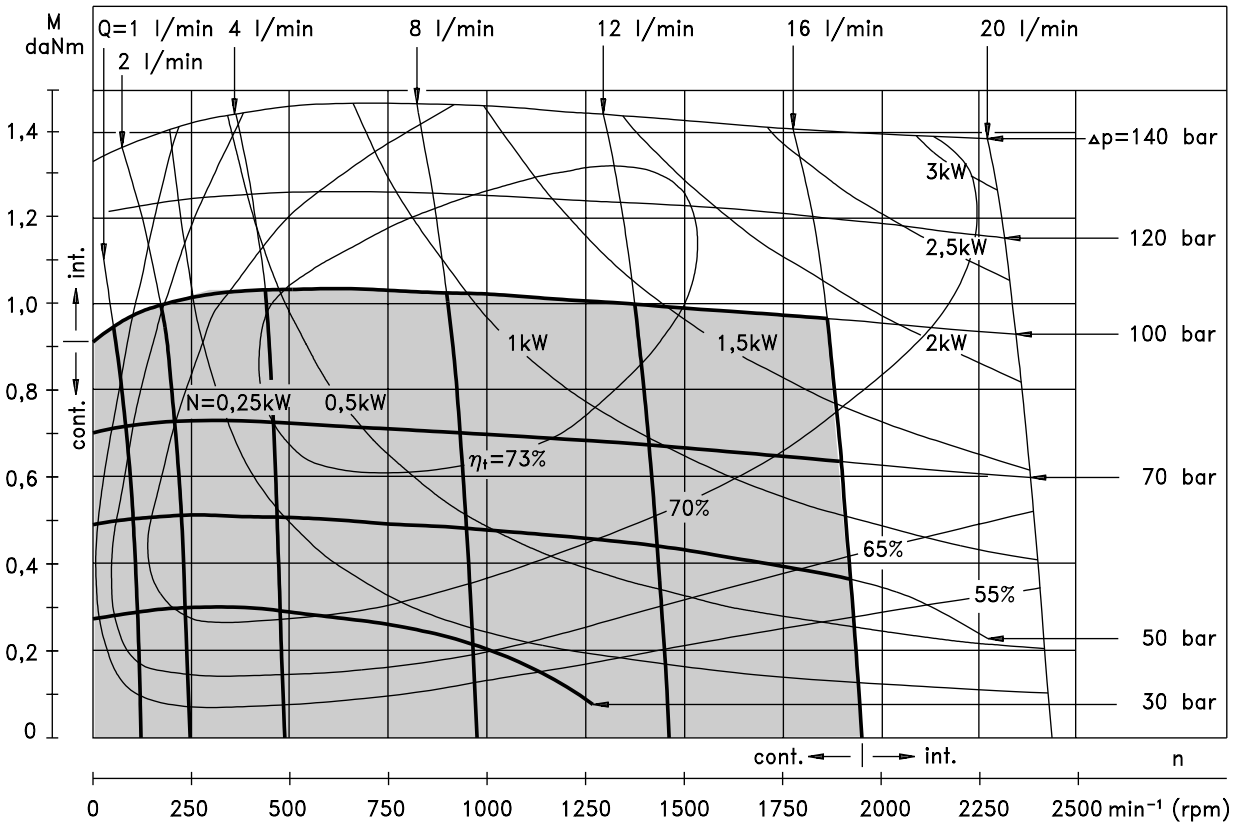
** Peak load: the permissible values may occur for max. 1% of every minute.

*** For speeds of 30 RPM or lower, consult factory or your regional manager.

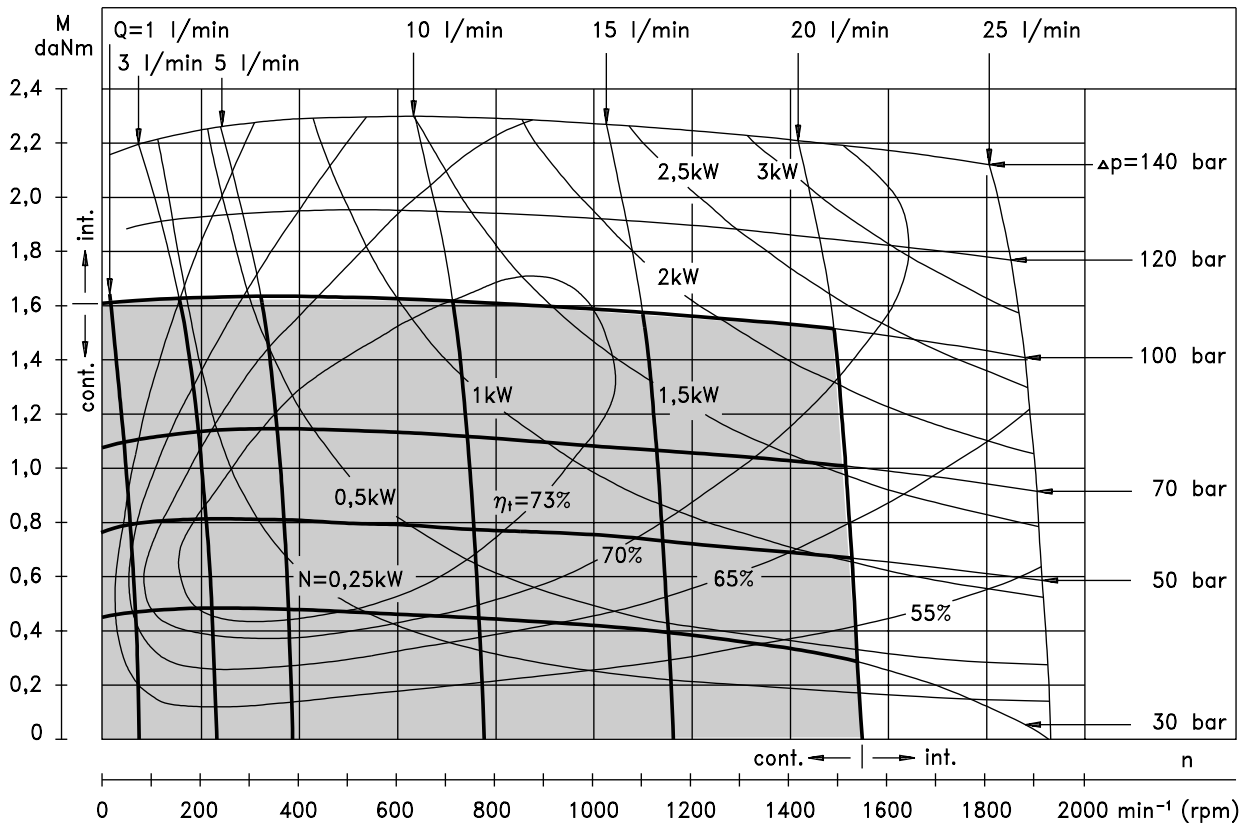
1. Intermittent speed and intermittent pressure drop must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 mm²/s at operating temperature 50°C.
5. Recommended maximum system operating temperature is 82°C.
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 15-30 min.

FUNCTION DIAGRAMS

MM 8



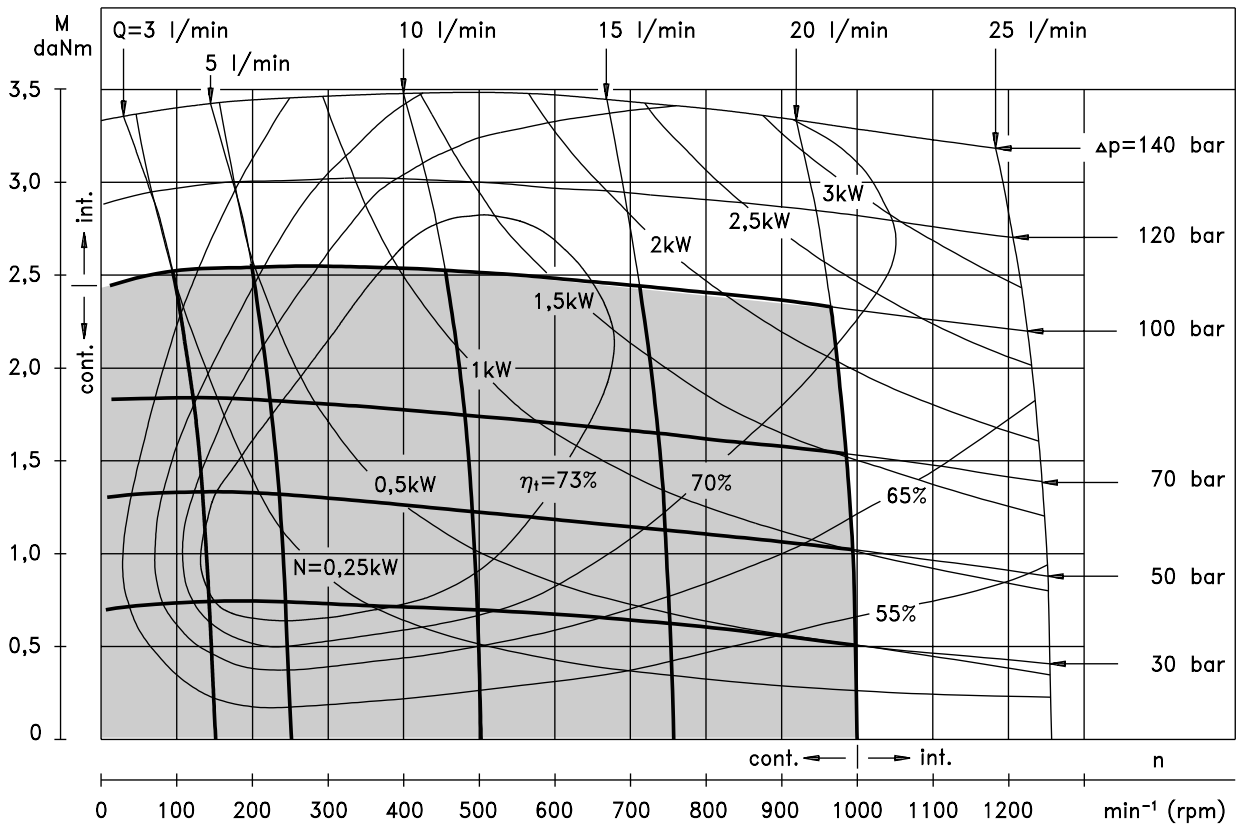
MM 12,5



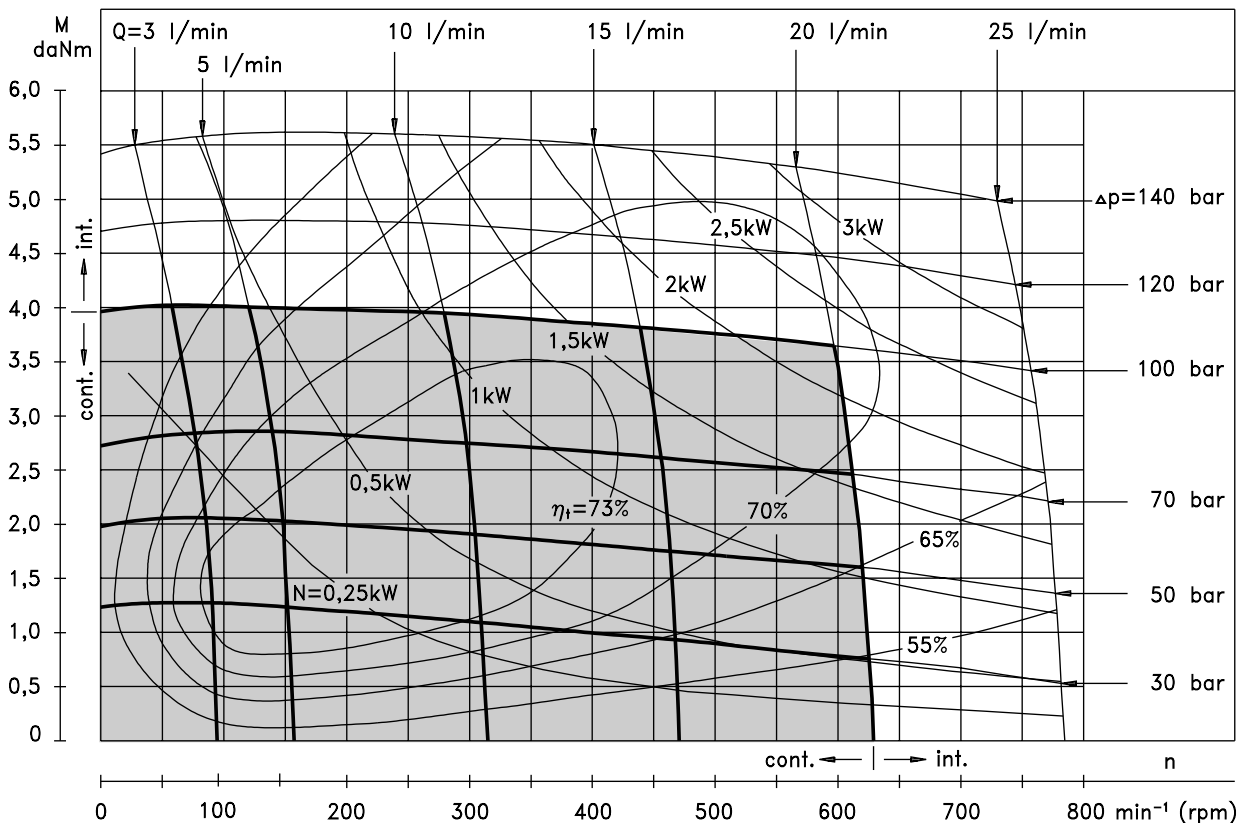
The function diagrams data was collected at back pressure 5÷10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MM 20



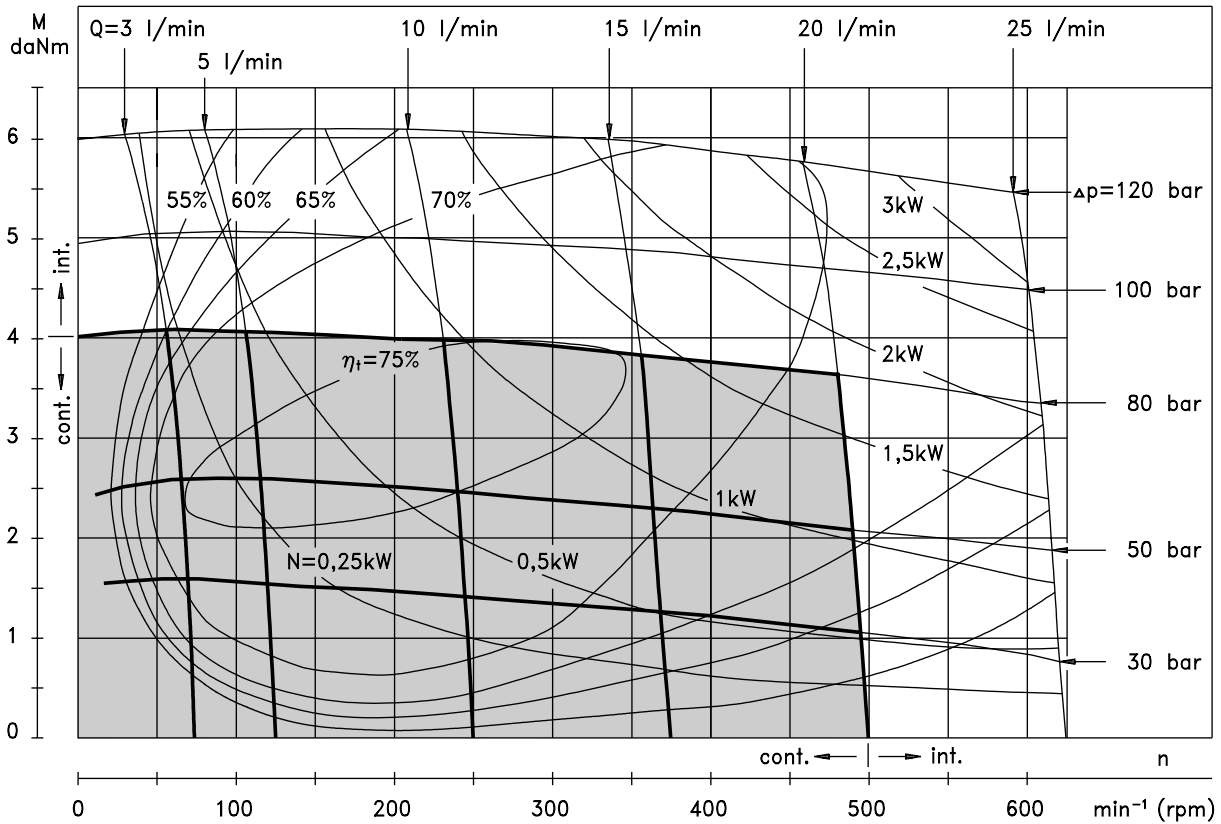
MM 32



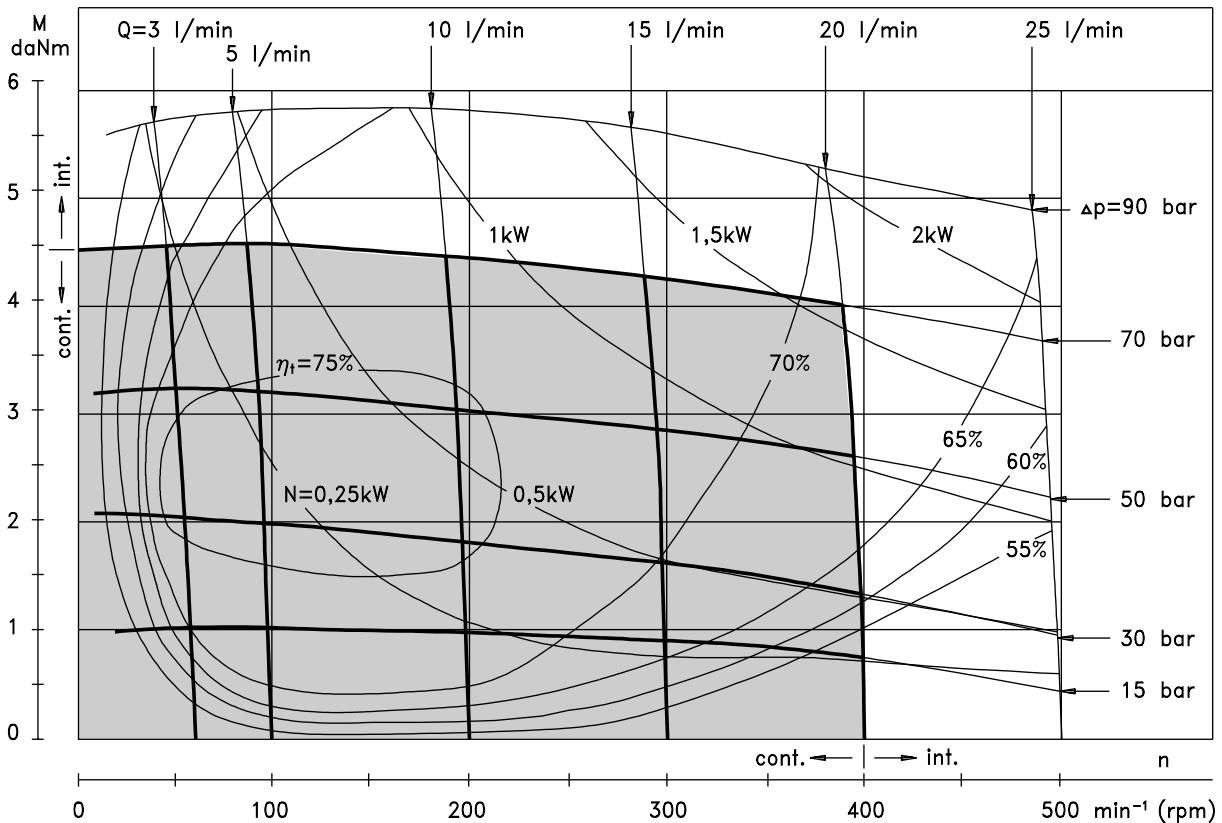
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MM 40



MM 50

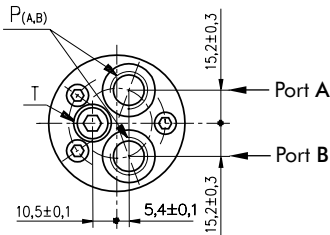


The function diagrams data was collected at back pressure 5÷10 bar and oil with viscosity of 32 mm²/s at 50° C.

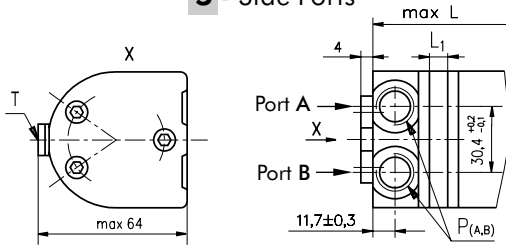
DIMENSIONS AND MOUNTING DATA

Porting

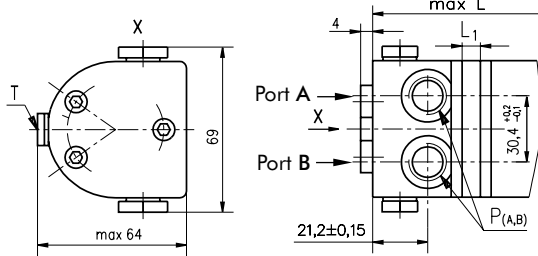
Rear Ports



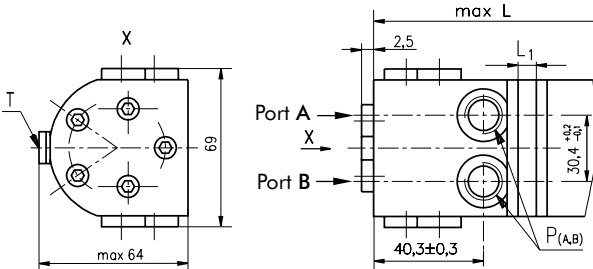
S - Side Ports



P - Side Ports with Single Crossover Relief Valve

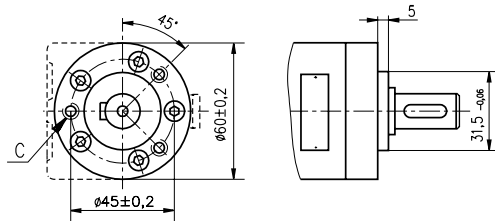


D - Side Ports with Dual Crossover Relief Valve

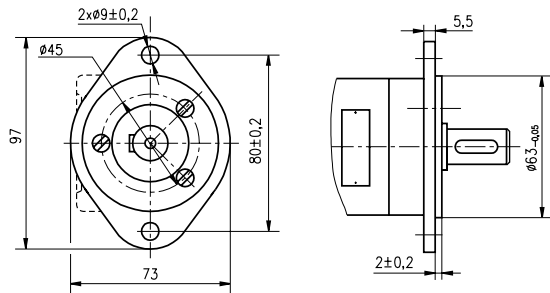


Mounting

Three Bolts Mount



F - Oval Mount (2 Holes)



C : 3xM6- 12 mm depth

P_(A,B): 2xG3/8 or (M18x1,5)- 12 mm depth

T : G1/8 or (M10x1)- 10 mm depth

Standard Rotation

Viewed from Shaft End

Port A Pressurized - CW

Port B Pressurized - CCW

Reverse Rotation

Viewed from Shaft End

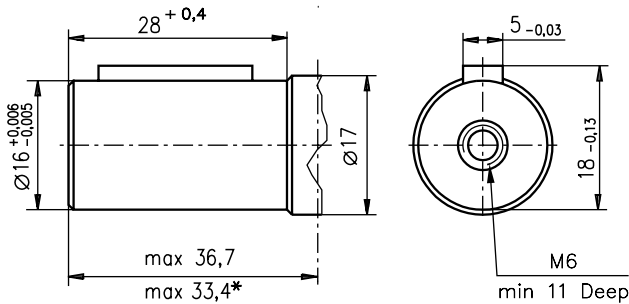
Port A Pressurized - CCW

Port B Pressurized - CW

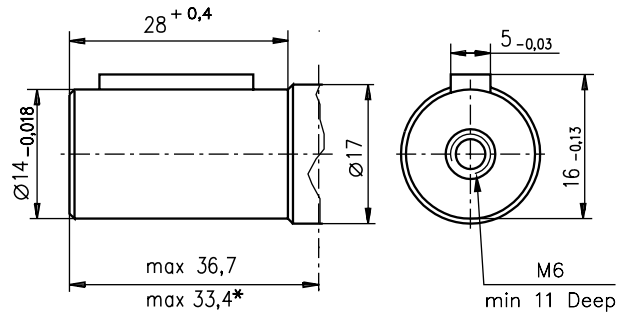
| Type | L,mm | Type | L,mm | Type | L,mm | Type | L,mm | L ₁ ,mm |
|--------|-------|---------|-------|---------|-------|---------|-------|--------------------|
| MM 8 | 104 | MMS 8 | 105 | MMP 8 | 115 | MMD 8 | 134 | 3,5 |
| MM12,5 | 106 | MMS12,5 | 107 | MMP12,5 | 117 | MMD12,5 | 136 | 5,5 |
| MM 20 | 109 | MMS 20 | 110 | MMP 20 | 120 | MMD 20 | 139 | 8,5 |
| MM 32 | 114 | MMS 32 | 115 | MMP 32 | 125 | MMD 32 | 144 | 13,5 |
| MM 40 | 117,5 | MMS 40 | 118,5 | MMP 40 | 128,5 | MMD 40 | 147,5 | 17 |
| MM 50 | 121,5 | MMS 50 | 122,5 | MMP 50 | 132,5 | MMD 50 | 151,5 | 21 |

SHAFT EXTENSIONS

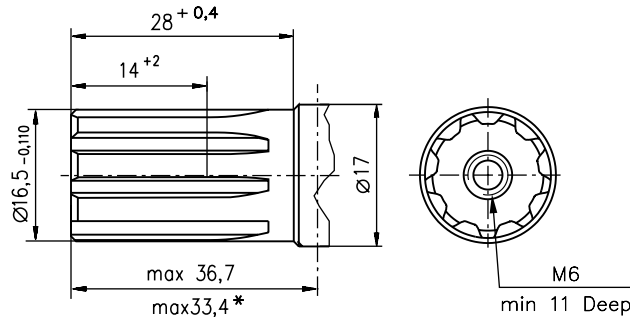
C - $\varnothing 16$ straight, Parallel key 5x5x16 DIN 6885
Max. Torque 3,9 daNm



CK - $\varnothing 14$ Straight, Parallel key 5x5x16 DIN 6885
Max. Torque 3 daNm

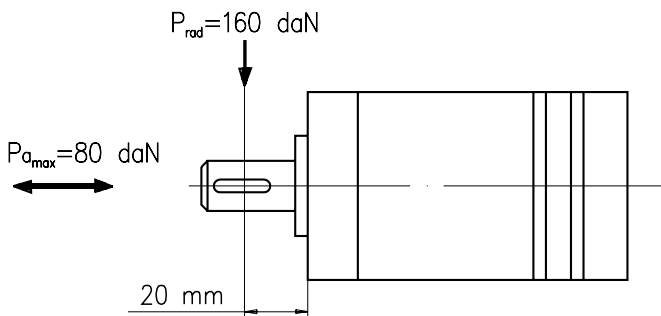


SH - $\varnothing 16,5$ Splined, B17x14 DIN 5482
Max. Torque 4,4 daNm



- Motor Mounting Surface
* For **F** Mounting

PERMISSIBLE SHAFT LOAD



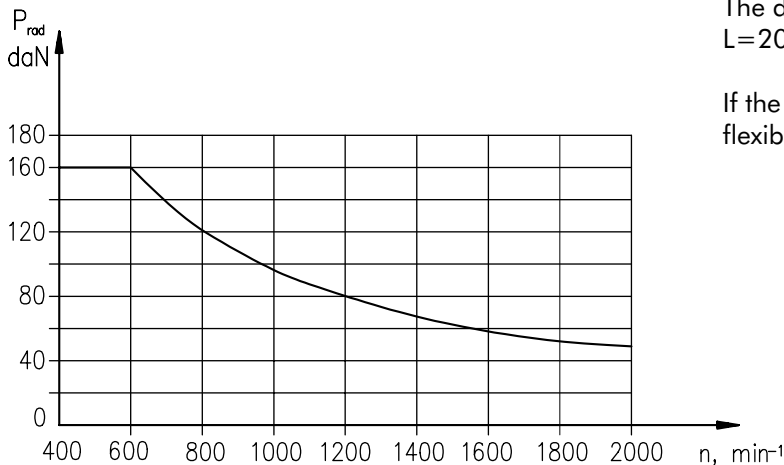
The permissible radial shaft load [P_{rad}] is calculated from the distance [L] between the point of load application and the mounting surface:

$$P_{rad} = \frac{600}{n} \times \frac{13040}{(61,5+L)}, \text{ [daN]}$$

[L in mm; L ≤ 80]

The drawing shows the permissible radial load when L=20 mm.

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]

12,5 - 12,9 [cm³/rev]

20 - 20,0 [cm³/rev]

32 - 31,8 [cm³/rev]

40 - 40,0 [cm³/rev]

50 - 50,0 [cm³/rev]

Pos. 5 - Shaft Extensions*

C - ø16 straight, Parallel key 5x5x16 DIN 6885

VC - ø16 straight, Parallel key 5x5x16 DIN 6885 with corrosion resistant bushing

CK - ø14 straight, Parallel key 5x5x16 DIN 6885

SH - ø16,5 splined, B17x14 DIN 5482

Pos. 6 - Ports

omit - BSPP (ISO 228)

M - Metric (ISO 262)

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

/L - B→A (left running)

/R - A→B (right running)

Pos. 8 - Valve Rated Pressure ***

/50 - Δ p = 50 bar

/100 - Δ p = 100 bar

Pos. 9 - Special Features (see page 46)

Pos. 10 - Design Series

omit - Factory specified

NOTES:

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

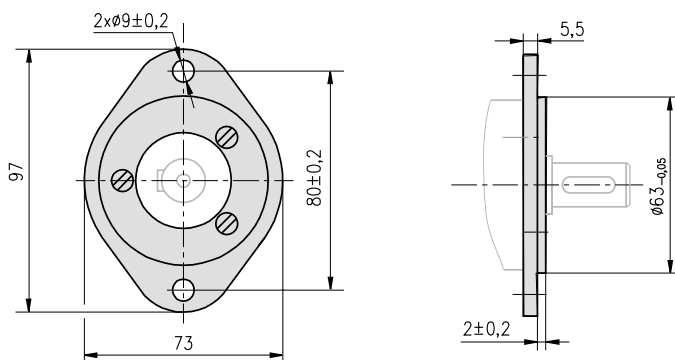
** For "**P**" option useful only.

*** For "**P**" and "**D**" option useful only.

The hydraulic motors are mangano-phosphatized as standard.

F - FLANGE KIT (2 Holes)

Order No: 48443 014 00



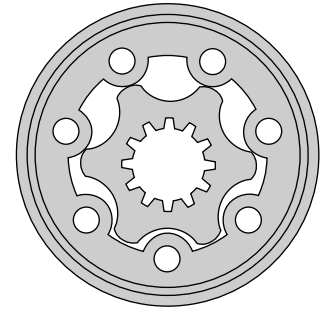
Flange Kit includes 3 screws - M6x14 for attaching flange to the motor.

HYDRAULIC MOTORS MP



APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Machines for agriculture
- » 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

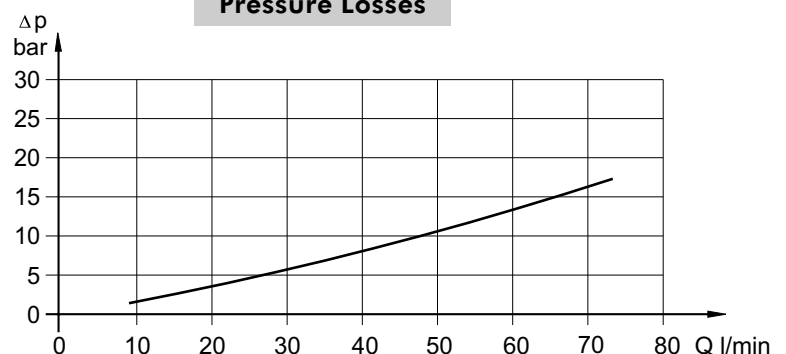
GENERAL

| | |
|---|---|
| Displacement, [cm ³ /rev.] | 25 ÷ 623,6 |
| Max. Speed, [RPM] | 95 ÷ 1600 |
| Max. Torque, [daNm] | 3,3 ÷ 50 |
| Max. Output, [kW] | 3,3 ÷ 10,5 |
| Max. Pressure Drop, [bar] | 55 ÷ 140 |
| Max. Oil Flow, [l/min] | 40 ÷ 60 |
| Min. Speed, [RPM] | 10 |
| Pressure fluid | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4) |
| Temperature range, [°C] | -30 ÷ 90 |
| Optimal Viscosity range, [mm ² /s] | 20 ÷ 75 |
| Filtration | ISO code 20/16 (Min. recommended fluid filtration of 25 micron) |

Oil flow in drain line

| Pressure drop (bar) | Viscosity (mm ² /s) | Oil flow in drain line (l/min) |
|---------------------|--------------------------------|--------------------------------|
| 100 | 20 | 2,5 |
| | 35 | 1,8 |
| 140 | 20 | 3,5 |
| | 35 | 2,8 |

Pressure Losses



SPECIFICATION DATA

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

| Type | MP | | | | | | | | | | | | | | |
|---|---------------------------|------|------|------|------|------|-------|-------|------|-------|-------|------|------|-------|------|
| | 25 | 32 | 40 | 50 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | |
| Displacement, [cm ³ /rev.] | 25 | 32 | 40 | 49,5 | 79,2 | 99 | 123,8 | 158,4 | 198 | 247,5 | 316,8 | 396 | 495 | 623,6 | |
| Max. Speed, [RPM] | cont. | 1600 | 1560 | 1500 | 1210 | 755 | 605 | 486 | 378 | 303 | 242 | 190 | 150 | 120 | 95 |
| | int.* | 1800 | 1720 | 1750 | 1515 | 945 | 755 | 605 | 472 | 378 | 303 | 236 | 189 | 150 | 120 |
| Max. Torque [daNm] | cont. | 3,3 | 4,3 | 6,2 | 9,4 | 15,1 | 19,3 | 23,7 | 31,3 | 36,6 | 38 | 38 | 36 | 39 | 44 |
| | int.* | 4,7 | 6,1 | 8,2 | 11,9 | 19,5 | 23,7 | 29,8 | 37,8 | 45,6 | 58,3 | 56 | 59 | 57 | 64 |
| | peak** | 6,7 | 8,6 | 10,7 | 14,3 | 22,4 | 27,5 | 36,5 | 43,8 | 55 | 68,5 | 85 | 85,4 | 78 | 82 |
| Max. Output, [kW] | cont. | 4,5 | 5,8 | 8,4 | 10,1 | 10,2 | 10,5 | 10 | 10,1 | 10 | 7,5 | 5,7 | 4,6 | 3,5 | 3,3 |
| | int.* | 6,1 | 7,8 | 11,6 | 12,2 | 12,5 | 12,8 | 12 | 12,1 | 12 | 12 | 9 | 7,8 | 7,2 | 5,6 |
| Max. Pressure Drop [bar] | cont. | 100 | 100 | 120 | 140 | 140 | 140 | 140 | 140 | 140 | 110 | 90 | 70 | 60 | 55 |
| | int.* | 140 | 140 | 155 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 140 | 115 | 90 | 80 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 180 | 130 | 110 |
| Max. Oil Flow [l/min] | cont. | 40 | 50 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | int.* | 45 | 55 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Max. Inlet Pressure [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 140 | 140 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 175 | 175 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Return Pressure with Drain Line [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 140 | 140 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 175 | 175 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Starting Pressure with Unloaded Shaft, [bar] | | 10 | 10 | 10 | 10 | 10 | 10 | 9 | 8 | 7 | 6 | 5 | 5 | 5 | 5 |
| Min. Starting Torque [daNm] | at max. press. drop cont. | 3 | 4 | 5,4 | 7,8 | 13,2 | 16,6 | 20,7 | 28,2 | 33,5 | 33,6 | 34,4 | 34,5 | 36 | 41,5 |
| | at max. press. drop int.* | 4,2 | 5,6 | 6,9 | 10 | 16,8 | 21 | 26,6 | 35,5 | 42,6 | 54,2 | 61,9 | 60,8 | 54 | 62 |
| Min. Speed***, [RPM] | | 20 | 15 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Weight, avg. [kg] | MP(F) | 5,6 | 5,6 | 5,7 | 5,8 | 5,9 | 6,1 | 6,2 | 6,4 | 6,6 | 6,8 | 7,1 | 7,6 | 8,9 | 9,5 |
| | MPQ(N) | 5,0 | 5,0 | 5,1 | 5,2 | 5,3 | 5,5 | 5,6 | 5,8 | 6,0 | 6,2 | 6,5 | 6,8 | 8,3 | 9,0 |
| | MP(F)(N)E | 6,1 | 6,1 | 6,2 | 6,3 | 6,4 | 6,6 | 6,7 | 6,9 | 7,1 | 7,3 | 7,6 | 8,1 | 9,3 | 10 |
| | MPW(N) | 5,3 | 5,3 | 5,4 | 5,5 | 5,6 | 5,8 | 5,9 | 6,1 | 6,3 | 6,5 | 6,8 | 7,2 | 8,6 | 9,2 |
| | MPQ(N)E | 5,5 | 5,5 | 5,6 | 5,7 | 5,8 | 6,0 | 6,1 | 6,3 | 6,5 | 6,7 | 7,0 | 7,3 | 8,8 | 8,5 |

* 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 of 10 RPM or lower, consult factory or your regional manager.

- Intermittent speed and intermittent pressure drop must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
- Recommended 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 at operating temperatures.
- Recommended maximum system operating temperature is 82°C.
- 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.
($\varnothing 35$ sealing diameter)

| Type | MP | | | | | | | | | | | | | |
|---|---------------------------|------|------|------|------|------|-------|-------|------|-------|-------|------|------|-------|
| | 25 | 32 | 40 | 50 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 |
| Displacement, [cm ³ /rev.] | 25 | 32 | 40 | 49,5 | 79,2 | 99 | 123,8 | 158,4 | 198 | 247,5 | 316,8 | 396 | 495 | 623,6 |
| Max. Speed, [RPM] | cont. | 1600 | 1560 | 1500 | 1210 | 755 | 605 | 486 | 378 | 303 | 242 | 190 | 150 | 95 |
| | int.* | 1800 | 1720 | 1750 | 1515 | 945 | 755 | 605 | 472 | 378 | 303 | 236 | 189 | 120 |
| Max. Torque [daNm] | cont. | 3,3 | 4,3 | 6,2 | 9,4 | 15,1 | 19,3 | 23,7 | 31,3 | 36,6 | 47 | 48,6 | 50 | 39 |
| | int.* | 4,7 | 6,1 | 8,2 | 11,9 | 19,5 | 23,7 | 29,8 | 37,8 | 45,6 | 58,3 | 56 | 59 | 64 |
| | peak** | 6,7 | 8,6 | 10,7 | 14,3 | 22,4 | 27,5 | 36,5 | 43,8 | 55 | 68,5 | 85 | 85,4 | 78 |
| Max. Output, [kW] | cont. | 4,5 | 5,8 | 8,4 | 10,1 | 10,2 | 10,5 | 10 | 10,1 | 9,5 | 9,5 | 7,6 | 6,2 | 3,5 |
| | int.* | 6,1 | 7,8 | 11,6 | 12,2 | 12,5 | 12,8 | 12 | 12,1 | 12,5 | 12 | 9 | 7,8 | 7,2 |
| Max. Pressure Drop [bar] | cont. | 100 | 100 | 120 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 120 | 95 | 60 |
| | int.* | 140 | 140 | 155 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 140 | 115 | 90 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 180 | 130 |
| Max. Oil Flow [l/min] | cont. | 40 | 50 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | int.* | 45 | 55 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Max. Inlet Pressure [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 140 | 140 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 175 | 175 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Return Pressure with Drain Line [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 140 | 140 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 175 | 175 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Starting Pressure with Unloaded Shaft, [bar] | | 10 | 10 | 10 | 10 | 10 | 10 | 9 | 8 | 7 | 6 | 5 | 5 | 5 |
| Min. Starting Torque [daNm] | at max. press. drop cont. | 3 | 4 | 5,4 | 7,8 | 13,2 | 16,6 | 20,7 | 28,2 | 33,5 | 42,8 | 45,8 | 46,8 | 36 |
| | at max. press. drop int.* | 4,2 | 5,6 | 6,9 | 10 | 16,8 | 21 | 26,6 | 35,5 | 42,6 | 54,2 | 61,9 | 60,8 | 54 |
| Min. Speed***, [RPM] | | 20 | 15 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Weight, avg. [kg] | MP(F)...B | 5,6 | 5,6 | 5,7 | 5,9 | 6 | 6,2 | 6,3 | 6,5 | 6,7 | 6,9 | 7,2 | 7,7 | 9 |
| | MP(F)E...B | 6,1 | 6,1 | 6,2 | 6,4 | 6,5 | 6,7 | 6,8 | 6,9 | 7,2 | 7,4 | 7,7 | 8,2 | 10,1 |

* 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 of 10 RPM or lower, 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. Recommended 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.

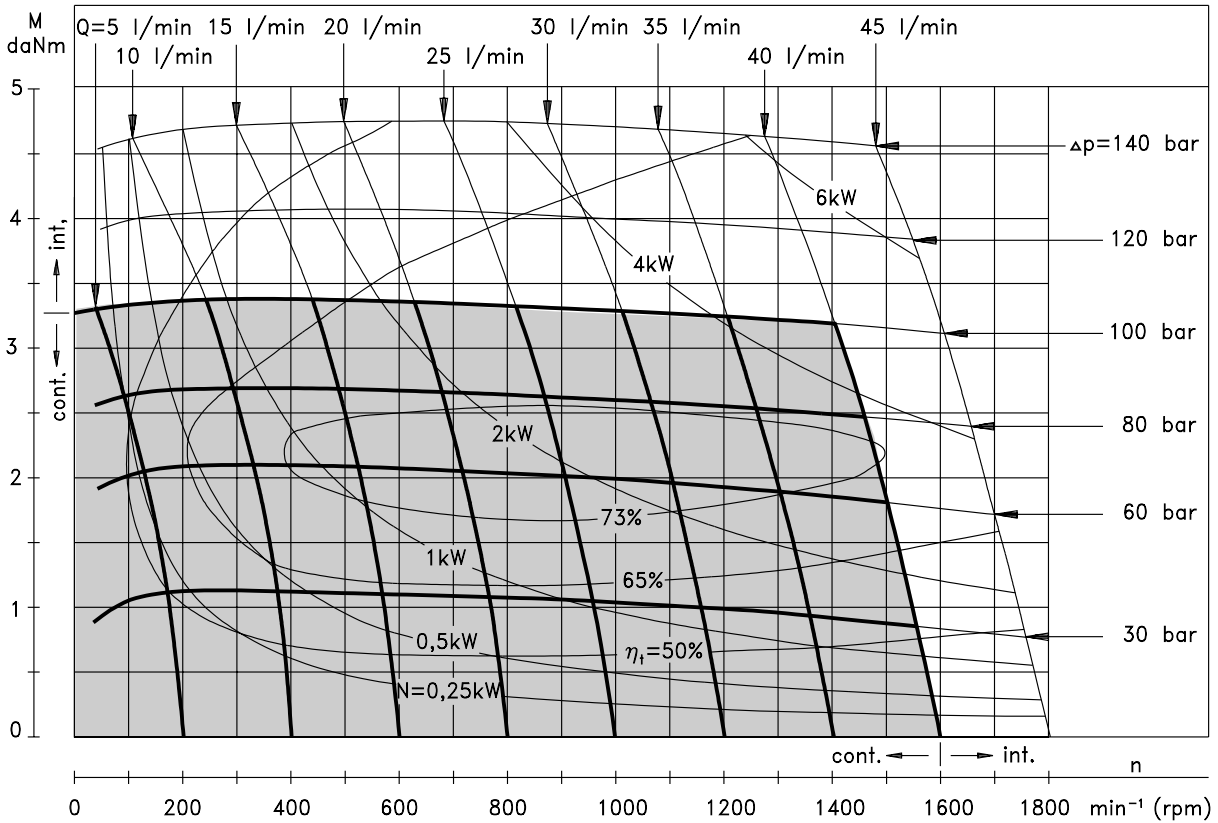
4. Recommended minimum oil viscosity 13 mm²/s at operating temperatures.

5. Recommended maximum system operating temperature is 82°C.

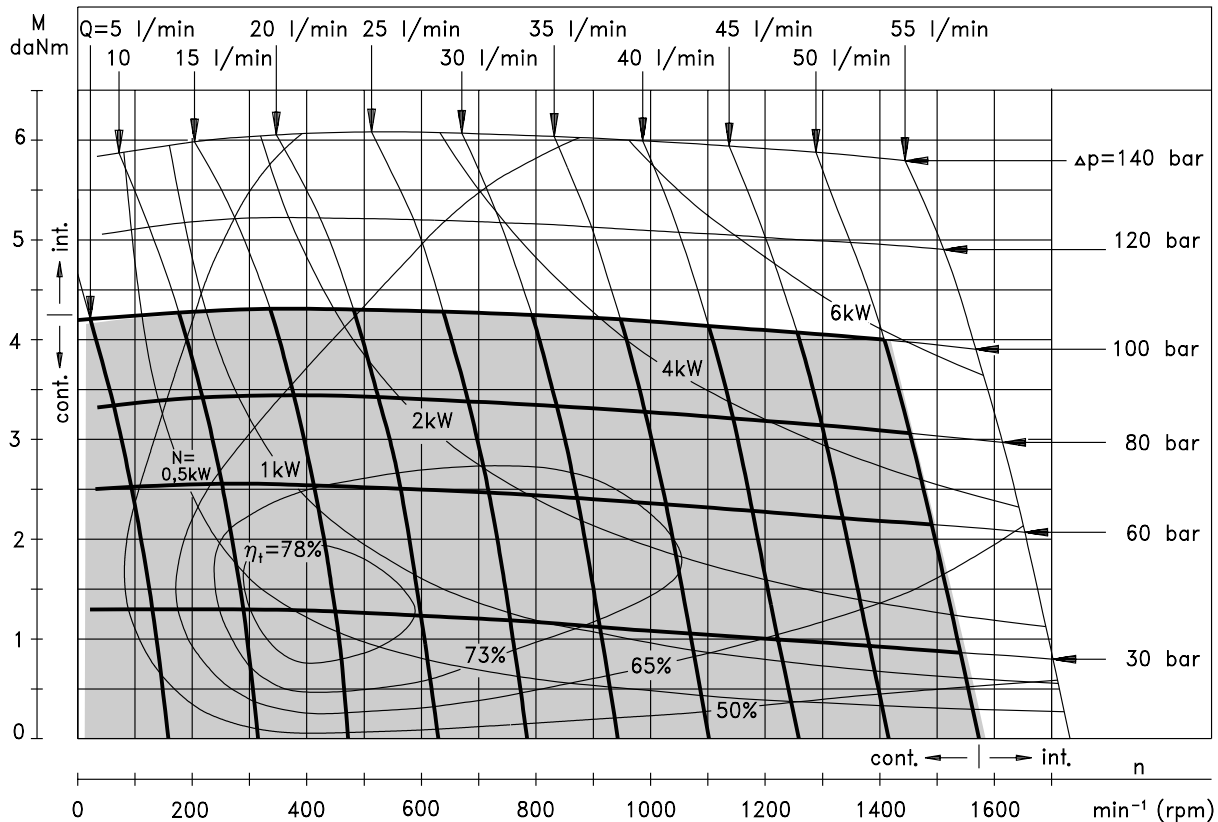
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

FUNCTION DIAGRAMS

MP 25



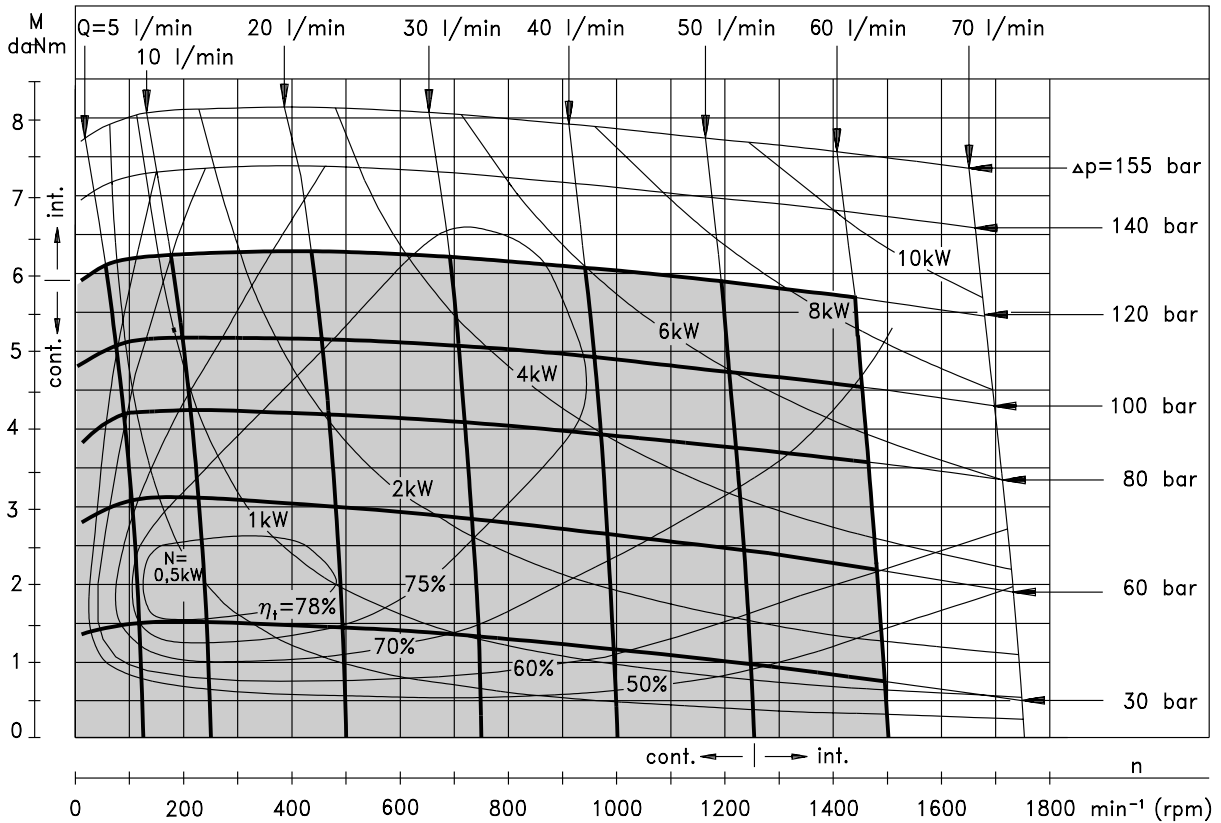
MP 32



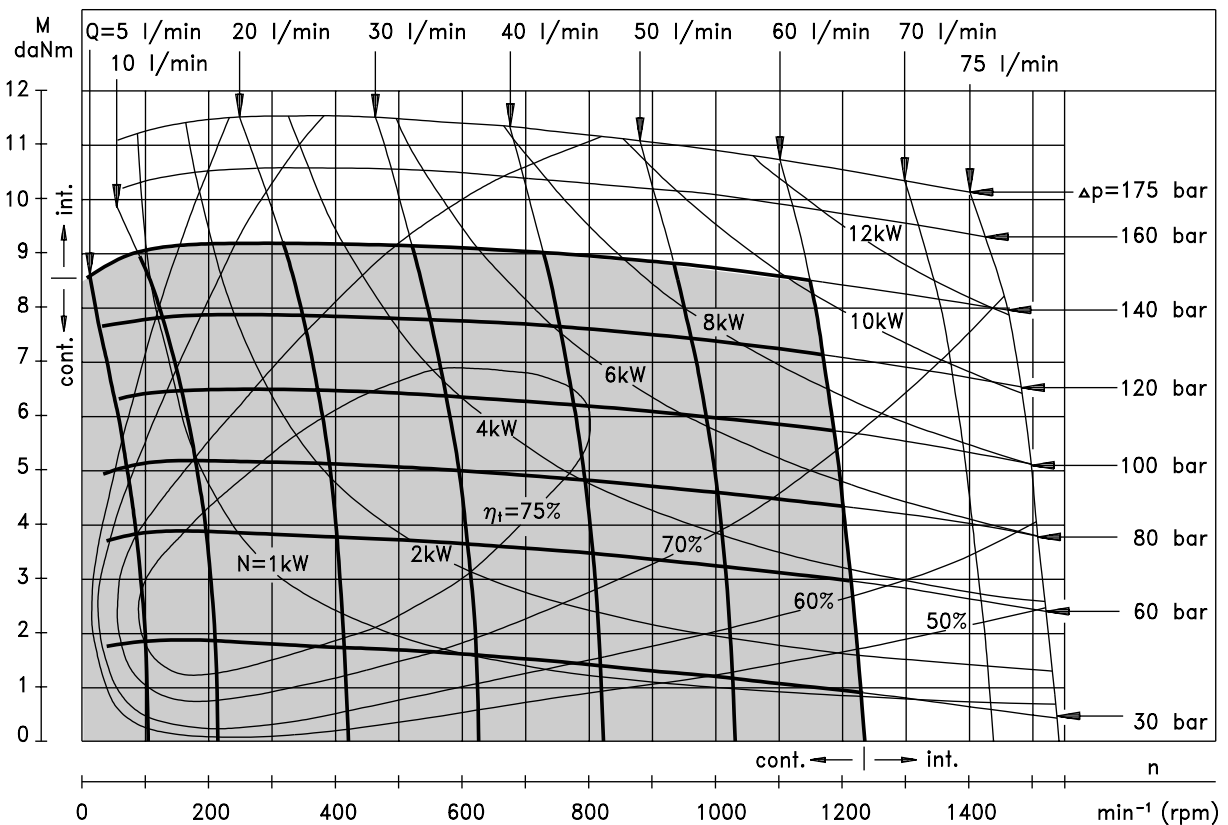
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MP 40



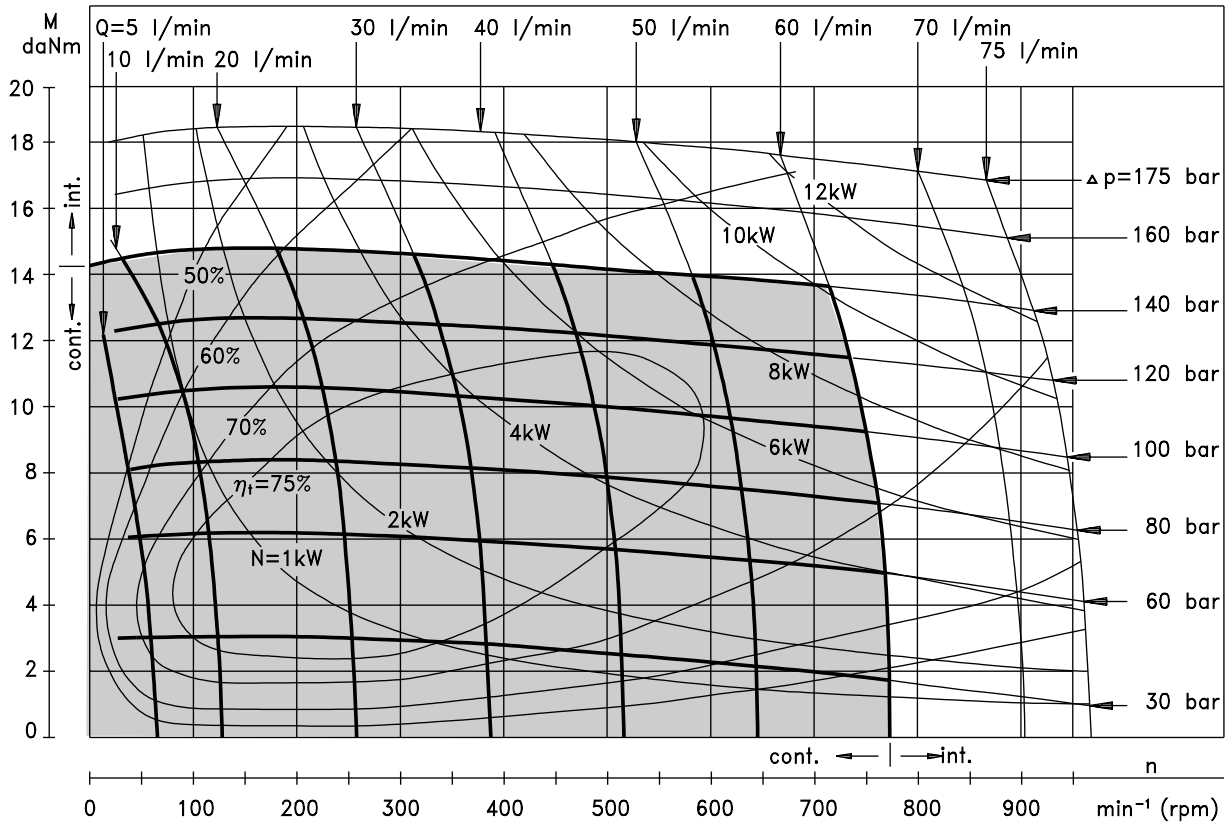
MP 50



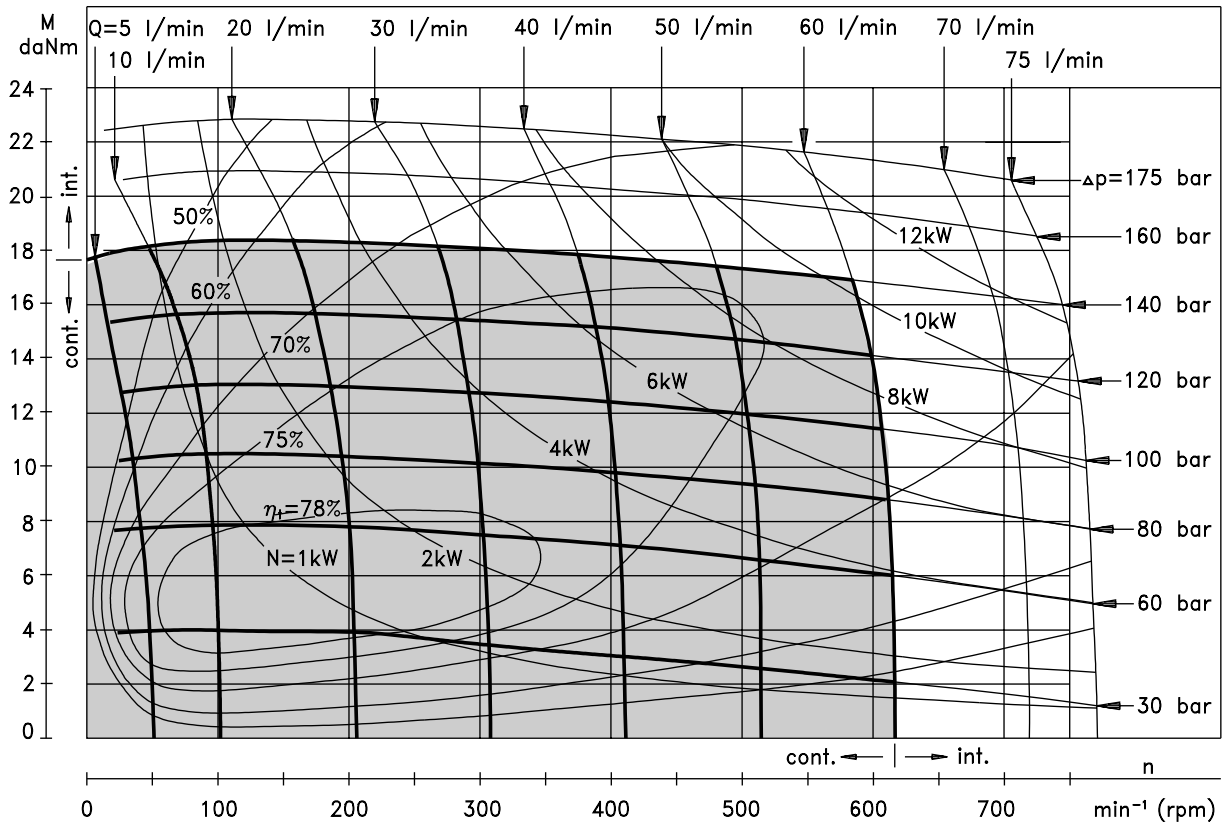
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MP 80



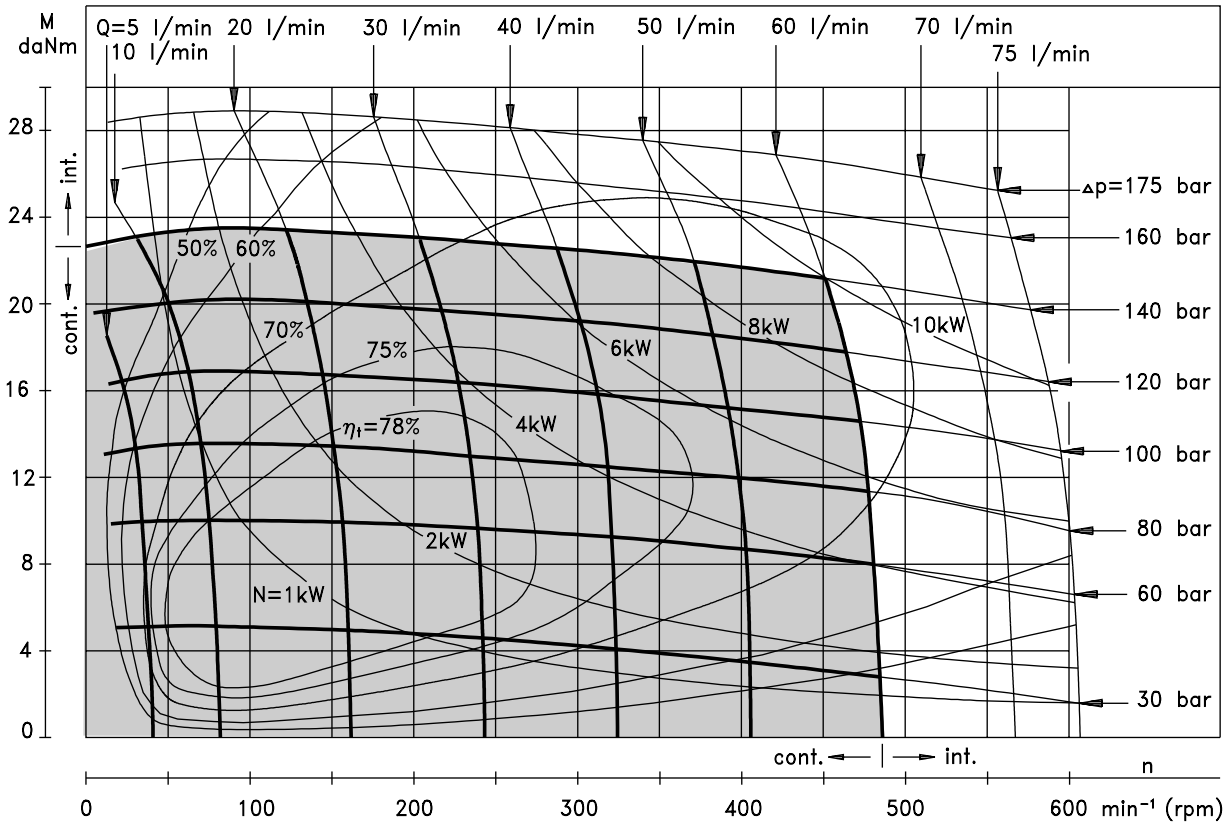
MP 100



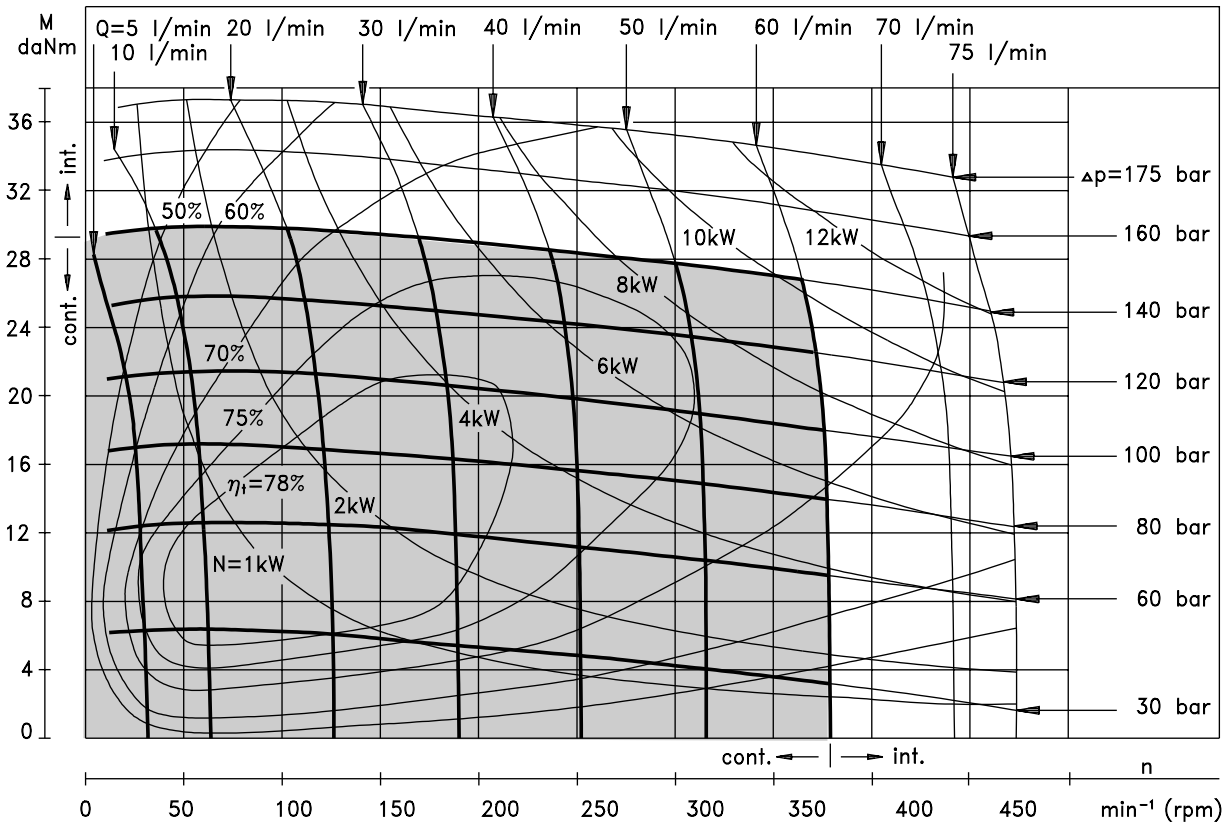
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MP 125



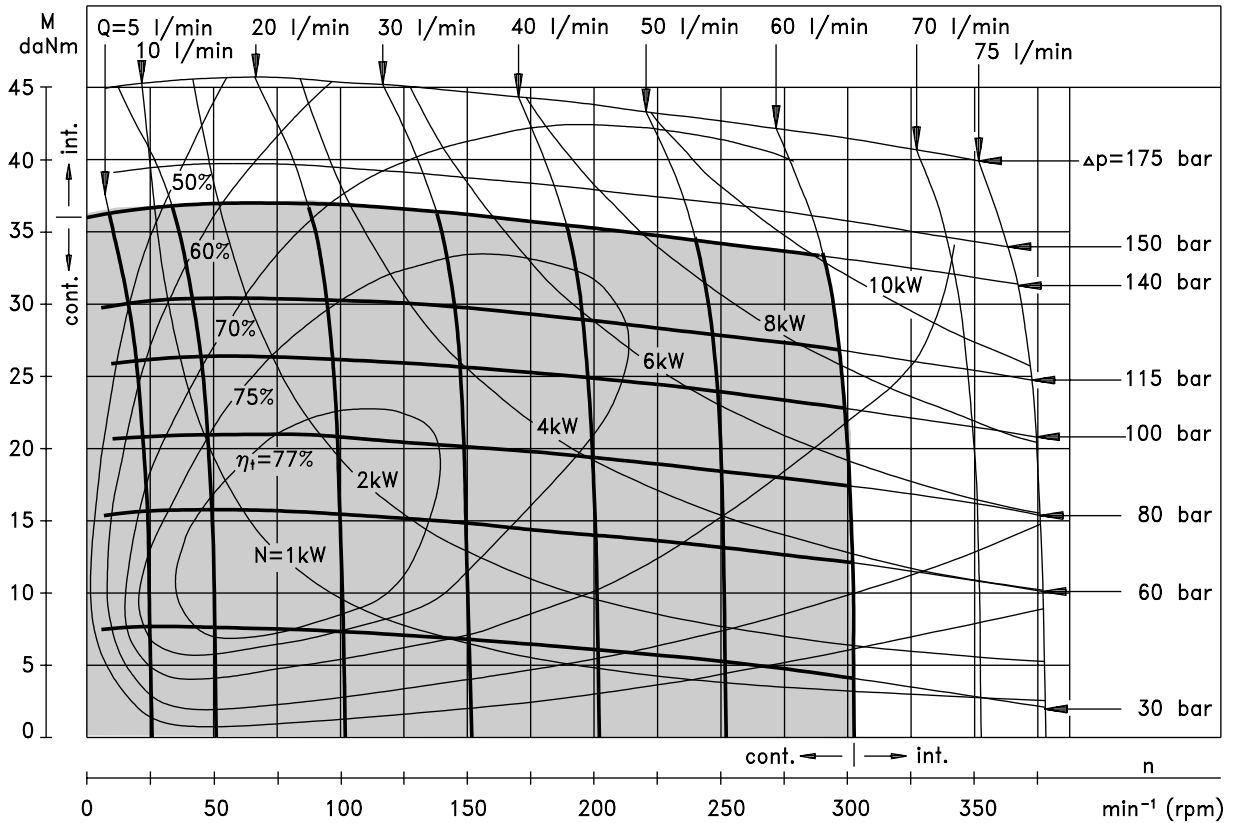
MP 160



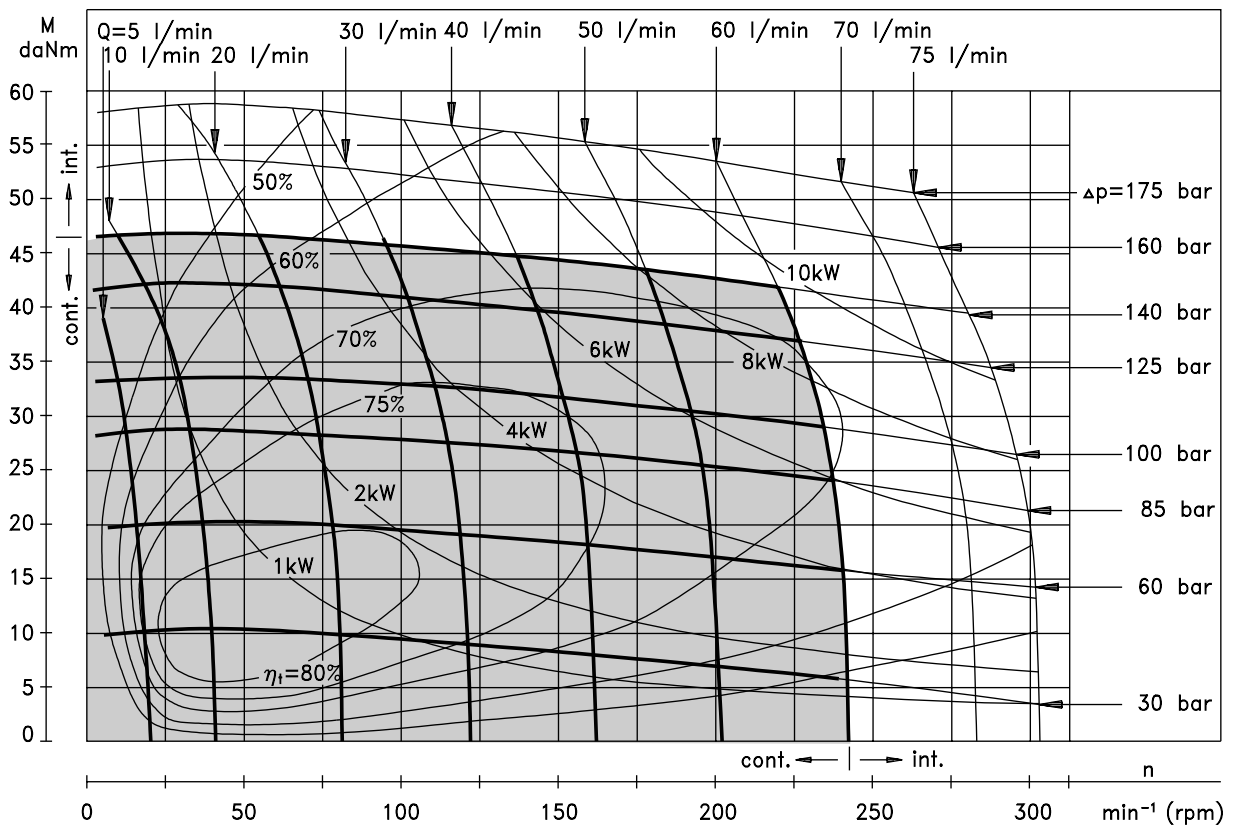
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MP 200



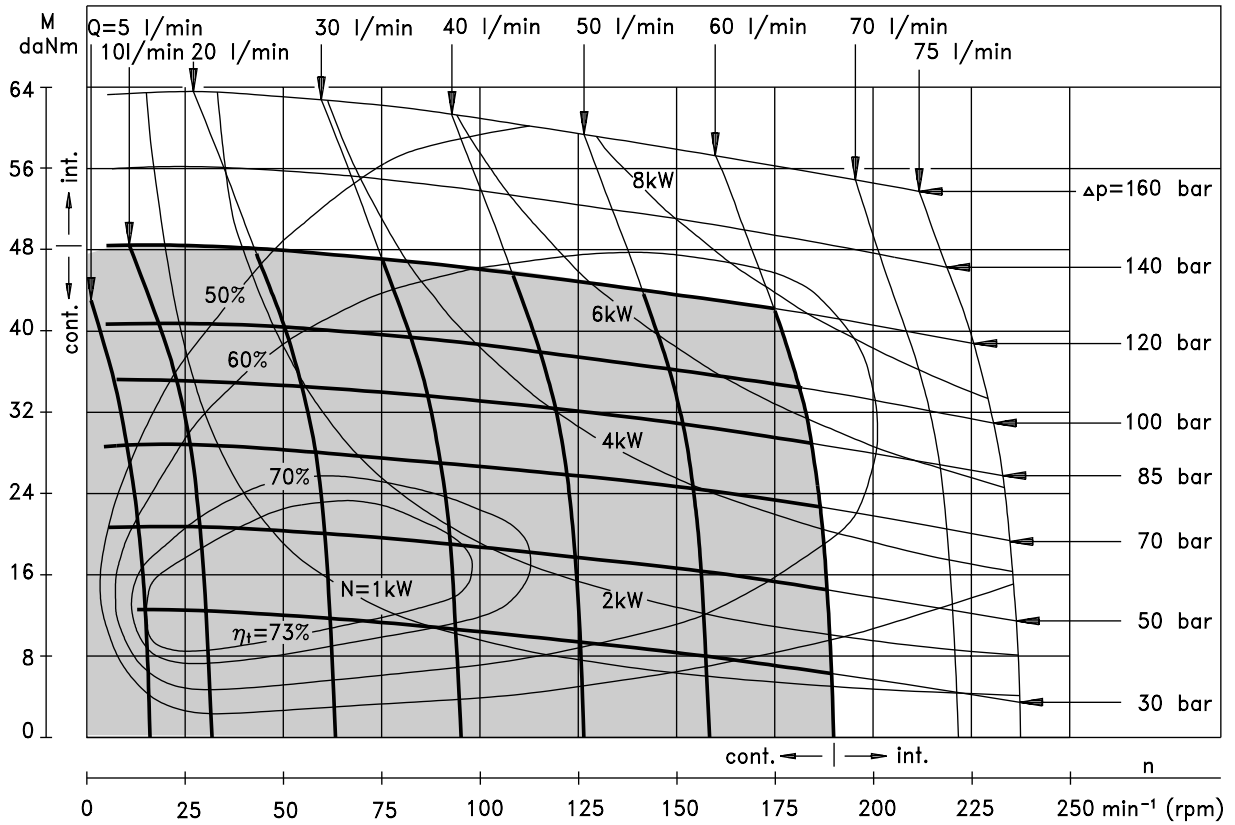
MP 250



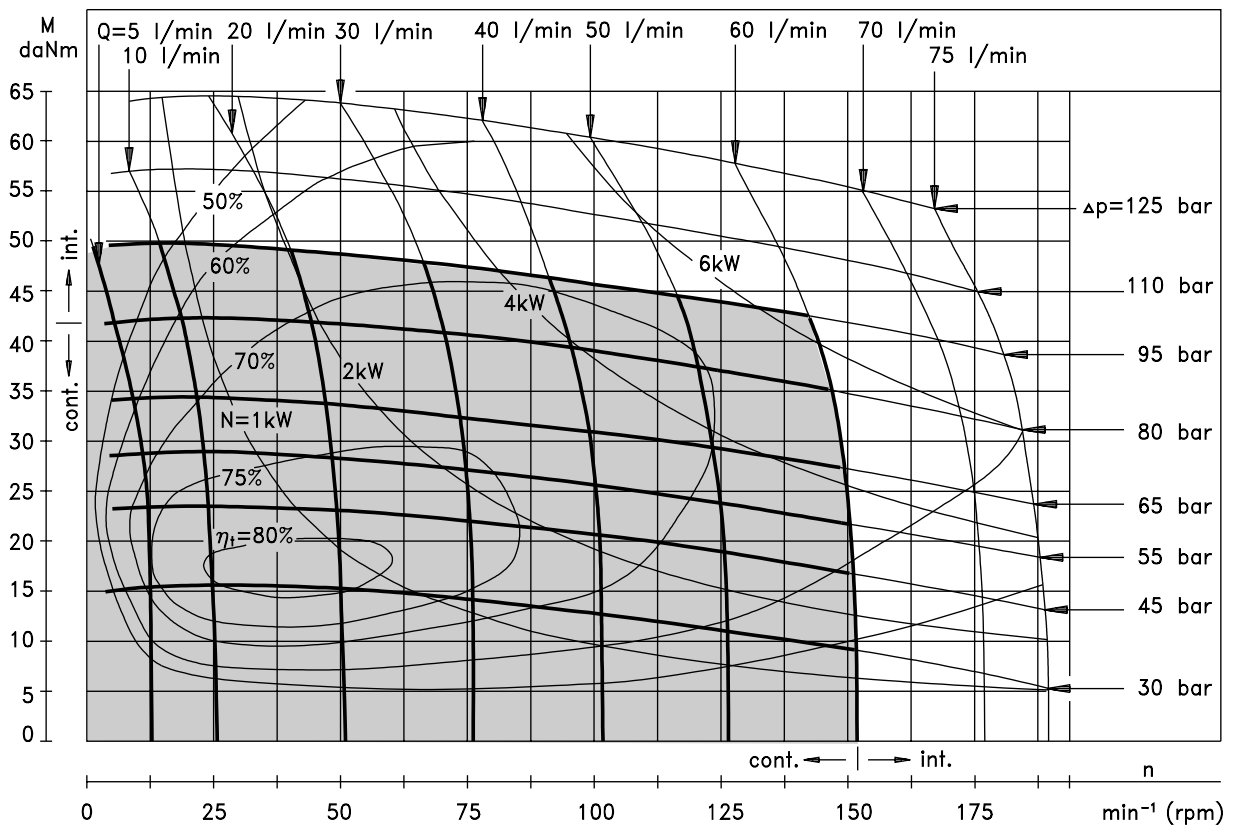
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAM

MP 315



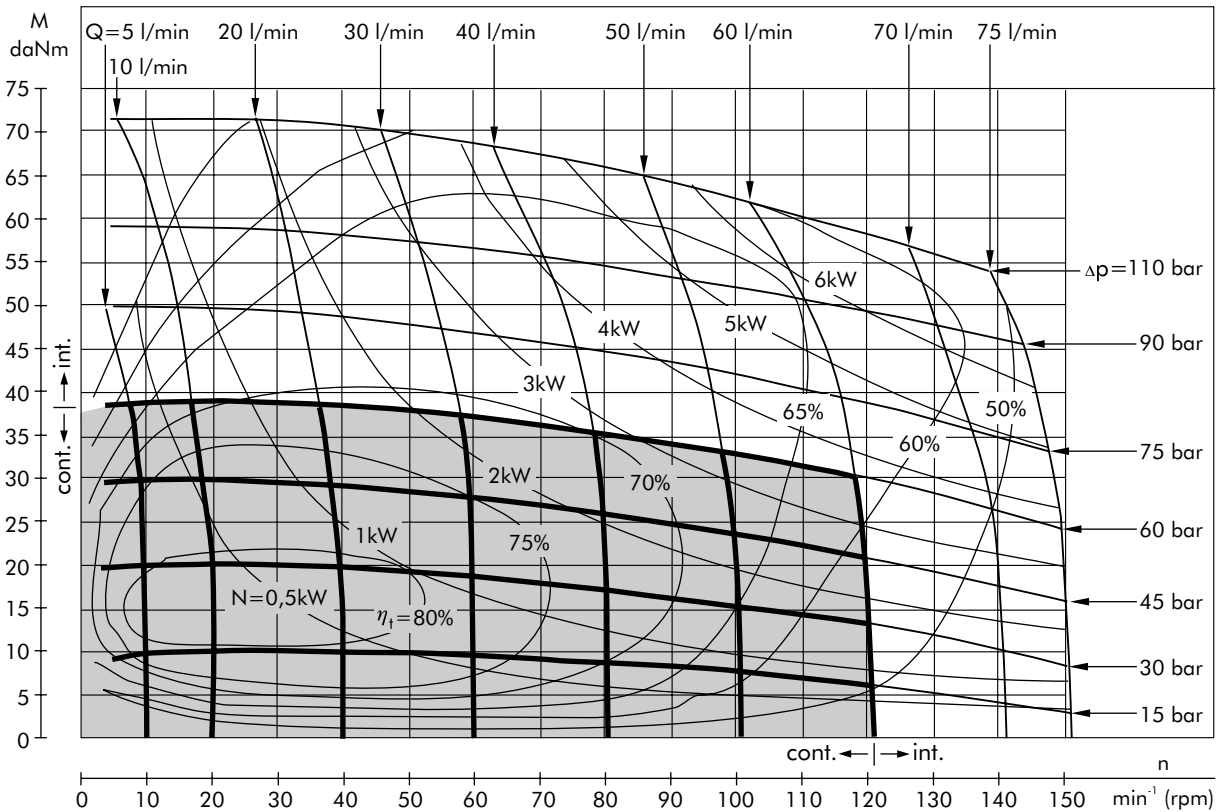
MP 400



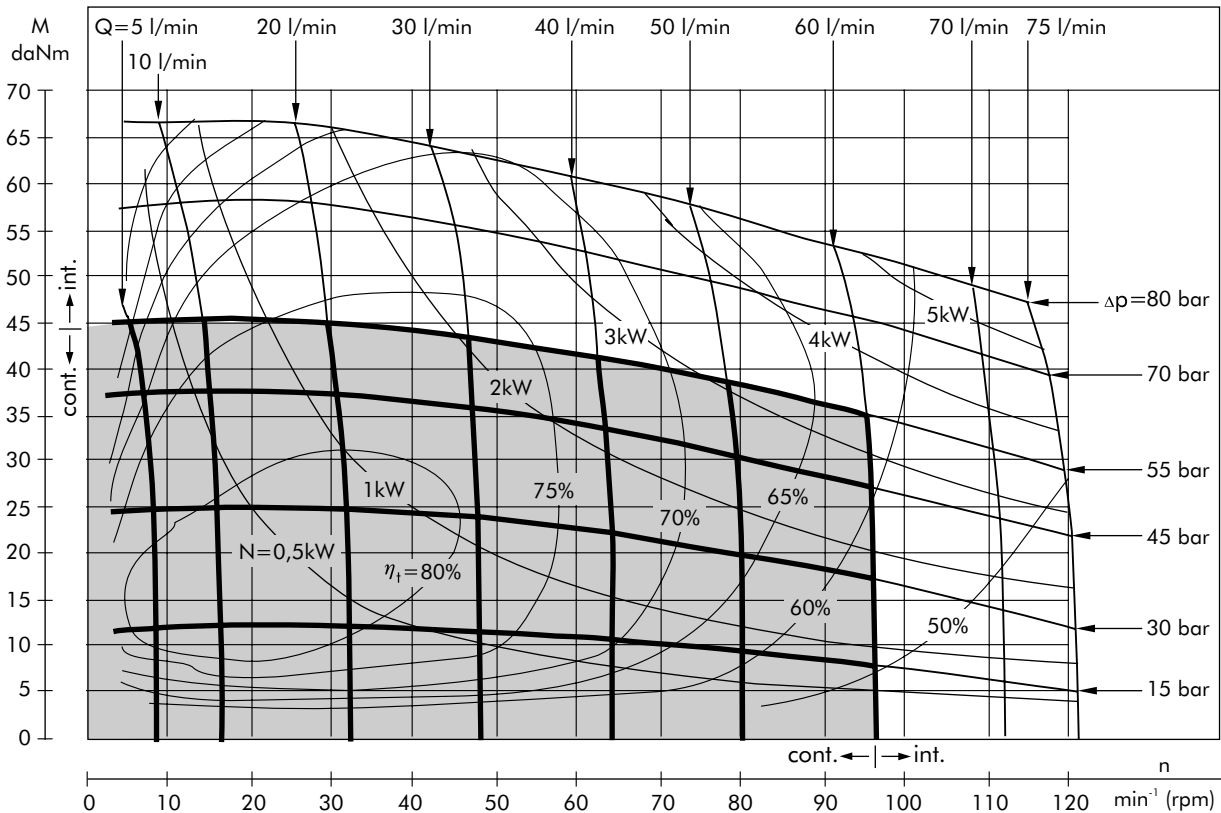
The function diagram data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAM

MP 500

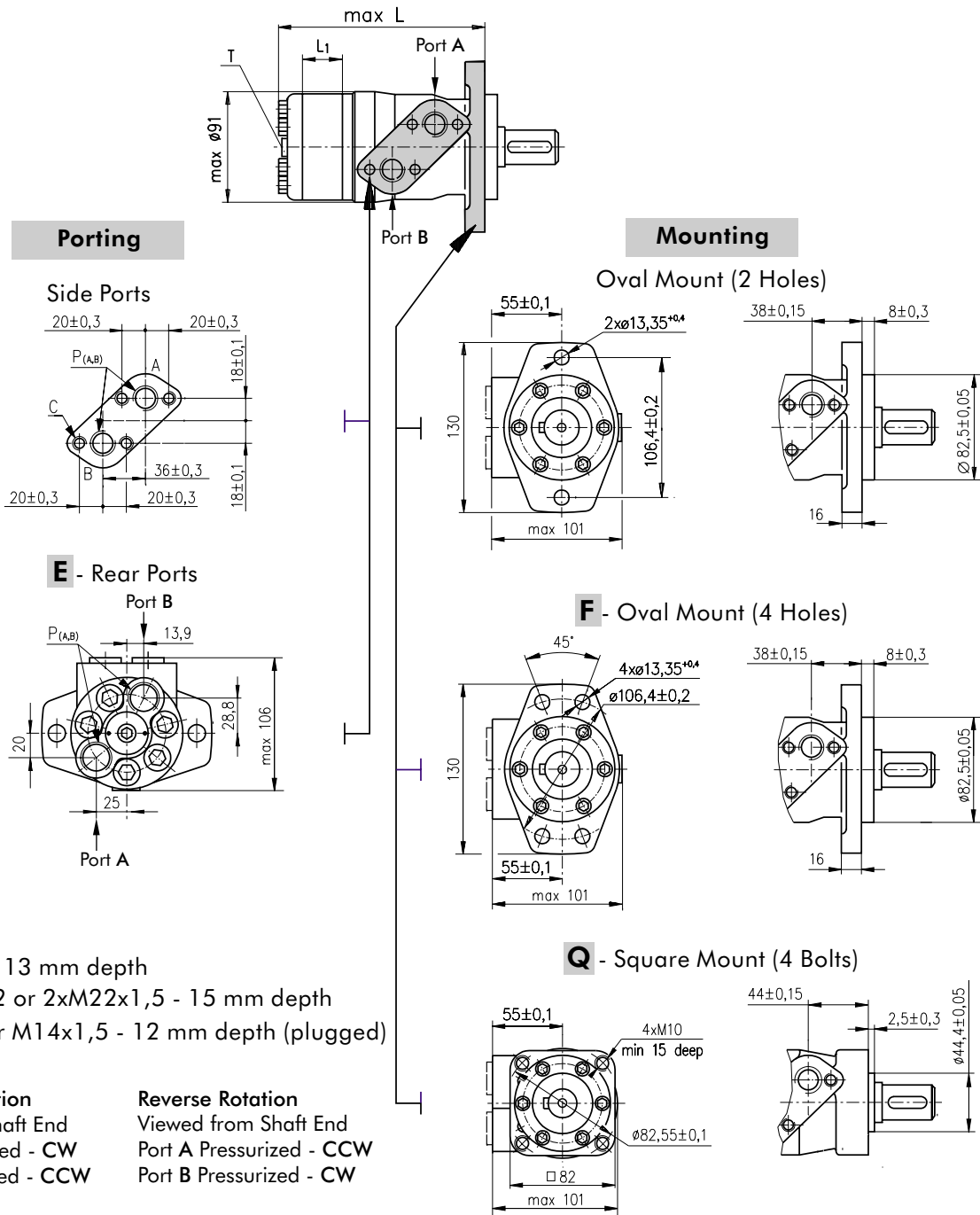


MP 630



The function diagram data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

DIMENSIONS AND MOUNTING DATA



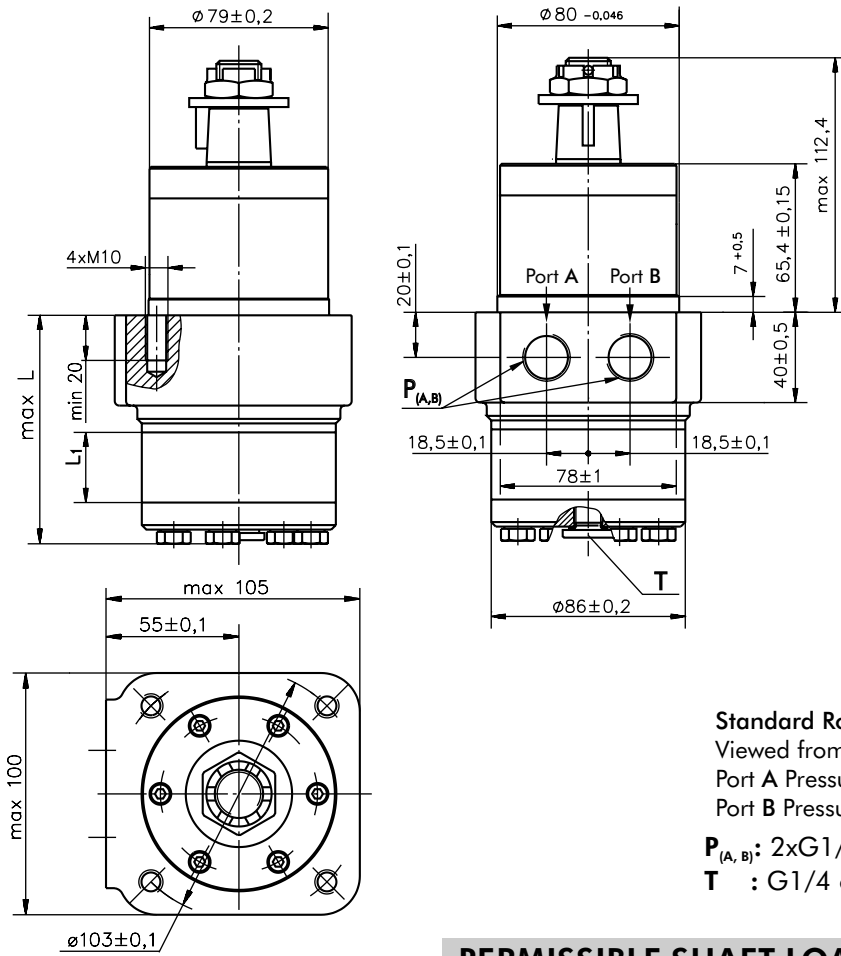
C : 4xM8 - 13 mm depth
P_(A,B): 2xG1/2 or 2xM22x1,5 - 15 mm depth
T : G1/4 or M14x1,5 - 12 mm depth (plugged)

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

| Type | L, mm | Type | L, mm | Type | L, mm | Type | L, mm | L ₁ , mm |
|-----------|-------|---------|-------|------------|-------|----------|-------|---------------------|
| MP(F) 25 | 133,2 | MPQ 25 | 139,4 | MP(F)E 25 | 151,2 | MPQE 25 | 157,4 | 5,20 |
| MP(F) 32 | 134,5 | MPQ 32 | 140,7 | MP(F)E 32 | 152,5 | MPQE 32 | 158,7 | 6,30 |
| MP(F) 40 | 135,2 | MPQ 40 | 141,4 | MP(F)E 40 | 153,2 | MPQE 40 | 159,4 | 7,40 |
| MP(F) 50 | 135,6 | MPQ 50 | 141,8 | MP(F)E 50 | 155,8 | MPQE 50 | 162,0 | 6,67 |
| MP(F) 80 | 139,6 | MPQ 80 | 145,8 | MP(F)E 80 | 159,8 | MPQE 80 | 166,0 | 10,67 |
| MP(F) 100 | 142,2 | MPQ 100 | 148,4 | MP(F)E 100 | 162,4 | MPQE 100 | 168,6 | 13,33 |
| MP(F) 125 | 145,6 | MPQ 125 | 151,8 | MP(F)E 125 | 165,8 | MPQE 125 | 172,0 | 16,67 |
| MP(F) 160 | 150,2 | MPQ 160 | 156,4 | MP(F)E 160 | 170,4 | MPQE 160 | 176,6 | 21,33 |
| MP(F) 200 | 155,6 | MPQ 200 | 161,8 | MP(F)E 200 | 175,8 | MPQE 200 | 182,0 | 26,67 |
| MP(F) 250 | 162,2 | MPQ 250 | 168,4 | MP(F)E 250 | 182,4 | MPQE 250 | 188,6 | 33,33 |
| MP(F) 315 | 171,6 | MPQ 315 | 177,8 | MP(F)E 315 | 191,8 | MPQE 315 | 198,0 | 42,67 |
| MP(F) 400 | 182,2 | MPQ 400 | 188,4 | MP(F)E 400 | 202,4 | MPQE 400 | 208,6 | 53,33 |
| MP(F) 500 | 193,0 | MPQ 500 | 199,0 | MP(F)E 500 | 213,0 | MPQE 500 | 219,0 | 66,63 |
| MP(F) 630 | 210,5 | MPQ 630 | 216,5 | MP(F)E 630 | 230,5 | MPQE 630 | 236,5 | 84,00 |

DIMENSIONS AND MOUNTING DATA - MPW

W - Wheel Mount



| Type | L, mm | L ₁ , mm |
|------------|-------|---------------------|
| MPW(N) 25 | 77,0 | 5,2 |
| MPW(N) 32 | 78,0 | 6,3 |
| MPW(N) 40 | 79,5 | 7,4 |
| MPW(N) 50 | 78,5 | 6,67 |
| MPW(N) 80 | 82,5 | 10,67 |
| MPW(N) 100 | 85,0 | 13,33 |
| MPW(N) 125 | 88,5 | 16,67 |
| MPW(N) 160 | 93,0 | 21,33 |
| MPW(N) 200 | 98,5 | 26,67 |
| MPW(N) 250 | 105,0 | 33,33 |
| MPW(N) 315 | 114,5 | 42,67 |
| MPW(N) 400 | 125,0 | 53,33 |
| MPW(N) 500 | 138,5 | 66,63 |
| MPW(N) 630 | 156,0 | 84,0 |

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_(A,B): 2xG1/2 or 2xM22x1,5 - 15 mm depth

T : G1/4 or M14x1,5 - 12 mm depth (plugged)

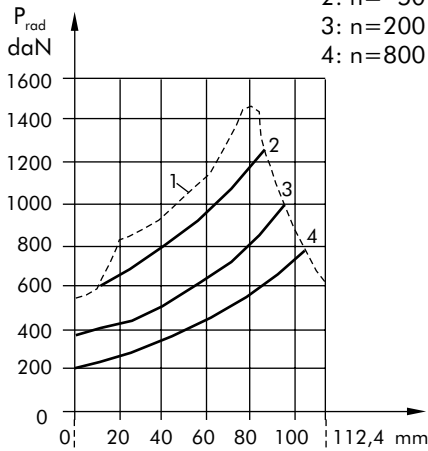
PERMISSIBLE SHAFT LOADS

MPWN

MPW

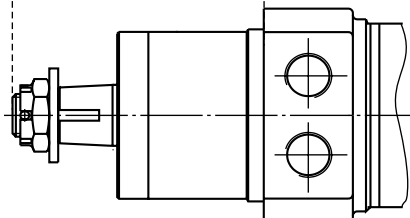
The curves apply to a B10 bearing life of 2000 hours.

- 1: Max. radial shaft load
- 2: n= 50 min⁻¹
- 3: n=200 min⁻¹
- 4: n=800 min⁻¹

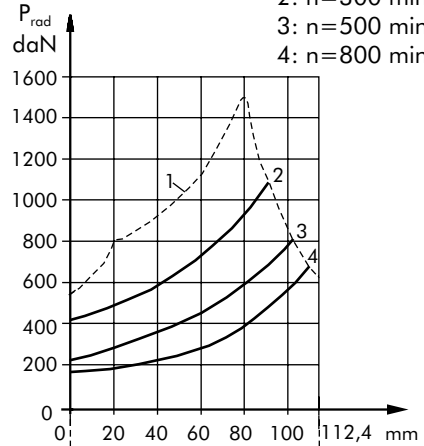


P_{a max} = 150 daN

P_{a max} = 200 daN

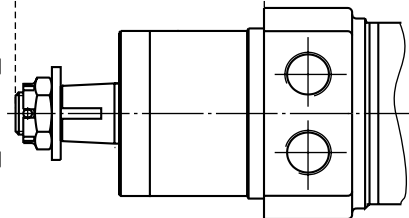


- 1: Max. radial shaft load
- 2: n=300 min⁻¹
- 3: n=500 min⁻¹
- 4: n=800 min⁻¹



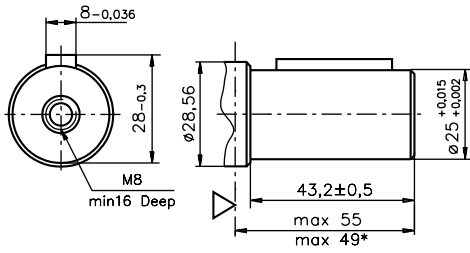
P_{a max} = 150 daN

P_{a max} = 200 daN

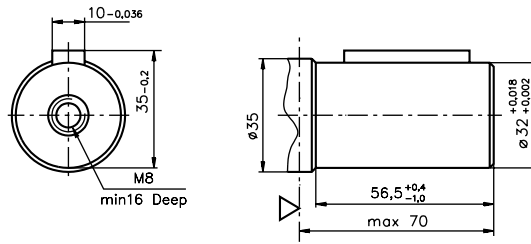


SHAFT EXTENSIONS FOR MP AND MR MOTORS

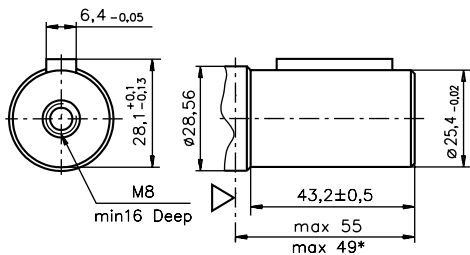
C - $\varnothing 25$ straight, Parallel key A8x7x32 DIN 6885
Max. Torque 34 daNm



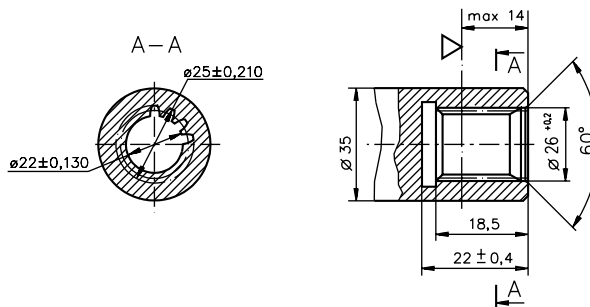
CB - $\varnothing 32$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm



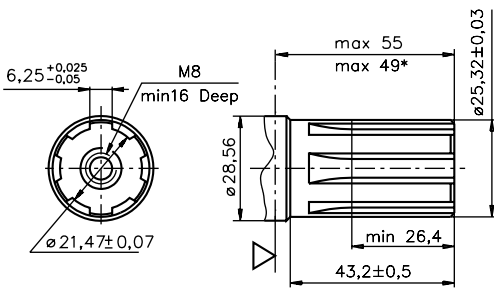
CO - $\varnothing 1"$ straight, Parallel key $\frac{1}{4} \times \frac{1}{4} \times 1 \frac{1}{4}$ BS46
Max. Torque 34 daNm



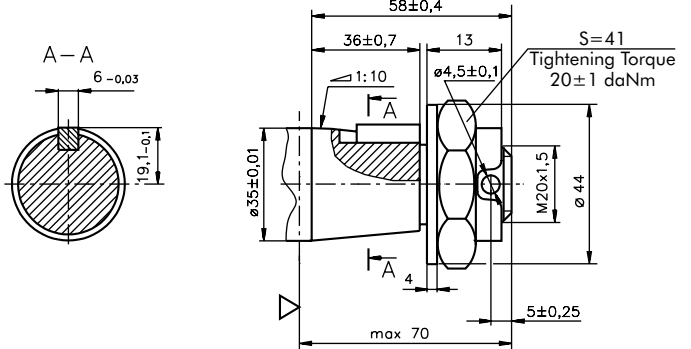
SB - splined A25x22xH10 DIN 5482
Max. Torque 34 daNm



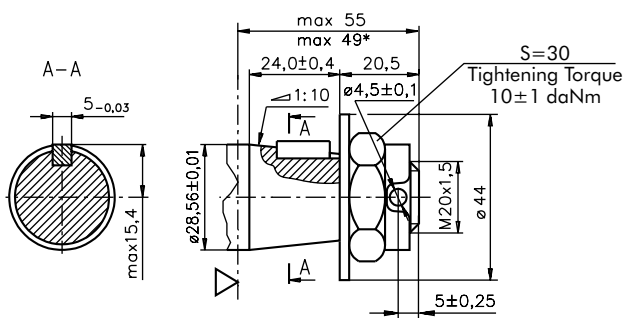
SH - splined, BS 2059 (SAE 6B)
Max. Torque 40 daNm



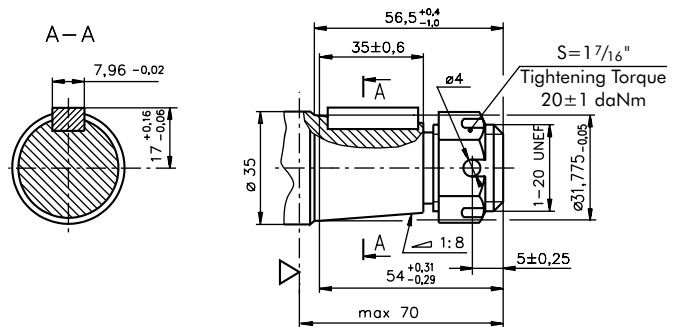
KB - tapered 1:10, Parallel key B6x6x20 DIN 6885
Max. Torque 77 daNm



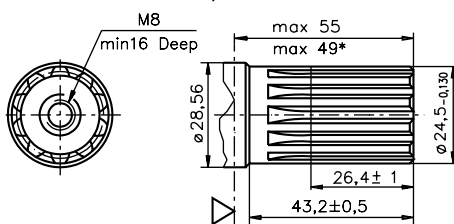
K - tapered 1:10, Parallel key B5x5x14 DIN 6885
Max. Torque 40 daNm



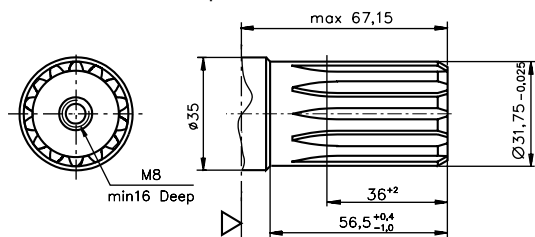
OB - tapered 1:8 SAEJ 501, Parallel key $\frac{5}{16} \times \frac{5}{16} \times 1 \frac{1}{4}$ BS46
Max. Torque 77 daNm



SA - splined, B25x22h9 DIN 5482
Max. Torque 40 daNm



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

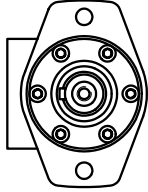
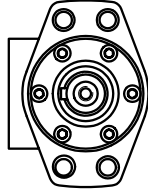
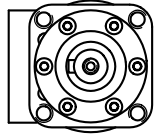


▽ - Motor Mounting Surface

* - For Q-flange

PERMISSIBLE SHAFT LOADS FOR MP AND MR 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.

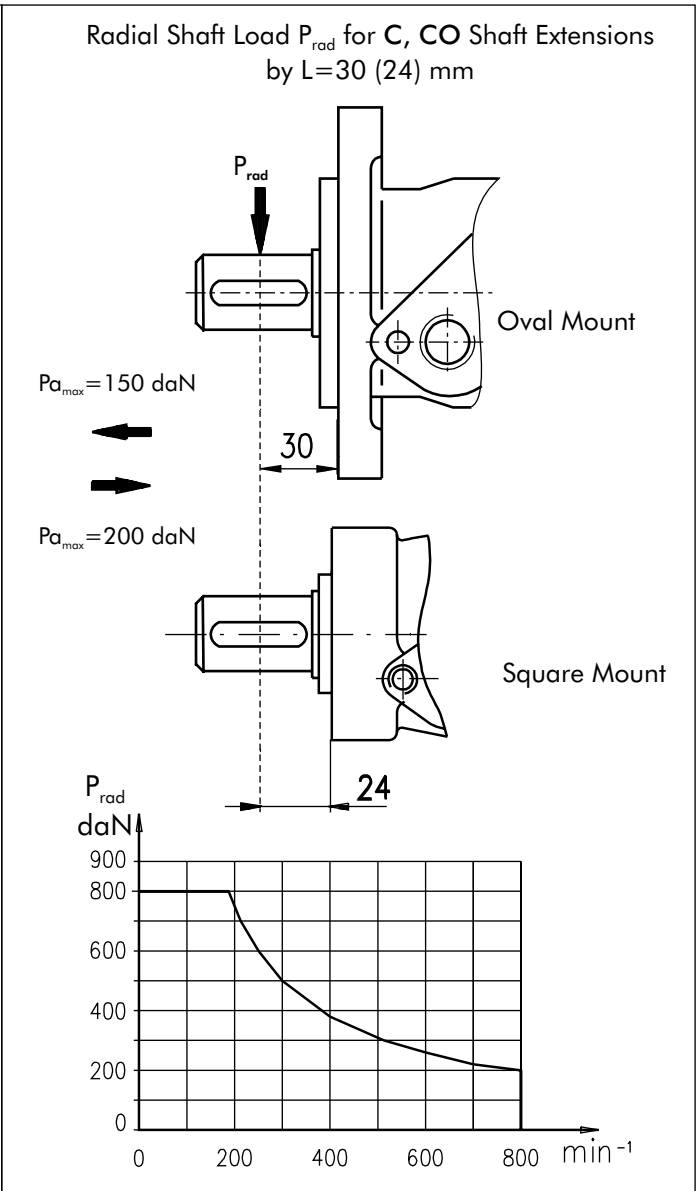
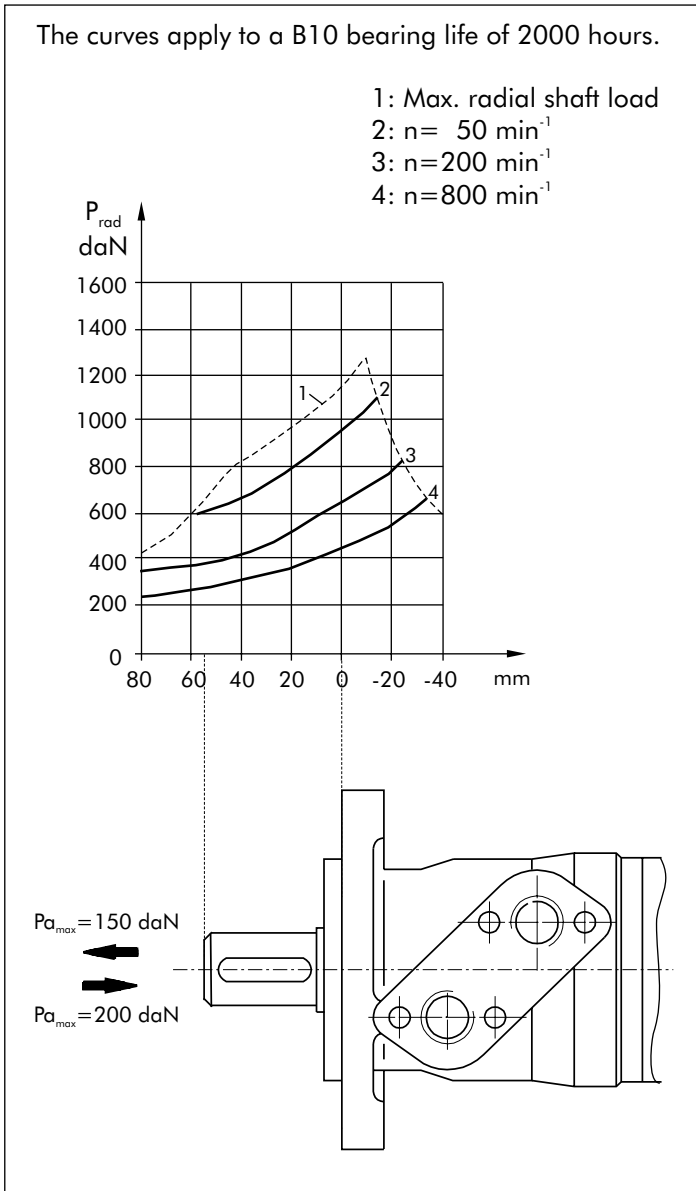
| | | | |
|-------------------------------|---|--|---|
| Mounting Flange |  |  |  |
| Shaft Version | cylindrical - C, CO tapered - K, splined - SH | splined - HB cylindrical - CB | cylindrical - C, CO |
| Radial Shaft Load P_{rad}^* | $\frac{800}{n} \times \frac{25000}{95+L}$, daN | $\frac{800}{n} \times \frac{18750}{95+L}$, daN | $\frac{800}{n} \times \frac{25000}{101+L}$, daN |

$n < 200 \text{ min}^{-1}$; max $P_{rad} = 800 \text{ daN}$

* $n \geq 200 \text{ min}^{-1}$; $L < 55 \text{ mm}$

MPN and MRN

MP and MR

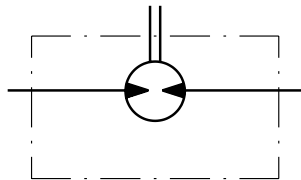


MAX. PERMISSIBLE SHAFT SEAL PRESSURE FOR MP AND MR MOTORS

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

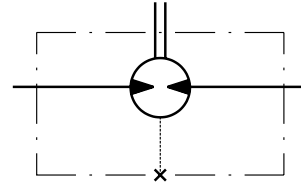
The shaft seal pressure equals the average of input pressure and return pressure.

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



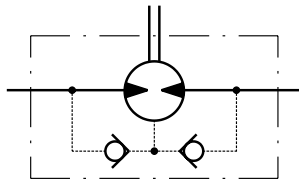
MP/MR...U motors with high pressure seal and drain connection:

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



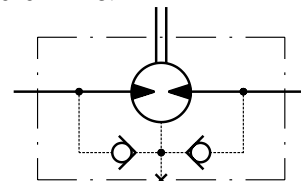
MP/MR...1 motors with low pressure seal or standard shaft seal and without drain connection:

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

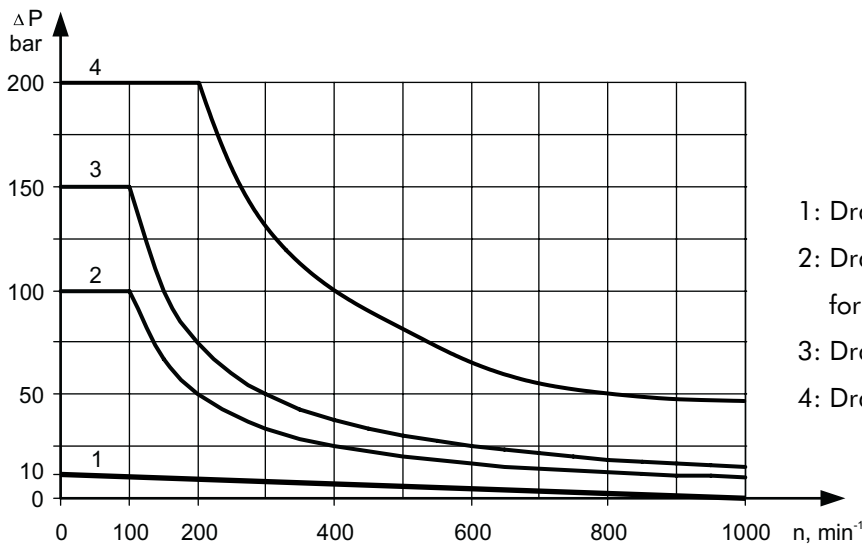


MP/MR... motors with low pressure seal or standard shaft seal and with drain connection:

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



Max. return pressure without drain line or max. 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)

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]

32* - 32,0 [cm³/rev]

40* - 40,0 [cm³/rev]

50 - 49,5 [cm³/rev]

80 - 79,2 [cm³/rev]

100 - 99,0 [cm³/rev]

125 - 123,8 [cm³/rev]

160 - 158,4 [cm³/rev]

200 - 198,0 [cm³/rev]

250 - 247,5 [cm³/rev]

315 - 316,8 [cm³/rev]

400 - 396,0 [cm³/rev]

500 - 495,0 [cm³/rev]

630 - 623,6 [cm³/rev]

Pos.5 - Shaft Extensions** (see page 24)

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" tapered 1:8, Parallel key ⅝"x⅝"x1¼" BS46

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

Pos. 6 - Shaft Seal Version (see page 26)

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 46)

Pos.10 - Design Series

omit - Factory specified

* Not with Low Pressure Seal

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

NOTES: The following combinations are not allowed:

- **Q** flange with "...B" shafts;
- **W** flange with "...B" shafts, **U** option or **E** rear ports;
- **N** option with "...B" shafts, Low Pressure Seal or **U** option;
- "...B" shafts with **D** and **U** shaft seals.

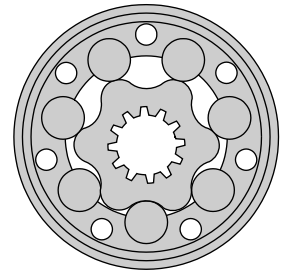
The hydraulic motors are manganophosphatized as standard.

HYDRAULIC MOTORS MR



APPLICATION

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



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Specification data29 ÷ 30
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 Dimensions and mounting 36
 Shaft extensions 24
 Permissible shaft loads 25
 Permissible shaft Seal Pressure ... 26
 Order code 37

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

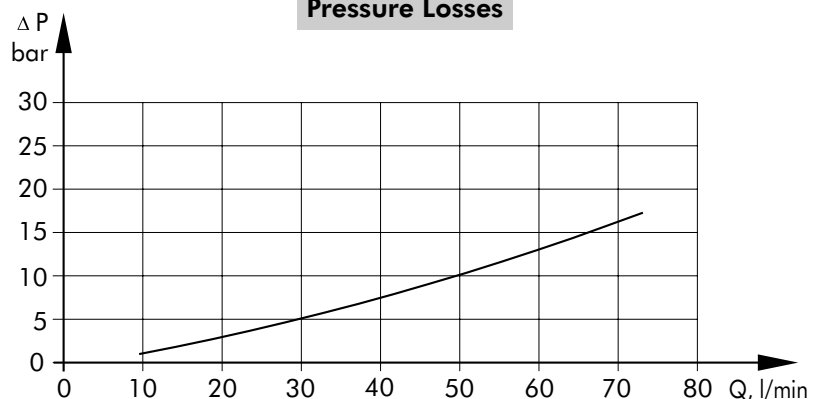
GENERAL

| | |
|---|---|
| Displacement, [cm ³ /rev.] | 51,5 ÷ 397 |
| Max. Speed, [RPM] | 150 ÷ 775 |
| Max. Torque, [daNm] | 10,1 ÷ 61 |
| Max. Output, [kW] | 5 ÷ 13 |
| Max. Pressure Drop, [bar] | 70 ÷ 175 |
| Max. Oil Flow, [l/min] | 40 ÷ 60 |
| Min. Speed, [RPM] | 10 |
| Pressure fluid | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4) |
| Temperature range, [°C] | -30 ÷ 90 |
| Optimal Viscosity range, [mm ² /s] | 20 ÷ 75 |
| Filtration | ISO code 20/16 (Min. recommended fluid filtration of 25 micron) |

Oil flow in drain line

| Pressure drop (bar) | Viscosity (mm ² /s) | Oil flow in drain line (l/min) |
|---------------------|--------------------------------|--------------------------------|
| 100 | 20 | 2,5 |
| | 35 | 1,8 |
| 140 | 20 | 3,5 |
| | 35 | 2,8 |

Pressure Losses



SPECIFICATION DATA

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

| Type | MR | | | | | | | | | |
|---|---------------------------|------|------|-------|-------|-------|-------|-------|------|------|
| | 50 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | |
| Displacement, [cm ³ /rev.] | 51,5 | 80,3 | 99,8 | 125,7 | 159,6 | 199,8 | 250,1 | 315,7 | 397 | |
| 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] | cont. | 10 | 20 | 24 | 30 | 39 | 38,5 | 39 | 36 | 38 |
| | int.* | 13 | 22 | 28 | 34 | 43 | 46 | 47 | 47 | 47 |
| | peak** | 17 | 27 | 32 | 37 | 46 | 56 | 60 | 61 | 61 |
| Max. Output, [kW] | cont. | 7 | 12,5 | 13 | 12,5 | 11,5 | 9 | 8 | 5 | 4,8 |
| | int.* | 8,5 | 15 | 15 | 14,5 | 14 | 12 | 9,5 | 8 | 6,8 |
| Max. Pressure Drop [bar] | cont. | 140 | 175 | 175 | 175 | 175 | 140 | 110 | 85 | 65 |
| | int.* | 175 | 200 | 200 | 200 | 200 | 175 | 140 | 115 | 90 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 200 | 150 | 115 |
| Max. Oil Flow [l/min] | cont. | 40 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | int.* | 50 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| Max. Inlet Pressure [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Return Pressure with Drain Line [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Starting Pressure with Unloaded Shaft, [bar] | | 10 | 10 | 10 | 9 | 7 | 5 | 4 | 3 | 3 |
| Min. Starting Torque [daNm] | at max. press. drop cont. | 8 | 15 | 20 | 25 | 32 | 33 | 31 | 31,5 | 31,5 |
| | at max. press. drop int.* | 10 | 17 | 23 | 28 | 37 | 40 | 48 | 50 | 50 |
| Min. Speed***, [RPM] | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Weight, avg. [kg] For rear ports: +0,650 kg | MR(F) | 6,8 | 6,9 | 7,2 | 7,3 | 7,5 | 8 | 8,4 | 9,1 | 9,8 |
| | MRQ(N) | 6,2 | 6,3 | 6,6 | 6,8 | 7,0 | 7,2 | 7,8 | 8,6 | 9,3 |

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

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

*** For speeds of 10 RPM or lower, 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. Recommended 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 at operating temperatures.
5. Recommended maximum system operating temperature - 82°C.
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 min.

SPECIFICATION DATA (continued)

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

| Type | MR | | | | | | | | | |
|---|---------------------------|------|------|-------|-------|-------|-------|-------|-----|------|
| | 50 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | |
| Displacement, [cm ³ /rev.] | 51,5 | 80,3 | 99,8 | 125,7 | 159,6 | 199,8 | 250,1 | 315,7 | 397 | |
| 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] | cont. | 10 | 20 | 24 | 30 | 39 | 45 | 54 | 55 | 61 |
| | int.* | 13 | 22 | 28 | 34 | 43 | 50 | 61 | 69 | 69 |
| | peak** | 17 | 27 | 32 | 37 | 46 | 56 | 71 | 84 | 87 |
| Max. Output, [kW] | cont. | 7 | 12,5 | 13 | 12,5 | 11,5 | 11 | 10 | 9 | 7,8 |
| | int.* | 8,5 | 15 | 15 | 14,5 | 14 | 13 | 12 | 10 | 10,6 |
| Max. Pressure Drop [bar] | cont. | 140 | 175 | 175 | 175 | 175 | 175 | 175 | 135 | 110 |
| Drop [bar] | int.* | 175 | 200 | 200 | 200 | 200 | 200 | 200 | 175 | 140 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 210 | 175 |
| Max. Oil Flow [l/min] | cont. | 40 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | int.* | 50 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| Max. Inlet Pressure [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Return Pressure with Drain Line [bar] | cont. | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| | int.* | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | peak** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| Max. Starting Pressure with Unloaded Shaft, [bar] | | 10 | 10 | 10 | 9 | 7 | 5 | 4 | 3 | 3 |
| Min. Starting Torque [daNm] | at max. press. drop cont. | 8 | 15 | 20 | 25 | 32 | 41 | 50 | 50 | 50 |
| | at max. press. drop int.* | 10 | 17 | 23 | 28 | 37 | 46 | 55 | 66 | 61 |
| Min. Speed***, [RPM] | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Weight, avg. [kg] For rear ports: +0,650 kg | MR(F) | 6,9 | 7 | 7,3 | 7,4 | 7,6 | 8,1 | 8,5 | 9,2 | 9,9 |

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

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

*** For speeds of 10 RPM or lower, 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. Recommended 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.

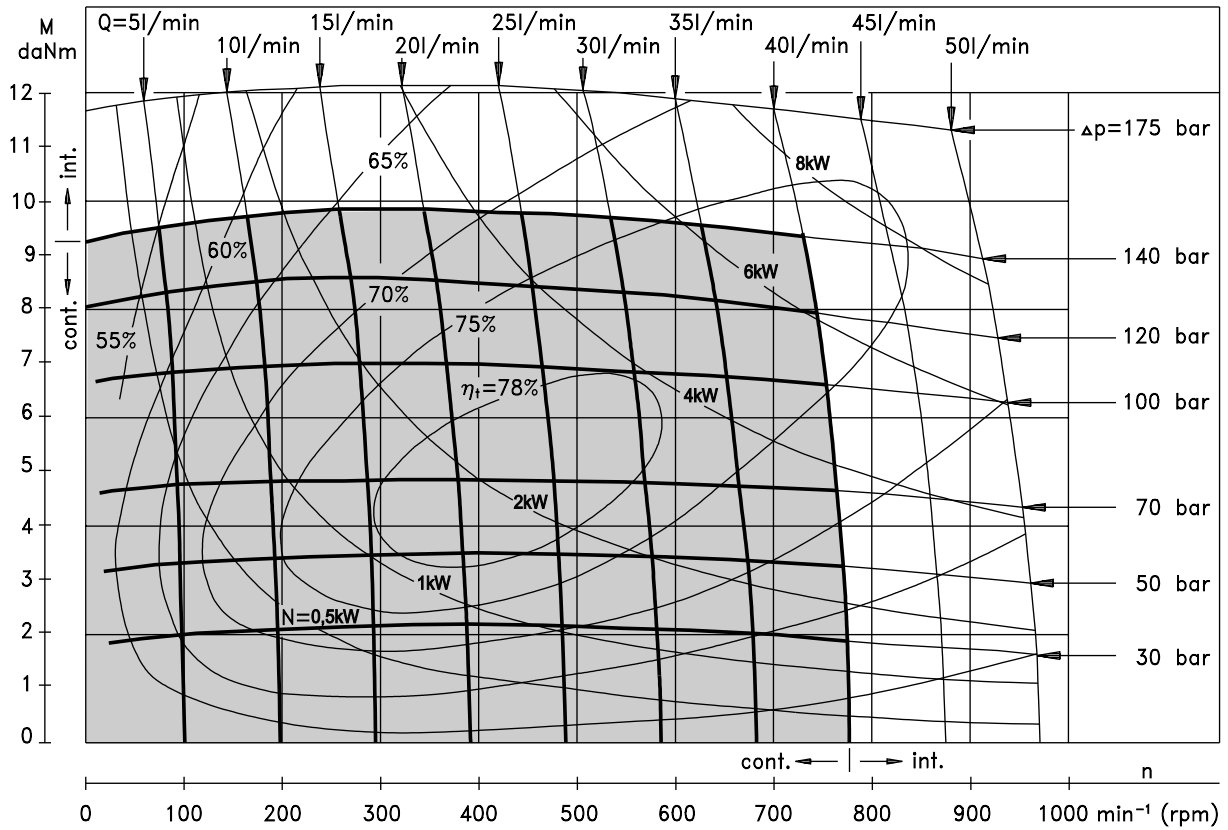
4. Recommended minimum oil viscosity 13 mm²/s at operating temperatures.

5. Recommended maximum system operating temperature - 82°C.

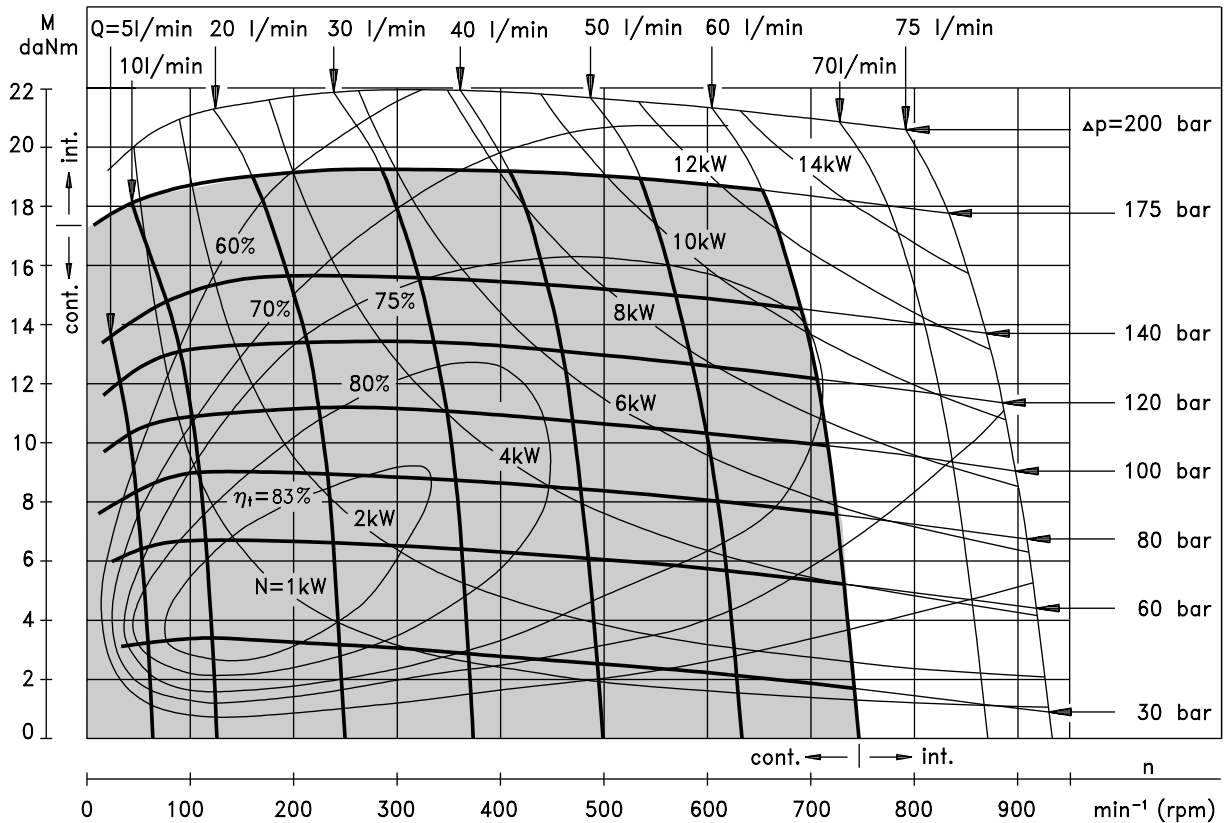
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 min.

FUNCTION DIAGRAMS

MR 50



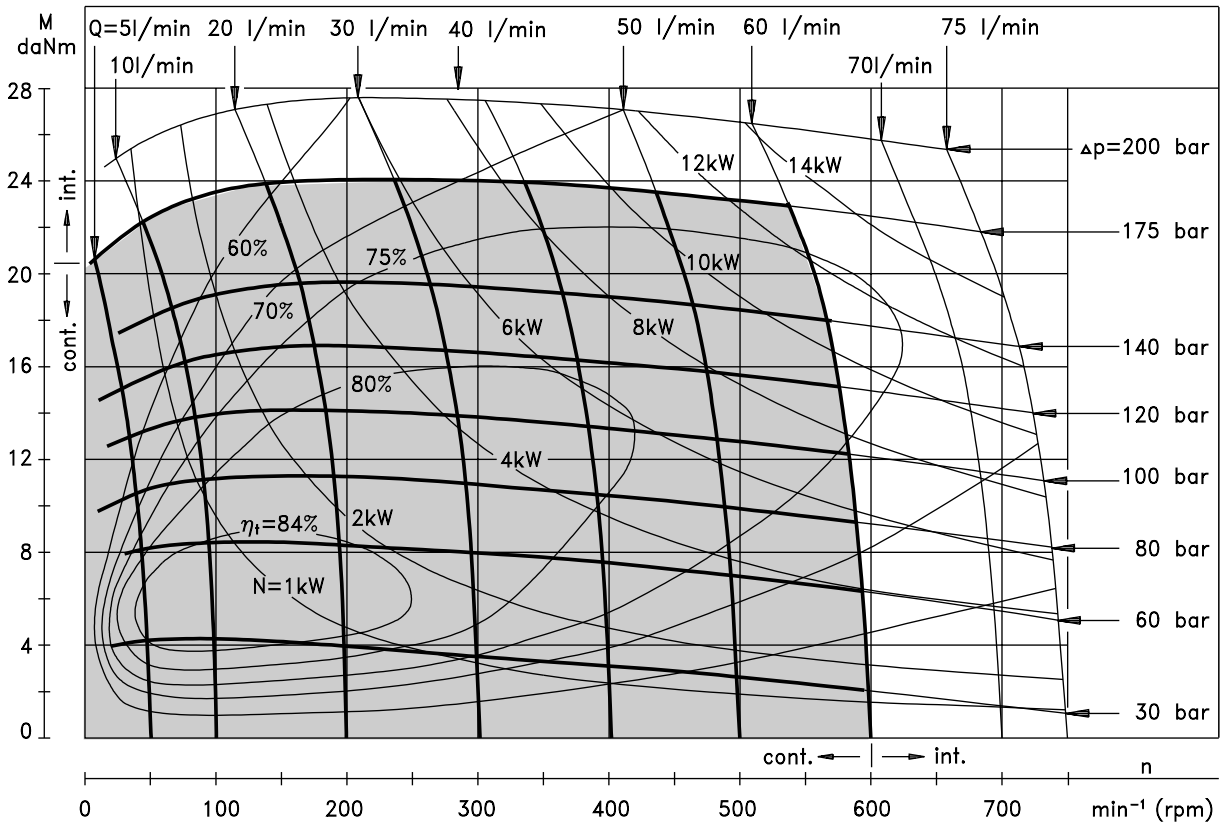
MR 80



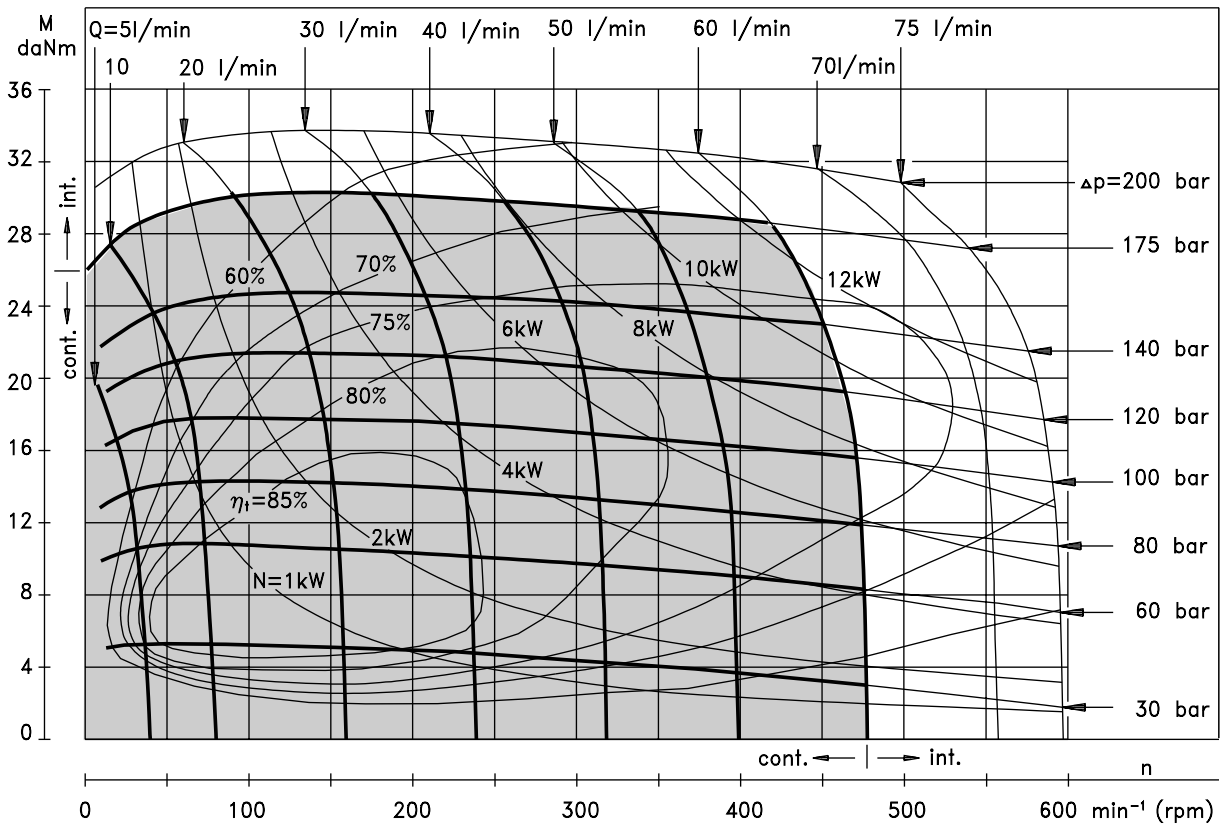
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MR 100



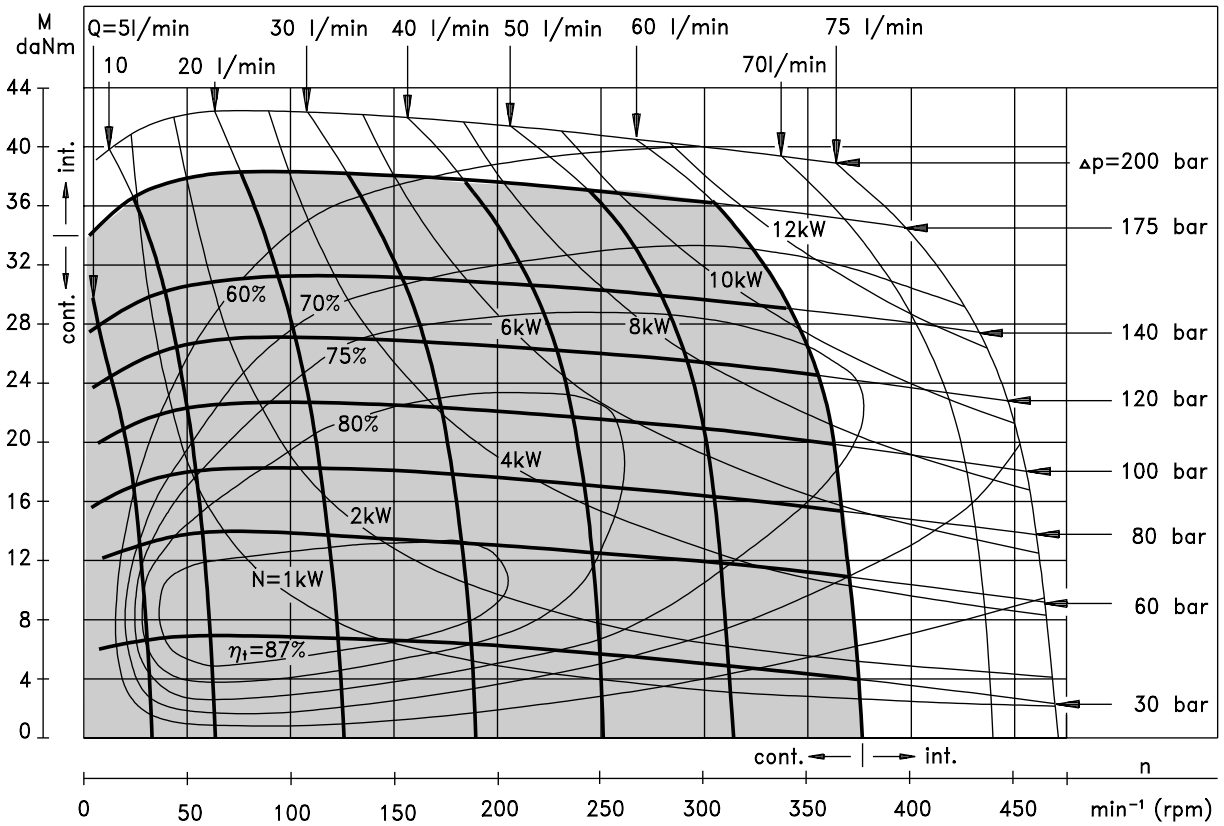
MR 125



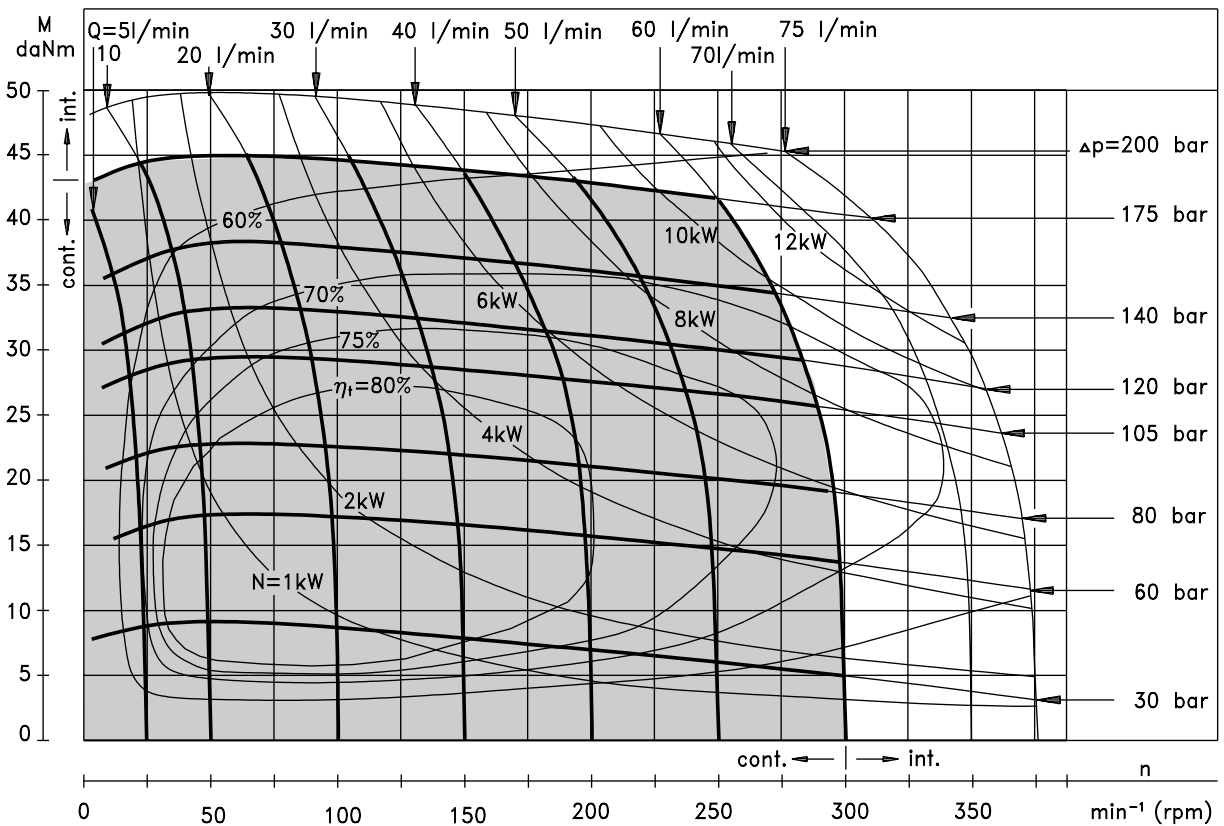
The function diagrams data was collected at back pressure $5 \div 10$ bar and oil with viscosity of $32 \text{ mm}^2/\text{s}$ at 50°C .

FUNCTION DIAGRAMS

MR 160



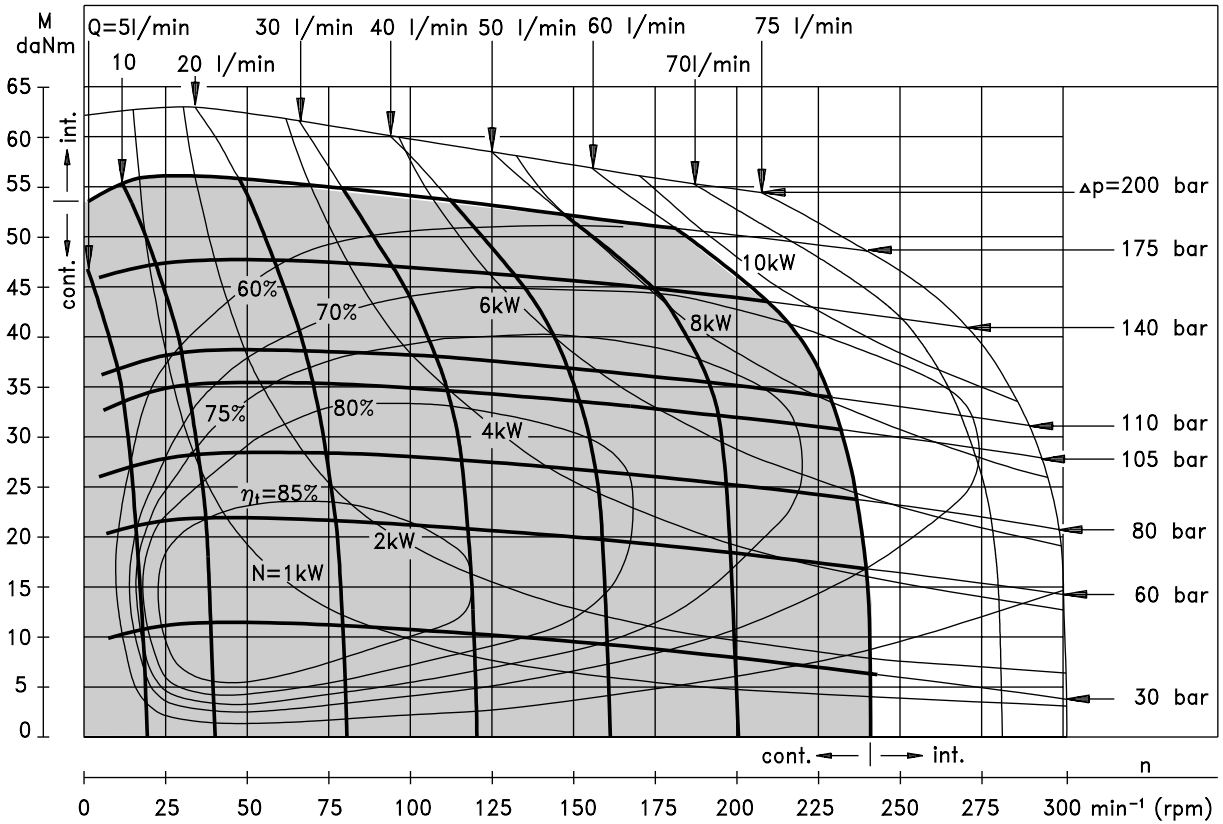
MR 200



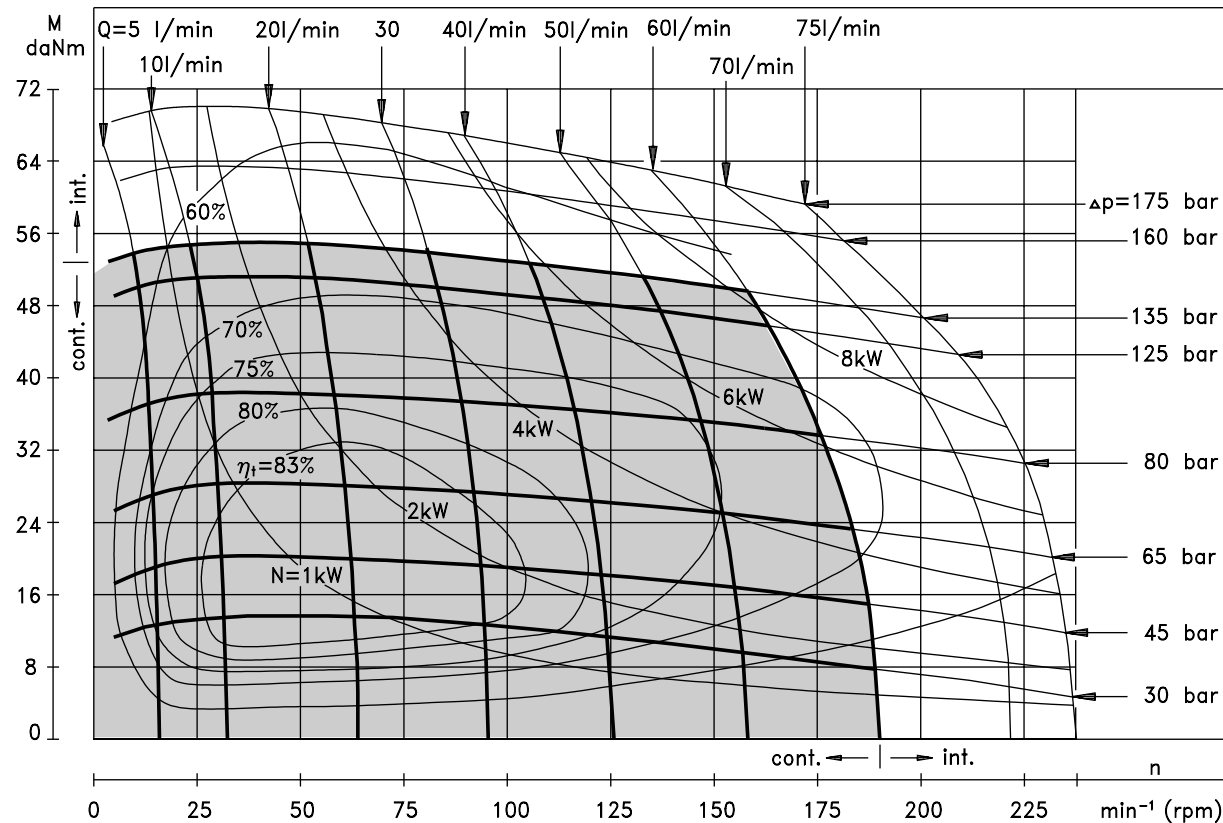
The function diagrams data was collected at back pressure $5 \div 10$ bar and oil with viscosity of $32 \text{ mm}^2/\text{s}$ at 50° C .

FUNCTION DIAGRAMS

MR 250



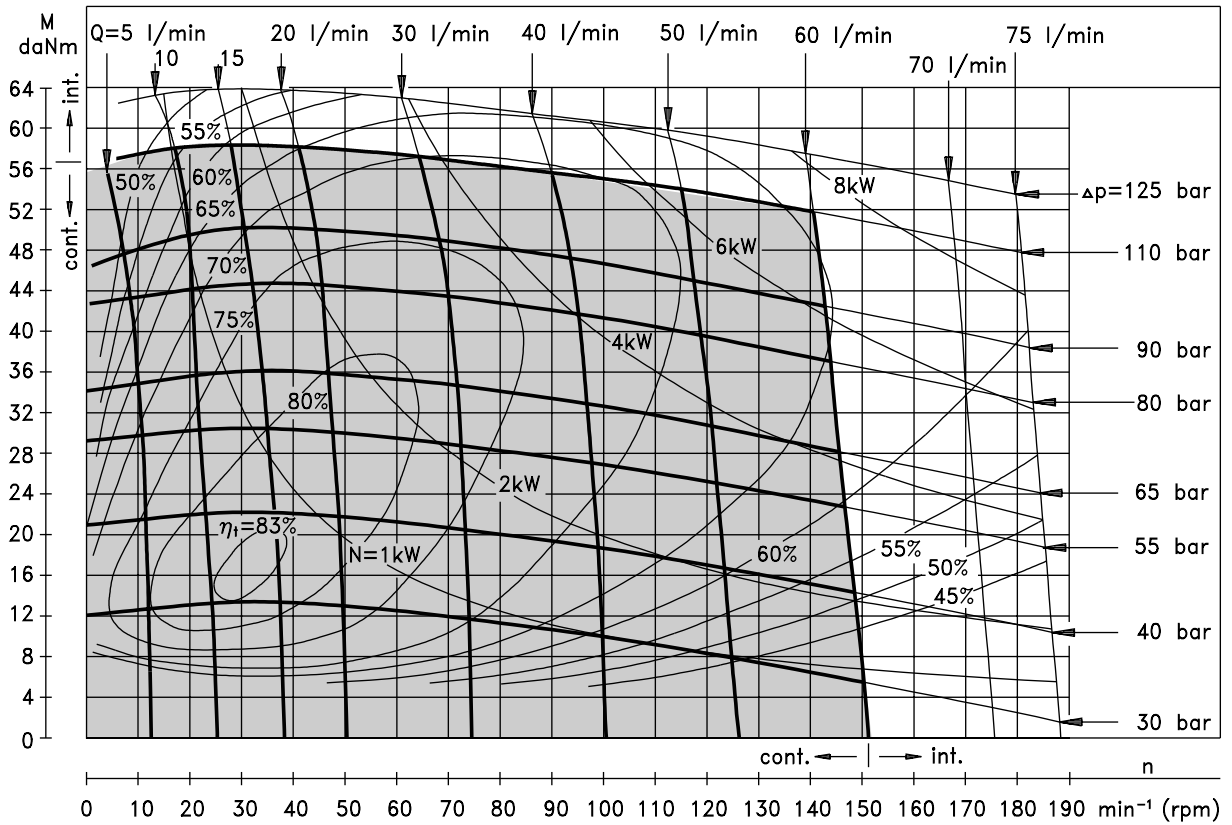
MR 315



The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

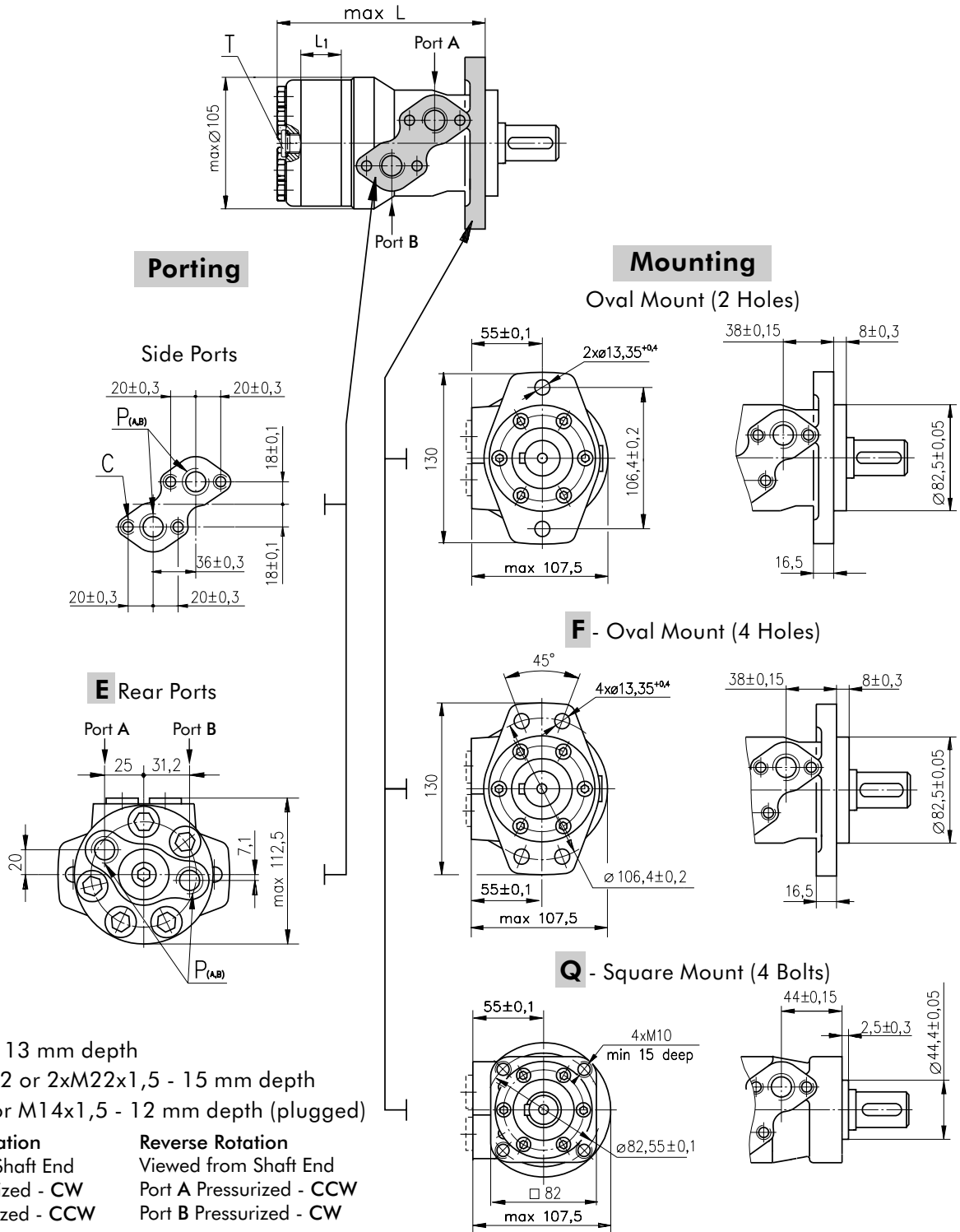
FUNCTION DIAGRAM

MR 400



The function diagram data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

DIMENSIONS AND MOUNTING DATA



C : 4xM8 - 13 mm depth
P_(A,B): 2xG1/2 or 2xM22x1,5 - 15 mm depth
T : G1/4 or M14x1,5 - 12 mm 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 | Type | L, mm | Type | L, mm | Type | L, mm | L ₁ , mm |
|-----------|-------|---------|-------|------------|-------|----------|-------|---------------------|
| MR(F) 50 | 138,0 | MRQ 50 | 143,5 | MR(F)E 50 | 157,5 | MRQE 50 | 163,5 | 9,0 |
| MR(F) 80 | 143,0 | MRQ 80 | 148,5 | MR(F)E 80 | 162,5 | MRQE 80 | 168,5 | 14,0 |
| MR(F) 100 | 146,0 | MRQ 100 | 152,0 | MR(F)E 100 | 165,5 | MRQE 100 | 171,5 | 17,4 |
| MR(F) 125 | 150,5 | MRQ 125 | 156,5 | MR(F)E 125 | 170,0 | MRQE 125 | 176,0 | 21,8 |
| MR(F) 160 | 156,5 | MRQ 160 | 162,5 | MR(F)E 160 | 176,0 | MRQE 160 | 182,0 | 27,8 |
| MR(F) 200 | 163,5 | MRQ 200 | 169,5 | MR(F)E 200 | 183,0 | MRQE 200 | 189,0 | 34,8 |
| MR(F) 250 | 172,0 | MRQ 250 | 179,0 | MR(F)E 250 | 192,0 | MRQE 250 | 198,0 | 43,5 |
| MR(F) 315 | 183,0 | MRQ 315 | 189,0 | MR(F)E 315 | 204,0 | MRQE 315 | 210,0 | 54,8 |
| MR(F) 400 | 198,0 | MRQ 400 | 204,0 | MR(F)E 400 | 218,0 | MRQE 400 | 224,0 | 69,4 |

ORDER CODE

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

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]

80 - 80,3 [cm³/rev]

100 - 99,8 [cm³/rev]

125 - 125,7 [cm³/rev]

160 - 159,6 [cm³/rev]

200 - 199,8 [cm³/rev]

250 - 250,1 [cm³/rev]

315 - 315,7 [cm³/rev]

400 - 397,0 [cm³/rev]

Pos.5 - Shaft Extensions*(see page 24)

C - ø25 straight, Parallel key A8x7x32 DIN6885

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

CO - ø1" straight, Parallel key 1/4"x1/4"x1 1/4" BS46

VCO - ø1" straight, Parallel key 1/4"x1/4"x1 1/4" 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 - ø1 1/4" tapered 1:8, Parallel key 5/16"x5/16"x1 1/4" BS46

HB - ø1 1/4" splined 14T ANSI B92.1 - 1976

Pos. 6 - Shaft Seal Version (see page 26)

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 46)

Pos.10 - Design Series

omit - Factory specified

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

NOTES: 1. 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.

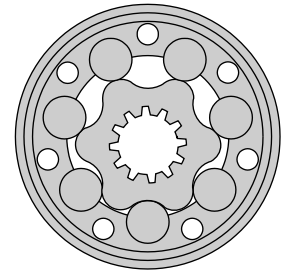
The hydraulic motors are mangano-phosphatized as standard.

HYDRAULIC MOTORS MH



APPLICATION

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



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| Permissible shaft loads | 43 |
| Dimensions and mounting ... | 44 |
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| Order code | 45 |

OPTIONS

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

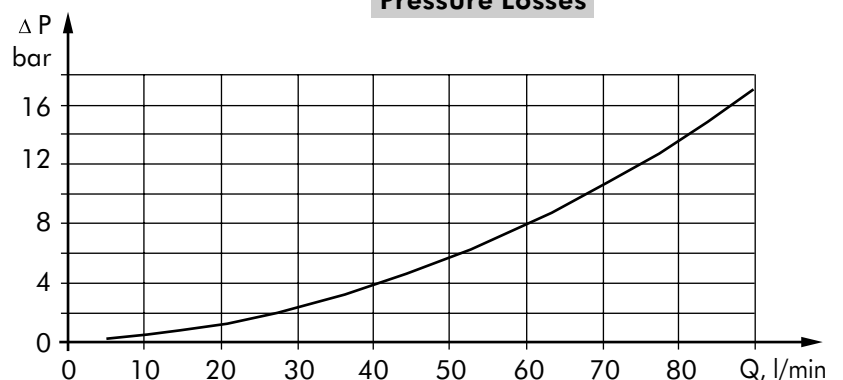
GENERAL

| | |
|---|---|
| Displacement, [cm ³ /rev.] | 201,3 ÷ 502,4 |
| Max. Speed, [RPM] | 150 ÷ 370 |
| Max. Torque, [daNm] | 51 ÷ 85 |
| Max. Output, [kW] | 11 ÷ 16 |
| Max. Pressure Drop, [bar] | 175 ÷ 125 |
| Max. Oil Flow, [l/min] | 75 |
| Min. Speed, [RPM] | 5 ÷ 10 |
| Pressure fluid | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4) |
| Temperature range, [°C] | -30 ÷ 90 |
| Optimal Viscosity range, [mm ² /s] | 20 ÷ 75 |
| Filtration | ISO code 20/16 (Min. recommended fluid filtration of 25 micron) |

Oil flow in drain line

| Pressure drop (bar) | Viscosity (mm ² /s) | Oil flow in drain line (l/min) |
|---------------------|--------------------------------|--------------------------------|
| 100 | 20 | 2,5 |
| | 35 | 1,8 |
| 140 | 20 | 3,5 |
| | 35 | 2,8 |

Pressure Losses



SPECIFICATION DATA

| Type | MH | | | | | |
|---|---------------------------|------|-------|-------|-------|-----|
| | 200 | 250 | 315 | 400 | 500 | |
| Displacement, [cm ³ /rev.] | 201,3 | 252 | 314,9 | 396,8 | 502,4 | |
| Max. Speed, [RPM] | cont. | 370 | 295 | 235 | 185 | 150 |
| | int.* | 445 | 350 | 285 | 225 | 180 |
| Max. Torque [daNm] | cont. | 51 | 61 | 74 | 84 | 85 |
| | int.* | 58 | 70 | 82 | 98 | 104 |
| | peak** | 64 | 79 | 98 | 109 | 117 |
| Max. Output, [kW] | cont. | 16 | 16 | 14 | 12,5 | 11 |
| | int.* | 18,5 | 18,5 | 15,5 | 15 | 14 |
| Max. Pressure Drop [bar] | cont. | 175 | 175 | 175 | 155 | 125 |
| | int.* | 200 | 200 | 200 | 190 | 160 |
| | peak** | 225 | 225 | 225 | 210 | 180 |
| Max. Oil Flow [l/min] | cont. | 75 | 75 | 75 | 75 | 75 |
| | int.* | 90 | 90 | 90 | 90 | 90 |
| Max. Inlet Pressure [bar] | cont. | 200 | 200 | 200 | 200 | 200 |
| | int.* | 225 | 225 | 225 | 225 | 225 |
| | peak** | 250 | 250 | 250 | 250 | 250 |
| Max. Starting Pressure with Unloaded Shaft, [bar] | 5 | 5 | 5 | 5 | 5 | |
| Min. Starting Torque [daNm] | at max. press. drop cont. | 39 | 52 | 66 | 72 | 72 |
| | at max. press. drop int.* | 45 | 59 | 73 | 88 | 88 |
| Min. Speed***, [RPM] | 10 | 10 | 8 | 5 | 5 | |
| Weight, avg. [kg] | 10,5 | 11 | 11,5 | 12,3 | 13 | |

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

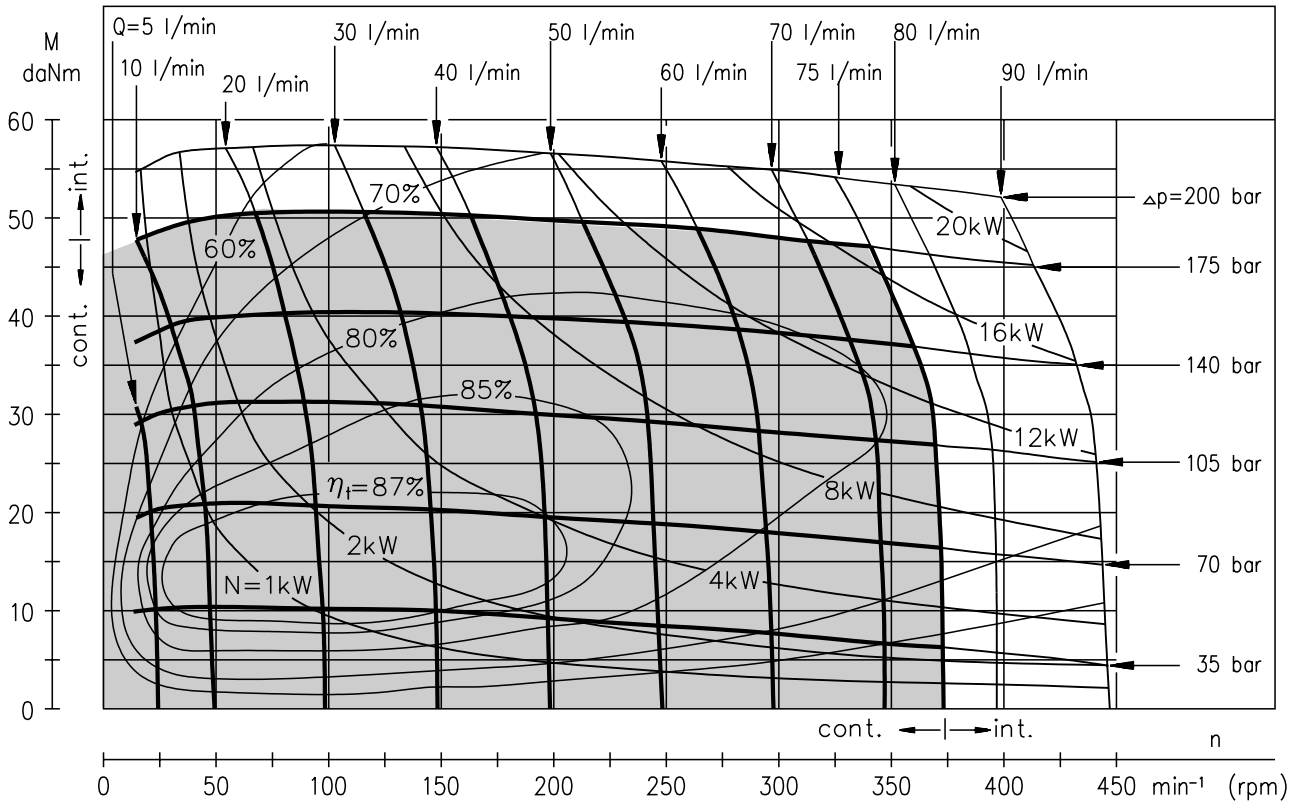
** Peak load: the permissible values may occur for max. 1% of every minute.

*** For speeds of 5 RPM lower than given, consult factory or your regional manager.

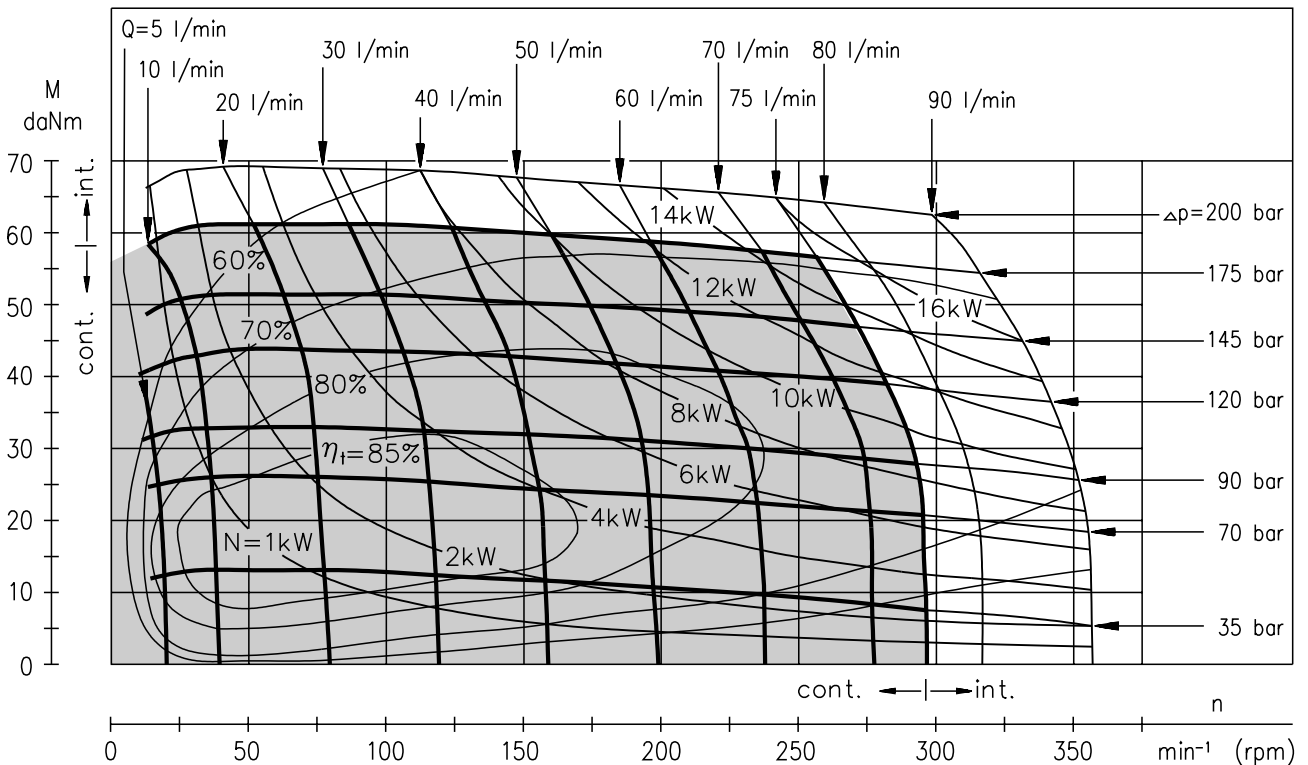
- 1) Intermittent speed and intermittent pressure must not occur simultaneously.
- 2) Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
- 3) Recommend using a premium quality, anti-wear type mineral based hydraulic oil, HLP(DIN51524) or HM(ISO6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
- 4) Recommended minimum oil viscosity 13 mm²/s at 50°C.
- 5) Recommended maximum system operating temperature is 82°C.
- 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



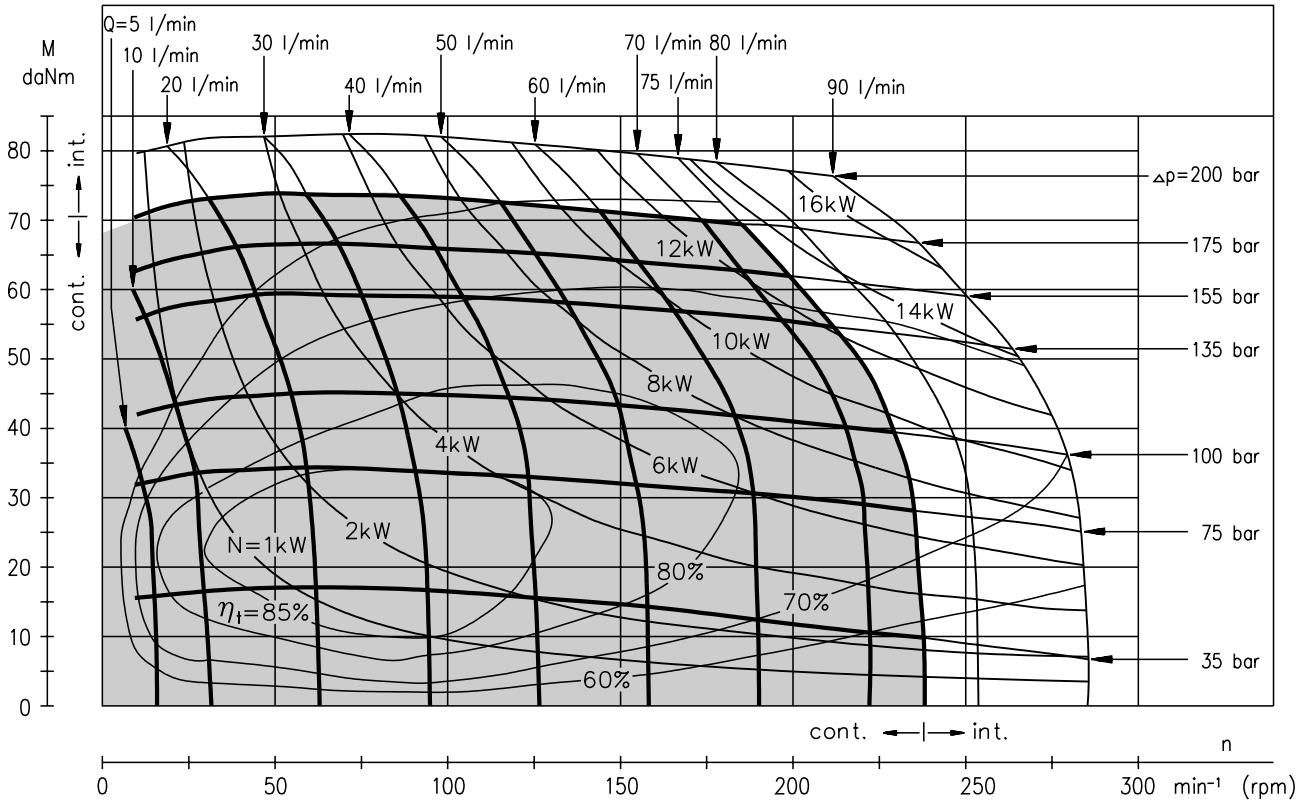
MH 250



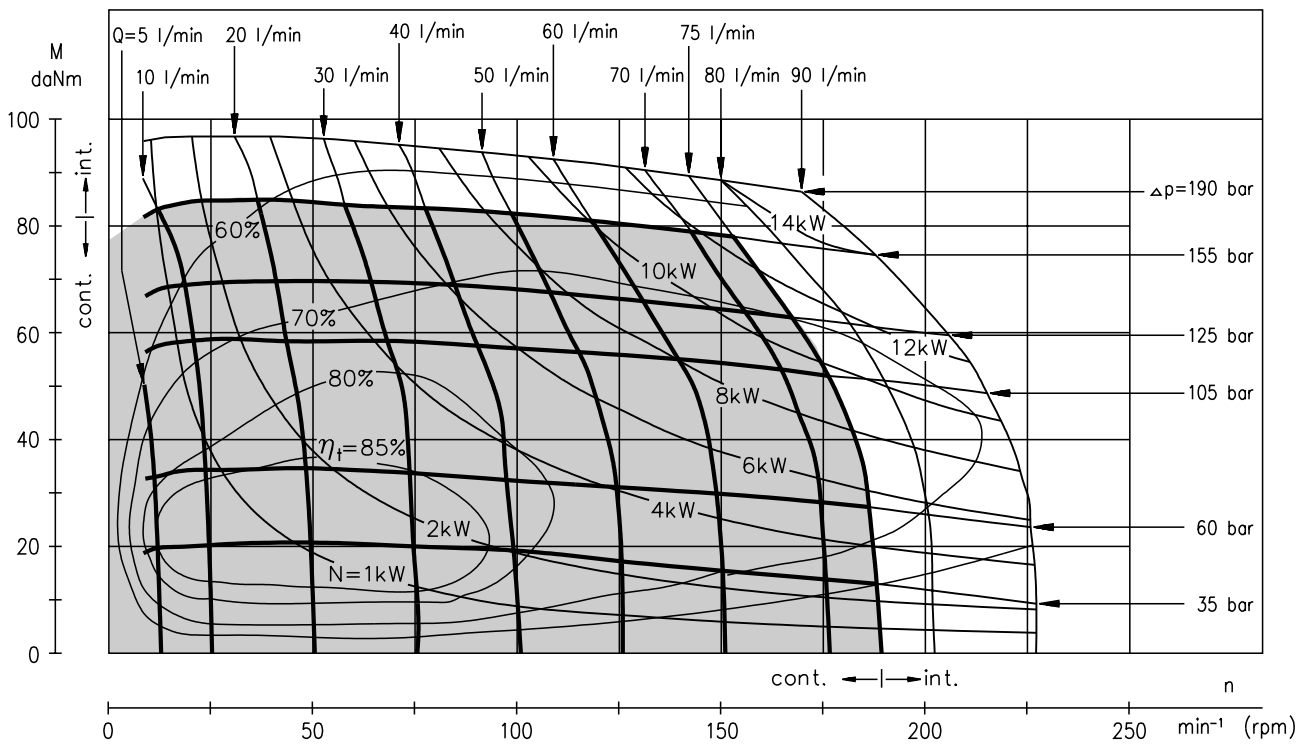
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MH 315



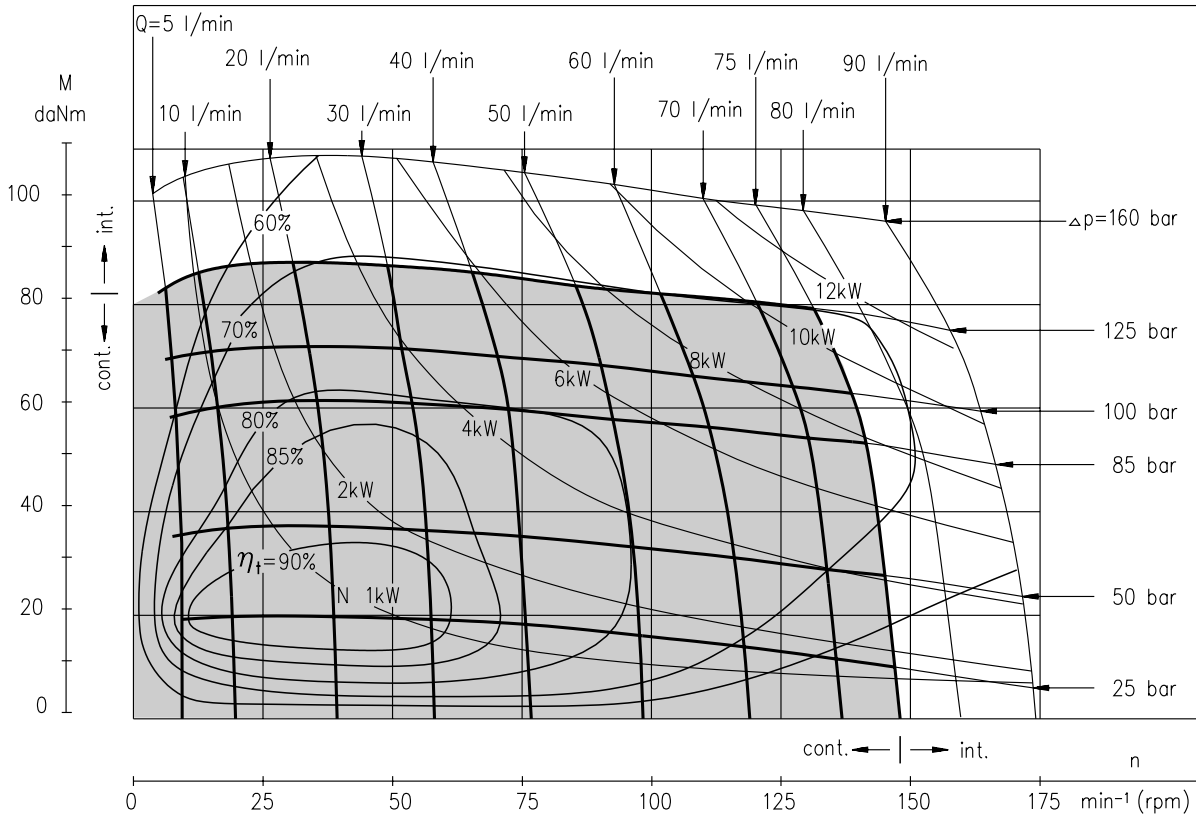
MH 400



The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

FUNCTION DIAGRAMS

MH 500



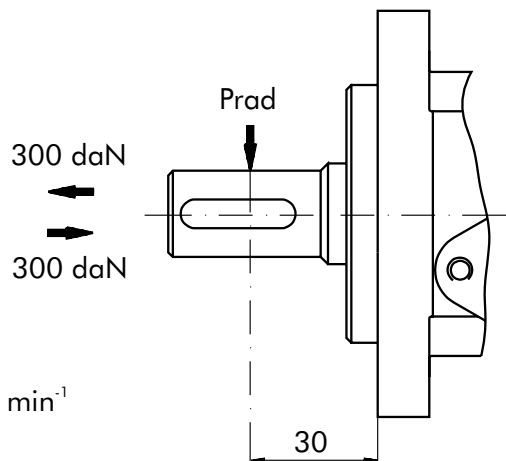
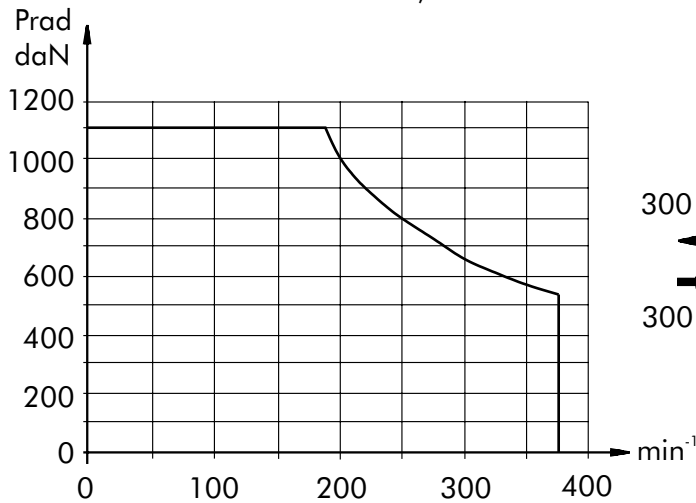
The function diagrams data was collected at back pressure 5 ÷ 10 bar and oil with viscosity of 32 mm²/s at 50° C.

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.

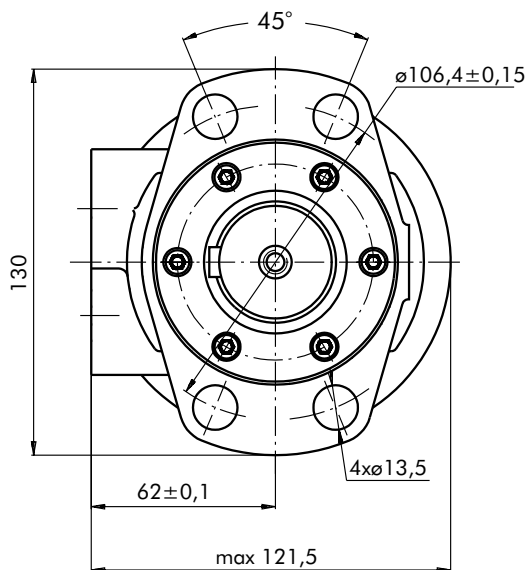
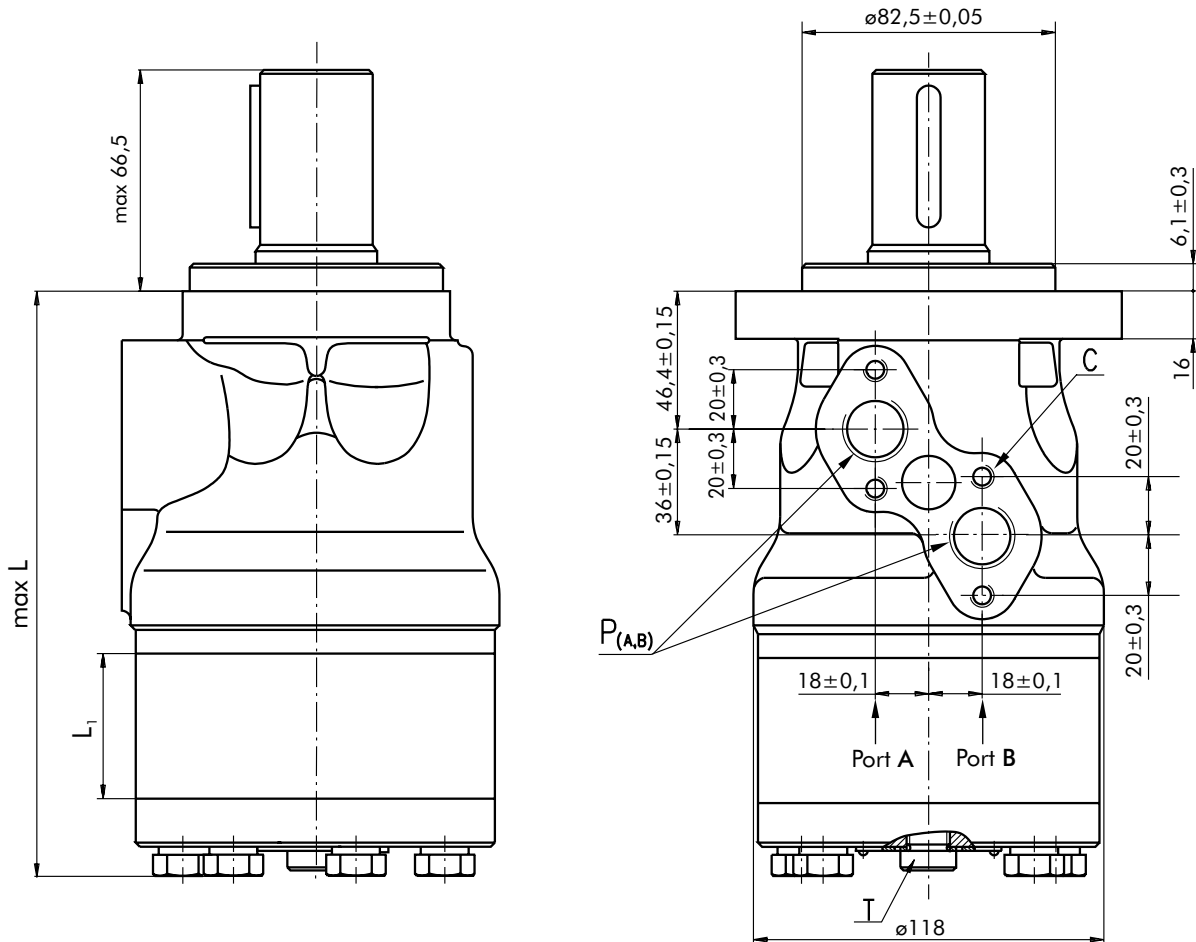
$$\text{Radial Shaft Load } P_{rad} = \frac{1100}{n} \times \frac{25000}{103,5+L}, \text{ daN}^*$$

*L < 60 mm; n ≥ 200 min⁻¹



DIMENSIONS AND MOUNTING DATA

Magneto Maunt (4 holes)



| Type | L, mm | L ₁ , mm |
|--------|-------|---------------------|
| MH 200 | 169 | 27,8 |
| MH 250 | 176 | 34,8 |
| MH 315 | 184 | 43,5 |
| MH 400 | 196 | 54,8 |
| MH 500 | 211 | 69,4 |

- C** : 4xM8-13 mm depth
- P_(A,B)**: 2xG1/2 or 2xM22x1,5-15 mm depth
- T** : G1/4 or M14x1,5-12 mm depth (plugged)

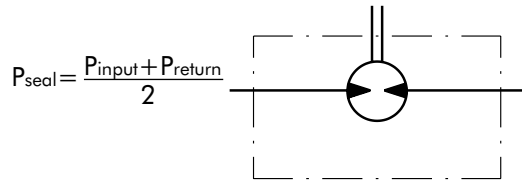
Standard Rotation
Viewed from Shaft End
Port A Pressurized - CW
Port B Pressurized - CCW

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

MAX. PERMISSIBLE SHAFT SEAL PRESSURE FOR MH MOTORS

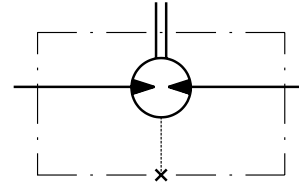
MH...U1 motors with high pressure seal and without drain connection:

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



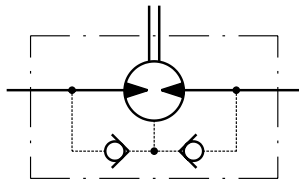
MH...U motors with high pressure seal and drain connection:

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



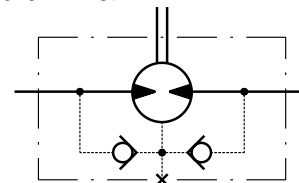
MH...1 motors with standard shaft seal and without drain connection:

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

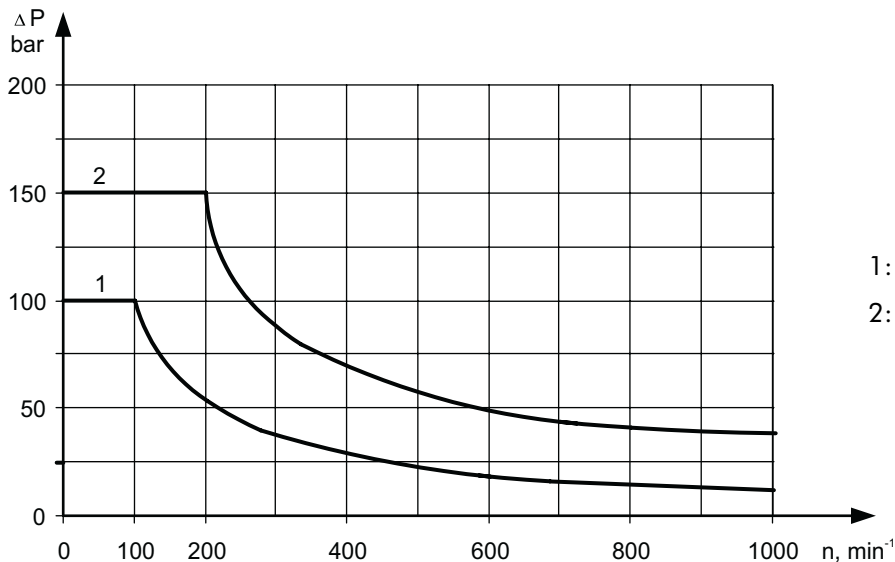


MH... motors with standard shaft seal and with drain connection:

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



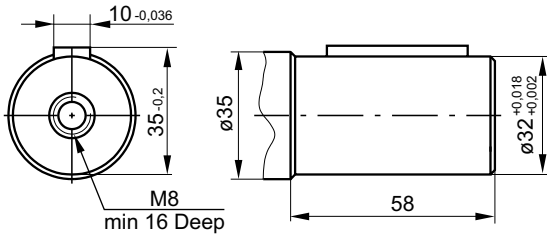
Max. return pressure without drain line or max. pressure in the drain line



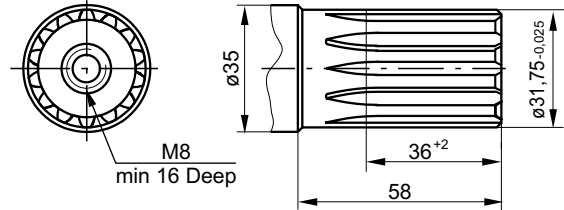
1: Drawing for Standard Shaft Seal
2: Drawing for High Pressure Seal ("U" Seal)

SHAFT EXTENSIONS

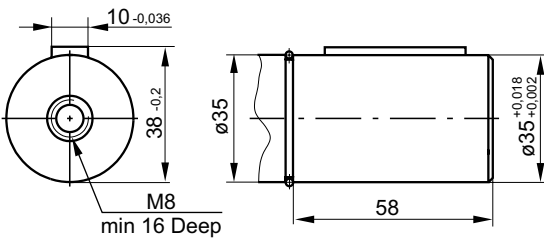
C - $\varnothing 32$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm



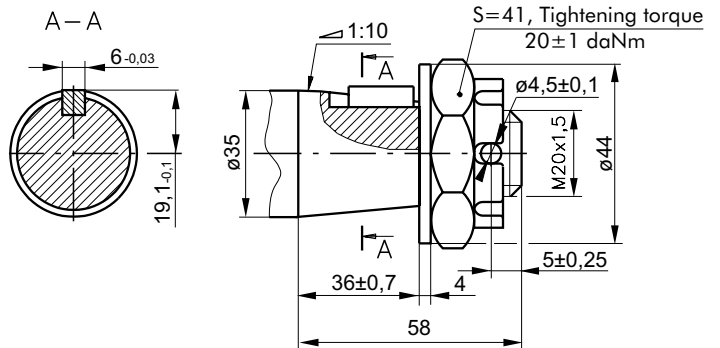
SH - $\varnothing 1\frac{1}{4}$ " splined 14T, DP 12/24 ANSI B92.1-1976
Max. Torque 95 daNm



CB - $\varnothing 35$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 95 daNm



K - tapered 1:10, Parallel key B6x6x20 DIN 6885
Max. Torque 95 daNm



ORDER CODE

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

Pos. 1 - Displacement code

| | |
|------------|--------------------------------|
| 200 | - 201,3 [cm ³ /rev] |
| 250 | - 252,0 [cm ³ /rev] |
| 315 | - 314,9 [cm ³ /rev] |
| 400 | - 396,8 [cm ³ /rev] |
| 500 | - 502,4 [cm ³ /rev] |

Pos. 2 - Shaft Extensions *

| | |
|-----------|--|
| C | - $\varnothing 32$ straight, Parallel key A10x8x45 DIN 6885 |
| SH | - $\varnothing 1\frac{1}{4}$ " splined 14T ANSI B92.1-1976 |
| CB | - $\varnothing 35$ straight, Parallel key A10x8x45 DIN 6885 |
| K | - $\varnothing 35$ tapered 1:10, Parallel key B6x6x20 DIN 6885 |

Pos. 3 - Shaft Seal Version (see page 44)

| | |
|----------|---|
| 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 46)

Pos. 7 - Design Series

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

NOTES:

- * The permissible output torque for shafts must be not exceeded!
- The hydraulic motors are mangano-phosphatized as standard.

MOTOR SPECIAL FEATURES

| Special Feature Description | Order Code | Motor type | | | | | | |
|-----------------------------|------------|------------|------|-----|-----|------|-----|----|
| | | MM | MP | MPN | MPW | MR | MRN | MH |
| Motor for Speed Sensor* | RS | ○ | ○ | - | - | ○ | - | ○ |
| Low Leakage | LL | ○ | ○ | - | ○ | ○ | - | ○ |
| Low Speed Valving | LSV | ○ | ○ | - | ○ | ○ | - | ○ |
| Free Running | FR | ○ | ○ | - | ○ | ○ | - | ○ |
| Reverse Rotation | R | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Paint** | P | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Corrosion Protected Paint** | PC | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Check Valves | | S | S*** | S | S | S*** | S | S |

- Optional
- Not applicable
- S Standard

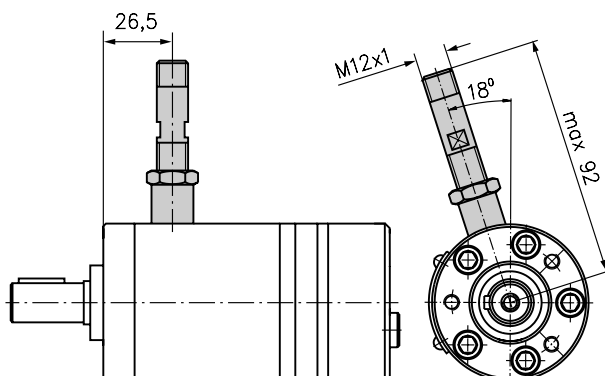
* for sensor ordering see pages 47-48

** color at customer's request.

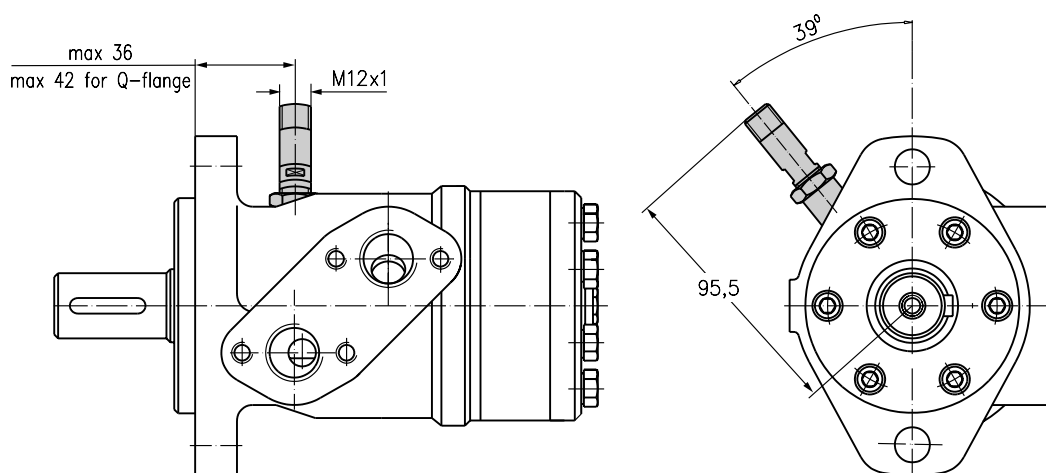
*** without check valves for "U" shaft seal versions (see page 26)

MOTORS WITH SPEED SENSOR

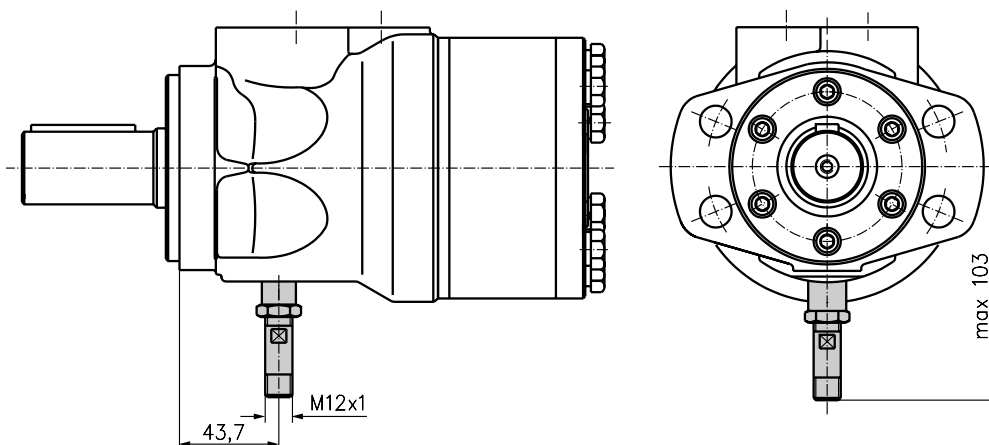
MM...RS



MP...RS and MR...RS



MH...RS

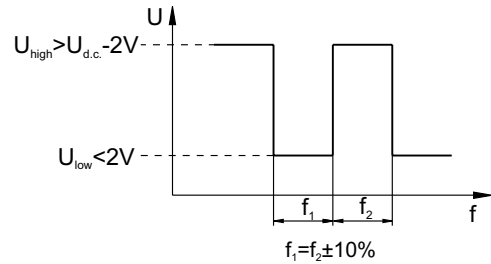


TECHNICAL DATA OF THE SPEED SENSOR

Technical data

| | |
|---------------------|------------------------|
| Frequency range | 3...20 000 Hz |
| Output | PNP, NPN |
| Power supply | 10...36 VDC |
| Current input | 20 mA (@24 VDC) |
| Current load | 500 mA (@24 VDC; 24°C) |
| Ambient Temperature | minus 40... plus 125°C |
| Protection | IP 67 |
| Plug connector | M12-Series |
| Mounting principle | ISO 6149 |

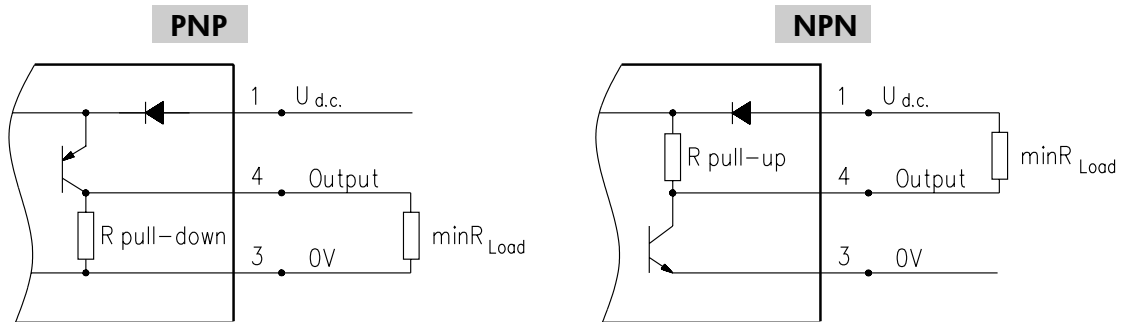
Output signal



Load max.: $I_{high} = I_{low} < 50\text{mA}$
 No load current, max: 20 mA

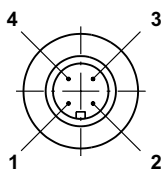
| | | | | |
|-----------------------|----|----|----|----|
| Motor type | MM | MP | MR | MH |
| Pulses per revolution | 30 | 36 | 36 | 42 |

Wiring diagrams



$$R_{Load} = U_{d.c.} / I_{max} (=50\text{mA})$$

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 |
| PSNL5 | NPN | Cable output 3x0,25; 5m long |
| RSPL5 | PNP | Cable output 3x0,25; 5m 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.