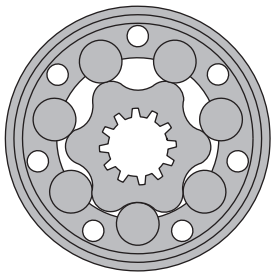
HYDRAULIC MOTOR-BRAKE B/MR

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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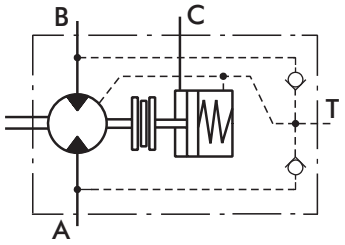


OPTIONS

» Model - Spool valve, roll-gerotor
» Fully integrated friction disk brake
» Side port
» Shafts - straight, tapered, splined
» BSPP ports
» Needle bearings
» Flanges SAE-A, magneto 4 bolts.

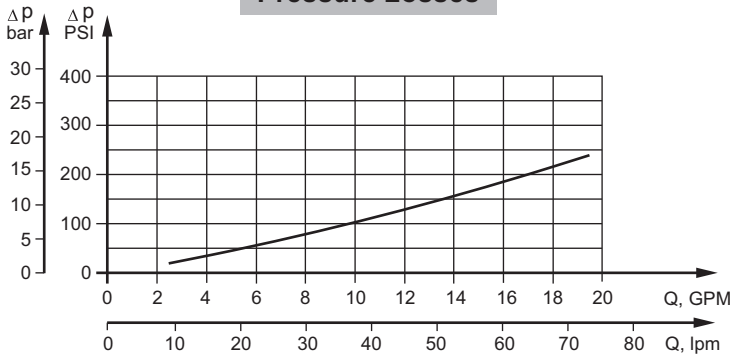
GENERAL

		Min.		Max.	
Displacement,	cm^3/rev [in^3/rev]	80,3 [4.90]		199,8 [12.19]	
Speed,	[RPM]	cont.: 500	int.: 600	cont.: 300	int.: 375
Torque,	daNm [lb-in]	cont.: 19,5 [1725]	int.: 22 [1947]	cont.: 45 [3980]	int.: 50 [4425]
Output,	kW [HP]	cont.: 8,4 [11.2]	int.: 9,6 [12.9]	cont.: 11 [14.8]	int.: 13 [17.4]
Pressure Drop,	bar [PSI]	cont.: 175 [2540]	int.: 200 [2900]	cont.: 175 [2540]	int.: 200 [2900]
Oil Flow,	lpm [GPM]	cont.: 40 [10.5]	int.: 48 [12.7]	cont.: 60 [15.9]	int.: 75 [19.8]
Min. Speed,	[RPM]	10			
Permissible Shaft Loads,	daNm [lb-in]	P_a=200 [450]			
Pressure fluid		Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)			
Temperature range,	^{O}C [^{O}F]	-40÷140 [-40÷284]			
Optimal Viscosity range,	mm^2/s [SUS]	20÷75 [98÷347]			
Filtration		ISO code 18/16/13	According to ISO 4406 - 1999		

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/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



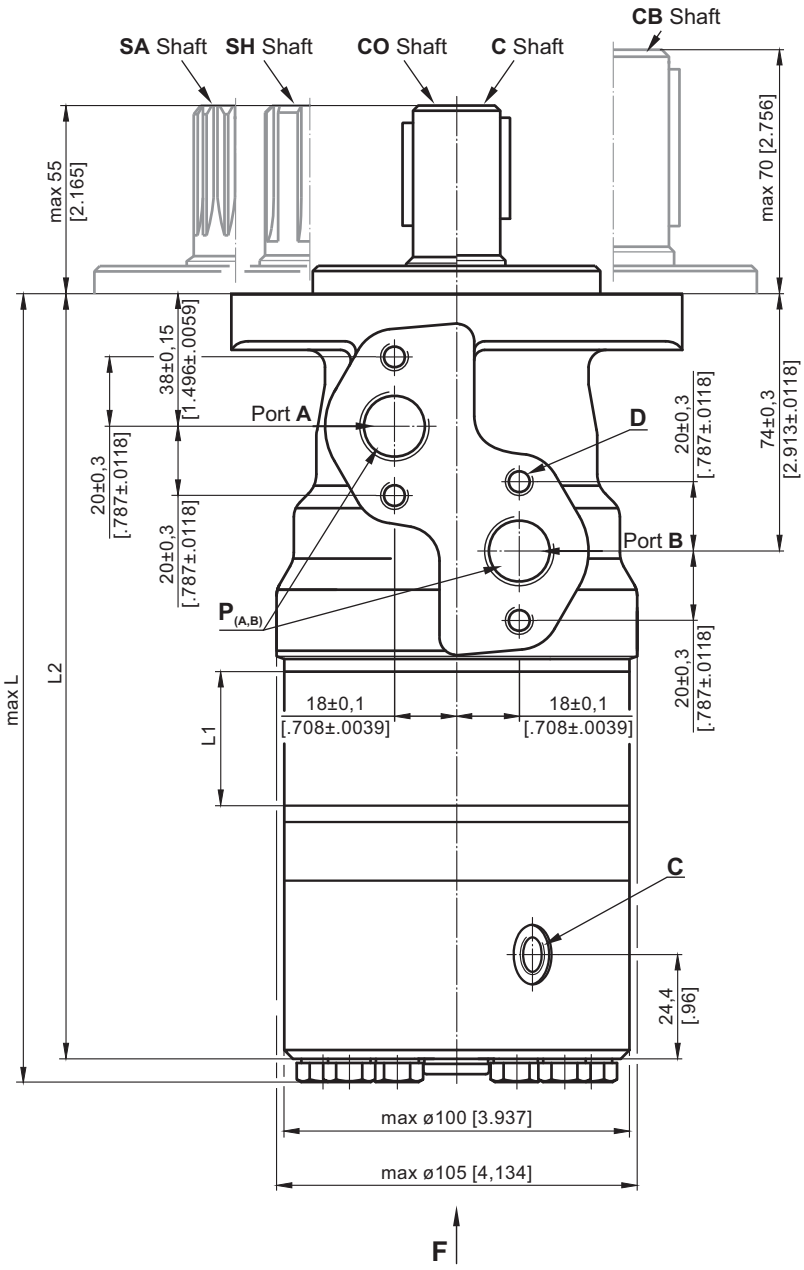
SPECIFICATION DATA

Type		B/MR 80	B/MR 100	B/MR 125	B/MR 160	B/MR 160 CB	B/MR 200	B/MR 200 CB
Displacement, cm^3/rev [in^3/rev]		80,3 [4.90]	99,8 [6.09]	125,7 [7.67]	159,6 [9.74]		199,8 [12.19]	
Max. Speed, [RPM]	Cont.	500	500	475	375		300	
	Int.*	600	600	600	470		375	
Max. Torque, daNm [lb-in]	Cont.	19,5 [1725]	24 [2125]	30 [2655]	30 [2655]	39 [3450]	30 [2655]	45 [3980]
	Int.*	22 [1947]	28 [2480]	34 [3010]	39 [3450]	43 [3805]	39 [3450]	50 [4425]
	Peak**	27 [2390]	32 [2832]	37 [3275]	46 [4070]	46 [4070]	56 [4955]	56 [4955]
Max. Output, kW [HP]	Cont.	8,4 [11.2]	10,8 [14.5]	12,5 [16.8]	10 [13.4]	11,5 [15.4]	7,8 [10.5]	11 [14.8]
	Int.*	9,6 [12.9]	12 [16.1]	14,5 [19.5]	12,5 [16.8]	14 [18.8]	12,4 [16.6]	13 [17.4]
Max. Pressure Drop, bar [PSI]	Cont.	175 [2540]	175 [2540]	175 [2540]	135 [1960]	175 [2540]	115 [1668]	175 [2540]
	Int.*	200 [2900]	200 [2900]	200 [2900]	175 [2540]	200 [2900]	150 [2175]	200 [2900]
	Peak**	225 [3263]	225 [3263]	225 [3263]	225 [3263]	225 [3263]	225 [3263]	225 [3263]
Max. Oil Flow, lpm [GPM]	Cont.	40 [10.5]	50 [13.2]	60 [15.9]				
	Int.*	48 [12.7]	60 [15.9]	75 [19.8]				
Max. Inlet Pressure, bar [PSI]	Cont.	175 [2540]						
	Int.*	200 [2900]						
	Peak**	225 [3263]						
Max. Starting Pressure, bar [PSI]		10 [145]	10 [145]	9 [130]	7 [102]		5 [73]	
Min. Starting Torque, daNm [lb-in]	At max.press.drop Cont.	15 [1330]	20 [1770]	25 [2215]	24 [2124	32 [2832]	26 [2301]	41 [3628]
	At max.press.drop Int.*	17 [1505]	23 [2035]	28 [2480]	32 [2832]	37 [3275]	33 [2920]	46 [4071]
Min. Speed***, [RPM]		10						
Static Torque of Brake, daNm [lb-in]		55 [4868]						
Min. Brake Release Pressure****, bar [PSI]		13 [190]						
Max.Opening Pressure, bar [PSI]		200 [2900]						
Weight, kg [lb]		11,0 [24.3]	11,2 [24.7]	11,4 [25.2]	11,6 [25.6]	11,7 [25.8]	12,2 [26.9]	12,3 [27.12]

* 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.
**** Motor-brakes must always have a drain line. The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line

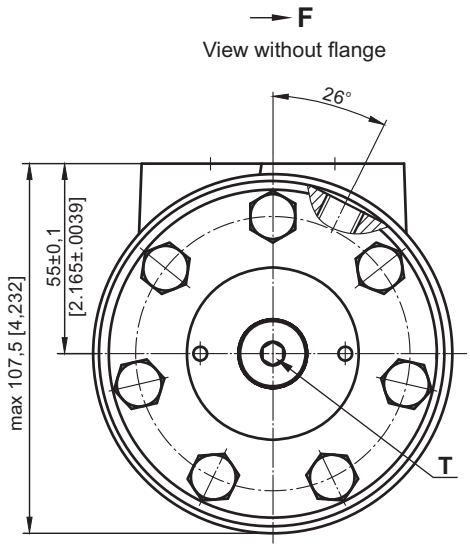
1. Intermittent speed and intermittent pressure must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 18/16/13. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 mm^2/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



Shaft Dim.
See Page 25

Flange Dim.
See Page 24



P $_{(A,B)}$: 2xG1/2 - 15 [.59 in] mm depth
C : Brake release port G1/4 - 12 [.47 in] mm depth
T : Drain port G1/4 - 12 [.47 in] mm depth
D : 4xM8 - 13 mm [.51 in] depth

Type	L_1, mm [in]	L_2, mm [in]	L, mm [in]
B/MR 80	14,0 [.55]	205,5 [8.09]	213,5 [8.41]
B/MR 100	17,4 [.69]	209,0 [8.23]	217,0 [8.54]
B/MR 125	21,8 [.86]	213,5 [8.41]	221,5 [8.72]
B/MR 160	27,8 [1.09]	219,5 [8.64]	227,5 [8.96]
B/MR 200	34,8 [1.37]	226,5 [8.92]	234,5 [9.23]

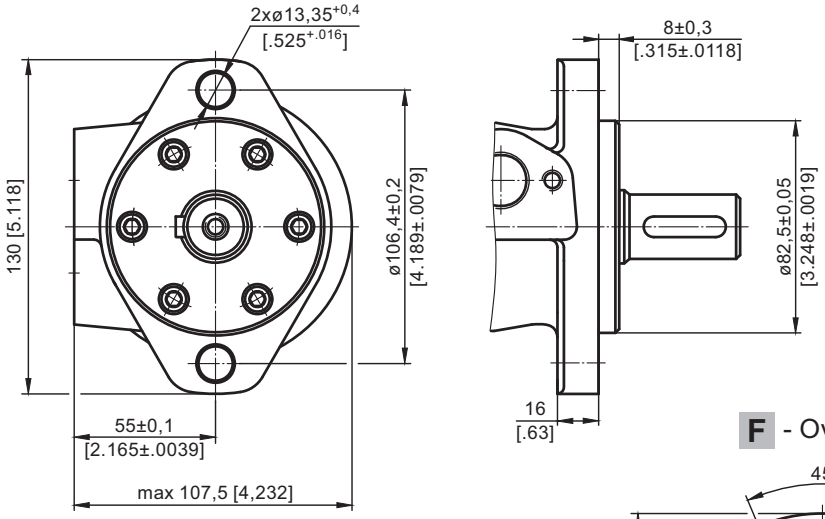
Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

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

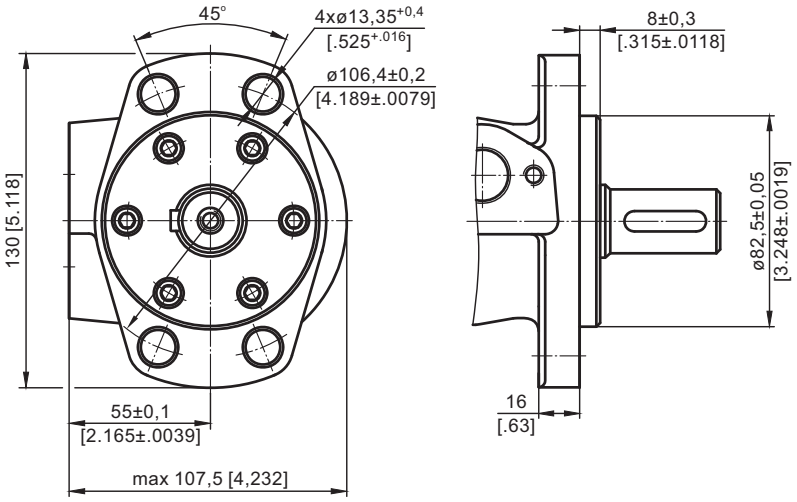
mm [in]

MOUNTING

Oval Mount (2 Holes) similar to SAE-A flange with 2 holes



F - Oval Mount (4 Holes) similar to SAE-A flange

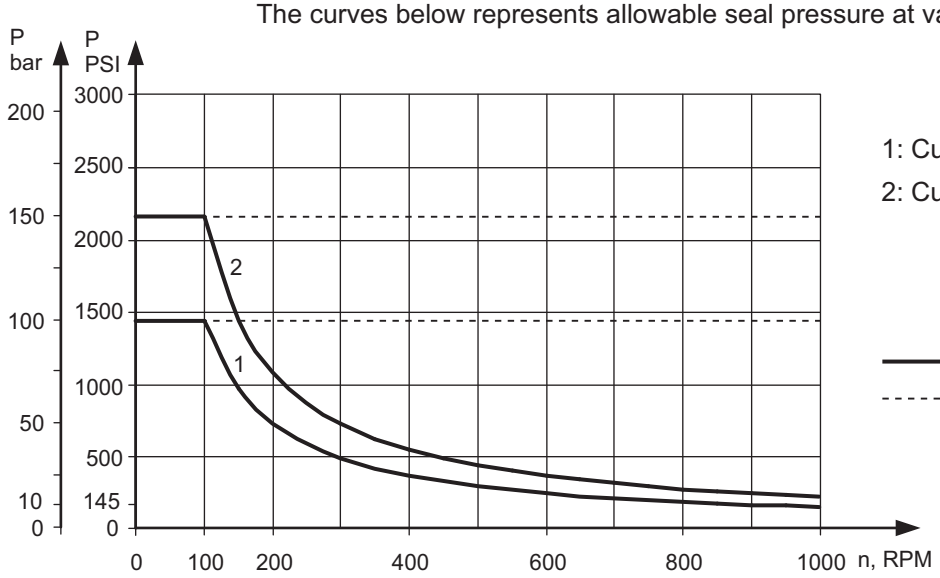


mm [in]

MAX. PERMISSIBLE SHAFT SEAL PRESSURE

Maximum return pressure or max. pressure in the drain line. The drain line must be always in use! The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line.

The curves below represents allowable seal pressure at various speeds



1: Curve for shaft type CB.

2: Curve for shaft type C, CO, SH and SA.

——— - continuous operations

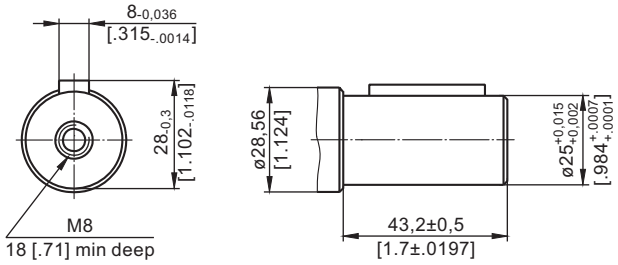
------ - intermittent operations

SHAFT EXTENSIONS

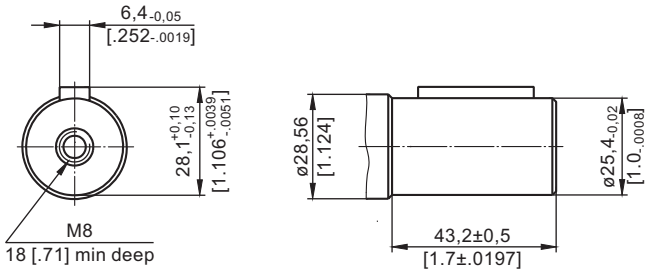
C, **CO**, **SH** and **SA** shafts

SHAFT WITH SEAL DIAMETER 28,56 mm

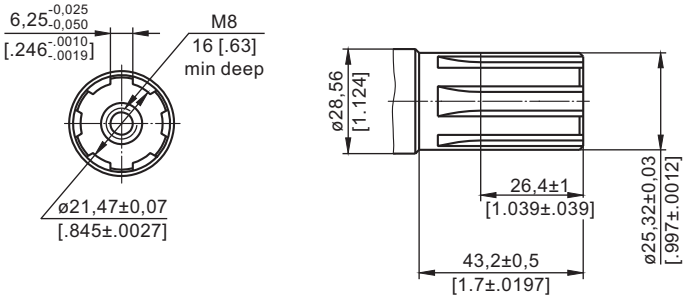
C - ø25 straight, Parallel key A8x7x32 DIN 6885
Max. Torque 34 daNm [3010 lb-in]



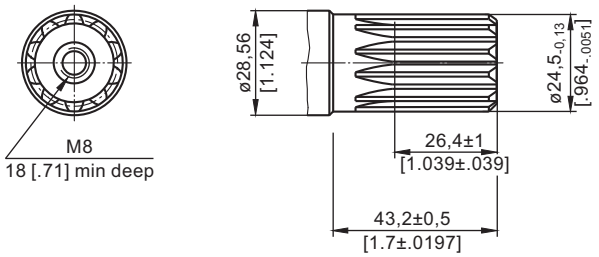
CO - ø1 straight, Parallel key ¼"x¼"x1¼" BS46
Max. Torque 34 daNm [3010 lb-in]



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



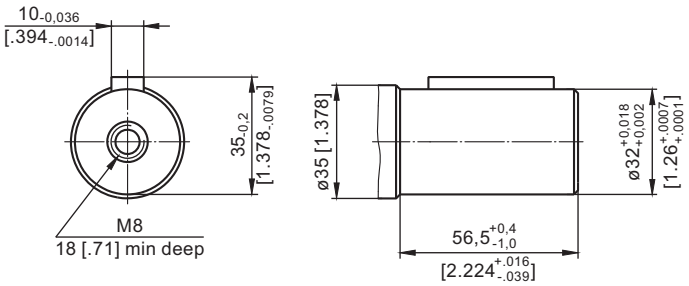
SA - splined, B25x22h9 DIN 5482
Max. Torque 40 daNm [3540 lb-in]



CB shaft

SHAFT WITH SEAL DIAMETER 35 mm /type ...B/

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



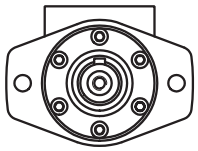
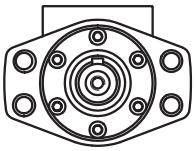
mm [in]

PERMISSIBLE SHAFT LOADS

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.

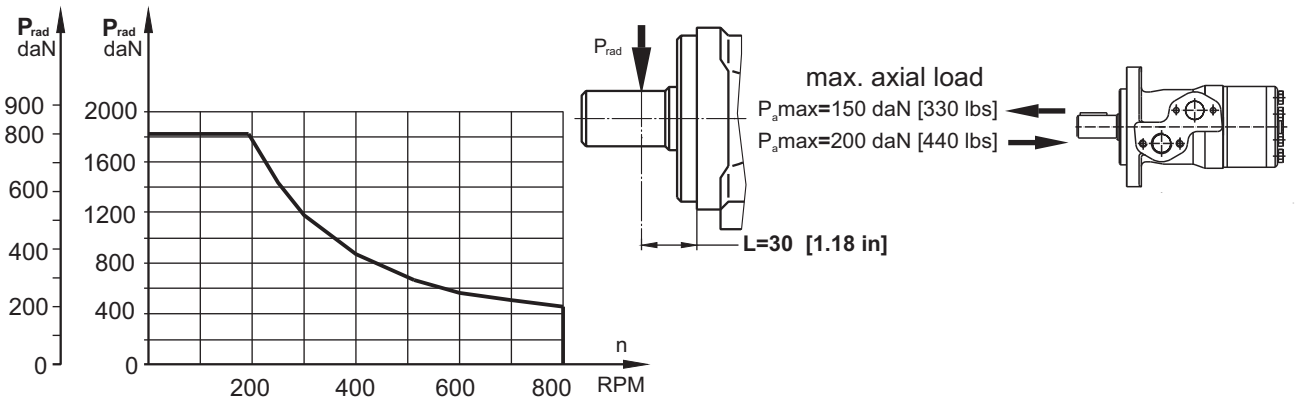
B/MR...

Radial Shaft Load for slide dearing]

Mounting Flange		
Shaft Version	**cylindrical - C, CO splined - SH, SA**	**cylindrical - CB**
Radial Shaft Load P_{rad}, in mm	$\frac{800}{n} \times \frac{25000}{95+L}$, daN*	$\frac{800}{n} \times \frac{18750}{95+L}$, daN*
Radial Shaft Load P_{rad}, in inch	$\frac{800}{RPM} \times \frac{2215}{3.74+L}$,lbs*	$\frac{800}{RPM} \times \frac{1660}{3.74+L}$,lbs*

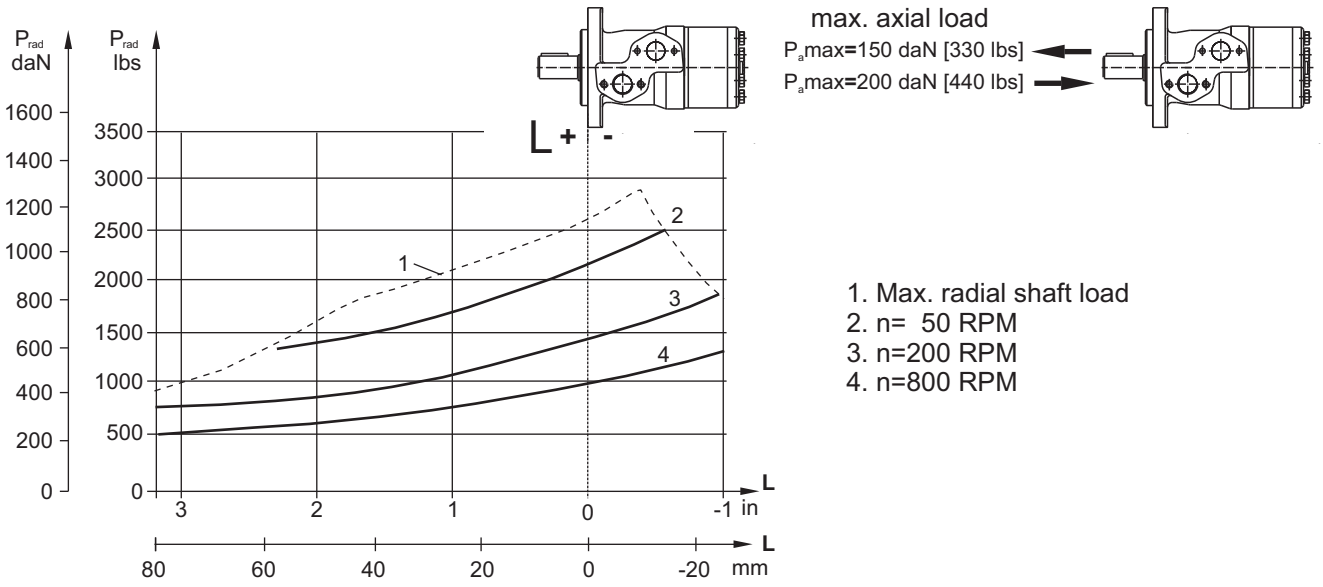
* n ≤ 200 RPM; max Prad=800 daN [1800 lbs] n ≥200 RPM; L < 55 mm [2.2 in]

Radial Shaft Load P_{rad} by L=30 mm [1.18 in]



B/MR...N...

Radial Shaft Load for needle bearing **pos.2** option **N**
The curves apply to a B10 bearing life of 2000 hours.



1. Max. radial shaft load
2. n= 50 RPM
3. n=200 RPM
4. n=800 RPM

ORDER CODE

	1	2	3	4	5	6	7
B/MR							

Pos.1 - Mounting Flange

omit - Oval mount, two holes

F - Oval mount, four holes

Pos.2 - Bearing Option

omit - slide bearing

N - needle bearings, only for pos.4 option C, CO, SH and SA

Pos.3 - Displacement code

80	- 80,3 cm^3/rev [4.90 in^3/rev]
100	- 99,8 cm^3/rev [6.09 in^3/rev]
125	- 125,7 cm^3/rev [7.67 in^3/rev]
160	- 159,6 cm^3/rev [9.74 in^3/rev]
200	- 199,8 cm^3/rev [12.19 in^3/rev]

Pos.4 - Shaft Extensions*

C	- ø25 straight, Parallel key A8x7x32 DIN6885
CO	- ø1" straight, Parallel key ¼"x¼"x1¼" BS46
SH	- ø25,32 splined BS 2059 (SAE 6B)
SA	- ø24,5 splined B25x22 DIN 5482

SHAFT WITH SEAL DIAMETER 35 mm /type ...B/

CB - ø32 straight, Parallel key A10x8x45 DIN6885

Pos.5 - Shaft Seal

omit - Shaft seal, for pressure and speed check page 24

Pos.6 - Additional Options (see page 77)

Pos.7 - Design Series

omit - Factory specified

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

The following combinations are not allowed:- **N** option with"**...B**"shafts

The motor-brakes are mangano-phosphatized as standard.

MOTOR-BRAKE ADDITIONAL OPTIONS

Additional Options Description	Order Code	Motor type						
		B/MR	BD/MR	MT/B	MT/BX	MTM/B	SW	TW
Low Leakage	LL	O	O	–	O	O	–	–
Low Speed Valving	LSV	O	O	–	O	O	–	–
Free Running	FR	–	O	–	–	O		–
Reinforced unit	HD	–	–	O	–	O	–	–
Reverse Rotation	R	O	O	O	O	O	–	–
Paint*	P	O	O	O	O	O	O	O
Corrosion Protected Paint*	PC	O	O	O	O	O	O	O
Special Paint**	PS	O	O	O	O	O	O	O
	PCS							
Check Valves		S	–	S***	S	–	S	S

O	Optional
–	Not applicable
S	Standard

* Colour at customer's request.
** Non painted feeding surfaces, colour at customer's request.
*** Without check valves for **"HD"** option.

⚠ For more information about HD option please contact with "M+S Hydraulic".

APPLICATION CALCULATION

VEHICLE DRIVE CALCULATIONS

1. Motor speed: n [RPM]

$$n=\frac{2.65 \times V_{km} \times i}{R_m} \qquad n=\frac{168 \times V_{ml} \times i}{R_{in}}$$

$\mathbf{v_{km}}$ - vehicle speed, km/h;
$\mathbf{v_{ml}}$ - vehicle speed, mil/h;
$\mathbf{R_m}$ - wheel rolling radius, m;
$\mathbf{R_{in}}$ - 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];
ρ - rolling resistance coefficient (Table 1).

Table 1

Rolling resistance coefficient In case of rubber tire rolling on different surfaces	
Surface	ρ
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]

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

α - gradient negotiation angle (Table 2).

Table 2

Grade %	α Degrees	Grade %	α Degrees
1%	0º 35'	12%	6º 5'
2%	1º 9'	15%	8º 31'
5%	2º 51'	20%	11º 19'
6%	3º 26'	25%	14º 3'
8%	4º 35'	32%	18º
10%	5º 43'	60%	31º

4. Accelerarion force: FA, daN [lbs]

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

$$FA=\frac{V_{km} \times G}{36 \times t}, [daN] \qquad FA=\frac{V_{ml} \times G}{22 \times t}, [lbs]$$

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 [lb-in]

Necessary torque moment for every hydraulic motor:

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

N - motor numbers;
η_M - mechanical gear efficiency (if it is available).

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

Necessary torque moment for every hydraulic motor:

$$M_W=\frac{G_W \times f \times R_m [R_{in}]}{i \times \eta_M}$$

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

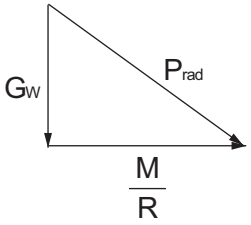
f - frictional factor;
$\mathbf{G_W}$ - total weight over the wheels, daN [lbs].

Table 3

Surface	Frictional factor 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 Prad is a sum of motion force and weight force acting on one wheel.



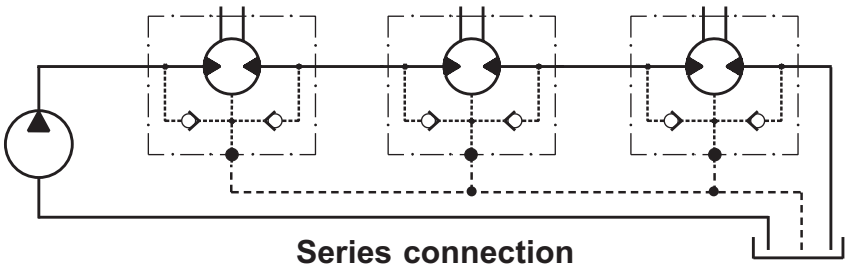
G_w - weight held by wheel;
P_{rad} - total radial loading of motor shaft;
M/R - motion force.

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

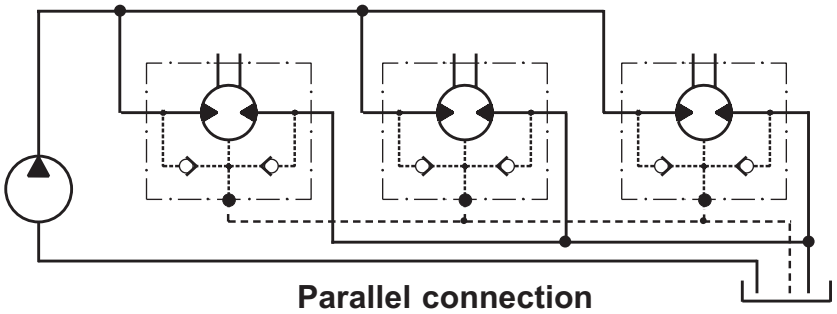
In accordance with calculated loadings the suitable motor from the catalogue is selected.

DRAINAGE SPACE AND DRAINAGE PRESSURE

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



Series connection



Parallel connection