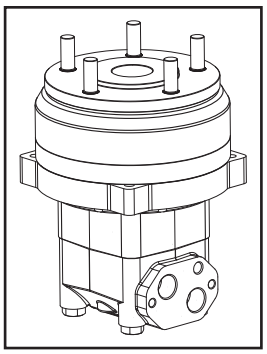
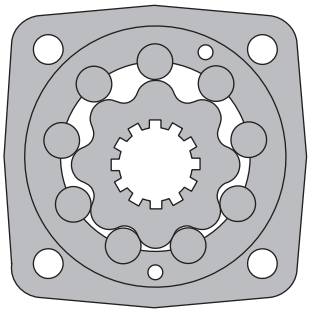
HYDRAULIC MOTOR-BRAKE MT/BX



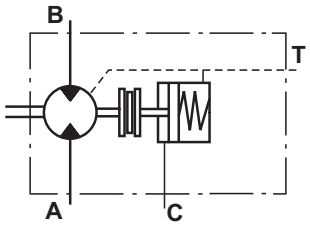
APPLICATION

» Conveyors
» Metal working machines
» Agricultural machines
» Road building machines
» Mining machinery
» Food industries
» Special vehicles
» Plastic and rubber machinery etc.



CONTENTS

Specification data 41
Dimensions and mounting 42
Permissible shaft loads 43
Order code 43



OPTIONS

» Model - Disc valve, roll-gerotor
» Fully integrated friction disk brake
» Side ports
» Shafts - straight, tapered, splined
» BSPP ports
» Other special features

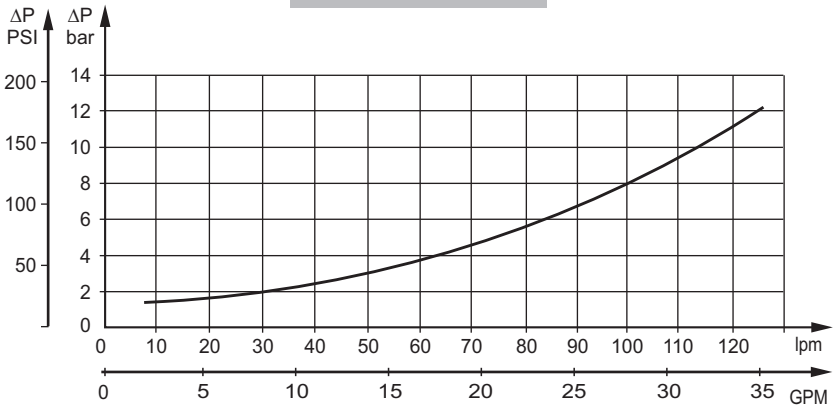
GENERAL

Max. Displacement,	cm^3/rev [in^3/rev]	523,6 [31.95]
Max. Speed,	[RPM]	780
Max. Torque,	daNm [lb-in]	cont.: 122 [10780] int.: 137 [12125]
Max. Output,	kW [HP]	40 [54]
Max. Pressure Drop,	bar [PSI]	cont.: 200 [2900] int.: 240 [3450]
Max. Oil Flow,	lpm [GPM]	150 [40]
Min. Speed,	[RPM]	5
Permissible Shaft Loads,	daNm [lb-in]	P_a=1000 [2248]
Pressure fluid		Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range,	°C [°F]	-40÷140 [-40÷284]
Optimal Viscosity range,	mm^2/s [SUS]	20÷75 [98÷347]
Filtration		ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	2,5 [.66]
	35 [164]	1,5 [.39]
210 [3045]	20 [98]	5 [1.32]
	35 [164]	3 [.79]

Pressure Losses



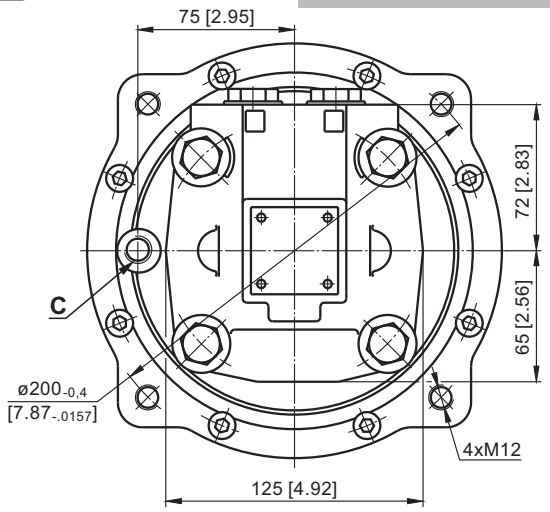
SPECIFICATION DATA

Type		MT/BX 160	MT/BX 200	MT/BX 250	MT/BX 315	MT/BX 400	MT/BX 500
Displacement, cm^3/rev [in^3/rev]		161,1 [9.83]	201,4 [12.29]	251,8 [15.36]	326,3 [19.90]	410,9 [25.06]	523,6 [31.95]
Max. Speed, [RPM]	Cont.	625	625	500	380	305	240
	Int.*	780	750	600	460	365	285
Max. Torque daNm [lb-in]	Cont.	47 [4160]	59 [5220]	73 [6460]	95 [8410]	108 [9560]	122 [10800]
	Int.*	56 [4960]	71 [6285]	88 [7790]	114 [10090]	126 [11150]	137 [12125]
Max. Output kW [HP]	Cont.	26,5 [36]	33,5 [45]	33,5 [45]	33,5 [45]	30 [40]	26,5 [36]
	Int.*	32 [43]	40 [54]	40 [54]	40 [54]	35 [45]	30 [40]
Max. Pressure Drop bar [PSI]	Cont.	200 [2900]	200 [2900]	200 [2900]	200 [2900]	180 [2600]	160 [2300]
	Int.*	240 [3450]	240 [3450]	240 [3450]	240 [3450]	210 [3050]	180 [2600]
Max. Oil Flow lpm [GPM]	Cont.	100 [26.5]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]
	Int.*	125 [33]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]
Max. Inlet Pressure bar [PSI]	Cont.	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]
	Int.*	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]
Max. Return Pressure with Drain Line,bar [PSI]	Cont.	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]
	Int.*	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		10 [150]	10 [150]	10 [150]	10 [150]	10 [150]	10 [150]
Min. Starting Torque daNm [lb-in]	At max. press. drop Cont.	34 [3010]	43 [3800]	53 [4690]	74 [6550]	84 [7435]	95 [8410]
	At max. press. drop Int.*	41 [3630]	52 [4600]	63 [5580]	89 [7880]	97 [8585]	106 [9380]
Min. Speed, [RPM]**		10	9	8	7	6	5
Static Torque of Brake, daNm [lb-in]		120 [10620]					
Min. Brake Release Pressure*, bar [PSI]**		12 [174]					
Max. Opening Pressure, bar [PSI]		30 [435]					
Max. Pressure in Drain Line, bar [PSI]		5 [73]					
Max. Pressure in Release Port C, bar [PSI]		75 [1088]					
Weight, kg [lb]	MT/BX A...	32,8 [72.3]	33,3 [73.4]	34,0 [74.9]	35,0 [77.2]	36,3 [80.0]	37,6 [82.9]
	MT/BX B...	32,2 [70.9]	32,8 [72.3]	33,5 [73.9]	34,5 [76.1]	35,8 [78.9]	37,1 [81.8]

* Intermittent operation: the permissible values may occur for max. 10% of every minute.
** Peak load: the permissible values may occur for max. 1% of every minute.
*** 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 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 mm^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

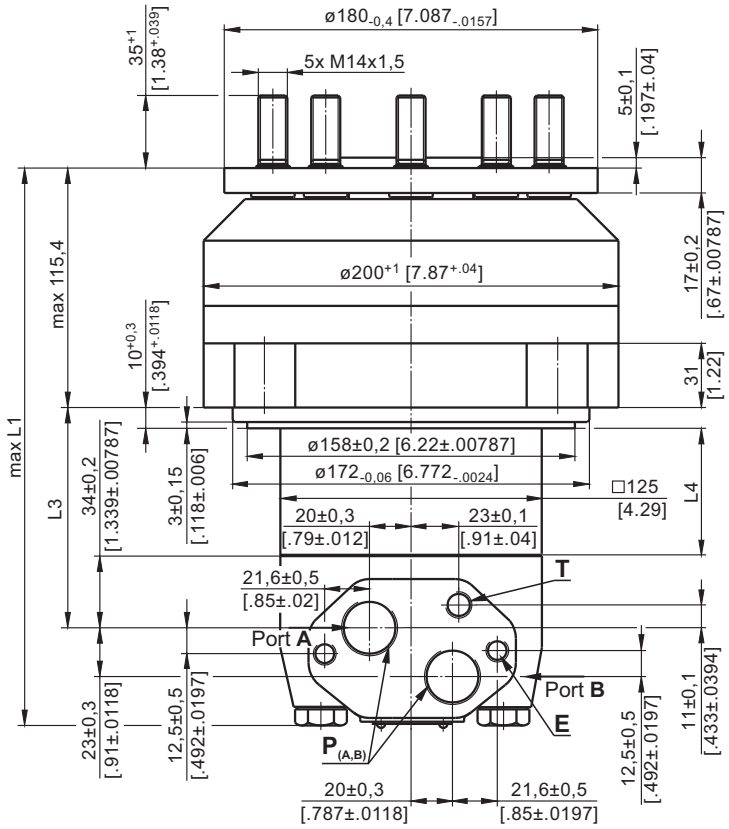


Type	L_1, mm [in]	L_2, mm [in]	L_3, mm [in]	*L_4, mm [in]
MT/BX 160	227 [8.94]	228 [8.98]	62,5 [2.46]	16,5 [.65]
MT/BX 200	232 [9.13]	233 [9.17]	67,5 [2.66]	21,5 [.85]
MT/BX 250	238 [9.37]	239 [9.41]	73,8 [2.91]	27,8 [1.09]
MT/BX 315	247 [9.72]	248 [9.76]	83,0 [3.27]	37,0 [1.46]
MT/BX 400	258 [10.16]	259 [10.20]	93,5 [3.68]	47,5 [1.87]
MT/BX 500	272 [10.71]	273 [10.75]	107,5 [4.23]	61,5 [2.42]

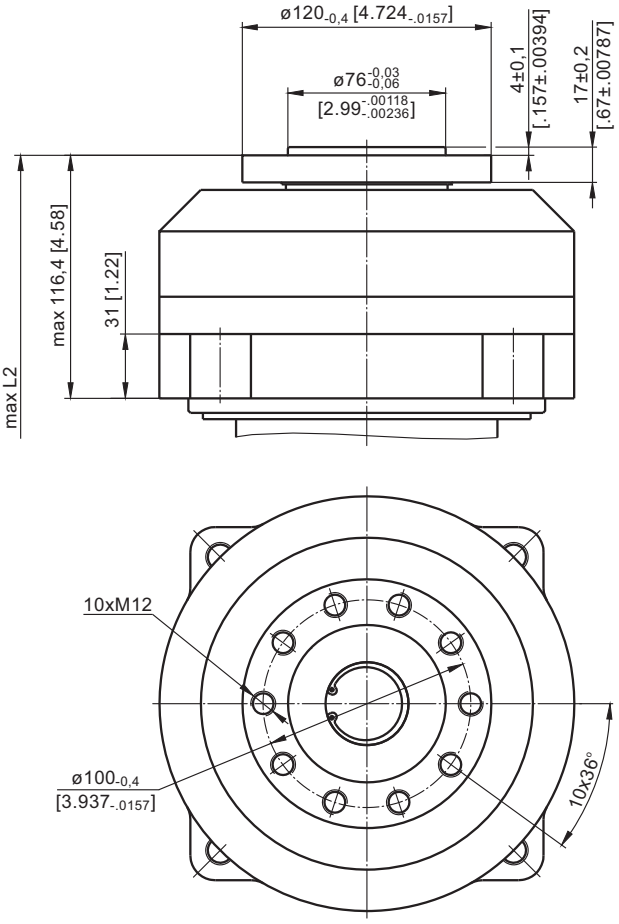
* The width of the gerolor is 3,5 mm [.14 in] greater than L_4.

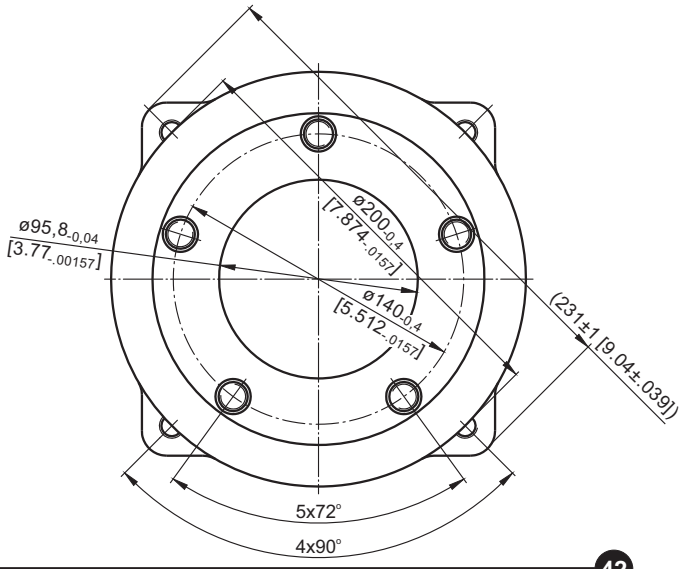
mm [in]

A Wheel bolt flange



B Threaded hole flange





	Versions	
	2	4
$P_{(A,B)}$	2xG3/4	2x1 1/16-12 UN
T - Drainage tap	G1/4	9/16-18 UNF
C - Brake release port	G1/4	9/16-18 UNF
E	2xM10	2xM10

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

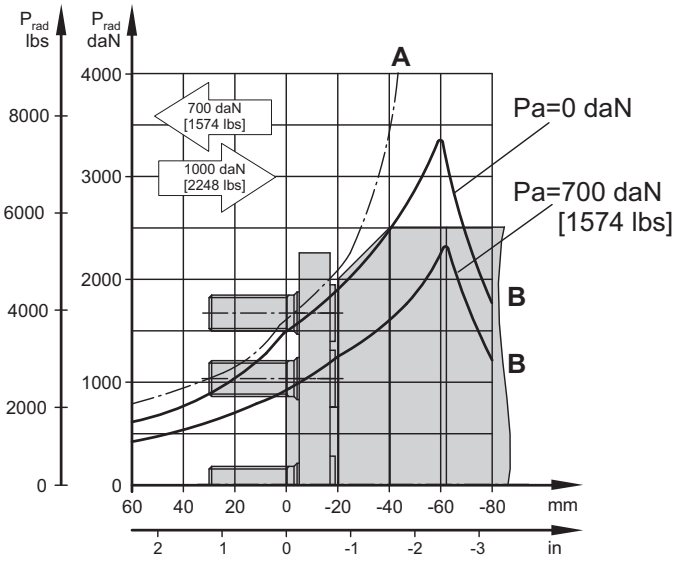
Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

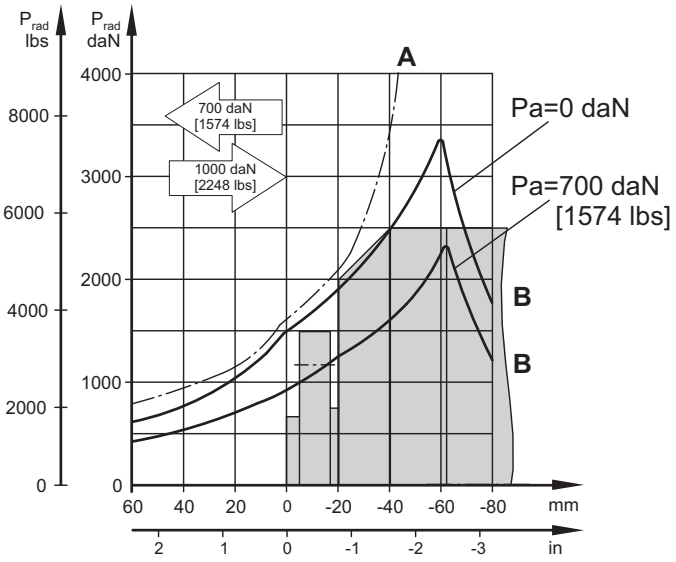
PERMISSIBLE SHAFT LOADS

The load diagram is valid for an average bearings life of 3000 hours at 50 RPM

A - Permissible radial shaft load.

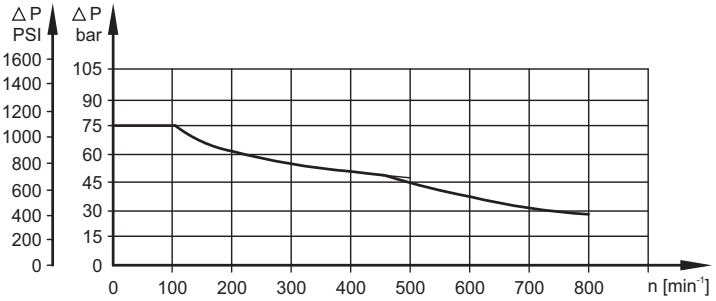
B - Max. radial shaft load. Any shaft load exceeding the values shown in the curve will involve a risk of breakage





Warning: Drain line should always be used.

MAX. PERMISSIBLE SHAFT SEAL PRESSURE



ORDER CODE

	1	2	3	4	5
M T / B X					

Pos.1 - Mounting Flange

A	- Wheel bolt flange 5xM14 on ø180
B	- Threated hole flange 10xM12 on ø120

Pos.2 - Displacement code

160	- 161,1 cm³/rev [9.83 in³/rev]
200	- 201,4 cm³/rev [12.29 in³/rev]
250	- 251,8 cm³/rev [15.36 in³/rev]
315	- 326,3 cm³/rev [19.90 in³/rev]
400	- 410,9 cm³/rev [25.06 in³/rev]
500	- 523,6 cm³/rev [31.95 in³/rev]

Pos.3 - Port Size/Type [standard manifold to each]

2	- side ports, 2xG3/4, G1/4, BSP thread, ISO 228
4	- side ports, 2x1 1/16-12 UN, O-ring, 9/16-18 INF

Pos.4 - Additional Options (see page 77)

Pos.5 - Design Series

omit - Factory specified

NOTES:

* Color at customer's request.

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 $M_W > M$

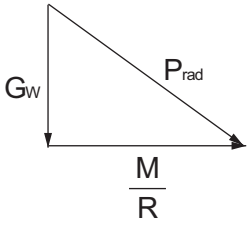
f - frictional factor;
$\mathbf{G_W}$ - total weight over the wheels, daN [lbs].

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.



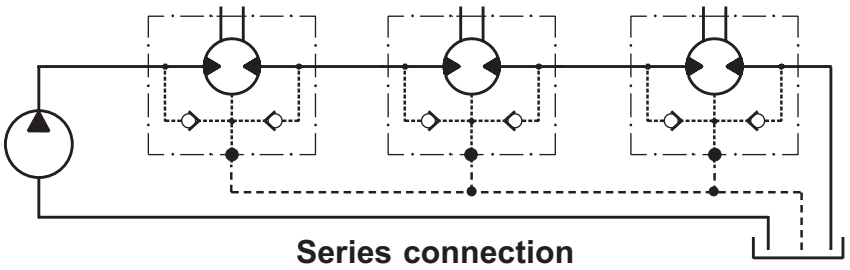
G_w - weight held by wheel;
P_{rad} - total radial loading of motor shaft;
M/R - motion force.

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

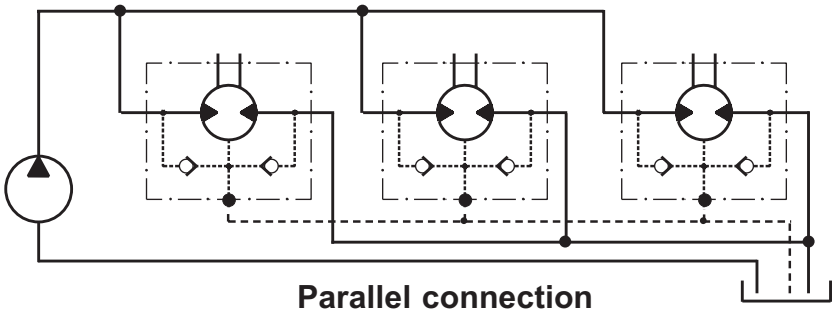
In accordance with calculated loadings the suitable motor from the catalogue is selected.

DRAINAGE SPACE AND DRAINAGE PRESSURE

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



Series connection



Parallel connection