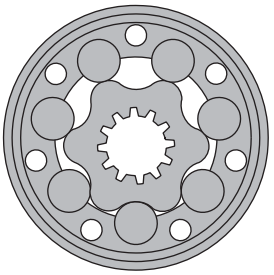
HYDRAULIC MOTOR-BRAKES RWB

APPLICATION

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



CONTENTS

OPTIONS

» Model - Spool valve, roll-gerotor
» Drum brake
» Shaft seal for high and low pressure
» SAE, Metric and BSPP ports
» Other special features

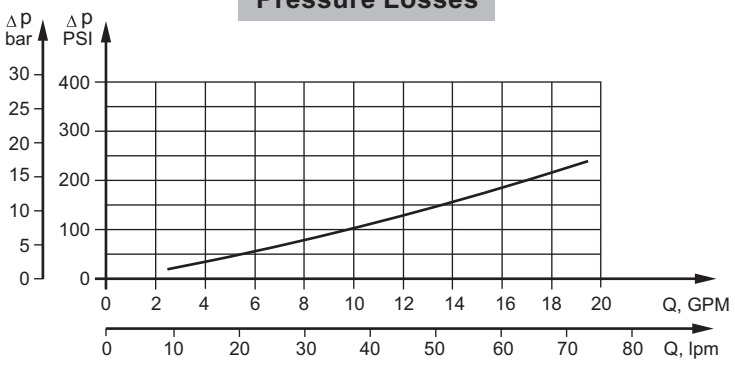
GENERAL

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

Oil flow in drain line

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

Pressure Losses



SPECIFICATION DATA

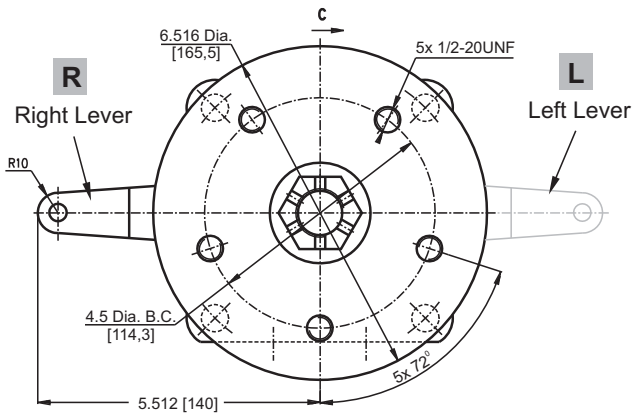
Type		RWB 50	RWB 80	RWB 100	RWB 125	RWB 160	RWB 200	RWB 250	RWB 315	RWB 400
Displacement, in³/rev		3.14	4.90	6.09	7.67	9.74	12.19	15.26	19.26	24.4
[cm³/rev]		[51,5]	[80,3]	[99,8]	[125,7]	[159,6]	[199,8]	[250,1]	[315,7]	[397]
Max. Speed,	Cont.	775	750	600	475	375	300	300	240	190
[RPM]	Int.*	1029	940	750	600	470	375	360	285	226
Max. Torque	Cont.	900 [10]	1770 [20]	2125 [24]	2655 [30]	3450 [39]	4000 [45]	4780 [54]	4870 [55]	5400 [61]
lb-in [daNm]	Int.*	1150 [13]	1947 [22]	2480 [28]	3010 [34]	3805 [43]	4425 [50]	5400 [61]	5580 [63]	6100 [69]
	Peak**	1505 [17]	2390 [27]	2832 [32]	3275 [37]	4070 [46]	4960 [56]	6280 [71]	7350 [83]	7700 [87]
Max. Output	Cont.	9.5 [7]	17 [12,5]	17.4 [13]	16.8 [12,5]	15.4 [11,5]	14.8 [11]	13.4 [10]	12 [9]	10.5 [7,8]
HP [kW]	Int.*	11.9 [8,5]	20.1 [15]	20.1 [15]	19.5 [14,5]	18.8 [14]	17.4 [13]	16.1 [12]	14.8 [11]	14.2 [10,6]
Max. Pressure Drop	Cont.	2030 [140]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	1960 [135]	1600 [110]
PSI [bar]	Int.*	2540 [175]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2320 [160]	2030 [140]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3045 [210]	2540 [175]
Max. Oil Flow	Cont.	11 [40]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	19.8 [75]	19.8 [75]	19.8 [75]
GPM [lpm]	Int.*	13 [50]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	23.8 [90]	23.8 [90]	23.8 [90]
Max. Inlet Pressure	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
PSI [bar]	Int.*	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Return Pres-	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
sure with Drain Line	Int.*	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]
PSI [bar]	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Starting Pressure with Unloaded Shaft, PSI [bar]		145 [10]	145 [10]	145 [10]	130 [9]	102 [7]	73 [5]	73 [5]	73 [5]	73 [5]
Min. Starting Torque	At max.press.									
lb-in [daNm]	drop Cont.	710 [8]	1330 [15]	1770 [20]	2215 [25]	2832 [32]	3630 [41]	4425 [50]	4425 [50]	4425 [50]
	At max.press.									
	drop Int.*	885 [10]	1505 [17]	2035 [23]	2480 [28]	3275 [37]	4070 [46]	4870 [55]	5840 [66]	5400 [61]
Min. Speed***, [RPM]		10	10	10	9	7	5	6	5	5

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

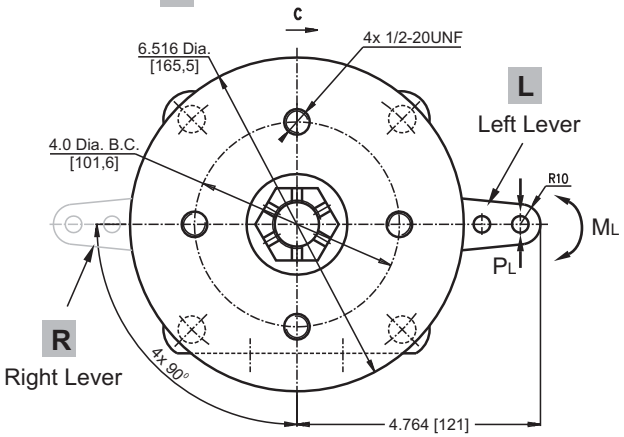
1. Intermittent speed and intermittent pressure drop must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 70 SUS [13 mm²/s] at 122ºF [50ºC].
5. Recommended maximum system operating temperature is 180ºF [82ºC].
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

B 5 Bolt Brake Drum

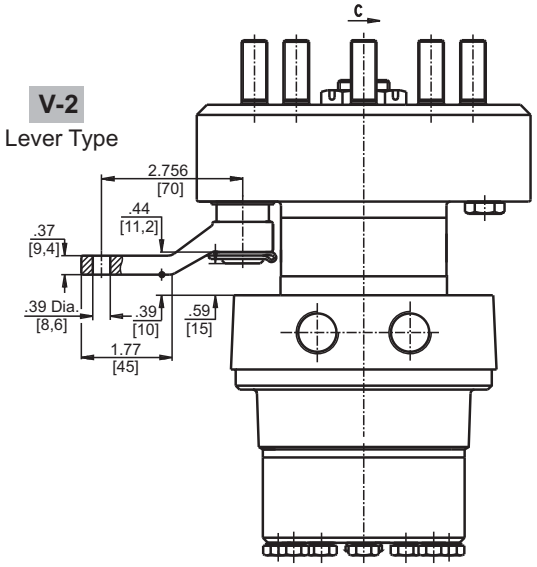


A 4 Bolt Brake Drum



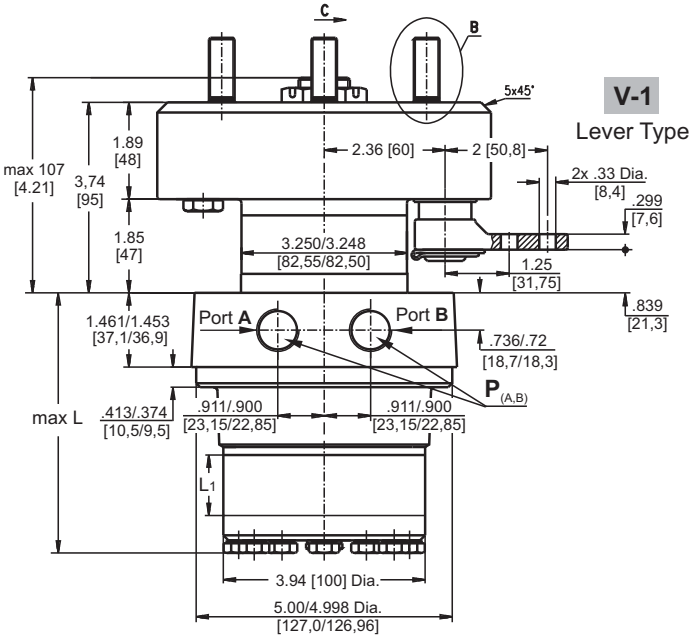
RW.../B2V-2R

V-2
Lever Type

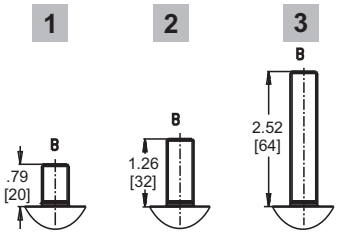


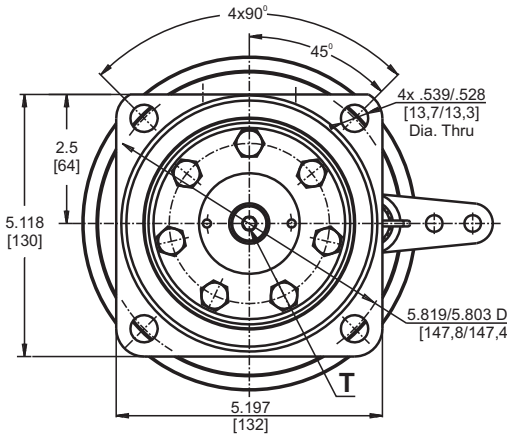
RW.../A2V-1L

V-1
Lever Type



Wheel Bolts Type





in [mm]

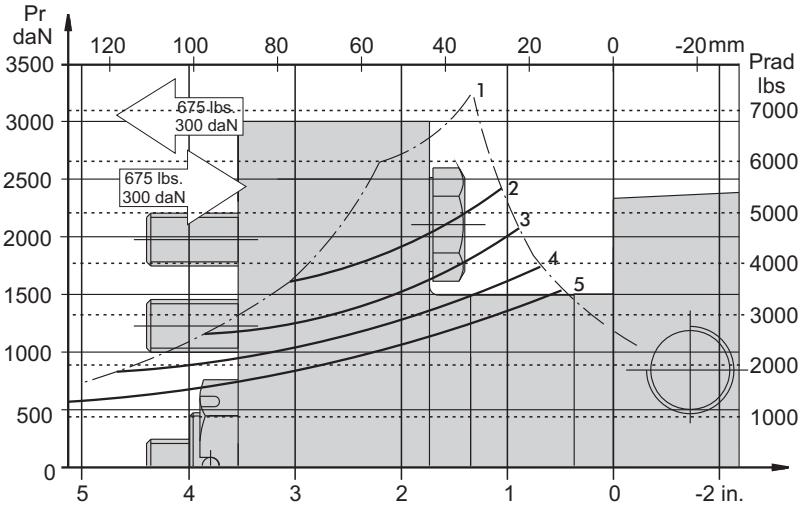
Type	Lmax, in [mm]	L1, in [mm]
RWB 50	4.25 [108,0]	.35 [9,0]
RWB 80	4.45 [113,0]	.55 [14,0]
RWB 100	4.59 [116,5]	.69 [17,4]
RWB 125	4.74 [120,5]	.86 [21,8]
RWB 160	4.98 [126,5]	1.09 [27,8]
RWB 200	5.26 [133,5]	1.37 [34,8]
RWB 250	5.61 [142,5]	1.71 [43,5]
RWB 315	6.04 [153,5]	2.16 [54,8]
RWB 400	6.63 [168,5]	2.73 [69,4]

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

	Versions		
	2	3	4
P(A,B)	2xG½	2xM22x1,5	2x⅞-14UNF O-ring
T	G¼	M14x1,5	7/16-20UNF O-ring

PERMISSIBLE SHAFT LOADS RWB

The curve applies to a B10 bearing life of 2000 hours when mineral-based hydraulic oil with sufficient content of anti-wear additives is used.

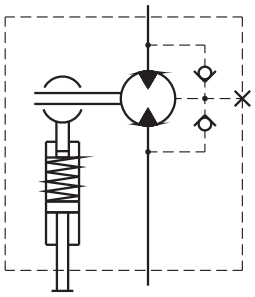


1. Permissible radial shaft load
2. Drawing by n= 50 RPM
3. Drawing by n=100 RPM
4. Drawing by n=200 RPM
5. Drawing by n=400 RPM

MAX. PERMISSIBLE SHAFT SEAL PRESSURE

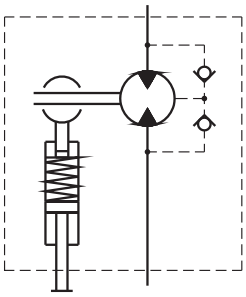
RWB...; RWB...UK motors with drain connection:

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



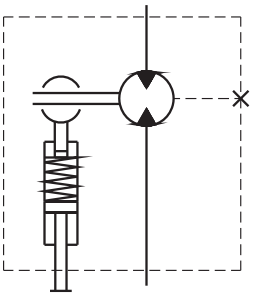
RWB...1 motors without drain connection:

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

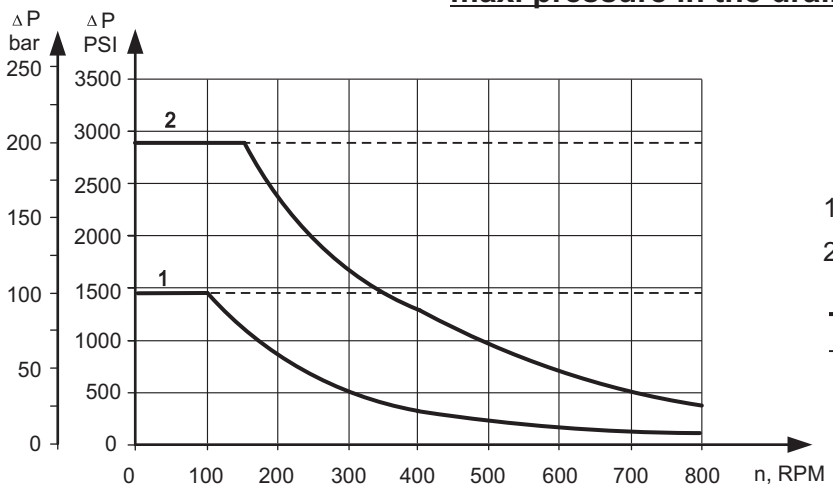


RWB...U motors with high pressure seal and drain connection:

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



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



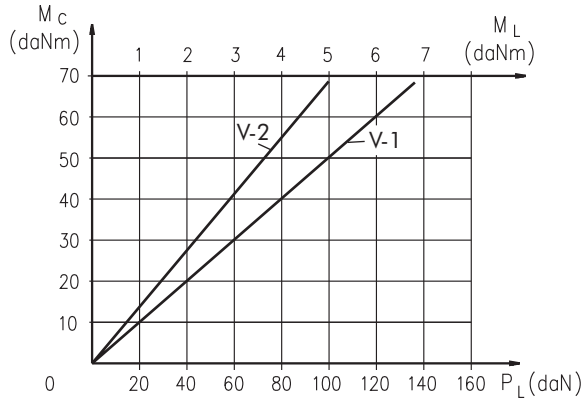
1: Drawing for Standard Shaft Seal

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

——— - continuous operations

- - - - - - intermittent operations

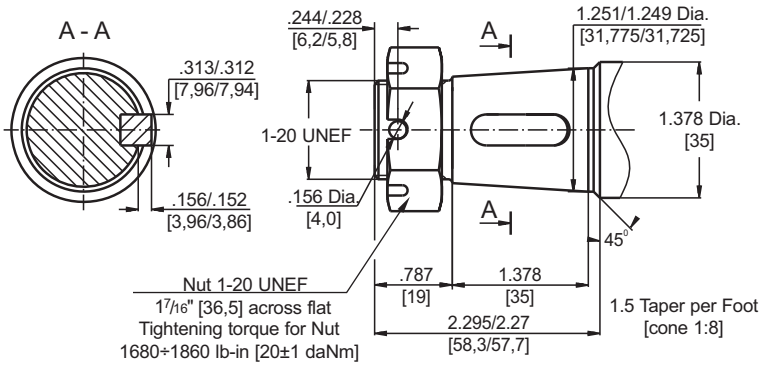
BRAKE HOLDING TORQUE



P_L - Brake Lever Load
M_C - Brake Torque
M_L - Brake Lever Torque
M_C max=68 daNm

SHAFT

1¼" [31,75],SAE J501 Tapered
Parallel key 5/16"x 5/16"x1"
Max. Torque 6815 lb-in [77 daNm]



Requirement max. Torque must not be exceeded.

ORDER CODE

	1	2	3	4	5	6		7	8	9	10	10	12
RWB							/						

Pos.1 - Displacement code

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

Pos.2 - Shaft Seal Version

omit - Standard shaft seal
U - High pressure shaft seal without check valves
UK - High pressure shaft seal with check valves

Pos.3 - Drain Port

omit - with drain port
1 - without drain port

Pos.4 - Port Size/Type [standard manifold to each]

2 - side ports, 2xG 1/2, G1/4, BSP thread, ISO 228
3 - side ports, 2xM22x1,5, M14x1,5, metric thread
4 - side ports, 2x7/8-14 UNF, O-ring, 7/16-20 UNF

Pos.5 - Additional Options

omit - none
LL - Low Leakage
LSV - Low Speed Valve

Pos. 6 - Rotation

omit - Standard Rotation
R - Reverse Rotation

Pos. 7 - Drum type

A - Drum brake with bolts 4x1/2-20 UNF on 4 Dia. [ø101,6]
B - Drum brake with bolts 5x1/2-20 UNF on 4.5 Dia. [ø114,3]

Pos. 8 - Drum Bolt type

1 - 1/2-20 UNF-2A L= .787 in [20 mm]
2 - 1/2-20 UNF-2A L=1.259 in [32 mm]
3 - 1/2-20 UNF-2A L=2.362 in [60 mm]

Pos. 9 - Lever Type

V-1 - Vertical Brake Lever 2x.33 Dia. [ø8,4] - 2 in [50,8 mm]
V-2 - Vertical Brake Lever .338 Dia. [ø8,6] - 2.76 in [70 mm]

Pos.10 - Lever Position

R - Right
L - Left

Pos.11 - Option (Paint)*

omit - no Paint
P - Painted
PC - Corrosion Protected Paint

Pos.12 - Design Series

omit - Factory specified

The hydraulic motor-brakes are mangano-phosphatized as standard.

MOTOR-BRAKE ADDITIONAL OPTIONS

Additional Options Description	Order Code	Motor type			
		B/HR	RWB	SW	TW
Low Leakage	LL	O	O	-	-
Low Speed Valving	LSV	O	O	-	-
Free Running	FR	-	-		-
Reverse Rotation	R	O	O	-	-
Paint*	P	O	O	O	O
Corrosion Protected Paint*	PC	O	O	O	O
Special Paint**	PS	O	O	O	O
	PCS				
Check Valves		-	O	S	S

O	Optional
-	Not applicable
S	Standard

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

APPLICATION CALCULATION

VEHICLE DRIVE CALCULATIONS

1.Motor speed: n, RPM

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

v_{km}- vehicle speed, km/h;
v_{mi}- vehicle speed, mile/h;
R_m- wheel rolling radius, m;
R_{in}- wheel rolling radius, in;
i- gear ratio between motor and wheels.
If no gearbox, use i=1.

2.Rolling resistance: RR, lbs [daN]
The resistance force resulted in wheels contact with different surfaces:

$$RR = G \times \rho$$

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

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

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. Acceleration force: FA, lbs [daN]
Force **FA** necessary for acceleration from 0 to maximum speed **v** and time **t** can be calculated with a formula:

$$FA = \frac{v_{mi} \times G}{22 \times t}, \text{[lbs]}; \qquad FA = \frac{v_{km} \times G}{36 \times t}, \text{[daN]}$$

FA- acceleration force, lbs [daN];
t- time, [s].

5.Tractive effort: DP, lbs [daN]
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, lbs [daN]
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, lb-in [daNm]
Necessary torque moment for every hydraulic motor:

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

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

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

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

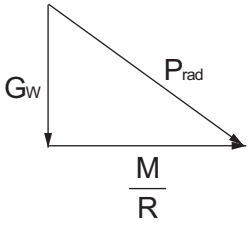
To avoid wheel slipping, the following condition should be observed $M_W > M$
f - frictional factor;
G_W- total weight over the wheels, lbs [daN].

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} , lbs [daN]

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



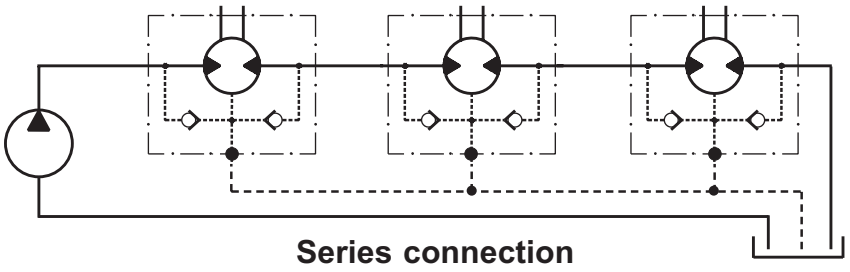
$$P_{rad}=\sqrt{G_w^2+\left(\frac{M}{R}\right)^2}$$

G_w - Weight held by wheel;
P_{rad} - Total radial loading of motor shaft;
M/R- Motion force.

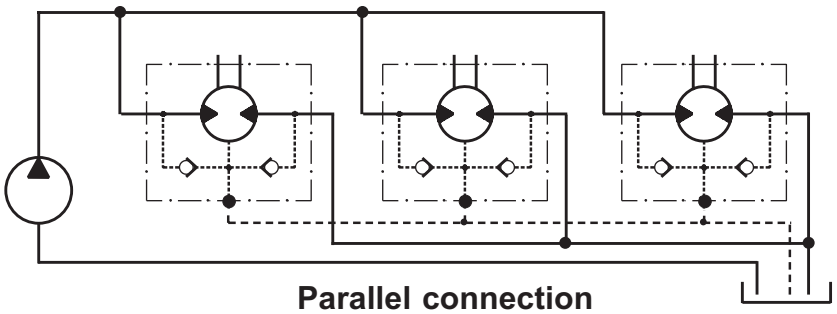
In accordance with calculated loadings the suitable motor from the catalogue is selected.

DRAINAGE SPACE AND DRAINAGE PRESSURE

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



Series connection



Parallel connection