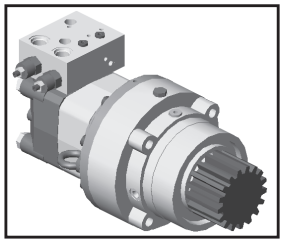
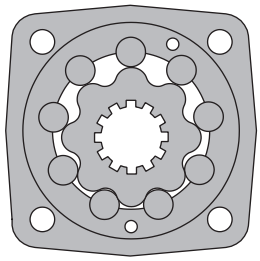
HYDRAULIC MOTOR-BRAKES TW500B350...V



APPLICATION

» Wheel drives
» Conveyors
» Rotators
» Positioners
» Winches
» Swing drives
» Door openers



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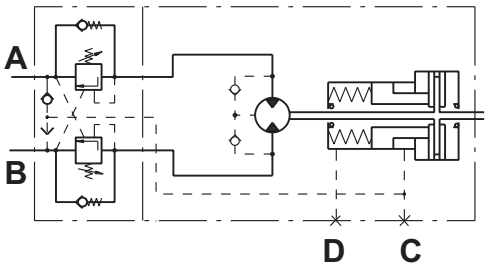
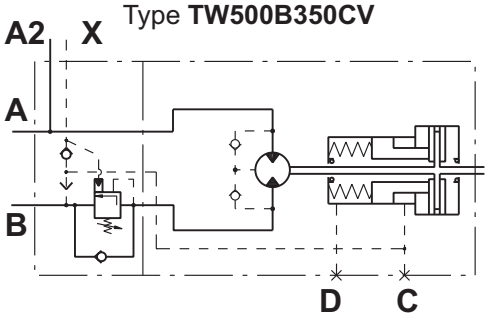
Motor-Brake
Type **TW500B350V**



Motor-Brake
Type **TW500B350CV**

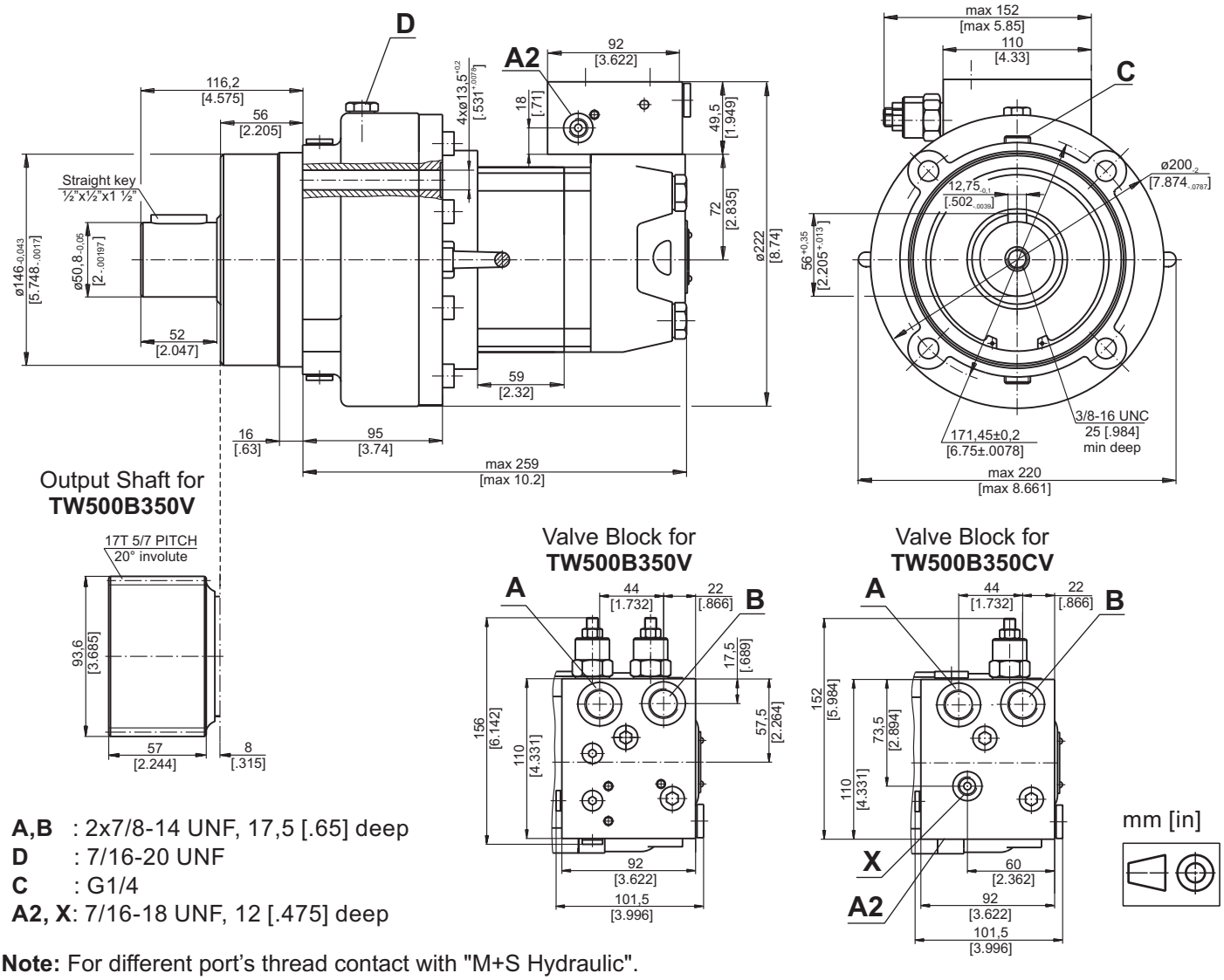


SPECIFICATION DATA

Type		TW500B350...V
Displacement, cm³/rev [in³/rev]		475 [29]
Max. Speed,	Cont.	40
RPM	Int.*	60
Max. Torque,	Cont.	114 [10 000]
daNm [lb-in]	Int.*	135 [12 000]
Max. Output,	Cont.	4,1 [5.4]
kW [HP]	Int.*	7,0 [9.39]
Max. Pressure Drop,	Cont.	170 [2500]
bar [PSI]	Int.*	200 [2900]
Max. Oil Flow,	Cont.	20 [5.3]
lpm [GPM]	Int.*	35 [9.2]
Max. Return Pressure without Drain Line or Max. Pressure in Drain Line, bar [PSI]		75 [1088]
Min. Starting Torque,	At max. press. drop Cont.	95 [8400]
daNm [lb-in]	At max. press. drop Int.*	112 [9940]
Min. Speed, RPM**		5
Static Torque for the Brake*, daNm [lb-in]**		164 [14515]
Release Pressure ±10%,	initial	22,5...27,5 [326...400]
bar [PSI]	full	28...34 [406...493]
Max. Steering Pressure, bar [PSI]		245 [3553]
Max. Pressure in Drain Space for the Brake, bar [PSI]		0,5 [7]
Pilot Ratio for the Valve		4,25:1

* Intermittent operation: the permissible values may occur for max. 10% of every minute.
** For speeds of 5 RPM lower than given, consult factory or your regional manager.
*** Static torque is obtained at working pressure - 0 bar [0 PSI].

DIMENSIONS AND MOUNTING



Output Shaft for **TW500B350V**

Valve Block for **TW500B350V**

Valve Block for **TW500B350CV**

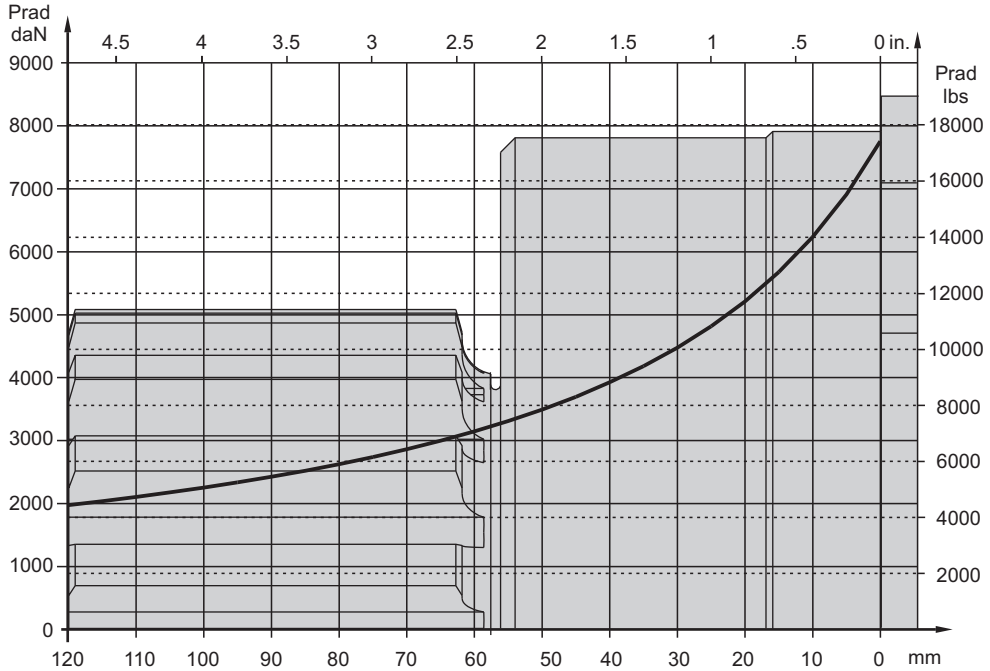
mm [in]

A,B : 2x7/8-14 UNF, 17,5 [.65] deep
D : 7/16-20 UNF
C : G1/4
A2, X: 7/16-18 UNF, 12 [.475] deep

Note: For different port's thread contact with "M+S Hydraulic".

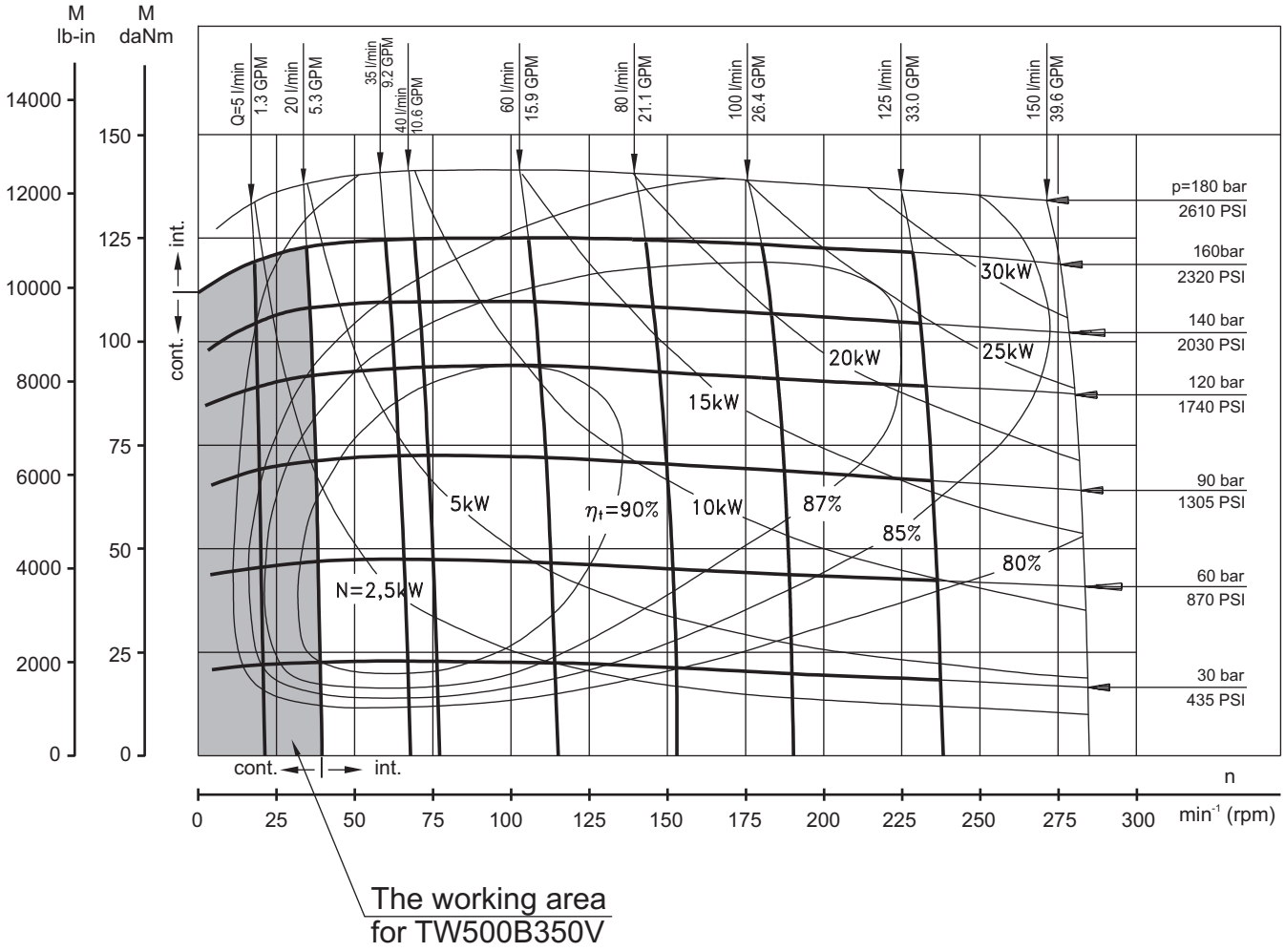
PERMISSIBLE SHAFT LOADS

The curve applies to a B10 bearing life of 3000 hours at 40 RPM.



FUNCTION DIAGRAMS

TW 500



ORDER CODE

1		2	3	4	5	6	7	8
T	W	500	B	350		V		

Pos.1 - Type

T - Motor MLHT

Pos.2 - Displacement code

Pos.3 - Brake

Pos.4 - Brake Type

Pos.5 - Shaft Extension*

omit - 17T 5/7 pitch 20° involute

C - Straight key ½"x½"x1 ½"

Pos.6 - Valve

Pos.7 - Special Features (see page 64)

Pos.8 - Design Series

omit - Factory specified

The motor-brakes are mangano-phosphatized as standard.

MOTOR-BRAKE SPECIAL FEATURES

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

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

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

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

$$RR=G \times \rho$$

G- total weight loaded on vehicle, daN [lbs];
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%	0° 35'	12%	6° 5'
2%	1° 9'	15%	8° 31'
5%	2° 51'	20%	11° 19'
6%	3° 26'	25%	14° 3'
8%	4° 35'	32%	18°
10%	5° 43'	60%	31°

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

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

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.

$$TE=1{,}1x(RR + GR + FA + DP)$$

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:

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

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

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

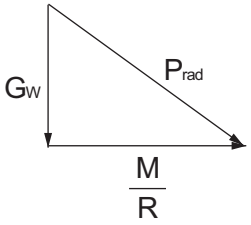
$$M_W=\frac{G_W \times f \times R_m[R_{in}]}{i \times h_M}$$

To avoid wheel slipping, the following condition should be observed $M_W > M$
f - frictional factor;
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 **P_{rad}** is a sum of motion force and weight force acting on one wheel.



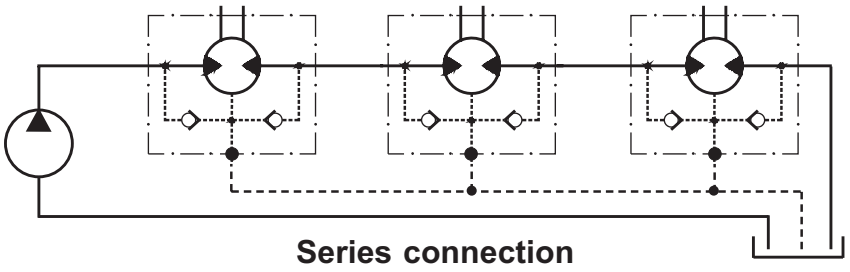
G_W - Weight held by wheel;
P_{rad} - Total radial loading of motor shaft;
M/R- Motion force.

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

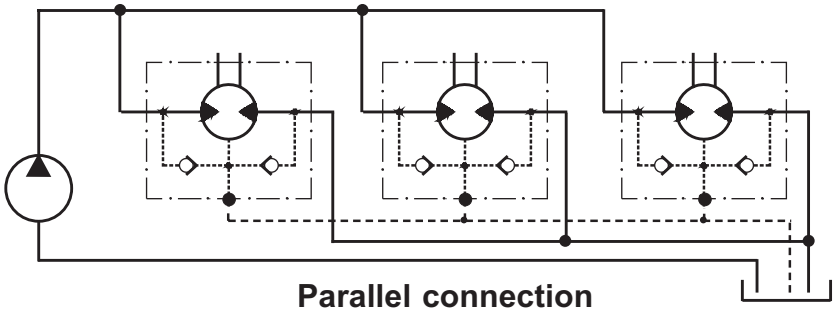
In accordance with calculated loadings the suitable motor from the catalogue is selected.

DRAINAGE SPACE AND DRAINAGE PRESSURE

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



Series connection



Parallel connection