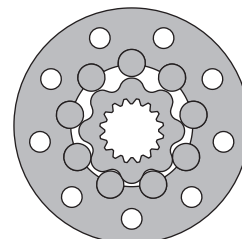
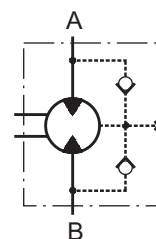
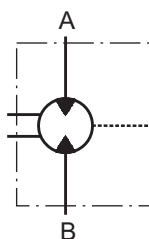


HYDRAULIC MOTORS MLHTM



APPLICATION

- » Skid Steer Loaders
- » Metal working machines
- » Trenchers
- » Augers
- » Agricultural machines
- » Road building machines
- » Special vehicles
- » Woodworking and sawmill machinery
- » Conveyors etc.



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Dimensions and mounting MLHTM6V	30
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OPTIONS

- » Model - Disc valve, roll-gerotor
- » Flange with wheel mount
- » Short motor
- » Side ports
- » Shafts - straight, splined and tapered
- » SAE and BSPP ports;
- » Other special features.

EXCELLENCE

- » High torque and pressure drop
- » High inlet pressure
- » High starting torque
- » Improved efficiency at high pressure drop
- » Smooth operation at low speed

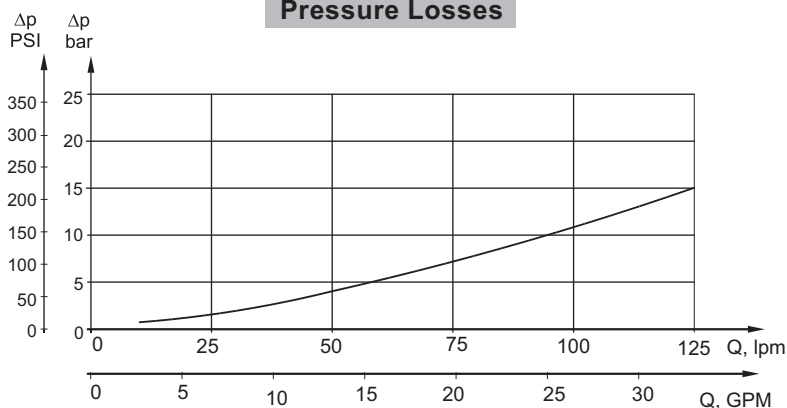
GENERAL

Max. Displacement, in ³ /rev [cm ³ /rev]	44.2 [724,3]
Max. Speed, [RPM]	750
Max. Torque, lb-in [daNm]	cont.: 16200 [183] int.: 20270 [229]
Max. Output, HP [kW]	94 [70]
Max. Pressure Drop, PSI [bar]	cont.: 3600 [250] int.: 5080 [350]
Max. Oil Flow, GPM [lpm]	40 [150]
Min. Speed, [RPM]	5
Permissible Shaft Loads lbs [daN]	P _a =2250 [1000]
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, °F [°C]	-40÷284 [-40÷140]
Optimal Viscosity range, SUS [mm²/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]
2030 [140]	98 [20]	.660 [2,5]
	164 [35]	.396 [1,5]
3045 [210]	98 [20]	1.321 [5]
	164 [35]	.793 [3]

Pressure Losses



SPECIFICATION DATA

Type		MLHTM 200	MLHTM 250	MLHTM 315	MLHTM 400	MLHTM 470	MLHTM 500	MLHTM 630	MLHTM 725
Displacement, in ³ /rev [cm ³ /rev]		12.29 [201,4]	15.36 [251,8]	19.9 [326,3]	25.06 [410,9]	28.97 [475]	31.95 [523,6]	38.52 [631,2]	44.2 [724]
Max. Speed, [RPM]	Cont.	625	500	380	305	260	240	190	170
	Int.*	750	600	460	365	315	285	230	215
Max. Torque, lb-in [daNm]	Cont.	6550 [74]	7965 [90]	10265 [116]	13010 [147]	15135 [171]	15225 [172]	16200 [183]	14160 [160]
	Int.*	9030 [102]	11330 [128]	14425 [163]	18232 [206]	16030 [215]	19030 [215]	20270 [229]	17000 [192]
	Peak**	10180 [115]	12745 [144]	16460 [186]	20800 [235]	21240 [240]	21240 [240]	24250 [274]	21240 [240]
Max. Output, HP [kW]	Cont.	55 [41]	55 [41]	55 [41]	55 [41]	55 [41]	50 [37,5]	37.5 [28]	35 [26]
	Int.*	87 [65]	94 [70]	94 [70]	94 [70]	74 [55]	68 [51]	56 [42]	54 [40]
Max. Pressure Drop, PSI [bar]	Cont.	3600 [250]	3600 [250]	3600 [250]	3600 [250]	3600 [250]	3340 [230]	2900 [200]	2320 [160]
	Int.*	5080 [350]	5080 [350]	5080 [350]	5080 [350]	4570 [315]	4060 [280]	3600 [250]	3045 [210]
	Peak**	5800 [400]	5800 [400]	5800 [400]	5800 [400]	5080 [350]	4640 [320]	4350 [300]	3770 [260]
Max. Oil Flow, GPM [lpm]	Cont.	33 [125]	33 [125]	33 [125]	33 [125]	33 [125]	33 [125]	33 [125]	33 [125]
	Int.*	40 [150]	40 [150]	40 [150]	40 [150]	40 [150]	40 [150]	40 [150]	40 [150]
Max. Inlet Pressure, PSI [bar]	Cont.	3920 [270]	3920 [270]	3920 [270]	3920 [270]	3920 [270]	3920 [270]	3920 [270]	3920 [270]
	Int.*	5370 [370]	5370 [370]	5370 [370]	5370 [370]	5370 [370]	5370 [370]	5370 [370]	5370 [370]
	Peak**	6100 [420]	6100 [420]	6100 [420]	6100 [420]	6100 [420]	6100 [420]	6100 [420]	6100 [420]
Max. Starting Pressure with Unloaded Shaft, PSI [bar]		90 [6]	90 [6]	90 [6]	90 [6]	90 [6]	90 [6]	90 [6]	90 [6]
Min. Starting Torque, lb-in [daNm]		5310 [60]	6640 [75]	8585 [97]	10800 [122]	12570 [142]	12655 [143]	12830 [145]	13100 [148]
Min. Speed***, [RPM]		5	5	5	5	5	5	5	5
Weight, lb [kg]	MLHTM	59.3 [26,9]	60.2 [27,3]	62 [28,1]	64 [29]	65.5 [29,7]	66.6 [30,2]	65.5 [29,7]	68.4 [31]
	MLHTMW	60.4 [27,4]	61.3 [27,8]	63.1 [28,6]	65.1 [29,5]	66.6 [30,2]	67.7 [30,7]	66.6 [30,2]	69.5 [31,5]
	MLHTMV	34.6 [15,7]	35.5 [16,1]	37.3 [16,9]	39.3 [17,8]	40.8 [18,5]	41.9 [19]	40.8 [18,5]	43.7 [19,8]

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

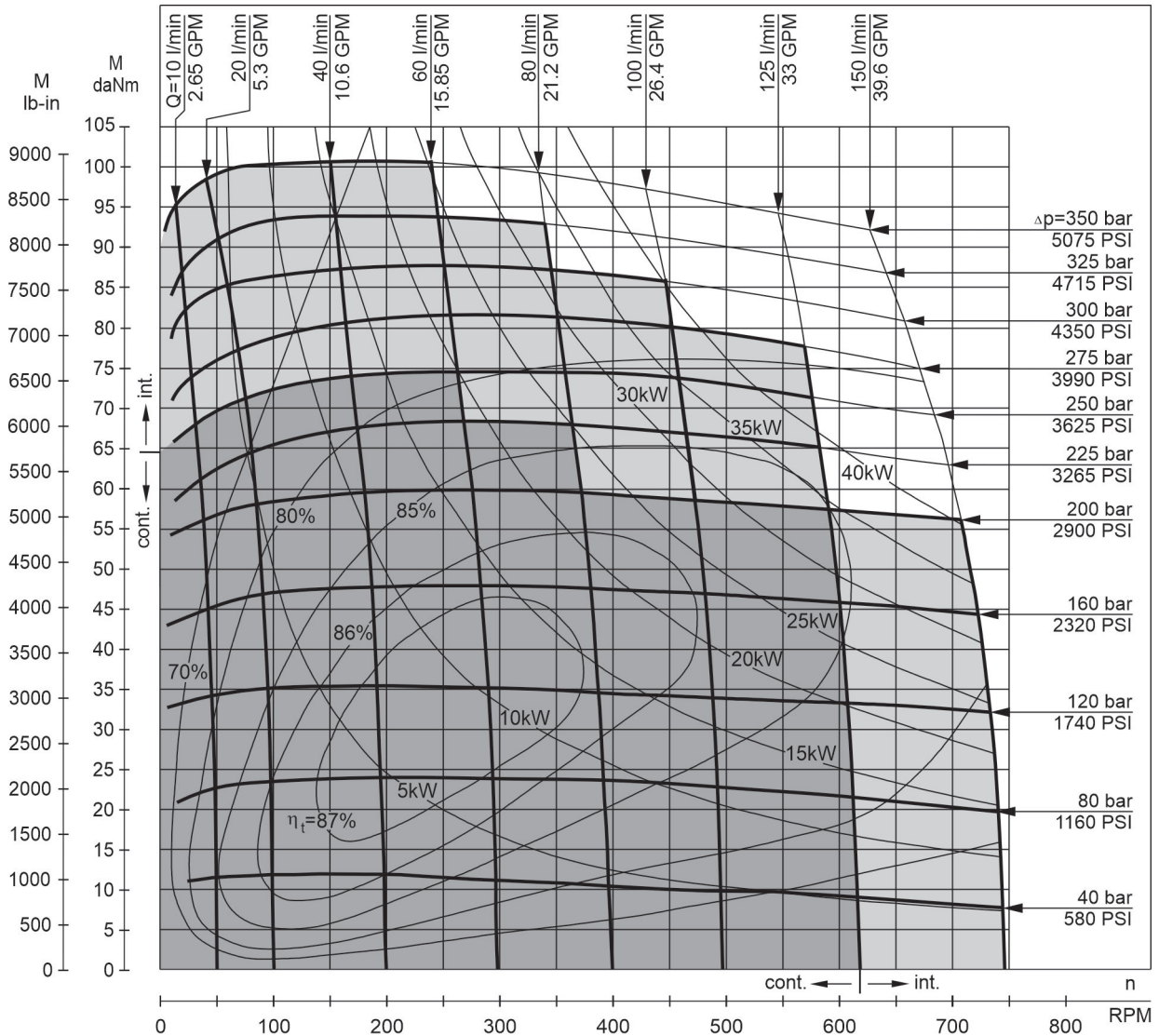
** Peak load: the permissible values may occur for max. 1% of every minute.

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

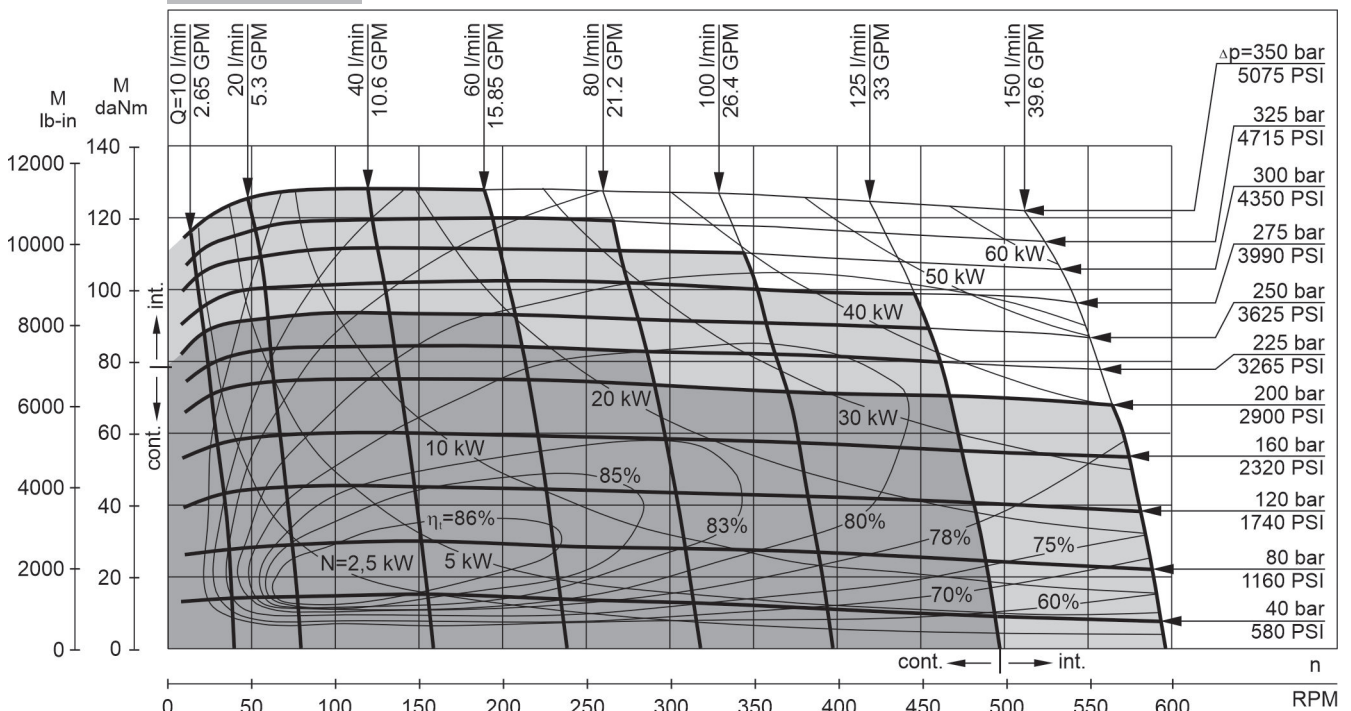
- Intermittent speed and intermittent pressure must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
- Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP (DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
- Recommended minimum oil viscosity 70 SUS [13 mm²/s] at 122°F [50°C].
- Recommended maximum system operating temperature is 180°F [82°C].
- To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

MLHTM 200

FUNCTION DIAGRAMS



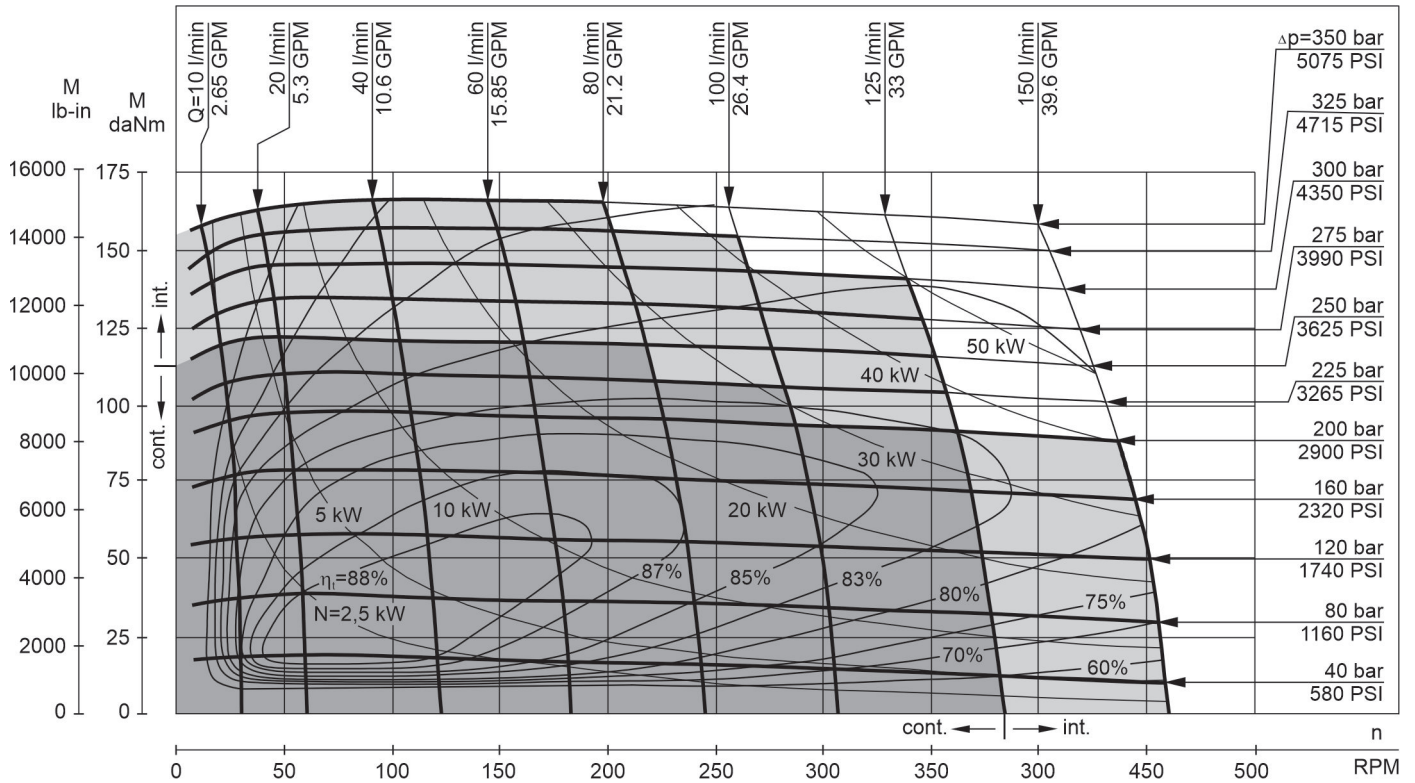
MLHTM 250



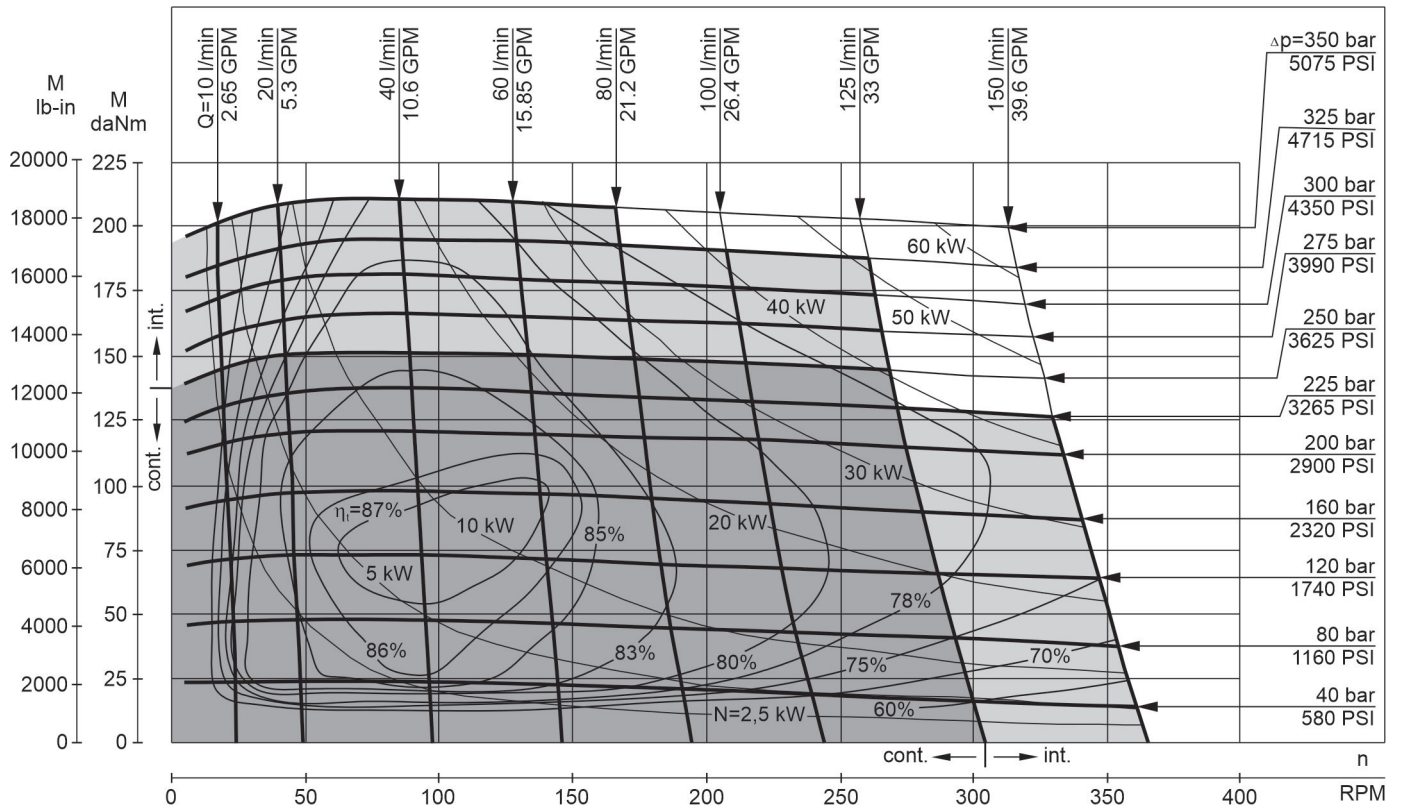
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHTM 315



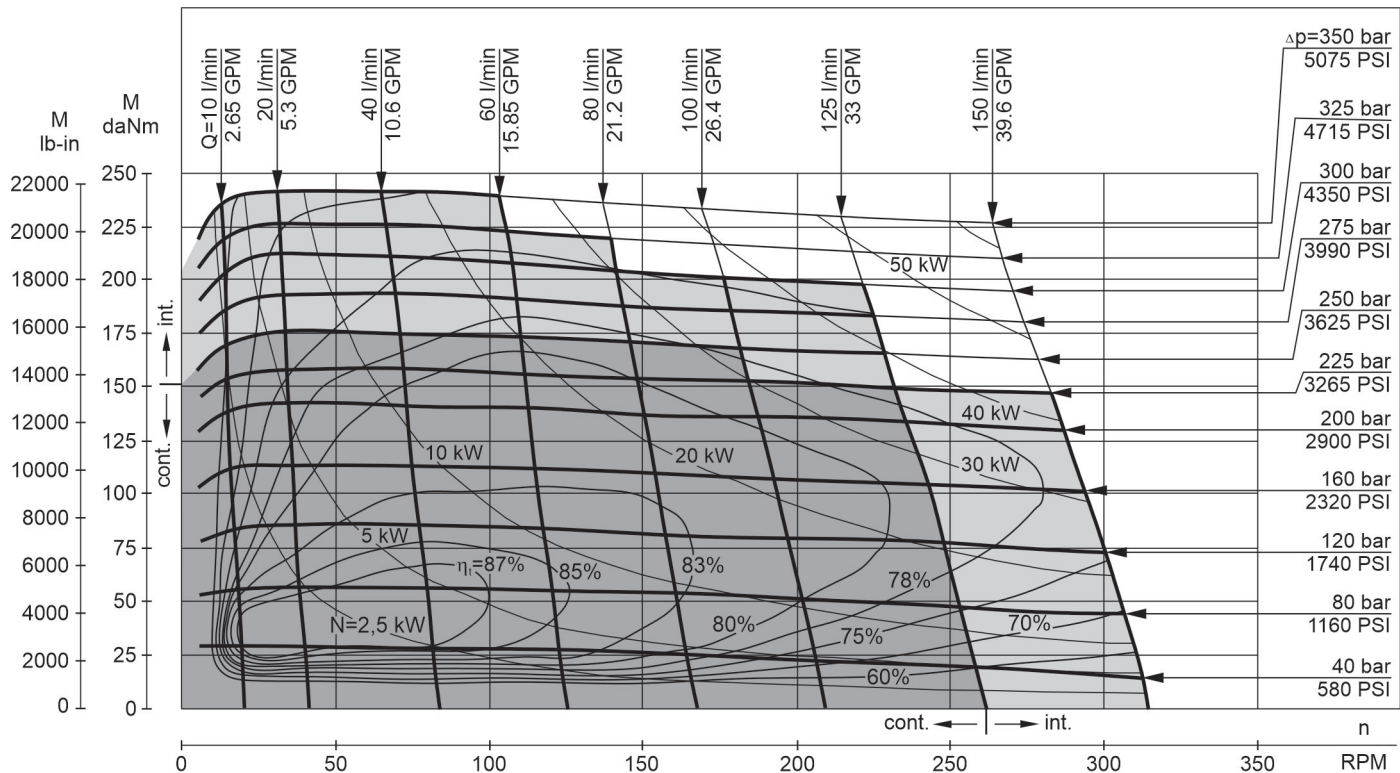
MLHTM 400



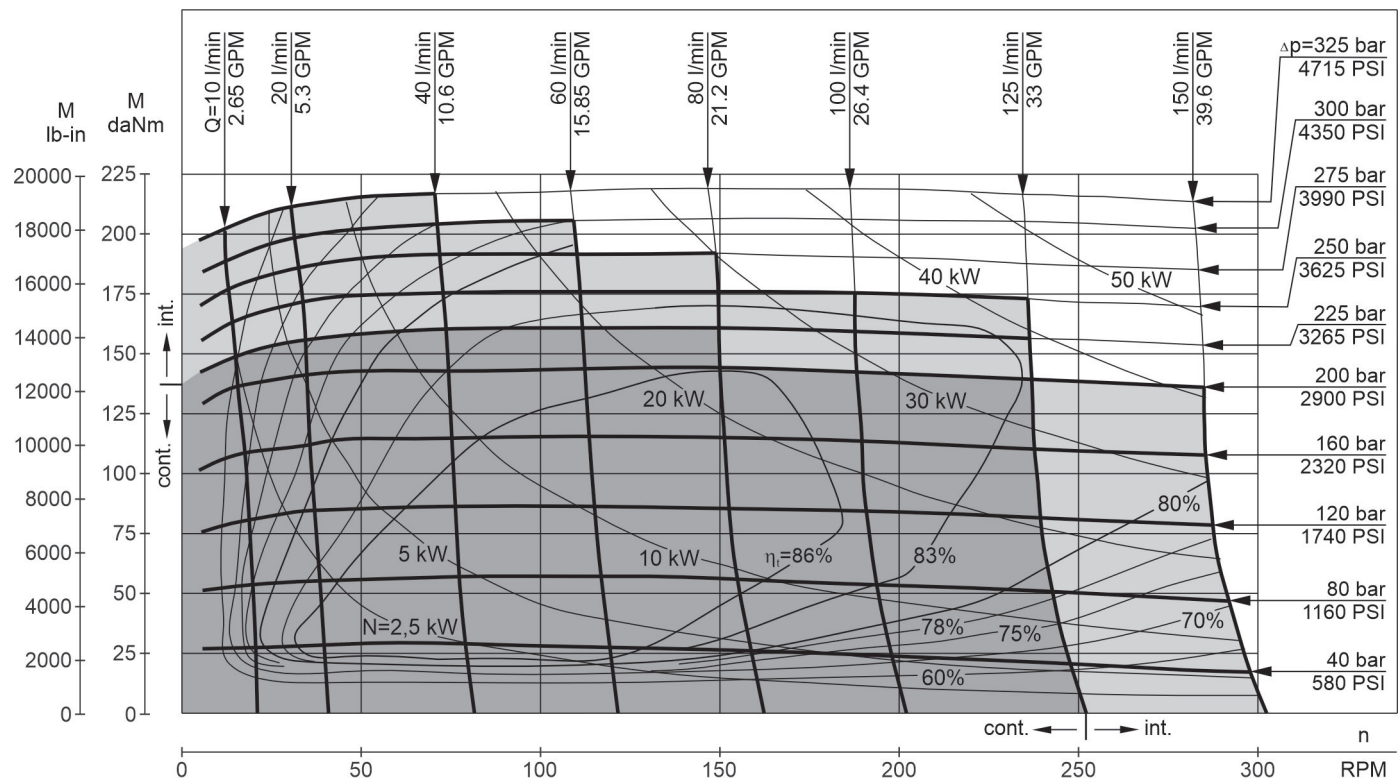
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHTM 470



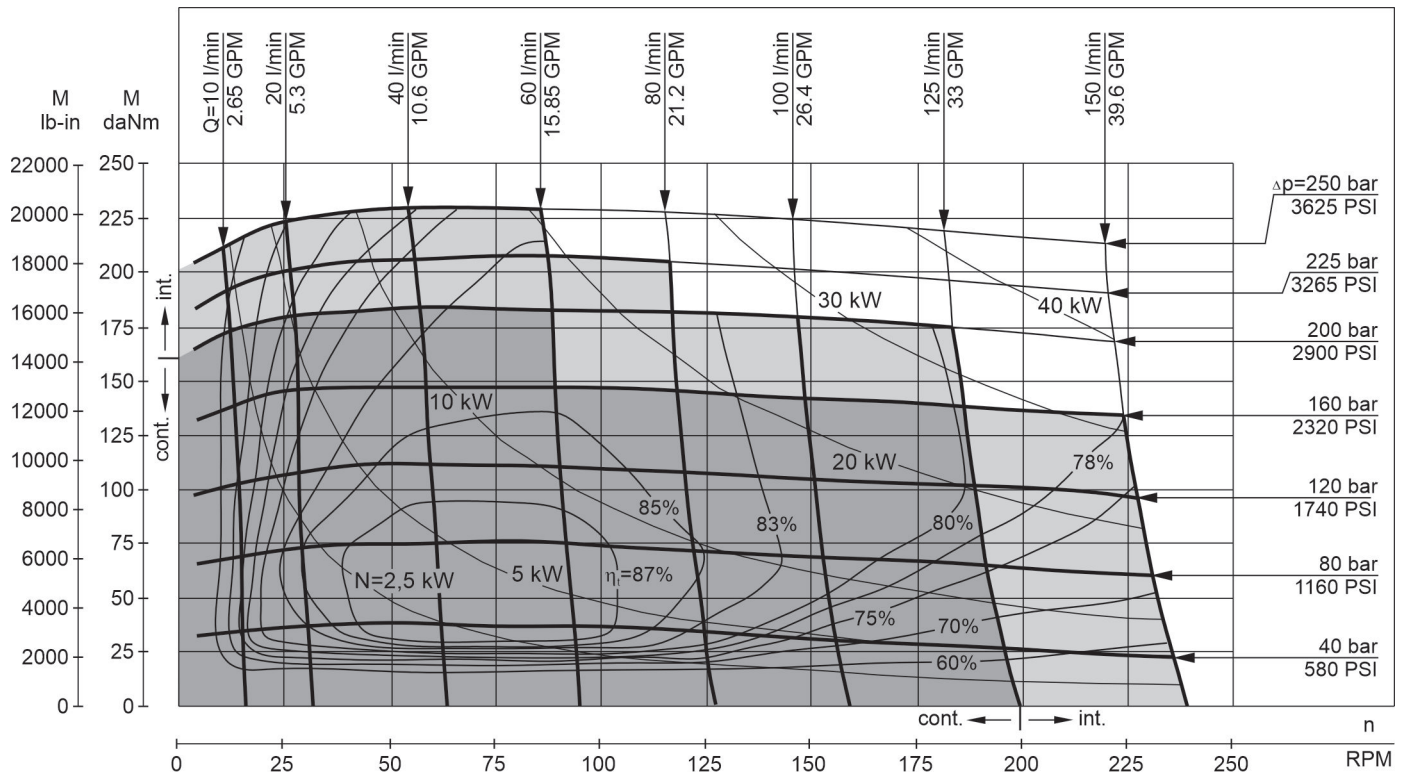
MLHTM 500



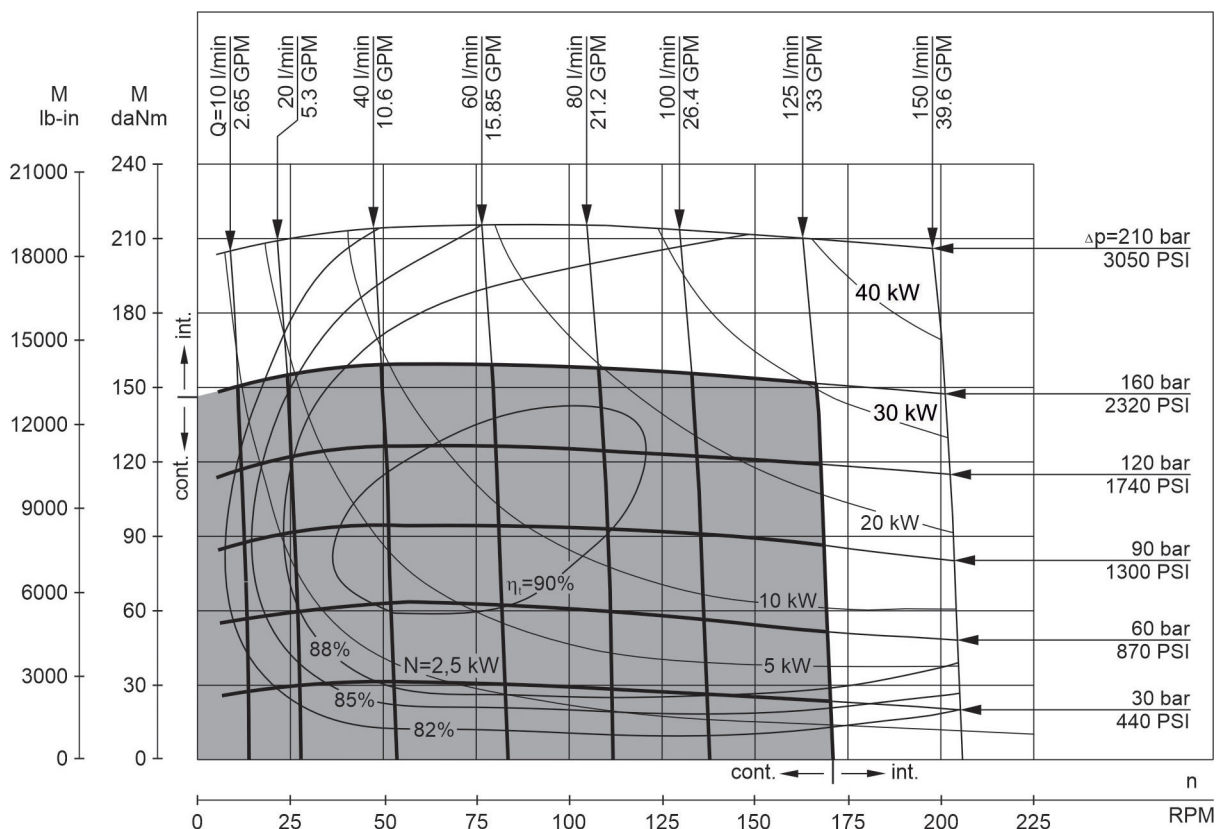
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHTM 630

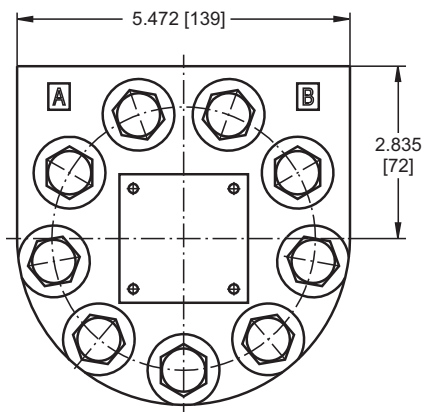
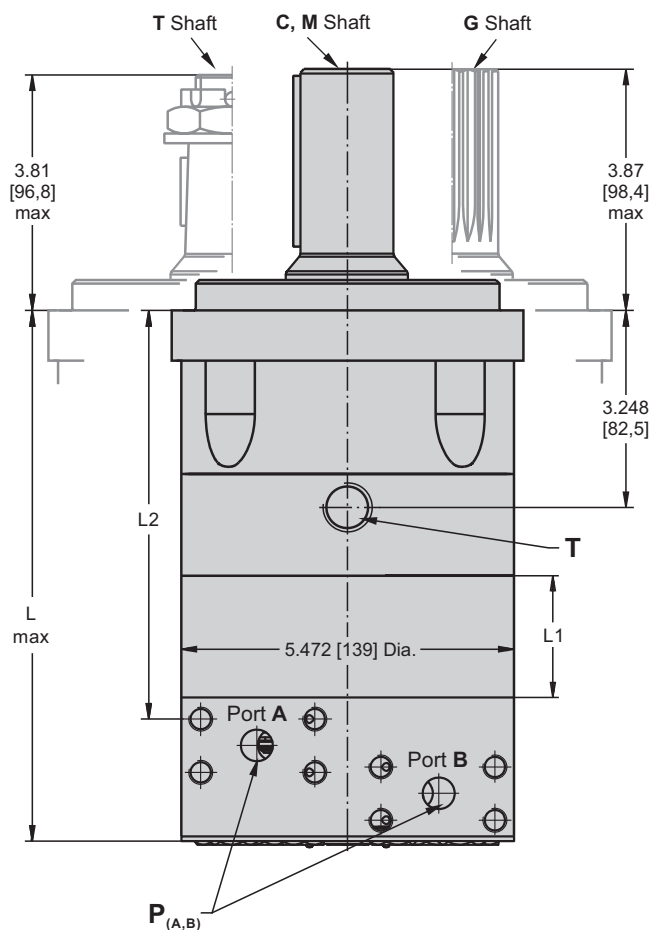
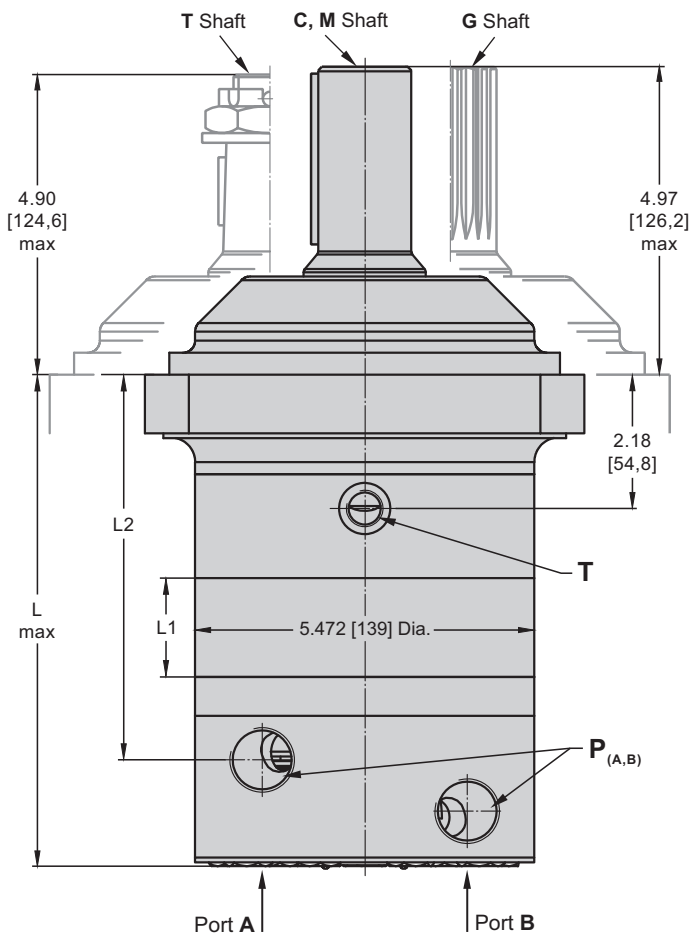


MLHTM 725



The function diagrams data is for average performance of randomly selected motors at back pressure 72.5÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

DIMENSIONS AND MOUNTING DATA
for MLHTM and MLHTMC - versions 2, 4, 5



Warning: Drain line should always be used. This is not applicable for option "1" (with check valves)!

	Versions		
	2	4	5
$P_{(A,B)}$	2xG3/4 .67 in [17] depth	2x1 $\frac{1}{16}$ -12UN O-ring .67 in [17] depth	2x3/4"SAE PSI3000 with 8xM10 threads .39 in [10] depth
T	G1/4 .47 in [12] depth	$\frac{9}{16}$ -18UN .51 in [13] depth	G1/4 .47 in [12] depth

Flange Dim.
See Page 26

Shaft Dim.
See Page 28

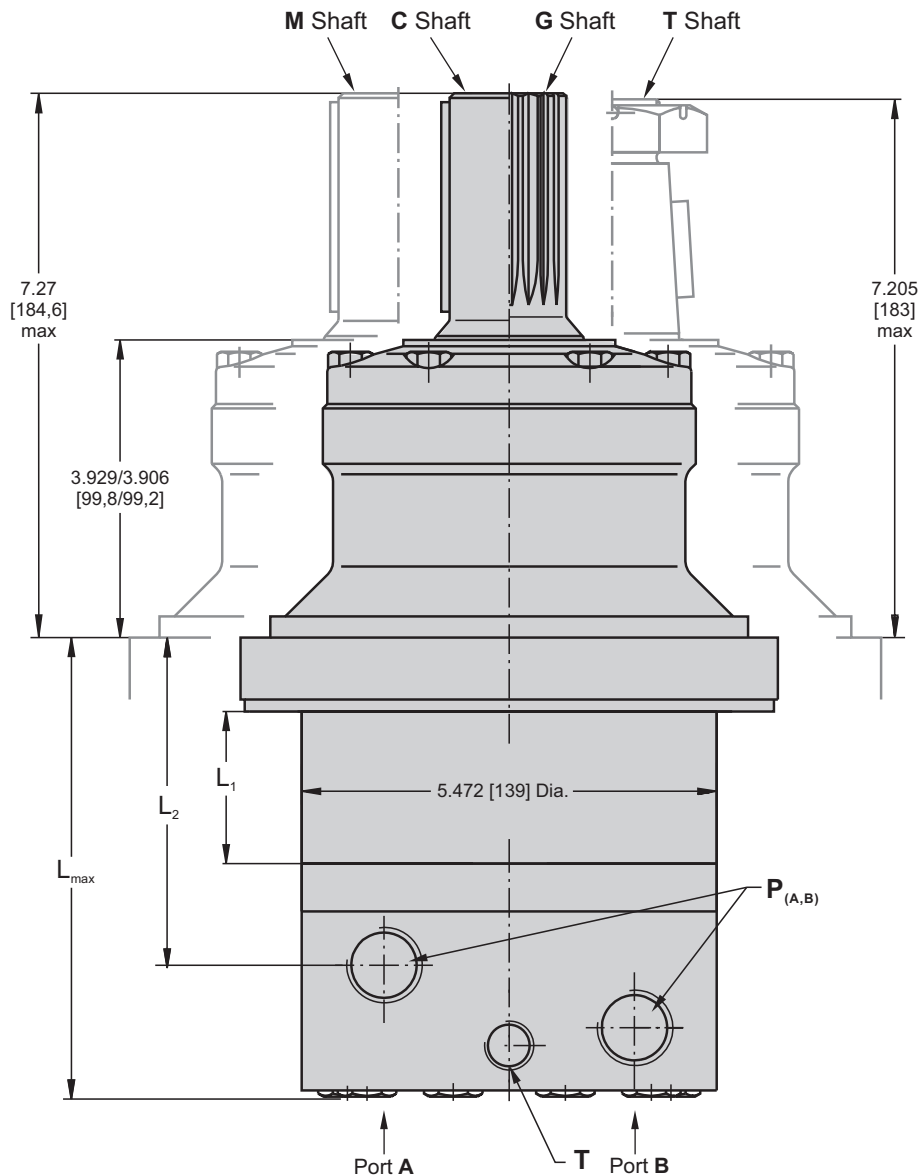


Standard Rotation
Viewed from Shaft End
Port A Pressurized - **CW**
Port B Pressurized - **CCW**

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

Type	L, in [mm]	L2, in [mm]	Type	L, in [mm]	L2, in [mm]	Type	L, in [mm]	L2, in [mm]	Type	L, mm [in]	L3, in [mm]	L1, in [mm]
MLHTM200 2,4	7.40 [188]	5.60 [142,3]	MLHTMC200 2,4	8.46 [214,8]	6.69 [169,8]	MLHTM200 5	7.40 [188]	5.26 [133,5]	MLHTMC200 5	8.46 [214,8]	6.33 [160,8]	.98 [25]
MLHTM250 2,4	7.64 [194]	5.85 [148,6]	MLHTMC250 2,4	8.70 [221,1]	6.93 [176,1]	MLHTM250 5	7.64 [194]	5.49 [139,5]	MLHTMC250 5	8.70 [221,1]	6.58 [167,1]	1.23 [31,3]
MLHTM315 2,4	7.99 [203]	6.21 [157,8]	MLHTMC315 2,4	9.07 [230,3]	7.30 [185,3]	MLHTM315 5	7.99 [203]	5.87 [149,0]	MLHTMC315 5	9.07 [230,3]	6.94 [176,3]	1.59 [40,5]
MLHTM400 2,4	8.43 [214]	6.63 [168,3]	MLHTMC400 2,4	9.48 [240,8]	7.71 [195,8]	MLHTM400 5	8.43 [214]	6.28 [159,5]	MLHTMC400 5	9.48 [240,8]	7.35 [186,8]	2.01 [51]
MLHTM470 2,4	8.74 [222]	6.94 [176,3]	MLHTMC470 2,4	9.79 [248,8]	8.02 [203,8]	MLHTM470 5	8.74 [222]	6.59 [167,5]	MLHTMC470 5	9.79 [248,8]	7.67 [194,8]	2.32 [59]
MLHTM500 2,4	8.98 [228]	7.18 [182,3]	MLHTMC500 2,4	10.0 [254,8]	8.26 [209,8]	MLHTM500 5	8.98 [228]	6.83 [173,5]	MLHTMC500 5	10.0 [254,8]	7.91 [200,8]	2.56 [65]
MLHTM630 2,4	8.82 [224]	7.02 [178,3]	MLHTMC630 2,4	9.87 [250,8]	8.10 [205,8]	MLHTM630 5	8.82 [224]	6.67 [169,5]	MLHTMC630 5	9.87 [250,8]	7.75 [196,8]	2.40 [61]
MLHTM725 2,4	9.17 [233]	7.37 [187,3]	MLHTMC725 2,4	10.2 [259,8]	8.46 [214,8]	MLHTM725 5	9.17 [233]	7.03 [178,5]	MLHTMC725 5	10.2 [259,8]	8.10 [205,8]	2.76 [70]

DIMENSIONS and MOUNTING DATA
for MLHTMW - versions 2 and 4



Flange Dim.
See Page 26

Shaft Dim.
See Page 28



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

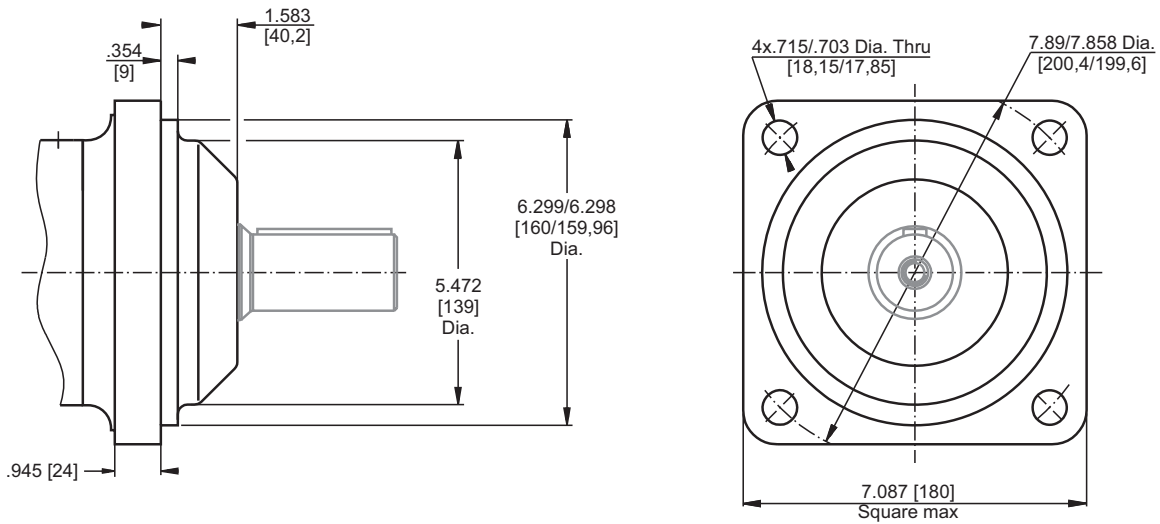
Warning: Drain line should always be used.
This is not applicable for option "1" (with check valves)!

Versions		
	2	4
P _(A,B)	2xG3/4 .67 in [17] depth	2x1 ¹ / ₁₆ -12UN O-ring .67 in [17] depth
T	G1/4 .47 in [12] depth	9 ¹ / ₁₆ -18UN .51 in [13] depth

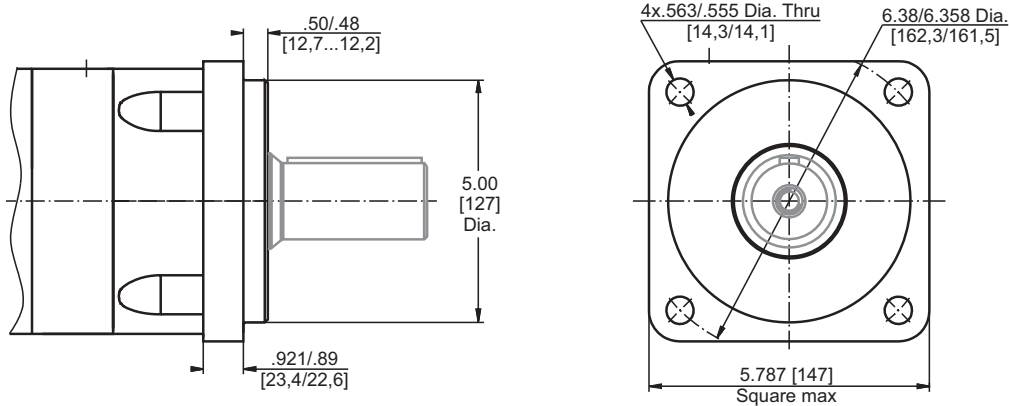
Type	L _{max} , in [mm]	L ₂ , in [mm]	L ₁ , in [mm]
MLHTMW 200	5.08 [129]	3.30 [83,8]	.98 [25]
MLHTMW 250	5.32 [135]	3.55 [90,1]	1.23 [31,3]
MLHTMW 315	5.67 [144]	3.91 [99,3]	1.59 [40,5]
MLHTMW 400	6.10 [155]	4.32 [109,8]	2.01 [51]
MLHTMW 470	6.42 [163]	4.64 [117,8]	2.32 [59]
MLHTMW 500	6.65 [169]	4.87 [123,8]	2.56 [65]
MLHTMW 630	6.50 [165]	4.72 [119,8]	2.40 [61]
MLHTMW 725	6.85 [174]	5.07 [128,8]	2.76 [70]

DIMENSIONS of MOUNTING

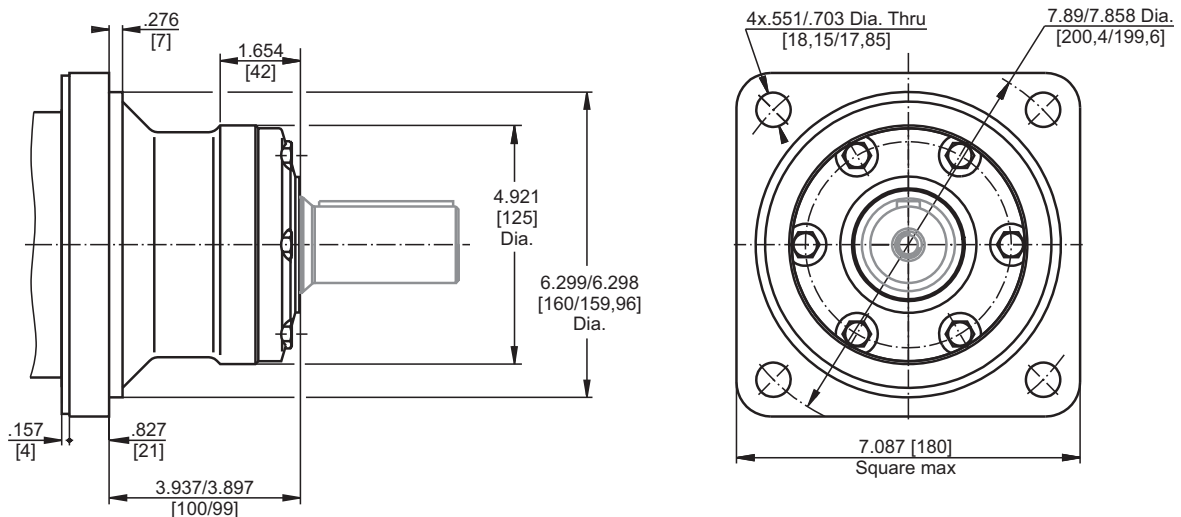
4-Bolt flange
spigot diameter 6.3 in [160 mm] - BC 7.87 in [200 mm]



C 4-Bolt flange, SAE C mounting flange
spigot diameter 5.00 in [127 mm]
BC 6.37 in [161,9 mm]



W 4-Bolt flange, Wheel Motor
spigot diameter 6.3 in [160 mm] - BC 7.87 in [200 mm]



PORTS

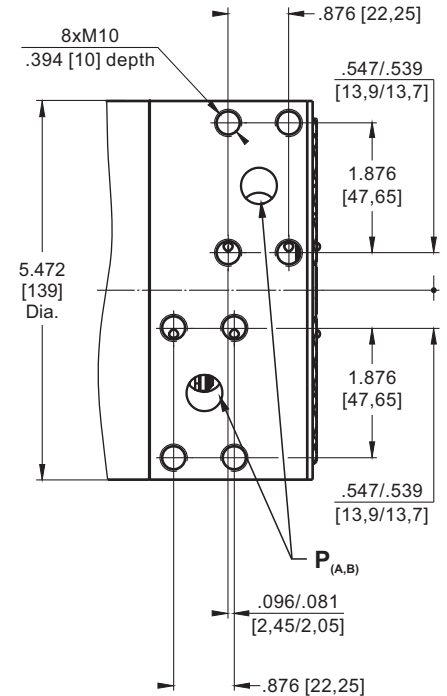
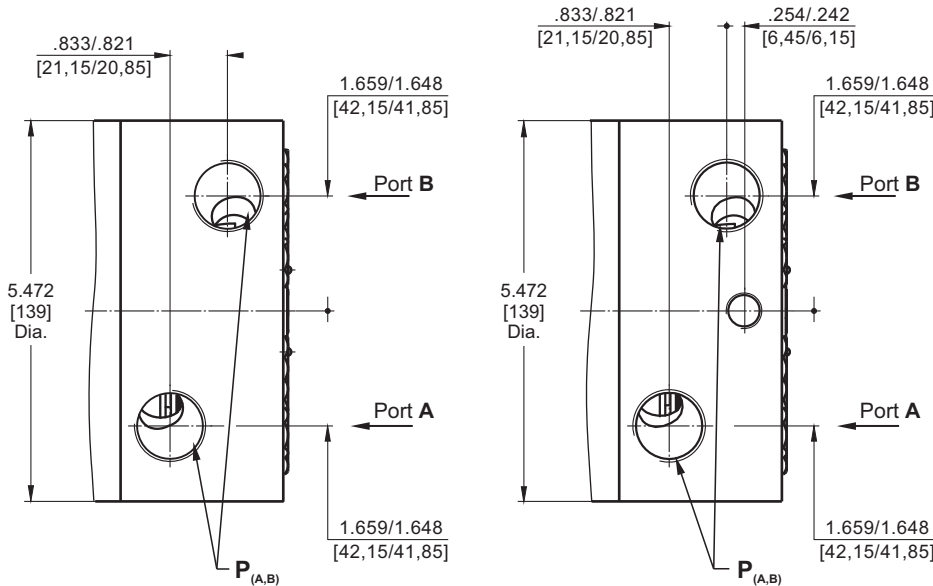
Versions **2** **4**

Version **5**

For **MLHTM** and **MLHTMC**

For **MLHTMW**

For **MLHTM** and **MLHTMC**

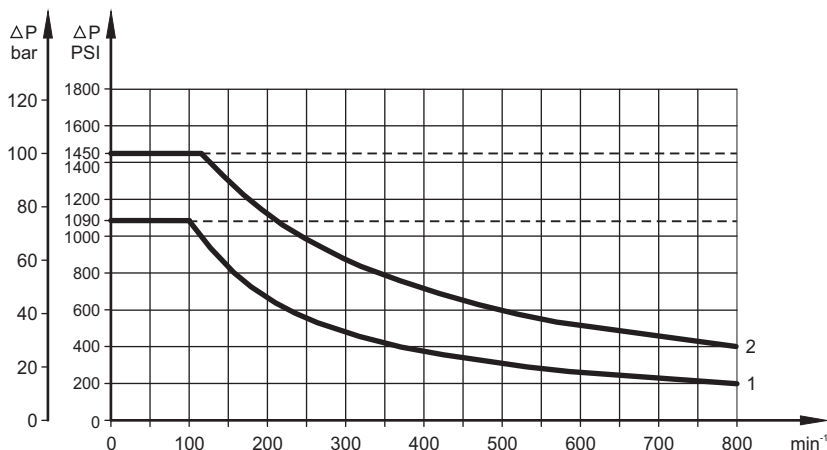


	Versions		
	2	4	5
P_(A,B)	2xG3/4 .67 in [17] depth	2x1 ¹ / ₁₆ -12UN O-ring .67 in [17] depth	2x3/4"SAE PSI3000 with 8xM10 threads .39 in [10] depth
T	G1/4 .47 in [12] depth	9 ¹ / ₁₆ -18UN .51 in [13] depth	G1/4 .47 in [12] depth



MAX. PERMISSIBLE SHAFT SEAL PRESSURE

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



1: Drawing for Standard Shaft Seal

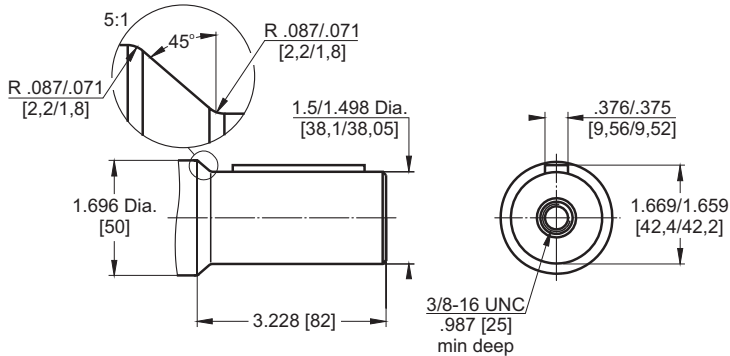
2: Drawing for High Pressure Seal ("U" Seal)

— - continuous operations
- - - - - intermittent operations

SHAFT EXTENSIONS

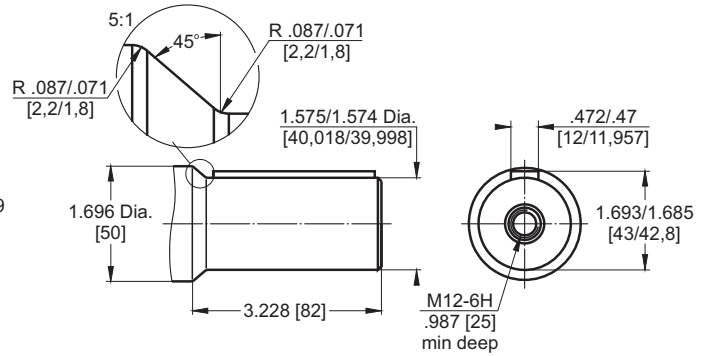
C

1 1/2" [38,1] straight, Parallel key 3/8"x 3/8"x 2 1/4" BS46
Max. Torque 11750 lb-in [133 daNm]



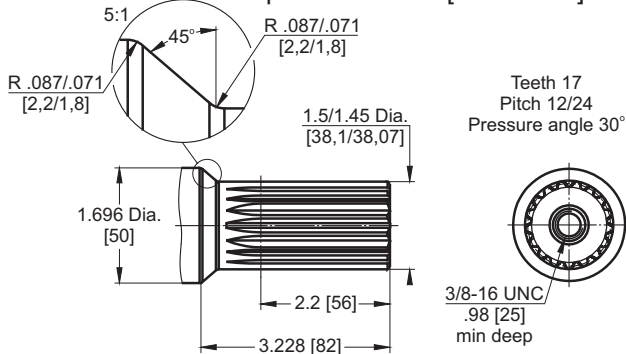
M

ø40 straight, Parallel key A12x8x70
Max. Torque 11750 lb-in [133 daNm]



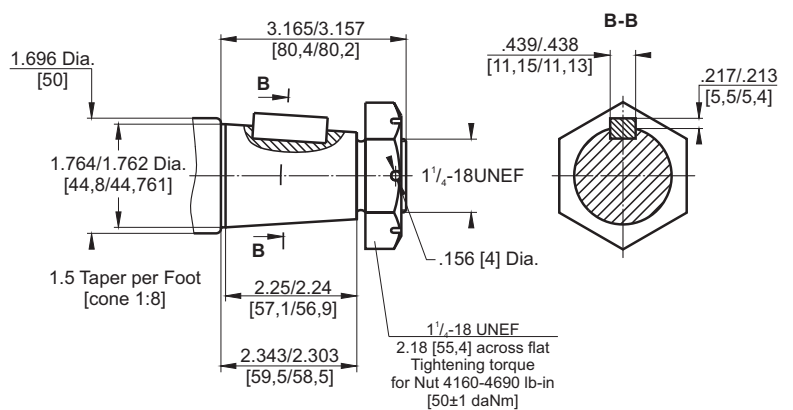
G

17T Splined, 1 1/2" [38,1] ANS B92.1-1976
Max. Torque 11750 lb-in [133 daNm]



T

1 3/4" [44,5] SAE J501 Tapered 1:8
Parallel key 7/16"x 7/16"x 1 1/4" BS46
Max. Torque 18650 lb-in [210 daNm]

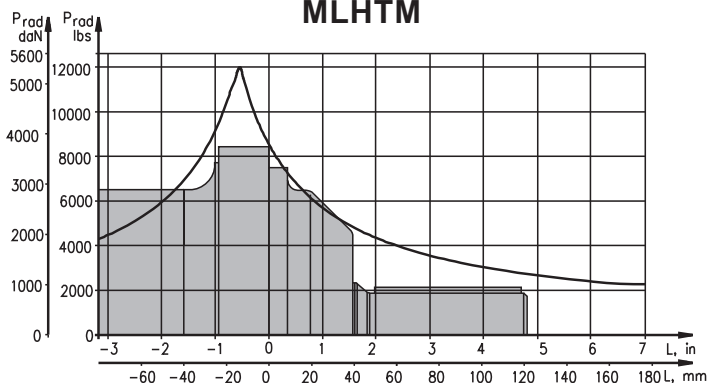


Requirement max. Torque must not be exceeded.

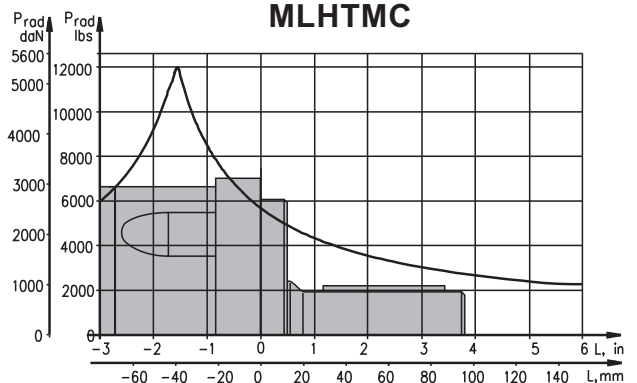
PERMISSIBLE SHAFT LOADS

The curves apply to a B10 bearing life (ISO281) of 2000 hours at 200 RPM.

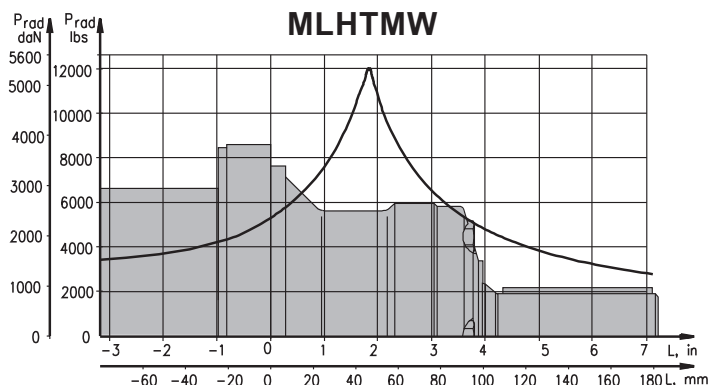
MLHTM



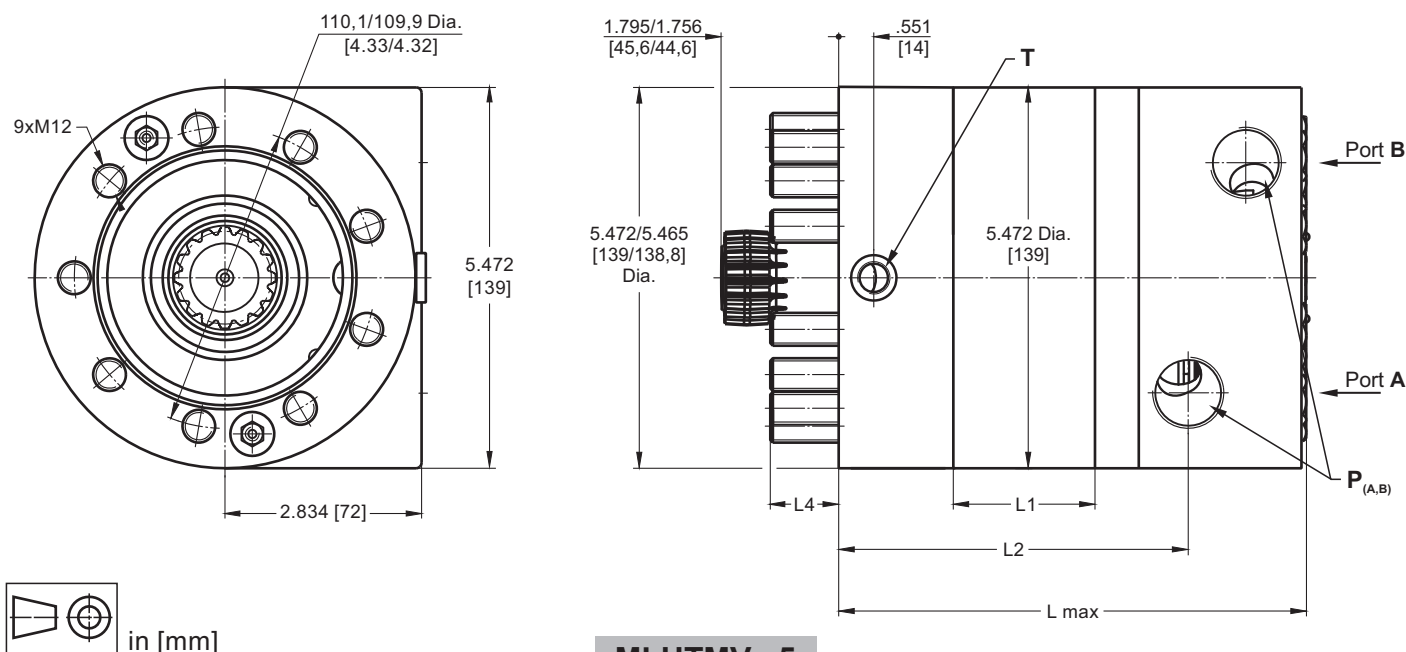
MLHTMC



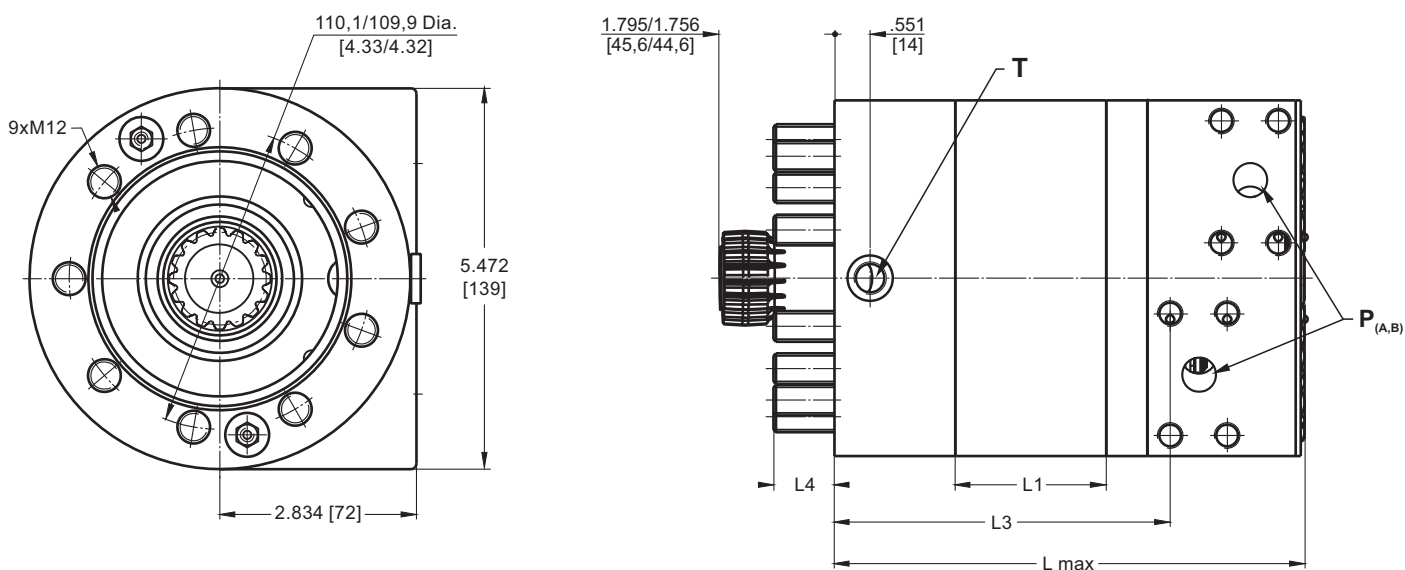
MLHTMW



MLHTMV...2 and MLHTMV...4



MLHTMV...5



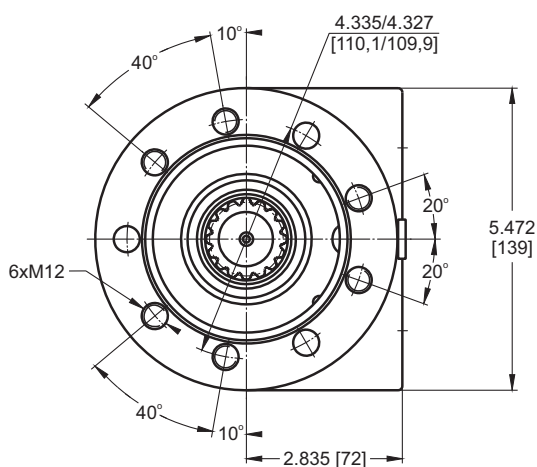
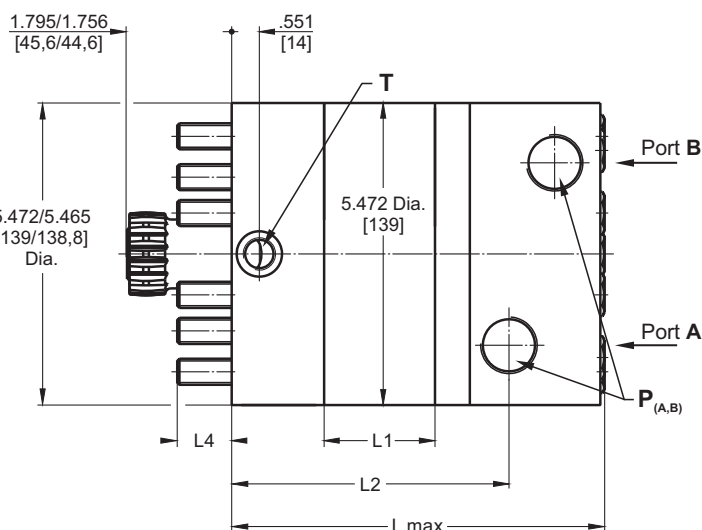
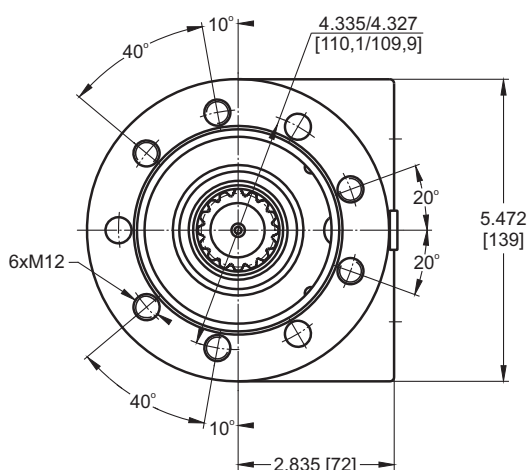
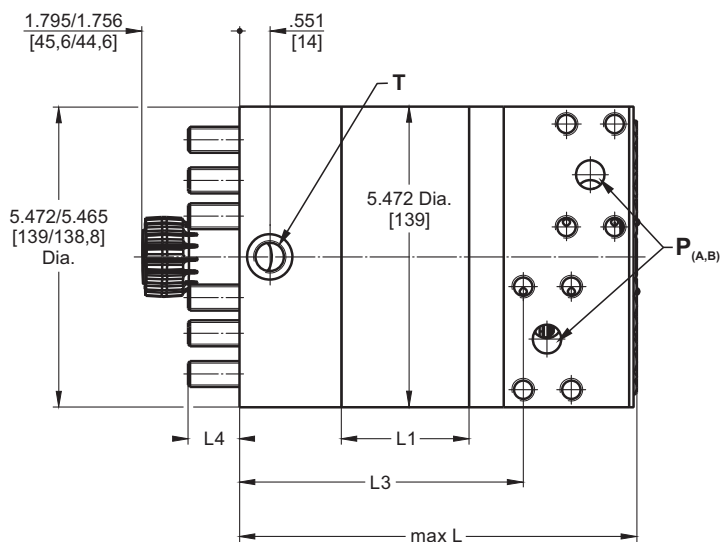
	Versions		
	2	4	5
P_(A,B)	2xG3/4 .67 in [17] depth	2x1 $\frac{1}{16}$ -12UN O-ring .67 in [17] depth	2x3/4"SAE PSI3000 with 8xM10 threads .39 in [10] depth
T	G1/4 .47 in [12] depth	$\frac{9}{16}$ -18UN .51 in [13] depth	G1/4 .47 in [12] depth

Warning: Drain line should always be used.
This is not applicable for option "1"
(with check valves)!

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, in [mm]	L ₂ , in [mm]	L ₃ , in [mm]	L ₄ , in [mm]	L ₁ , in [mm]
MLHTMV 200	5.945 [151]	4.193 [106,5]	3.827 [97,2]	1.094 [27,8]	.98 [25,0]
MLHTMV 250	6.181 [157]	4.441 [112,8]	4.075 [103,5]	1.043 [26,5]	1.23 [31,3]
MLHTMV 315	6.575 [167]	4.803 [122,0]	4.437 [112,7]	.878 [22,3]	1.59 [40,5]
MLHTMV 400	6.968 [177]	5.217 [132,5]	4.850 [123,2]	.858 [21,8]	2.01 [51,0]
MLHTMV 470	7.283 [185]	5.531 [140,5]	5.165 [131,2]	.937 [23,8]	2.32 [59,0]
MLHTMV 500	7.520 [191]	5.768 [146,5]	5.402 [137,2]	1.094 [27,8]	2.56 [65,0]
MLHTMV 630	7.362 [187]	5.610 [142,5]	5.244 [133,2]	.858 [21,8]	2.40 [61,0]
MLHTMV 725	7.717 [196]	5.965 [151,5]	5.598 [142,2]	.898 [22,8]	2.76 [70,0]

MLHTM6V...2 and MLHTM6V...4

Fig.1

MLHTM6V...5

Fig.1


	Versions		
	2	4	5
P_(A,B)	2xG3/4 .67 in [17] depth	2x1 ¹ / ₁₆ -12UN O-ring .67 in [17] depth	2x3/4"SAE PSI3000 with 8xM10 threads .39 in [10] depth
T	G1/4 .47 in [12] depth	9 ¹ / ₁₆ -18UN .51 in [13] depth	G1/4 .47 in [12] depth

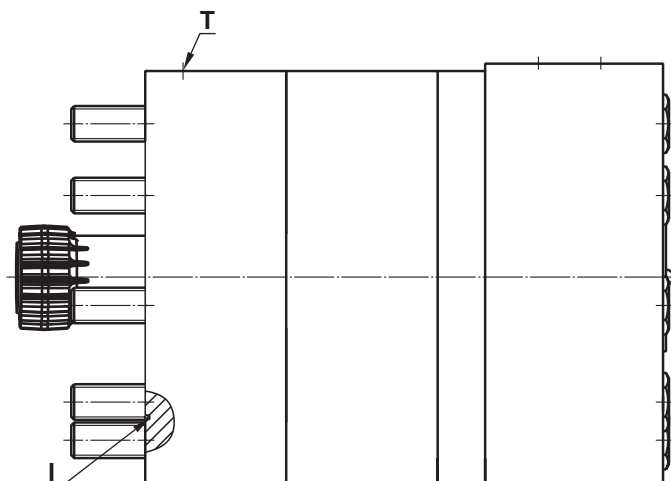
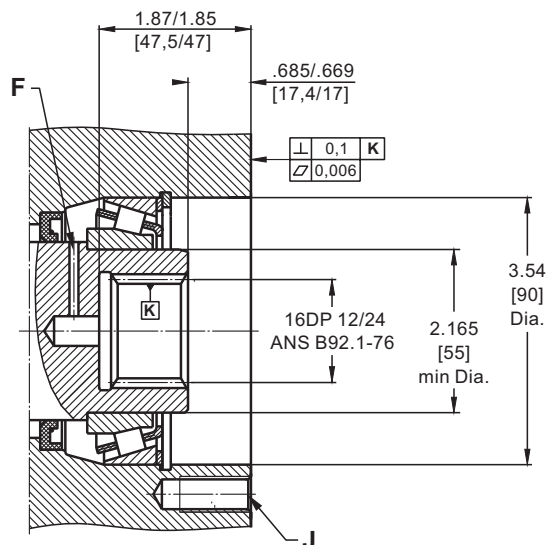
Warning: Drain line should always be used.
This is not applicable for option "1"
(with check valves)!

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, in [mm]	L ₂ , in [mm]	L ₃ , in [mm]	L ₄ , in [mm]	L ₁ , in [mm]
MLHTMV 200	5.945 [151]	4.193 [106,5]	3.827 [97,2]	1.094 [27,8]	.98 [25,0]
MLHTMV 250	6.181 [157]	4.441 [112,8]	4.075 [103,5]	1.043 [26,5]	1.23 [31,3]
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MLHTMV 725	7.717 [196]	5.965 [151,5]	5.598 [142,2]	.898 [22,8]	2.76 [70,0]

DIMENSIONS OF THE ATTACHED COMPONENT



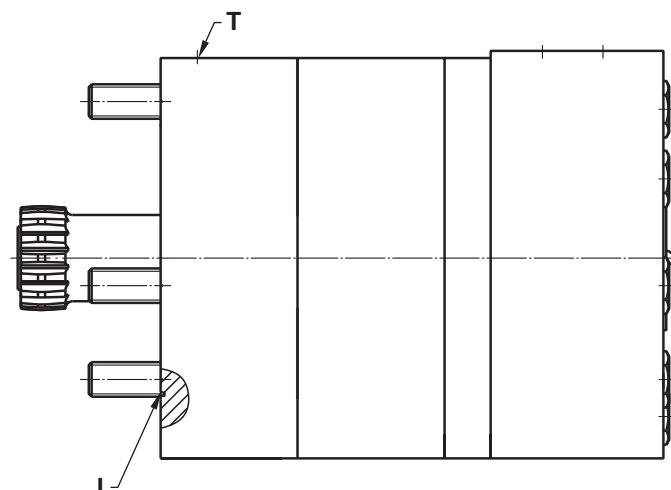
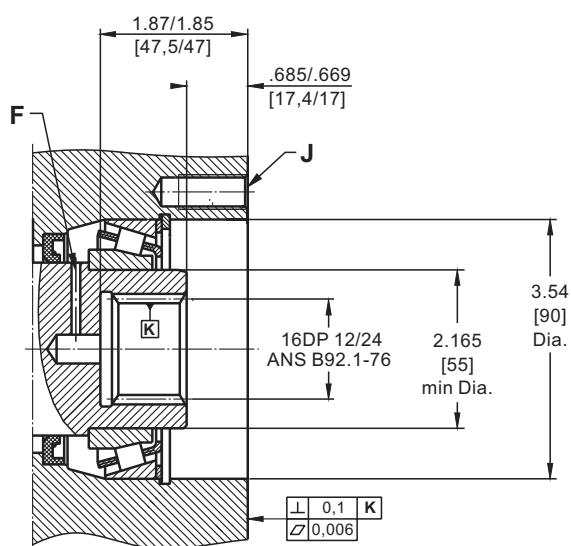
F: Oil circulation hole

J: 9xM12 - 1.181 in [30 mm] depth, 40°, 4.33±.0039 in Dia. [110±0,1 mm]

I: O-Ring 3.661x.059 in [93x1,5 mm]

T: Drain connection G1/4

DIMENSIONS OF THE ATTACHED COMPONENT FOR MLHTM6V



F: Oil circulation hole

J: 9xM12 - 1.181 in [30 mm] depth, 40°, 4.33±.0039 in Dia. [110±0,1 mm] or 6xM12 - 1.181 in [30 mm] depth, situated in accordance with the bolts M12, shown on Fig.1, 4.33±.0039 in Dia. [110±0,1 mm]

I: O-Ring 3.661x.059 in [93x1,5 mm]

T: Drain connection G1/4

DRAIN CONNECTION



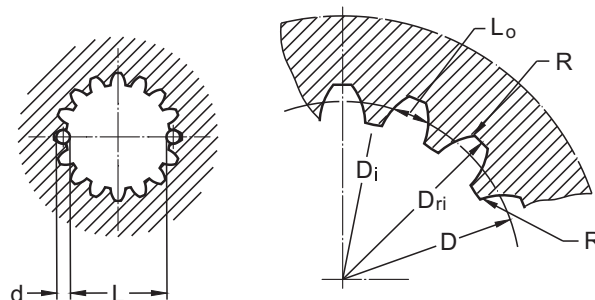
A drain line has to be used when pressure in the return line can exceed the permissible pressure. It can be connected at the drain connection of the attached component. The maximum pressure in the drain line is limited by the attached component and its shaft seal.

The drain line must be possible for oil to flow freely between motor and attached component and must be led to the tank. The maximum pressure in the drain line is limited by the attached component and its seal.

INTERNAL SPLINE DATA FOR THE ATTACHED COMPONENT

Standard *ANS B92.1-1976, class 5*
[m=2.1166; corrected x.m=+1,0]

Fillet Root Side Fit		inch	mm
Number of Teeth	z	16	16
Diametral Pitch	DP	12/24	12/24
Pressure Angle		30 ⁰	30 ⁰
Pitch Dia.	D	1.3333	33,8656
Major Dia.	D _{ri}	1.5118÷1.5275	38,4 ^{+0,4}
Minor Dia.	D _i	1.2657÷1.2673	32,15 ^{+0,04}
Circular Space Width	L _o	.1763÷.1791	4,516±0,037
Fillet Radius	R	.02	0,5
Dimension Between Two Pins	L	1.063÷1.059	26,9 ^{+0,10}
Pin Dia.	d	.19026÷.19034	4,835±0,001



Hardening Specification:
 HV=750±50 on the surface.
 HV=560 at .035±.019 [0,7±0,2] case depth
 Material: 20 MoCr4 EN 10084 or SAE8620.

ORDER CODE

1	2	3	4	5	6	7	8
M	L	H	T	M		HD	

Pos.1	- Mounting Flange
omit	- 4-Bolt flange, spigot dia. 6.3 in, BC 7.87 in
C	- SAE C, 4-Bolt flange, spigot dia. 5 in, BC 6.37 in
W	- Wheel motor, spigot dia. 6.3 in, BC 7.87 in
V*	- Very short mount, 9xM12 mounting bolts
6V*	- Very short mount, 6xM12 mounting bolts

Pos.2	- Displacement code
200	- 12.29 in ³ /rev [201,4 cm ³ /rev]
250	- 15.36 in ³ /rev [251,8 cm ³ /rev]
315	- 19.90 in ³ /rev [326,3 cm ³ /rev]
400	- 25.06 in ³ /rev [410,9 cm ³ /rev]
470	- 28.97 in ³ /rev [475,0 cm ³ /rev]
500	- 31.95 in ³ /rev [523,6 cm ³ /rev]
630	- 38.52 in ³ /rev [631,2 cm ³ /rev]
725	- 44.20 in ³ /rev [724,3 cm ³ /rev]

Pos.3	- Shaft Extensions**
C	- 1½" [38,10] straight, Parallel key
G	- 1½" [38,10] 17T Splined
M	- ø40 mm straight, Parallel key
T	- 1¾" [44,50] J501 Tapered

Pos.4	- Port Size/Type [standard manifold to each]
2	- side ports, 2xG 3/4, G1/4, BSP thread, ISO 228
4	- side ports, 2x1½"-12 UN, O-ring, 9/16"-18 UNF
5***	- side ports, 2xG 3/4, SAE 3000 PSI (SAE J518c), G1/4-ISO 228

Pos.5	- Shaft Seal Version****
omit	- Low pressure seal
U	- High pressure seal

Pos.6	- Check Valves
omit	- without check valves
1	- with check valves

Pos.7	- Additional Options
HD	- Reinforced motor HD***** For other Additional Options see page 69

Pos.8	- Design Series
omit	- Factory specified

NOTES:

- * The following combinations are not allowed - **V** and **6V** flange with shafts pos.3
- ** The permissible output torque for shafts must not be exceeded!
- *** Not for **W** mount!
- **** Shaft seal is available with the "omit" and "W" mounting flange only!
- ***** Drain line should always be used. This is not applicable for option "1" (with check valves)!

The hydraulic motors are mangano phosphatized as standard.

MOTOR ADDITIONAL OPTIONS

Additional Options Description	Order Code	Motor type						
		MLHSEM	MTK	MLHTM	TMF	TMYF	MVM	VMF
Speed Sensor*	RS	O	O	O	O	O	O	O
Reinforced motor	HD	-	S	S	S	S	S	S
Low Leakage	LL	O	O	O	O	O	O	O
Low Speed Valving	LSV	O	O	O	O	O	O	O
Free Running	FR	-	O	O	-	O	O	-
Reverse Rotation	R	O	O	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	O	O	-	O	O	-

O	Optional
-	Not applicable
S	Standard

* For sensor ordering see pages 70÷71.

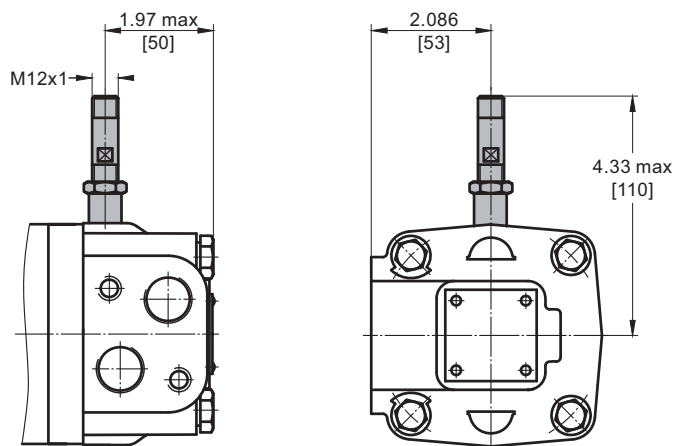
** Colour at customer's request.

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

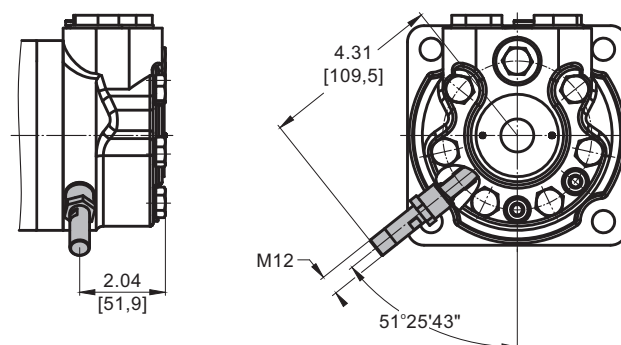
 For more information about **HD** option please contact with "M+S Hydraulic".

MOTORS WITH SPEED SENSOR

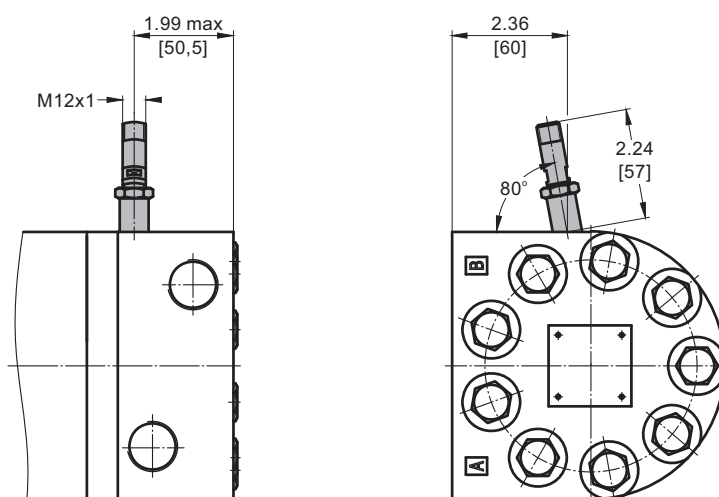
MLHSEM...RS



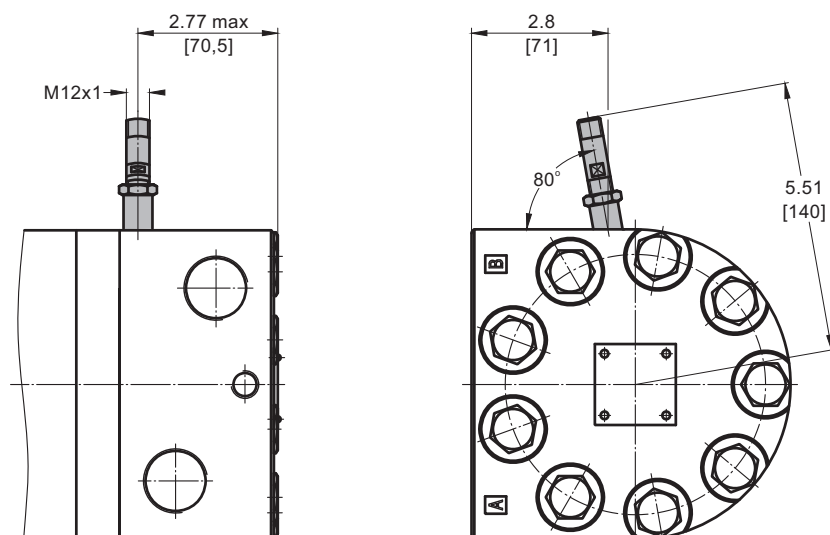
MTK...RS



**MLHTM...RS
TMF...RS**

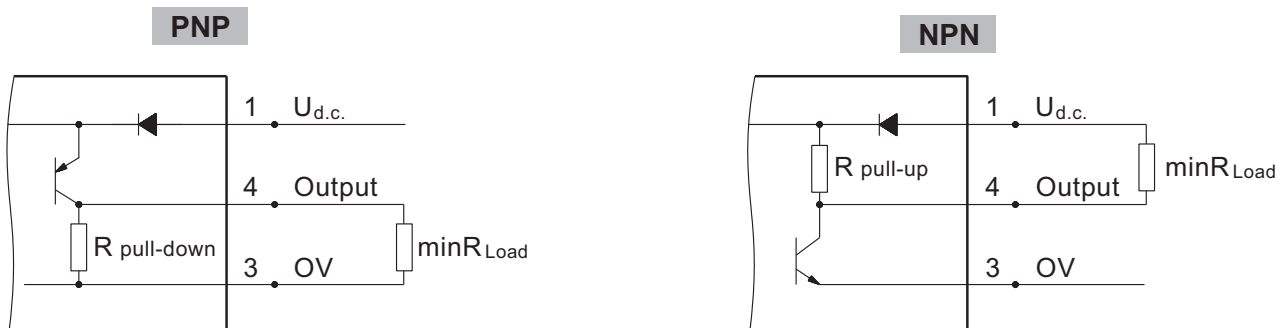


**MVM...RS
VMF...RS**



TECHNICAL DATA of the SPEED SENSOR

Wiring diagrams



$$R_{Load} [k\Omega] = U_{d.c.} [V] / I_{max} [mA]$$

Motor type	MLHSEM MTK	MLHTM TMF	MVM VMF	DW
Pulses per revolution	54	84	102	30

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	Electric connection
RS	Connector BINDER 713 series
RSL2,5	Cable output 3x0,25; 98 in [2,5 m] long
RSL3,5	Cable output 3x0,25; 138 in [3,5 m] long
RSL5	Cable output 3x0,25; 196 in [5 m] long
RSL10	Cable output 3x0,25; 394 in [10 m] 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.

APPLICATION CALCULATION

VEHICLE DRIVE CALCULATIONS

1. Motor speed: n [RPM]

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

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 , lbs [daN]

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 , lbs [daN]

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

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

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]

Necessary torque moment for every hydraulic motor:

$$M_w = \frac{G_w \times f \times R_{in} [R_m]}{i \times \eta_m}$$

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

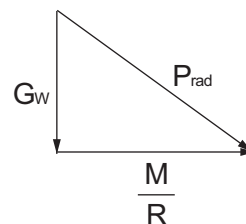
9. Radial motor loading: P_{rad} , lbs [daN]

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.

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.

