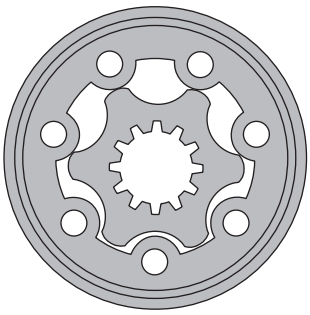
HYDRAULIC MOTORS MLHP

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, gerotor
- » Flange and wheel mount
- » Motor with needle bearing
- » Side and rear ports
- » Shafts - straight, splined and tapered
- » Shaft seal for high and low pressure
- » SAE, Metric and BSPP ports
- » Speed sensoring
- » Other special features

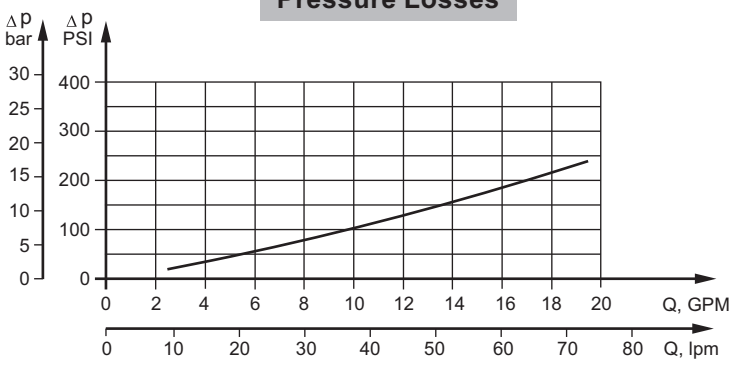
GENERAL

Max. Displacement,	in^3/rev [cm^3/rev]	38.05 [623,6]
Max. Speed,	[RPM]	1815
Max. Torque,	lb-in [daNm]	cont.: 4415 [50] int.: 5565 [64]
Max. Output,	HP [kW]	17.1 [12,8]
Max. Pressure Drop,	PSI [bar]	cont.: 2030 [140] int.: 2540 [175]
Max. Oil Flow,	GPM [lpm]	19.8 [75]
Min. Speed,	[RPM]	10
Pressure fluid		Mineral based - HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range,	°F [°C]	-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

Specification Data for MLHP... motors with **C, D, G, H, M, S** and **T** shafts.
(1.124 [28,56] sealing diameter)

Type		MLHP 25	MLHP 32	MLHP 40	MLHP 50	MLHP 63	MLHP 80	MLHP 100	MLHP 125
Displacement, in³/rev [cm³/rev]		1.73 [28,4]	2.1 [34,5]	2.47 [40,5]	3.02 [49,5]	3.8 [62,3]	4.83 [79,2]	6.04 [99]	7.55 [123,8]
Max. Speed,	Cont.	1408	1450	1480	1210	960	755	605	486
[RPM]	Int.*	1584	1594	1555	1515	1200	945	755	605
Max. Torque,	Cont.	290 [3,3]	380 [4,3]	550 [6,2]	835 [9,4]	1044 [11,8]	1340 [15,1]	1710 [19,3]	23,7 [2100]
lb-in [daNm]	Int.*	415 [4,7]	540 [6,1]	730 [8,2]	1050 [11,9]	1300 [14,7]	1725 [19,5]	2100 [23,7]	29,8 [2640]
	Peak**	595 [6,7]	760 [8,6]	950 [10,7]	1285 [14,3]	1080 [12,2]	1985 [22,4]	2435 [27,5]	36,5 [3235]
Max. Output,	Cont.	6.0 [4,5]	6.0 [4,5]	11.5 [8,4]	13.5 [10,1]	13.5 [10,1]	13.7 [10,2]	14.1 [10,5]	13.7 [10,2]
HP [kW]	Int.*	8.2 [6,1]	10.5 [7,8]	15.5 [11,6]	16.1 [12,2]	16.1 [12,2]	16.8 [12,5]	17.1 [12,8]	16.1 [12]
Max. Pressure	Cont.	1450 [100]	1450 [100]	1750 [120]	2030 [140]	2030 [140]	2030 [140]	2030 [140]	2030 [140]
Drop, PSI [bar]	Int.*	2030 [140]	2030 [140]	2250 [155]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Oil Flow,	Cont.	10.5 [40]	13.2 [50]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]
GPM [lpm]	Int.*	11.9 [45]	14.5 [55]	18.5 [70]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]
Max. Inlet	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
Pressure, PSI [bar]	Int.*	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]
Max. Return Pressure	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
with Drain Line,	Int.*	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]
Max. Starting Pressure with Unloaded Shaft, PSI [bar]		145 [10]	145 [10]	145 [10]	145 [10]	145 [10]	145 [10]	145 [10]	131 [9]
Min. Starting	At max.press. drop Cont.	265 [3,0]	355 [4,0]	480 [5,4]	690 [7,8]	690 [7,8]	1170 [13,2]	1470 [16,6]	1830 [20,7]
Torque, lb-in [daNm]	At max.press. drop Int.*	4,2 [370]	5,6 [500]	6,8 [600]	10 [885]	10 [885]	16,8 [1490]	21 [1860]	26,6 [2360]
Min. Speed*, [RPM]**		20	15	10	10	10	10	10	10
Weight, lb [kg] For rear ports: +.992 [0,450]	MLHP[F][N]	12.3 [5,6]	12.3 [5,6]	12.6 [5,7]	12.8 [5,8]	12.8 [5,8]	13.2 [5,9]	13.5 [6,1]	13.7 [6,2]
	MLHPW[N]	11.7 [5,3]	11.7 [5,3]	11.9 [5,4]	12.1 [5,5]	12.1 [5,5]	12.4 [5,6]	12.8 [5,8]	13.2 [5,9]
	MLHPQ[N]	11.1 [5,0]	11.1 [5,0]	11.2 [5,1]	11.5 [5,2]	11.5 [5,2]	11.7 [5,3]	12.1 [5,5]	12.4 [5,6]

* 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 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 122°F [50°C].
5. Recommended maximum system operating temperature is 180°F [82°C].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA (continued)

Specification Data for MLHP... motors with **C, D, G, H, M, S** and **T** shafts.
(1.124 [28,56] sealing diameter)

Type		MLHP 160	MLHP 200	MLHP 250	MLHP 315	MLHP 400	MLHP 500	MLHP 630
Displacement, in³/rev [cm³/rev]		9.66 [158,4]	12.1 [198]	15.1 [247,5]	19.3 [316,8]	24.16 [396]	30.2 [495]	38.05 [623,6]
Max. Speed, [RPM]	Cont.	378	303	242	190	150	120	95
	Int.*	472	378	303	236	189	150	120
Max. Torque, lb-in [daNm]	Cont.	2770 [31,3]	3240 [36,6]	3360 [38]	3360 [38]	3190 [36]	3452 [39]	3895 [44]
	Int.*	3345 [37,8]	4035 [45,6]	5160 [58,3]	4960 [56]	5240 [59]	5045 [57]	5665 [64]
	Peak**	3880 [43,8]	4870 [55]	6060 [68,5]	7505 [85]	7560 [85,4]	6903 [78]	7257 [82]
Max. Output, HP [kW]	Cont.	13.5 [10,1]	13.5 [10]	10 [7,5]	7.9 [5,8]	6.2 [4,6]	4.7 [3,5]	4.4 [3,3]
	Int.*	16.2 [12,1]	16.1 [12]	16.1 [12]	12.1 [9]	10.5 [7,8]	9,7 [7,2]	7.5 [5,6]
Max. Pressure Drop, PSI [bar]	Cont.	2030 [140]	2030 [140]	1600 [110]	1300 [90]	1015 [70]	870 [60]	800 [55]
	Int.*	2540 [175]	2540 [175]	2540 [175]	2030 [140]	1665 [115]	1305 [90]	1160 [80]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	2610 [180]	1885 [130]	1740 [110]
Max. Oil Flow, GPM [lpm]	Cont.	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]
	Int.*	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]
Max. Inlet Pressure, PSI [bar]	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2030 [140]	2030 [140]
	Int.*	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2540 [175]	2540 [175]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Return Pressure with Drain Line, PSI [bar]	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2030 [140]	2030 [140]
	Int.*	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2540 [175]	2540 [175]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3262 [225]	3260 [225]	3260 [225]
Max. Starting Pressure with Unloaded Shaft, PSI [bar]		116 [8]	100 [7]	87 [6]	73 [5]	73 [5]	73 [5]	73 [5]
Min. Starting Torque, lb-in [daNm]	At max.press. drop Cont.	2500 [28,2]	2950 [33,5]	2970 [33,6]	3045 [34,4]	3050 [34,5]	3180 [36]	3670 [41,5]
	At max.press. drop Int.*	3140 [35,5]	3770 [42,6]	4795 [54,2]	5480 [61,9]	5390 [60,8]	4780 [54]	5480 [62]
Min. Speed*, [RPM]**		10	10	10	10	10	10	10
Weight, lb [kg] For rear ports: +.992 [0,450]	MLHP[F][N]	14.1 [6,4]	14.6 [6,6]	15 [6,8]	15.6 [7,1]	16.8 [7,6]	20 [8,9]	21.4 [9,5]
	MLHPW[N]	13.5 [6,1]	13.9 [6,3]	14.3 [6,5]	15 [6,8]	15.9 [7,2]	19.0 [8,6]	20.3 [9,2]
	MLHPQ[M][N]	12.8 [5,8]	13.2 [6]	13.7 [6,2]	14.3 [6,5]	15 [6,8]	18.3 [8,3]	19.8 [9]

* 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 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 122°F [50°C].
5. Recommended maximum system operating temperature is 180°F [82°C].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA (continued)

Specification Data for MLHP... motors with **B, K, R** and **L** shafts.
(1.378 [35] sealing diameter)

Type		MLHP 80	MLHP 100	MLHP 125	MLHP 160	MLHP 200
Displacement, in³/rev [cm³/rev]		4.83 [79,2]	6.04 [99]	7.55 [123,8]	9.66 [158,4]	12.1 [198]
Max. Speed, [RPM]	Cont.	755	605	486	378	303
	Int.*	945	755	605	472	378
Max. Torque, lb-in [daNm]	Cont.	1340 [15,15]	1710 [19,3]	2100 [23,7]	2770 [31,3]	3240 [36,6]
	Int.*	1725 [19,5]	2100 [23,7]	2640 [29,8]	3345 [37,8]	4035 [45,6]
	Peak**	1985 [22,4]	2435 [27,5]	3235 [36,5]	3875 [43,8]	4870 [55]
Max. Output, HP [kW]	Cont.	13.7 [10,2]	14.1 [10,5]	13.7 [10,2]	13.5 [10,1]	13.5 [10]
	Int.*	16.8 [12,5]	17.1 [12,8]	16.1 [12]	16.2 [12,1]	16.1 [12]
Max. Pressure Drop, PSI [bar]	Cont.	2030 [140]	2030 [140]	2030 [140]	2030 [140]	2030 [140]
	Int.*	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Oil Flow, GPM [lpm]	Cont.	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]
	Int.*	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]
Max. Inlet Pressure, PSI [bar]	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
	Int.*	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Return Pressure with Drain Line, PSI [bar]	Cont.	2540 [175]	2540 [175]	2540 [175]	2540 [175]	2540 [175]
	Int.*	2900 [200]	2900 [200]	2900 [200]	2900 [200]	2900 [200]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Starting Pressure with Unloaded Shaft, PSI [bar]		145 [10]	145 [10]	131 [9]	116 [8]	100 [7]
Min. Starting Torque, lb-in [daNm]	At max.press. drop Cont.	1170 [13,2]	1470 [16,6]	1830 [20,7]	2500 [28,2]	2950 [33,5]
	At max.press. drop Int.*	1490 [16,8]	1860 [21]	2360 [26,6]	3140 [35,5]	3770 [42,6]
Min. Speed*, [RPM]**		10	10	10	10	10
Weight, lb [kg] For rear ports: +.992 [0,450]	MLHP[F]	13.2 [6]	13.7 [6,2]	13.9 [6,3]	14.3 [6,5]	14.8 [6,7]

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** 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 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 122°F [50°C].
5. Recommended maximum system operating temperature is 180°F [82°C].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA (continued)

Specification Data for MLHP... motors with **B, K, R** and **L** shafts.
(1.378 [35] sealing diameter)

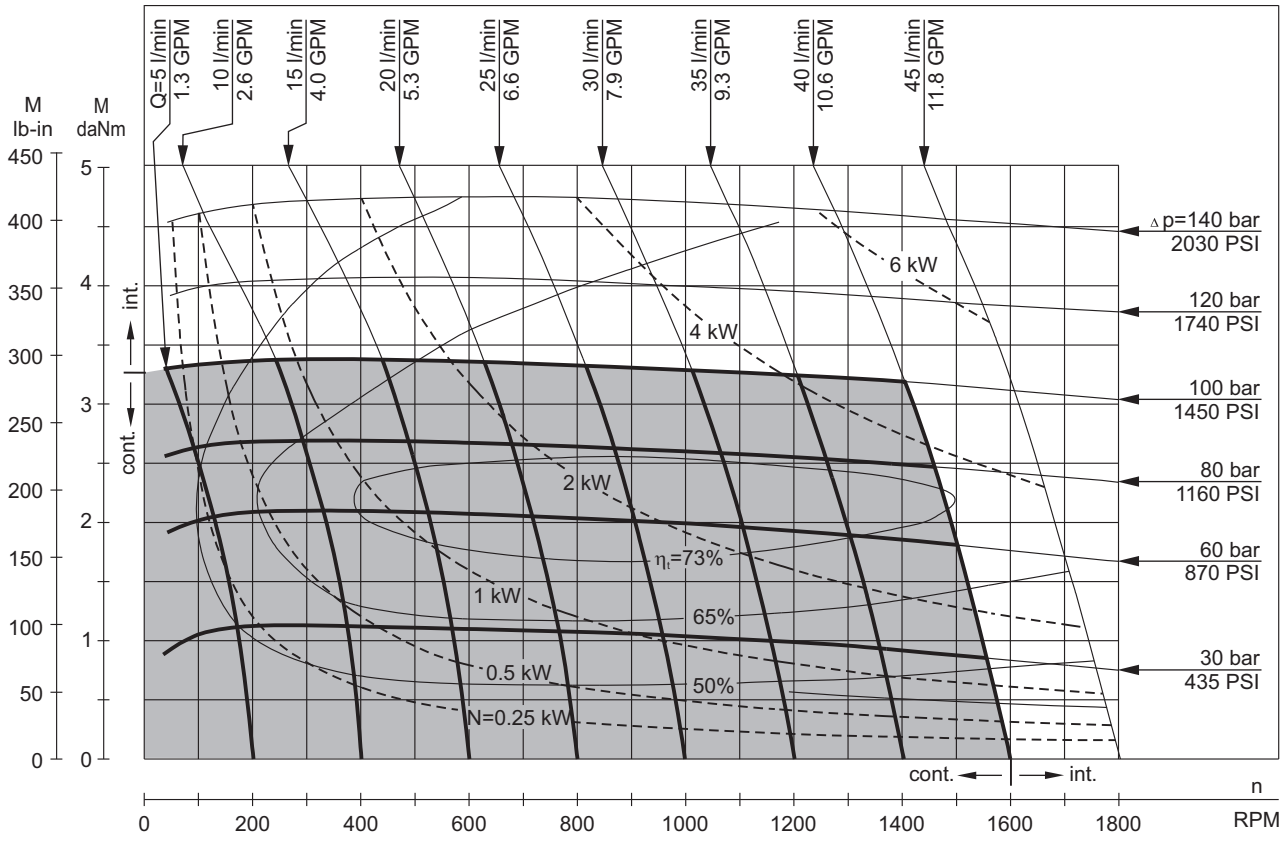
Type		MLHP 250	MLHP 315	MLHP 400	MLHP 500	MLHP 630
Displacement, in³/rev [cm³/rev]		15.1 [247,5]	19.3 [316,8]	24.16 [396]	30.2 [495]	38.05 [623,6]
Max. Speed, [RPM]	Cont.	242	190	150	120	95
	Int.*	303	236	189	150	120
Max. Torque, lb-in [daNm]	Cont.	4160 [47]	4360 [48]	4415 [50]	3452 [39]	3895 [44]
	Int.*	5160 [58,3]	4960 [56]	5240 [59]	5045 [57]	5665 [64]
	Peak**	6060 [68,5]	7505 [85]	7560 [85,4]	6903 [78]	7257 [82]
Max. Output, HP [kW]	Cont.	12.1 [9]	10.2 [7,6]	8.3 [6,2]	4.7 [3,5]	4.4 [3,3]
	Int.*	16.1 [12]	12.1 [9]	10.5 [7,8]	9,7 [7,2]	7.5 [5,6]
Max. Pressure Drop, PSI [bar]	Cont.	3030 [140]	1740 [120]	1400 [95]	870 [60]	800 [55]
	Int.*	2540 [175]	2030 [140]	1670 [115]	1305 [90]	1160 [80]
	Peak**	3260 [225]	3260 [225]	2610 [180]	1885 [130]	1740 [110]
Max. Oil Flow, GPM [lpm]	Cont.	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]	15.9 [60]
	Int.*	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]	19.8 [75]
Max. Inlet Pressure, PSI [bar]	Cont.	2540 [175]	2540 [175]	2540 [175]	2030 [140]	2030 [140]
	Int.*	2900 [200]	2900 [200]	2900 [200]	2540 [175]	2540 [175]
	Peak**	3260 [225]	3260 [225]	3260 [225]	3260 [225]	3260 [225]
Max. Return Pressure with Drain Line, PSI [bar]	Cont.	2540 [175]	2540 [175]	2540 [175]	2030 [140]	2030 [140]
	Int.*	2900 [200]	2900 [200]	2900 [200]	2540 [175]	2540 [175]
	Peak**	3260 [225]	3260 [225]	3262 [225]	3260 [225]	3260 [225]
Max. Starting Pressure with Unloaded Shaft, PSI [bar]		87 [6]	73 [5]	73 [5]	73 [5]	73 [5]
Min. Starting Torque, lb-in [daNm]	At max.press. drop Cont.	3790 [42,8]	4050 [45,8]	4140 [46,8]	3180 [36]	3670 [41,5]
	At max.press. drop Int.*	4795 [54,2]	5480 [61,9]	5390 [60,8]	4780 [54]	5480 [62]
Min. Speed*, [RPM]**		10	10	10	10	10
Weight, lb [kg] For rear ports: +.992 [0,450]	MLHP[F]	15.2 [6,9]	15.9 [7,2]	17 [7,7]	19.9 [9,0]	21.2 [9,6]

* 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.

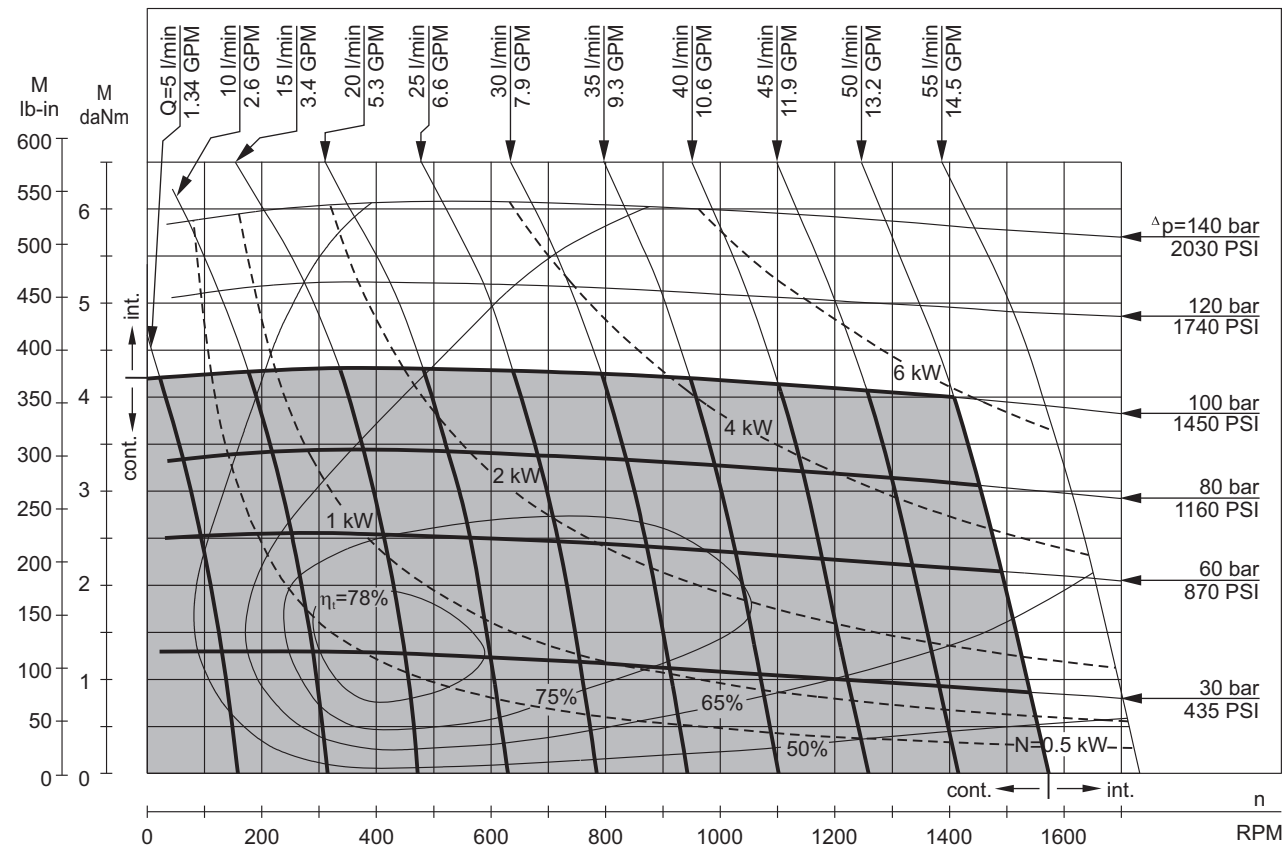
1. Intermittent speed and intermittent pressure must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP (DIN51524) or HM (ISO 6743/4).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

FUNCTION DIAGRAMS

MLHP 25



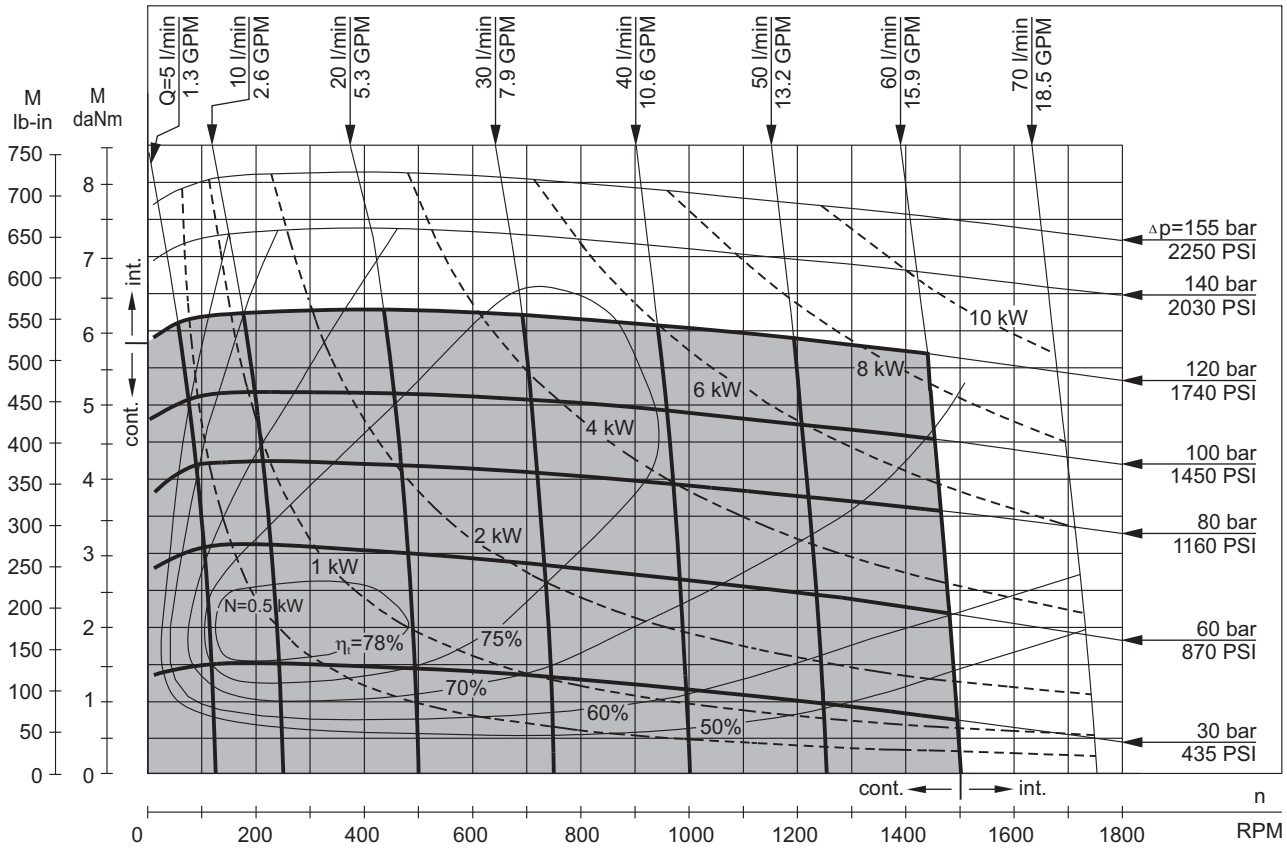
MLHP 32



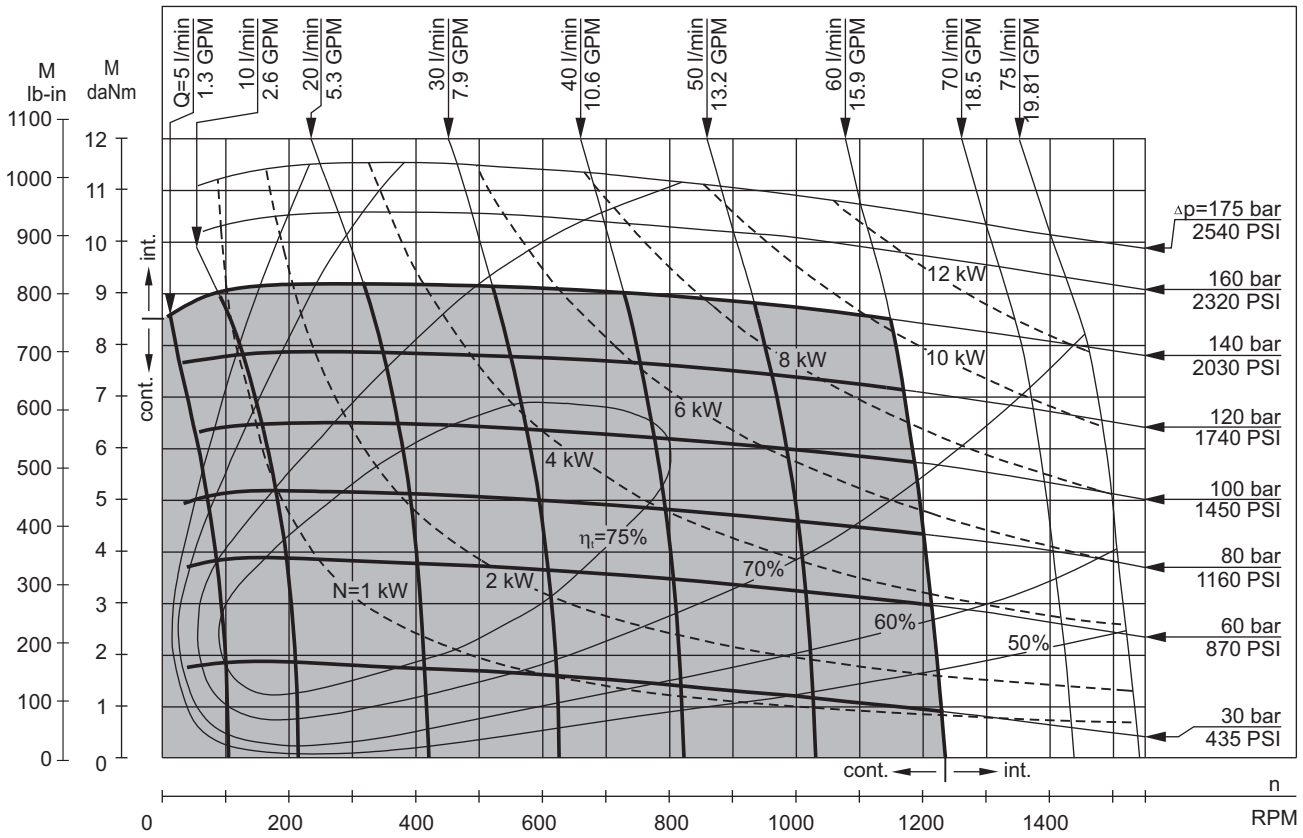
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5 PSI÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHP 40



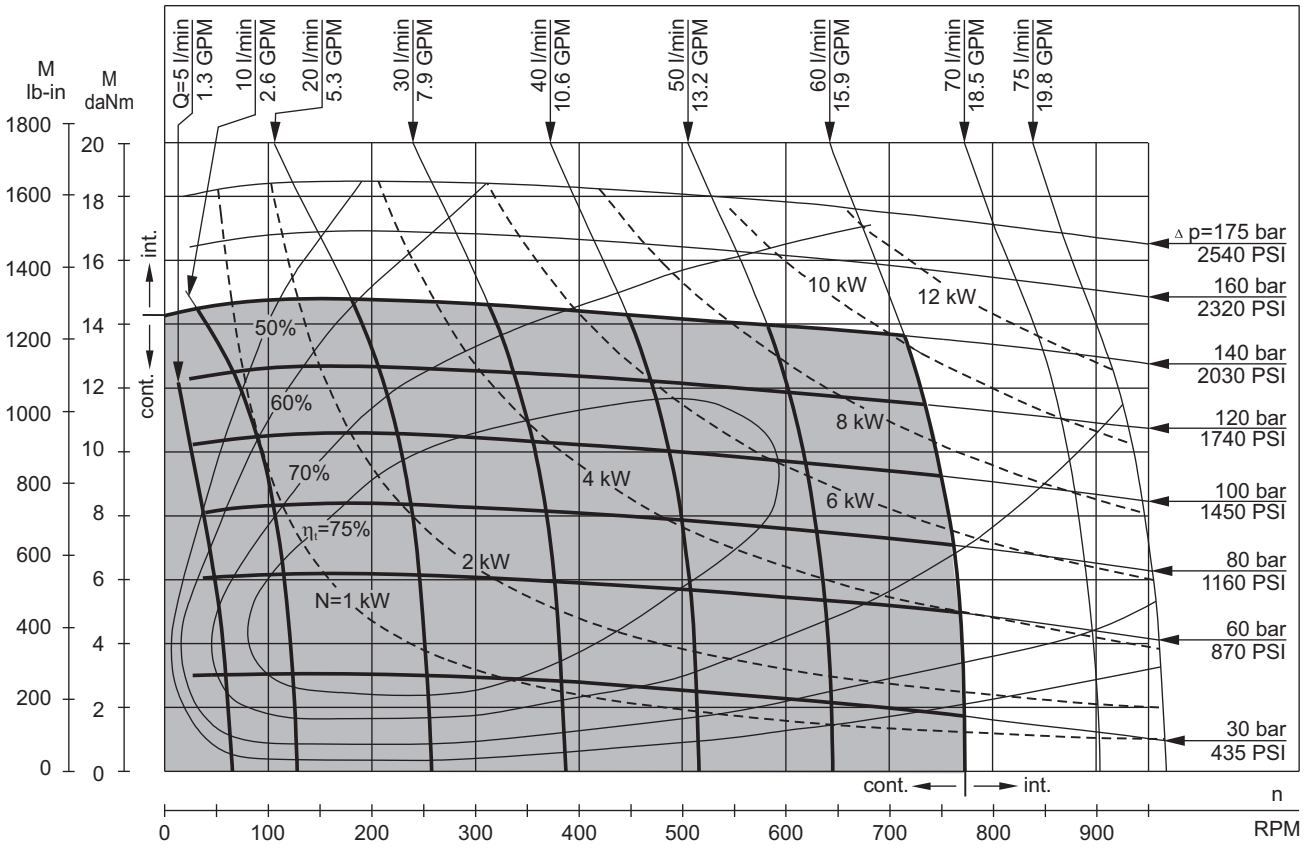
MLHP 50



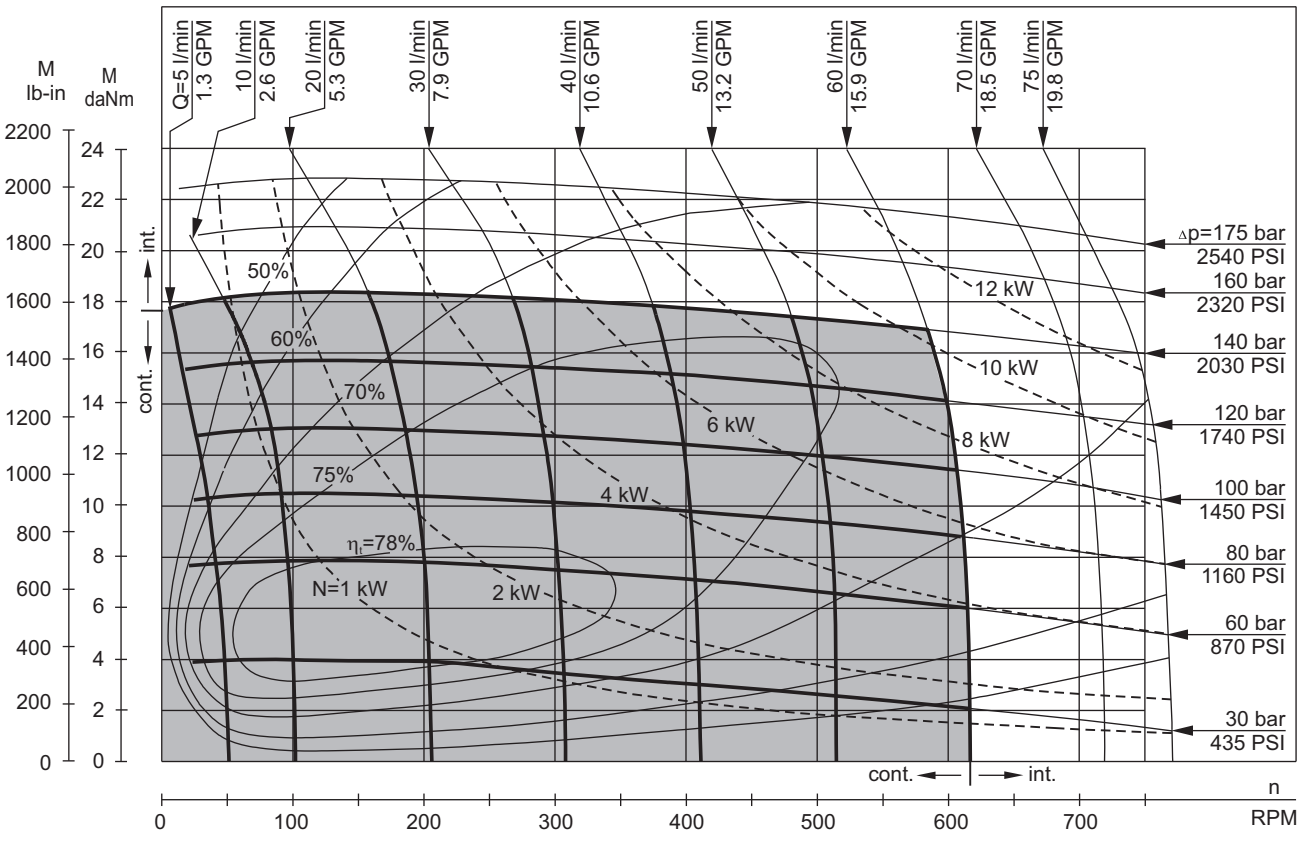
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5 PSI÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHP 80



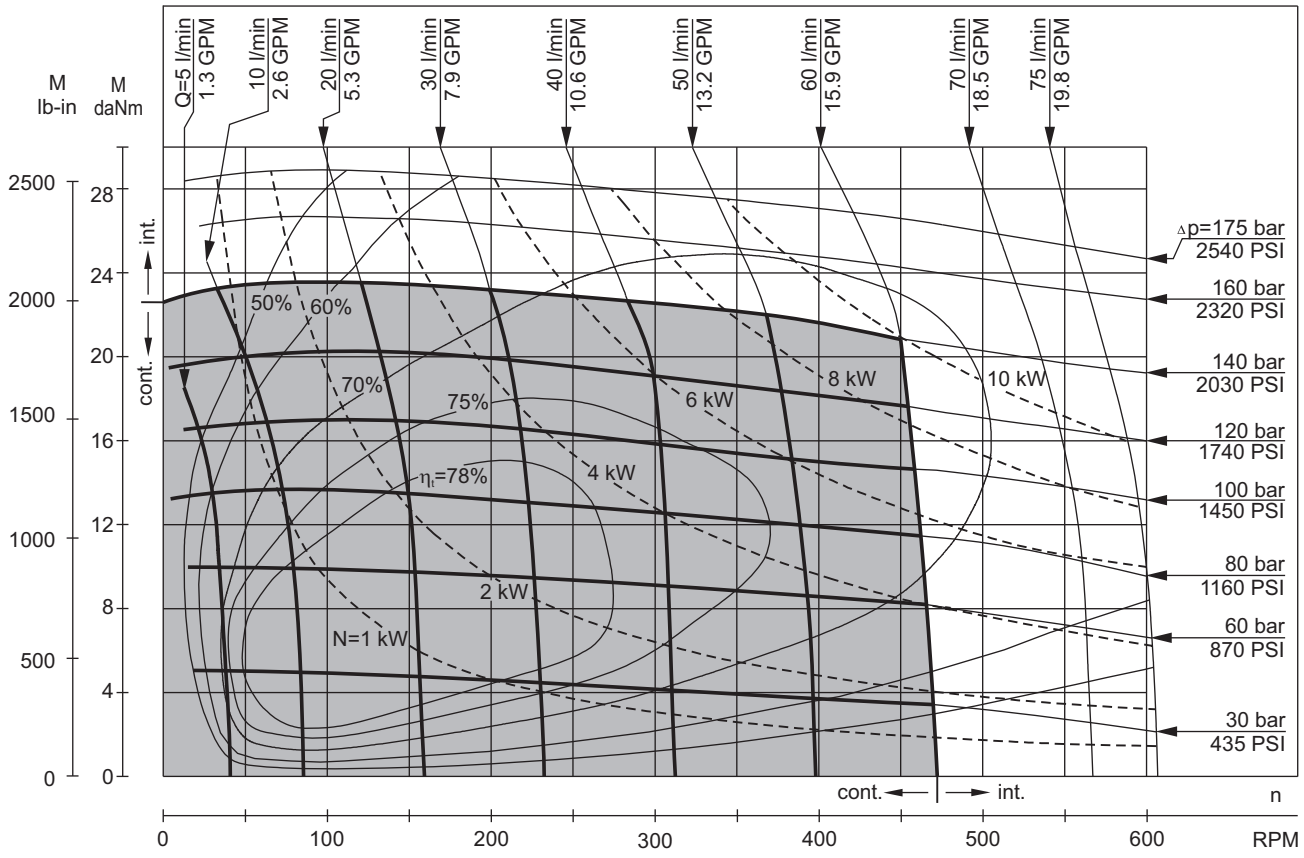
MLHP 100



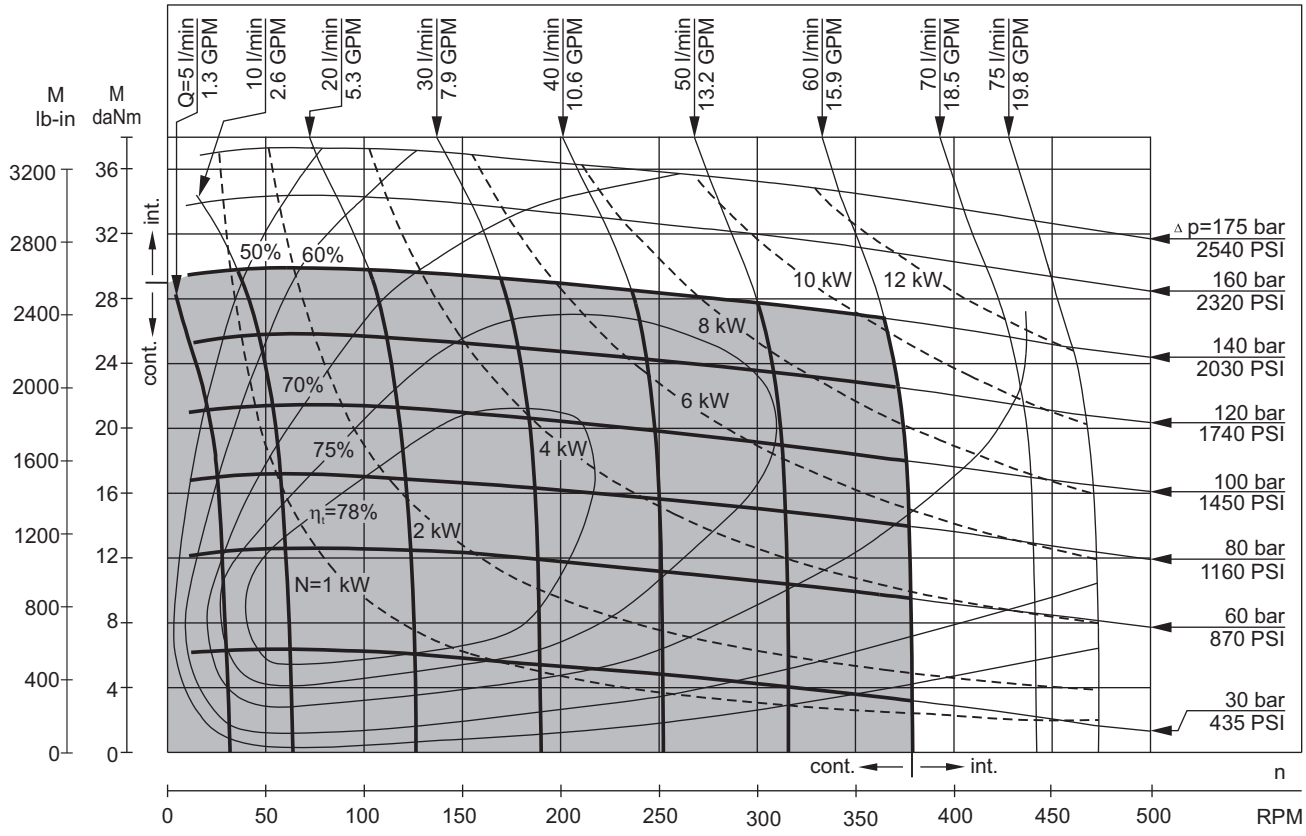
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5 PSI÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHP 125



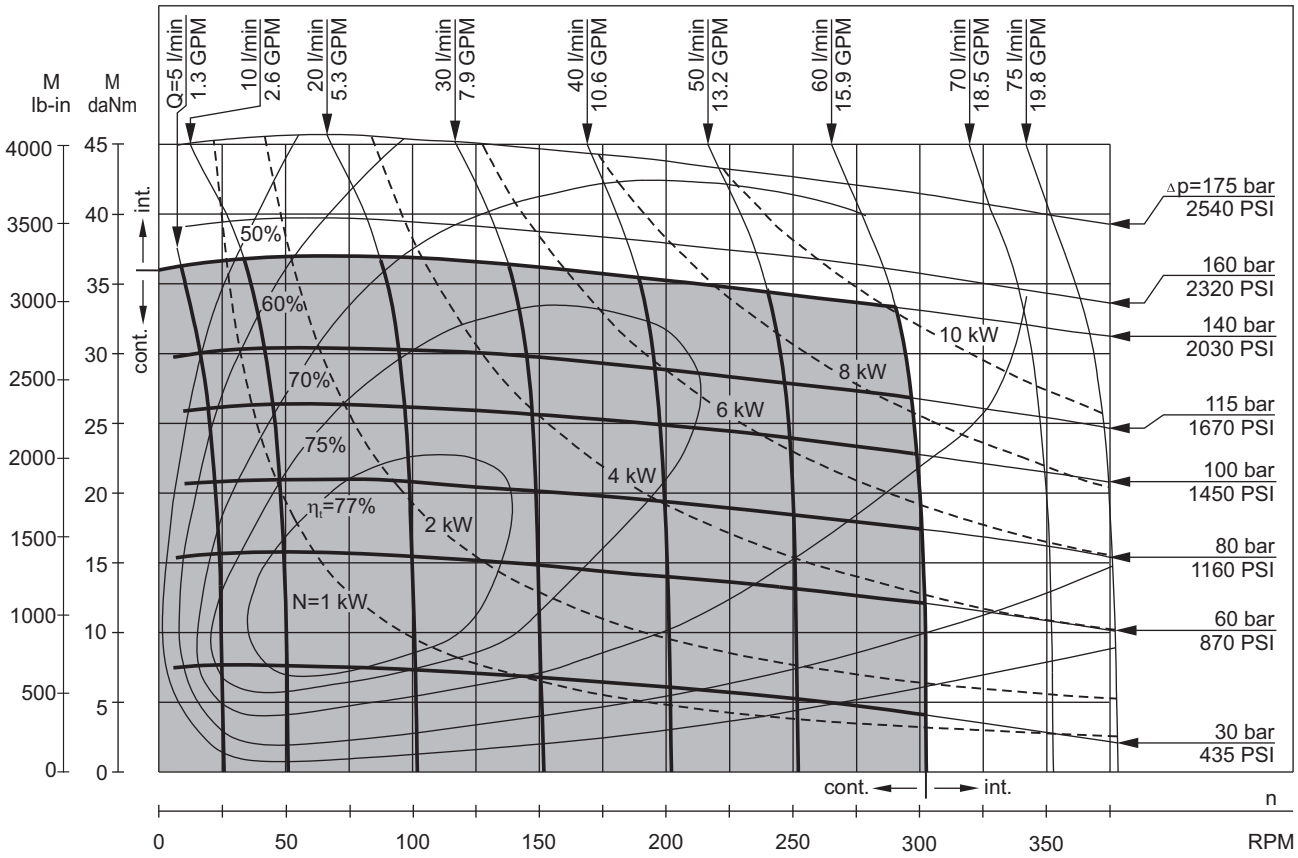
MLHP 160



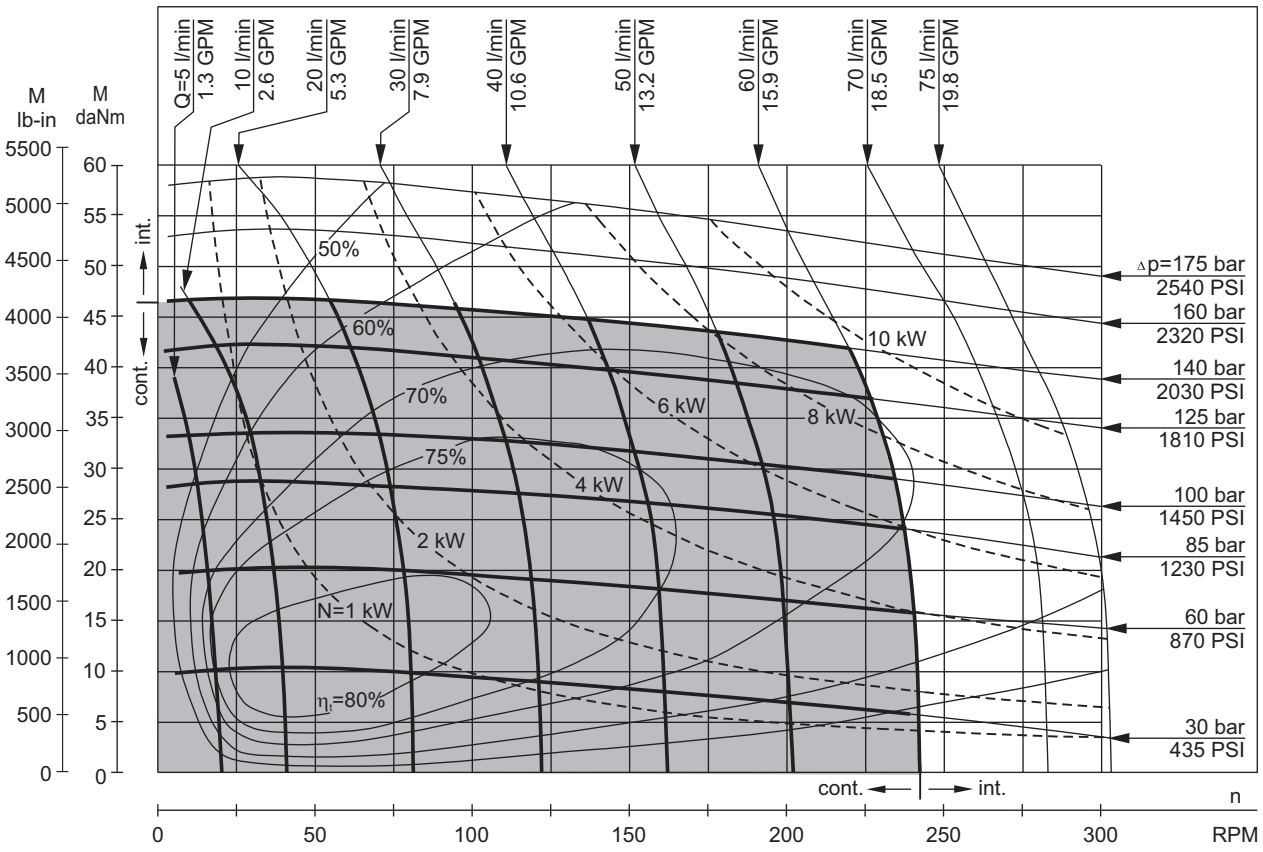
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5 PSI÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHP 200



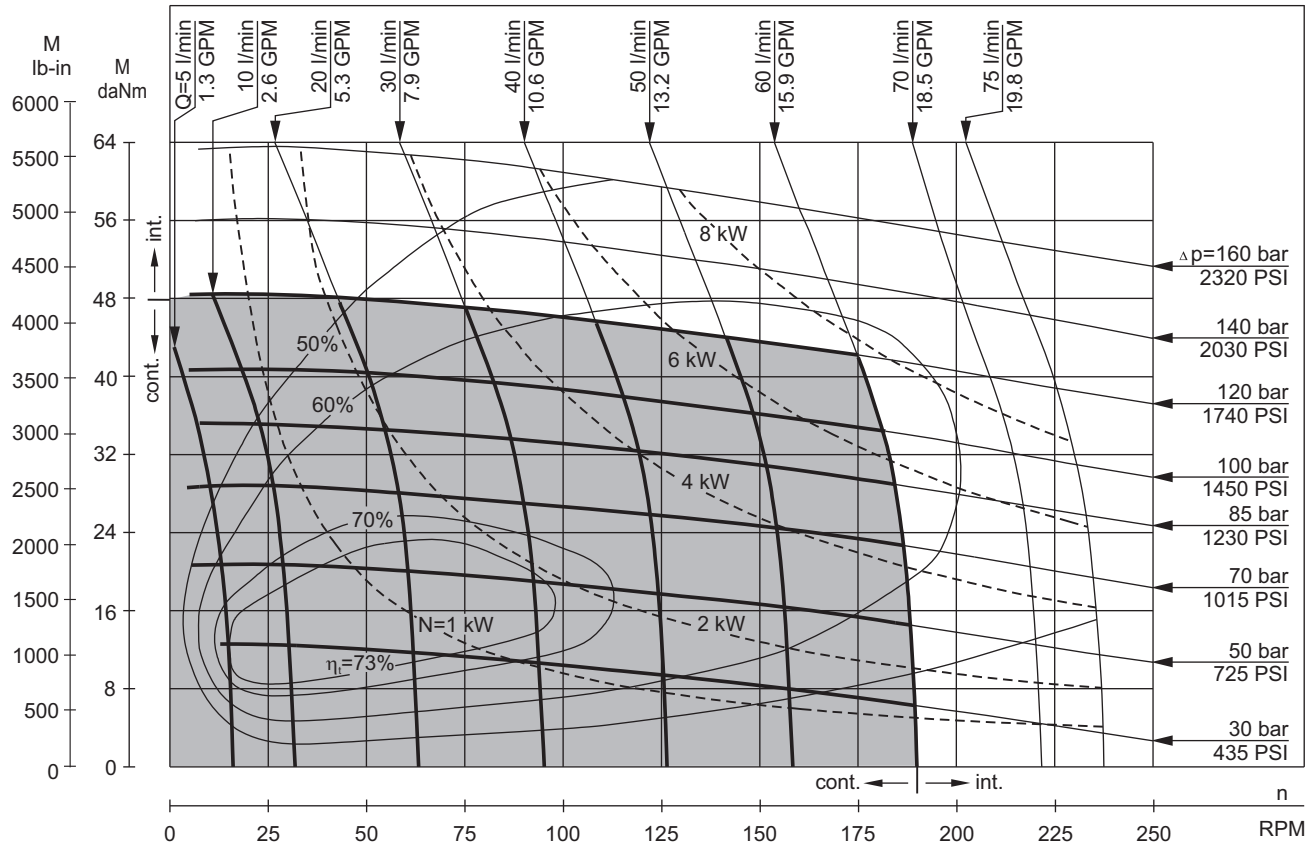
MLHP 250



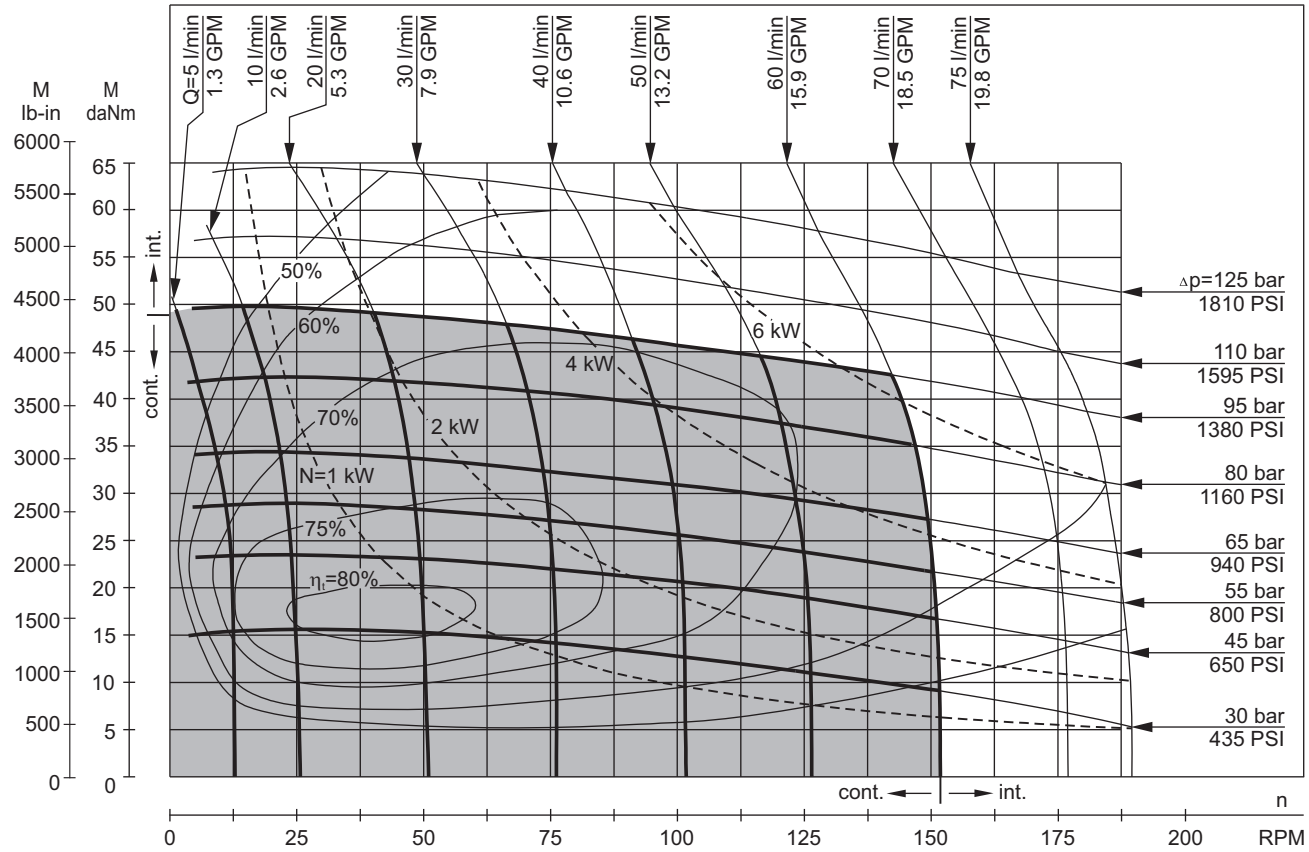
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5 PSI÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHP 315



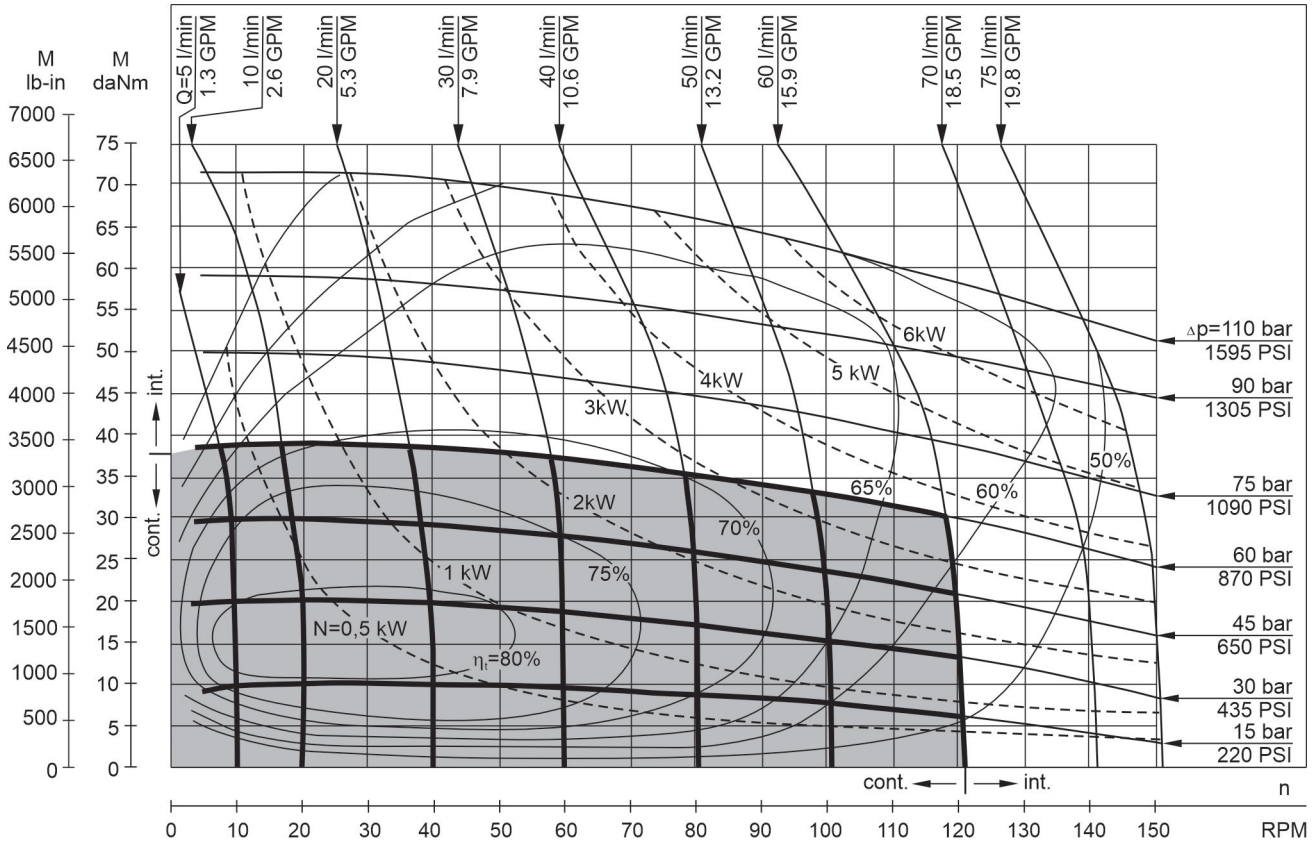
MLHP 400



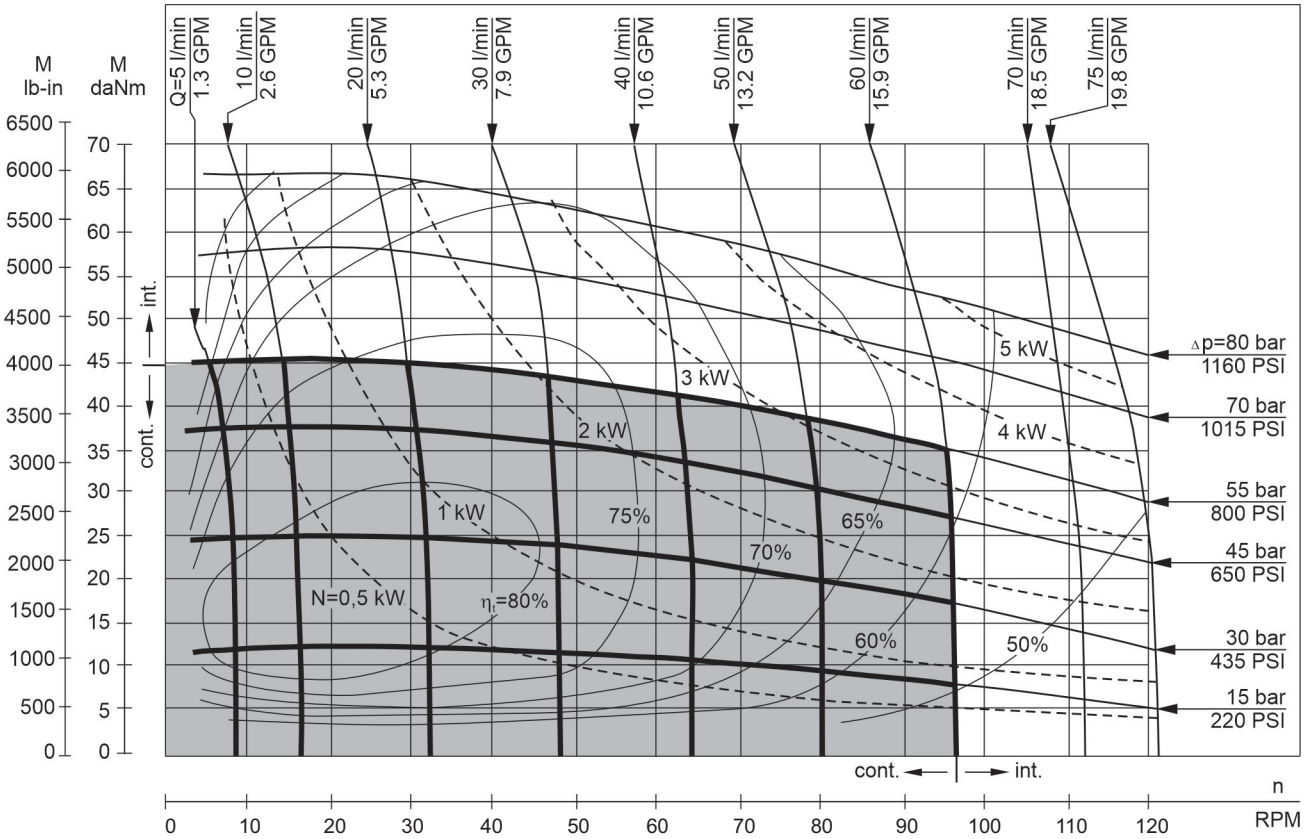
The function diagrams data is for average performance of randomly selected motors at back pressure 72.5 PSI÷145 PSI [5÷10 bar] and oil with viscosity of 150 SUS [32 mm²/s] at 122°F [50°C].

FUNCTION DIAGRAMS

MLHP 500



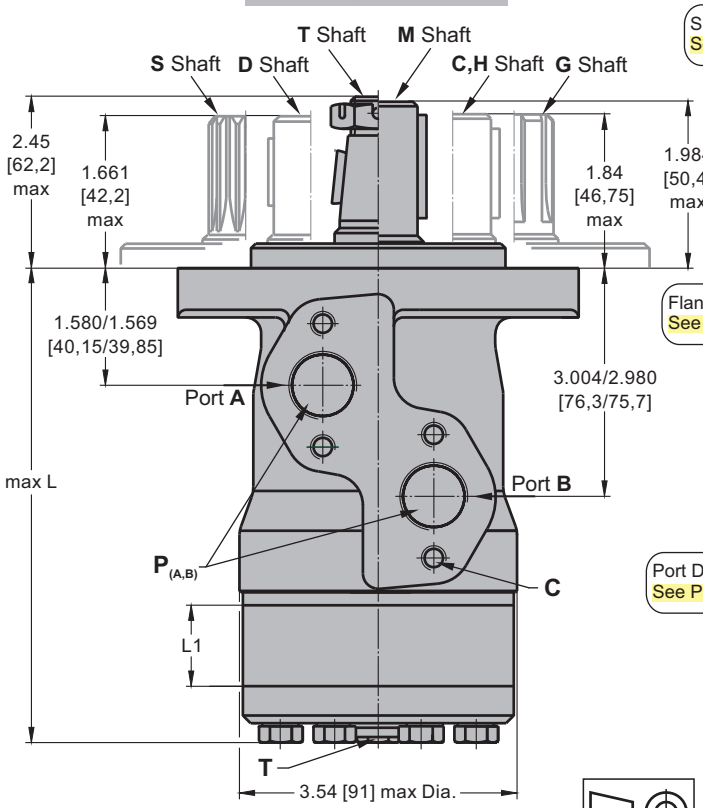
MLHP 630



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

DIMENSIONS and MOUNTING DATA

MLHP, MLHPF

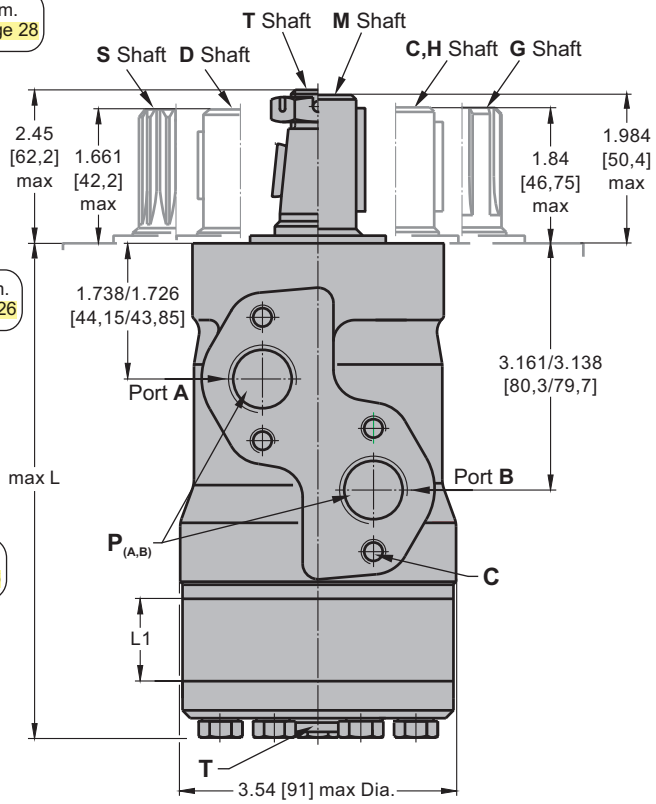


Shaft Dim. See Page 28

Flange Dim. See Page 26

Port Dim. See Page 26

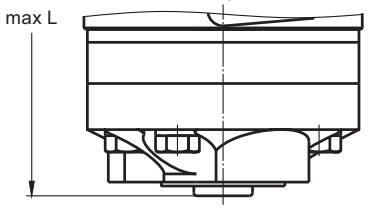
MLHPQ, MLHPM

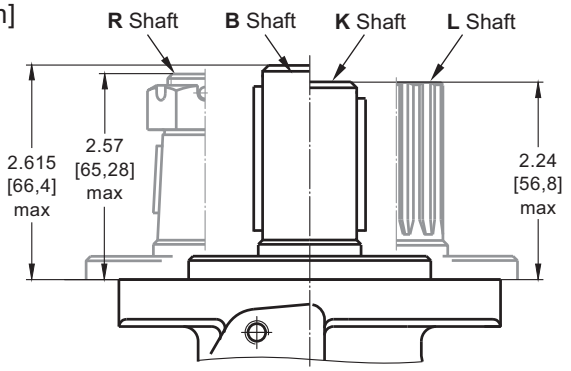


in [mm]

Version 6 7 8 9

Rear ports





	Versions			
	2, 6	3, 9	4, 7	5, 8
C	4xM8	4xM8	4x 5/16 - 18 UNF	4x 5/16 - 18 UNF
$P_{(A,B)}$	2xG½	2xM22x1,5	2x 7/8 - 14 UNF	2x½ - 14 NPTF
T	G¼	M14x1,5	7/16 - 20 UNF	7/16 - 20 UNF

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

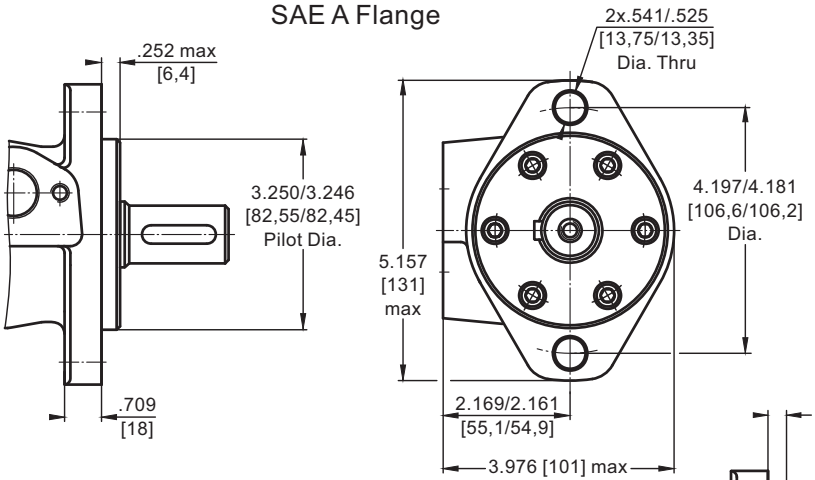
Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

Type	L max, in [mm]		Type	L max, in [mm]		L1, in [mm]
	Versions 2,3,4,5	*Versions 6,7,8,9		Versions 2,3,4,5	*Versions 6,7,8,9	
MLHP(F) 25	5.35 [136,0]	5.91 [150,0]	MLHPQ(M) 25	5.53 [140,5]	6.08 [154,5]	.21 [5,20]
MLHP(F) 32	5.39 [137,0]	5.96 [151,5]	MLHPQ(M) 32	5.57 [141,5]	6.12 [155,5]	.25 [6,30]
MLHP(F) 40	5.45 [138,5]	6.00 [152,5]	MLHPQ(M) 40	5.61 [142,5]	6.16 [156,5]	.29 [7,40]
MLHP(F) 50	5.41 [137,5]	5.96 [151,5]	MLHPQ(M) 50	5.59 [142,0]	6.14 [156,0]	.26 [6,67]
MLHP(F) 63	5,39 [137,0]	5.85 [148,5]	MLHPQ(M) 80	5.65 [143,5]	6.08 [154,5]	.33 [8,40]
MLHP(F) 80	5.57 [141,5]	6.12 [155,5]	MLHPQ(M) 80	5.75 [146,0]	6.29 [160,0]	.42 [10,67]
MLHP(F) 100	5.67 [144,0]	6.24 [158,5]	MLHPQ(M) 100	5.85 [148,5]	6.39 [162,5]	.52 [13,33]
MLHP(F) 125	5.81 [147,5]	6.36 [161,5]	MLHPQ(M) 125	5.98 [152,0]	6.54 [166,0]	.66 [16,67]
MLHP(F) 160	5.98 [152,0]	6.56 [166,5]	MLHPQ(M) 160	6.16 [156,5]	6.71 [170,5]	.84 [21,33]
MLHP(F) 200	6.20 [157,5]	6.75 [171,5]	MLHPQ(M) 200	6.38 [162,0]	6.93 [176,0]	1.05 [26,67]
MLHP(F) 250	6.46 [164,0]	7.03 [178,5]	MLHPQ(M) 250	6.63 [168,5]	7.19 [182,5]	1.31 [33,33]
MLHP(F) 315	6.83 [173,5]	7.38 [187,5]	MLHPQ(M) 315	7.01 [178,0]	7.56 [192,0]	1.68 [42,67]
MLHP(F) 400	7.24 [184,0]	7.81 [198,5]	MLHPQ(M) 400	7.42 [188,5]	7.97 [202,5]	2.10 [53,33]
MLHP(F) 500	7.78 [197,5]	8.33 [211,5]	MLHPQ(M) 500	7.95 [202,0]	8.50 [216,0]	2.62 [66,63]
MLHP(F) 630	8.47 [215,0]	9.02 [229,0]	MLHPQ(M) 630	8.62 [219,0]	9.17 [233,0]	3.31 [84,00]

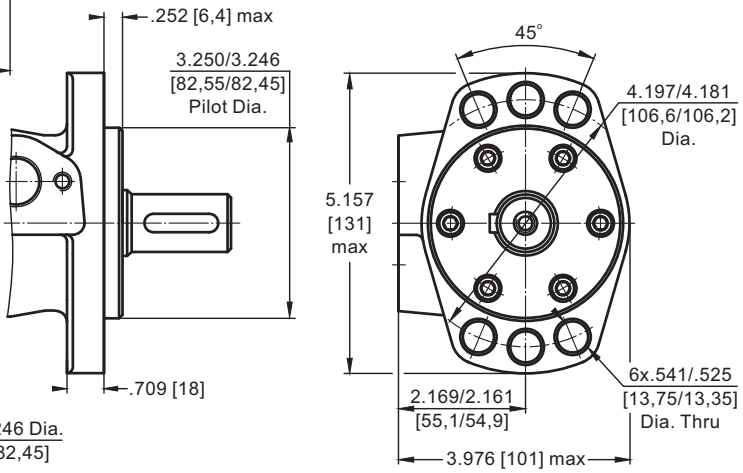
* - For Rear Ported Motors

MOUNTING

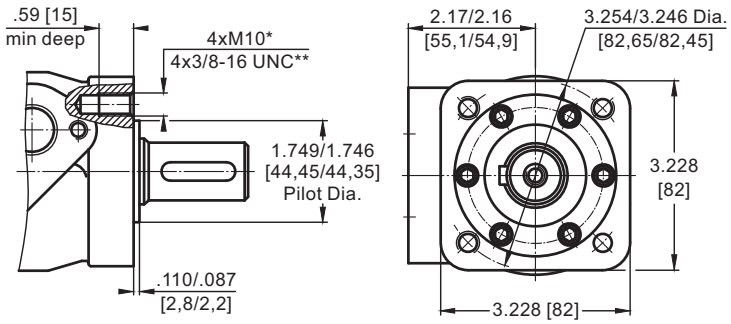
SAE A Flange



F - Magneto Flange



M and **Q** - Square Flange

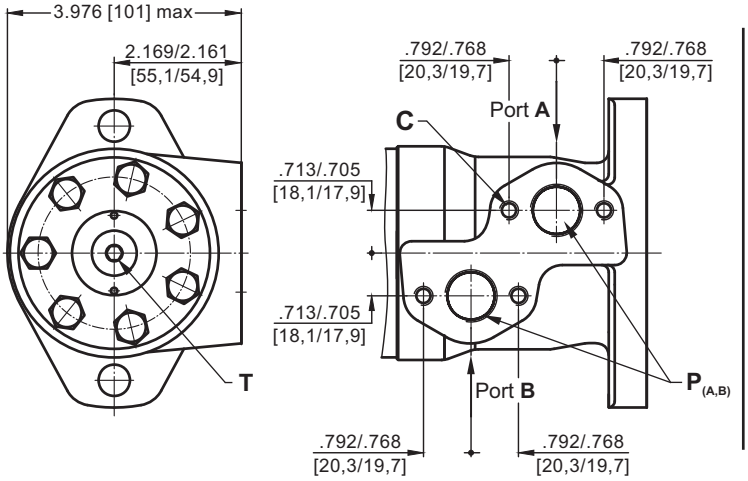


* For **M** Flange
** For **Q** Flange

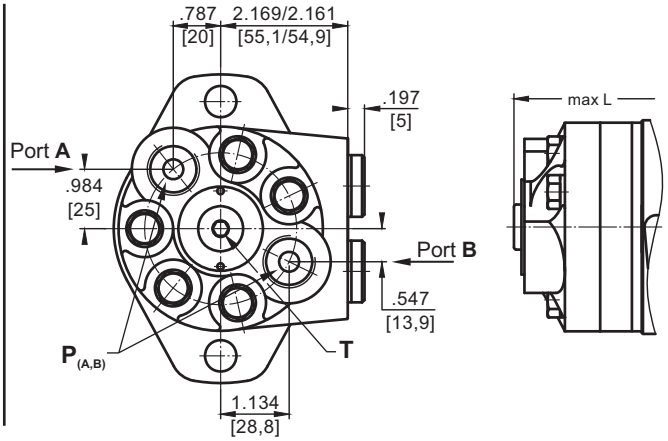
in [mm]

PORTS

Side Ports
Version 2 3 4 5



Rear Ports
Version 6 7 8 9

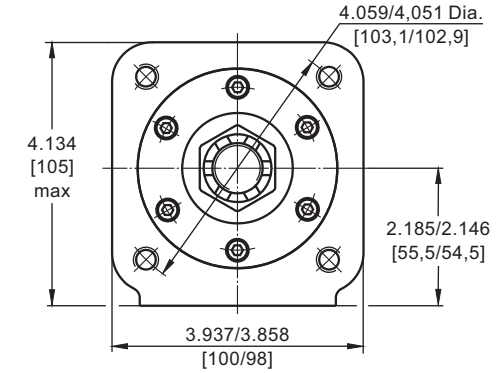


Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

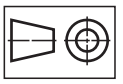
Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

	Versions			
	2, 6	3, 9	4, 7	5, 8
C	4xM8	4xM8	4x 5/16 - 18 UNF	4x 5/16 - 18 UNF
P(A,B)	2xG½	2xM22x1,5	2x 7/8 - 14 UNF	2x½ - 14 NPTF
T	G¼	M14x1,5	7/16 - 20 UNF	7/16 - 20 UNF

DIMENSIONS and MOUNTING DATA - MLHPW (WHEEL MOTOR)

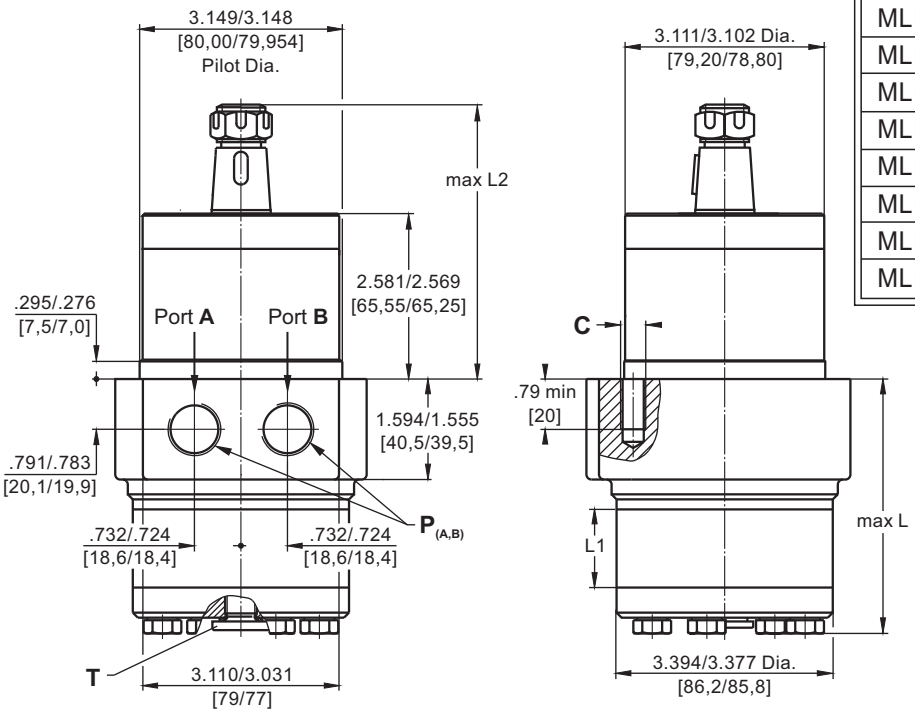


	Versions			
	2	3	4	5
C	4xM10	4xM10	⅜ - 16 UNF	⅜ - 16 UNF
$P_{(A,B)}$	2xG½	2xM22x1,5	2x⅞ - 14 UNF	2x½ - 14 NPTF
T	G¼	M14x1,5	7/16 - 20 UNF	7/16 - 20 UNF



in [mm]

Type	L, in [mm]	L_1, in [mm]
MLHPW(N) 25	3.01 [76,5]	.21 [5,20]
MLHPW(N) 32	3.07 [78,0]	.25 [6,30]
MLHPW(N) 40	3.13 [79,5]	.29 [7,40]
MLHPW(N) 50	3.07 [78,0]	.26 [6,67]
MLHPW(N) 80	3.23 [82,0]	.42 [10,67]
MLHPW(N) 100	3.35 [85,0]	.52 [13,33]
MLHPW(N) 125	3.47 [88,0]	.66 [16,67]
MLHPW(N) 160	3.66 [93,0]	.84 [21,33]
MLHPW(N) 200	3.86 [98,0]	1.05 [26,67]
MLHPW(N) 250	4.13 [105,0]	1.31 [33,33]
MLHPW(N) 315	4.51 [114,5]	1.68 [42,67]
MLHPW(N) 400	4.92 [125,0]	2.10 [53,33]



Shaft version	L_2, in [mm]
C, G, H	4.17 [106]
S, D	3.99 [101,4]
M	4.32 [109,6]
T	4.78 [121,5]

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

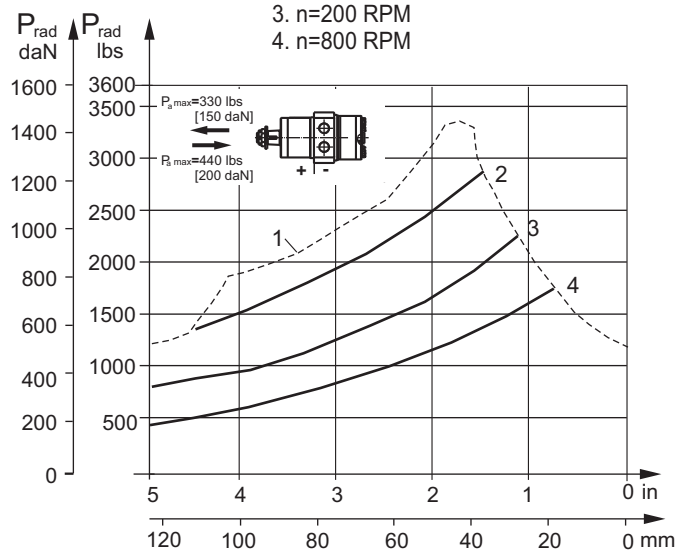
Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

PERMISSIBLE SHAFT LOADS

MLHPWN

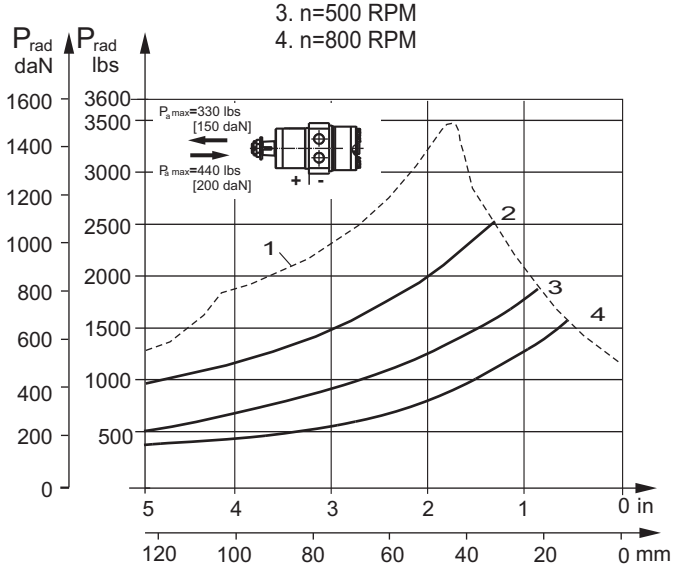
The curves apply to a B10 bearing life of 2000 hours.

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



MLHPW

1. Max. radial shaft load
2. n=300 RPM
3. n=500 RPM
4. n=800 RPM

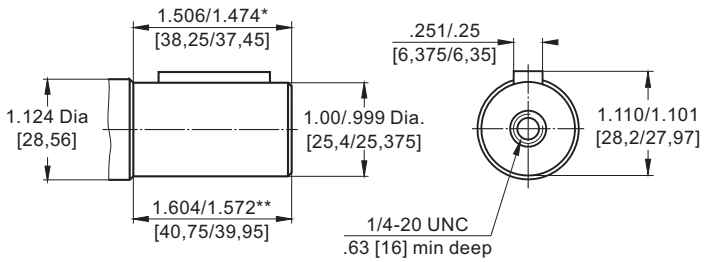


SHAFT EXTENSIONS for MLHP and MLHR MOTORS

1.124 [28,56] sealing diameter

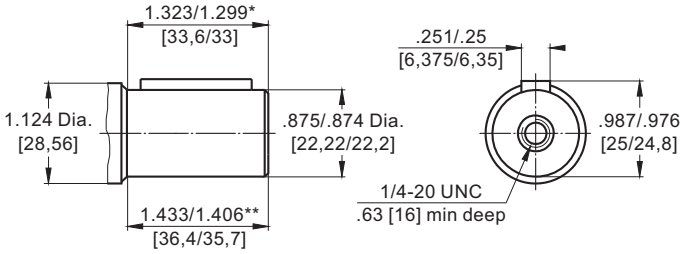
C

1" [25,4] straight, Parallel key ¼"x¼"x1¼" BS 46
Max. Torque 3009 lb-in [34 daNm]



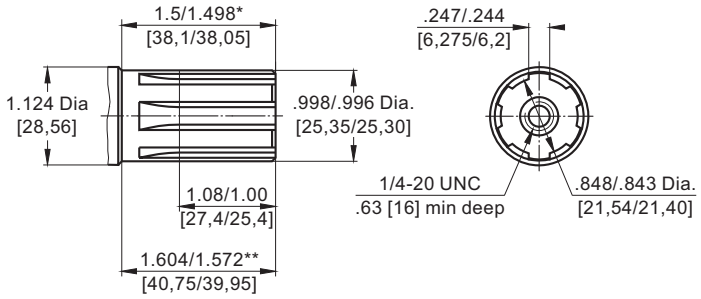
D

7/8" [22,2] straight, Parallel key ¼"x¼"x1" BS 46
Max. Torque 3200 lb-in [36 daNm]



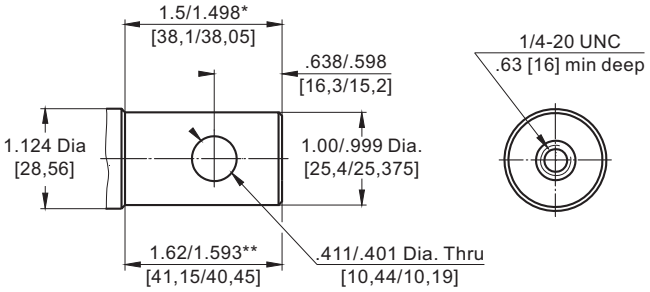
G

1" [25,4], SAE 6B Splined
Max. Torque 3540 lb-in [40 daNm]



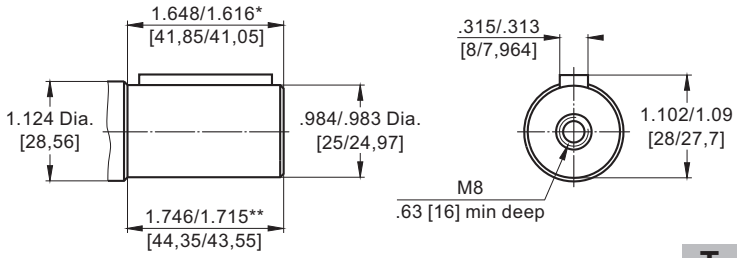
H

1" [25,4] straight, w/ .406 [10,3] Crosshole
Max. Torque 3009 lb-in [34 daNm]



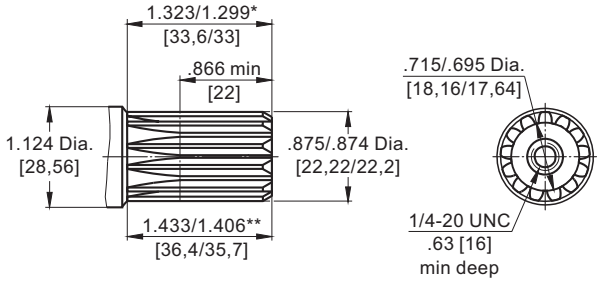
M

ø25 straight, Parallel key A8x7x32 DIN 6885
Max. Torque 3009 lb-in [34 daNm]



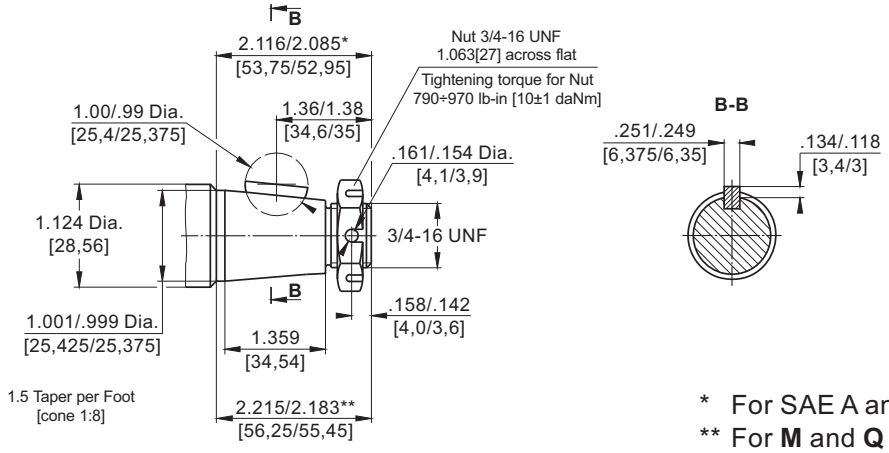
S

13 T Splined, 7/8" [22,2], ANS B 92.1-1976
Max. Torque 3200 lb-in [36 daNm]



T

1" [25,4], SAE J501 Tapered
Woodruff key ¼"x1" SAE J502
Max. Torque 3540 lb-in [40 daNm]



in [mm]

* For SAE A and **F** Flange
** For **M** and **Q** Flange

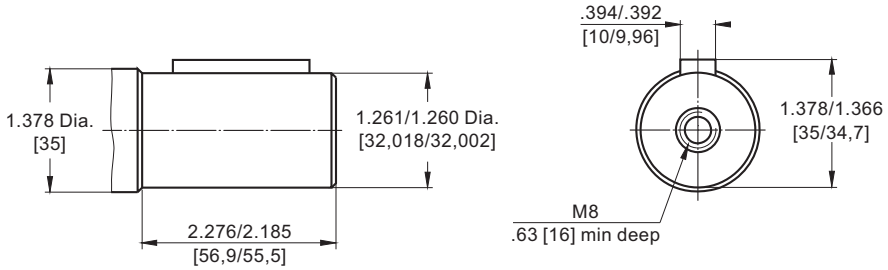
Requirement max. Torque must not be exceeded.

SHAFT EXTENSIONS for MLHP and MLHR MOTORS (continued)

1.378 [35] sealing diameter

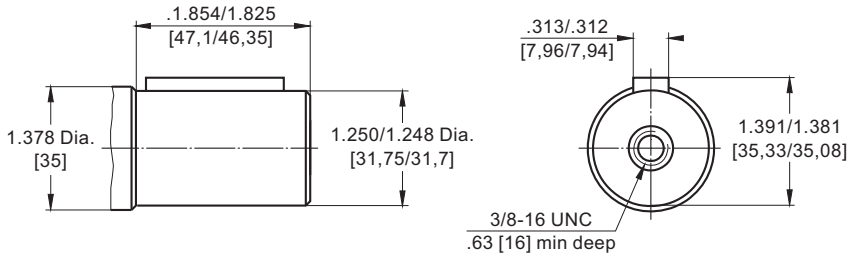
B

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



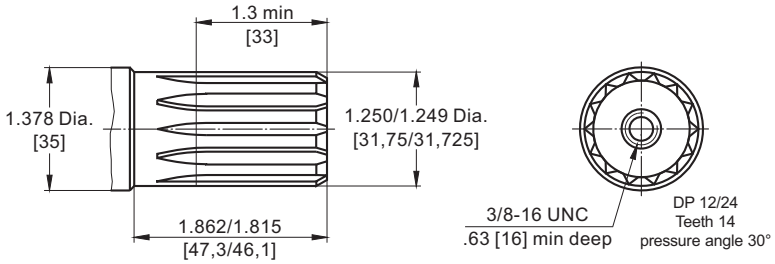
K

1¼" [31,75] straight, Parallel key 5/16"x5/16"x1¼" BS 46
Max. Torque 6815 lb-in [77 daNm]



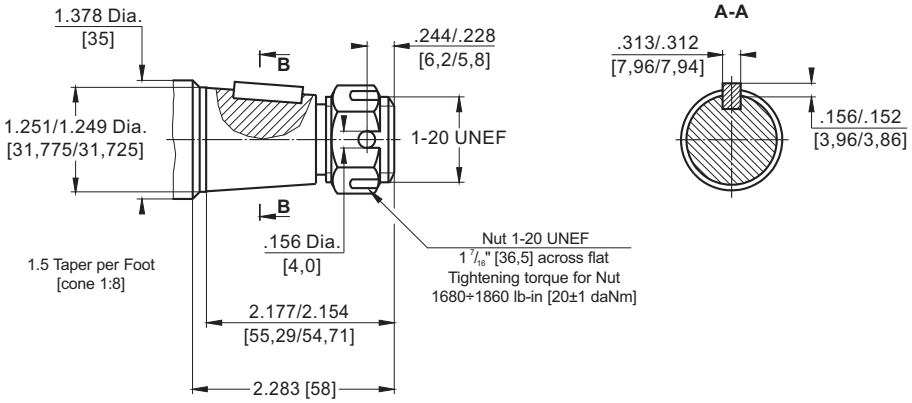
L

14T Splined,1¼" [31,75], ANS B 92.1-1976
Max. Torque 6815 lb-in [77 daNm]



R

1¼" [31,75],SAE J501 Tapered, Parallel key 5/16"x5/16"x1"
Max. Torque 6815 lb-in [77 daNm]

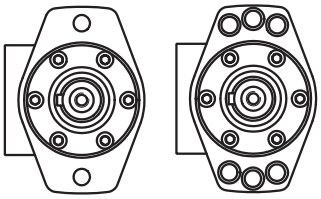
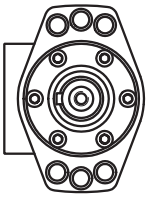
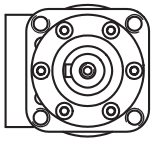


in [mm]

Requirement max. Torque must not be exceeded.

PERMISSIBLE SHAFT LOADS for MLHP and MLHR MOTORS

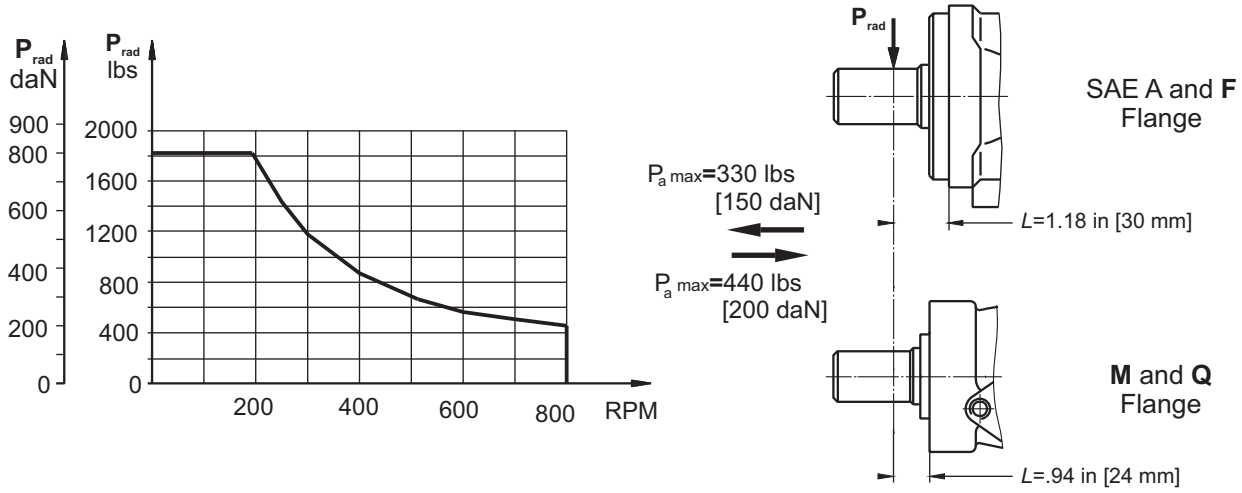
The permissible radial shaft load P_{rad} depends on the speed **n**, RPM, mounting flange, distance **L** from the point of load to the mounting flange and shaft version.

Mounting Flange			
Shaft Version	Keyed **C** Splined **G**	Keyed **B** Splined **L**	Keyed **C** Splined **G**
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*	$\frac{800}{n} \times \frac{25000}{101+L}$, 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*	$\frac{800}{RPM} \times \frac{2215}{3.98+L}$, lbs*

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

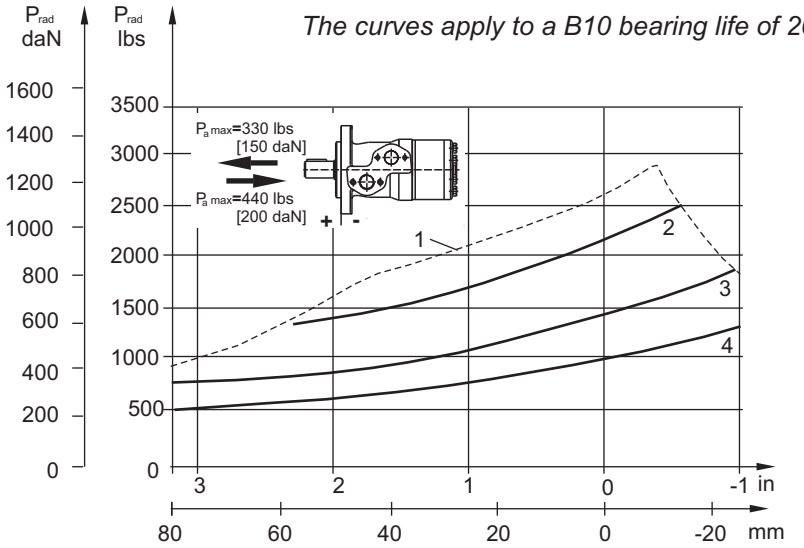
MLHP and MLHR

Radial Shaft Load P_{rad} for C, G Shaft Extensions by L=1.18 in [30 mm] (.94 in [24 mm])

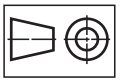


MLHPN and MLHRN

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

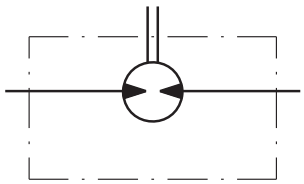
 in [mm]

MAX. PERMISSIBLE SHAFT SEAL PRESSURE for MLHP and MLHR MOTORS

MLHP/MLHR...U1 motors with high pressure seal and without drain connection:

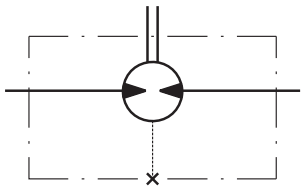
The shaft seal pressure equals the average of input pressure and return pressure.

$$P_{seal} = \frac{P_{input} + P_{return}}{2}$$



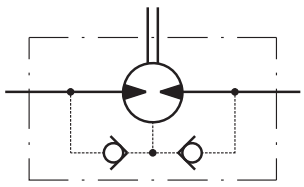
MLHP/MLHR...U motors with high pressure seal and drain connection:

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



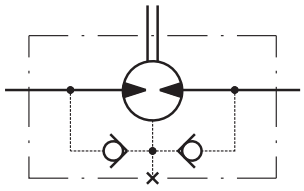
MLHP/MLHR...1 motors with standard shaft seal and without drain connection:

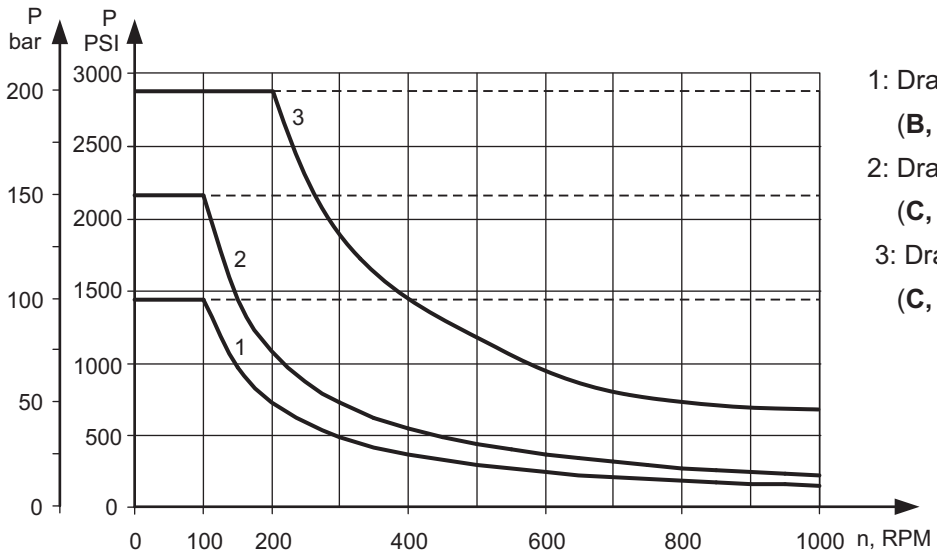
The shaft seal pressure never exceeds the pressure in the return line.



MLHP/MLHR... motors with standard shaft seal and with drain connection:

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





1: Drawing for Standard Shaft Seal (**B, K, L, R** shafts)
2: Drawing for Standard Shaft Seal (**C, G, D, H, M, S, T** shafts)
3: Drawing for High Pressure Seal ("**U**" Seal) (**C, G, D, H, M, S, T** shafts)

——— - continuous operations
- - - - - - - intermittent operations

ORDER CODE

	1	2	3	4	5	6	7	8	9
M L H P									

Pos.1 - **Mounting Flange**

omit - SAE A, two holes
F - Magneto, six holes
M - Square metric, four bolts M10
Q - Square, four bolts
W - Wheel motor

Pos.2 - **Displacement code**

25* - 1.73 in^3/rev [28,4 cm^3/rev]
32* - 2.11 in^3/rev [34,5 cm^3/rev]
40* - 2.47 in^3/rev [40,5 cm^3/rev]
50 - 3.02 in^3/rev [49,5 cm^3/rev]
63** - 3.80 in^3/rev [62,3 cm^3/rev]
80 - 4.83 in^3/rev [79,2 cm^3/rev]
100 - 6.04 in^3/rev [99,0 cm^3/rev]
125 - 7.55 in^3/rev [123,8 cm^3/rev]
160 - 9.66 in^3/rev [158,4 cm^3/rev]
200 - 12.10 in^3/rev [198,0 cm^3/rev]
250 - 15.10 in^3/rev [247,5 cm^3/rev]
315 - 19.30 in^3/rev [316,8 cm^3/rev]
400 - 24.16 in^3/rev [396,0 cm^3/rev]
500 - 30.20 in^3/rev [495,0 cm^3/rev]
630 - 38.05 in^3/rev [623,6 cm^3/rev]

Pos.3 - **Shaft Extensions*** ** [see pages 28 and 29]

C - 1" [25,4] straight, Parallel key
VC - 1" [25,4] straight, Parallel key w/ corrosion resistant protection
D - $^7/_8$" [22,2] straight, Parallel key
G - 1" [25,4] SAE 6B Splined
H - 1" [25,4] straight w/ .406 [10,3] Crosshole
M - 25 mm straight, Parallel key
VM - 25 mm straight, Parallel key w/ corrosion resistant protectiion
S - $^7/_8$" [22,2] 13T Splined
T - 1" [25,4] SAE J501 Tapered
B - 32 mm straight, Parallel key
K - 1¼" [31,75] straight, Parallel key
L - 1¼" [31,75] 14T Splined
R - 1¼" [31,75] SAE J501 Tapered

Pos.4 - **Option** [needle bearings]

omit - none
N - with needle bearings

Pos.5 - **Port Size/Type** [standard manifold to each]

2 - side ports, 2xG1/2, G1/4, BSP thread, ISO 228
3 - side ports, 2xM22x1,5, M14x1,5, metric thread, ISO 262
4 - side ports, 2x7/8-14 UNF, O-ring, 7/16-20 UNF
5 - side ports, 2x1/2-14 NPTF, 7/16-20 UNF
6 - rear ports, 2xG1/2, G1/4, BSP thread, ISO 228
7 - rear ports, 2x7/8-14 UNF, O-ring, 7/16-20 UNF
8 - rear ports, 2x1/2-14 NPTF, 7/16-20 UNF
9 - rear ports, 2xM22x1,5, M14x1,5, metric thread, ISO 262

Pos.6 - **Shaft Seal Version** [see page 31]

omit - Standard shaft seal
U - High pressure shaft seal (without check valves)

Pos.7 - **Drain Port**

omit - with drain port
1 - without drain port

Pos.8 - **Additional Options** [see page 110]

Pos.9 - **Design Series**

omit - Factory specified

The hydraulic motors are mangano-phosphatized as standard.

NOTES: * Not with Low Pressure Seal.
** 63 displacement code is not for MLHPW!
*** The permissible output torque for shafts must not be exceeded.

The following combinations are not allowed:
- **Q, M, W** flange with **B**, **K**, **L**, **R** shafts;
- **N** option with **B**, **K**, **L**, **R** shafts, **U** option or **RS** option;
- **W** flange with rear ports;
- **B**, **K**, **L**, **R** shafts with **U** option.

Displacement codes 25, 32, 40, 50 and 63 are not allowed with **B**, **K**, **L**, **R** shafts!

MOTOR ADDITIONAL OPTIONS

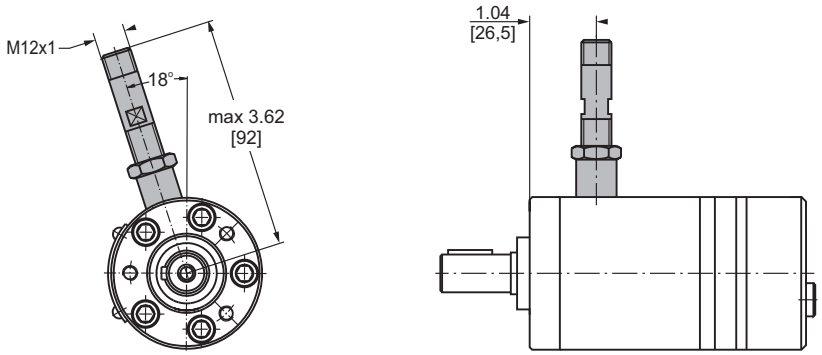
Additional Options Description	Order Code	Motor type											
		MLHM	MLHP	MLHPW, MLHP(W)N	HP	MLHR	MLHRN	HR	MLHPL	MLHRL	MLHRW	MLHH	HW
Speed Sensor*	**RS**	O	O	-	O	O	-	O	-	-	-	O	O*****
Low Leakage	**LL**	O	-	-	-	O	O	O	-	O	O	O	O
Low Speed Valving	**LSV**	-	-	-	-	O	-	-	-	-	-	O	O
Free Running	**FR**	O	O	O	O	O	O	O	O	O	O	O	O
Reverse Rotation	**R**	O	O	O	O	O	O	O	O	O	O	O	O
Paint**	**P**	O	O	O	O	O	O	O	O	O	O	O	O
Corrosion Protected Paint**	**PC**	O	O	O	O	O	O	O	O	O	O	O	O
Special Paint***	**PS**	O	O	O	O	O	O	O	O	O	O	O	O
	PCS												
Check Valves		S	S****	S	O	S****	S	O	S	S	S****	S****	S

O	Optional
-	Not applicable
S	Standard

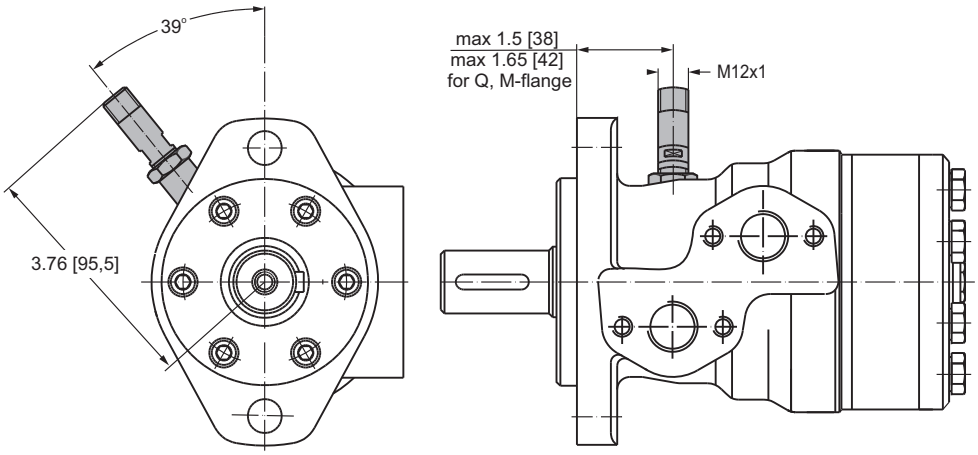
* For sensor ordering see pages 111÷112.
** Colour at customer's request.
*** Non painted feeding surfaces, colour at customer's request.
**** Without check valves for "**U**" shaft seal versions.
***** RS option is not available at HW...R (with relief valves).

MOTORS WITH SPEED SENSOR

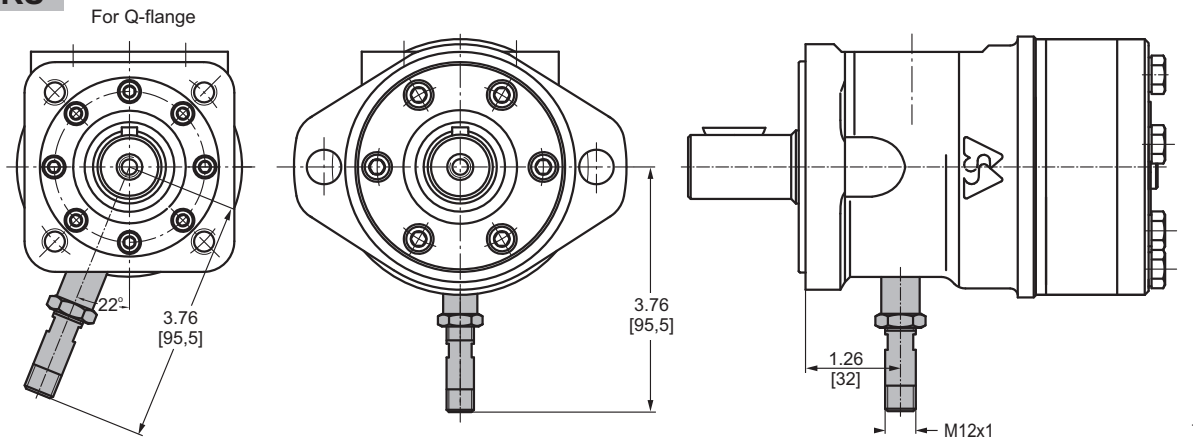
MLHM...RS



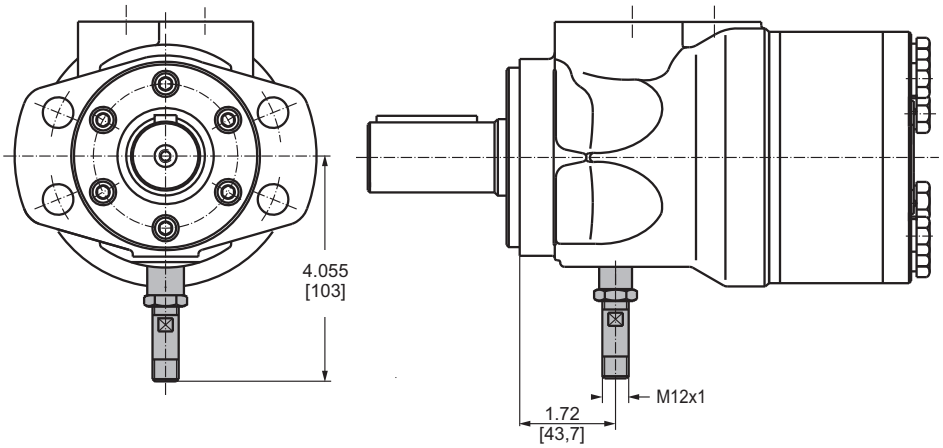
MLHP...RS
MLHR...RS



HP...RS
HR...RS



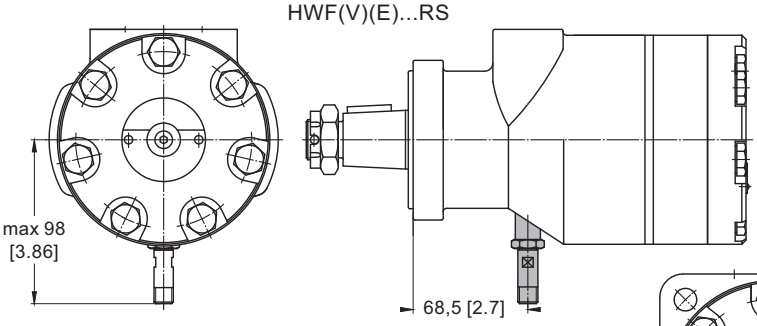
MLHH...RS



in [mm]

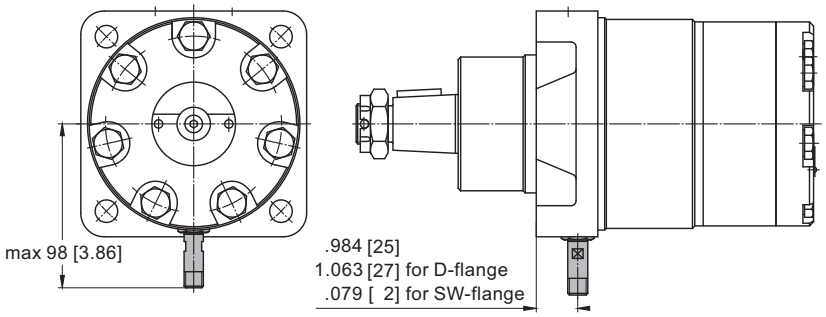
HW...RS

HWF(V)(E)...RS



RS option is not available at HW...R (with relief valves).

HW(S)(D)(SW)(V)(E)...RS



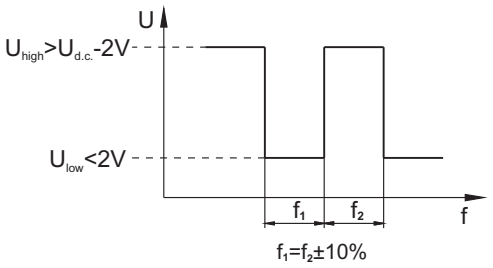
in [mm]

TECHNICAL DATA of the SPEED SENSOR

Technical data

Frequency range	0...15 000 Hz
Output	Universal PUSH PULL
Power supply	10-30 VDC
Current input	<20 mA (@24 VDC)
Maximum output current	500 mA
Ambient Temperature	-40...+125^{0}C [-40...+257^{0}F]
Protection	IP 67
Plug connector	M12-Series
Mounting principle	ISO 6149

Output signal

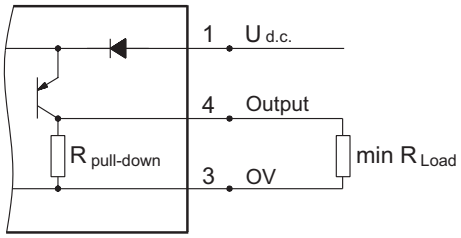


Load max.:$I_{high}=I_{low}$<50mA

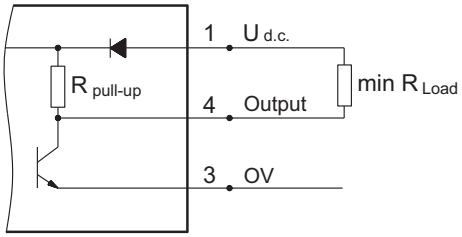
Motor type	MLHM	MLHP	MLHR	HP, HR	MLHH	HW
Pulses per revolution	30	36	36	36	42	12

Wiring diagrams

PNP

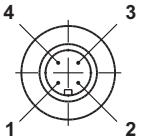


NPN



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

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

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

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%	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:

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

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]

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

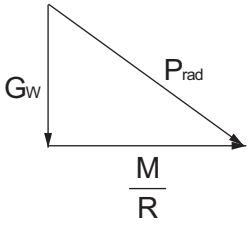
To avoid wheel slipping, the following condition should be observed $M_W > M$
f - frictional factor;
G_w - total weight over the wheels, lbs [daN].

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.



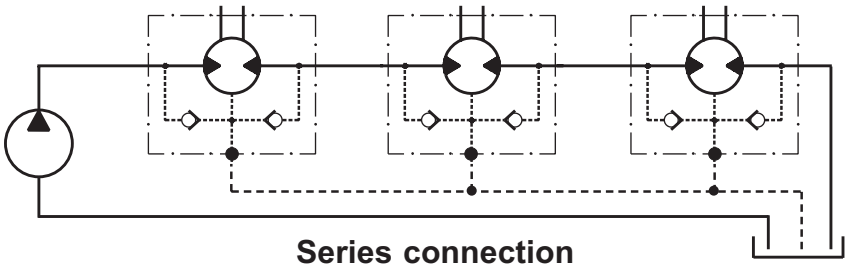
$$P_{rad}=\sqrt{G_w^2+\left(\frac{M}{R}\right)^2}$$

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

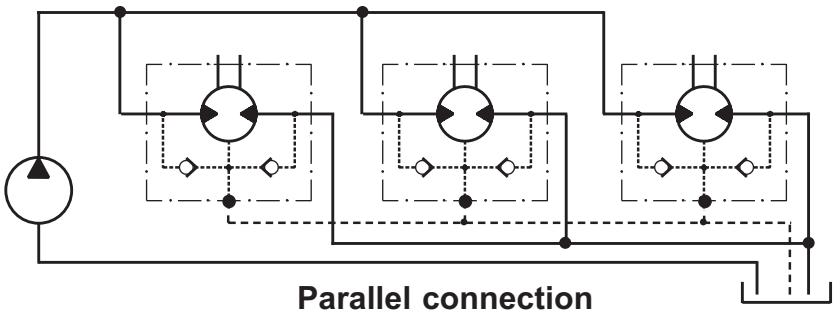
In accordance with calculated loadings the suitable motor from the catalogue is selected.

DRAINAGE SPACE AND DRAINAGE PRESSURE

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



Series connection



Parallel connection