HEAVY DUTY MOTORS

HEAVY DUTY HYDRAULIC MOTORS

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DISC VALVE HYDRAULIC MOTORS

GENERAL INFORMATION:

Orbit motors convert hydraulic energy (pressure, oil flow) into mechanical energy (torque, speed). Hydraulic orbit motors operate on the principle of an internal gear (rotor) rotating within a fixed external gear (stator). The internal gear transmits the torque generated by the application of pressure from hydraulic oil fed into motor which is then delivered via the motor's output shaft. Orbit motors have high starting torque and constant output torque at wide speed range. The output shaft runs on tapered roller bearings and can absorb high axial and radial forces.

DISTRIBUTOR VALVE
MSWM, MTK, MTM, TMF, MVM, MVMC, VMF series motors have disk valve: the distributor valve has been separated from output shaft and is driven by short cardan shaft. A balance plate counterbalances the hydraulic forces around the distributor valve. It gives the motors high efficiency - even at high pressures, and good starting characteristics.

GEAR WHEEL SET
There are two forms of gear wheel set: Gerotor set has plain teeth and Roll-gerotor set with teeth fitted with rollers.
MSWM, MTK, MTM, TMF, MVM, MVMC, VMF series motors have roll-gerotor set. The rollers reduce local stress and the tangential reaction forces on the rotor reducing friction to a minimum. This gives long operating life and better efficiency even at continuous high pressures.

FEATURES:

Standard Motor The standard motor mounting flange is located as close to the output shaft as possible. This type of mounting supports the motor close to the shaft load. This mounting flange is also compatible with many standard gear boxes.

Wheel Motor The wheel motor mounting flange is located near the center of the motor which permits part or all of the motor to be located inside the wheel or roller hub. In traction drive applications, loads can be positioned over the motor bearings for best bearing life. This wheel motor mounting flange provides design flexibility in many applications.

Short Motor This motor is assembled without the output shaft, bearings and bearing housing and has the same drive components as the standard motors. The short motor is especially suited for applications such as gear boxes, winch, reel and roll drives. Short motor applications must be designed with a bearing supported internal spline to mate with the short motor drive. Product designs using these hydraulic motors provide considerable cost savings.

Low Leakage LL Series hydraulic motors are designed to operate at the whole standard range of working conditions (pressure drop and frequency of rotation), but with considerable decreased volumetric losses in the drain ports. This motors are suitable for hydraulic systems with series-connected motors with demands for low leakage.

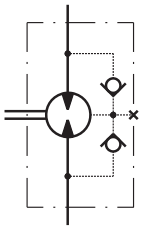
Low Speed Valve LSV feature optimizes the motor for low-speed performance. Motors with this valving provide very low speed while maintaining high torque. They are designed to run continuously at low speed (up to 200 RPM) at normal pressure drop and reduced flow. Optimal run is guaranteed at frequency of rotation from 20 to 50 RPM. Motors with this valving have an increased starting pressure and are not recommended for using at pressure drop less than 40 bar [580 PSI].

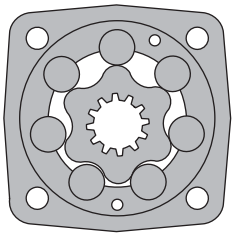
Motors with Speed Sensor Motors are available with integrated inductive speed sensor. The output signal is a standardized voltage signal that can be used to control the speed of a motor. The torque and the radial load of the motor are not affected by the installation of speed sensor.

HYDRAULIC MOTORS MSWM

APPLICATION

» Sawmill machines
» Woodworking machines
» Metal working machines
» Agricultural machines
» Road building machines
» Mining machinery
» Food industries
» Special vehicles etc.





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OPTIONS

» Model- Disc valve, roll-gerotor
» Wheel mount
» Side and rear ports
» Shafts - straight, splined and tapered
» Metric and BSPP ports
» Other special features

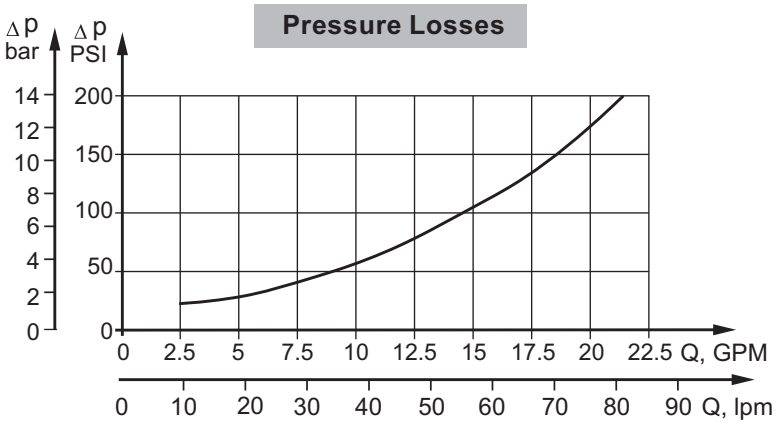
GENERAL

Max. Displacement, cm^3/rev [in^3/rev]	397 [24.2]
Max. Speed, [RPM]	560
Max. Torque, daNm [lb-in]	cont.: 90 [7965] int: 110 [9735]
Max. Output, kW [HP]	24 [32.2]
Max. Pressure Drop, bar [PSI]	cont.: 200 [2900] int: 225 [3270]
Max. Oil Flow, lpm [GPM]	90 [24]
Min. Speed, [RPM]	5
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, ^oC [^oF]	-40÷140 [-40÷284]
Optimal Viscosity range, mm^2/s [SUS]	20÷75 [98÷347]
Filtration	ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	1,5 [.396]
	35 [164]	1 [.264]
210 [3045]	20 [98]	3 [.793]
	35 [164]	2 [.528]

Pressure Losses



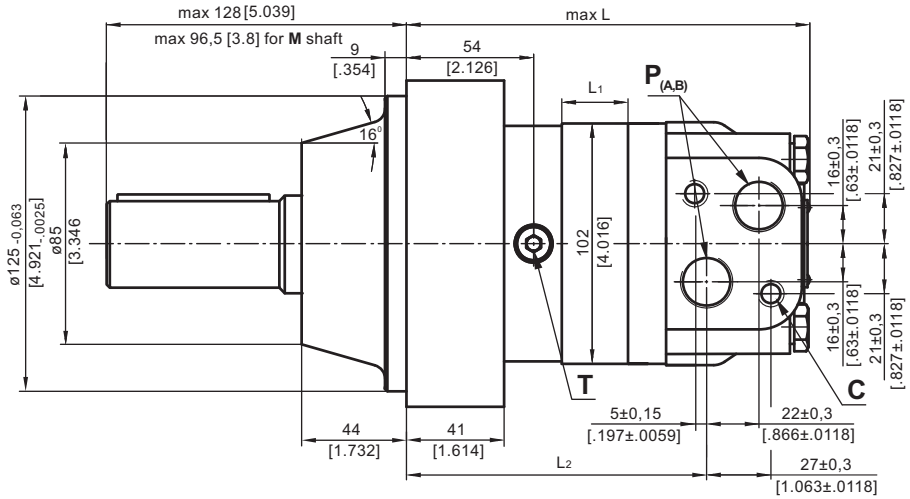
SPECIFICATION DATA

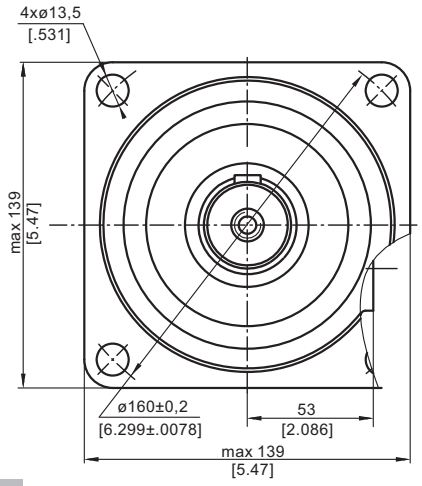
Type		MSWM 160	MSWM 200	MSWM 250	MSWM 315	MSWM 400
Displacement, cm^3/rev [in^3/rev]		159,7 [9.74]	200 [12.2]	250 [15.3]	19.2 [314,9]	397 [24.2]
Max. Speed,	cont.	470	375	300	240	185
[RPM]	Int.*	560	450	360	285	225
Max. Torque	cont.	46 [4070]	56,6 [5010]	70,8 [6270]	90,0 [7965]	90,0 [7965]
daNm [lb-in]	Int.*	51,5 [4560]	64,5 [5710]	80,6 [7135]	96,0 [8500]	97,0 [8585]
	peak**	51,5 [4560]	65 [5755]	80,6 [7135]	108 [9560]	110 [9735]
Max. Output	cont.	18,6 [24.9]	18,1 [24.3]	18,0 [24.1]	17,0 [22.8]	11,0 [14.7]
kW [HP]	int.*	24,0 [32.2]	24,0 [32.2]	23,8 [31.9]	20,2 [27.1]	12 [16.1]
Max. Pressure Drop	cont.	200 [2900]	200 [2900]	200 [2900]	200 [2900]	160 [2320]
bar [PSI]	Int.*	225 [3270]	225 [3270]	225 [3270]	220 [3190]	175 [2540]
	peak**	225 [3270]	225 [3270]	225 [3270]	225 [3270]	200 [2900]
Max. Oil Flow	cont.	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
lpm [GPM]	Int.*	90 [24]	90 [24]	90 [24]	90 [24]	90 [24]
Max. Inlet Pressure	cont.	210 [3045]	210 [3045]	210 [3045]	210 [3045]	210 [3045]
bar [PSI]	Int.*	250 [3625]	250 [3625]	250 [3625]	250 [3625]	250 [3625]
	peak**	300 [4350]	300 [4350]	300 [4350]	300 [4350]	300 [4350]
Max. Return Pressure	cont.	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]
with Drain Line	Int.*	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
bar [PSI]	peak**	210 [3045]	210 [3045]	210 [3045]	210 [3045]	210 [3045]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		10 [145]	10 [145]	10 [145]	10 [145]	10 [145]
Min. Starting Torque daNm [lb-in]		36,9 [3270]	46,2 [4090]	58,0 [5135]	73,8 [6530]	72,0 [6370]
Min. Speed***, [RPM]		6	6	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 must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 mm^2/s [70 SUS] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS AND MOUNTING DATA

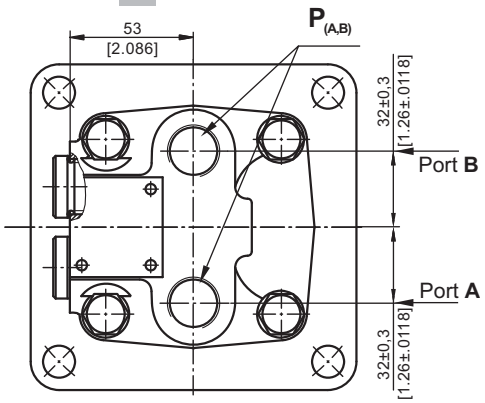




C: 2xM10-12 mm [.47 in] depth
P$_{(A,B)}$: 2xG1/2 or 2xM22x1,5-15 mm [.59 in] depth
T: G ¼ or M14x1,5- 12 mm [.47 in] depth (plugged)

Type	L, mm [in]	L2, mm [in]	L1, mm [in]
MSWM 160	170,5[6.71]	129,3[5.09]	27,8 [1.09]
MSWME 160	177,5[6.99]		
MSWM 200	177,5[6.99]	136,3[5.37]	34,8 [1.37]
MSWME 200	184,5[7.26]		
MSWM 250	186,0[7.32]	145,0[5.71]	43,5 [1.71]
MSWME 250	193,0[7.60]		
MSWM 315	197,5[7.78]	157,3[6.19]	54,8 [2.16]
MSWME 315	206,5[8.13]		
MSWM 400	212,0[8.35]	171,0[6.73]	69,4 [2.73]
MSWME 400	219,0[8.62]		

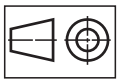
E Rear Ports



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

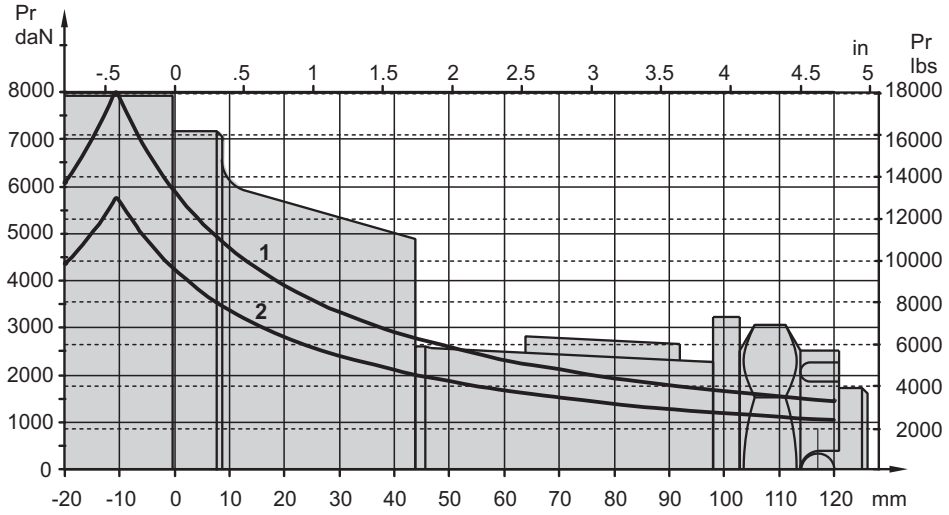
Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

mm [in]



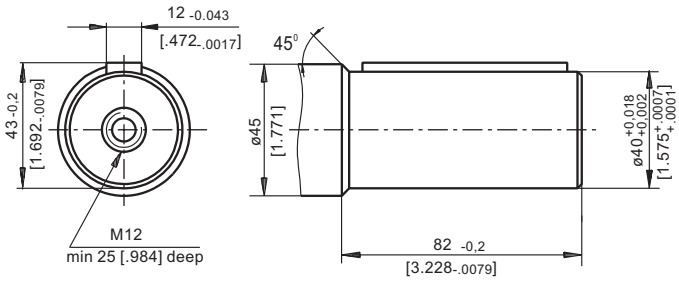
PERMISSIBLE SHAFT LOADS

The output shaft runs in tapered bearings that permit high axial and radial forces.
Curve "**1**" shows max. radial shaft load at bearing life of 2000 hours at 100 RPM.
Curve "**2**" shows max. radial shaft load at bearing life of 3000 hours at 200 RPM.

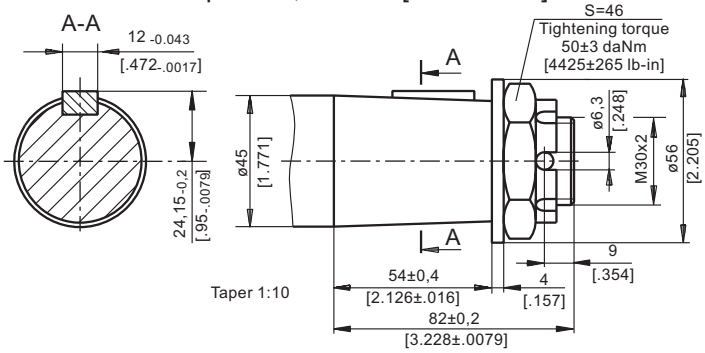


SHAFT EXTENSIONS

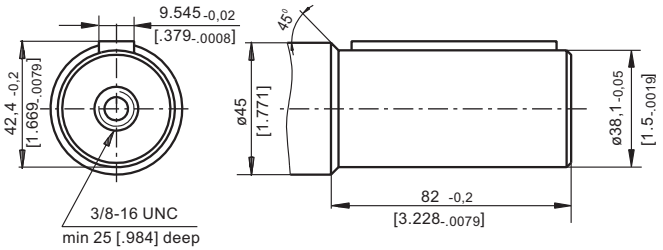
C -ø40 straight, Parallel key A12x8x70 DIN 6885
Max. Torque 132,8 daNm [11755 ln-in]



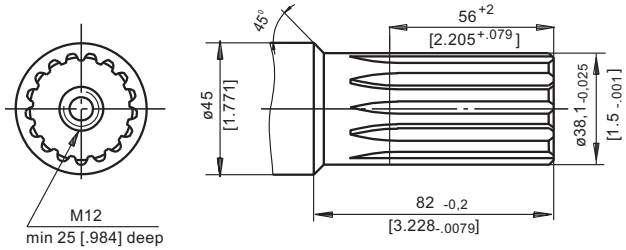
K -tapered 1:10, Parallel key B12x8x28 DIN 6885
Max. Torque 210,7 daNm [18650 lb-in]



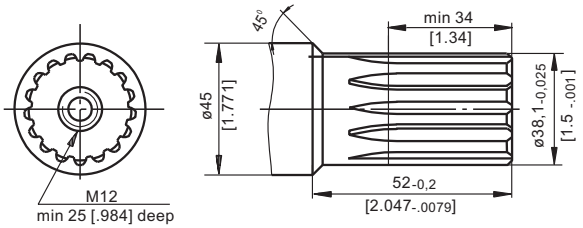
CO-ø1½" straight, Parallel key ⅜"x ⅜"x 2¼" BS46
Max. Torque 132,8 daNm [11755 ln-in]



SH -ø1½" splined 17T, DP 12/24 ANSI B92.1-1976
Max. Torque 132,8 daNm [11755 ln-in]



M -ø1½" splined 17T, DP 12/24 ANSI B92.1-1976
Max. Torque 132,8 daNm [11755 ln-in]



mm [in]

ORDER CODE

	1	2	3	4	5	6
M S W M						

Pos.1 - **Port type**

omit - Side ports

E - Rear ports

Pos.2 - **Displacement code**

160	- 159,7 cm^3/rev [9.74 in^3/rev]
200	- 200,0 cm^3/rev [12.20 in^3/rev]
250	- 250,0 cm^3/rev [15.30 in^3/rev]
315	- 314,9 cm^3/rev [19.20 in^3/rev]
400	- 397,0 cm^3/rev [24.20 in^3/rev]

Pos.4 - **Shaft Extensions***

C	- ø40 straight, Parallel key A12x8x70 DIN6885
CO	- ø1½ " straight, Parallel key ⅜"x⅜"x2¼" BS46
K	- ø45 tapered 1:10, Parallel key B12x8x28 DIN6885
SH	- ø1½" splined 17T ANS B92.1-1976
M	- ø1½" splined 17T ANS B92.1-1976

Pos. 4 - **Ports**

omit - BSPP (ISO 228)

M - Metric (ISO 262)

Pos. 5 - **Special Features** (see page 48)

Pos. 6 - **Design Series**

omit - Factory specified

NOTES:

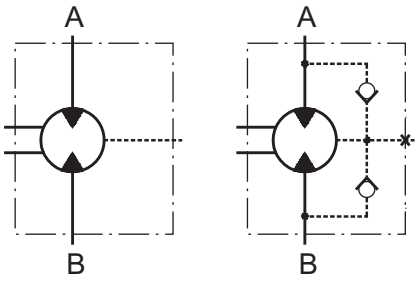
* The permissible output torque for shafts must not be exceeded!

The hydraulic motors are mangano-phosphatized as standard.

HYDRAULIC MOTORS MTK

APPLICATION

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



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OPTIONS

- Model - Disc valve, roll-gerotor
- Flange mount with wheel mount
- Side and rear ports
- Shafts - straight, splined and tapered
- Metric, SAE and BSPP ports
- Other special features

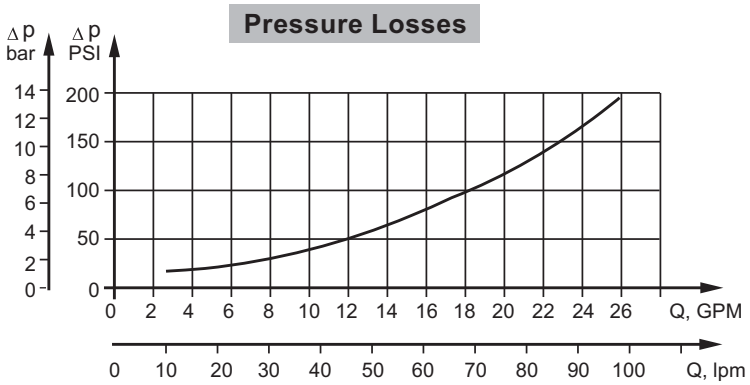
GENERAL

Displacement,	cm^3/rev [in^3/rev]	157,9÷502,4 [9.63÷30.7]
Max. Speed,	RPM	159÷505
Max. Torque,	daNm [lb-in]	57÷109 [5045÷9650]
Max. Output,	kW [HP]	22 [30]
Max. Pressure Drop,	bar [PSI]	160÷250 [2320÷3626]
Max. Oil Flow,	lpm [GPM]	80 [21]
Min. Speed,	RPM	5÷10
Permissible Shaft Loads,	daN [lb]	Pa=1000 [2250]
Pressure fluid		Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range,	^{o}C [^{o}F]	-30÷90 [-22÷194]
Optimal Viscosity range,	mm^2/s [SUS]	20÷75 [98÷347]
Filtration		ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

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

Pressure Losses



SPECIFICATION DATA

Type		MTK 160	MTK 200	MTK 250	MTK 315	MTK 400	MTK 470	MTK 500
Displacement, cm^3/rev [in^3/rev]		157,9 [9.63]	201,3 [12.28]	252,2 [15.38]	314,9 [19.2]	396,8 [24.2]	470,5 [28.7]	502,4 [30.65]
Max. Speed, [RPM]	Cont.	505	400	320	255	200	170	159
	Int.*	630	500	400	315	250	210	199
Max. Torque, daNm [lb-in]	Cont.	57 [5045]	72 [6373]	91 [8055]	105 [9293]	107 [9470]	102 [9028]	109 [9648]
	Int.*	72,5 [6420]	92 [8143]	107 [9470]	131 [11595]	140 [12390]	133 [11772]	136 [12037]
Max. Output, kW [HP]	Cont.	22 [29.5]	22 [29.5]	21 [28.2]	20 [26.8]	17,5 [23.5]	14 [18.8]	14 [18.8]
	Int.*	27 [36.2]	27 [36.2]	25 [33.5]	23,5 [31.5]	22 [29.5]	17.5 [23.5]	17 [22.8]
Max. Pressure Drop, bar [PSI]	Cont.	250 [3626]	250 [3626]	250 [3626]	250 [3626]	200 [2900]	160 [2320]	160 [2320]
	Int.*	325 [4714]	325 [4714]	300 [4350]	300 [4350]	250 [3626]	200 [2900]	200 [2900]
Max. Inlet Pressure, bar [PSI]	Cont.	250 [3626]						
	Int.*	350 [5077]						
Max. Oil Flow, lpm [GPM]	Cont.	80 [21.1]						
	Int.*	100 [26.4]						
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		8 [116]	8 [116]	7 [102]	7 [102]	7 [102]	7 [102]	7 [102]
Min. Starting Torque, daNm [lb-in]	at max. pressure drop cont.	43 [3806]	54 [4780]	68 [6020]	79 [6992]	80 [7080]	83 [7346]	84 [7435]
	at max. pressure drop int.*	54.5 [4824]	69 [6107]	80 [7080]	98,5 [8720]	105 [9294]	105 [9294]	105 [9294]
Max. Return Pressure without Drain Line, bar [PSI]		see diagram						
Max. Return Pressure with Drain Line, bar [PSI]	Cont.	140 [2030]						
	Int.*	175 [2540]						
	Peak*	210 [3046]						

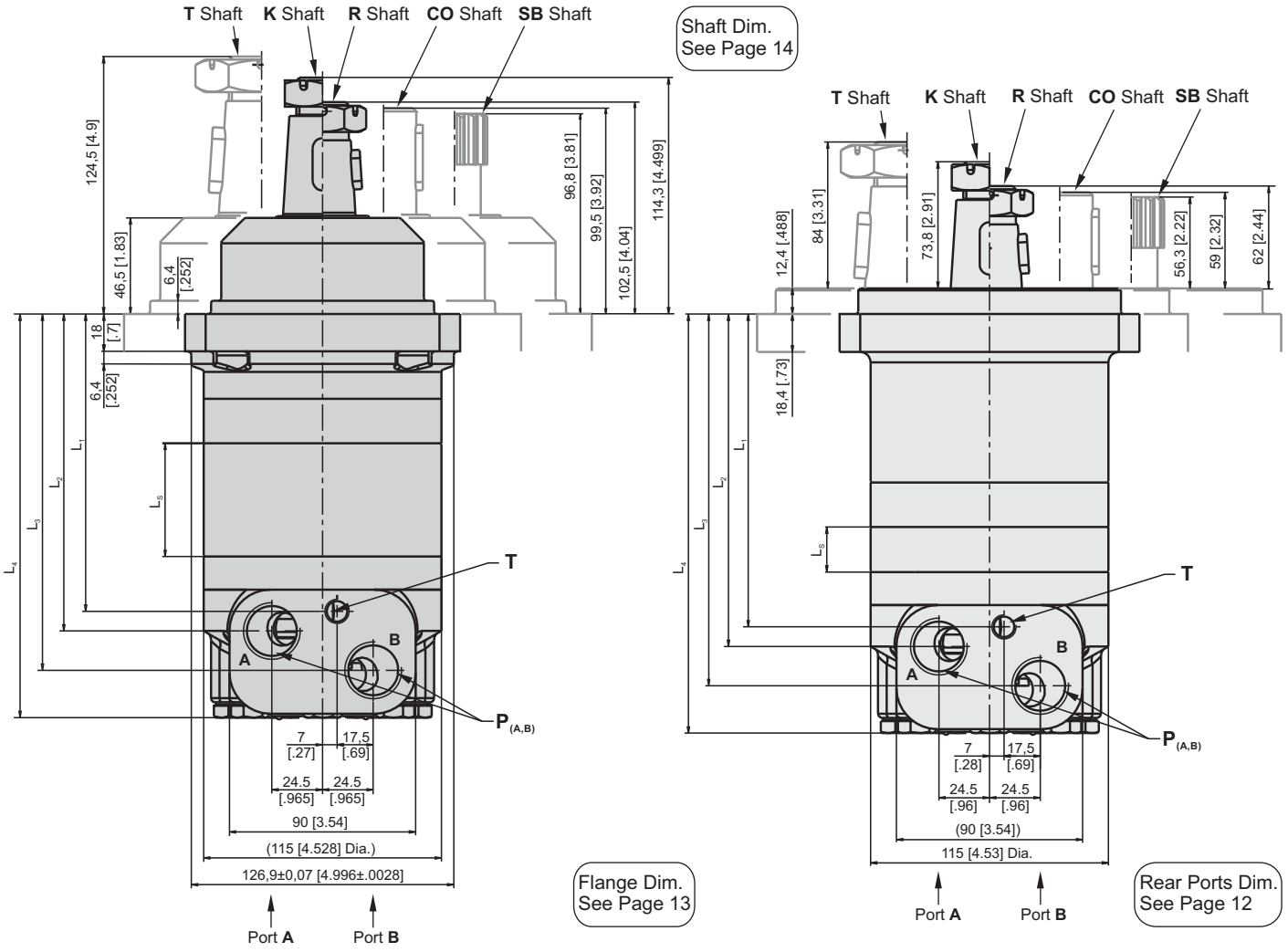
* Intermittent operation: the permissible values may occur for max. 10% of every minute.

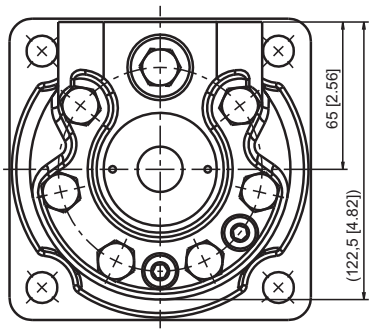
** Peak load: the permissible values may occur for max. 1% of every minute.

*** For speeds of 5 RPM 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(ISO6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 cm^2/s [70 SUS] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS - MTK W and MTK C





	Versions				
	Side			Rear	
	2	3	4	5	6
P (A,B)	2xG 3/4	2xM27x2	2x1 1/16-12UN	2xG 1/2	2x 7/8-20UNF
T	G 1/4	M14x1,5	7/16-20UNF	G 1/4	7/16-20UNF

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**

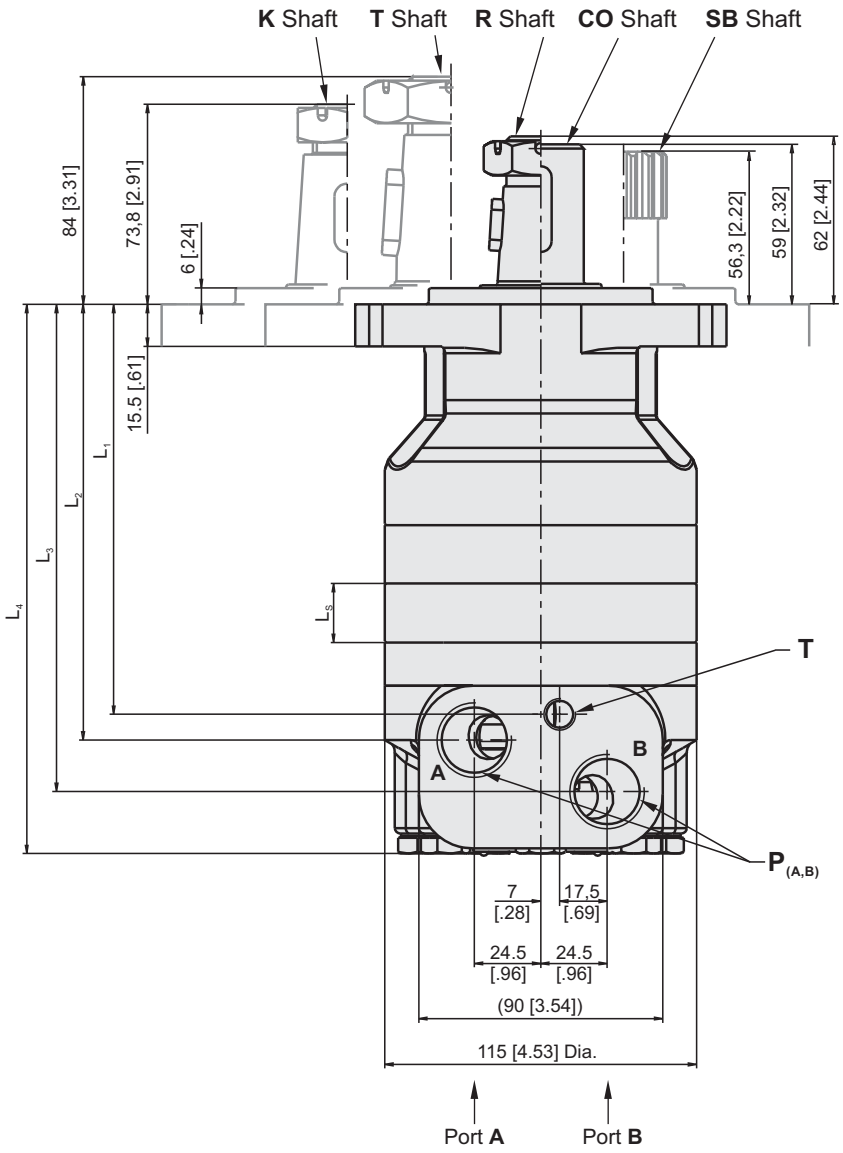
Type		L_S, mm [in]
MTKW160	MTKC160	21,8 [.86]
MTKW200	MTKC200	27,8 [1.09]
MTKW250	MTKC250	34,8 [1.37]
MTKW315	MTKC315	43,5 [1.71]
MTKW400	MTKC400	54,8 [2.16]
MTKW470	MTKC470	65,0 [2.56]
MTKW500	MTKC500	69,4 [2.73]

mm [in]

Type	L_1, mm [in]	L_2, mm [in]	L_3, mm [in]	L_4, mm [in]	Type	L_1, mm [in]	L_2, mm [in]	L_3, mm [in]	L_4, mm [in]
MTKW160	110,8 [4.36]	120,3 [4.74]	139,3 [5.48]	162,2 [6.39]	MTKC160	151,3 [5.96]	160,8 [6.33]	179,8 [7.08]	202,7 [7.98]
MTKW200	116,8 [4.59]	126,3 [4.97]	145,3 [5.72]	168,2 [6.62]	MTKC200	157,3 [6.19]	166,8 [6.57]	185,8 [7.32]	208,7 [8.22]
MTKW250	123,8 [4.87]	133,3 [5.25]	152,3 [5.99]	175,2 [6.89]	MTKC250	164,3 [6.47]	173,8 [6.84]	192,8 [7.59]	215.7 [8.49]
MTKW315	132,5 [5.22]	142,0 [5.59]	161,0 [6.34]	183,9 [7.24]	MTKC315	173,0 [6.81]	182,5 [7.19]	201,5 [7.93]	224,4 [8.84]
MTKW400	143,8 [5.66]	153,3 [6.04]	172,3 [6.78]	195,2 [7.69]	MTKC400	184,3 [7.26]	193,8 [7.63]	212,8 [8.38]	235,7 [9.28]
MTKW470	154,0 [6.06]	163,5 [6.44]	182,5 [7.19]	205,4 [8.09]	MTKC470	194,5 [7.66]	204,0 [8.03]	223,0 [8.78]	245,9 [9.68]
MTKW500	158,4 [6.24]	167,9 [6.61]	186,9 [7.36]	209,8 [8.26]	MTKC500	198,9 [7.83]	208,4 [8.20]	227,4 [8.95]	250,3 [9.85]

DIMENSIONS - MTK F

Shaft Dim. See Page 14



Flange Dim. See Page 13

Rear Ports Dim. See Page 12

mm [in]

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

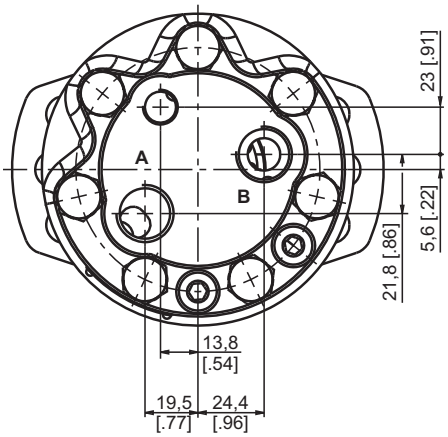
Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

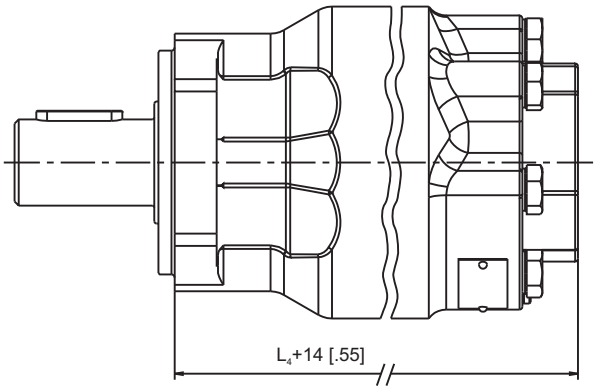
	Versions				
	Side			Rear	
	2	3	4	5	6
P (A,B)	2xG 3/4	2xM27x2	2x1 1/16-12UN	2xG 1/2	2x 7/8-20UNF
T	G 1/4	M14x1,5	7/16-20UNF	G 1/4	7/16-20UNF

Type	L_1, mm [in]	L_2, mm [in]	L_3, mm [in]	L_4, mm [in]	L_S, mm [in]
MTKF 160	151,3 [5.96]	160,8 [6.33]	179,8 [7.08]	202,7 [7.98]	21,8 [.86]
MTKF 200	157,3 [6.19]	166,8 [6.57]	185,8 [7.32]	208,7 [8.22]	27,8 [1.09]
MTKF 250	164,3 [6.47]	173,8 [6.84]	192,8 [7.59]	215,7 [8.49]	34,8 [1.37]
MTKF 315	173,0 [6.81]	182,5 [7.19]	201,5 [7.93]	224,4 [8.84]	43,5 [1.71]
MTKF 400	184,3 [7.26]	193,8 [7.63]	212,8 [8.38]	235,7 [9.28]	54,8 [2.16]
MTKF 470	194,5 [7.66]	204,0 [8.03]	223,0 [8.78]	245,9 [9.68]	65,0 [2.56]
MTKF 500	198,9 [7.83]	208,4 [8.21]	227,4 [8.95]	250,3 [9.85]	69,4 [2.73]

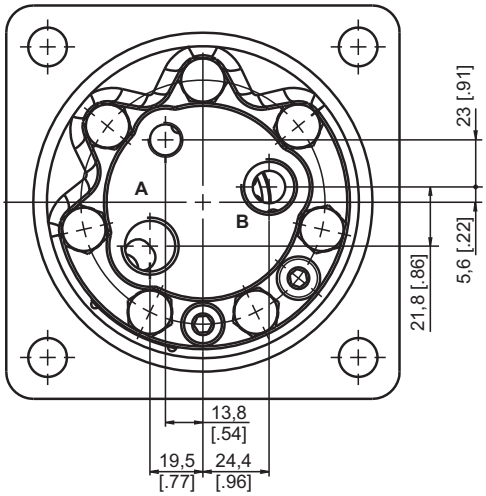
Rear Ports

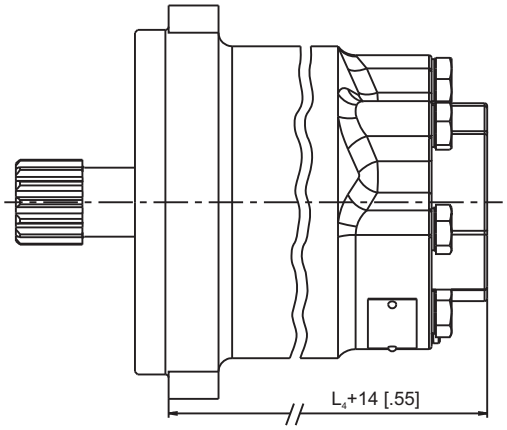
MTK W



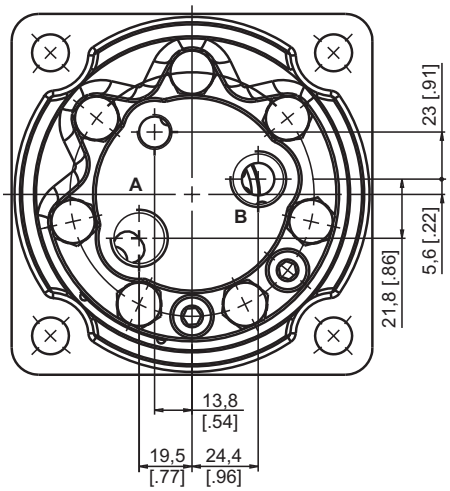


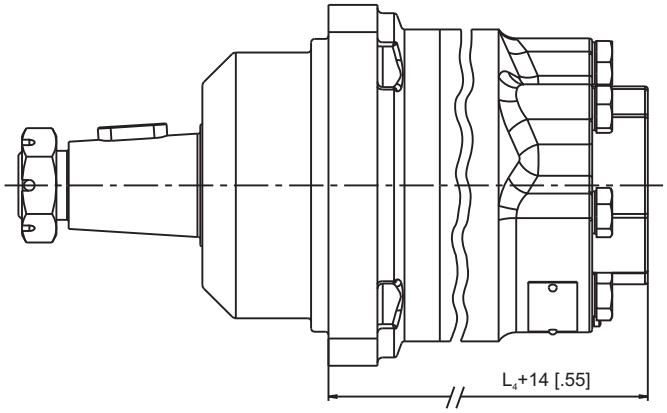
MTK C





MTK F

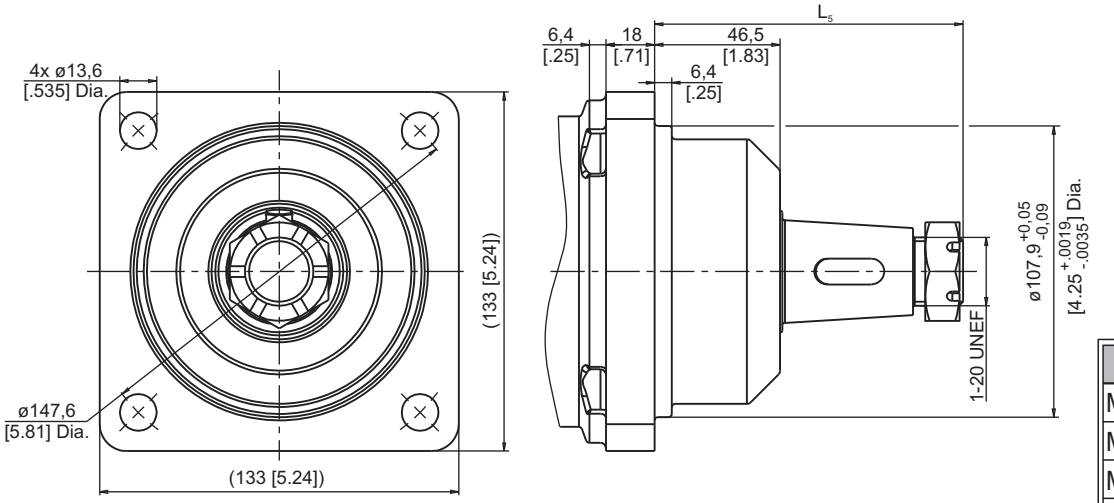




mm [in]

DIMENSIONS OF MOUNTING

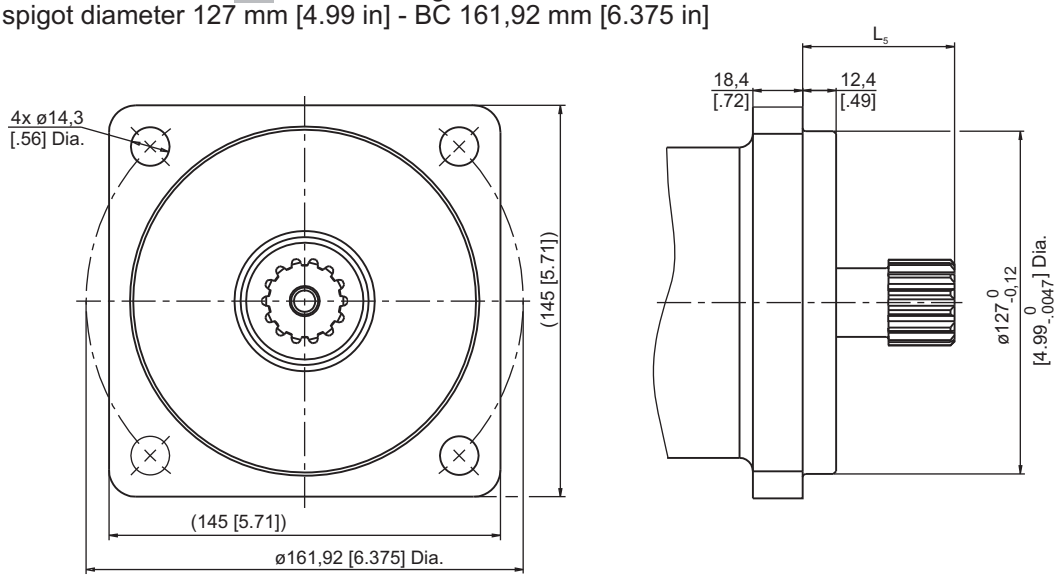
W 4-Bolt flange, Wheel Motor
spigot diameter 107,9 mm [2.25 in] - BC 147,6 mm [5.81 in]



Type	L_5, mm [in]
MTKW...CO...	99,5 [3.92]
MTKW...SB...	96,8 [3.81]
MTKW...R...	102,5 [4.04]
MTKW...K...	114,3 [4.49]
MTKW...T...	124,5 [4.91]

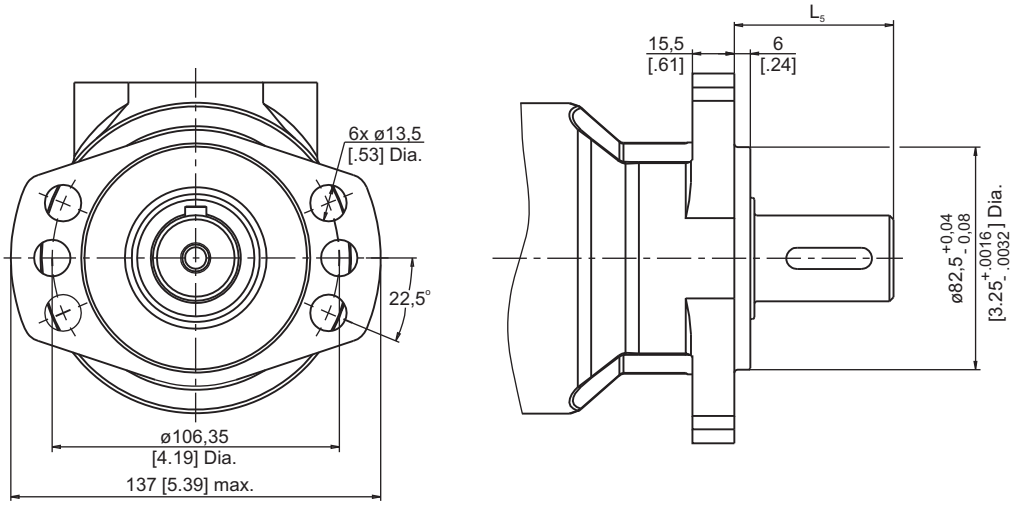
C 4-Bolt flange,
spigot diameter 127 mm [4.99 in] - BC 161,92 mm [6.375 in]

mm [in]



Type	L_5, mm [in]
MTKC...CO...	59 [2.39]
MTKC...SB...	56,3 [2.22]
MTKC...R...	62,0 [2.44]
MTKC...K...	73,8 [2.91]
MTKC...T...	84,0 [3.31]

F 6-Bolt flange,
spigot diameter 82,5 mm [3.25 in] - BC 106,35 mm [4.19 in]

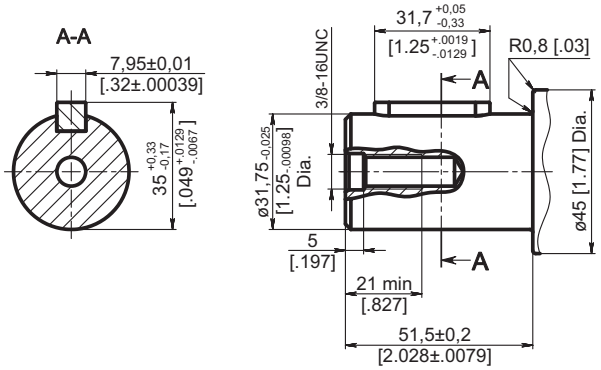


Type	L_5, mm [in]
MTKF...CO...	59 [2.39]
MTKF...SB...	56,3 [2.22]
MTKF...R...	62,0 [2.44]
MTKF...K...	73,8 [2.91]
MTKF...T...	84,0 [3.31]

SHAFT EXTENSIONS

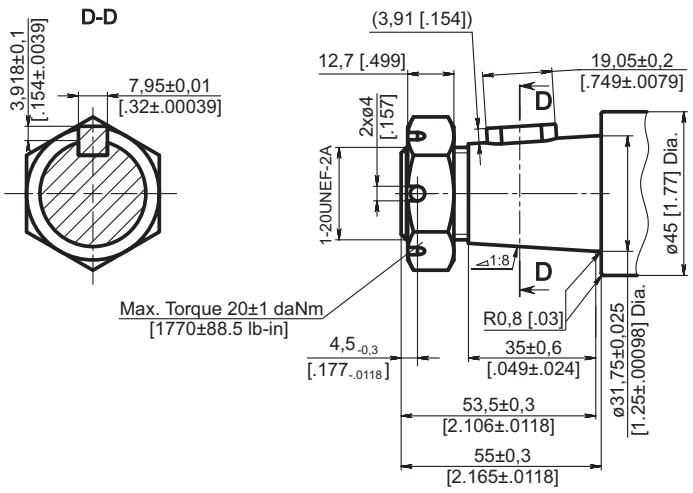
CO

ø1.25” [31,75] srtaight, Parallel key 5/16"x 5/16"x 1 1/4"
Max. Torque 77 daNm [6815 lb-in]



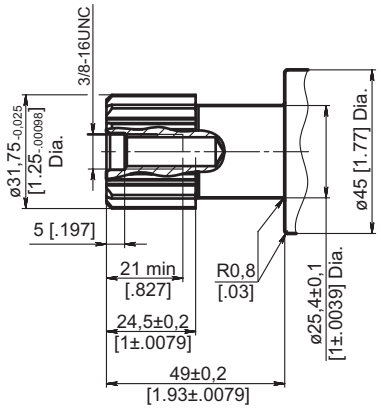
R

ø1.25” [31,75] tapered 1:8, Parallel key 5/16"x 5/16"x3/4"
Max. Torque 77 daNm [6815 lb-in]



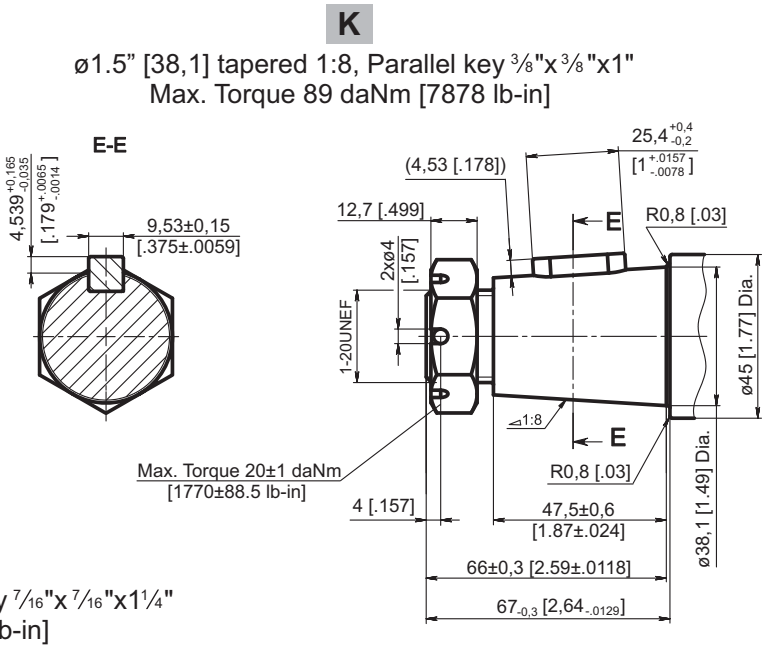
SB

ø1.25” [31,75] 14T Splined ANSI B92.1-1970, 12/24
Max. Torque 77 daNm [6815 lb-in]



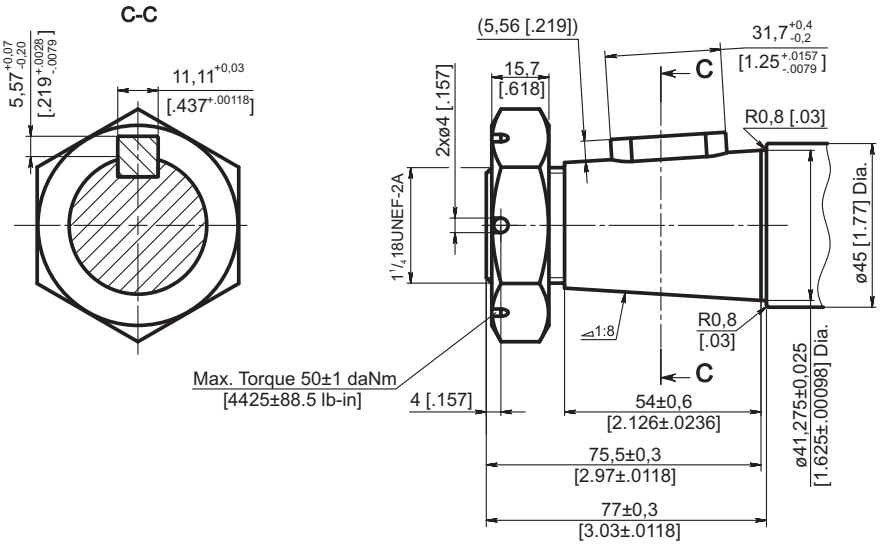
K

ø1.5” [38,1] tapered 1:8, Parallel key 3/8"x 3/8"x1"
Max. Torque 89 daNm [7878 lb-in]



T

ø1.625” [41,275] tapered 1:8, Parallel key 7/16"x 7/16"x1 1/4"
Max. Torque 100 daNm [8850 lb-in]

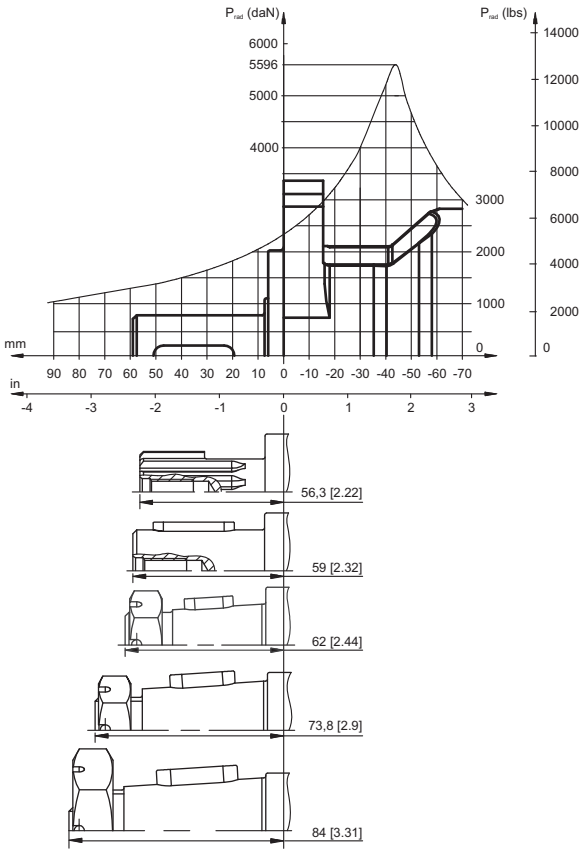


mm [in]

PERMISSIBLE SHAFT LOADS

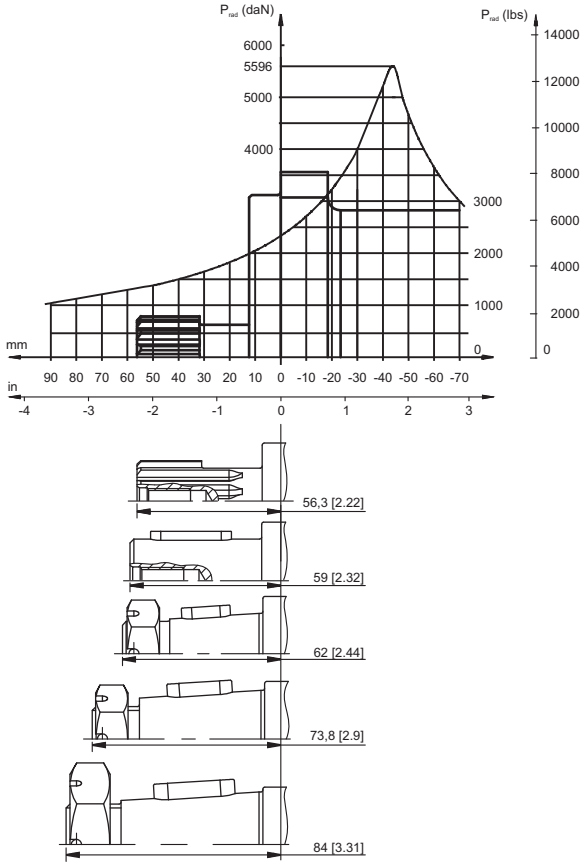
The curves apply to a B10 bearing life (ISO281) of 2000 hours at 100 RPM.

MTKF

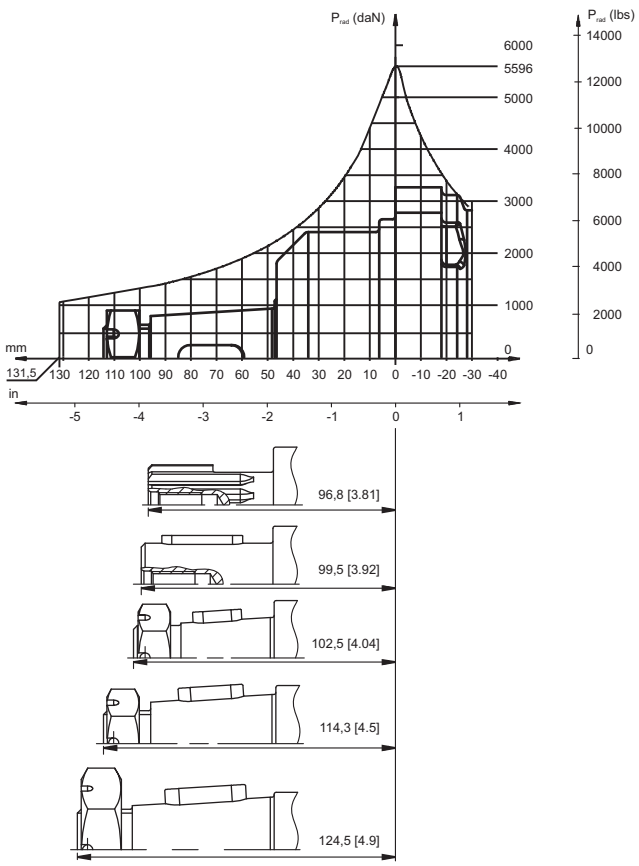


The curves apply to a B10 bearing life (ISO281) of 2000 hours at 100 RPM.

MTKC

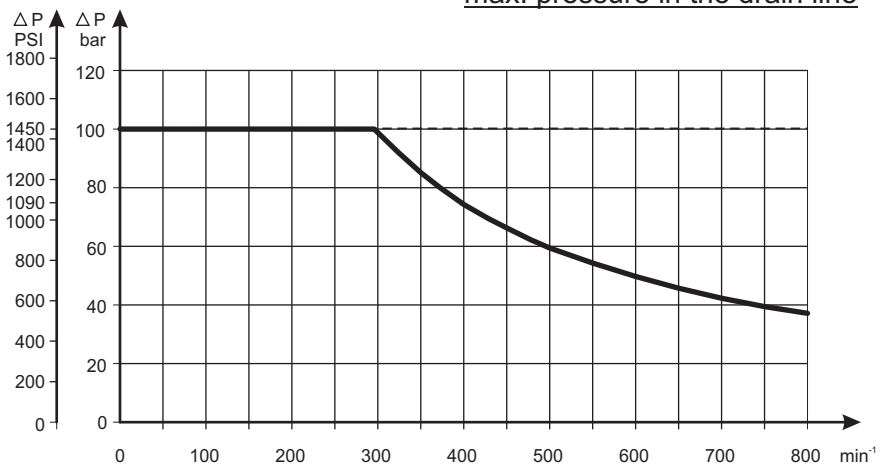


MTKW



MAX. PERMISSIBLE SHAFT SEAL PRESSURE for MTK motors

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



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

ORDER CODE

	1	2	3	4	5	6	7	8
M T K								

Pos.1 - Mounting Flange

- **W** - 4-Bolt flange, Wheel Motor spigot diameter 107,9 mm [2.25 in] - BC 147,6 mm [5.81 in]
- **C** - 4-Bolt flange, spigot diameter 127 mm [4.99 in] - BC 161,92 mm [6.375 in]
- **F** - Bolt flange, spigot diameter 82,5 mm [3.25 in] - BC 106,35 mm [4.19 in]

Pos.2 - Port type

- omit - Side ports
- **E** - Rear ports

Pos.3 - Displacement code

- **160** - 157,9 cm^3/rev [9.63 in^3/rev]
- **200** - 201,3 cm^3/rev [12.28 in^3/rev]
- **250** - 252,2 cm^3/rev [15.38 in^3/rev]
- **315** - 314,9 cm^3/rev [19.20 in^3/rev]
- **400** - 396,8 cm^3/rev [24.20 in^3/rev]
- **470** - 470,5 cm^3/rev [28.70 in^3/rev]
- **500** - 502,4 cm^3/rev [30.65 in^3/rev]

Pos.4 - Shaft Extensions*

- **CO** - ø1.25" [31,75] straight, Parallel key 5/16"x5/16"x1 1/4", 3/8-16 UNC
- **SB** - ø1.25" [31,75] 14T Splined ANSI B92.1-1970, 12/24, 3/8-16 UNC
- **R** - ø1.25" [31,75] Tapered 1:8, Parallel key 5/16"x5/16"x3/4", 1-20 UNEF
- **K** - ø1.5" [38,1] Tapered 1:8, Parallel key 3/8"x3/8"x1", 1-20 UNEF
- **T** - ø1.625" [41,275] Tapered 1:8, Parallel key 7/16"x7/16"x1 1/4", 1 1/4-18 UNEF

Pos.5 - Port Size/Type

- **2** - side ports, 2xG 3/4, G1/4 BSP (ISO 228)
- **3** - side ports, 2xM27x2, M14x1,5 - 6H (ISO 262)
- **4** - side ports, 2x1 1/16-12 UN, 7/16-20 UNF
- **5** - rear ports, 2xG 1/2, G1/4 BSP (ISO 228)
- **6** - rear ports, 2x7/8-20 UNF, 7/16-20 UNF

Pos.6 - Check Valves

- omit - without check valves
- **1** - with check valves

Pos.7 - Special Features (see page 48)

- omit - Factory specified

Pos.8 - Design Series

- omit - Factory specified

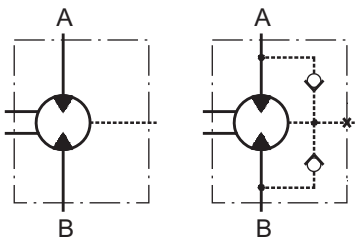
Notes: * The permissible output torque for shafts must not be exceeded!
** Color at customer's request.

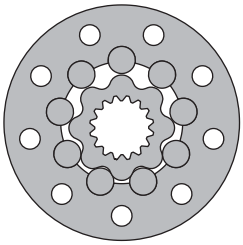
The hydraulic motors are mangano phosphatized as standard.

HYDRAULIC MOTORS MTM

APPLICATION

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





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Dimensions and mounting ..... 22÷24
Shaft extensions 25
Permissible shaft loads 25
Dimensions and mounting- MTMV 26
Dimensions and mounting- MTM6V 27
Internal Spline data 28
Order code 28

OPTIONS

» Model - Disc valve, roll-gerotor
» Flange with wheel mount
» Short motor
» Side ports
» Shafts - straight, splined and tapered
» 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

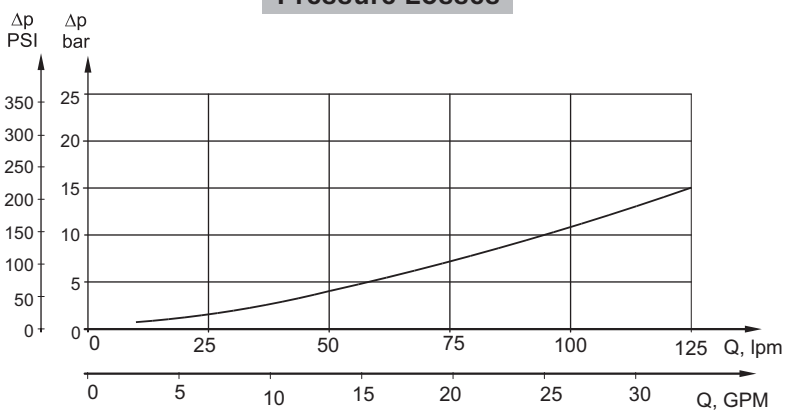
GENERAL

Max. Displacement, cm^3/rev [in^3/rev]	724,3 [44.2]
Max. Speed, [RPM]	750
Max. Torque, daNm [lb-in]	cont.: 183 [16200] int.: 229 [20270]
Max. Output, kW [HP]	70 [94]
Max. Pressure Drop, bar [PSI]	cont.: 250 [3600] int.: 350 [5080]
Max. Oil Flow, lpm [GPM]	150 [40]
Min. Speed, [RPM]	5
Permissible Shaft Loads daN [lbs]	P_a=1000 [2250]
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, ^oC [^oF]	-40÷140 [-40÷284]
Optimal Viscosity range, mm^2/s [SUS]	20÷75 [98÷347]
Filtration	ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	2,5 [.660]
	35 [164]	1,5 [.396]
210 [3045]	20 [98]	5 [1.321]
	35 [164]	3 [.793]

Pressure Losses



SPECIFICATION DATA

Type		MTM 200	MTM 250	MTM 315	MTM 400	MTM 470	MTM 500	MTM 630	MTM 725
Displacement, cm^3/rev [in^3/rev]		201,4 [12.29]	251,8 [15.36]	326,3 [19.9]	410,9 [25.06]	475 [28.97]	523,6 [31.95]	631,2 [38.52]	724 [44.2]
Max. Speed, [RPM]	Cont.	625	500	380	305	260	240	190	170
	Int.*	750	600	460	365	315	285	230	215
Max. Torque daNm [lb-in]	Cont.	72[6375]	90[7965]	116[10265]	147[13010]	171[15135]	172[15225]	183[16200]	160[14160]
	Int.*	102[9030]	128[11330]	163[14425]	206[18232]	215[16030]	215[16030]	229[20270]	192[17000]
	Peak**	115[10180]	144[12745]	186[16460]	235[20800]	240[21240]	240[21240]	274[24250]	240[21240]
Max. Output kW [HP]	Cont.	41 [55]	41 [55]	41 [55]	41 [55]	41 [55]	37,5[50]	28 [37,5]	26 [35]
	Int.*	70 [94]	70 [94]	70 [94]	70 [94]	55 [74]	51 [68]	42 [56]	40 [54]
Max. Pressure Drop bar [PSI]	Cont.	250[3600]	250[3600]	250[3600]	250[3600]	250[3600]	230[3340]	200[2900]	160[2320]
	Int.*	350[5080]	350[5080]	350[5080]	350[5080]	315[4570]	280[4060]	250[3625]	210[3045]
	Peak**	400[5800]	400[5800]	400[5800]	400[5800]	350[5080]	320[4640]	300[4350]	260[3770]
Max. Oil Flow lpm [GPM]	Cont.	125[33]	125[33]	125[33]	125[33]	125[33]	125[33]	125[33]	125[33]
	Int.*	150[40]	150[40]	150[40]	150[40]	150[40]	150[40]	150[40]	150[40]
Max. Inlet Pressure bar [PSI]	Cont.	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]
	Int.*	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]
	Peak**	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]
Max. Return Pressure without Drain Line or Max. Pressure in Drain Line, bar [PSI]	Cont. 0-100 RPM	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]
	Cont. 100-300 RPM	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]
	Cont. >300 RPM	20 [290]	20 [290]	20 [290]	20 [290]	20 [290]	-	-	-
	Int.* 0-max. RPM	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]
Max. Return Pressure with Drain Line bar [PSI]	Cont.	140 [2000]	140 [2000]	140 [2000]	140 [2000]	140 [2000]	140 [2000]	140 [2000]	140 [2000]
	Int.*	175 [2500]	175 [2500]	175 [2500]	175 [2500]	175 [2500]	175 [2500]	175 [2500]	175 [2500]
	Peak**	210 [3000]	210 [3000]	210 [3000]	210 [3000]	210 [3000]	210 [3000]	210 [3000]	210 [3000]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		6 [90]	6 [90]	6 [90]	6 [90]	6 [90]	6 [90]	6 [90]	6 [90]
Min. Starting Torque daNm [lb-in]		60[5310]	75[6640]	97[8585]	122[10800]	142[12570]	143[12655]	145[12830]	148[13100]
Min. Speed***, [RPM]		5	5	5	5	5	5	5	5
Weight, kg [lb]	MTM	26,9 [59.3]	27,3 [60.2]	28,1 [62]	29 [64]	29,7 [65.5]	30,2 [66.6]	29,7 [65.5]	31 [68.4]
	MTMW	27,4 [60.4]	27,8 [61.3]	28,6 [63.1]	29,5 [65.1]	30,2 [66.6]	30,7 [67.7]	30,2 [66.6]	31,5 [69.5]
	MTMV	15,7 [34.6]	16,1 [35.5]	16,9 [37.3]	17,8 [39.3]	18,5 [40.8]	19 [41.9]	18,5 [40.8]	19,8 [43.7]

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

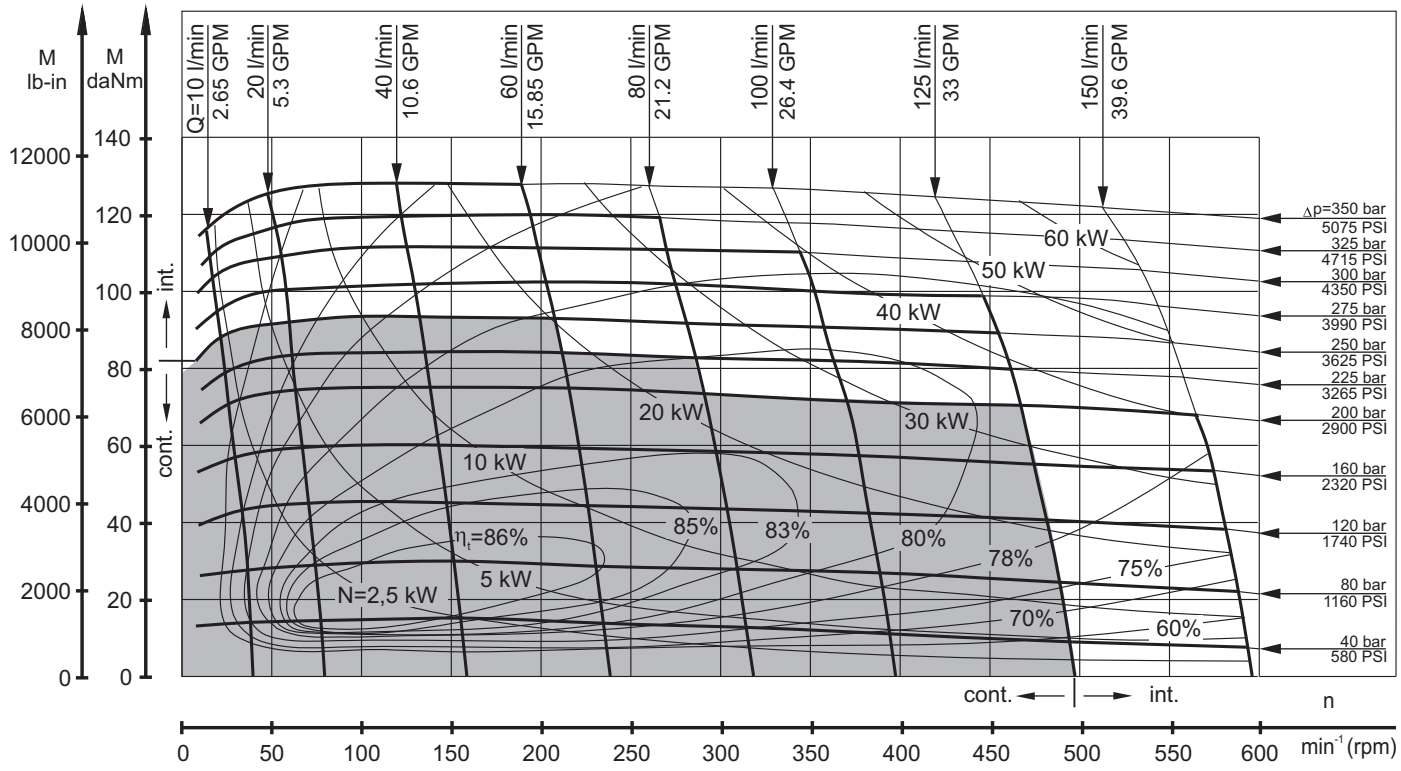
** Peak load: the permissible values may occur for max. 1% of every minute.

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

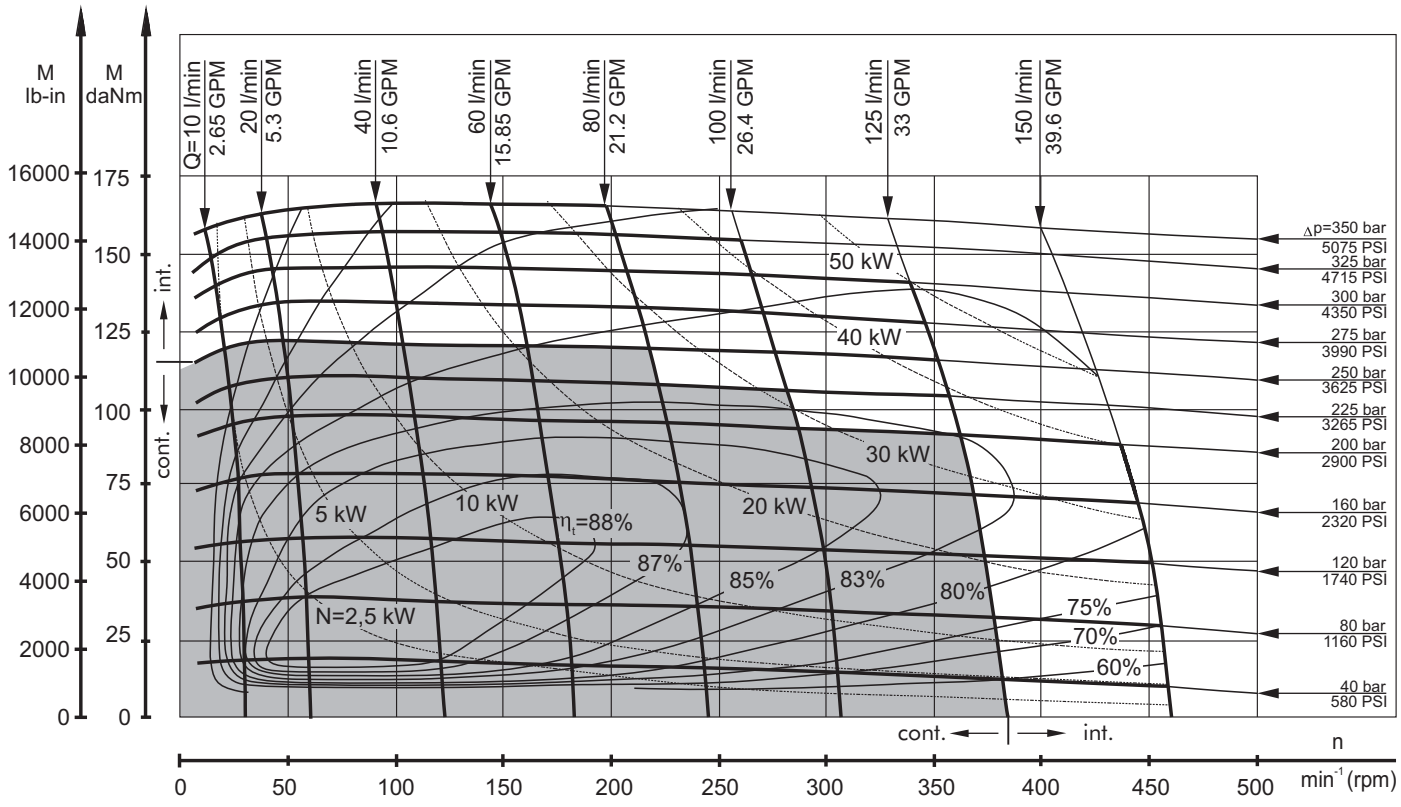
1. Intermittent speed and intermittent pressure must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil, HLP(DIN51524) or HM(ISO6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 70 SUS [13 mm^2/s] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

FUNCTION DIAGRAMS

MTM 250



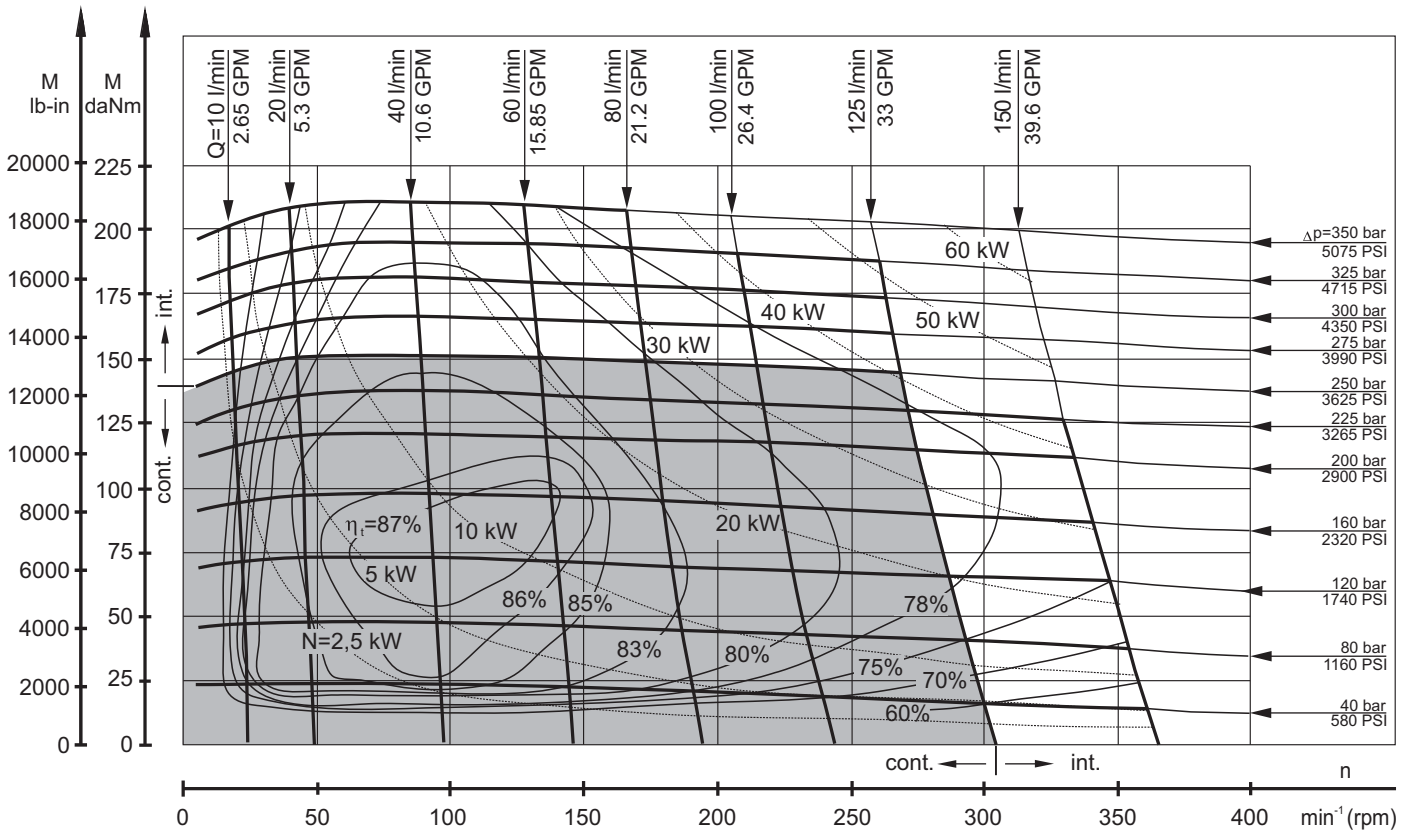
MTM 315



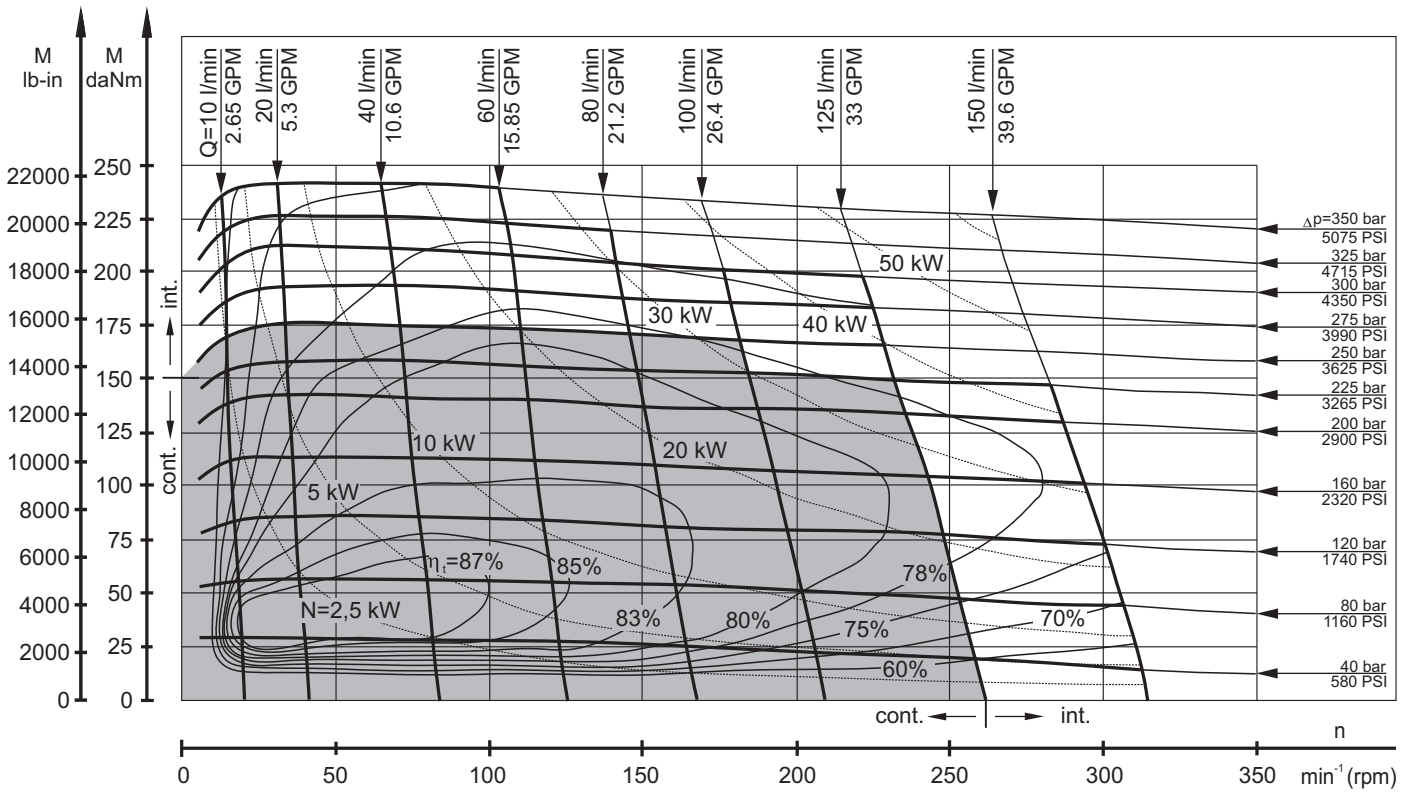
The function diagrams data was collected at back pressure 5÷10 bar (72.5PSI÷145PSI) and oil with viscosity of 32 mm²/s [150SUS] at 50° C [122°F].

FUNCTION DIAGRAMS

MTM 400



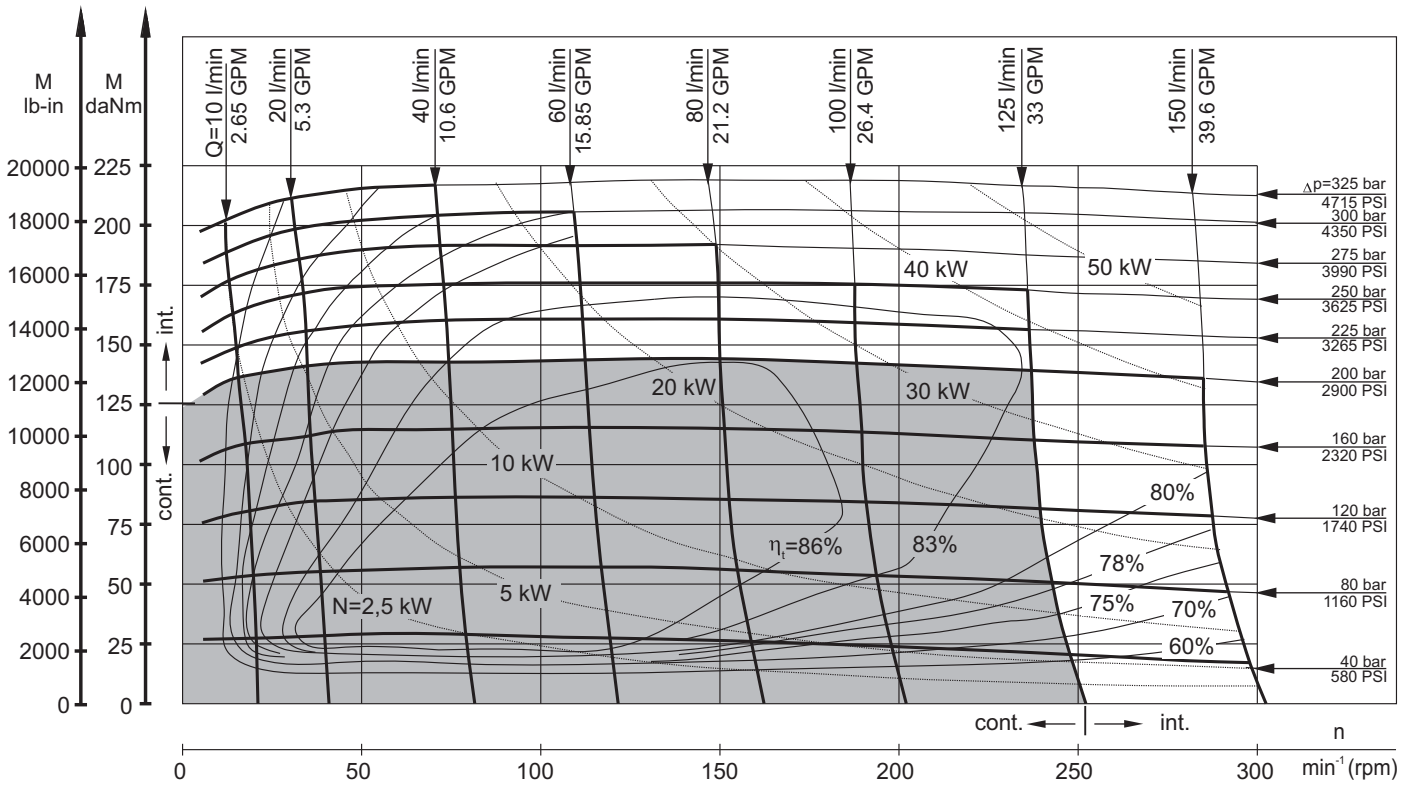
MTM 470



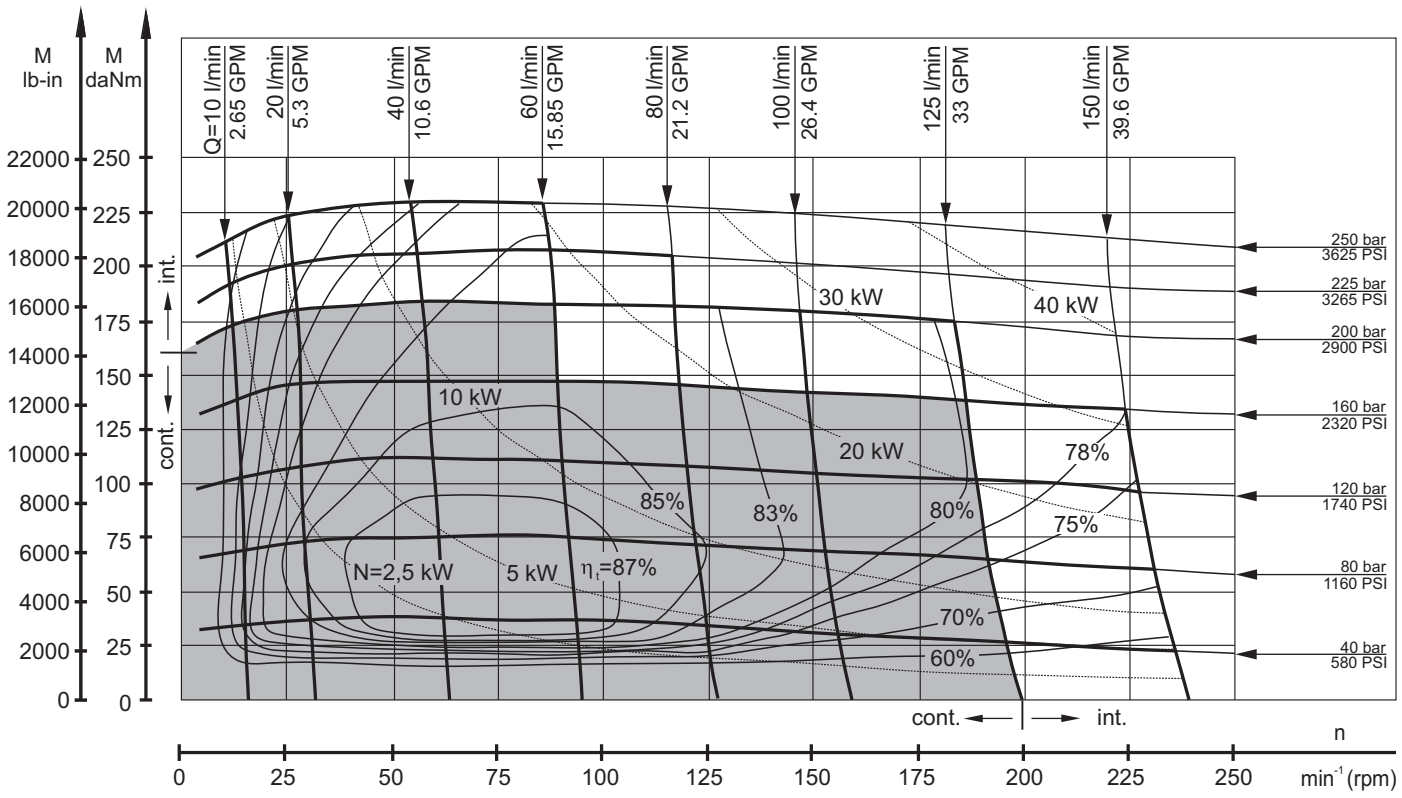
The function diagrams data was collected at back pressure 5÷10 bar (72.5PSI÷145PSI) and oil with viscosity of 32 mm²/s [150SUS] at 50° C [122°F].

FUNCTION DIAGRAMS

MTM 500

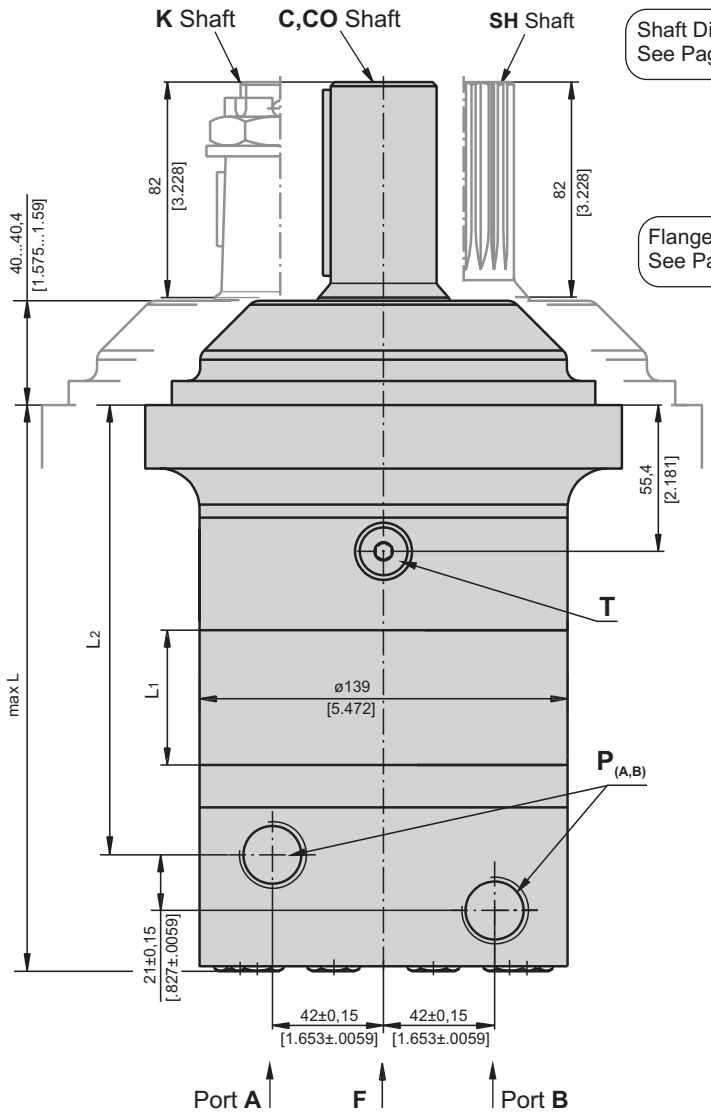


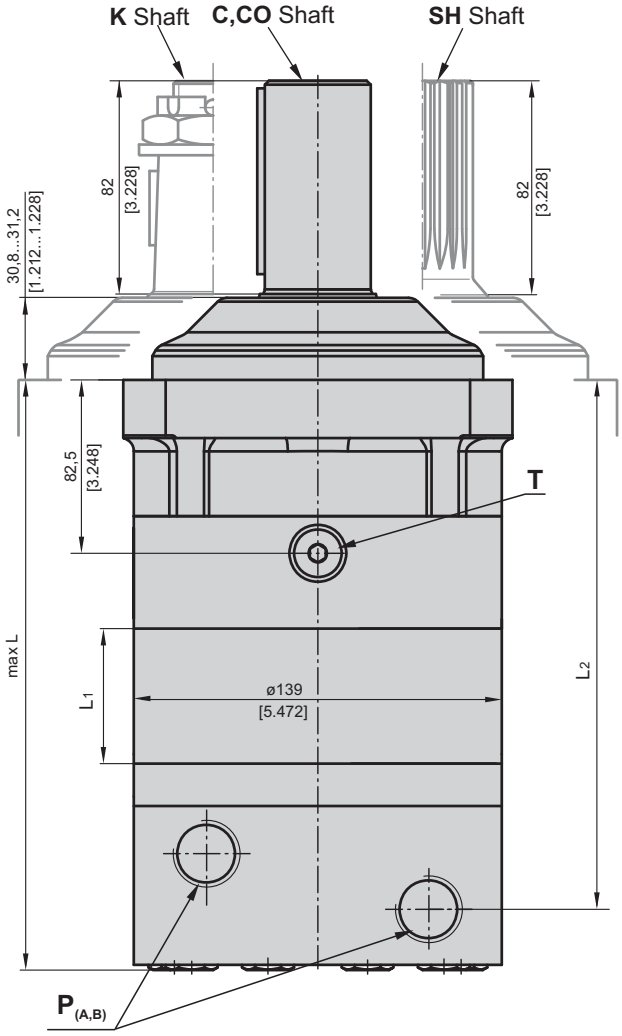
MTM 630



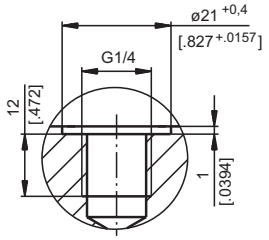
The function diagrams data was collected at back pressure 5÷10 bar (72.5PSI÷145PSI) and oil with viscosity of 32 mm²/s [150SUS] at 50° C [122°F].

DIMENSIONS AND MOUNTING DATA - MTM and MTMC

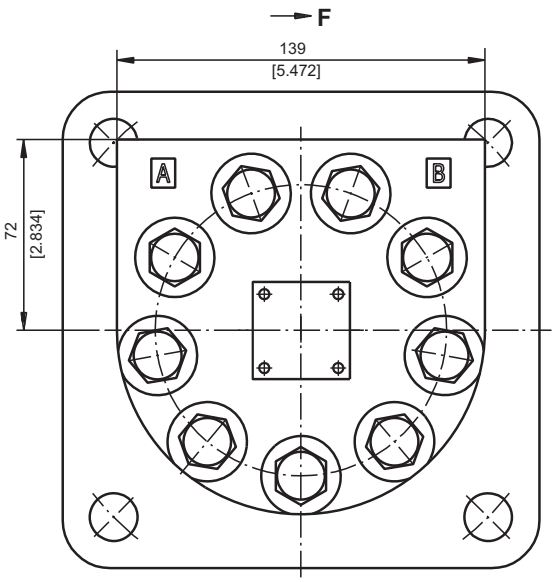




T - Drain port



Warning: Drain line should always be used.



P$_{(A, B)}$: 2xG3/4 - 17 mm [.669 in] depth
T : G1/4 - 12 mm [.472 in] depth (plugged)

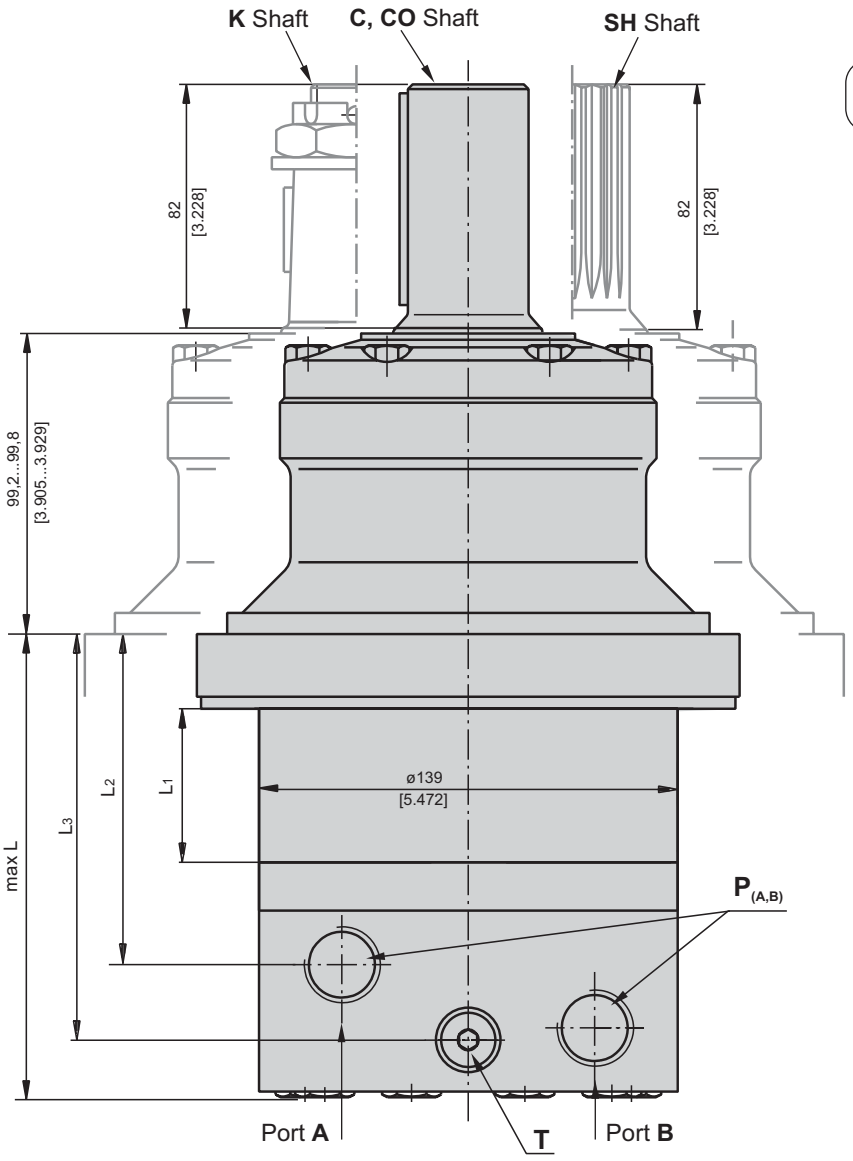
Type	L, mm [in]	L2, mm [in]	Type	L, mm [in]	L2, mm [in]	L1, mm [in]
MTM 200	188 [7.40]	142,3[5.60]	MTMC 200	198 [7.79]	153 [6.02]	25 [.98]
MTM 250	194 [7.64]	148,6 [5.85]	MTMC 250	204,5 [8.05]	159,3 [6.27]	31,3 [1.23]
MTM 315	203 [7.99]	157,8 [6.21]	MTMC 315	213,5 [8.40]	168,5 [6.63]	40,5 [1.59]
MTM 400	214 [8.43]	168,3 [6.63]	MTMC 400	224 [8.82]	179 [7.04]	51 [2.01]
MTM 470	222 [8.74]	176,3 [6.94]	MTMC 470	232 [9.13]	187 [7.36]	59 [2.32]
MTM 500	228 [8.98]	182,3 [7.18]	MTMC 500	238 [9.37]	193 [7.60]	65 [2.56]
MTM 630	224 [8.82]	178,3 [7.02]	MTMC 630	234 [9.21]	189 [7.44]	61 [2.40]
MTM 725	233 [9.17]	187,3 [7.37]	MTMC 725	243 [9.56]	198 [7.79]	70 [2.76]

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**

mm [in]

DIMENSIONS AND MOUNTING DATA - MTMW



Shaft Dim. See Page 25

Flange Dim. See Page 24

Port Dim. See Page 22

Warning: Drain line should always be used.

$P_{(A, B)}$: 2xG3/4 - 17 mm [.669 in] depth
T : G1/4 - 12 mm [.472 in] depth (plugged)

Type	L, mm [in]	L_1, mm [in]	L_2, mm [in]	L_3, mm [in]
MTMW 200	129 [5.08]	25 [.98]	83,8 [3.30]	111,1 [3.37]
MTMW 250	135 [5.32]	31,3 [1.23]	90,1 [3.55]	117,4 [4.62]
MTMW 315	144 [5.67]	40,5 [1.59]	99,3 [3.91]	126,6 [4.98]
MTMW 400	155 [6.10]	51 [2.01]	109,8 [4.32]	137,1 [5.40]
MTMW 470	163 [6.42]	59 [2.32]	117,8 [4.64]	145,1 [5.71]
MTMW 500	169 [6.65]	65 [2.56]	123,8 [4.87]	151,1 [5.95]
MTMW 630	165 [6.50]	61 [2.40]	119,8 [4.72]	147,1 [5.79]
MTMW 725	174 [6.85]	70 [2.76]	128,8 [5.07]	156,1 [6.15]

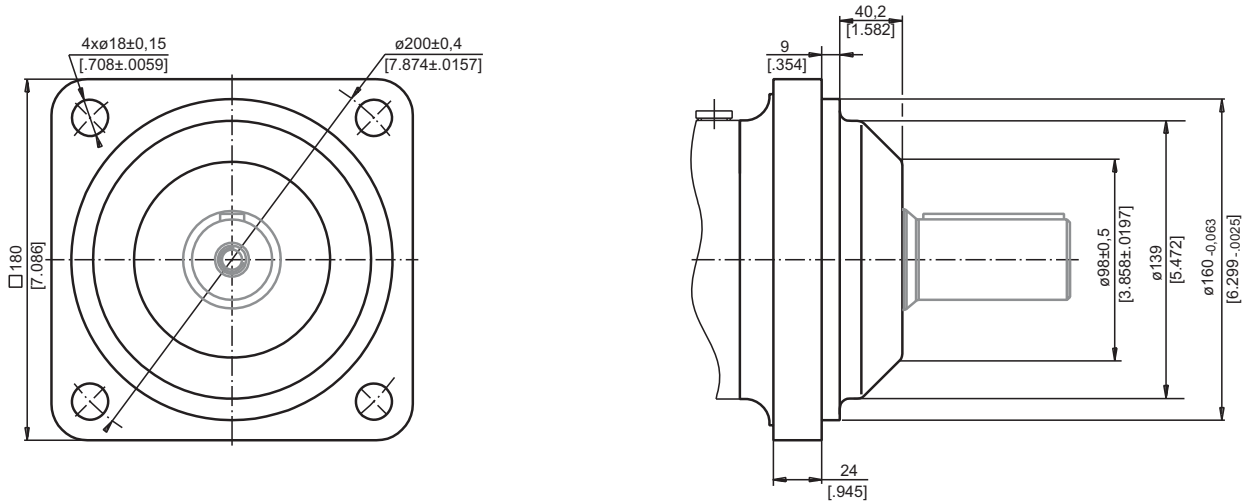
Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

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

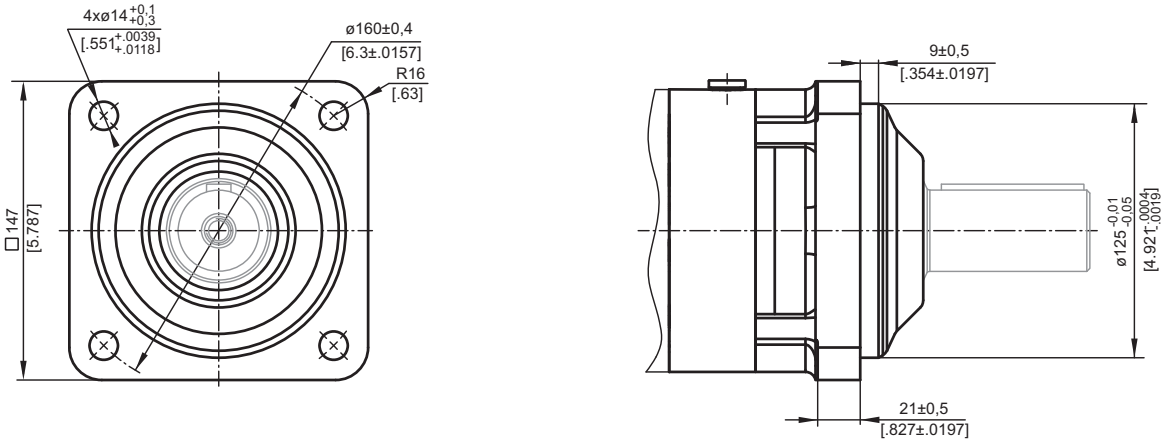
mm [in]

MOUNTING

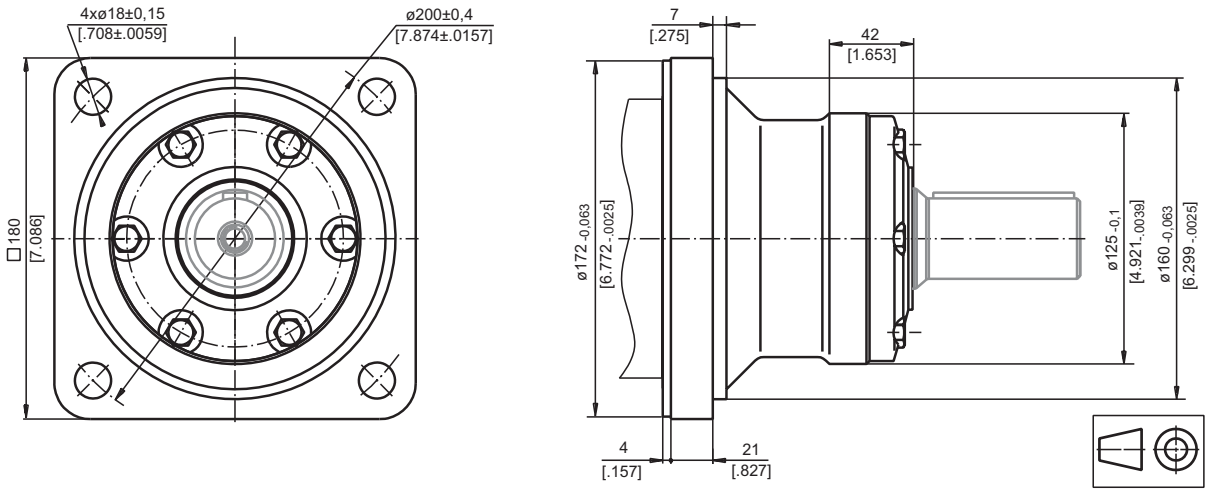
4-Bolt flange
spigot diameter ø160 mm [6.3 in] - BC ø200 [7.874 in] mm



C 4-Bolt flange
spigot diameter ø125 mm [4.921 in] - BC ø160 mm [6.3 in]



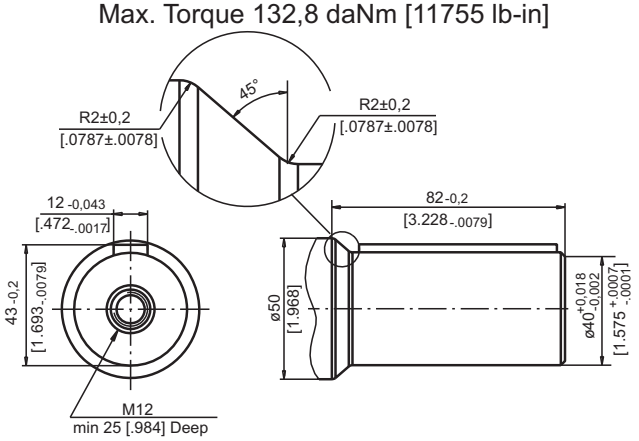
W 4-Bolt flange, Wheel Motor
spigot diameter ø160 mm [6.3 in] - BC ø200 mm [7.874 in]



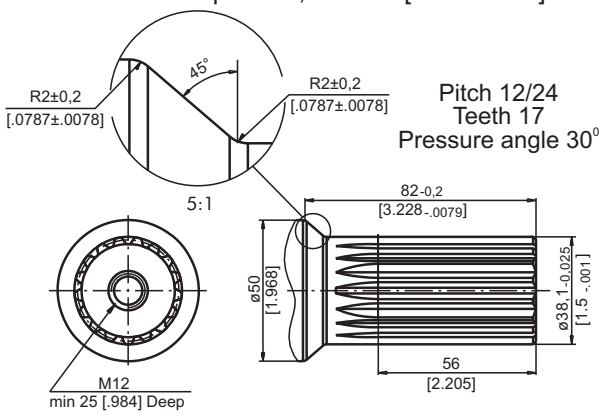
mm [in]

SHAFT EXTENSIONS

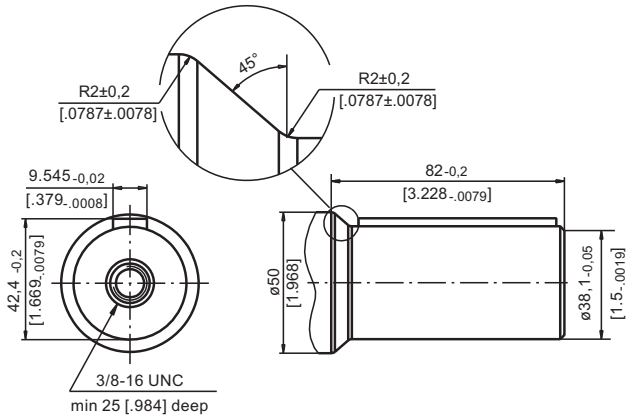
C - ø40 straight, Parallel key A12x8x70 DIN 6885
Max. Torque 132,8 daNm [11755 lb-in]



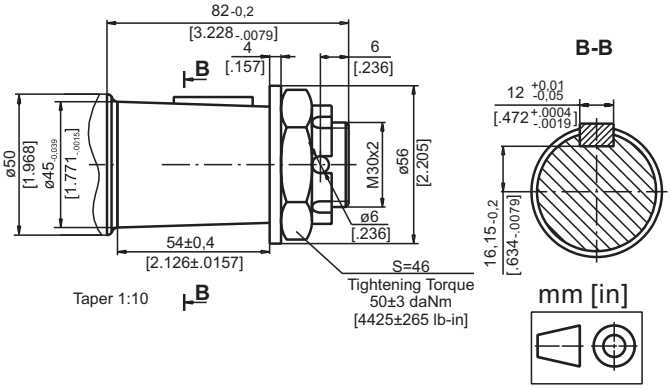
SH - ø1½" splined 17T, DP 12/24 ANSI B92.1-1976
Max. Torque 132,8 daNm [11755 lb-in]



CO-ø1½" straight, Parallel key ⅜"x ⅜"x 2¼" BS46
Max. Torque 132,8 daNm [11755 lb-in]



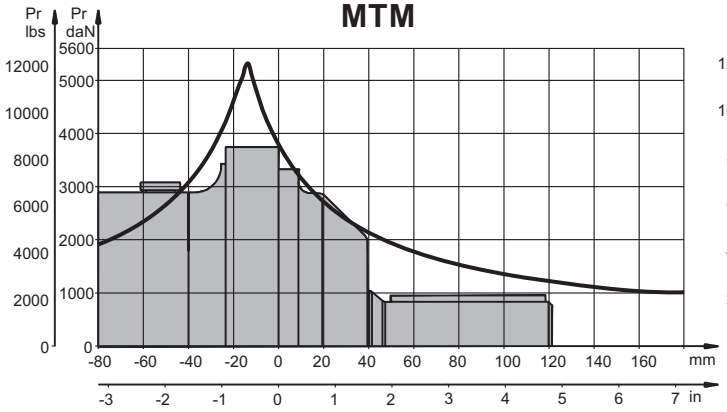
K - tapered 1:10, Parallel key B12x8x28 DIN 6885
Max. Torque 210,7 daNm [18650 lb-in]



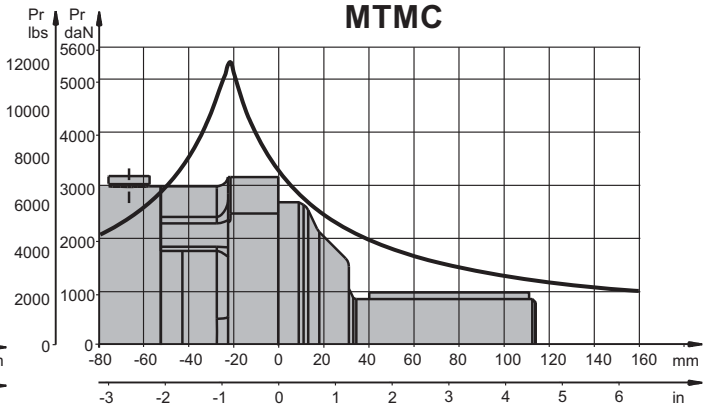
PERMISSIBLE SHAFT LOADS

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

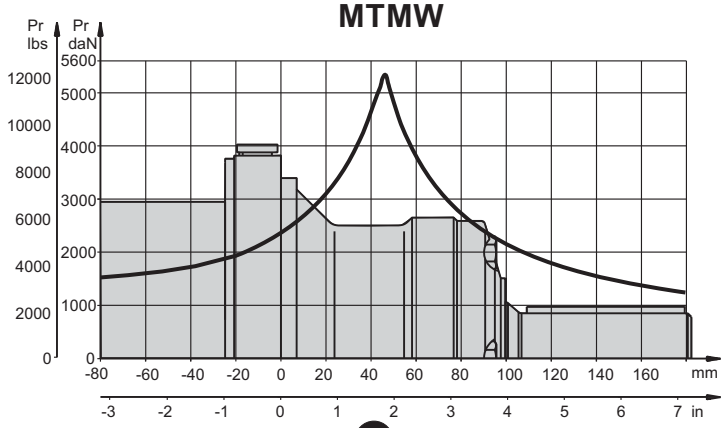
MTM



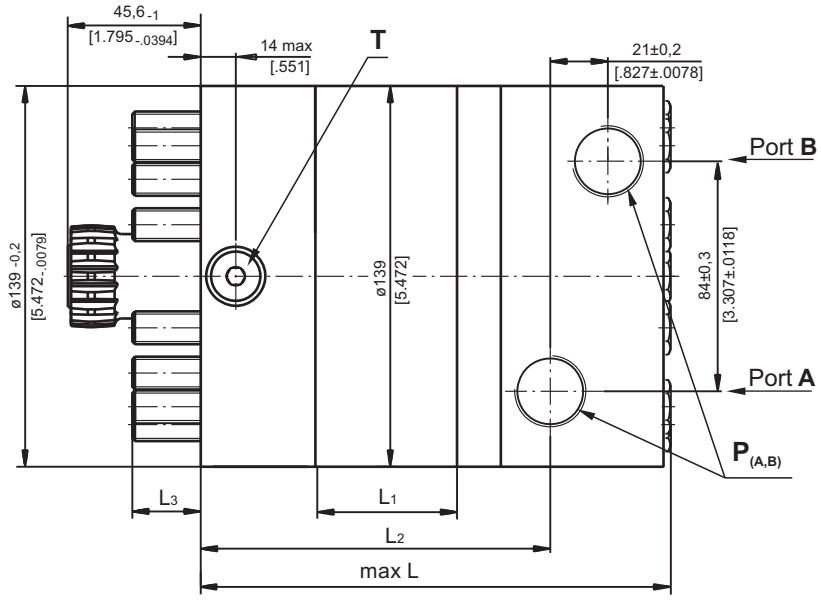
MTMC

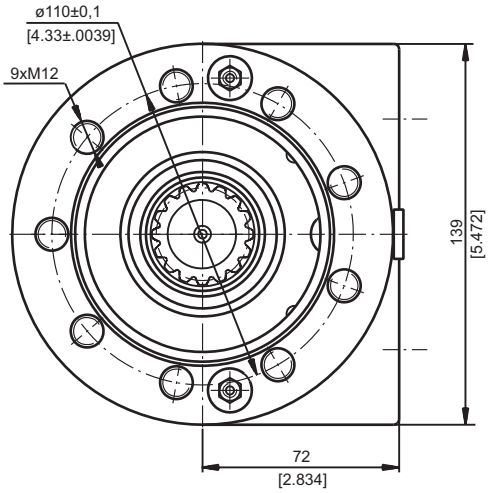


MTMW



DIMENSIONS AND MOUNTING DATA - MTMV





mm [in]

Warning: Drain line should always be used.

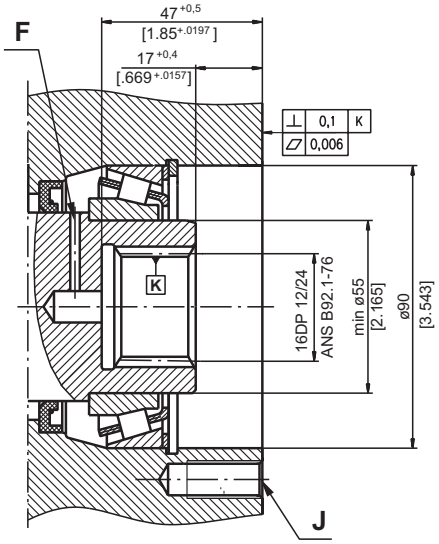
P(A, B): 2xG3/4 - 17 mm [.669 in] depth
T : G1/4 12 mm [.472 in] depth (plugged)

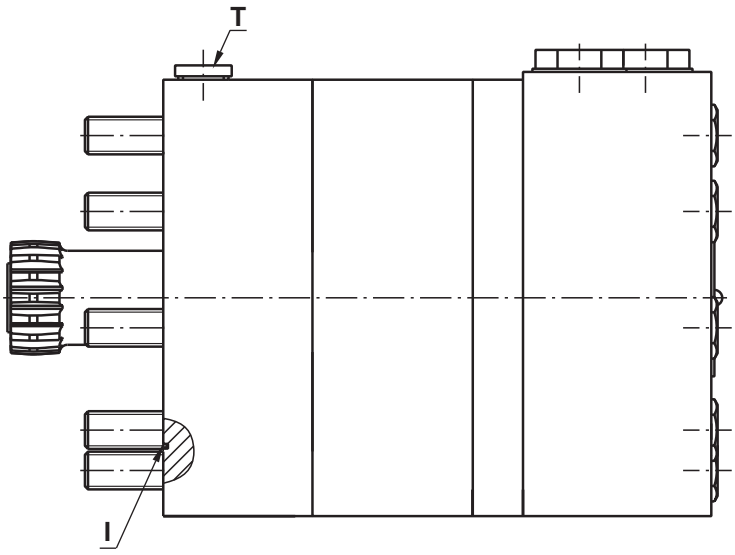
Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

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

Type	L, mm [in]	L1, mm [in]	L2, mm [in]	L3, mm [in]
MTMV 200	151 [5.945]	25 [.98]	106,5 [4.193]	27,8 [1.094]
MTMV 250	157 [6.181]	31,3 [1.23]	112,8 [4.441]	26,5 [1.043]
MTMV 315	167 [6.575]	40,5 [1.59]	122,0 [4.803]	22,3 [.878]
MTMV 400	177 [6.968]	51 [2.01]	132,5 [5.217]	21,8 [.858]
MTMV 470	185 [7.283]	59 [2.32]	140,5 [5.531]	23,8 [.937]
MTMV 500	191 [7.520]	65 [2.56]	146,5 [5.768]	27,8 [1.094]
MTMV 630	187 [7.362]	61 [2.40]	142,5 [5.610]	21,8 [.858]
MTMV 725	196 [7.717]	70 [2.76]	151,5 [5.965]	22,8 [.898]

DIMENSIONS OF THE ATTACHED COMPONENT





F: Oil circulation hole
J: 9xM12-30 mm [1.181 in] depth, 400, ø110±0,1 [4.33±.0039]

I: O- Ring 93x1,5mm [3.661x.059 in]
T: Drain connection G1/4

DIMENSIONS AND MOUNTING DATA - MTM6V

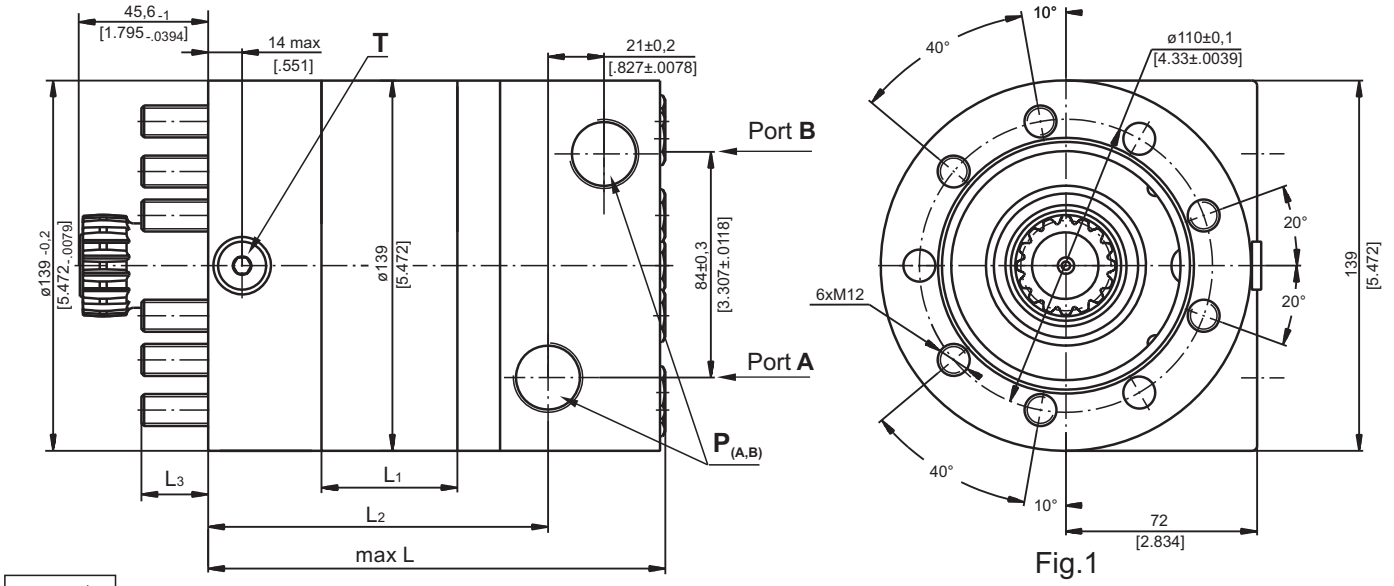


Fig.1

mm [in]

Warning: Drain line should always be used.

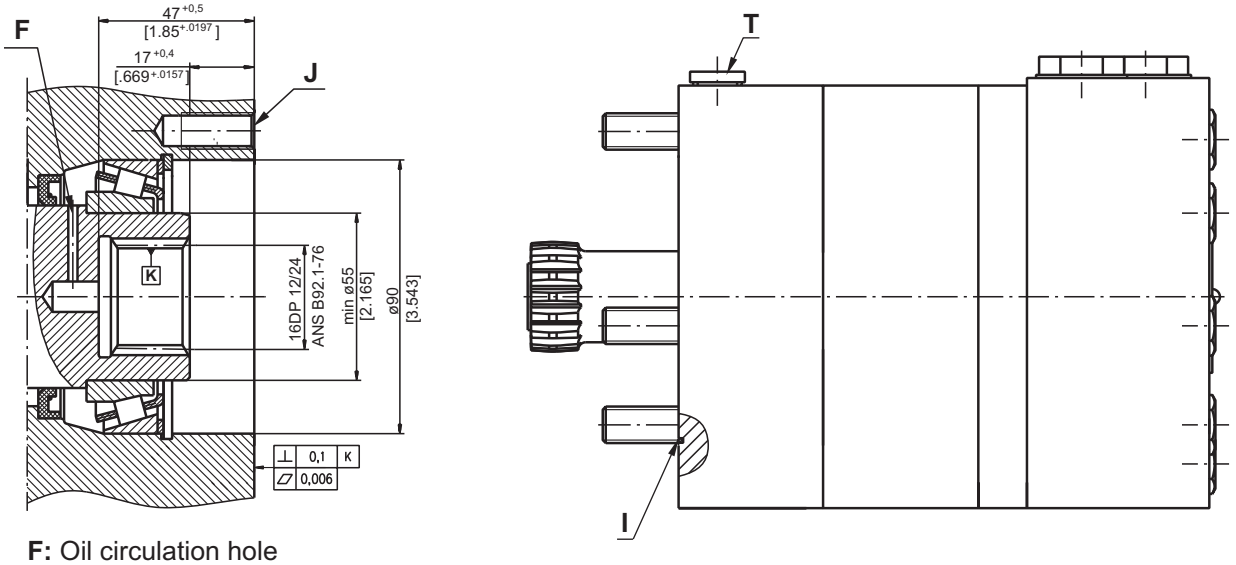
$P_{(A, B)}$: 2xG3/4 - 17 mm [.669 in] depth
T : G1/4 12 mm [.472 in] depth (plugged)

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, mm [in]	L_1, mm [in]	L_2, mm [in]	L_3, mm [in]
MTM6V 200	151 [5.945]	25 [.98]	106,5 [4.193]	27,8 [1.094]
MTM6V 250	157 [6.181]	31,3 [1.23]	112,8 [4.441]	26,5 [1.043]
MTM6V 315	167 [6.575]	40,5 [1.59]	122,0 [4.803]	22,3 [.878]
MTM6V 400	177 [6.968]	51 [2.01]	132,5 [5.217]	21,8 [.858]
MTM6V 470	185 [7.283]	59 [2.32]	140,5 [5.531]	23,8 [.937]
MTM6V 500	191 [7.520]	65 [2.56]	146,5 [5.768]	27,8 [1.094]
MTM6V 630	187 [7.362]	61 [2.40]	142,5 [5.610]	21,8 [.858]
MTM6V 725	196 [7.717]	70 [2.76]	151,5 [5.965]	22,8 [.898]

DIMENSIONS OF THE ATTACHED COMPONENT FOR MTM6V



F: Oil circulation hole
J: 9xM12-30 mm [1.181 in] depth, 40°, ø110±0,1 [4.33±.0039] or 6xM12-30 mm [1.181 in] depth, situated in accordance with the bolts M12, shown on Fig.1, ø110±0,1 [4.33±.0039]

I: O- Ring 93x1,5mm [3.661x.059 in]
T: Drain connection G1/4

DRAIN CONNECTION

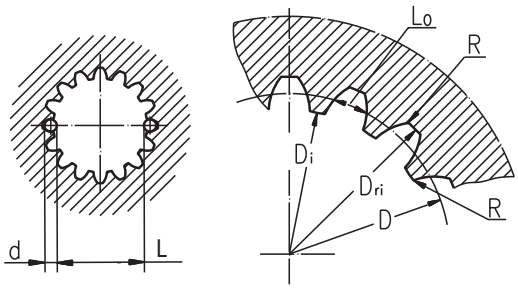
A drain line ought to be used when pressure in the return line can exceed the permissible pressure. It can be connected to the drain connection of the attached component. The maximum pressure in the drain line is limited by the attached component and its shaft seal.

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.	Dri	1.5118÷1.5275	$38,4^{+0,4}$
Minor Dia.	Di	1.2657÷1.2673	$32,15^{+0,04}$
Circular Space Width	Lo	.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 0,7±0,2 [.035÷.019] case depth
Material: 20 MoCr4 EN 10084 or SAE8620.

ORDER CODE

	1	2	3	4	5	6	7
M T M							

Pos.1 - Mounting Flange

omit - 4-Bolt flange, spigot dia. ø160, BC ø200
C - 4-Bolt flange, spigot dia. ø125, BC ø160
W - Wheel motor
V - Very short mount, 9xM12 mounting bolts
6V - Very short mount, 6xM12 mounting bolts

Pos.2 - Displacement code

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

Pos.3 - Shaft Extensions*

C - ø40 straight, Parallel key A12x8x70 DIN6885
CO - ø1½ " straight, Parallel key $^3/_8$"x$^3/_8$"x2¼" BS46
K - ø45 tapered 1:10, Parallel key B12x8x28 DIN6885
SH - ø1½" splined 17T ANSI B92.1-1976

Pos.4 - Check Valves

omit - without check valves
1 - with check valves

Pos.5 - Ports

omit - BSPP (ISO 228)

Pos.6 - Special Features (see page 48)

Pos.7 - Design Series

omit - Factory specified

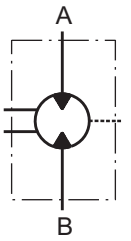
NOTES:
* The permissible output torque for shafts must not be exceeded!

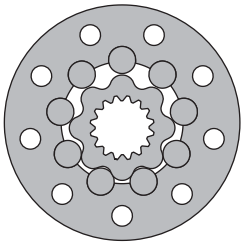
The hydraulic motors are mangano-phosphatized as standard.

HYDRAULIC MOTORS TMF

APPLICATION

» Marine equipment
» Forestry equipment
» Metal working machines
» Agricultural machines
» Road building machines
» Mining machinery
» Special vehicles etc.





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OPTIONS

» Model - Disc valve, roll-gerotor
» Wheel mounting flange
» Side ports
» Shaft - thread hole flange
» SAE and BSPP ports
» Other special features

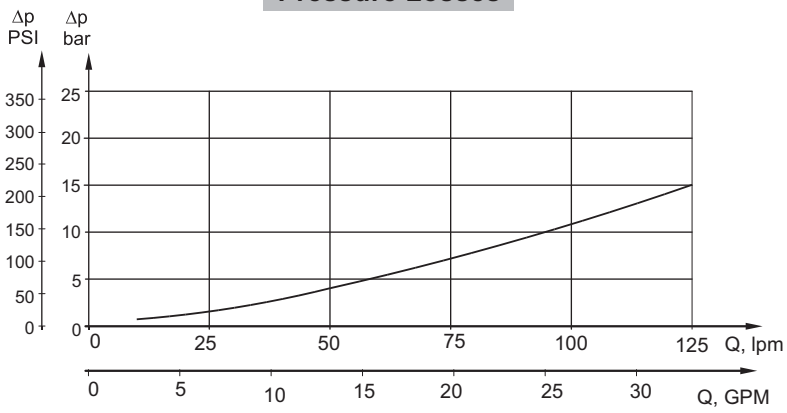
GENERAL

Max. Displacement, cm^3/rev [in^3/rev]	724,3 [44.2]
Max. Speed, [RPM]	750
Max. Torque, daNm [lb-in]	cont.: 175 [15490] int.: 215 [16030]
Max. Output, kW [HP]	70 [94]
Max. Pressure Drop, bar [PSI]	cont.: 250 [3600] int.: 350 [5080]
Max. Oil Flow, lpm [GPM]	150 [40]
Min. Speed, [RPM]	5
Permissible Shaft Loads daN [lbs]	P_a=1000 [2250]
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, ^oC [^oF]	-40÷140 [-40÷284]
Optimal Viscosity range, mm^2/s [SUS]	20÷75 [98÷347]
Filtration	ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	2,5 [.660]
	35 [164]	1,5 [.396]
210 [3045]	20 [98]	5 [1.321]
	35 [164]	3 [.793]

Pressure Losses



SPECIFICATION DATA

Type		TMF 200	TMF 250	TMF 315	TMF 400	TMF 470	TMF 500	TMF 630	TMF 725
Displacement, cm^3/rev [in^3/rev]		201,4 [12.29]	251,8 [15.36]	326,3 [19.9]	410,9 [25.06]	475 [28.97]	523,6 [31.95]	631,2 [38.52]	724 [44.2]
Max. Speed, [RPM]	Cont.	625	500	380	305	260	240	185	170
	Int.*	750	600	460	365	315	285	225	215
Max. Torque daNm [lb-in]	Cont.	72 [6375]	90[7965]	116[10265]	147[13010]	171[15135]	172[15225]	175[15490]	160[14160]
	Int.*	102 [9030]	128[11330]	163[14425]	206[18232]	215[16030]	215[19030]	215[19030]	192[17000]
	Peak**	115[10180]	144[12745]	186[16460]	235[20800]	240[21240]	240[21240]	250[21225]	240[21240]
Max. Output kW [HP]	Cont.	41 [55]	41 [55]	41 [55]	41 [55]	41 [55]	37,5 [50]	28 [37,5]	26 [35]
	Int.*	65 [87]	70 [94]	70 [94]	70 [94]	55 [74]	51 [68]	42 [56]	40 [54]
Max. Pressure Drop bar [PSI]	Cont.	250[3600]	250[3600]	250[3600]	250[3600]	250[3600]	230[3340]	185[2680]	160[2320]
	Int.*	350[5080]	350[5080]	350[5080]	350[5080]	350[5080]	280[4060]	225[3260]	210[3045]
	Peak**	400[5800]	400[5800]	400[5800]	400[5800]	400[5800]	320[4640]	270[3915]	260[3770]
Max. Oil Flow lpm [GPM]	Cont.	125[33]	125[33]	125[33]	125[33]	125[33]	125[33]	125[33]	125[33]
	Int.*	150[40]	150[40]	150[40]	150[40]	150[40]	150[40]	150[40]	150[40]
Max. Inlet Pressure bar [PSI]	Cont.	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]	270[3920]
	Int.*	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]	370[5370]
	Peak**	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]	420[6100]
Max. Return Pressure without Drain Line or Max. Pressure in Drain Line, bar [PSI]	Cont. 0-100 RPM	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]
	Cont. 100-300 RPM	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]	40 [580]
	Cont. >300 RPM	20 [290]	20 [290]	20 [290]	20 [290]	20 [290]	-	-	-
	Int.* 0-max. RPM	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]	75 [1100]
Max. Return Pressure with Drain Line bar [PSI]	Cont.	140[2000]	140[2000]	140[2000]	140[2000]	140[2000]	140[2000]	140[2000]	140[2000]
	Int.*	175[2500]	175[2500]	175[2500]	175[2500]	175[2500]	175[2500]	175[2500]	175[2500]
	Peak**	210[3000]	210[3000]	210[3000]	210[3000]	210[3000]	210[3000]	210[3000]	210[3000]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		6 [90]	6 [90]	6 [90]	6 [90]	6 [90]	6 [90]	6 [90]	6 [90]
Min. Starting Torque daNm [lb-in]		60[5310]	75[6640]	97[8585]	122[10800]	142[12570]	143[12655]	145[12830]	148[13100]
Min. Speed***, [RPM]		5	5	5	5	5	5	5	5
Weight, kg [lb]		26,9[59.3]	27,3[60.2]	28,1[62]	29 [64]	29,7[65.5]	30,2[66.6]	29,7[65.5]	31[68.4]

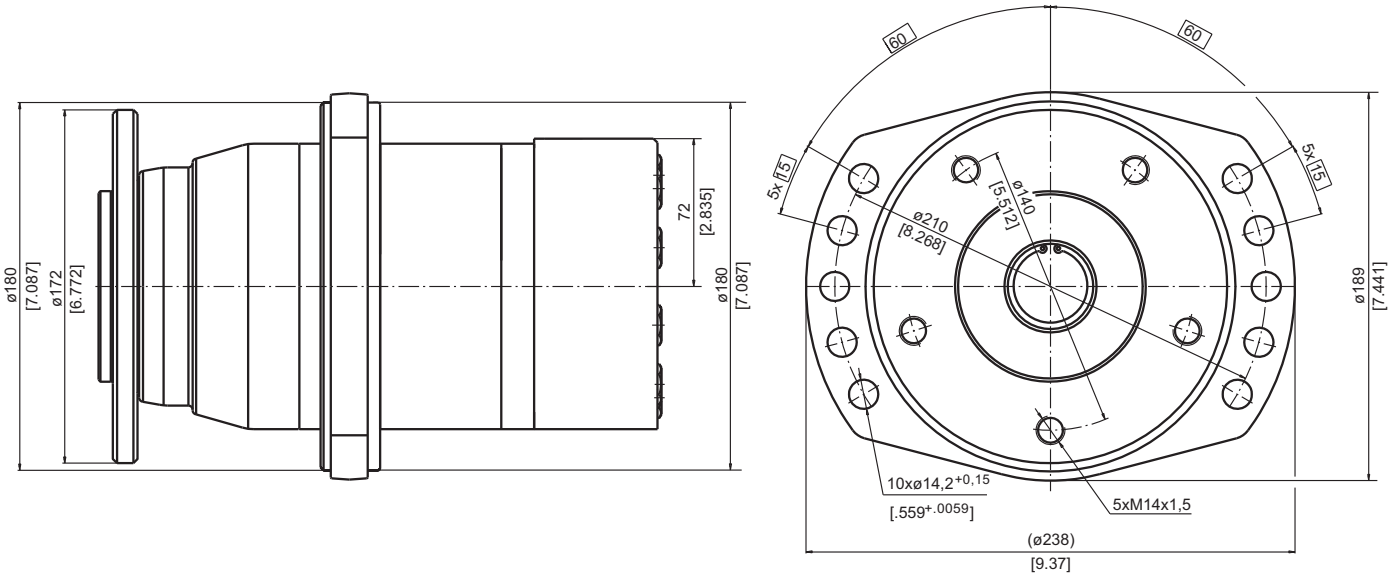
* Intermittent operation: the permissible values may occur for max. 10% of every minute.

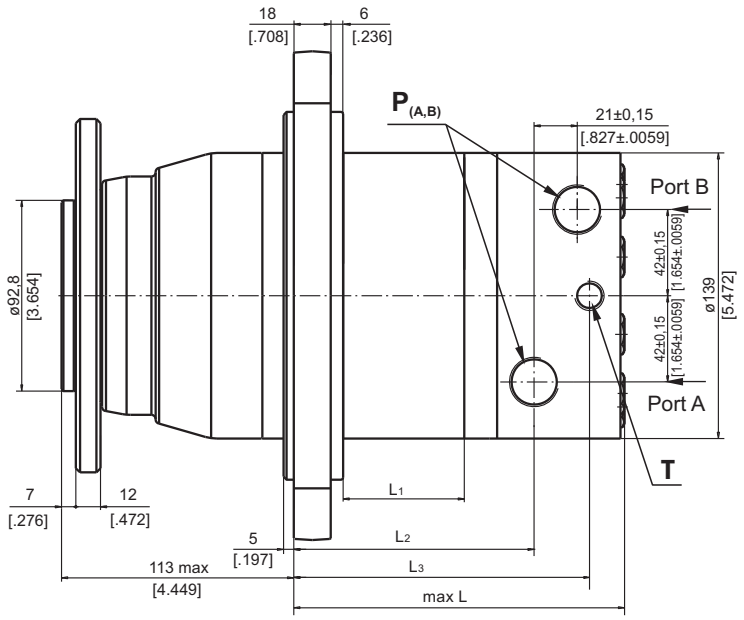
** Peak load: the permissible values may occur for max. 1% of every minute.

*** 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(ISO6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 70 SUS [13 cm^2/s] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS AND MOUNTING DATA - TMF





P (A, B): 2xG3/4 - 17 mm [.669 in] depth
T : G1/4 - 12 mm [.472 in] depth

mm [in]

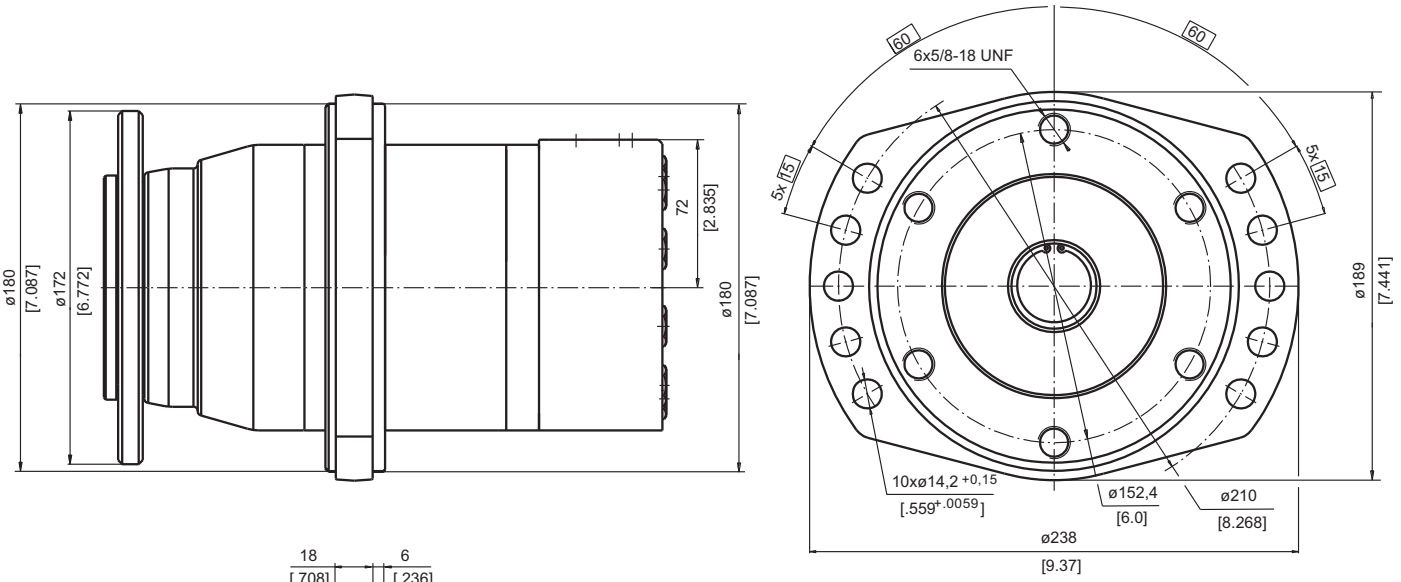
Warning: Drain line should always be used.

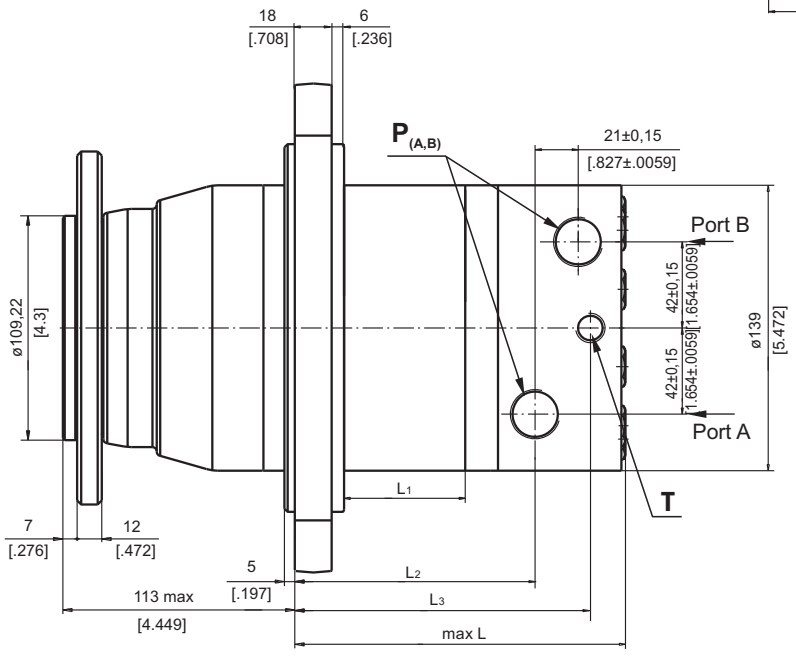
Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

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

Type	L, mm [in]	L1, mm [in]	L2,mm [in]	L3, mm [in]
TMF 200	126 [4.96]	.98 [25]	83 [3.268]	110,3 [4.34]
TMF 250	132.3 [5.21]	31,3 [1.23]	89.3 [3.516]	116,6 [4.59]
TMF 315	141.5[5.57]	40,5 [1.59]	98.5 [3.878]	125,8 [4.95]
TMF 400	152 [5.98]	51 [2.01]	109 [4.291]	136,3 [5.37]
TMF 470	160 [6.30]	59 [2.32]	117 [4.606]	144,3 [5.68]
TMF 500	166 [6.54]	65 [2.56]	123 [4.843]	150,3 [5.92]
TMF 630	162 [6.38]	61 [2.40]	119 [4.69]	146,3 [5.76]
TMF 725	171 [6.73]	70 [2.76]	128 [5.04]	155,3 [6.11]

DIMENSIONS AND MOUNTING DATA - TMFA





P(A, B): 2x1 1/16-12 UN, O-ring port
17 mm [.669 in] depth
T : 9/16-18 UNF, O-ring port
12 mm [.472 in] depth

mm [in]

Warning: Drain line should always be used.

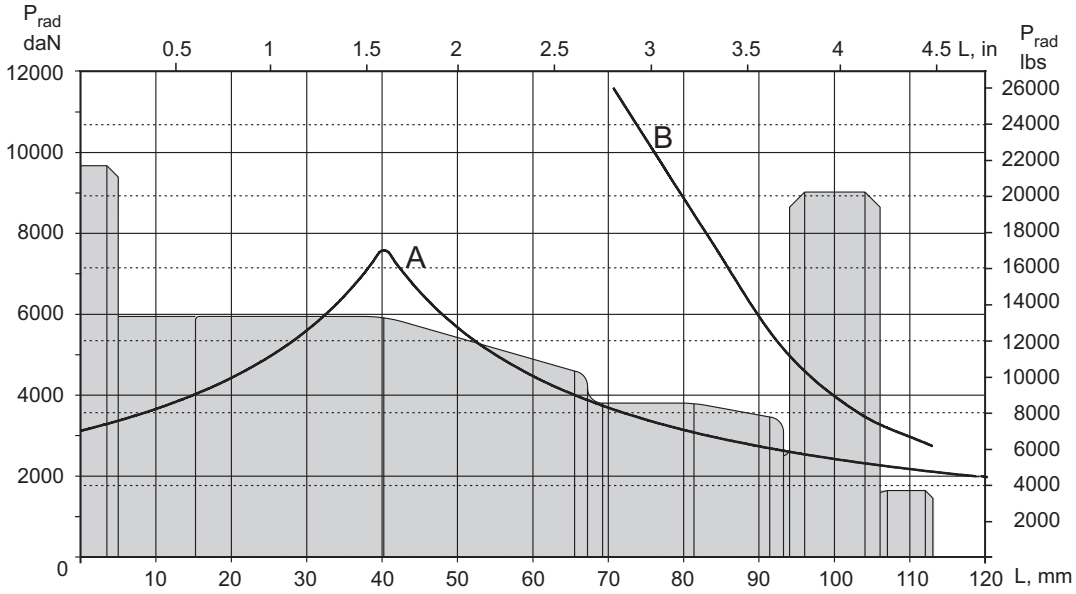
Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

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

Type	L, mm [in]	L1, mm [in]	L2,mm [in]	L3, mm [in]
TMFA 200	126 [4.96]	.98 [25]	83 [3.268]	110,3 [4.34]
TMFA 250	132.3 [5.21]	31,3 [1.23]	89.3 [3.516]	116,6 [4.59]
TMFA 315	141.5[5.57]	40,5 [1.59]	98.5 [3.878]	125,8 [4.95]
TMFA 400	152 [5.98]	51 [2.01]	109 [4.291]	136,3 [5.37]
TMFA 470	160 [6.30]	59 [2.32]	117 [4.606]	144,3 [5.68]
TMFA 500	166 [6.54]	65 [2.56]	123 [4.843]	150,3 [5.92]
TMFA 630	162 [6.38]	61 [2.40]	119 [4.69]	146,3 [5.76]
TMFA 725	171 [6.73]	70 [2.76]	128 [5.04]	155,3 [6.11]

PERMISSIBLE SHAFT LOADS

The load diagram is valid for an average bearings life of 2000 hours at 100 RPM



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

ORDER CODE

	1	2	3	4
TMF				

Pos.1 - **Mounting Flange**

omit - Thread hole flange, 5xM12x1,5 on ø140

A - Thread hole flange, 6x5/8-18 UNF on ø152,4

Pos.2 - **Displacement code**

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

Pos.3 - **Special Features** (see page 48)

Pos.4 - **Design Series**

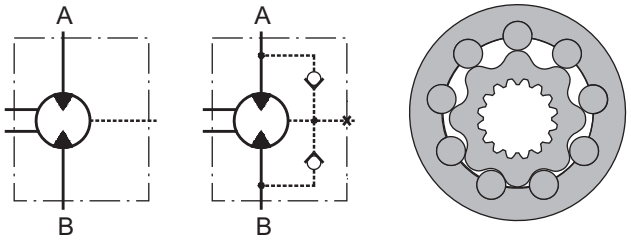
omit - Factory specified

The hydraulic motors are mangano-phosphatized as standard.

HYDRAULIC MOTORS MVM

APPLICATION

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



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Specification data 35
Dimensions and mounting 36
Shaft extensions 36
Permissible shaft Seal Pressure 37
Permissible shaft loads 38
Order code 38

OPTIONS

» Model - Disc valve, roll-gerotor
» Flange with wheel mount
» Short motor
» Side ports
» Shafts - straight, splined and tapered
» 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
» High radial and axial bearing capacity

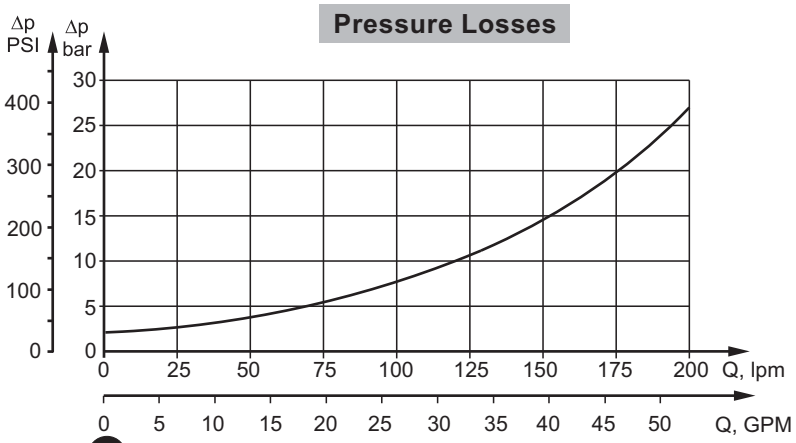
GENERAL

Max. Displacement, cm^3/rev [in^3/rev]	801,8 [48.91]
Max. Speed, [RPM]	763
Max. Torque, daNm [lb-in]	cont.: 259 [22920] int.: 340 [30090]
Max. Output, kW [HP]	112 [150]
Max. Pressure Drop, bar [PSI]	cont.: 250 [3630] int.: 350 [5080]
Max. Oil Flow, lpm [GPM]	240 [63.4]
Min. Speed, [RPM]	5
Permissible Shaft Loads, daN [lbs]	Pa=1500 [3370]
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, ^{o}C [^{o}F]	-40÷140 [-40÷284]
Optimal Viscosity range, mm^2/s [SUS]	20÷75 [98÷347]
Filtration	ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	3 [.793]
	35 [164]	2 [.528]
210 [3045]	20 [98]	6 [1.585]
	35 [164]	4 [1.057]

Pressure Losses



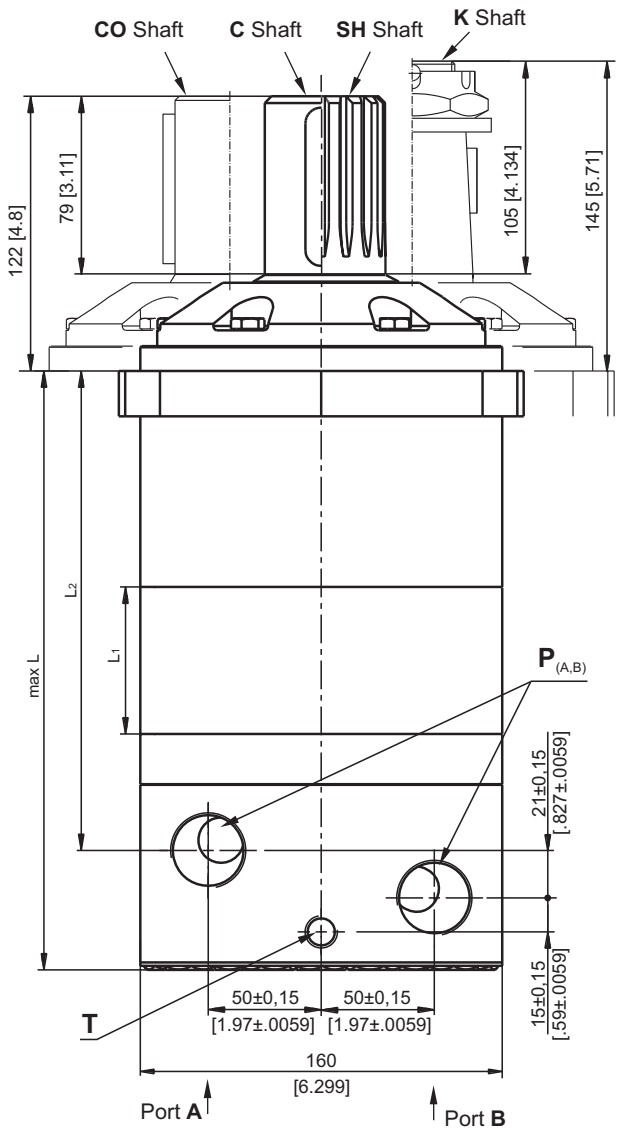
SPECIFICATION DATA

Type		MVM 315	MVM 400	MVM 500	MVM 630	MVM 800
Displacement, cm^3/rev [in^3/rev]		314,5 [19.19]	400,9 [24.5]	499,6 [30.5]	629,1 [38.38]	801,8 [48.91]
Max. Speed,	cont.	636	500	400	315	250
[RPM]	Int.*	763	600	480	380	300
Max. Torque	cont.	115 [10180]	144 [12745]	180 [15930]	227 [20090]	259 [22920]
daNm [lb-in]	Int.*	160 [14160]	200 [17700]	260 [23010]	310 [27440]	340 [30090]
	peak**	180 [15930]	230 [20355]	286 [25315]	360 [31860]	402 [35580]
Max. Output	cont.	67 [90]	67 [90]	67 [90]	67 [90]	67 [90]
kW [HP]	int.*	112 [150]	112 [150]	112 [150]	112 [150]	112 [150]
Max. Pressure Drop	cont.	250 [3630]	250 [3630]	250 [3630]	250 [3630]	225 [3263]
bar [PSI]	Int.*	350 [5080]	350 [5080]	350 [5080]	350 [5080]	300 [4350]
	peak**	400 [5800]	400 [5800]	400 [5800]	400 [5800]	350 [5080]
Max. Oil Flow	cont.	200 [52.8]	200 [52.8]	200 [52.8]	200 [52.8]	200 [52.8]
lpm [GPM]	Int.*	240 [63.4]	240 [63.4]	240 [63.4]	240 [63.4]	240 [63.4]
Max. Inlet Pressure	cont.	270 [3915]	270 [3915]	270 [3915]	270 [3915]	270 [3915]
bar [PSI]	Int.*	370 [5365]	370 [5365]	370 [5365]	370 [5365]	370 [5365]
	peak**	420 [6090]	420 [6090]	420 [6090]	420 [6090]	420 [6090]
Max. Return Pressure	cont.	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]
with Drain Line	Int.*	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
bar [PSI]	peak**	210 [3045]	210 [3045]	210 [3045]	210 [3045]	210 [3045]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		5 [70]	5 [70]	5 [70]	5 [70]	5 [70]
Min. Starting Torque daNm [lb-in]		92 [8140]	115 [10180]	144 [12745]	180 [15930]	205 [18145]
Min. Speed***, [RPM]		10	6	8	6	5
Weight, kg [lb]		41,3 [91]	42,1 [93]	43 [95]	44,5 [98]	46 [101.4]

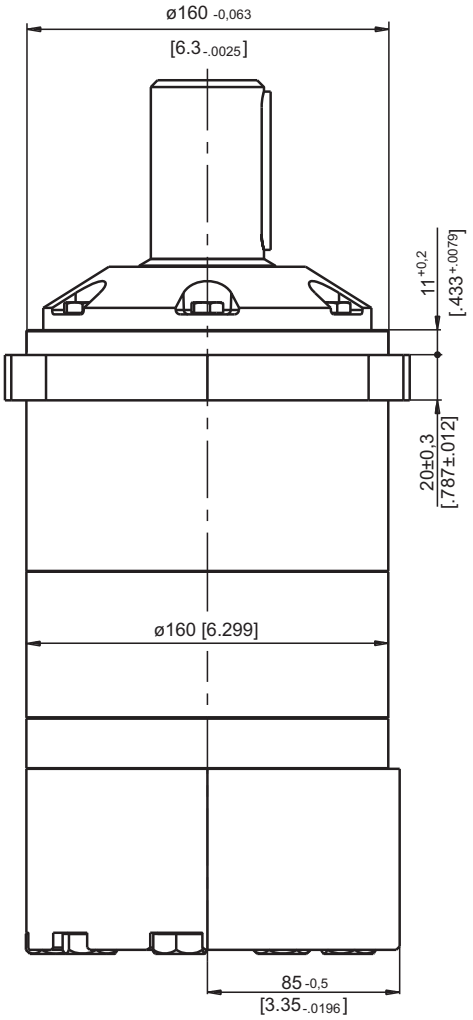
* Intermittent operation: the permissible values may occur for max. 10% of every minute.
** Peak load: the permissible values may occur for max. 1% of every minute.
*** For speeds lower than given, consult factory or your regional manager.

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 13 mm^2/s [70 SUS] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

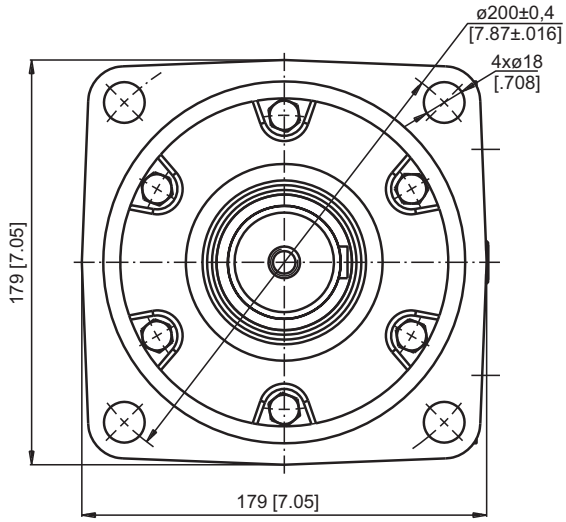
DIMENSIONS AND MOUNTING DATA



Shaft Dim. See Page 37



	Versions	
	2	4
P(A,B)	2xG1	2x1 5/16-12UN
T	G¼	9/16-18UNF



Warning: Drain line should always be used.

Type	L,mm [in]	L2,mm [in]	L1,mm [in]
MVM 315	226,5 [8.92]	172,5 [6.79]	25,5 [1.00]
MVM 400	233,5 [9.19]	179,5 [7.07]	32,5 [1.28]
MVM 500	241,5 [9.51]	187,5 [7.38]	40,5 [1.59]
MVM 630	252 [9.92]	198 [7.79]	51 [2.01]
MVM 800	266 [10.47]	212 [8.35]	65 [2.56]

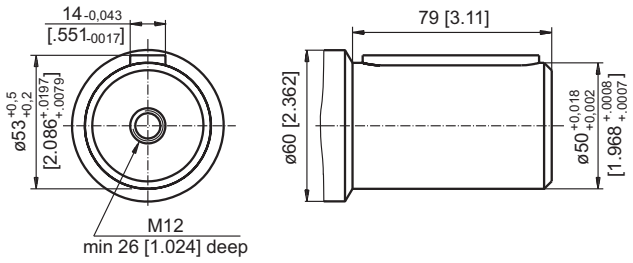
Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

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

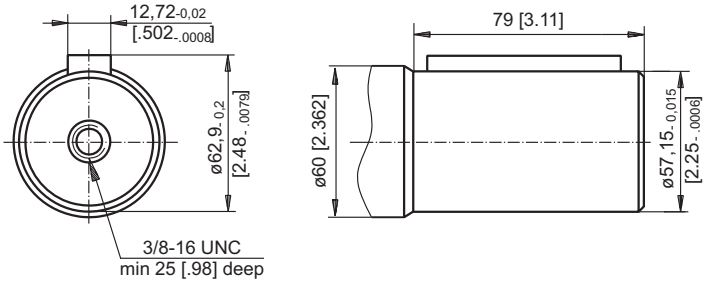
mm [in]

SHAFT EXTENSIONS

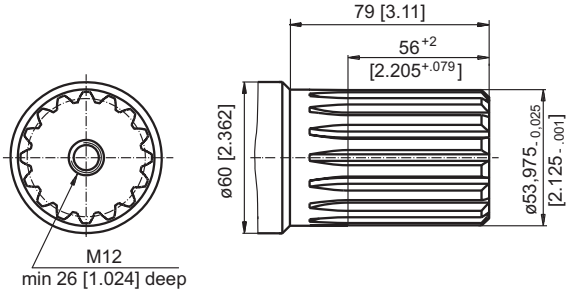
C - ø50 straight, Parallel key A14x9x70 DIN 6885



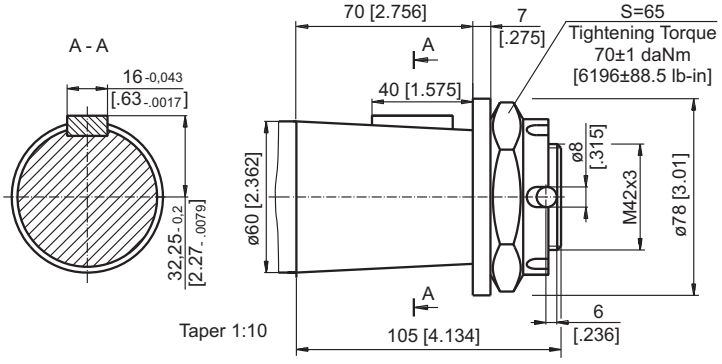
CO - ø2¼"[57,15] straight,Parallel key ½ "x½"x 2¼" BS46



SH - ø2 ⅛"splined, 16 DP 8/16 ANS B92.1-1976



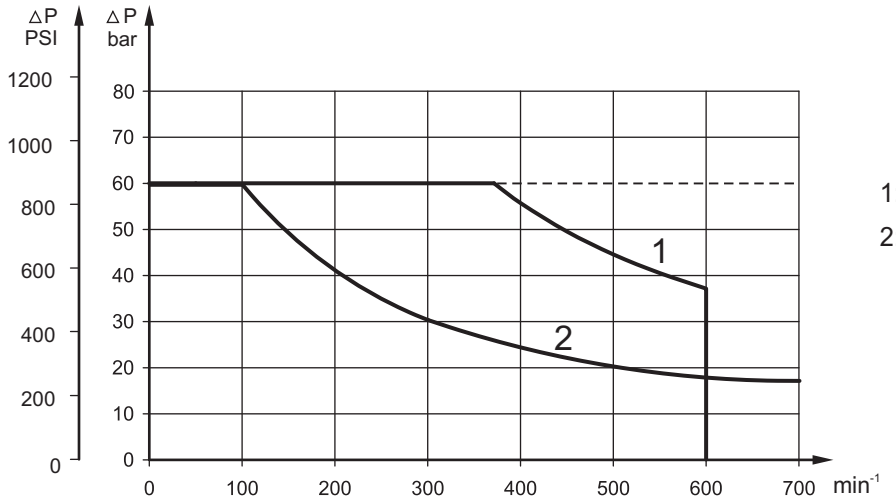
K - tapered 1:10, Parallel key B16x10x32 DIN 6885



mm [in]

MAX. PERMISSIBLE SHAFT SEAL PRESSURE

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



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

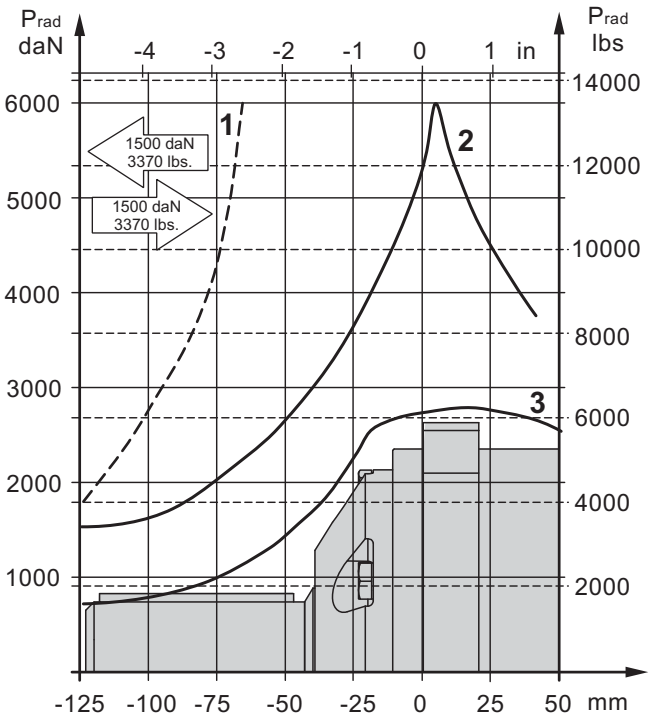
2: Drawing for Standard Shaft Seal

——— - continuous operations

- - - - - - intermittent operations

PERMISSIBLE SHAFT LOADS

The output shaft runs in tapered bearings that permit high axial and radial forces. Curve "**1**" shows max. radial shaft load. Any shaft load exceeding the values shown by the curve will seriously reduce motor life. The two other curves apply to a B10 bearing life of 3000 hours at 200 RPM.



2 - P_a=0 daN [0 lbs]
3 - P_a=1500 daN [3370 lbs]

ORDER CODE

	1	2	3	4	5	6	7
M V M							

Pos.1 - Displacement code

315	- 314,5 cm³/rev [19.8 in³/rev]
400	- 400,9 cm³/rev [24.45 in³/rev]
500	- 499,6 cm³/rev [30.48 in³/rev]
630	- 629,1 cm³/rev [38.38 in³/rev]
800	- 801,8 cm³/rev [48.91 in³/rev]

Pos.2 - Shaft Extensions*

C	- ø50 straight, Parallel key A14x9x70 DIN6885
CO	- ø2 1/4" straight, Parallel key 1/2"x1/2"x2 1/4" BS 46
SH	- ø2 1/8" splined, ANSI B92.1-1976
K	- ø60 tapered 1:10, Parallel key B16x10x32 DIN6885

Pos.3 - Ports

2	- side ports, 2xG1, G1/4, BSP thread, ISO 228
4	- side ports, 2x1 5/16-12 UN, O-ring, 9/16-18 UNF

Pos.4 - Check Valves

omit	- without check valves
1	- with check valves

Pos.5 - Shaft Seal Version (see page 37)

omit	- Low pressure shaft seal
U	- High pressure shaft seal

Pos.6 - Special Features (see page 48)

Pos.7 - Design Series

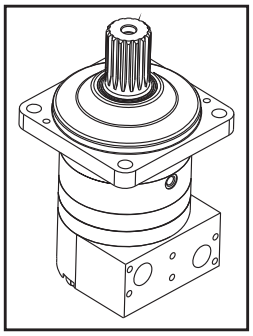
omit - Factory specified

NOTES:

* The permissible output torque for shafts must not be exceeded!

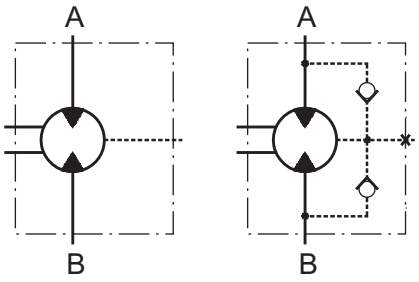
The hydraulic motors are mangano-phosphatized as standard.

HYDRAULIC MOTORS MVMC



OPTIONS

- Model - Disc valve, roll-gerotor
- Flange mount with wheel mount
- Side ports
- Shafts - straight, splined and tapered
- Metric, SAE and BSPP ports
- Other special features



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Shaft extensions 42
Permissible shaft Seal Pressure 42
Permissible shaft loads 43
Order code 43

EXCELLENCE

- High torque and pressure drop
- High inlet pressure
- High starting torque
- Improved efficiency at high pressure drop and frequent reversing
- Smooth operation at low speed
- High radial and axial bearing capacity

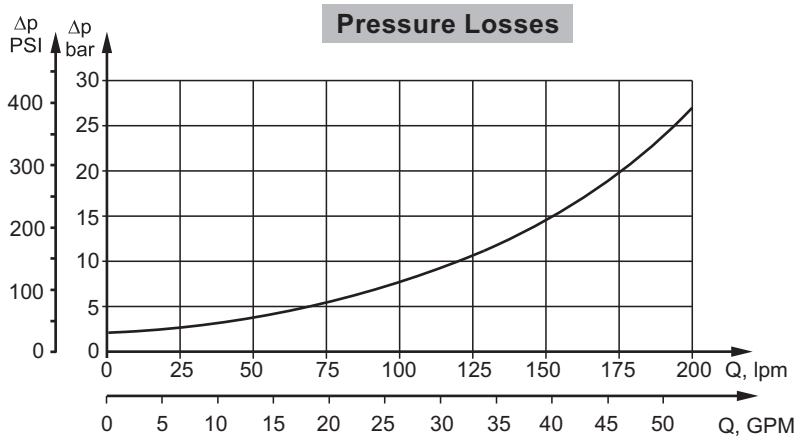
GENERAL

Max. Displacement, cm^3/rev [in^3/rev]	801,8 [48.91]
Max. Speed, [RPM]	763
Max. Torque, daNm [lb-in]	cont.: 259 [22920] int.: 340 [30090]
Max. Output, kW [HP]	112 [150]
Max. Pressure Drop, bar [PSI]	cont.: 250 [3630] int.: 350 [5080]
Max. Oil Flow, lpm [GPM]	240 [63.4]
Min. Speed, [RPM]	5
Permissible Shaft Loads, daN [lbs]	Pa=1500 [3370]
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, ^oC [^oF]	-40÷140 [-40÷284]
Optimal Viscosity range, mm^2/s [SUS]	20÷75 [98÷347]
Filtration	ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	3 [.793]
	35 [164]	2 [.528]
210 [3045]	20 [98]	6 [1.585]
	35 [164]	4 [1.057]

Pressure Losses



SPECIFICATION DATA

Type		MVMC 315	MVMC 400	MVMC 500	MVMC 630	MVMC 800
Displacement, cm^3/rev [in^3/rev]		314,5 [19.18]	400,9 [24.5]	499,6 [30.5]	629,1 [38.38]	801,8 [48.91]
Max. Speed,	cont.	636	500	400	315	250
[RPM]	Int.*	736	600	480	380	300
Max. Torque	cont.	115 [10180]	144 [12745]	180 [15930]	227 [20090]	259 [22920]
daNm [lb-in]	Int.*	160 [14160]	200 [17700]	260 [23010]	310 [27440]	340 [30090]
	peak**	180 [15930]	230 [20355]	286 [25315]	360 [31860]	402 [35580]
	start	92 [8143]	115 [10180]	144 [12745]	180 [15930]	205 [18144]
Max. Output	cont.	67 [90]	67 [90]	67 [90]	67 [90]	67 [90]
kW [HP]	int.*	112 [150]	112 [150]	112 [150]	112 [150]	112 [150]
Max. Pressure Drop	cont.	250 [3630]	250 [3630]	250 [3630]	250 [3630]	225 [3263]
bar [PSI]	Int.*	350 [5080]	350 [5080]	350 [5080]	350 [5080]	300 [4350]
	peak**	400 [5800]	400 [5800]	400 [5800]	400 [5800]	350 [5080]
Max. Oil Flow	cont.	200 [52.8]	200 [52.8]	200 [52.8]	200 [52.8]	200 [52.8]
lpm [GPM]	Int.*	240 [63.4]	240 [63.4]	240 [63.4]	240 [63.4]	240 [63.4]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		5 [70]	5 [70]	5 [70]	5 [70]	5 [70]
Drain Pressure, bar [PSI]		$P_{atm.}$				
Weight, kg [lb]		43,8 [96.6]	44,9 [99]	45,8 [101]	48,3 [106.5]	50,4 [111.1]

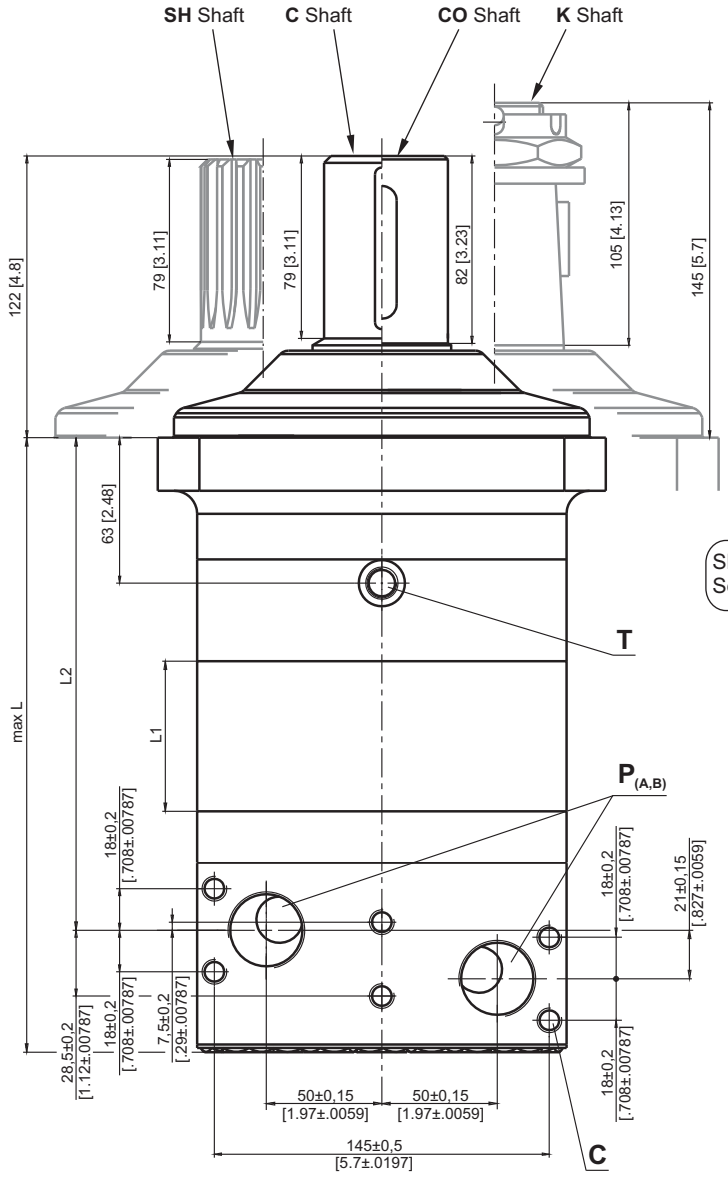
* Intermittent operation: the permissible values may occur for max. 10% of every minute.

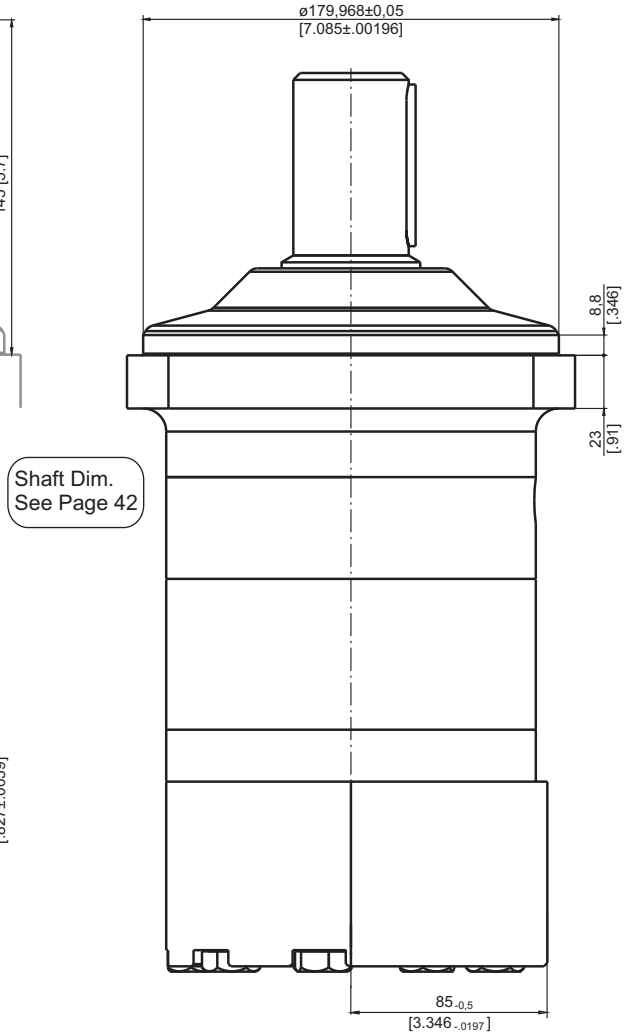
** Peak load: the permissible values may occur for max. 1% of every minute.

*** For speeds of 5 RPM lower than given, consult factory or your regional manager.

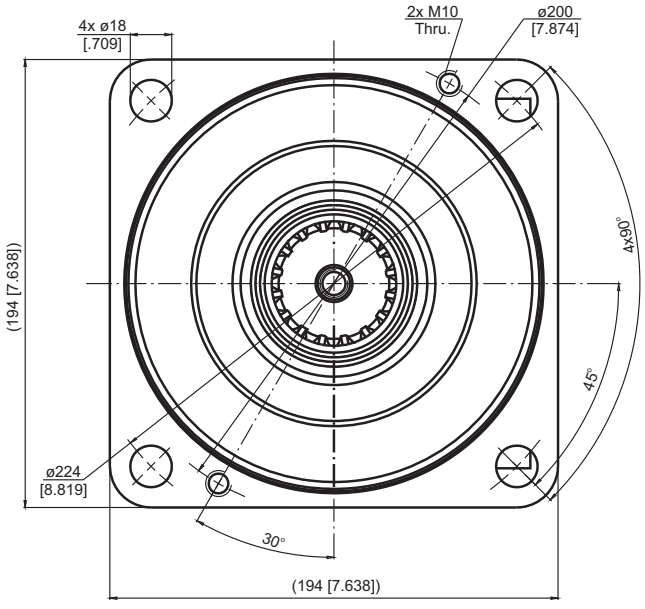
1. Intermittent speed and intermittent pressure must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil, HLP(DIN51524) or HM(ISO6743/4). If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 cm^2/s [70 SUS] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS AND MOUNTING DATA





Shaft Dim. See Page 42



	Versions
	3
P(A,B)	2xG1
T	G¼
C	6xM10

mm [in]

Warning: Drain line should always be used.

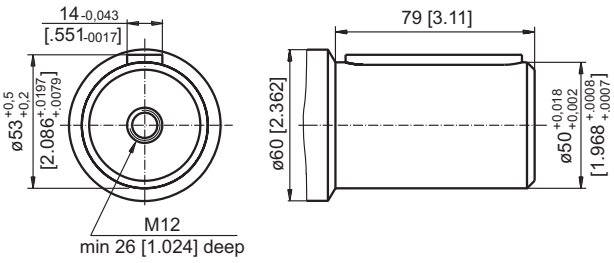
Type	L,mm [in]	L2,mm [in]	L1,mm [in]
MVMC 315	227,5 [8.957]	174,0 [6.850]	25,5 [1.00]
MVMC 400	234,5 [9.232]	181,0 [7.126]	32,5 [1.28]
MVMC 500	242,5 [9.547]	189,0 [7.441]	40,5 [1.59]
MVMC 630	253,0 [9.961]	199,5 [7.854]	51,0 [2.01]
MVMC 800	267,0 [10.518]	213,5 [8.405]	65,0 [2.56]

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

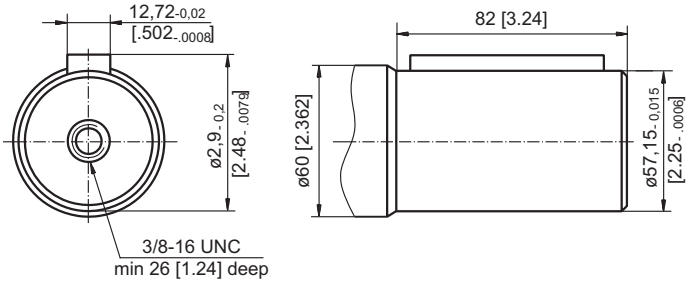
Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

SHAFT EXTENSIONS

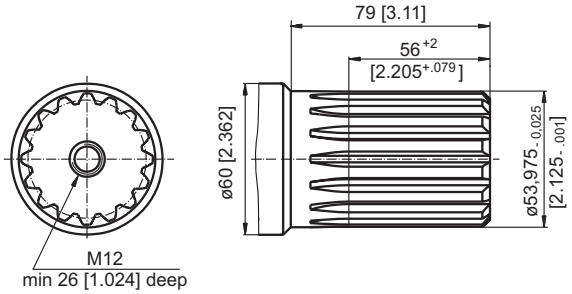
C - ø50 straight, Parallel key A14x9x70 DIN 6885



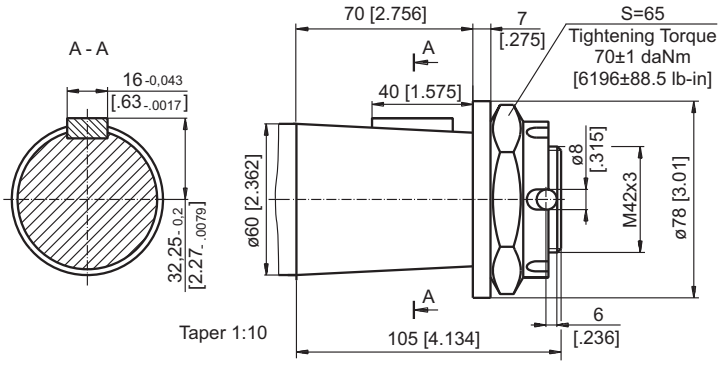
CO - ø2¼"[57,15] straight,Parallel key ½ "x½"x 2¼" BS46



SH - ø2 ⅛"splined, 16 DP 8/16 ANS B92.1-1976



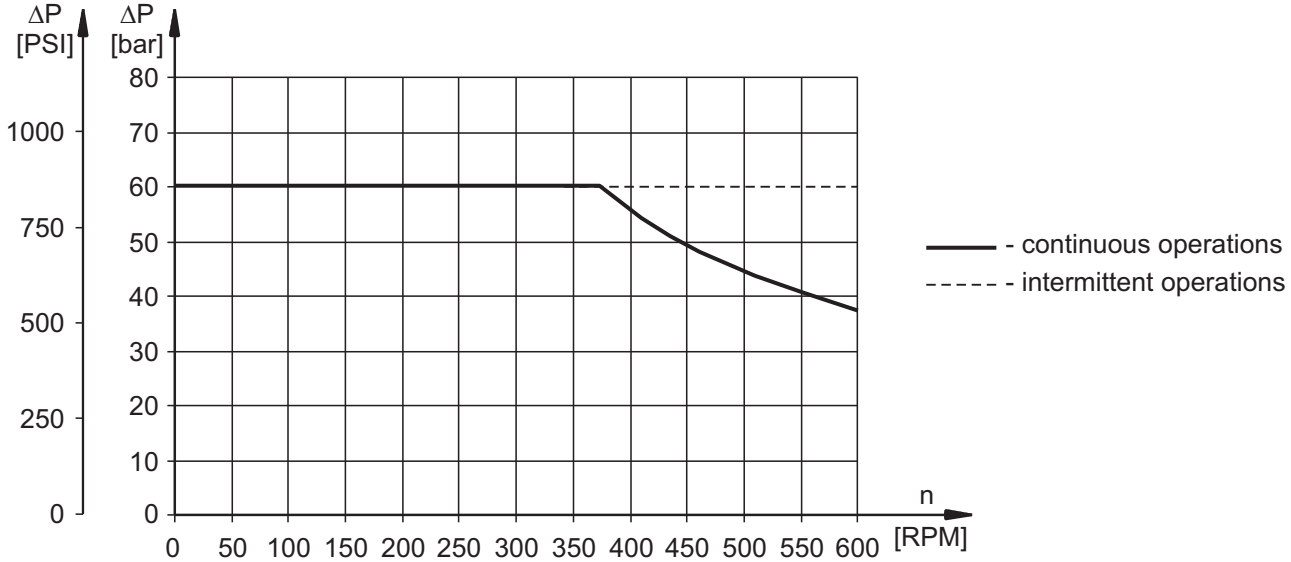
K - tapered 1:10, Parallel key B16x10x32 DIN 6885



mm [in]

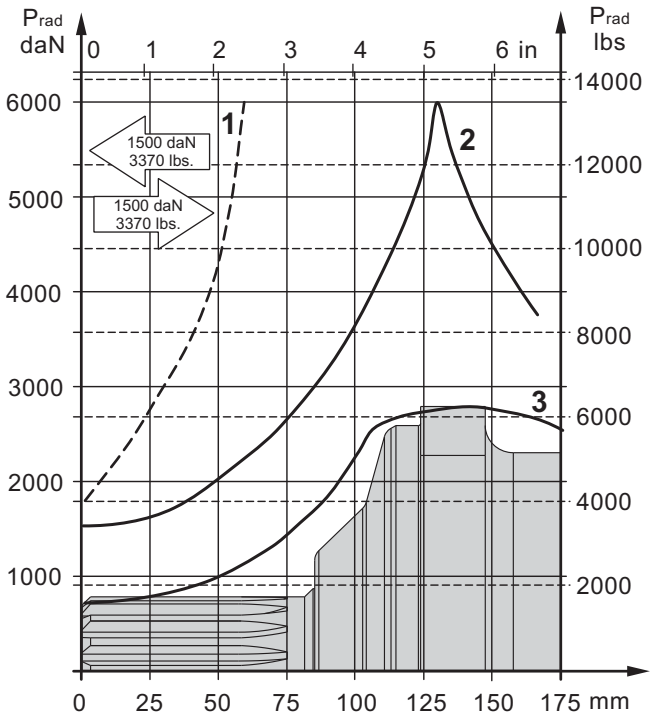
MAX. PERMISSIBLE SHAFT SEAL PRESSURE

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



PERMISSIBLE SHAFT LOADS

The output shaft runs in tapered bearings that permit high axial and radial forces. Curve "**1**" shows max. radial shaft load. Any shaft load exceeding the values quoted in the curve will seriously reduce motor life. The two other curves apply to a B10 bearing life of 3000 hours at 200 RPM.



2 - P_a=0 daN [0 lbs]
3 - P_a=1500 daN [3370 lbs]

ORDER CODE

	1	2	3	4	5	6
M V M C						

Pos.1 - Displacement code

315	- 314,5 cm³/rev [19.8 in³/rev]
400	- 400,9 cm³/rev [24.45 in³/rev]
500	- 499,6 cm³/rev [30.48 in³/rev]
630	- 629,1 cm³/rev [38.38 in³/rev]
800	- 801,8 cm³/rev [48.91 in³/rev]

Pos.2 - Shaft Extensions*

C	- ø50 straight, Parallel key A14x9x70 DIN6885
CO	- ø2 1/4" straight, Parallel key 1/2"x1/2"x2 1/4" BS46
SH	- ø2 1/8" splined, ANSI B92.1-1976
K	- ø60 tapered 1:10, Parallel key B16x10x32 DIN6885

Pos.3 - Ports

3	- side ports 2xG1, G1/4, BSP thread, ISO 228, 6xM10

Pos.4 - Check Valves

omit	- without check valves
1	- with check valves

Pos.5 - Special Features (see page 48)

Pos.6 - Design Series

omit - Factory specified

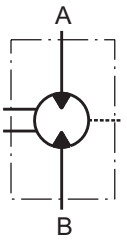
NOTES:
* The permissible output torque for shafts must not be exceeded!

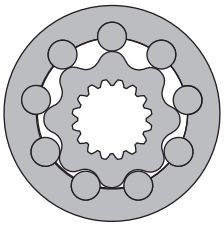
The hydraulic motors are mangano-phosphatized as standard.

HYDRAULIC MOTORS VMF

APPLICATION

» Marine equipment
» Forestry equipment
» Metal working machines
» Agricultural machines
» Road building machines
» Mining machinery
» Special vehicles etc.





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Permissible shaft loads 47
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OPTIONS

» Model - Disc valve, roll-gerotor
» Wheel mounting flange
» Side ports
» Shaft - thread hole flange
» SAE and BSPP ports
» Other special features

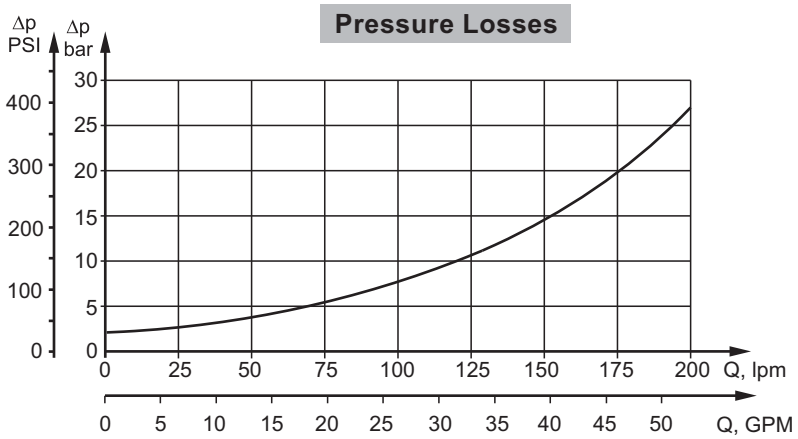
GENERAL

Max. Displacement, cm^3/rev [in^3/rev]	801,8 [48.91]
Max. Speed, [RPM]	736
Max. Torque, daNm [lb-in]	cont.: 259 [22920] int.: 340 [30090]
Max. Output, kW [HP]	112 [150]
Max. Pressure Drop, bar [PSI]	cont.: 250 [3630] int.: 350 [5080]
Max. Oil Flow, lpm [GPM]	240 [63.4]
Min. Speed, [RPM]	5
Permissible Shaft Loads, daN [lbs]	Pa=1500 [3370]
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, ^{O}C [^{O}F]	-40÷140 [-40÷284]
Optimal Viscosity range, mm^2/s [SUS]	20÷75 [98÷347]
Filtration	ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm^2/s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	3 [.793]
	35 [164]	2 [.528]
210 [3045]	20 [98]	6 [1.585]
	35 [164]	4 [1.057]

Pressure Losses



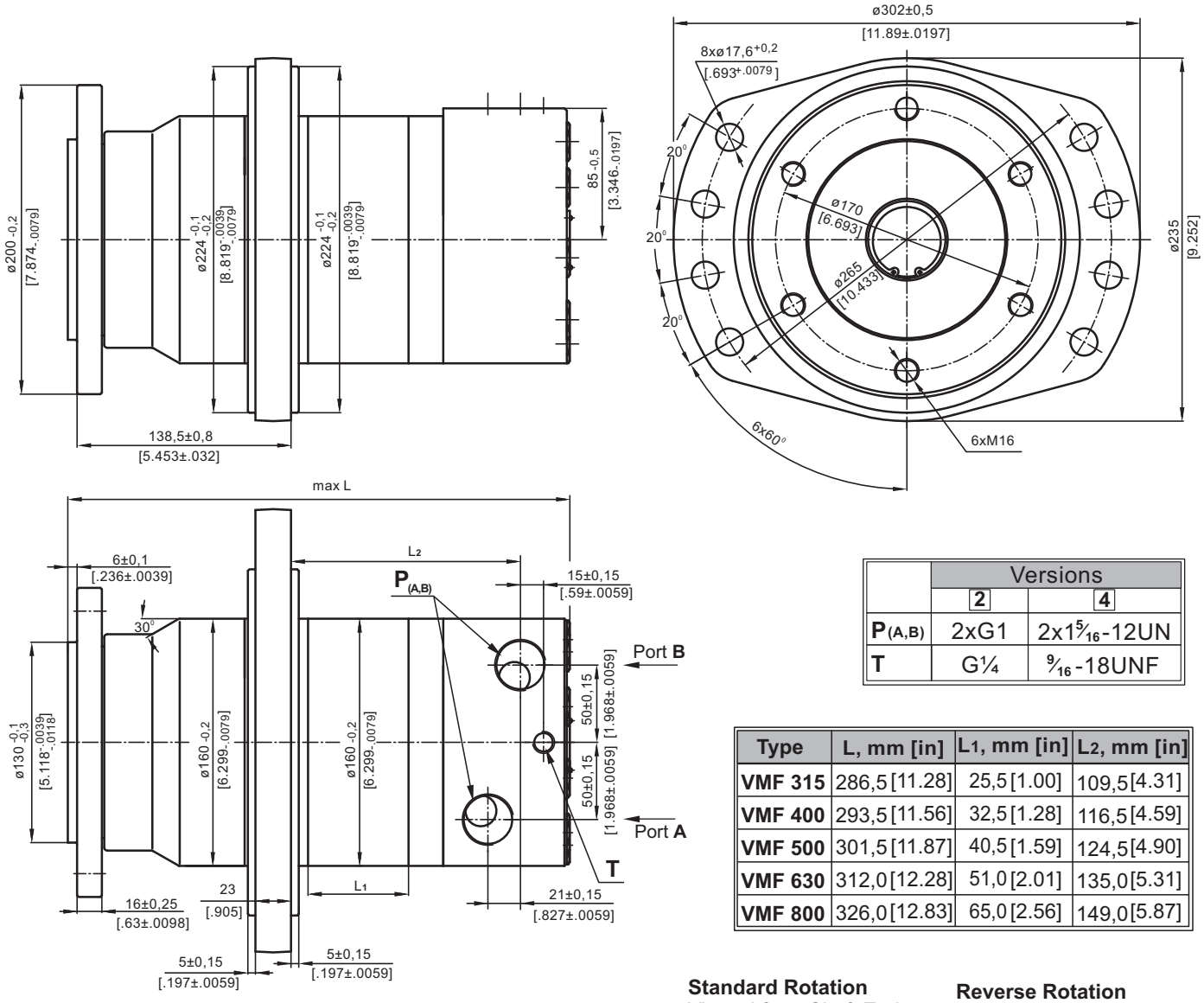
SPECIFICATION DATA

Type		VMF 315	VMF 400	VMF 500	VMF 630	VMF 800
Displacement, cm^3/rev [in^3/rev]		314,5 [19.18]	400,9 [24.5]	499,6 [30.5]	629,1 [38.38]	801,8 [48.91]
Max. Speed, [RPM]	cont.	636	500	400	315	250
	Int.*	736	600	480	380	300
Max. Torque daNm [lb-in]	cont.	115 [10180]	144 [12745]	180 [15930]	227 [20090]	259 [22920]
	Int.*	160 [14160]	200 [17700]	260 [23010]	310 [27440]	340 [30090]
	peak**	180 [15930]	230 [20355]	286 [25315]	360 [31860]	402 [35580]
Max. Output kW [HP]	cont.	67 [90]	67 [90]	67 [90]	67 [90]	67 [90]
	int.*	112 [150]	112 [150]	112 [150]	112 [150]	112 [150]
Max. Pressure Drop bar [PSI]	cont.	250 [3630]	250 [3630]	250 [3630]	250 [3630]	225 [3263]
	Int.*	350 [5080]	350 [5080]	350 [5080]	350 [5080]	300 [4350]
	peak**	400 [5800]	400 [5800]	400 [5800]	400 [5800]	350 [5080]
Max. Oil Flow lpm [GPM]	cont.	200 [52.8]	200 [52.8]	200 [52.8]	200 [52.8]	200 [52.8]
	Int.*	240 [63.4]	240 [63.4]	240 [63.4]	240 [63.4]	240 [63.4]
Max. Inlet Pressure bar [PSI]	cont.	270 [3915]	270 [3915]	270 [3915]	270 [3915]	270 [3915]
	Int.*	370 [5365]	370 [5365]	370 [5365]	370 [5365]	370 [5365]
	peak**	420 [6090]	420 [6090]	420 [6090]	420 [6090]	420 [6090]
Max. Return Pressure with Drain Line bar [PSI]	cont.	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]
	Int.*	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
	peak**	210 [3045]	210 [3045]	210 [3045]	210 [3045]	210 [3045]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		5 [70]	5 [70]	5 [70]	5 [70]	5 [70]
Min. Starting Torque daNm [lb-in]		92 [8140]	115 [10180]	144 [12745]	180 [15930]	205 [18145]
Min. Speed***, [RPM]		10	6	8	6	5
Weight, kg [lb]		46 [101.4]	47,2 [104,1]	48,5 [106.9]	50 [110.2]]	51,5 [113.5]

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

DIMENSIONS AND MOUNTING DATA



	Versions	
	2	4
P(A,B)	2xG1	2x1 5/16-12UN
T	G1/4	9/16-18UNF

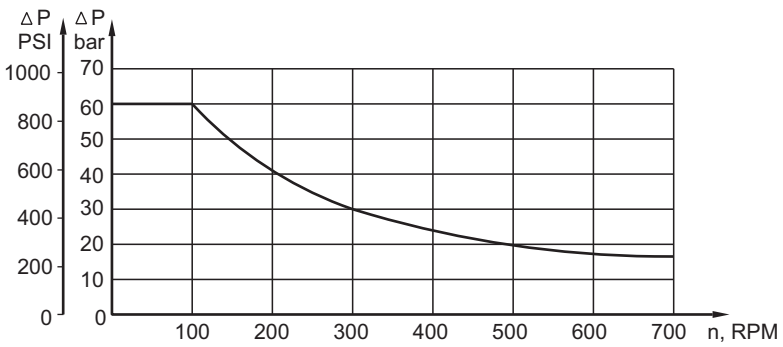
Type	L, mm [in]	L1, mm [in]	L2, mm [in]
VMF 315	286,5 [11.28]	25,5 [1.00]	109,5 [4.31]
VMF 400	293,5 [11.56]	32,5 [1.28]	116,5 [4.59]
VMF 500	301,5 [11.87]	40,5 [1.59]	124,5 [4.90]
VMF 630	312,0 [12.28]	51,0 [2.01]	135,0 [5.31]
VMF 800	326,0 [12.83]	65,0 [2.56]	149,0 [5.87]

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**

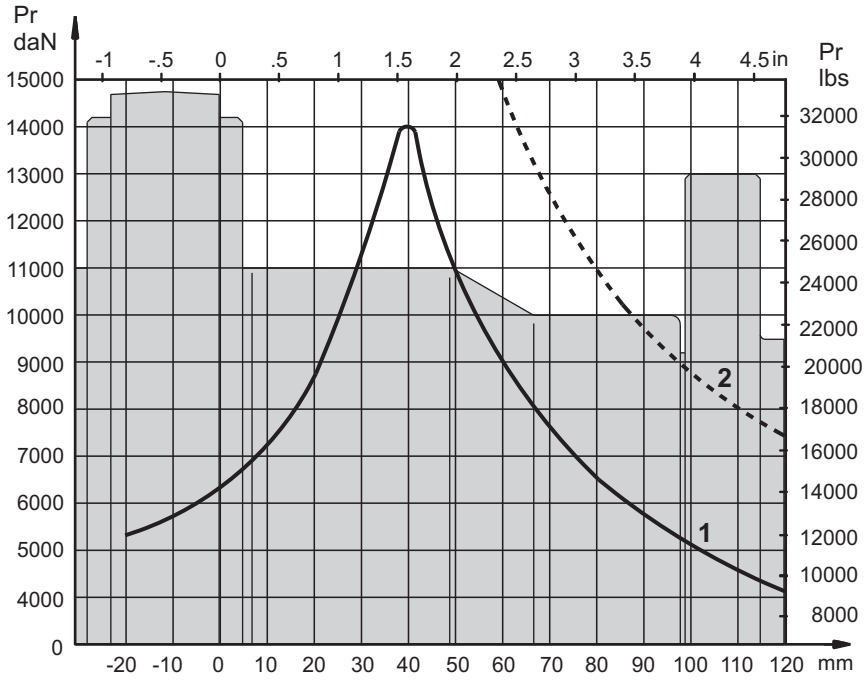
Warning: Drain line should always be used.

MAX. PERMISSIBLE SHAFT SEAL PRESSURE



mm [in]

PERMISSIBLE SHAFT LOADS



1 - Bearing curve: The curve applies to a B10 bearing life of 2000 hours at 100 RPM.

2 - Shaft curve: The curve represents Max. permissible radial shaft load with safety factor 2:1.

ORDER CODE

	1	2	3	4
VMF				

Pos.1 - **Displacement code**

315	- 314,5 cm^3/rev [19.18 in^3/rev]
400	- 400,9 cm^3/rev [24.45 in^3/rev]
500	- 499,6 cm^3/rev [30.48 in^3/rev]
630	- 629,1 cm^3/rev [38.38 in^3/rev]
800	- 801,8 cm^3/rev [48.91 in^3/rev]

Pos.2 - **Ports**

2	- side ports, 2xG1, G¼, BSP thread, ISO 228
4	- side ports, 2x1⅝-12 UN, O-ring, ⅝-18 UNF

Pos.3 - **Special Features** (see page 48)

Pos.4 - **Design Series**

omit - Factory specified

The hydraulic motors are mangano-phosphatized as standard.

MOTOR SPECIAL FEATURES

Special Feature Description	Order Code	Motor type						
		MSWM	MTK	MTM	TMF	MVM	MVMC	VMF
Speed Sensor*	RS	O	O	O	O	O	-	O
Reinforced motor	HD	-	-	O	O	O	-	O
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	-
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
Check Valves		S	O	O	-	O	O	-

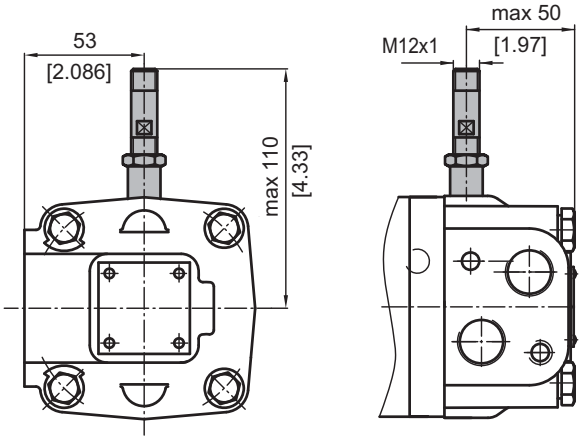
O Optional
- Not applicable
S Standard

* For sensor ordering see pages 49-50.
** Color at customer's request.

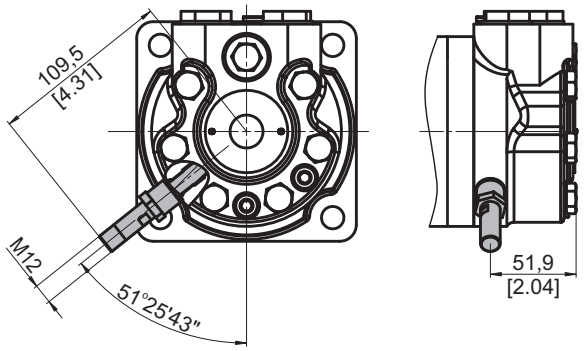
⚠ For more information about **HD** option please contact with "M+S Hydraulic".

MOTORS WITH SPEED SENSOR

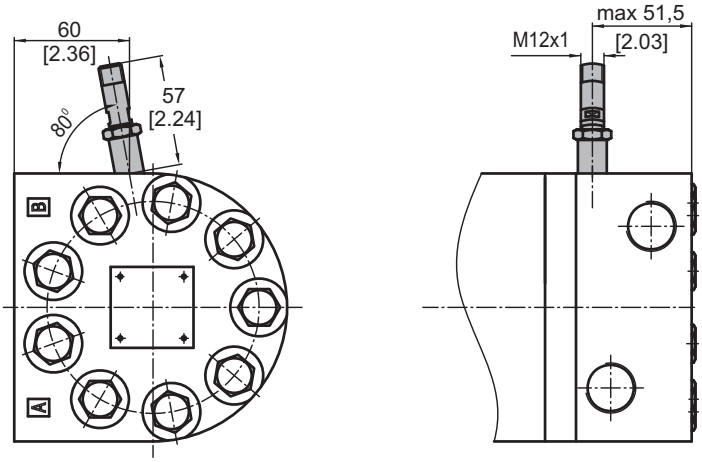
MSWM...RS



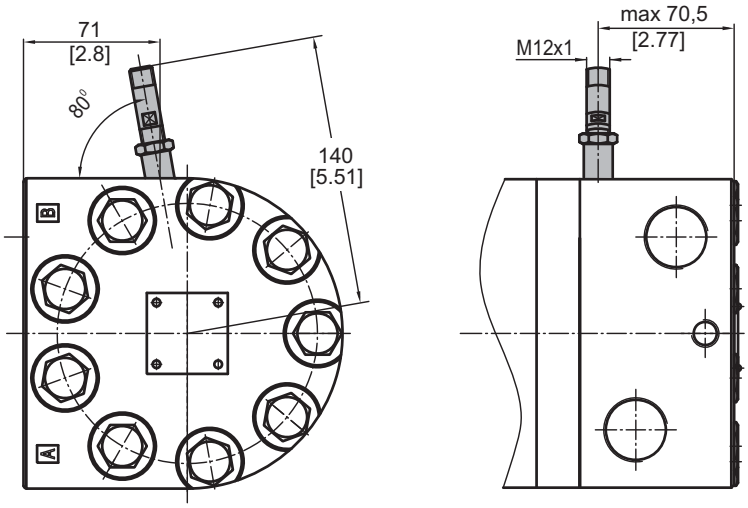
MTK...RS



MTM...RS
TMF...RS



MVM...RS
VMF...RS

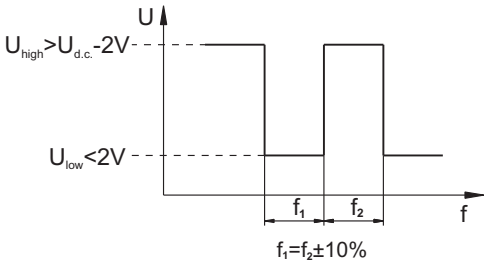


TECHNICAL DATA OF THE SPEED SENSOR

Technical data

Frequency range	0...15 000 Hz
Output	PNP, NPN
Power supply	10...36 VDC
Current input	20 mA (@24 VDC)
Ambient Temperature	-40...+125^{0}C [-40...+257^{0}F]
Protection	IP 67
Plug connector	M12-Series
Mounting principle	ISO 6149

Output signal

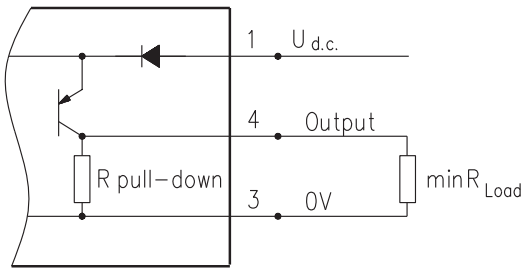


Load max.:I_{high}=I_{low}<50mA

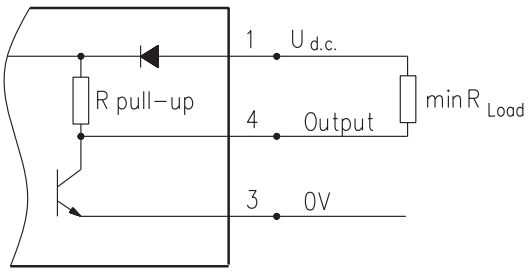
Motor type	MSWM MTK	MTM TMF	MVM VMF
Pulses per revolution	54	84	102

Wiring diagrams

PNP

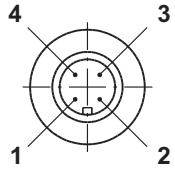


NPN



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	Output type	Electric connection
RSN	NPN	Connector BINDER 713 series
RSP	PNP	Connector BINDER 713 series
RSNL5	NPN	Cable output 3x0,25; 5 m [196 in] long
RSPL5	PNP	Cable output 3x0,25; 5 m [196 in] 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

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

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%	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, 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:

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

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

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

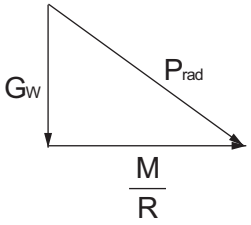
$$M_w=\frac{G_w \times f \times R_m[R_{in}]}{i \times \eta_M}$$

To avoid wheel slipping, the following condition should be observed $M_w > M$
f - frictional factor;
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.



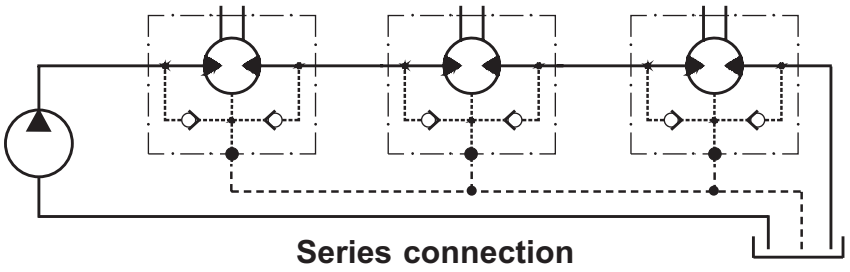
G_W - Weight held by wheel;
P_{rad} - Total radial loading of motor shaft;
M/R- Motion force.

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

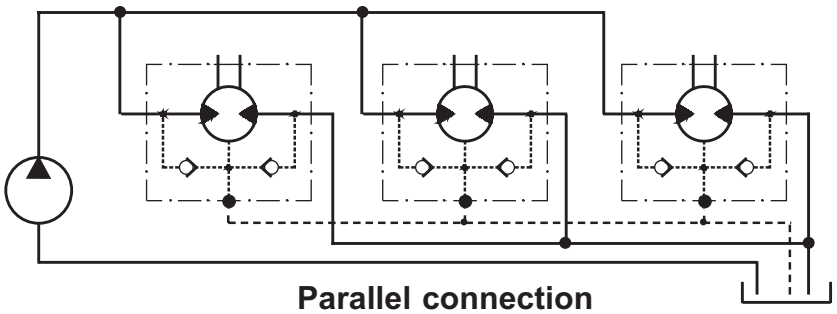
In accordance with calculated loadings the suitable motor from the catalogue is selected.

DRAINAGE SPACE AND DRAINAGE PRESSURE

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



Series connection



Parallel connection