

SPOOL 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.

DISTRIBUTOR VALVE

MM, MP, MR, SP, SR, MH, PL, RL, PK, RK, RW, HW series motors have spool valve: the distributor valve has been integrated with the output shaft. The cardan shaft rotates distributor valve and transfers mechanical energy from gerotor set to output shaft. The valve has hydrodynamic bearings and has infinite life when load ratings are not exceeded.

GEARWHEEL SET

There are two forms of gearwheel set:

- Gerotor set has plain teeth. These type of motors are suitable for long operating periods at moderate pressures or short operating periods at high pressures. MM, MP, SP, PL and PK series motors have gerotor set.

- Roll-gerotor set has teeth fitted with rollers. 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. Roll-gerotor sets are recommended for operation with thin oil and for applications with continually reversing loads. MR, SR, RL, RK, MH, RW and HW series motors have roll-gerotor set.

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 W mounting flange makes the motors possible to fit a wheel hub or a winch drum so that the radial load acts closer to motor bearings. This gives the best utilization of the bearing capacity and is a very compact solution.

Needle Bearing MPN and MRN have an output shaft supported in needle bearing. These types motors are suitable for operating conditions such as frequent start and stops, vibration on the shaft, high static and dynamic radial loads in short operating terms.

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 min^{-1}) at normal pressure drop and reduced flow. Optimal run is guaranteed at frequency of rotation from 20 to 50 min^{-1} . Motors with this valving have an increased starting pressure and are not recommended for using at pressure drop less than 40 bar.

Free Running FR motors are with increased clearance at all friction parts, allowing the shaft to rotate more freely with less mechanical drag. The increased clearance also improves lubrication of the wear surfaces of gear set and friction parts. Additional advantages of "FR" version are prolonging of the life of the hydraulic motors at high speeds, as well as the possibility to use them in systems with wide variation of the loading. FR Series motors are designed to operate with high speed /over than 300 min^{-1} and low pressure drop. Volumetric efficiency may be reduced slightly.

High Pressure Shaft Seal The high pressure shaft seals allow the motors to withstand high case pressures at high speeds without external drain line.

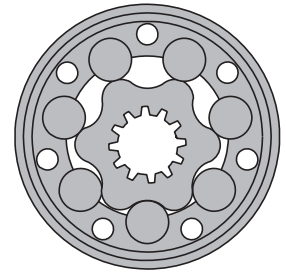
Motors with Speed Sensor Motors are available with integrated inductive speed sensor. The output signal is a standardized voltage signal that can be used to control the speed of a motor. The torque and the radial load of the motor are not affected by the installation of speed sensor.

HYDRAULIC MOTORS MH



APPLICATION

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



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OPTIONS

- » Model - Spool valve, roll-gerotor
- » Flange mount
- » Shafts - straight, splined and tapered
- » Metric and BSPP ports
- » Other special features

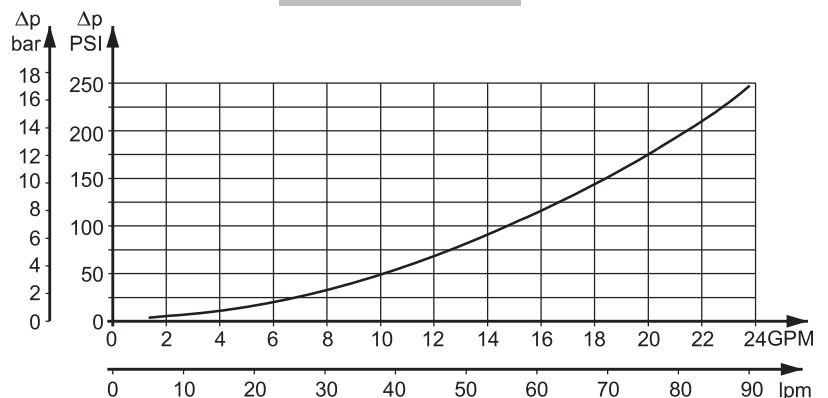
GENERAL

Max. Displacement, cm ³ /rev [in ³ /rev]	502,4 [30.7]
Max. Speed, [RPM]	445
Max. Torque, daNm [lb-in]	cont.: 84 [7434] int.: 104 [9204]
Max. Output, kW [HP]	18,5 [24.8]
Max. Pressure Drop, bar [PSI]	cont.: 175 [2540] int.: 200 [2900]
Max. Oil Flow, lpm [GPM]	90 [23.78]
Min. Speed, [RPM]	5
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, °C [°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]
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		MH 200	MH 250	MH 315	MH 400	MH 500
Displacement, cm³/rev [in³/rev]		201,3 [12.3]	252 [15.4]	314,9 [19.2]	396,8 [24.2]	502,4 [30.7]
Max. Speed, [RPM]	Cont.	370	295	235	185	150
	Int.*	445	350	285	225	180
Max. Torque daNm [lb-in]	Cont.	51 [4510]	61 [5398]	74 [6548]	84 [7434]	82 [7257]
	Int.*	58 [5130]	70 [6195]	82 [7257]	98 [8673]	104 [9204]
	Peak**	64 [5064]	79 [6992]	98 [8673]	109 [9647]	117 [10350]
Max. Output kW [HP]	Cont.	16 [21]	16 [21]	14 [18.7]	12,5 [16.7]	11 [14.7]
	Int.*	18,5 [24.8]	18,5 [24.8]	15,5 [20.7]	15 [20.1]	14 [18.7]
Max. Pressure Drop bar [PSI]	Cont.	175 [2540]	175 [2540]	175 [2540]	155 [2240]	125 [1810]
	Int.*	200 [2900]	200 [2900]	200 [2900]	190 [2750]	160 [2320]
	Peak**	225 [3260]	225 [3260]	225 [3260]	210 [3045]	180 [2610]
Max. Oil Flow lpm [GPM]	Cont.	75 [19.81]	75 [19.81]	75 [19.81]	75 [19.81]	75 [19.81]
	Int.*	90 [23.78]	90 [23.78]	90 [23.78]	90 [23.78]	90 [23.78]
Max. Inlet Pressure bar [PSI]	Cont.	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]
	Int.*	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]
	Peak**	250 [3626]	250 [3626]	250 [3626]	250 [3626]	250 [3626]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		5 [72]	5 [72]	5 [72]	5 [72]	5 [72]
Min. Starting Torque, daNm [lb-in]	At max.press.dropCont	39 [3450]	52 [4600]	66 [5840]	72 [6370]	72 [6370]
	At max.press.drop Int.*	45 [3980]	59 [5221]	73 [6460]	88 [7788]	88 [7788]
Min. Speed***, [RPM]		10	10	8	5	5
Weight, kg [lb]		10,5 [23.2]	11 [24.3]	11,5 [25.4]	12,3 [27.1]	13 [28.7]

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

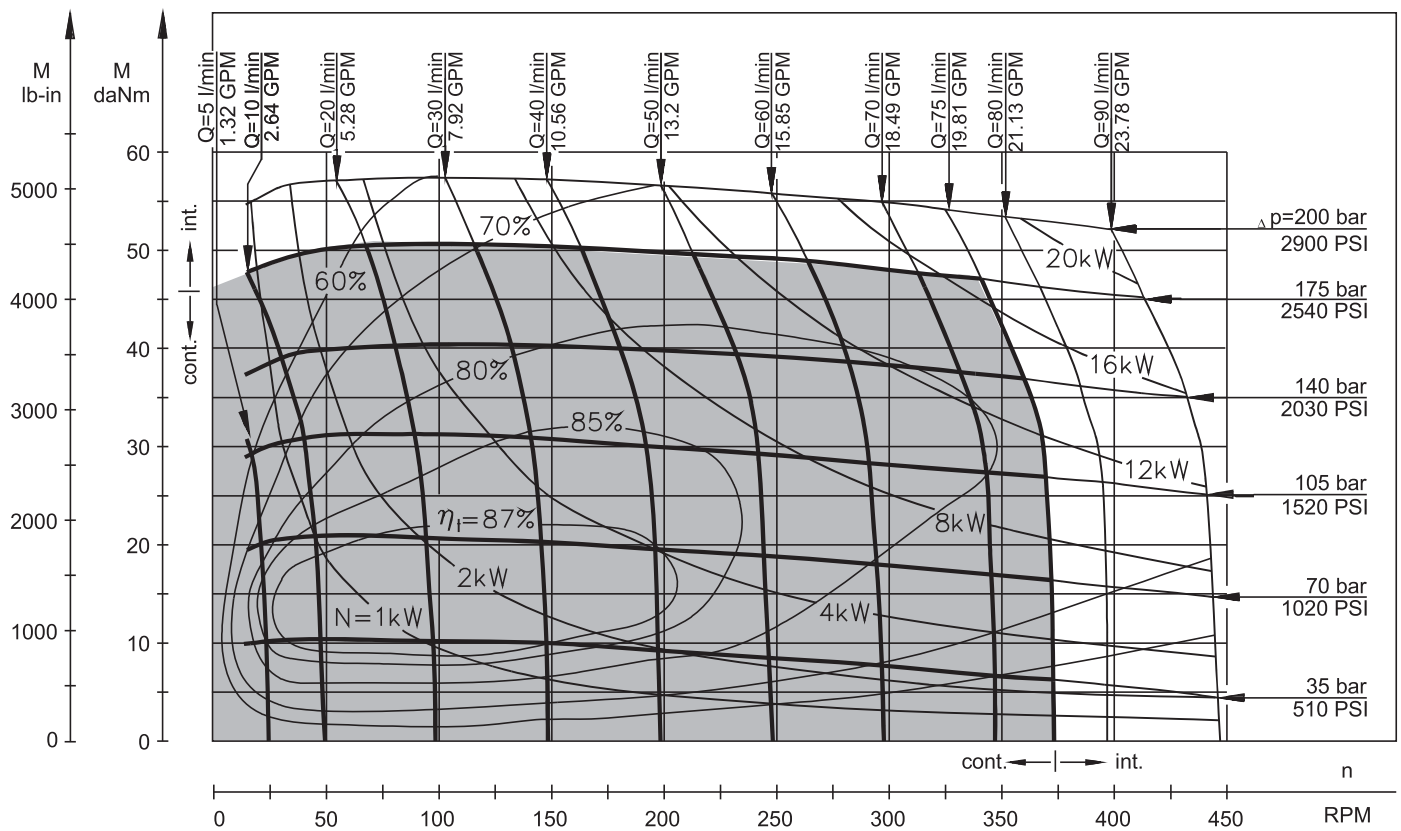
** Peak load: the permissible values may occur for max. 1% of every minute.

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

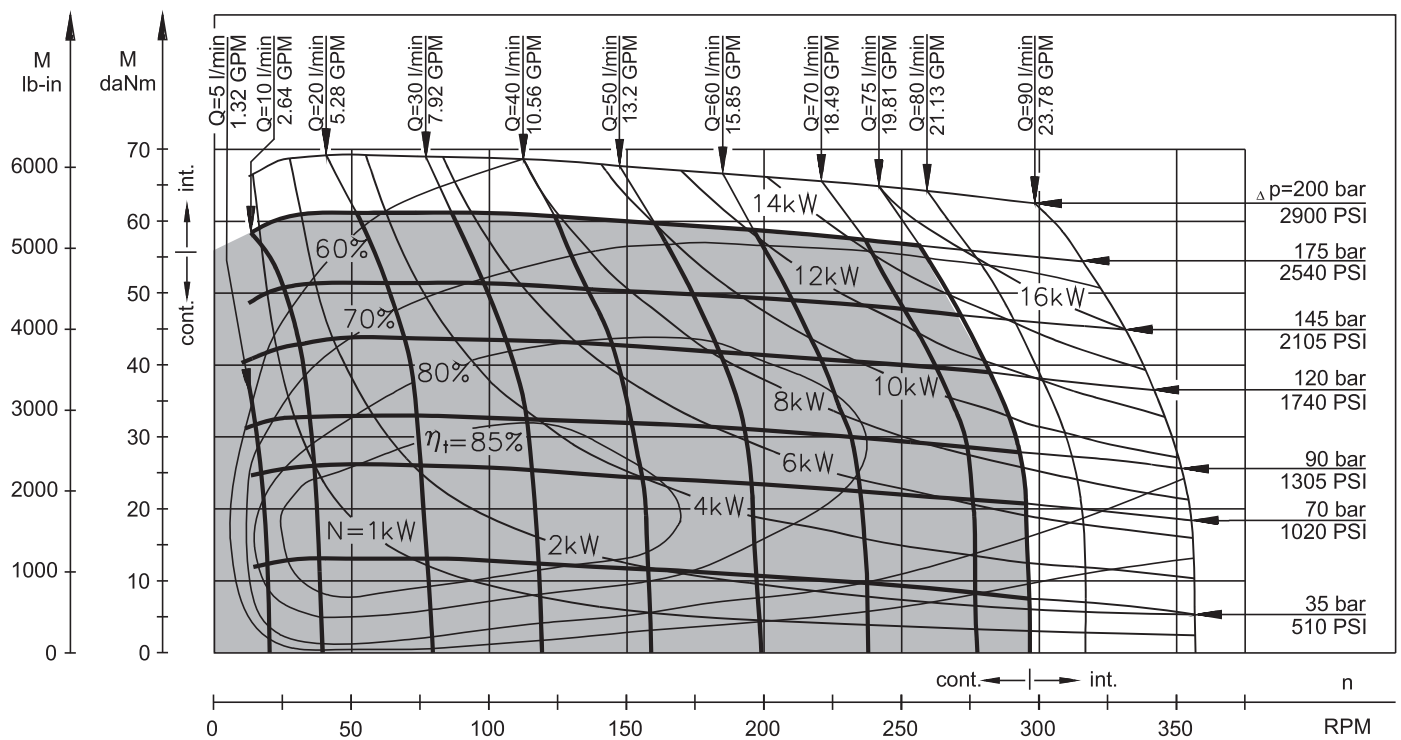
- Intermittent speed and intermittent pressure must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
- Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using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

FUNCTION DIAGRAMS

MH 200



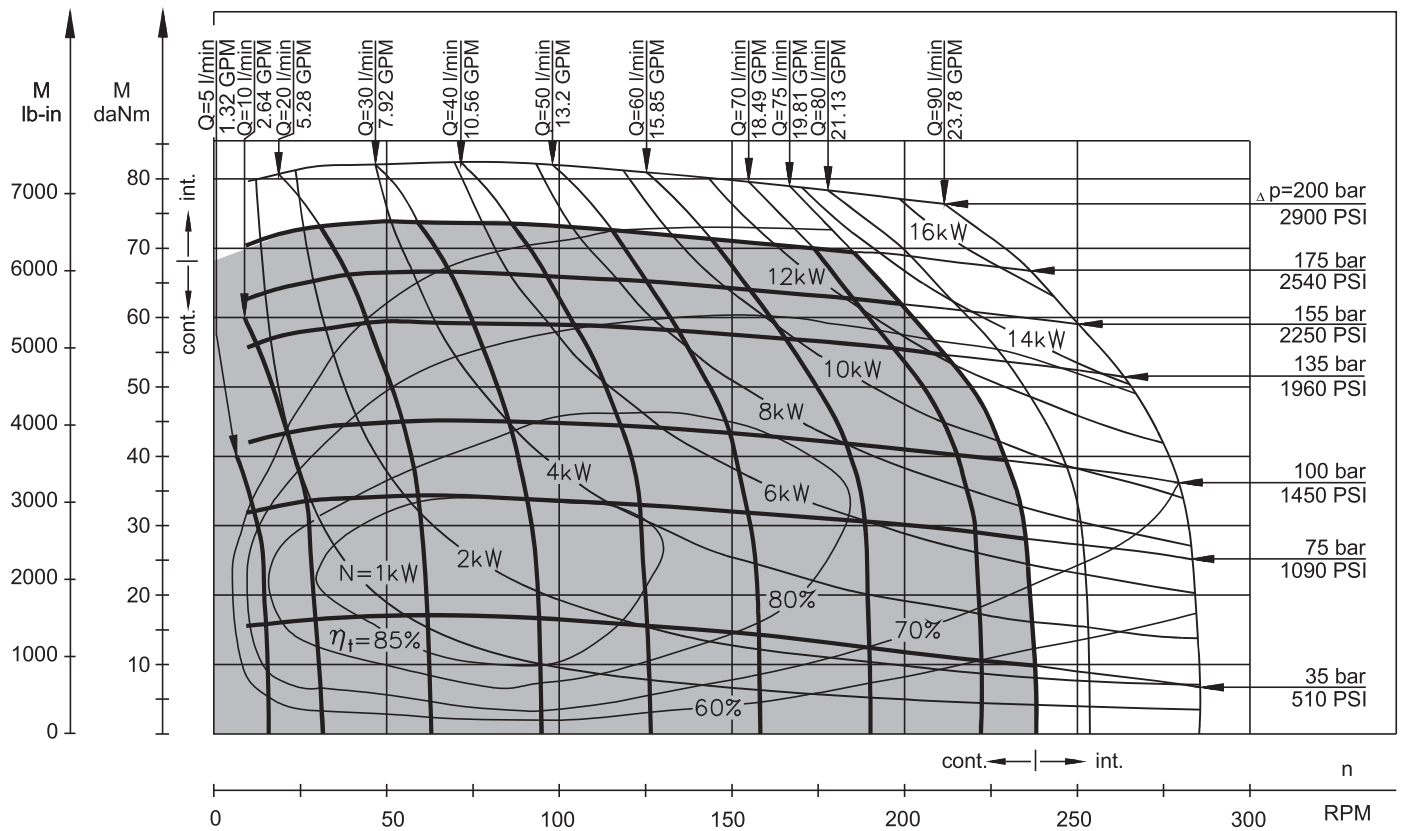
MH 250



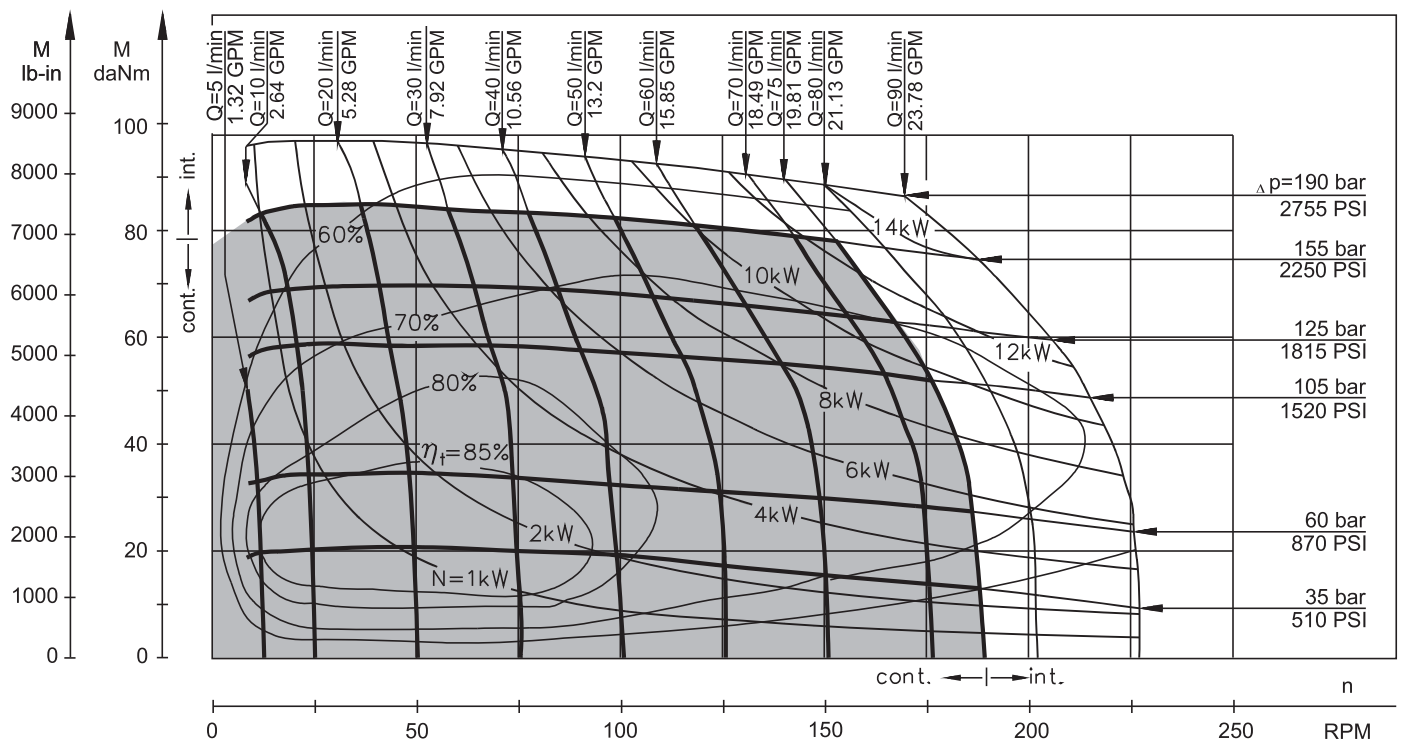
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

FUNCTION DIAGRAMS

MH 315



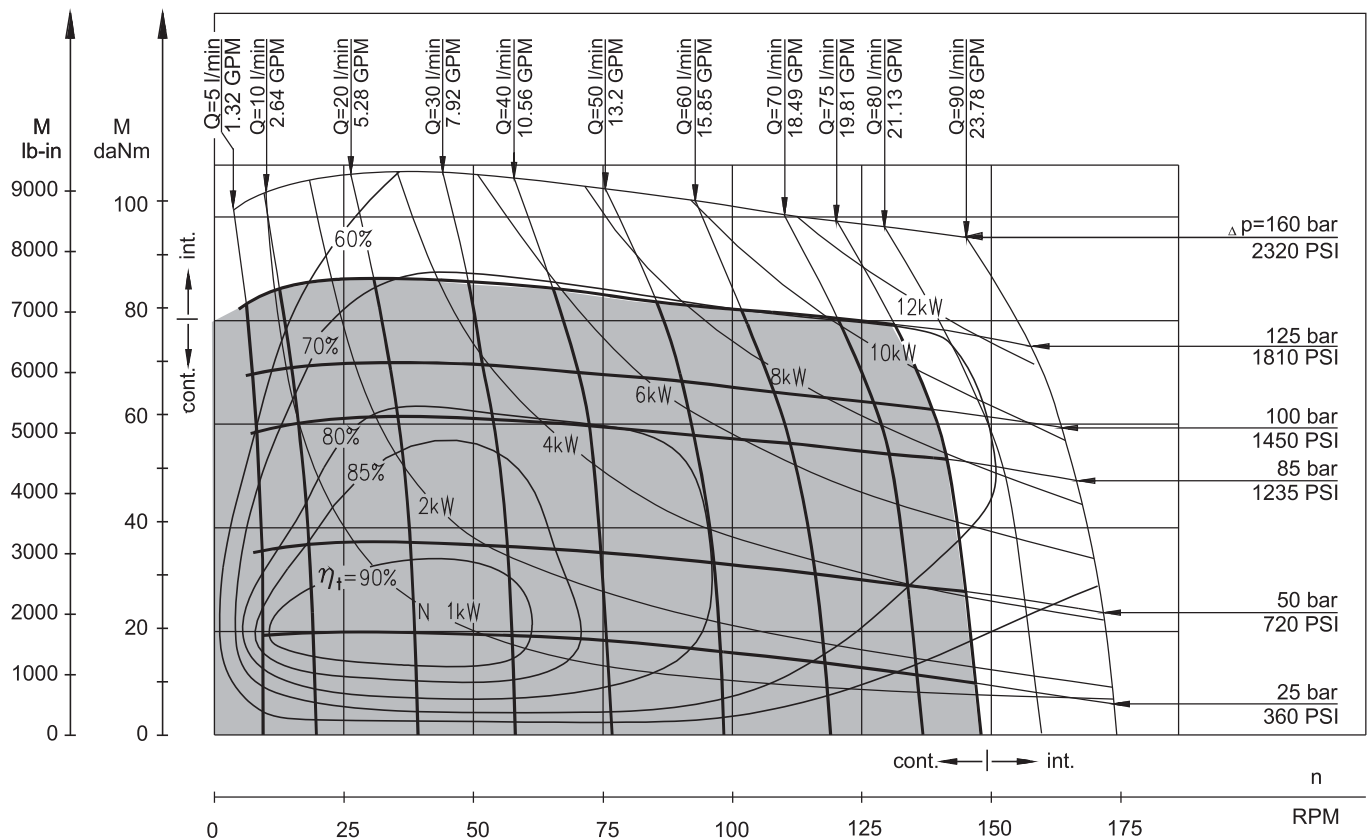
MH 400



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

FUNCTION DIAGRAMS

MH 500



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

PERMISSIBLE SHAFT LOADS FOR MH MOTORS

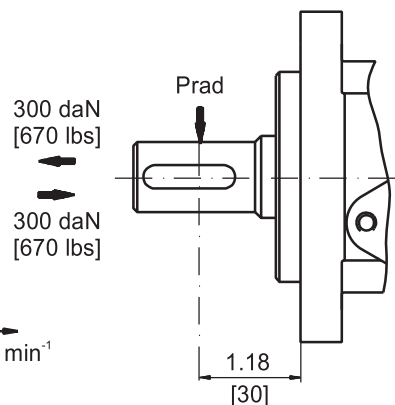
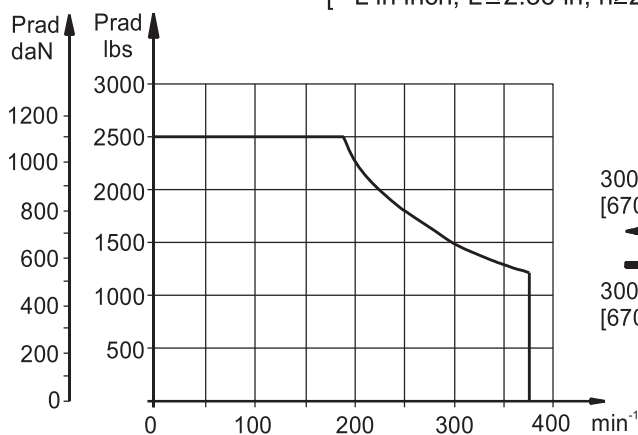
The permissible radial shaft load P_{rad} depends on the speed (RPM) and distance (L) from the point of load to the mounting flange.

$$\text{Radial Shaft Load } P_{\text{rad}} = \frac{1100}{n} \times \frac{25000}{103,5+L}, \text{ daN*}$$

[*L in mm; L ≤ 60 mm; n ≥ 200 RPM]

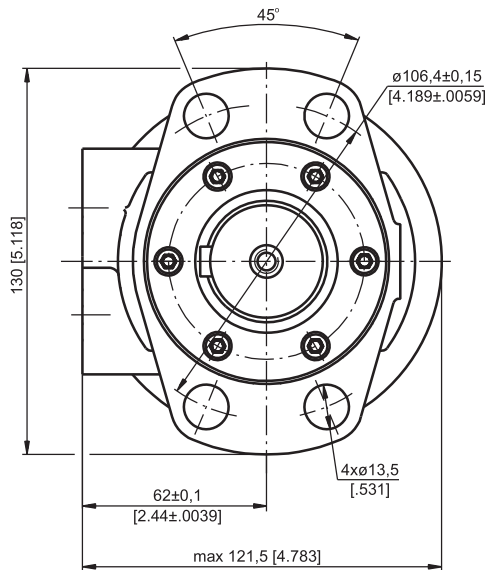
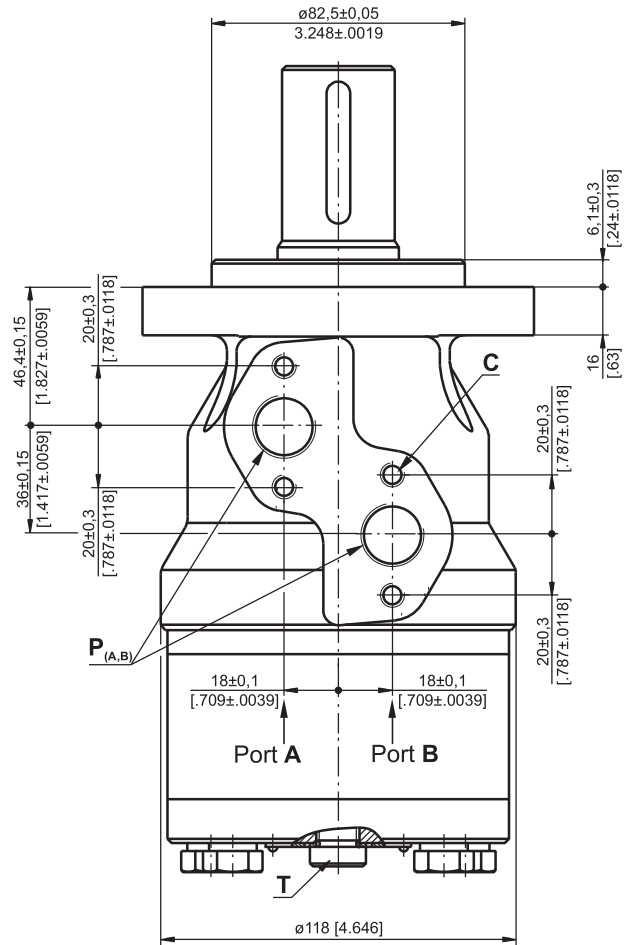
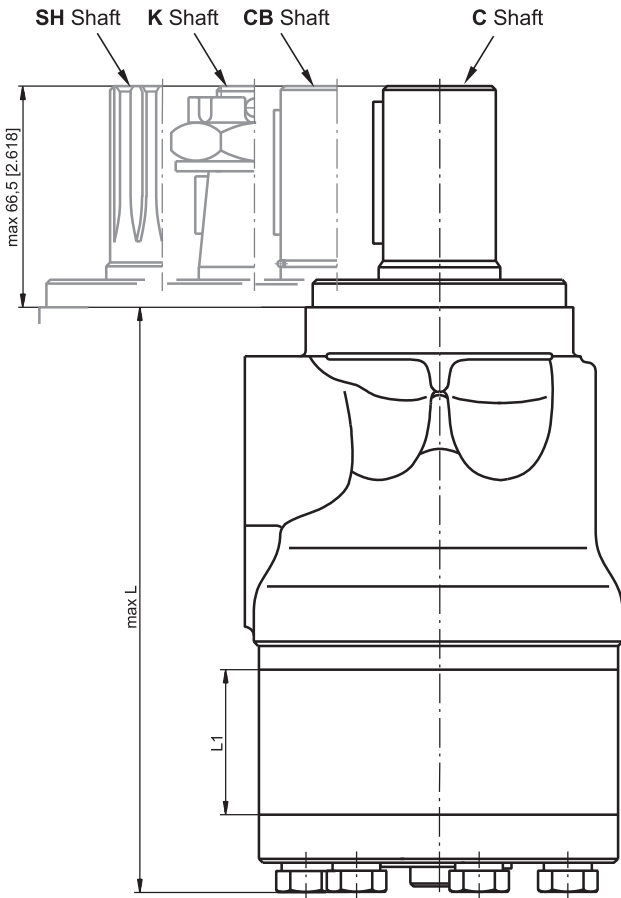
$$\text{Radial Shaft Load } P_{\text{rad}} = \frac{1100}{\text{RPM}} \times \frac{2215}{4.075+L}, \text{ lbs**}$$

[**L in inch; L ≤ 2.36 in; n ≥ 200 RPM]



DIMENSIONS AND MOUNTING DATA

Magneto Mount (4 holes)



Type	L, mm [in]	L ₁ , mm [in]
MH 200	169 [6.65]	27,8 [1.09]
MH 250	176 [6.93]	34,8 [1.37]
MH 315	184 [7.24]	43,5 [1.71]
MH 400	196 [7.72]	54,8 [2.16]
MH 500	211 [8.31]	69,4 [2.73]

- C** : 4xM8-13 mm [.51 in] depth
P_(A,B) : 2xG1/2 or 2xM22x1,5-15 mm [.59 in] depth
T : G1/4 or M14x1,5-12 mm [.47 in] depth (plugged)

Standard Rotation

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

Reverse Rotation

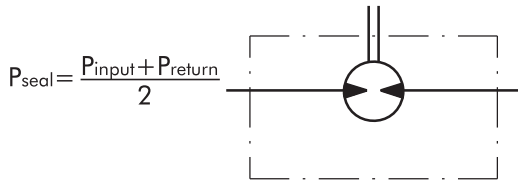
Viewed from Shaft End
 Port A Pressurized - **CCW**
 Port B Pressurized - **CW**



MAX. PERMISSIBLE SHAFT SEAL PRESSURE FOR MH MOTORS

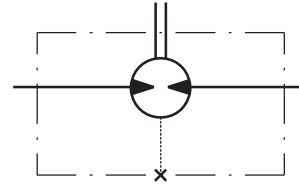
MH...U1 motors with high pressure seal and without drain connection:

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



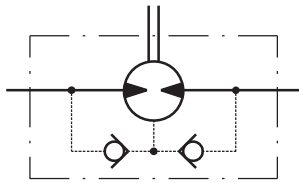
MH...U motors with high pressure seal and drain connection:

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



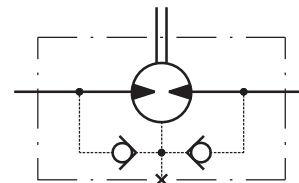
MH...1 motors with standard shaft seal and without drain connection:

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

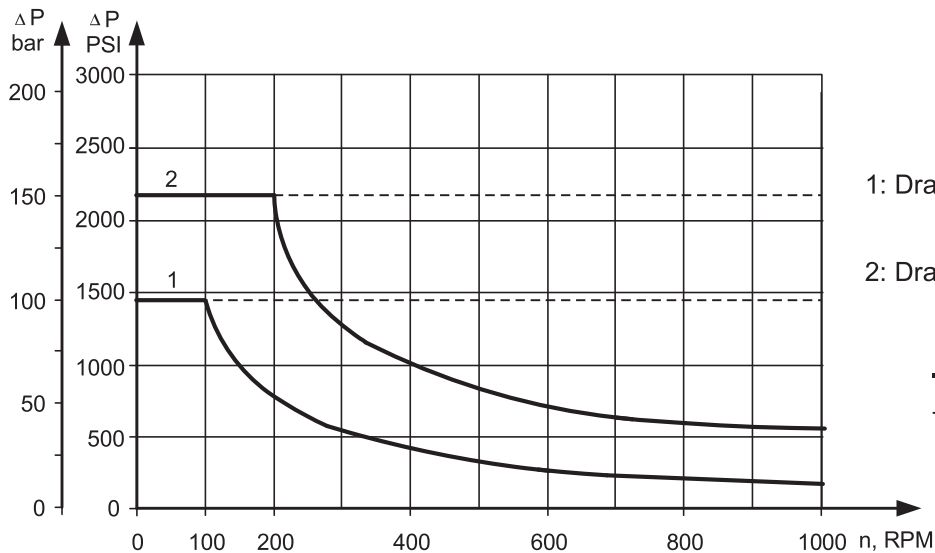


MH... motors with standard shaft seal and with drain connection:

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



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



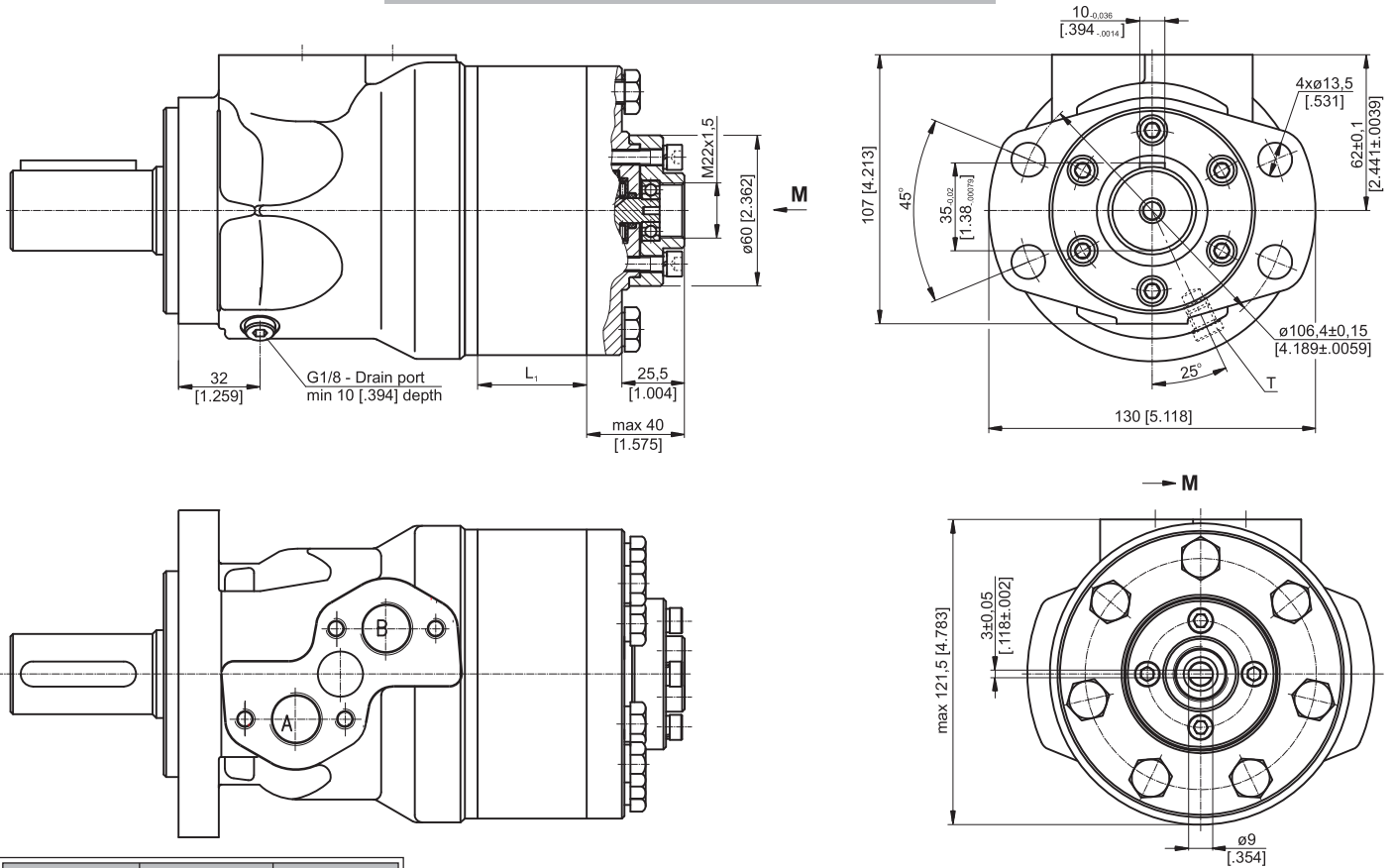
1: Drawing for Standard Shaft Seal

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

— - continuous operations

- - - - intermittent operations

MOTORS WITH TACHO CONNECTION

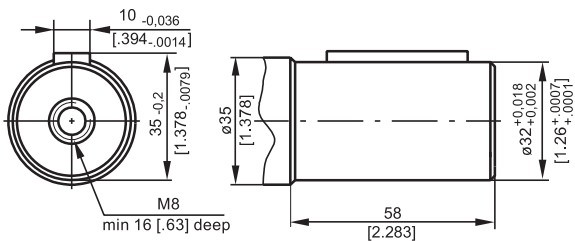


Type	L, mm [in]	L_1 , mm [in]
MH 200	191 [7.52]	27,8 [1.09]
MH 250	198 [7.79]	34,8 [1.37]
MH 315	207 [8.15]	43,5 [1.71]
MH 400	218 [8.58]	54,8 [2.16]
MH 500	233 [9.17]	69,4 [2.73]

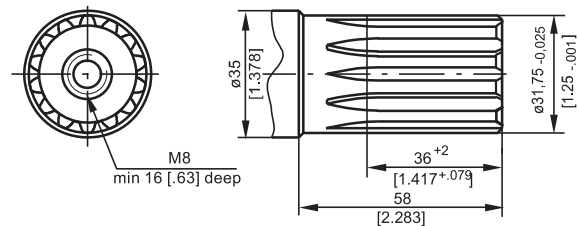


SHAFT EXTENSIONS

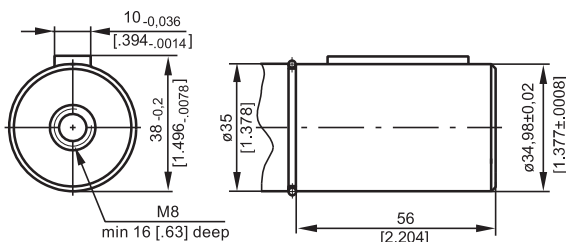
C - $\phi 32$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm [6815 lb-in]



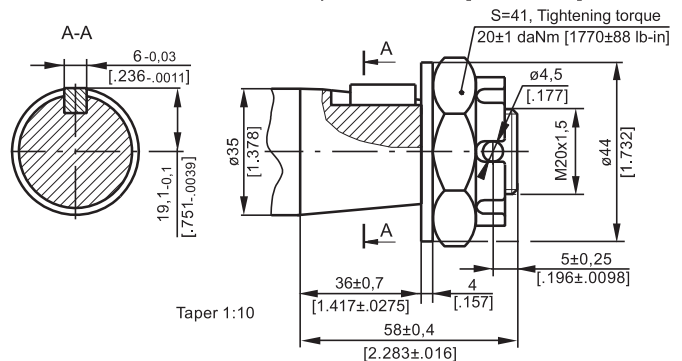
SH - $\phi 1\frac{1}{4}$ " splined 14T, DP 12/24 ANSI B92.1-1976
Max. Torque 95 daNm [8400 lb-in]



CB - $\phi 35$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 95 daNm [8400 lb-in]



K - tapered 1:10, Parallel key B6x6x20 DIN 6885
Max. Torque 95 daNm [8400 lb-in]



ORDER CODE

	1	2	3	4	5	6	7
M H							

Pos.1 - Displacement code

200	- 201,3 cm ³ /rev [12.3 in ³ /rev]
250	- 252,0 cm ³ /rev [15.4 in ³ /rev]
315	- 314,9 cm ³ /rev [16.4 in ³ /rev]
400	- 396,8 cm ³ /rev [24.2 in ³ /rev]
500	- 502,4 cm ³ /rev [30.7 in ³ /rev]

Pos.2 - Shaft Extensions*

C	- ø32 straight, Parallel key A10x8x45 DIN 6885
SH	- ø1¼" splined 14T ANSI B92.1-1970
CB**	- ø35 straight, Parallel key A10x8x45 DIN 6885
K	- ø35 tapered 1:10, Parallel key B6x6x20 DIN 6885

Pos.3 - Shaft Seal Version

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

Pos.4 - Drain Port

omit	- with drain port
1	- without drain port

Pos.5 - Ports

omit	- BSPP (ISO 228)
M	- Metric (ISO 262)

Pos.6 - Special Features [\(see page 120\)](#)

Pos.7 - Design Series

omit	- Factory specified
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NOTES: * The permissible output torque for shafts must not be exceeded!
 ** The following combination is not allowed: "CB" shaft with U shaft seal.

The hydraulic motors are mangano-phosphatized as standard.

MOTOR SPECIAL FEATURES

Special Feature Description	Order Code	Motor type														
		MM	MP	MPW	MP(W)N	MR	MRN	MRB	SP, SR	PL	RL	PK(Q)	RK	RW	MH	HW
Speed Sensor*	RS	O	O	-	-	O	-	-	-	-	-	-	-	-	O	-
Tacho connection	T	-	-	-	-	O	O	-	-	-	-	-	-	-	O	-
Low Leakage	LL	O	-	-	-	O	O	-	-	-	O	-	O	O	O	O
Low Speed Valving	LSV	-	-	-	-	O	-	-	-	-	-	-	-	-	O	O
Free Running	FR	O	O	O	O	O	O	-	-	O	O	O	O	O	O	-
Reverse Rotation	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Paint**	P	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Corrosion Protected Paint**	PC	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Special Paint***	PS	O	O	O	O	O	O	O	-	O	O	O	O	O	O	O
	PCS	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Check Valves		S	S****	S****	S	S****	S	S	S	S	S	S	S	S****	S****	S

O	Optional
-	Not applicable
S	Standard

* For sensor ordering see pages 121÷122.

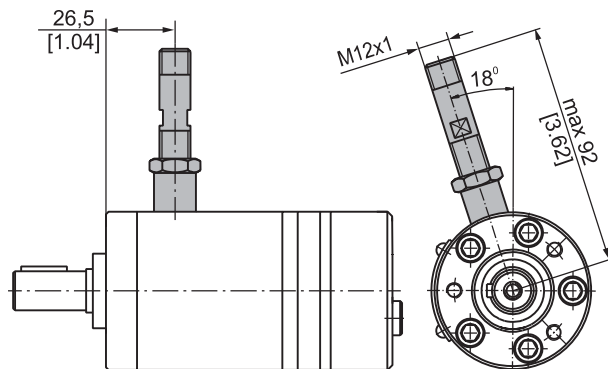
** Colour at customer's request.

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

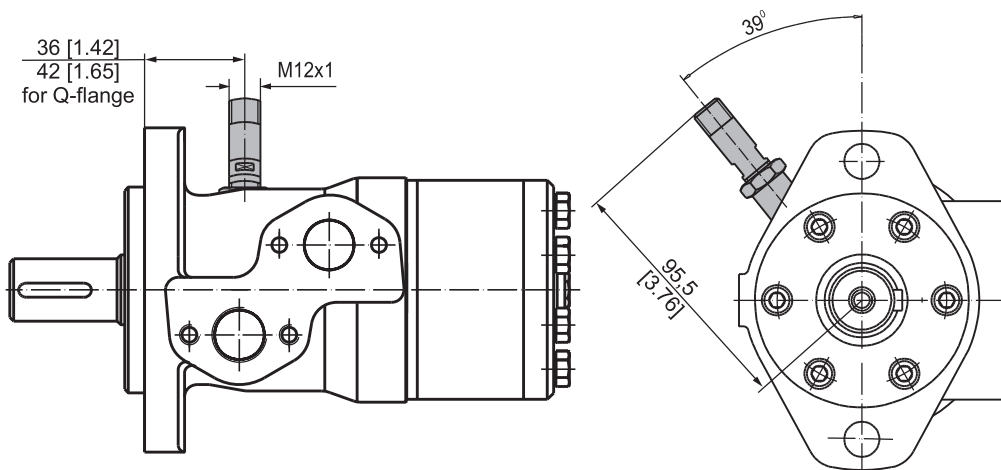
**** Without check valves for "U" shaft seal versions.

MOTORS WITH SPEED SENSOR

MM...RS



MP...RS and MR...RS



MH...RS

