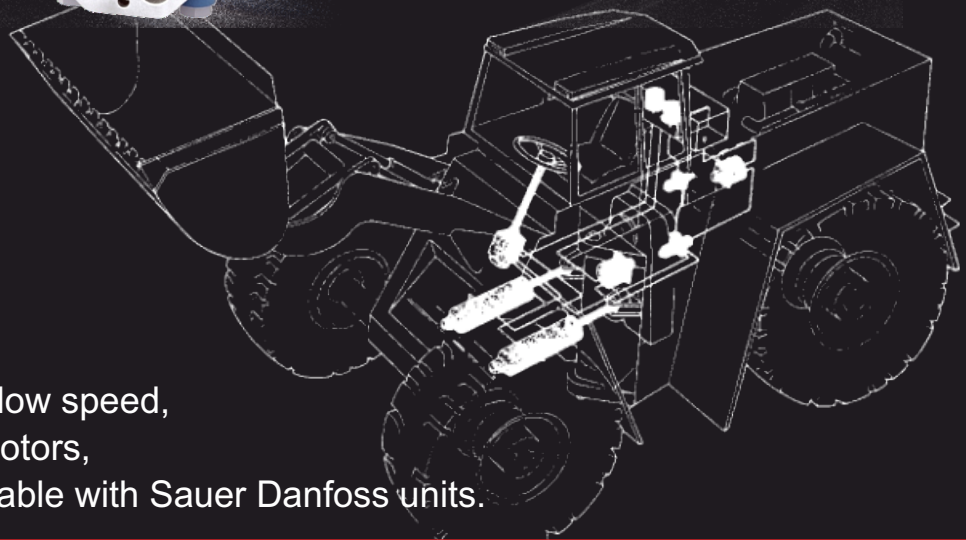


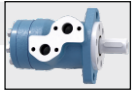
HENDERS[®] N Hydraulics

Hydraulic Orbital Motors



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high torque hydraulic motors,
completely interchangeable with Sauer Danfoss units.

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HYDRAULIC MOTORS MGP



APPLICATIONS

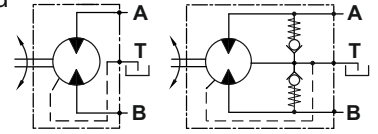
- Sweepers & Scrubbers
- Forklift
- Lawn & Turf
- Harvesters
- Industrial Applications

OPTIONS

- Flange and wheel mount
- Twin side and rear ports
- Shafts - straight, splined and tapered
- Shaft seal for high and low pressure
- Metric and BSPP ports
- Speed sensors

ADVANTAGES

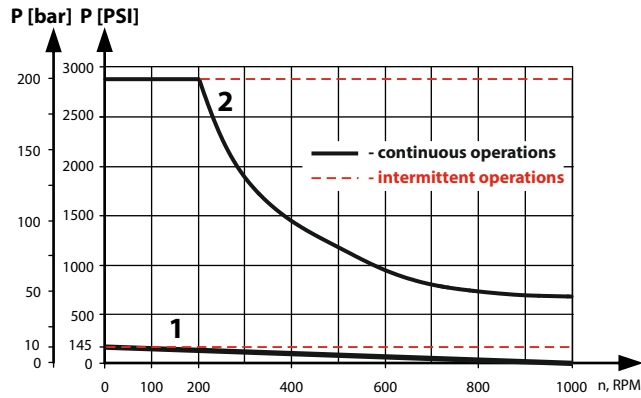
- Compact size
- High power density



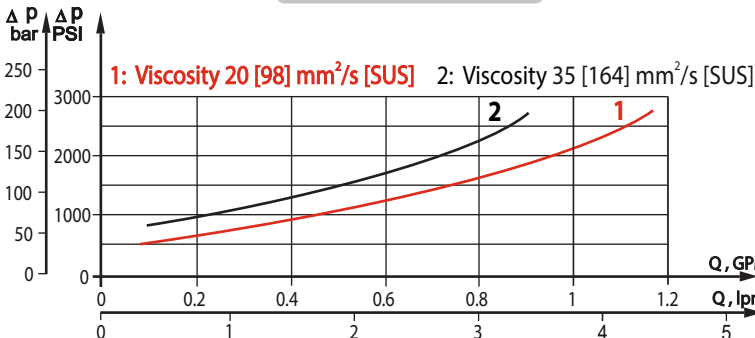
GENERAL

| | | |
|---------------------------------|---|---|
| Displacement, | cm³/rev [in³/rev] | 28,4 [1.73] ÷ 623,6 [38.05] |
| Max. Speed, | RPM | 1815 |
| Max. Torque, | Nm [lb-in] | cont.:50 [4415] int.: 64 [5565] |
| Max. Output, | kW [HP] | 12,8 [17.1] |
| Max. Pressure Drop, | bar [PSI] | cont.:140 [2030] int.:175 [2540] |
| Max. Oil Flow, | l/min [GPM] | 75 [19.8] |
| Min. Speed, | RPM | 10 |
| HydrauFluid | Mineral based- HLP(DIN 51524) or HM(ISO 6743/4) | |
| Temperature Range, | °C [°F] | -40÷140 [-40÷284] |
| Optimal Viscosity Range, | mm²/s [SUS] | 20÷75 [98÷347] |
| Filtration | ISO code 20/16 (Min. recommended fluid filtration of 25 microns) | |

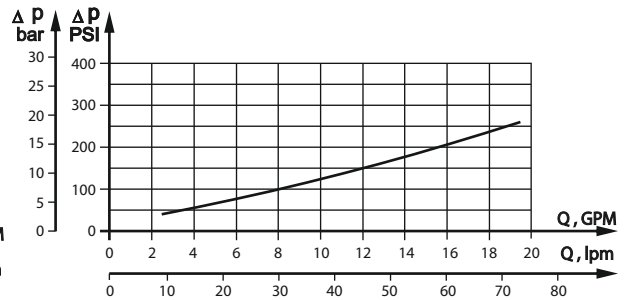
Max. return pressure without drain line or max. pressure in the drain line

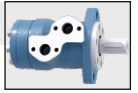


Oil flow in drain line



Pressure Losses





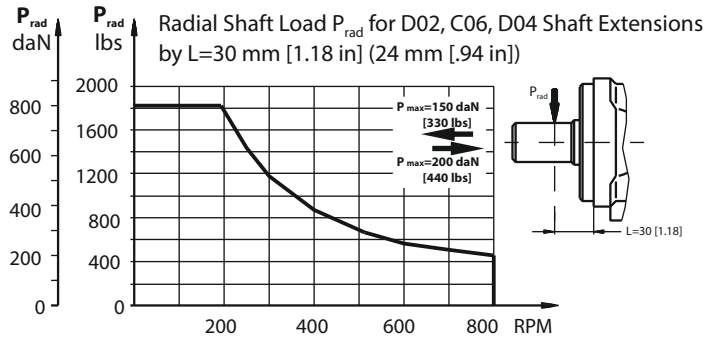
PERMISSIBLE SHAFT LOADS

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

$$P_{rad, \text{in mm}} = \frac{800}{n} \times \frac{25000}{95+L}, \text{ daN}^*$$

$$P_{rad, \text{in inch}} = \frac{800}{\text{RPM}} \times \frac{2215}{3.74+L}, \text{ lbs}^*$$

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



SPECIFICATION DATA

| Type | MGP 25 | MGP 32 | MGP 40 | MGP 50 | MGP 80 | MGP 100 | MGP 125 | |
|--|--------------------------|------------|-------------|-------------|-------------|-------------|--------------|-------------|
| Displacement, cm³/rev [in³/rev] | 28,4 [1.73] | 34,5 [2,1] | 40,5 [2.47] | 49,5 [3.02] | 79,2 [4.83] | 99 [6.04] | 123,8 [7.55] | |
| Max. Speed, [RPM] | Cont. | 1408 | 1450 | 1480 | 1210 | 755 | 605 | |
| | Int.* | 1584 | 1594 | 1555 | 1515 | 945 | 605 | |
| Max. Torque daNm [lb-in] | Cont. | 3,3 [290] | 4,3 [380] | 6,2 [550] | 9,4 [835] | 15,1 [1340] | 19,3 [1710] | 23,7 [2100] |
| | Int.* | 4,7 [415] | 6,1 [540] | 8,2 [730] | 11,9 [1050] | 19,5 [1725] | 23,7 [2100] | 29,8 [2640] |
| | Peak** | 6,7 [595] | 8,6 [760] | 10,7 [950] | 14,3 [1285] | 22,4 [1985] | 27,5 [2435] | 36,5 [3235] |
| Max. Output kW [HP] | Cont. | 4,5 [6.0] | 5,8 [7.8] | 8,4 [11.5] | 10,1 [13.5] | 10,2 [13.7] | 10,5 [14.1] | 10,2 [13.7] |
| | Int.* | 6,1 [8.2] | 7,8 [10.5] | 11,6 [15.5] | 12,2 [16.1] | 12,5 [16.8] | 12,8 [17.1] | 12 [16.1] |
| Max. Pressure Drop bar [PSI] | Cont. | 100 [1450] | 100 [1450] | 120 [1750] | 140 [2030] | 140 [2030] | 140 [2030] | 140 [2030] |
| | Int.* | 140 [2030] | 140 [2030] | 155 [2250] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] |
| Max. Oil Flow lpm [GPM] | Cont. | 40 [10.5] | 50 [13.2] | 60 [15.9] | 60 [15.9] | 60 [15.9] | 60 [15.9] | 60 [15.9] |
| | Int.* | 45 [11.9] | 55 [14.5] | 70 [18.5] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] |
| Max. Inlet Pressure bar [PSI] | Cont. | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] |
| | Int.* | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] |
| Max. Return Pressure with Drain Line bar [PSI] | Cont. | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] |
| | Int.* | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] | | 10 [145] | 10 [145] | 10 [145] | 10 [145] | 10 [145] | 9 [131] | |
| Min. Starting Torque daNm [lb-in] | At max.press. drop Cont. | 3,0 [265] | 4,0 [355] | 5,4 [480] | 7,8 [690] | 13,2 [1170] | 16,6 [1470] | 20,7 [1830] |
| | At max.press. drop Int.* | 4,2 [370] | 5,6 [500] | 6,8 [600] | 10 [885] | 16,8 [1490] | 21 [1860] | 26,6 [2360] |
| Min. Speed***, [RPM] | | 20 | 15 | 10 | 10 | 10 | 10 | |
| Weight, kg [lb] For rear ports +0,450 [.992] | | 5,6 [12.3] | 5,6 [12.3] | 5,7 [12.6] | 5,8 [12.8] | 5,9 [13.2] | 6,1 [13.5] | 6,2 [13.7] |

* 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 please ask

- 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.



SPECIFICATION DATA (continued)

| Type | | MGP 160 | MGP 200 | MGP 250 | MGP 315 | MGP 400 | MGP 500 | MGP 630 |
|--|---------------------------------|--------------|-------------|--------------|--------------|-------------|------------|---------------|
| Displacement, cm³/rev [in³/rev] | | 158,4 [9.66] | 198 [12.1] | 247,5 [15.1] | 316,8 [19.3] | 396 [24.16] | 495 [30.2] | 623,6 [38.05] |
| Max. Speed, [RPM] | Cont. | 378 | 303 | 242 | 190 | 150 | 120 | 95 |
| | Int.* | 472 | 378 | 303 | 236 | 189 | 150 | 120 |
| Max. Torque daNm [lb-in] | Cont. | 31,3 [2770] | 36,6 [3240] | 38 [3360] | 38 [3360] | 36 [3190] | 39 [3452] | 44 [3895] |
| | Int.* | 37,8 [3345] | 45,6 [4035] | 58,3 [5160] | 56 [4960] | 59 [5240] | 57 [5045] | 64 [5665] |
| | Peak** | 43,8 [3880] | 55 [4870] | 68,5 [6060] | 85 [7505] | 85,4 [7560] | 78 [6903] | 82 [7257] |
| Max. Output kW [HP] | Cont. | 10,1 [13.5] | 10 [13.5] | 7,5 [10] | 5,8 [7.9] | 4,6 [6.2] | 3,5 [4.7] | 3,3 [4.4] |
| | Int.* | 12,1 [16.2] | 12 [16.1] | 12 [16.1] | 9 [12.1] | 7,8 [10.5] | 7,2 [9.7] | 5,6 [7.5] |
| Max. Pressure Drop bar [PSI] | Cont. | 140 [2030] | 140 [2030] | 110 [1600] | 90 [1300] | 70 [1015] | 60 [870] | 55 [800] |
| | Int.* | 175 [2540] | 175 [2540] | 175 [2540] | 140 [2030] | 115 [1665] | 90 [1305] | 80 [1160] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 180 [2610] | 130 [1885] | 110 [1740] |
| Max. Oil Flow lpm [GPM] | Cont. | 60 [15.9] | 60 [15.9] | 60 [15.9] | 60 [15.9] | 60 [15.9] | 60 [15.9] | 60 [15.9] |
| | Int.* | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] |
| Max. Inlet Pressure bar [PSI] | Cont. | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 140 [2030] | 140 [2030] |
| | Int.* | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 175 [2540] | 175 [2540] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] |
| Max. Return Pressure with Drain Line bar [PSI] | Cont. | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 140 [2030] | 140 [2030] |
| | Int.* | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 175 [2540] | 175 [2540] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] | | 8 [116] | 7 [100] | 6 [87] | 5 [73] | 5 [73] | 5 [73] | 5 [73] |
| Min. Starting Torque daNm [lb-in] | At max.press. drop Cont. | 28,2 [2500] | 33,5 [2950] | 33,6 [2970] | 34,4 [3045] | 34,5 [3050] | 36 [3180] | 41,5 [3670] |
| | At max.press. drop Int.* | 35,5 [3140] | 42,6 [3770] | 54,2 [4795] | 61,9 [5480] | 60,8 [5390] | 54 [4780] | 62 [5480] |
| Min. Speed***, [RPM] | | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Weight, kg [lb] For rear ports +0,450 [.992] | | 6,4 [14.1] | 6,6 [14.6] | 6,8 [15] | 7,1 [15.6] | 7,6 [16.8] | 8,9 [20] | 9,5 [21.4] |

* 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.

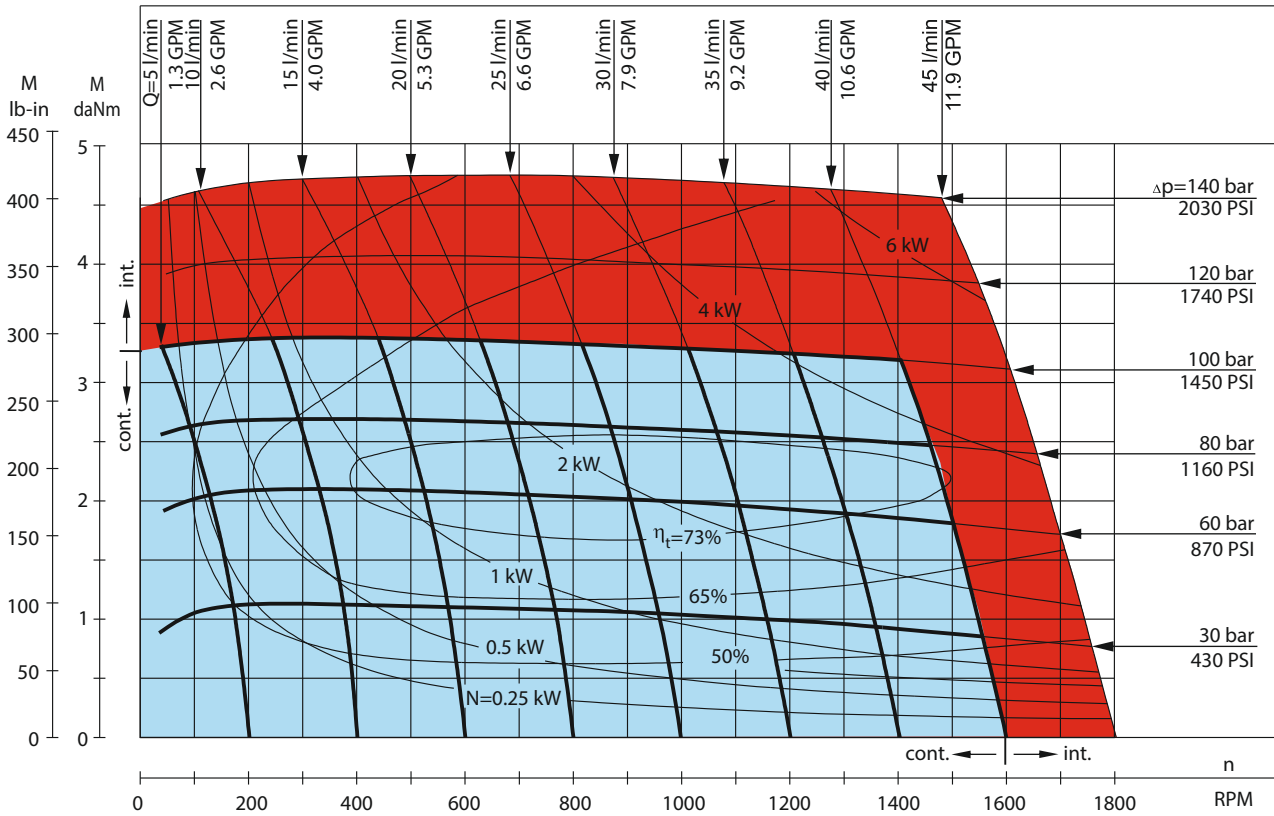
*** For speeds lower than given *please ask*

- 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.

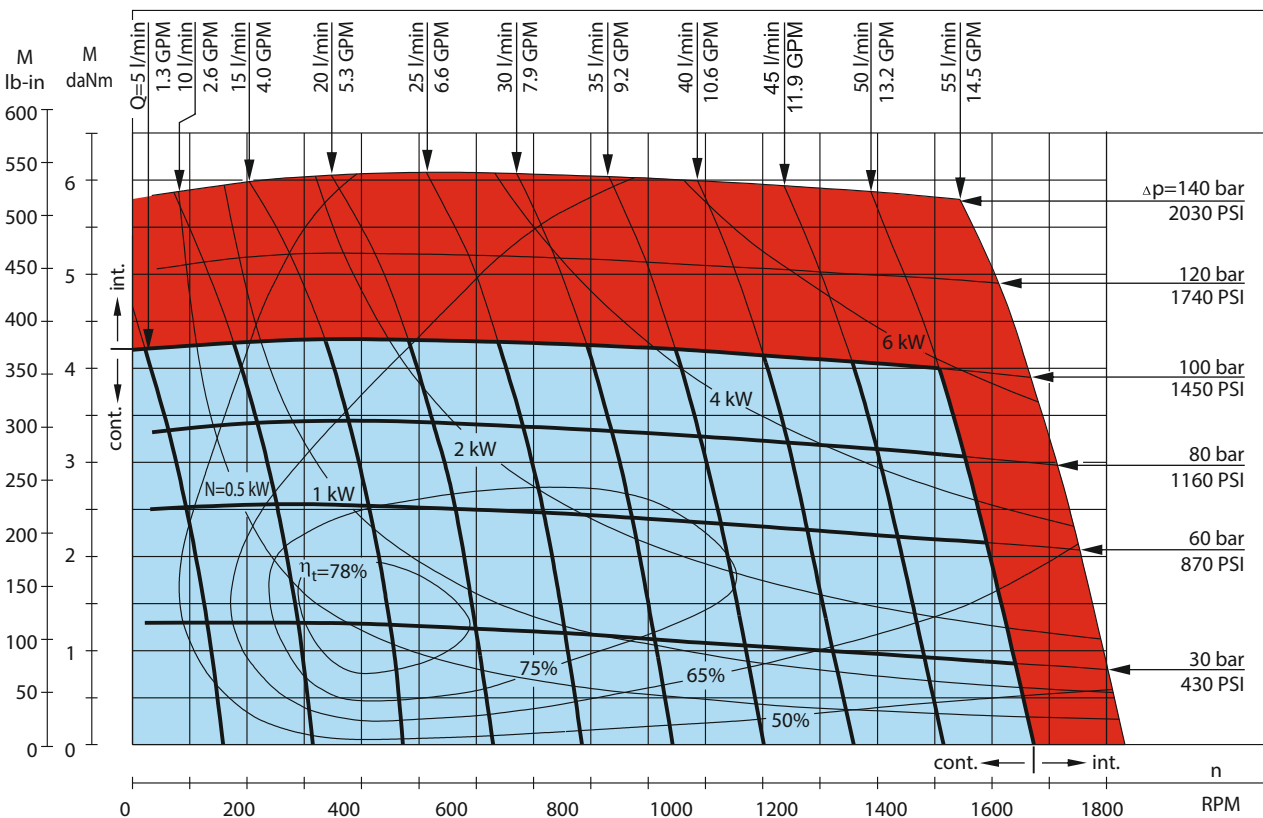


FUNCTION DIAGRAMS

MGP 25



MGP 32

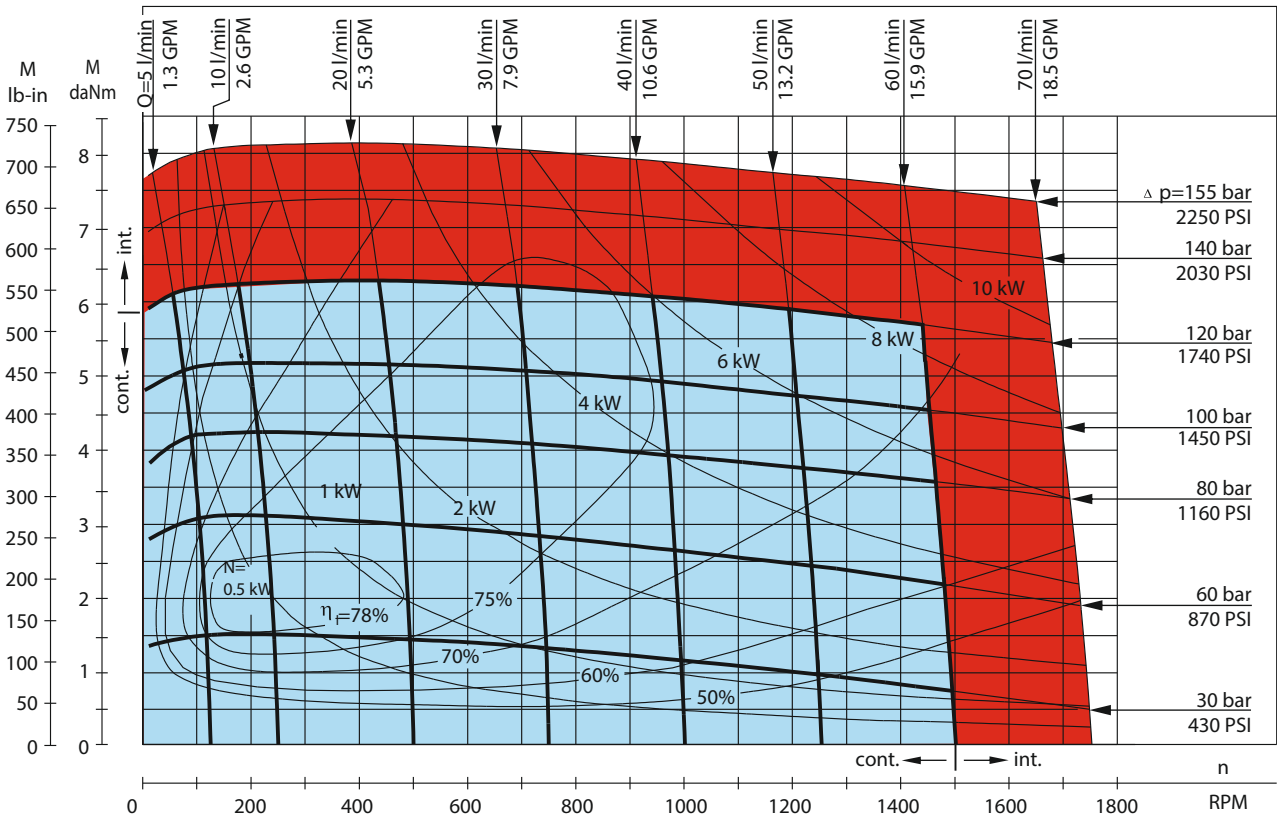


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

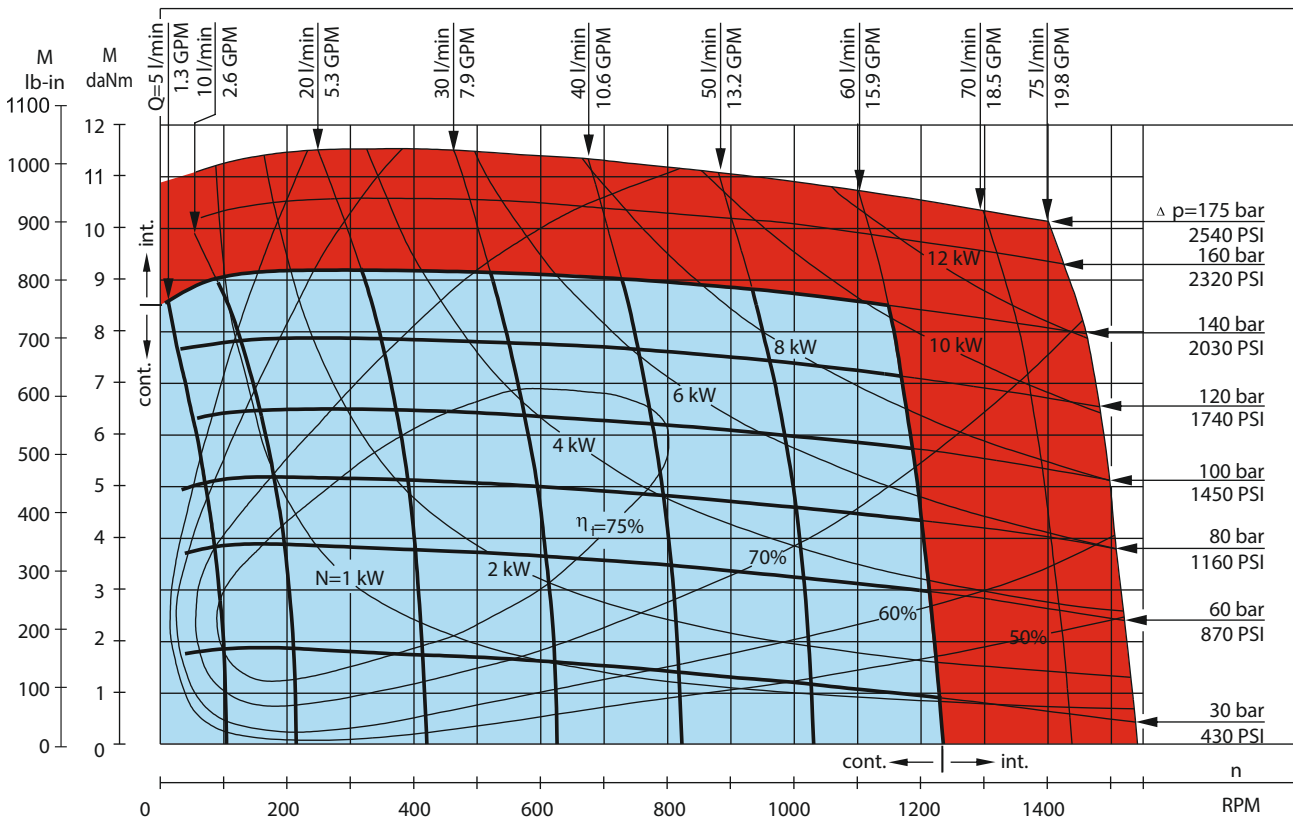


FUNCTION DIAGRAMS

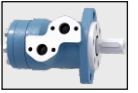
MGP 40



MGP 50

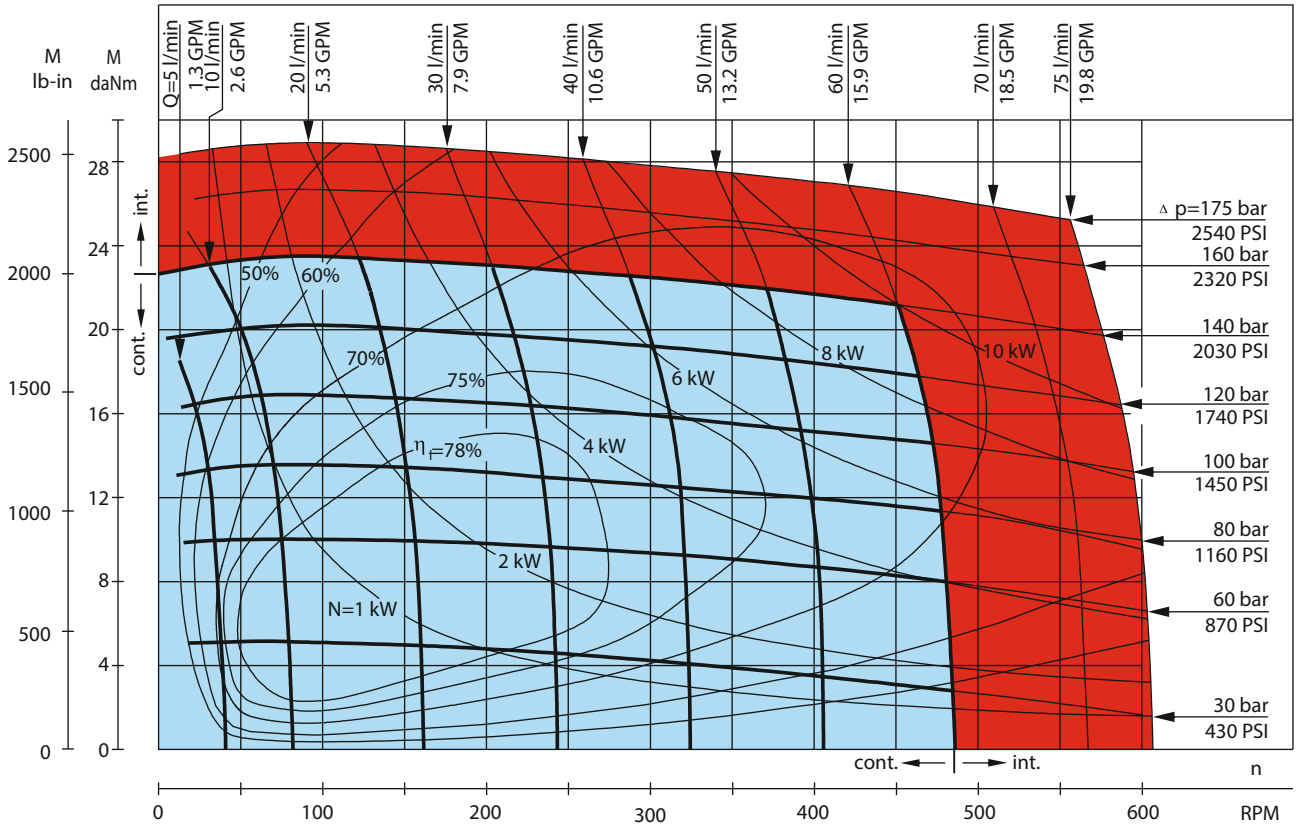


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

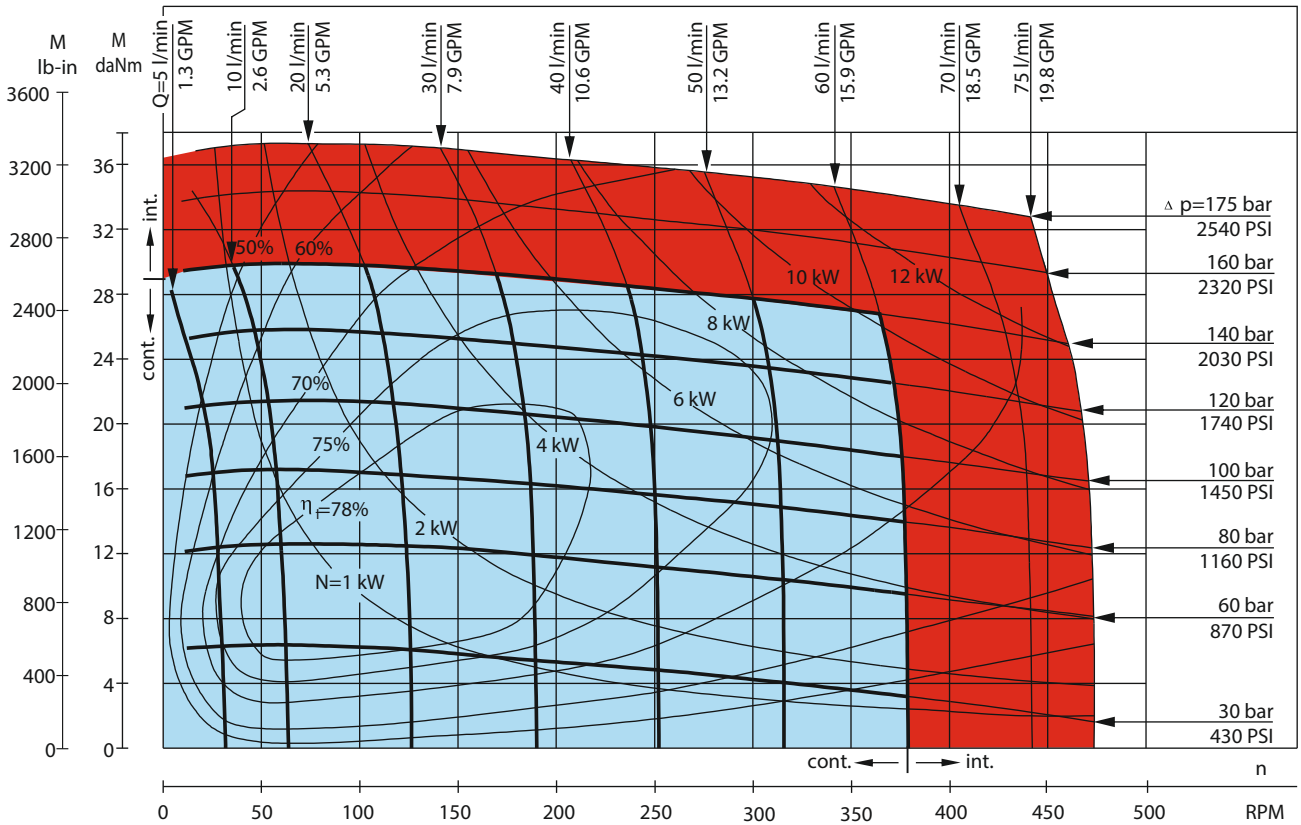


FUNCTION DIAGRAMS

MGP 125



MGP 160

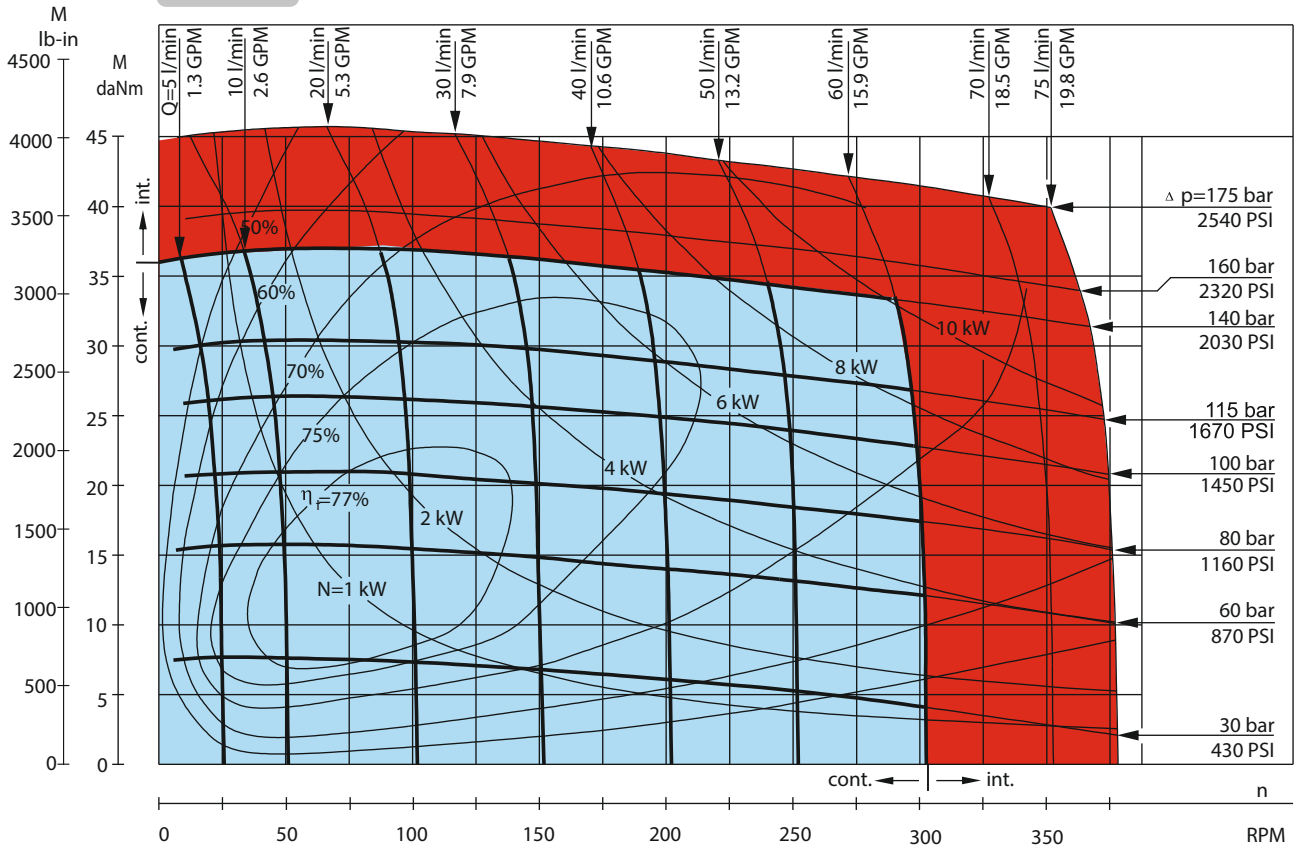


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

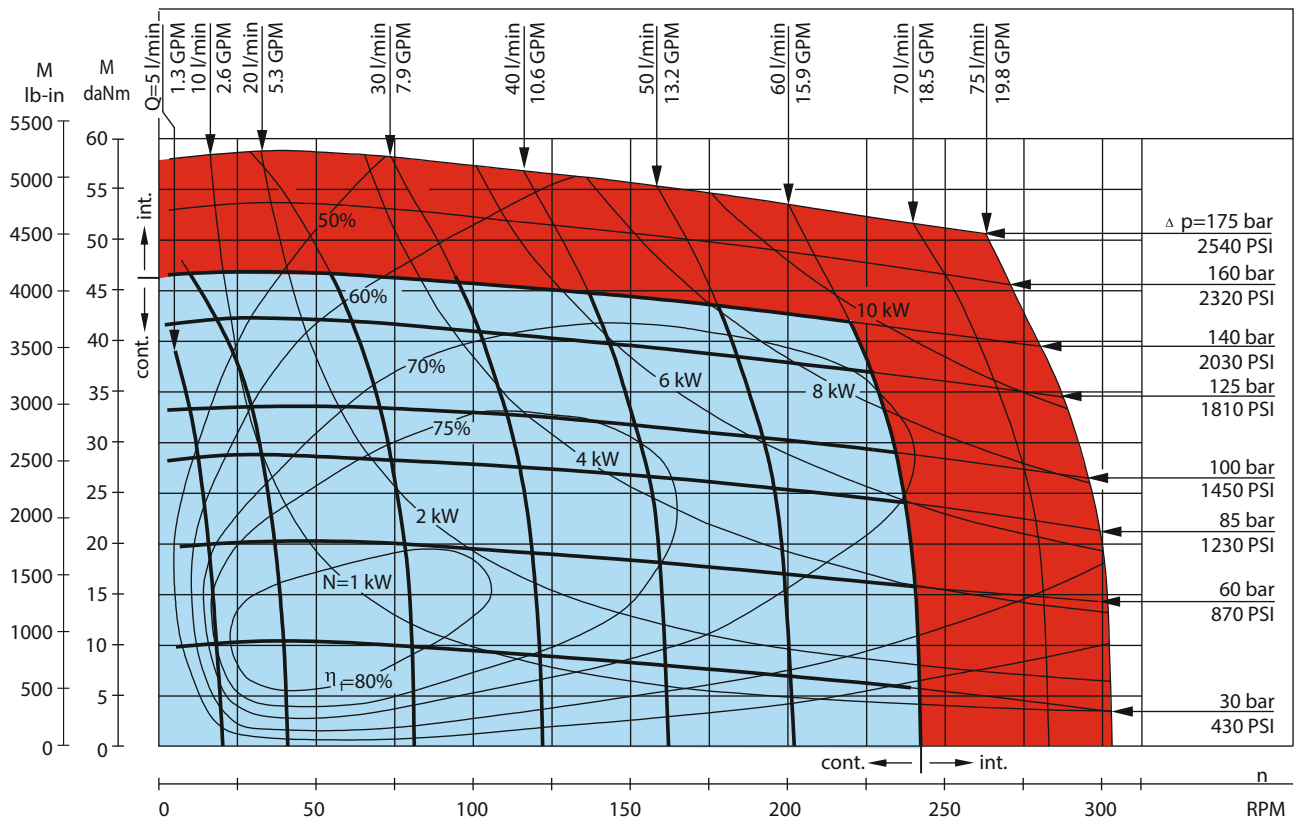


FUNCTION DIAGRAMS

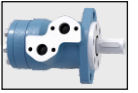
MGP 200



MGP 250

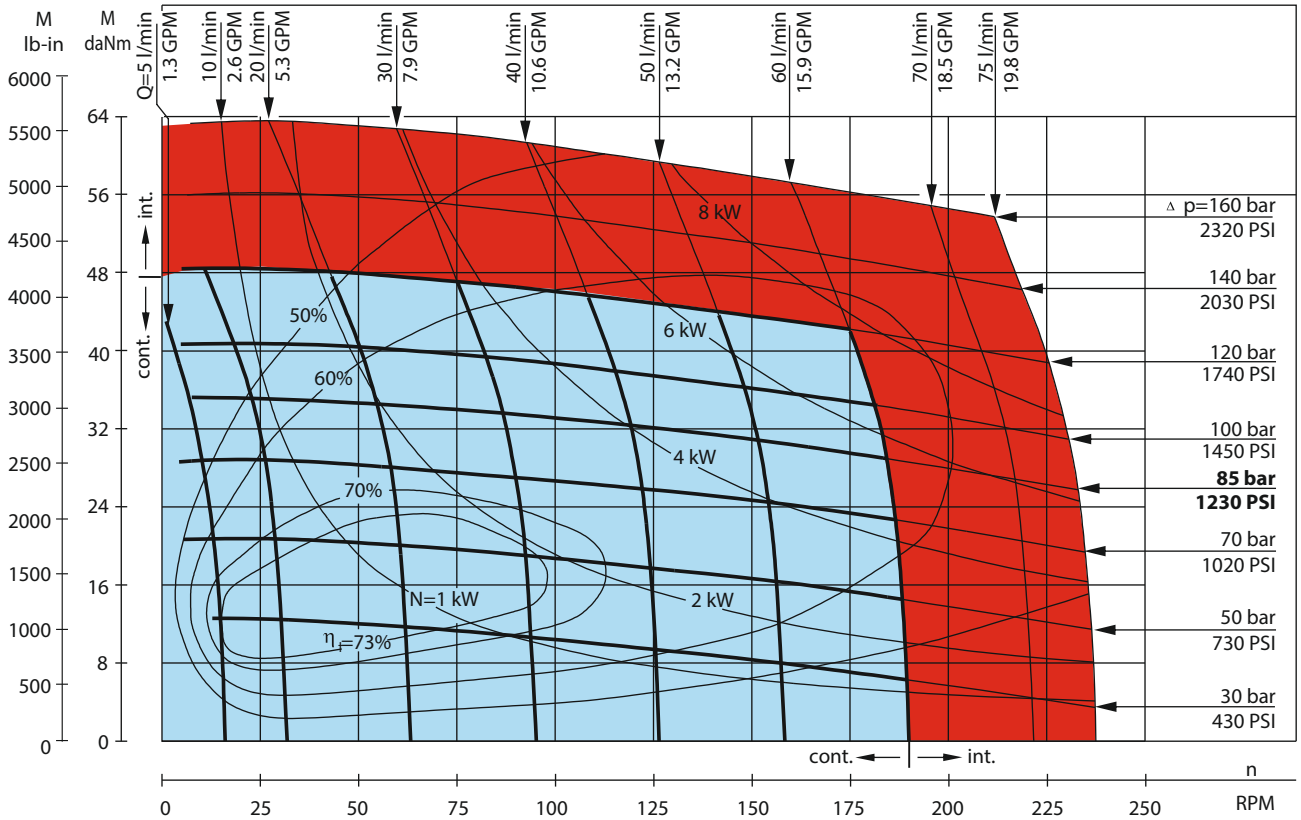


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

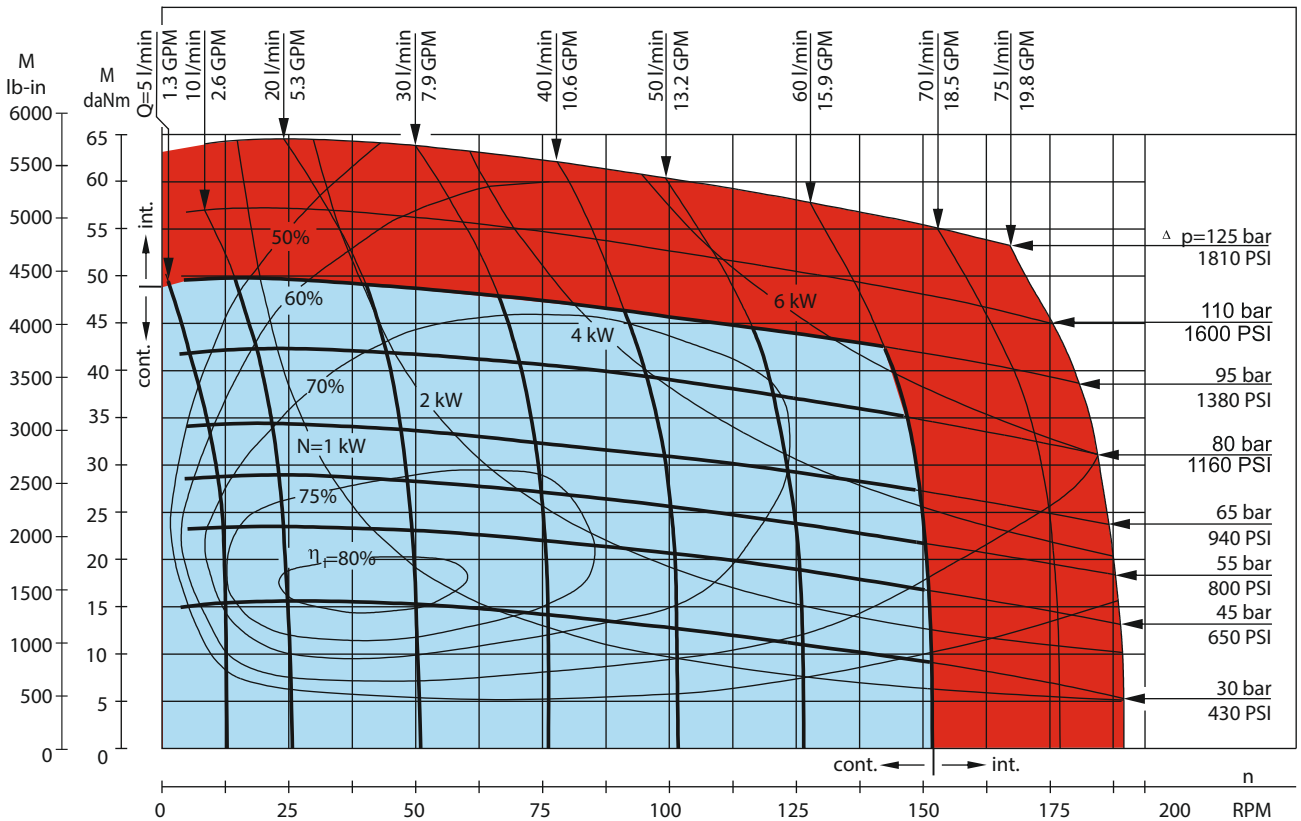


FUNCTION DIAGRAMS

MGP 315



MGP 400

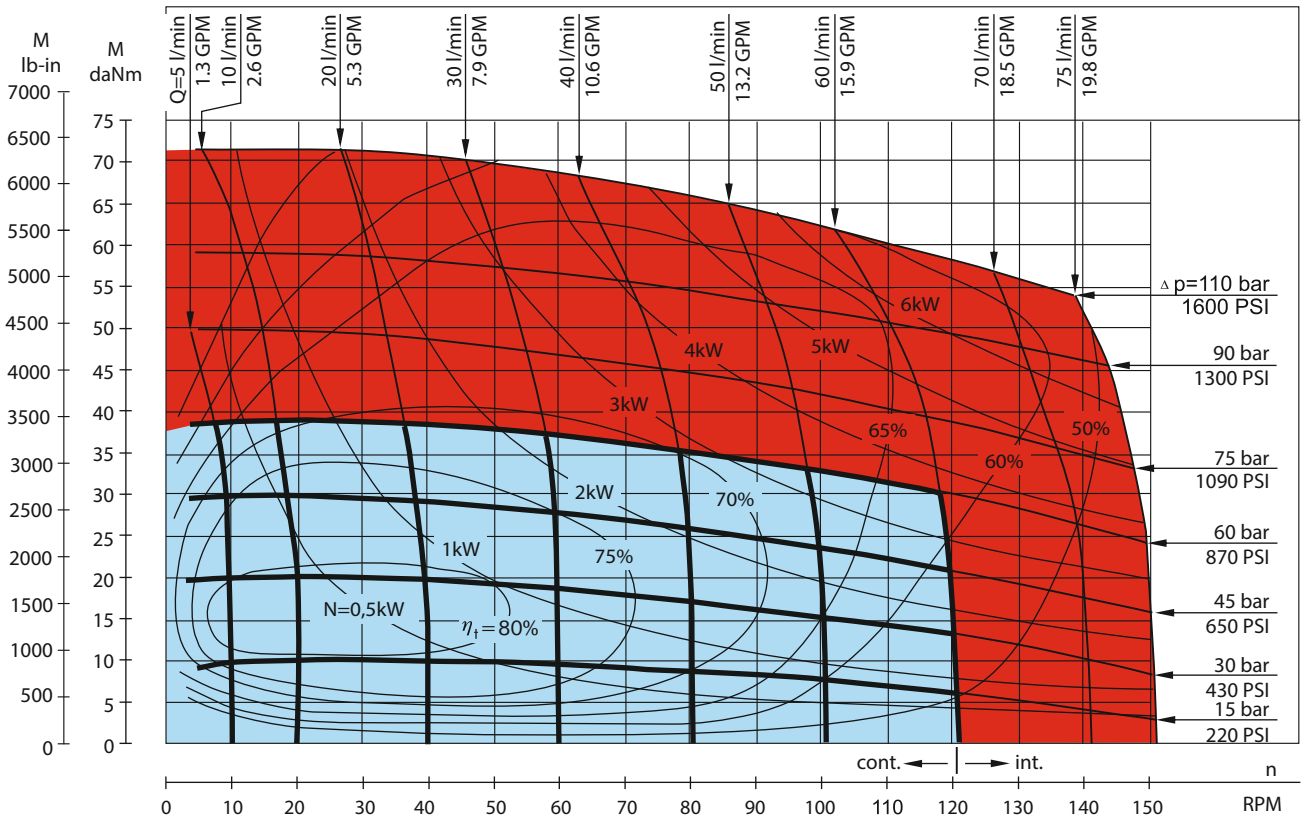


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].

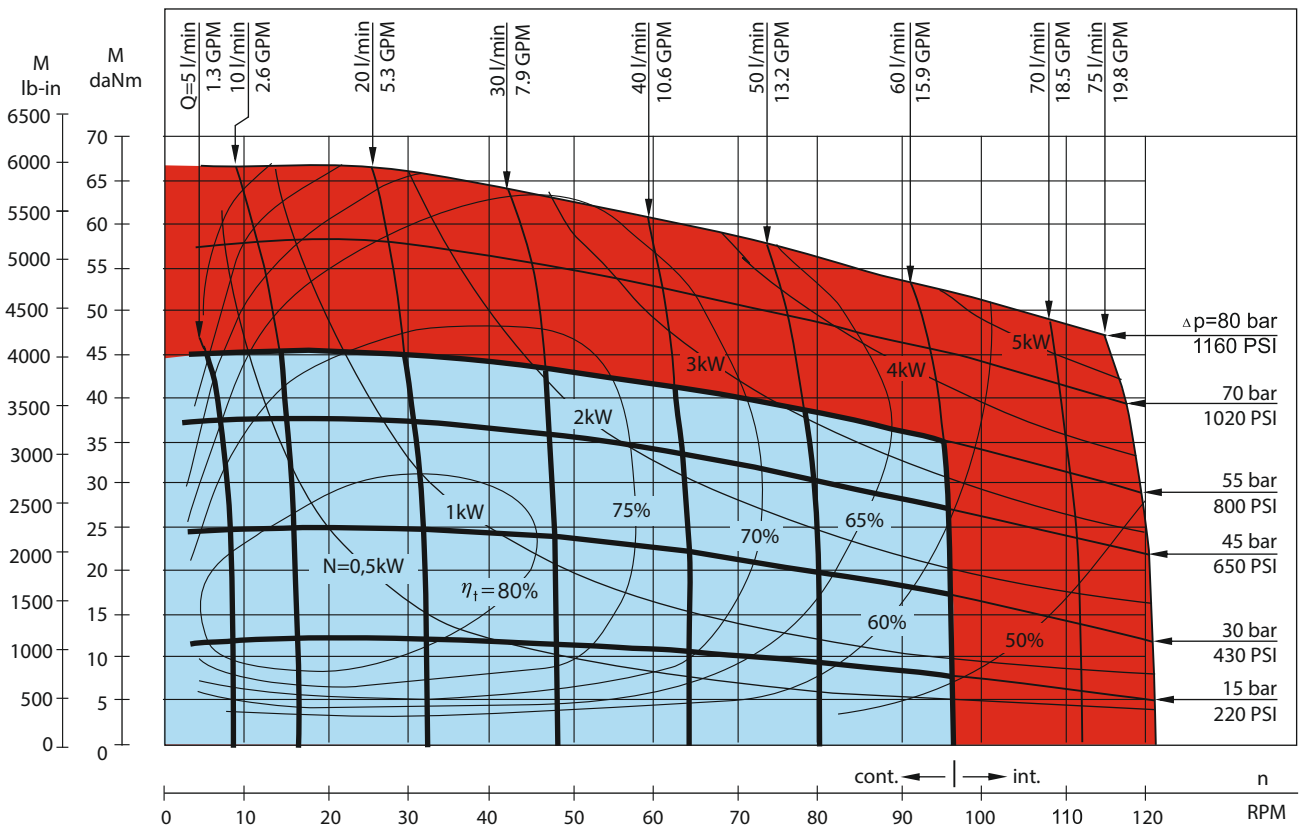


FUNCTION DIAGRAMS

MGP 500



MGP 630



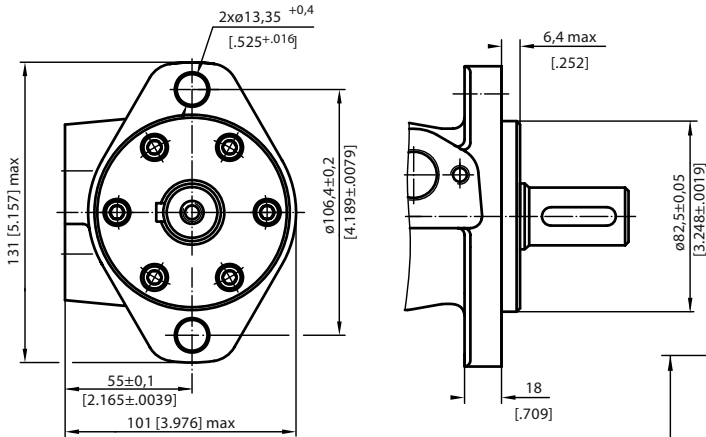
The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar [72.5÷145 PSI] and oil with viscosity of 32 mm²/s [150 SUS] at 50°C [122°F].



A

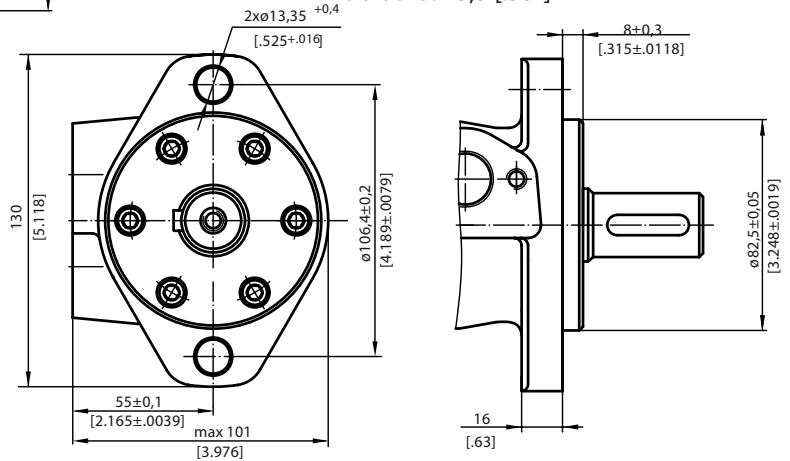
MOUNTING

2 Bolt flange, SAE A version,
spigot dia. 82,5 [3.25"] BC 106,35 [4.19"],
Bolt Dia. 13,5 [.53"]



AM

2 Bolt flange, EU version,
spigot dia. 82,5 [3.25"] BC 106,35 [4.19"],
Bolt Dia. 13,5 [.53"]



| Type | L, mm [in] | Type | L, mm [in] | L ₁ , mm [in] |
|---------|--------------|----------|--------------|--------------------------|
| MGP 25 | 134,0 [5.28] | MGPE 25 | 150,0 [5.91] | 5,20 [.21] |
| MGP 32 | 135,0 [5.31] | MGPE 32 | 151,5 [5.96] | 6,30 [.25] |
| MGP 40 | 136,5 [5.37] | MGPE 40 | 152,5 [6.00] | 7,40 [.29] |
| MGP 50 | 135,5 [5.33] | MGPE 50 | 151,5 [5.96] | 6,67 [.26] |
| MGP 80 | 139,5 [5.49] | MGPE 80 | 155,5 [6.12] | 10,67 [.42] |
| MGP 100 | 142,0 [5.59] | MGPE 100 | 158,5 [6.24] | 13,33 [.52] |
| MGP 125 | 145,5 [5.73] | MGPE 125 | 161,5 [6.36] | 16,67 [.66] |
| MGP 160 | 150,0 [5.91] | MGPE 160 | 166,5 [6.56] | 21,33 [.84] |
| MGP 200 | 155,5 [6.12] | MGPE 200 | 171,5 [6.75] | 26,67 [1.05] |
| MGP 250 | 162,0 [6.38] | MGPE 250 | 178,5 [7.03] | 33,33 [1.31] |
| MGP 315 | 171,5 [6.75] | MGPE 315 | 187,5 [7.38] | 42,67 [1.68] |
| MGP 400 | 182,0 [7.17] | MGPE 400 | 198,5 [7.81] | 53,33 [2.10] |
| MGP 500 | 195,5 [7.70] | MGPE 500 | 211,5 [8.33] | 66,63 [2.62] |
| MGP 630 | 213,0 [8.39] | MGPE 630 | 229,0 [9.02] | 84,00 [3.31] |

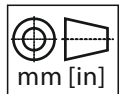
C : 4xM8 - 13 mm [.51 in] depth

P_(A, B) : 2xG1/2 or 2x7/8-14 UNF - 15 mm [.59 in] depth

T : G1/4 or 7/16-20 UNF - 12 mm [.47 in] depth (plugged)

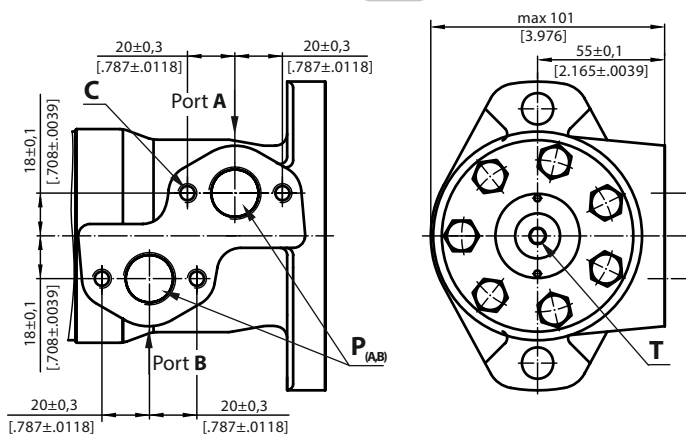
Standard Rotation
Viewed from Shaft End
Port A Pressurized - CW
Port B Pressurized - CCW

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

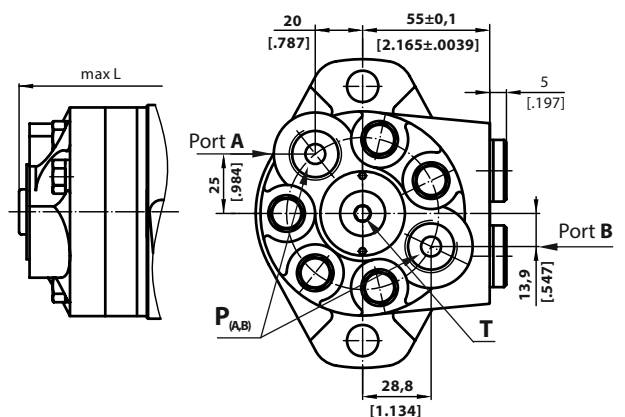


PORTS

T



E





ORDER CODE

| | | | | | | | | |
|------------|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| MGP | | | | | | | | |

Pos.1 - Mounting Flange

- A** - 2 Bolt flange, SAE A, spigot dia. 82,5 [3.25"] BC 106,35 [4.19"], Bolt Dia. 13,5 [.53"]
- AM** - 2 Bolt flange, EU version, spigot dia. 82,5 [3.25"] BC 106,35 [4.19"], Bolt Dia. 13,5 [.53"]

Pos.2 - Port type

- T** - Twin side ports on one side
- E** - Rear ports

Pos.3 - Displacement code

- 25** - 25,0 cm³/rev [1.52 in³/rev]
- 32** - 32,0 cm³/rev [1.95 in³/rev]
- 40** - 40,0 cm³/rev [2.44 in³/rev]
- 50** - 49,5 cm³/rev [3.02 in³/rev]
- 80** - 79,2 cm³/rev [4.83 in³/rev]
- 100** - 99,0 cm³/rev [6.04 in³/rev]
- 125** - 123,8 cm³/rev [7.55 in³/rev]
- 160** - 158,4 cm³/rev [9.66 in³/rev]
- 200** - 198,0 cm³/rev [12.10 in³/rev]
- 250** - 247,5 cm³/rev [15.10 in³/rev]
- 315** - 316,8 cm³/rev [19.30 in³/rev]
- 400** - 396,0 cm³/rev [24.16 in³/rev]
- 500** - 495,0 cm³/rev [30.20 in³/rev]
- 630** - 623,6 cm³/rev [38.05 in³/rev]

Pos. 4 - Shaft Extensions**(see page 28)

- D02** - ø25 [.984"] Straight, M8-6H thread, EU and SAE ver. Parallel key A8x7x32 DIN6885
- C06** - ø25,4 [1"] Straight, M8-6H thread, EU version Parallel key 1/4"x1/4"x1 1/4"BS46
- D04*** - ø25,4 [1"] Straight, 1/4-20 UNC thread, SAE version Parallel key 1/4"x1/4"x1 1/4"BS46
- S03** - ø25,4 [1"] Splined BS 2059 (SAE 6B), M8-6H thread, EU version
- G07*** - ø25,4 [1"] Splined BS 2059 (SAE 6B), M8-6H thread, SAE version
- K01** - ø28,56 [1.125"] Tapered 1:10, EU version, Parallel key B5x5x14
- T01*** - 1" [25,4] SAE J501 Tapered 1:8, SAE version, Woodruff key 1/4"x1"SAE J502

Pos. 5 - Shaft Seal Version (see page 1)

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

Pos. 6 - Ports

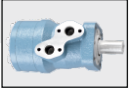
- B3** - 2xG1/2, drain port G1/4
- A3** - 2x7/8-14 UNF, drain port 7/16-20 UNF

Pos. 7 - Special Features (see pages 66÷75)

Pos. 8 - Design Series

- default - Factory specified

* Options D04, G07 and T01 are available for pos.1 option A only.
 ** The permissible output torque for shafts must not be exceeded!



HYDRAULIC MOTORS MGR



APPLICATIONS

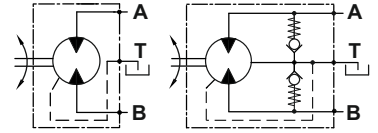
- Sweepers & Scrubbers
- Forklift
- Lawn & Turf
- Harvesters
- Industrial Applications

OPTIONS

- Flange and wheel mount
- Twin side and rear ports
- Shafts - straight, splined and tapered
- Shaft seal for high and low pressure
- Metric and BSPP ports
- Speed sensors

ADVANTAGES

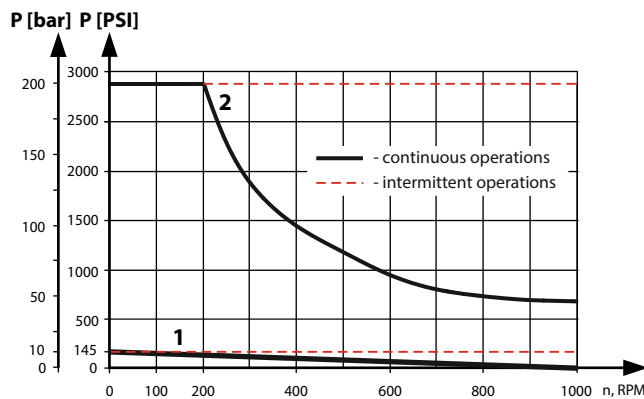
- Compact size
- High power density
- Roller design



GENERAL

| | | |
|--------------------------|---|--|
| Displacement, | cm ³ /rev [in ³ /rev] | 51,5 [3.14] ÷ 397 [24.4] |
| Max. Speed, | RPM | 970 |
| Max. Torque, | Nm [lb-in] | cont.: 61 [5400] int.: 69 [6100] |
| Max. Output, | kW [HP] | 15 [20.1] |
| Max. Pressure Drop, | bar [PSI] | cont.: 175 [2540] int.: 200 [2900] |
| Max. Oil Flow, | l/min [GPM] | 75 [20] |
| Min. Speed, | RPM | 10 |
| HydrauFluid | | 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) |

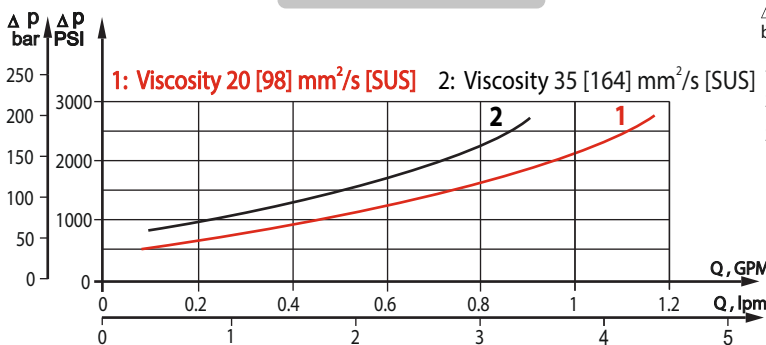
Max. return pressure without drain line or max. pressure in the drain line



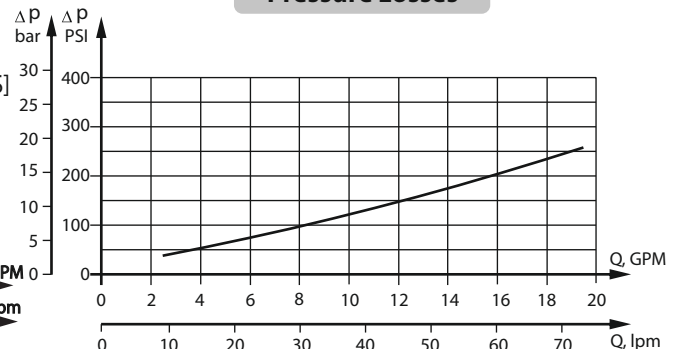
1: Drawing for Low Pressure Seal

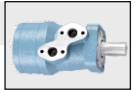
2: Drawing for High Pressure Seal ("U" Seal)

Oil flow in drain line



Pressure Losses





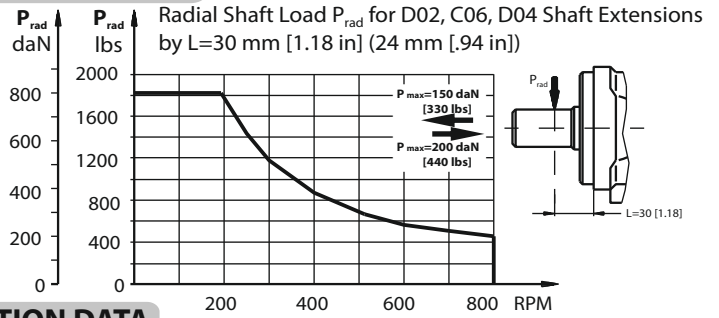
PERMISSIBLE SHAFT LOADS

The permissible radial shaft load **Prad** depends on the speed **n**, RPM and distance **L** from the point of load to the mounting flange.

$$P_{rad, \text{in mm}} = \frac{800}{n} \times \frac{25000}{95+L}, \text{ daN}^*$$

$$P_{rad, \text{in inch}} = \frac{800}{\text{RPM}} \times \frac{2215}{3.74+L}, \text{ lbs}^*$$

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



SPECIFICATION DATA

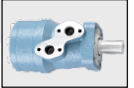
| Type | MGR 50 | MGR 80 | MGR 100 | MGR 125 | MGR 160 | MGR 200 | MGR 250 | MGR 315 | MGR 400 | |
|--|--------------------------|----------------|----------------|-----------------|-----------------|------------------|------------------|------------------|---------------|-------------|
| Displacement, cm³/rev [in³/rev] | 51,5 [3.14] | 80,3 [4.90] | 99,8 [6.09] | 125,7 [7.67] | 159,6 [9.74] | 199,8 [12.19] | 250,1 [15.26] | 315,7 [19.26] | 397 [24.4] | |
| Max. Speed, [RPM] | Cont. | 775 | 750 | 600 | 475 | 375 | 300 | 240 | 190 | |
| | Int.* | 970 | 940 | 750 | 600 | 470 | 375 | 300 | 190 | |
| Max. Torque daNm [lb-in] | Cont. | 10 [900] | 20 [1770] | 24 [2125] | 30 [2655] | 39 [3450] | 38,5 [3410] | 39 [3450] | 36 [3185] | 38 [3360] |
| | Int.* | 13 [1150] | 22 [1947] | 28 [2480] | 34 [3010] | 43 [3805] | 46 [4070] | 47 [4160] | 47 [4160] | 47 [4160] |
| | Peak** | 17 [1505] | 27 [2390] | 32 [2832] | 37 [3275] | 46 [4070] | 56 [4960] | 60 [5310] | 61 [5400] | 61 [5400] |
| Max. Output kW [HP] | Cont. | 7 [9.5] | 12,5 [17] | 13 [17.4] | 12,5 [16.8] | 11,5 [15.4] | 9 [12] | 8 [10.7] | 5 [6.7] | 4,8 [6.4] |
| | Int.* | 8,5 [11.9] | 15 [20.1] | 15 [20.1] | 14,5 [19.5] | 14 [18.8] | 12 [16.1] | 9,5 [12.7] | 8 [10.7] | 6,8 [9.1] |
| Max. Pressure Drop bar [PSI] | Cont. | 140 [2030] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 140 [2030] | 110 [1600] | 85 [1230] | 65 [940] |
| | Int.* | 175 [2540] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 175 [2540] | 140 [2030] | 115 [1670] | 90 [1300] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 200 [2900] | 150 [2175] | 115 [1670] |
| Max. Oil Flow lpm [GPM] | Cont. | 40 [10.5] | 60 [15.8] | 60 [15.8] | 60 [15.8] | 60 [15.8] | 60 [15.8] | 60 [15.8] | 60 [15.8] | 60 [15.8] |
| | Int.* | 50 [13.2] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] | 75 [19.8] |
| Max. Inlet Pressure bar [PSI] | Cont. | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] |
| | Int.* | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] |
| Max. Return Pressure with Drain Line bar [PSI] | Cont. | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] |
| | Int.* | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] |
| | Peak** | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] | 225 [3260] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] | | | | | | | | | | |
| | 10 [145] | 10 [145] | 10 [145] | 9 [130] | 7 [102] | 5 [73] | 4 [58] | 3 [44] | 3 [44] | |
| Min. Starting Torque daNm [lb-in] | At max.press. | | | | | | | | | |
| | drop Cont. | 8 [710] | 15 [1330] | 20 [1770] | 25 [2215] | 32 [2832] | 33 [2920] | 31 [2740] | 31,5 [2875] | 31,5 [2875] |
| | At max.press. drop Int.* | 10 [885] | 17 [1505] | 23 [2035] | 28 [2480] | 37 [3275] | 40 [3540] | 48 [4250] | 58 [5220] | 50 [4425] |
| Min. Speed***, [RPM] | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| Weight, kg [lb] For rear ports +0,650 [1.433] | 6,8 [15] | 6,9 [15,2] | 7,2 [15,9] | 7,3 [16,1] | 7,5 [15,2] | 8 [17,6] | 8,4 [18,5] | 9,1 [20] | 9,8 [21,6] | |

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

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

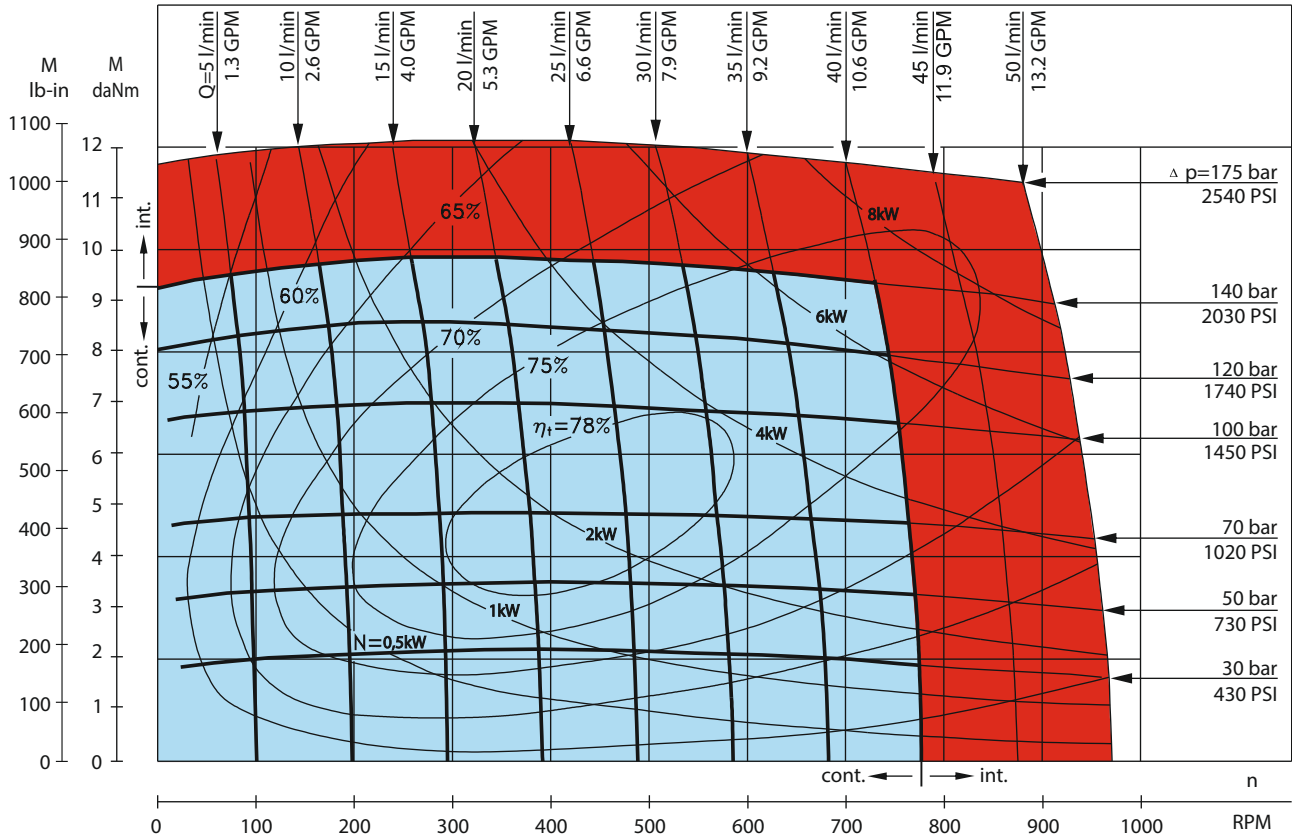
*** For speeds lower than given please ask

- 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.

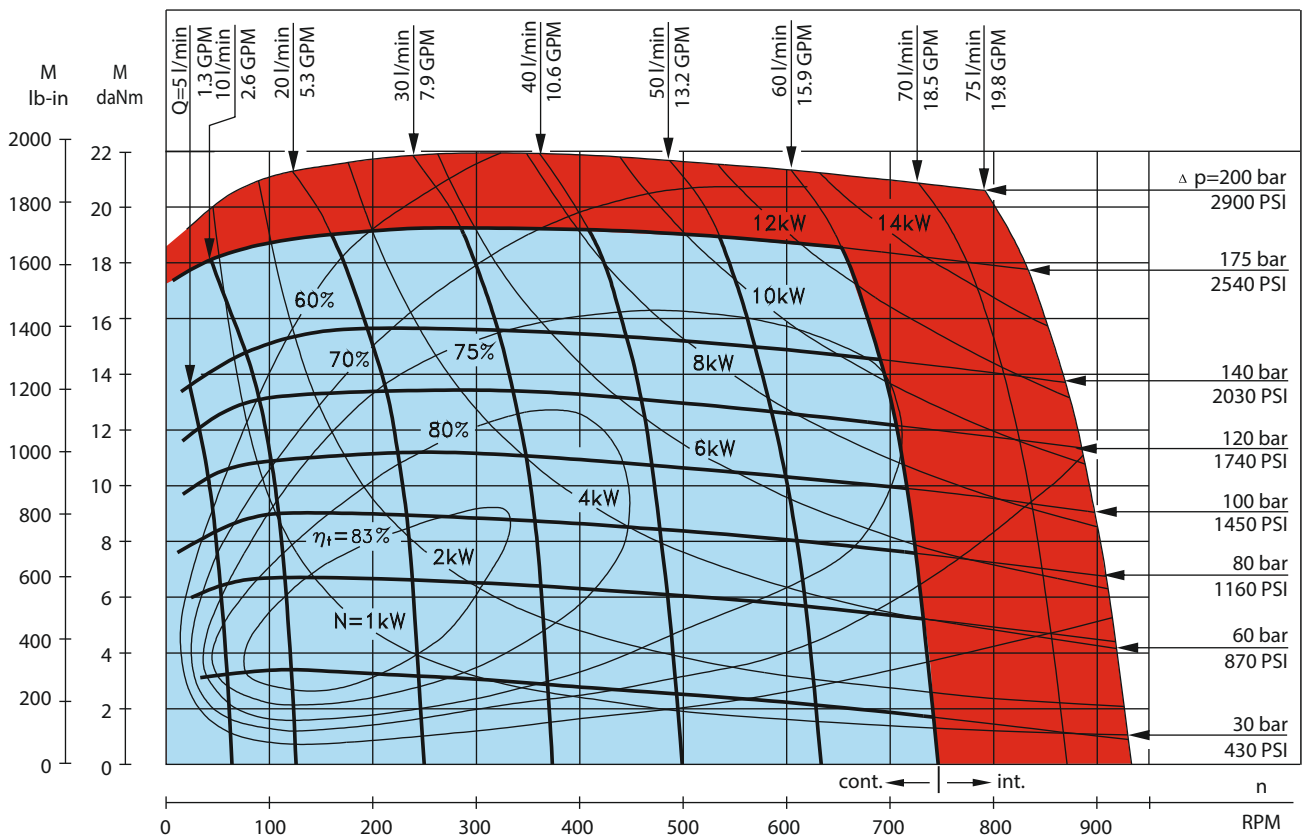


FUNCTION DIAGRAMS

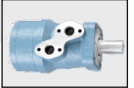
MGR 50



MGR 80

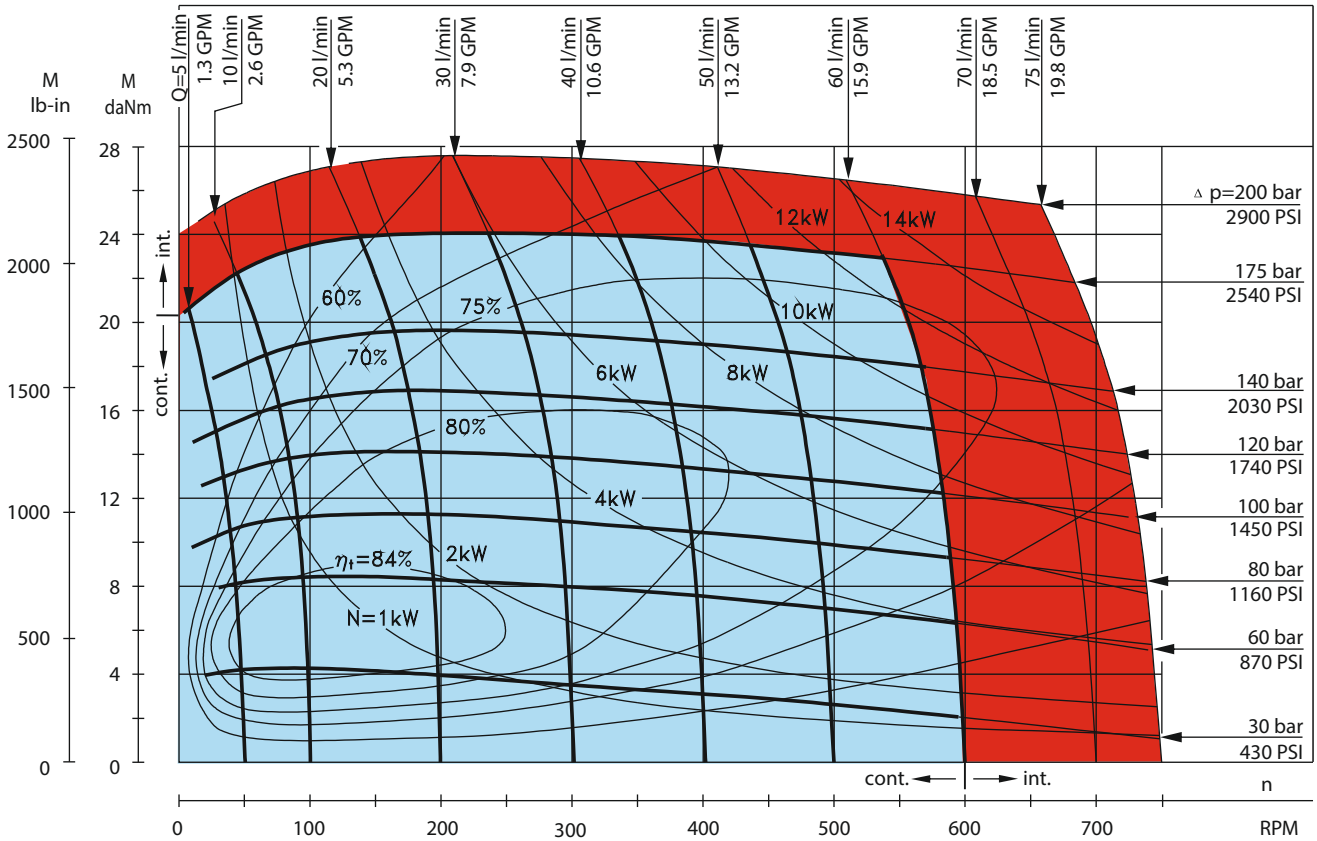


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

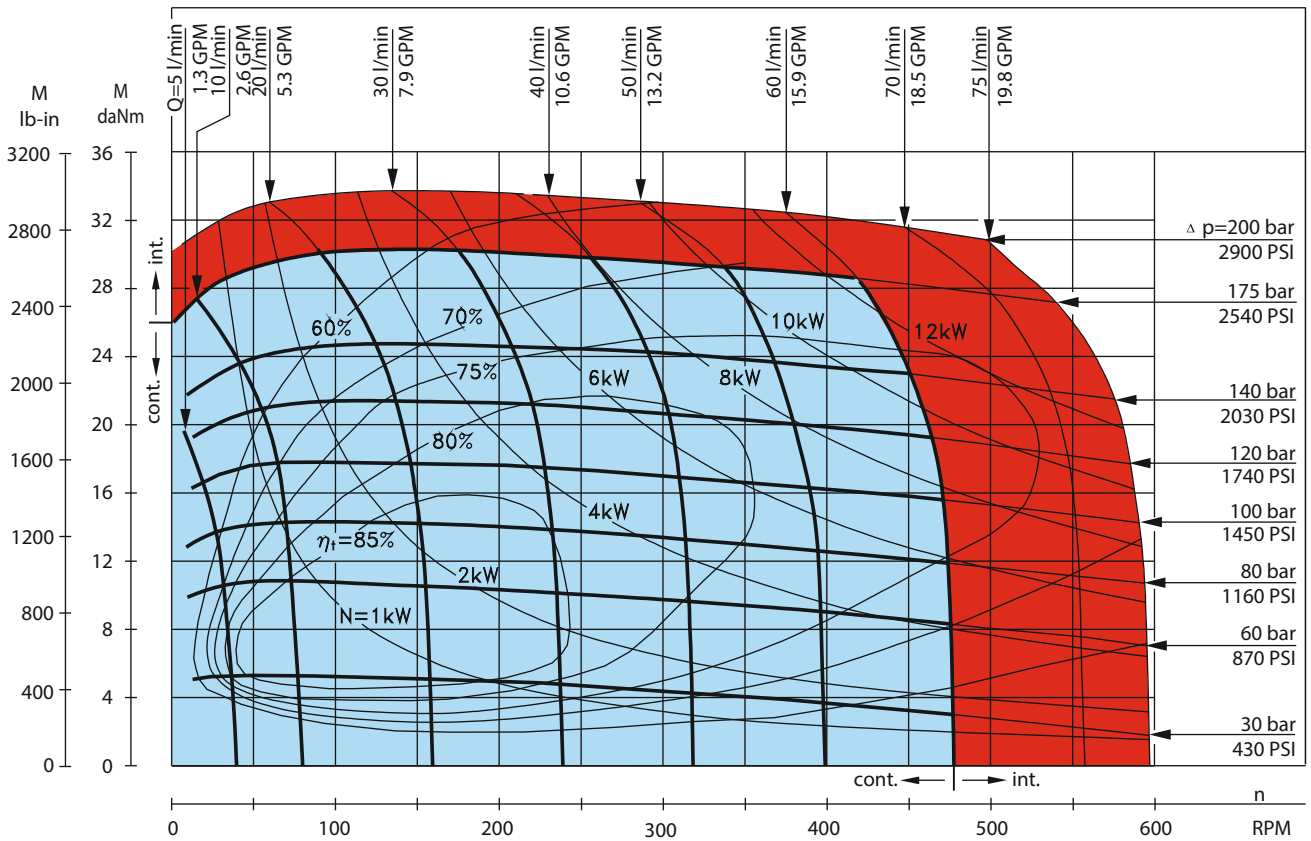


FUNCTION DIAGRAMS

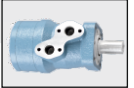
MGR 100



MGR 125

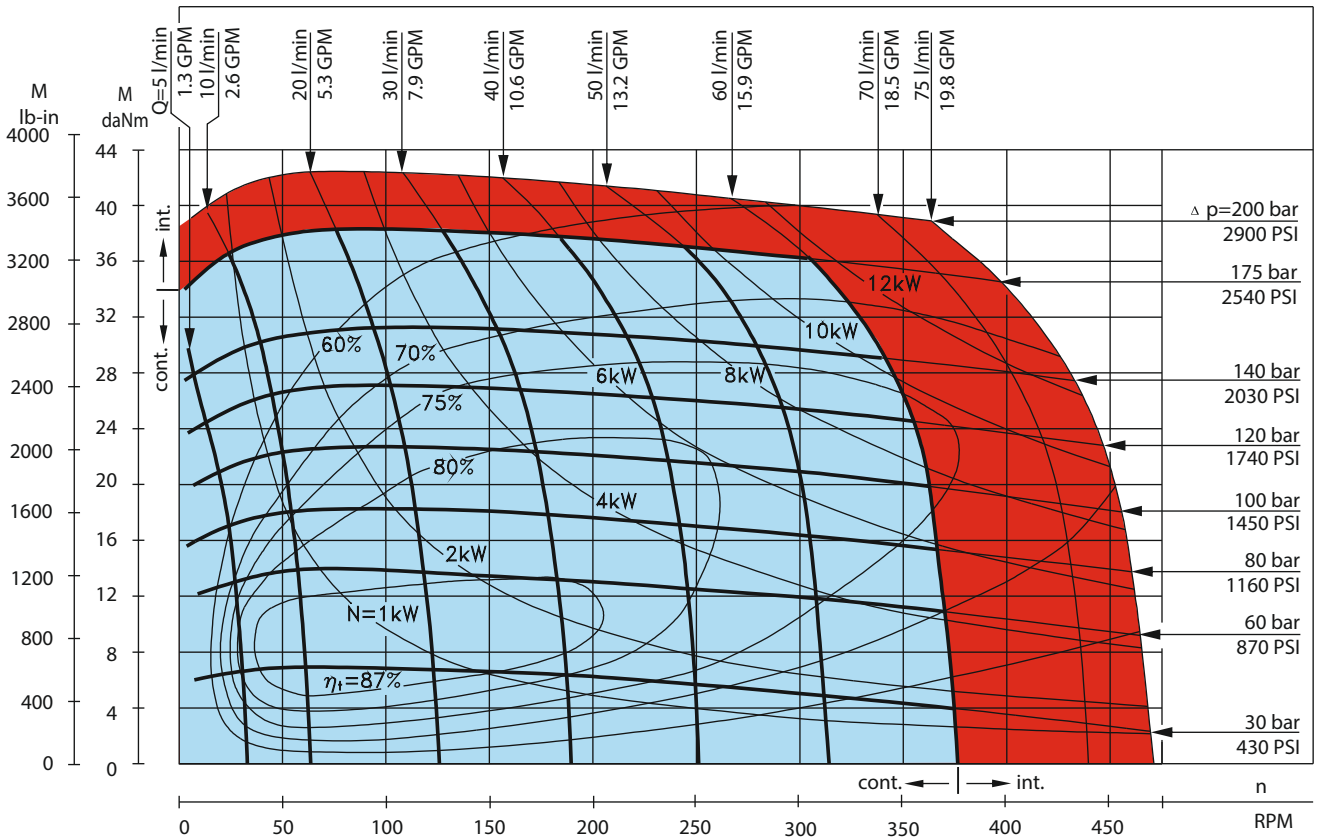


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

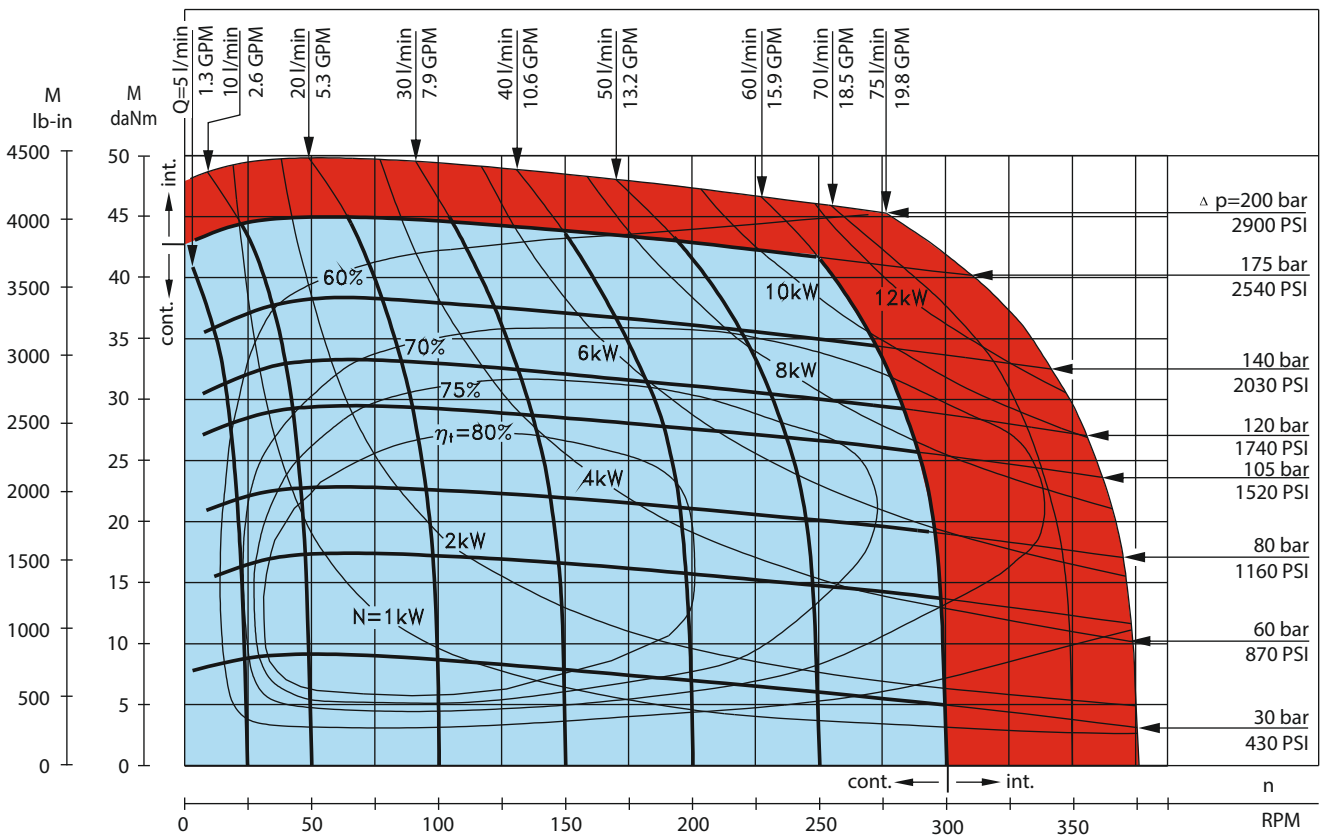


FUNCTION DIAGRAMS

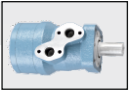
MGR 160



MGR 200

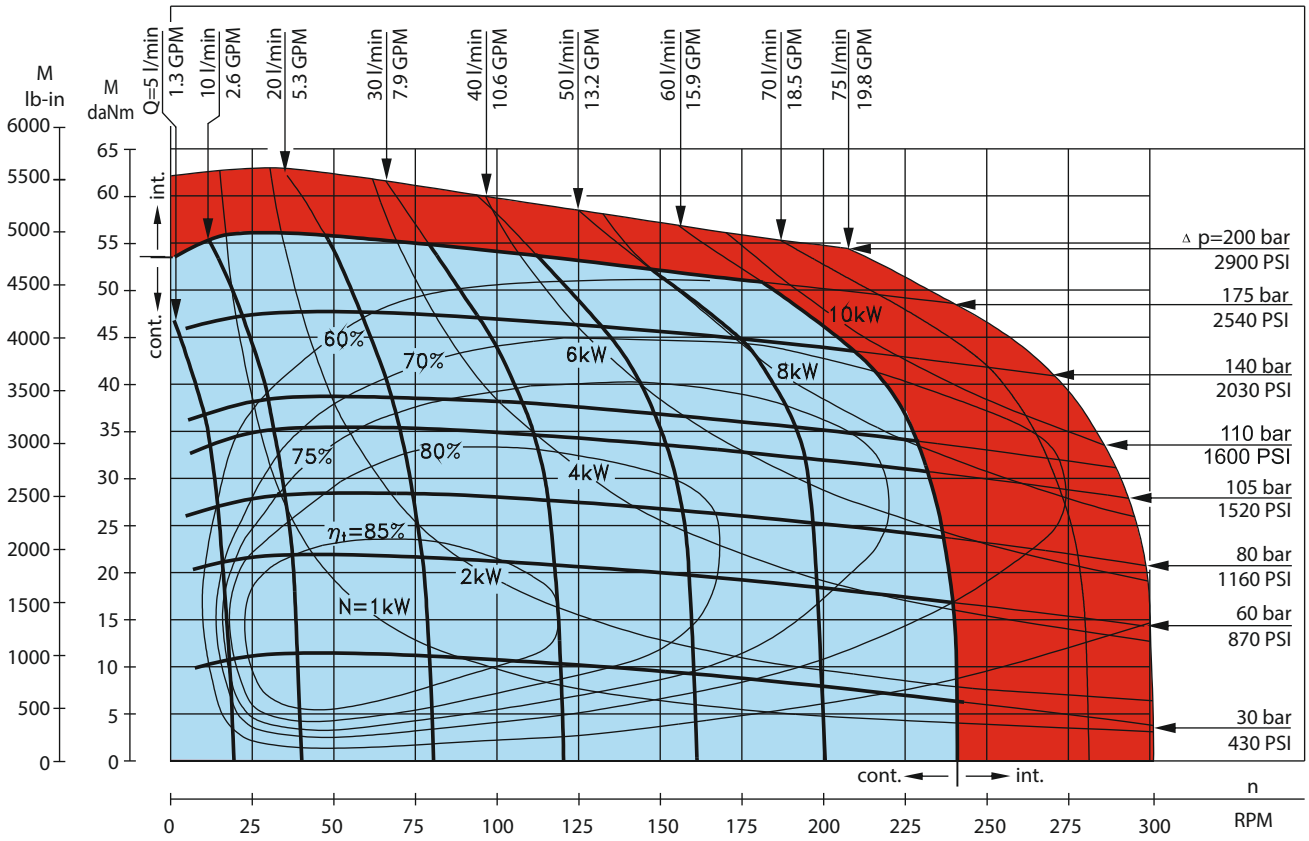


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

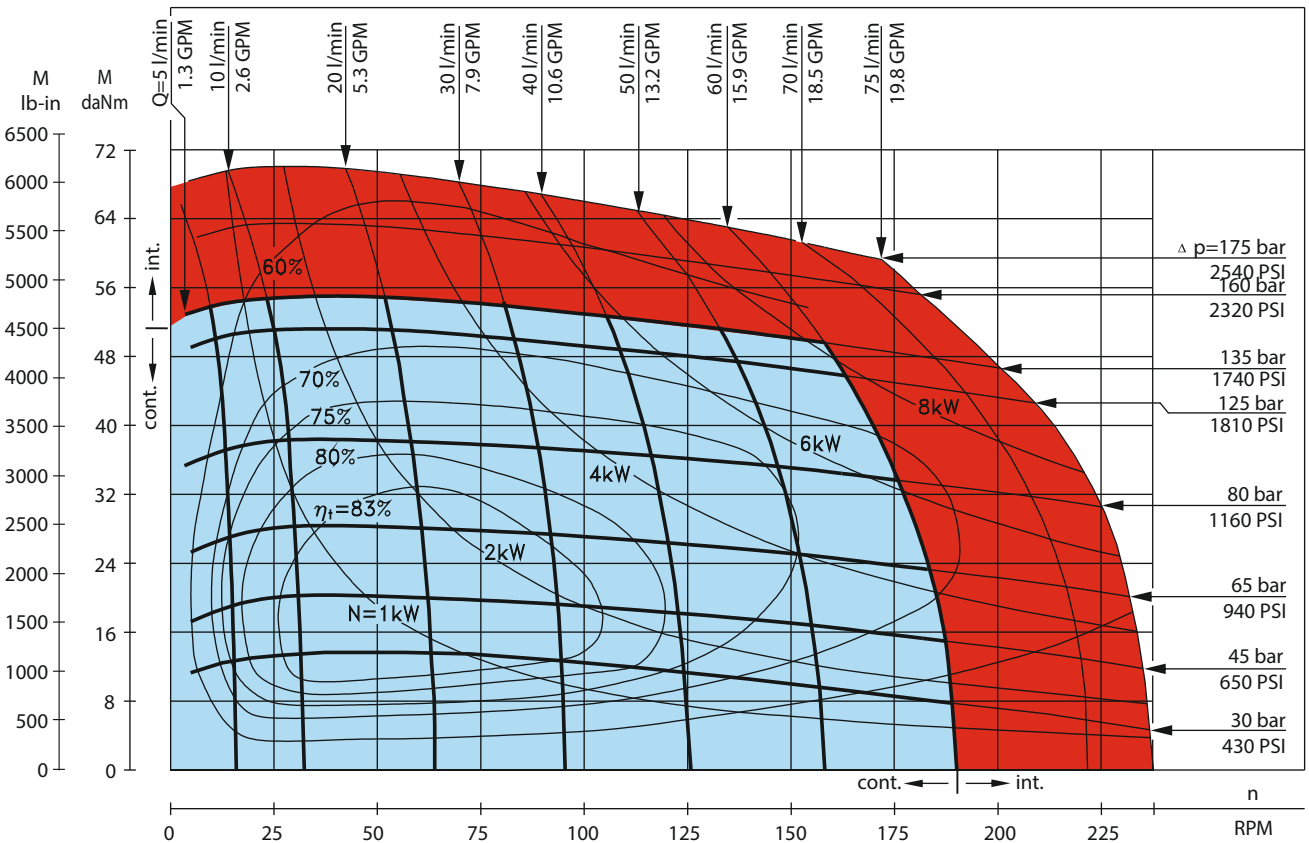


FUNCTION DIAGRAMS

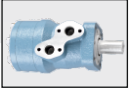
MGR 250



MGR 315

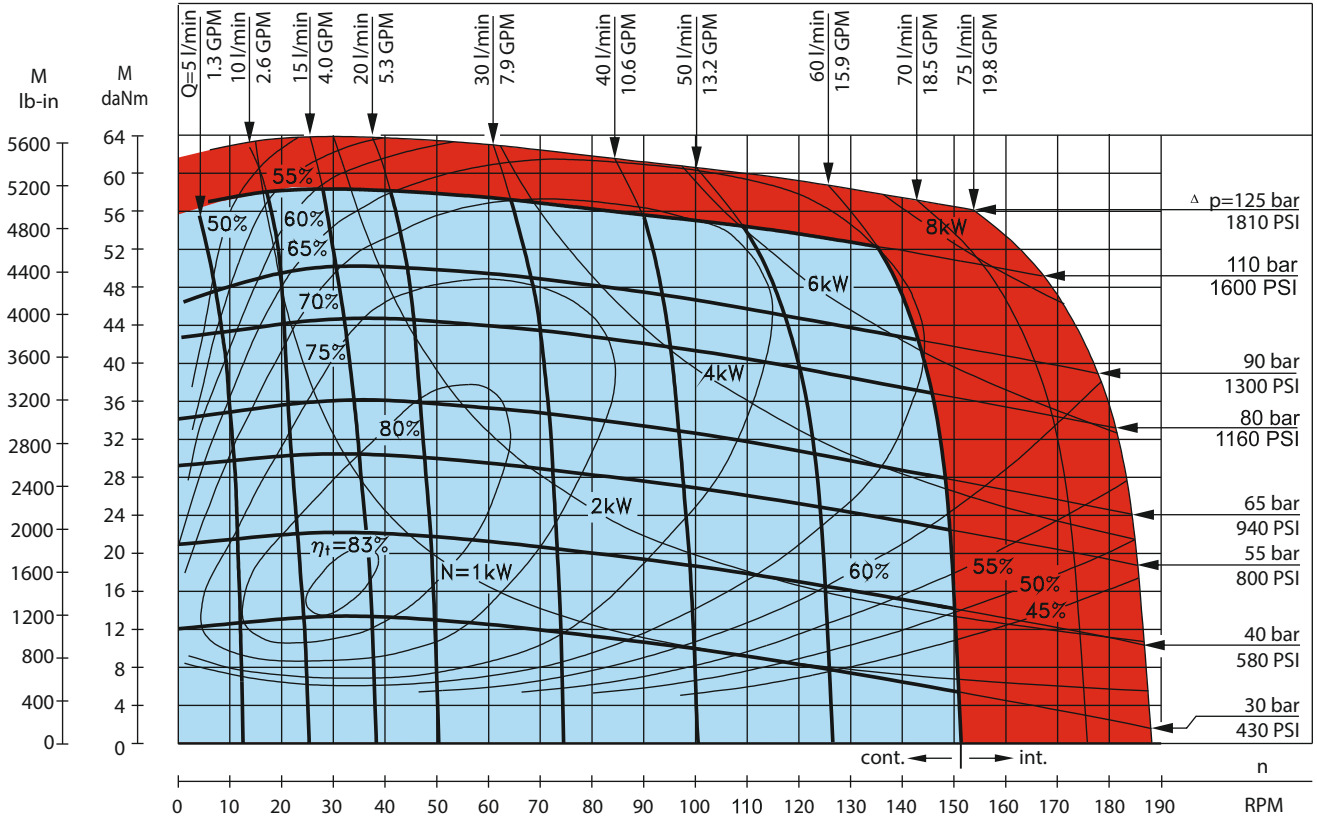


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar



MGR 400

FUNCTION DIAGRAMS

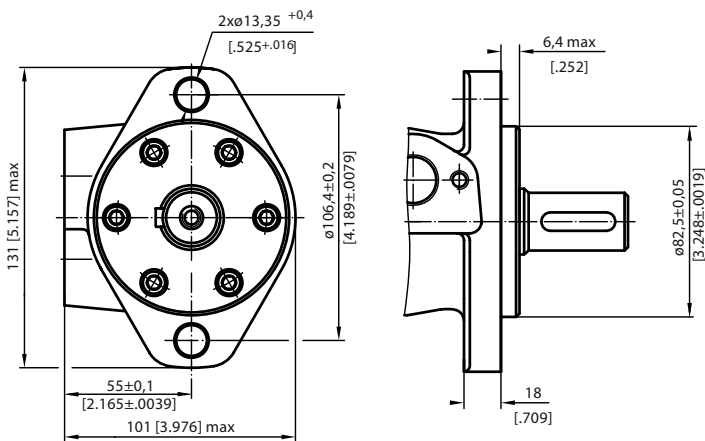


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

MOUNTING

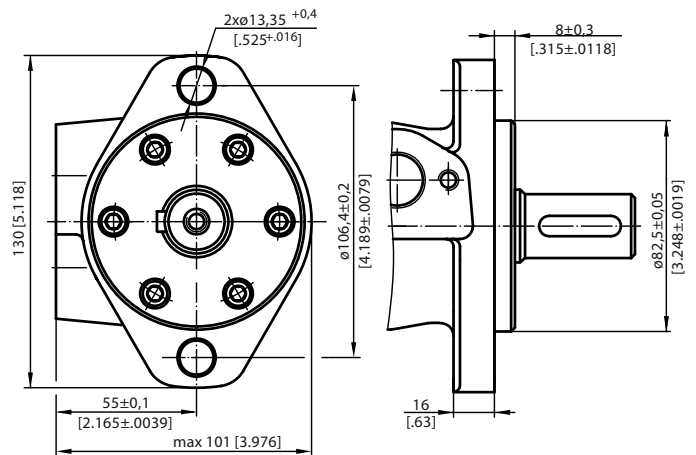
A

2 Bolt flange, SAE A version, spigot dia. 82,5 [3.25"]
BC 106,35 [4.19"], Bolt Dia. 13,5 [.53"]



AM

2 Bolt flange, EU version,
spigot dia. 82,5 [3.25"] BC 106,35 [4.19"], Bolt Dia. 13,5 [.53"]



| Type | L, mm [in] | Type | L, mm [in] | L, mm [in] |
|---------|--------------|----------|--------------|-------------|
| MGR 50 | 138,0 [5.43] | MGRE 50 | 157,5 [6.20] | 9,0 [.35] |
| MGR 80 | 143,0 [5.63] | MGRE 80 | 162,5 [6.40] | 14,0 [.55] |
| MGR 100 | 146,0 [5.75] | MGRE 100 | 165,5 [6.52] | 17,4 [.69] |
| MGR 125 | 150,5 [5.93] | MGRE 125 | 170,0 [6.69] | 21,8 [.86] |
| MGR 160 | 156,5 [6.16] | MGRE 160 | 176,0 [6.93] | 27,8 [1.09] |
| MGR 200 | 163,5 [6.44] | MGRE 200 | 183,0 [7.20] | 34,8 [1.37] |
| MGR 250 | 172,0 [6.77] | MGRE 250 | 192,0 [7.56] | 43,5 [1.71] |
| MGR 315 | 183,0 [7.20] | MGRE 315 | 204,0 [8.03] | 54,8 [2.16] |
| MGR 400 | 198,0 [7.80] | MGRE 400 | 218,0 [8.58] | 69,4 [2.73] |

C : 4xM8 - 13 mm [.51 in] depth

P_(A,B): 2xG1/2 or 2x7/8-14 UNF - 15 mm [.59 in] depth

T : G1/4 or 7/16-20 UNF - 12 mm [.47 in] depth (plugged)

Standard Rotation

Viewed from Shaft End

Port **A** Pressurized - **CW**

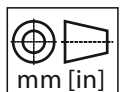
Port **B** Pressurized - **CCW**

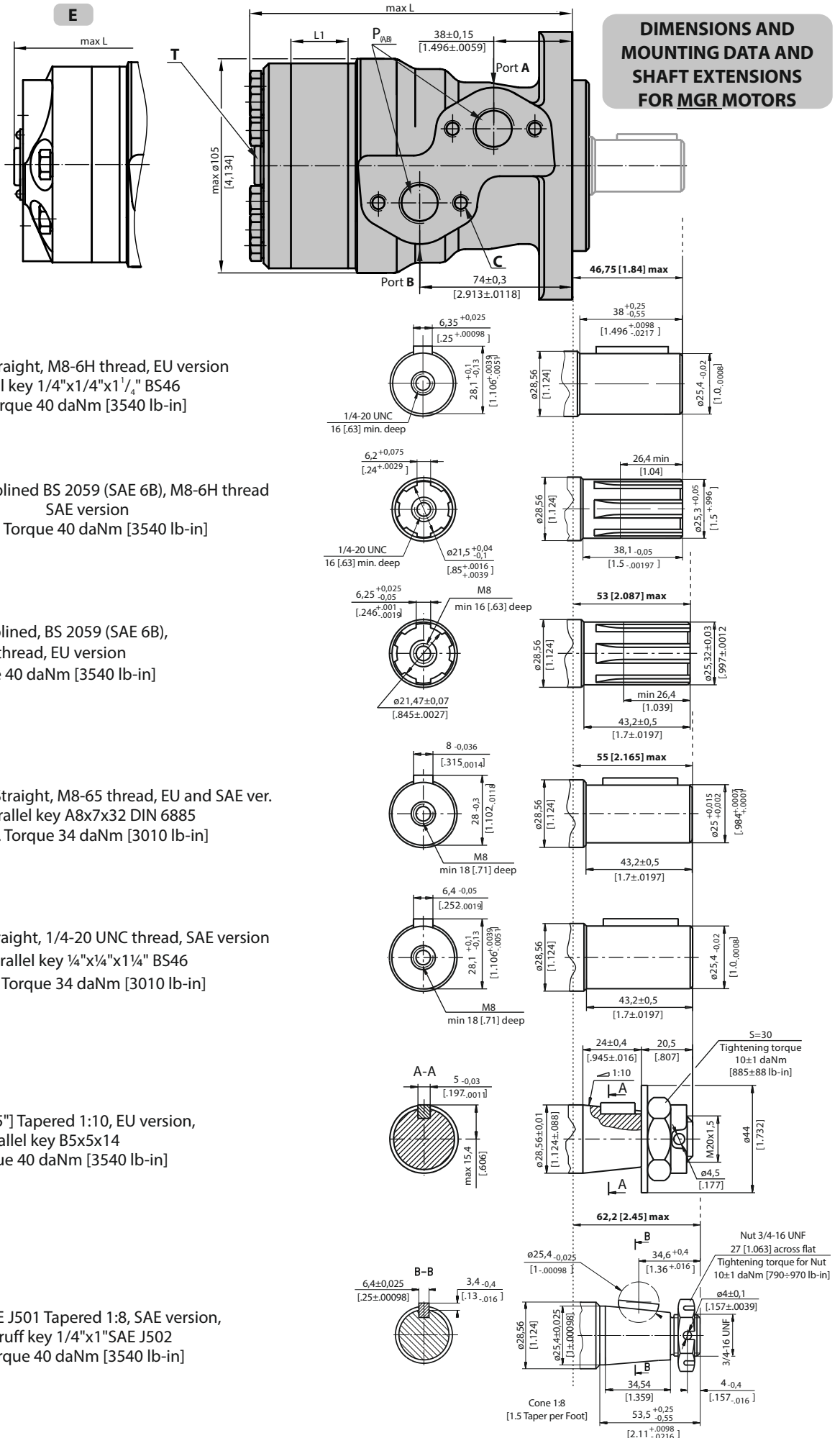
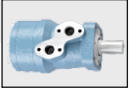
Reverse Rotation

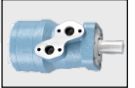
Viewed from Shaft End

Port **A** Pressurized - **CCW**

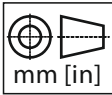
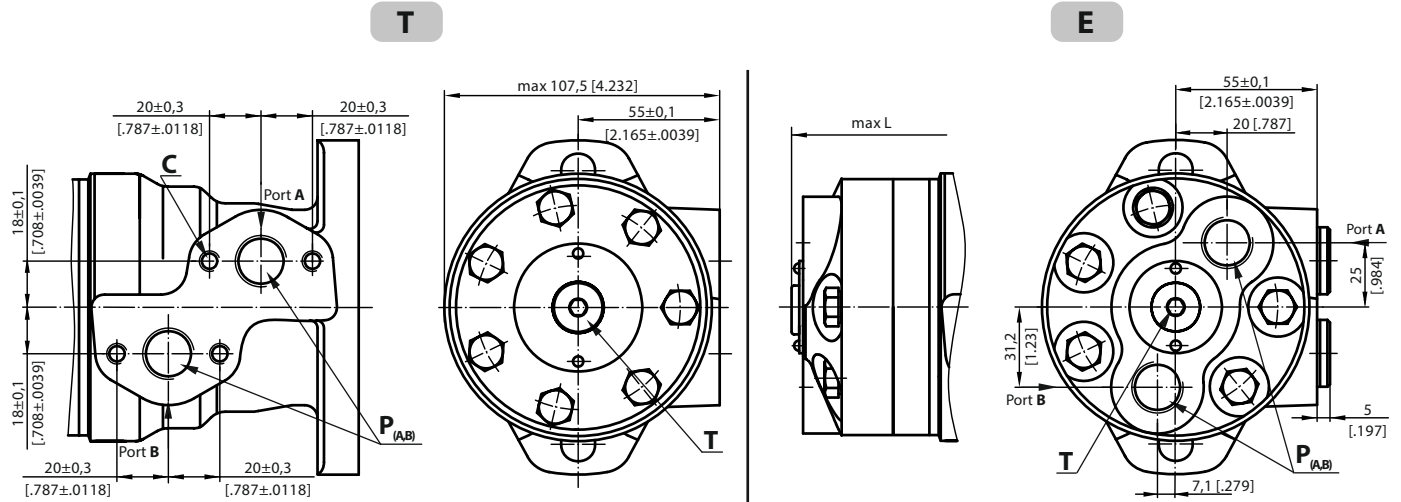
Port **B** Pressurized - **CW**







PORTS

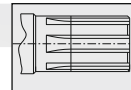


ORDER CODE

| | | | | | | | | |
|------------|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| MGR | | | | | | | | |

- Pos.1 - Mounting Flange**
 - A** - 2 Bolt flange, SAE A, spigot dia. 82,5 [3.25"] BC 106,35 [4.19"], Bolt Dia. 13,5 [.53"]
 - AM** - 2 Bolt flange, EU version, spigot dia. 82,5 [3.25"] BC 106,35 [4.19"], Bolt Dia. 13,5 [.53"]
- Pos.2 - Port type**
 - T** - Twin (Two) side ports on one side
 - E** - Rear ports
- Pos.3 - Displacement code**
 - 50** - 51,5 cm³/rev [3.14 in³/rev]
 - 80** - 80,3 cm³/rev [4.90 in³/rev]
 - 100** - 99,8 cm³/rev [6.09 in³/rev]
 - 125** - 125,7 cm³/rev [7.67 in³/rev]
 - 160** - 159,6 cm³/rev [9.74 in³/rev]
 - 200** - 199,8 cm³/rev [12.19 in³/rev]
 - 250** - 250,1 cm³/rev [15.26 in³/rev]
 - 315** - 315,7 cm³/rev [19.26 in³/rev]
 - 400** - 397,0 cm³/rev [24.40 in³/rev]
- Pos. 4 - Shaft Extensions****
 - D02** - ø25 [.984"] Straight, M8-6H thread, EU and SAE ver. Parallel key A8x7x32 DIN 6885
 - C06** - ø25,4 [1"] Straight, M8-6H thread, EU version Parallel key 1/4"x1/4"x1 1/4" BS46
 - D04*** - ø25,4 [1"] Straight, 1/4-20 UNC thread, SAE version Parallel key 1/4"x1/4"x1 1/4" BS46
 - S03** - ø25,4 [1"] Splined BS 2059 (SAE 6B), M8-6H thread, EU version
 - G07*** - ø25,4 [1"] Splined BS 2059 (SAE 6B), M8-6H thread, SAE version
 - K01** - ø28,56 [1.125"] Tapered 1:10, EU version, Parallel key B5x5x14
 - T01*** - 1" [25,4] SAE J501 Tapered 1:8, SAE version, Woodruff key 1/4"x1"SAE J502
- Pos. 5 - Shaft Seal Version** (see page 1)
 - default - Standard shaft seal
 - U** - High pressure shaft seal (without check valves)
- Pos. 6 - Ports**
 - B3** - 2xG1/2, drain port G1/4
 - A3** - 2x7/8-14 UNF, drain port 7/16-20 UNF
- Pos. 7 - Special Features** (see pages 66÷75)
- Pos. 8 - Design Series**
 - default - Factory specified

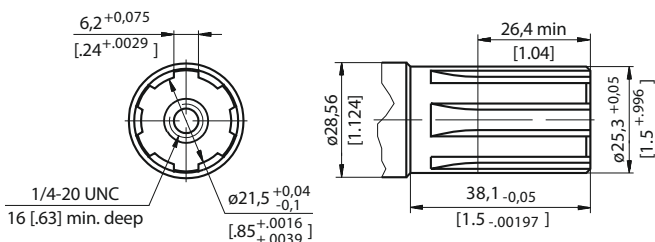
* Options D04, G07 and TF are available for pos.1 option A only.
 ** The permissible output torque for shafts must not be exceeded!



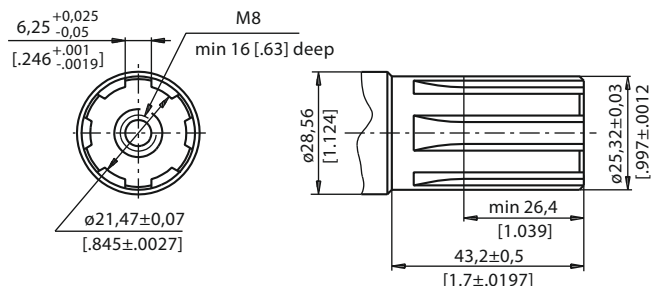
SHAFT TYPES AND DIMENSIONS

SPLINED

G07 - $\varnothing 25,4$ [1"] Splined BS 2059 (SAE 6B), M8-6H thread
SAE version
Max. Torque 40 daNm [3540 lb-in]

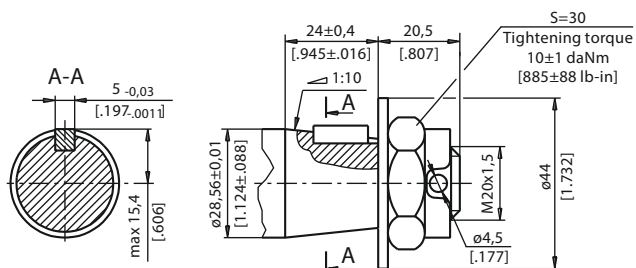


S03 - $\varnothing 25,4$ [1"] Splined, BS 2059 (SAE 6B),
M8-6H thread, EU version
Max. Torque 40 daNm [3540 lb-in]

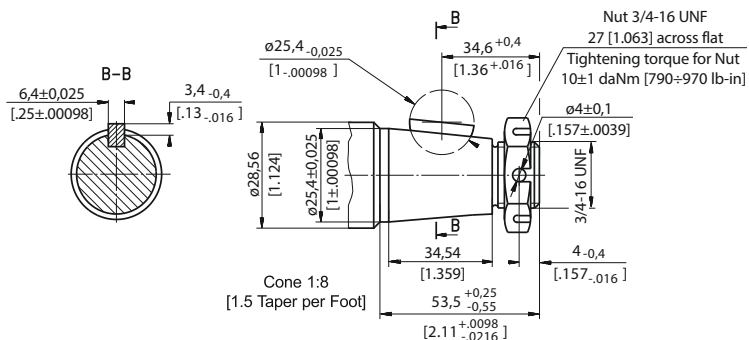


TAPERED

K01 - $\varnothing 28,56$ [1.125"] Tapered 1:10, EU version,
Parallel key B5x5x14
Max. Torque 40 daNm [3540 lb-in]

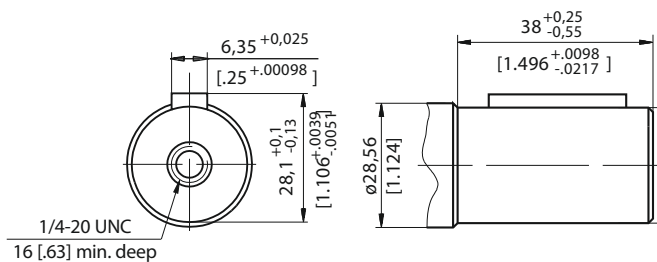


T01 - 1" [25,4] SAE J501 Tapered 1:8, SAE version,
Woodruff key 1/4"x1"SAE J502
Max. Torque 40 daNm [3540 lb-in]

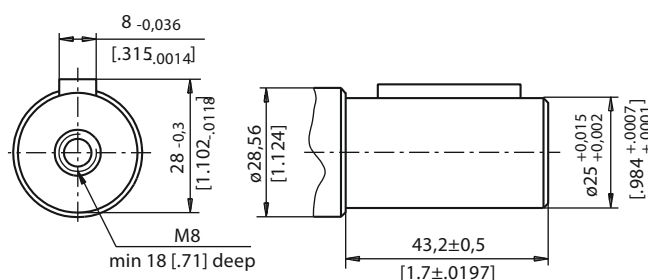


STRAIGHT

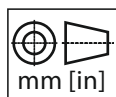
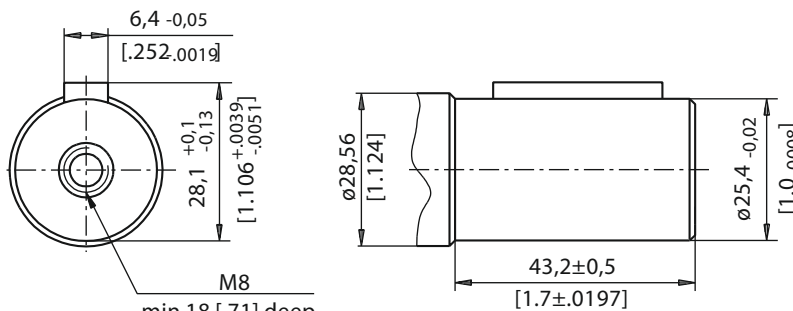
C06 - $\varnothing 25,4$ [1"] Straight, M8-6H thread, EU version
Parallel key 1/4"x1/4"x1/4" BS46
Max. Torque 40 daNm [3540 lb-in]



D02 - $\varnothing 25$ [.984"] Straight, M8-65 thread, EU and SAE ver.
Parallel key A8x7x32 DIN 6885
Max. Torque 34 daNm [3010 lb-in]

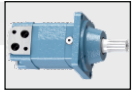


D04* - $\varnothing 25,4$ [1"] Straight, 1/4-20 UNC thread, SAE version
Parallel key 1/4"x1/4"x1/4" BS46
Max. Torque 34 daNm [3010 lb-in]



The required max. torque must not be exceeded

M8 min 18 [.71] deep



HYDRAULIC MOTORS MGS



APPLICATIONS

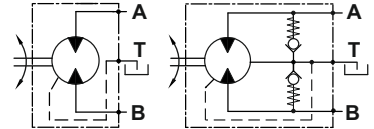
- Sweepers & Scrubbers
- Forklift
- Lawn & Turf
- Harvesters
- Drilling
- Forklift
- Wheel Loaders
- Aerial Work Platforms
- Industrial Applications
- Roadbuilding Machinery
- Skid Steer Loaders
- Forestry Machinery
- Salt Spreaders

OPTIONS

- Flange and wheel mount
- Twin side and rear ports
- Short motor
- Shafts - straight, splined and tapered
- Shaft seal for high and low pressure
- Metric and BSPP ports
- Speed sensors

ADVANTAGES

- Compact size
- High power density
- Roller design
- Strong bearing

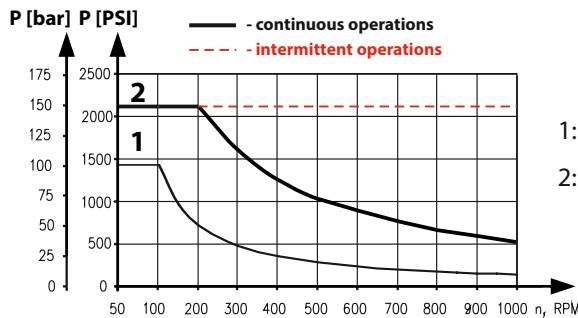


GENERAL

| | |
|---|--|
| Max. Displacement, cm ³ /rev [in ³ /rev] | 80,5 [4.91] ÷ 564,9 [34.47] |
| Max. Speed, [RPM] | 1000 |
| Max. Torque, daNm [lb-in] | cont.: 85 [7520] int.: 99 [8760] |
| Max. Output, kW [HP] | 23 [30.8] |
| Max. Pressure Drop, bar [PSI] | cont.: 210 [3050] int.: 275 [3990] |
| Max. Oil Flow, lpm [GPM] | 90 [24] |
| Min. Speed, [RPM] | 5 |
| Permissible Shaft Loads daN [lbs] | P _a =500 [1125] |
| 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) |

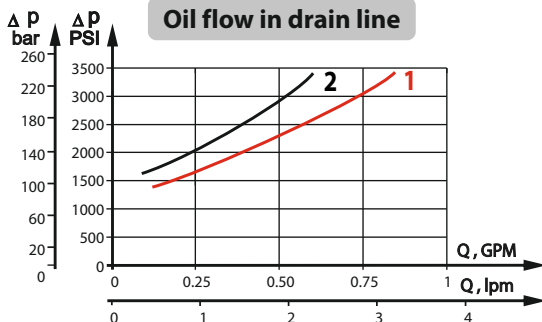
MAX. PERMISSIBLE SHAFT SEAL PRESSURE

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



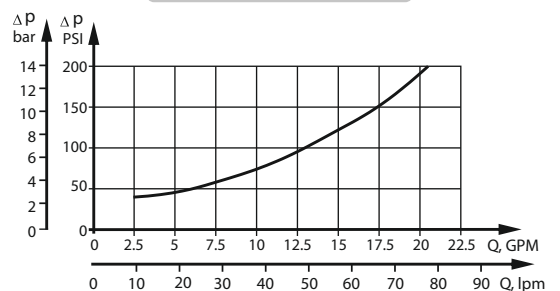
- 1: Drawing for Standard Shaft Seal
- 2: Drawing for High Pressure Seal ("U" Seal)

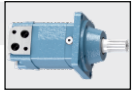
Oil flow in drain line



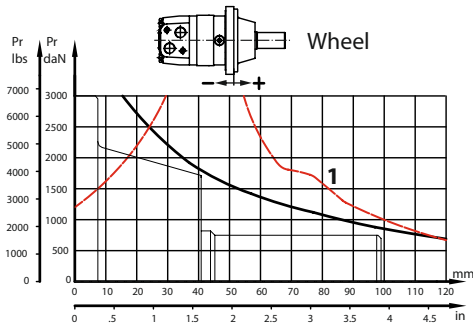
1: Viscosity 20 [98] mm²/s [SUS] 2: Viscosity 35 [164] mm²/s [SUS]

Pressure Losses

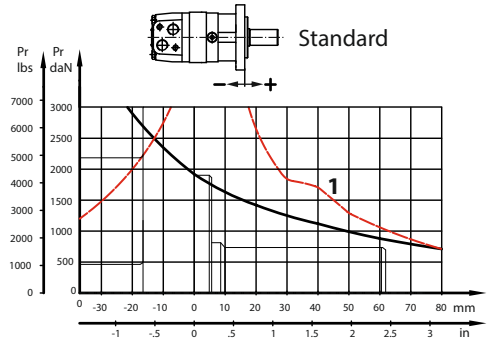




PERMISSIBLE SHAFT LOADS



The output shaft runs in tapered bearings that permit high axial and radial forces. The permissible radial load on the shaft is shown for an axial load of 0 N as function of the distance from the mounting flange to the point of load application. The curves apply to a B10 bearing life of 2000 hours at 100 RPM . Curve "1" shows max. radial shaft load. Any shaft load exceeding the values shown by the curve will seriously

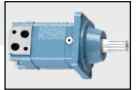


SPECIFICATION DATA

| Type | MGS 80 | MGS 100 | MGS 125 | MGS 160 | MGS 200 |
|--|--|--|--|--|--|
| Displacement, cm³/rev [in³/rev] | 80,5 [4.91] | 100 [6.1] | 125,7 [7.67] | 159,7 [9.74] | 200 [12.2] |
| Max. Speed, [RPM] | cont. 810 Int.* 1000 | cont. 750 Int.* 900 | cont. 600 Int.* 720 | cont. 470 Int.* 560 | cont. 375 Int.* 450 |
| Max. Torque daNm [lb-in] | cont. 24 [2120] Int.* 31 [2740] | cont. 30,5 [2700] Int.* 39 [3450] | cont. 37,5 [3320] Int.* 49 [4340] | cont. 49 [4340] Int.* 60 [5310] | cont. 61 [5400] Int.* 72 [6370] |
| Max. Output kW [HP] | cont. 15,5 [20.8] int.* 19,5 [26.2] | cont. 18 [24.1] int.* 22,8 [30.2] | cont. 18 [24.1] int.* 22,5 [30.2] | cont. 16,5 [22.1] int.* 23 [30.8] | cont. 16,5 [22.1] int.* 22 [29.52] |
| Max. Pressure Drop bar [PSI] | cont. 210 [3050] Int.* 275 [3990] peak** 295 [4280] | cont. 210 [3050] Int.* 275 [3990] peak** 295 [4280] | cont. 210 [3050] Int.* 275 [3990] peak** 295 [4280] | cont. 210 [3050] Int.* 275 [3990] peak** 295 [4280] | cont. 210 [3050] Int.* 275 [3990] peak** 295 [4280] |
| Max. Oil Flow lpm [GPM] | cont. 65 [17] Int.* 80 [21] | cont. 75 [20] Int.* 90 [24] | cont. 75 [20] Int.* 90 [24] | cont. 75 [20] Int.* 90 [24] | cont. 75 [20] Int.* 90 [24] |
| Max. Inlet Pressure bar [PSI] | cont. 230 [3340] Int.* 295 [4280] peak** 300 [4350] | cont. 230 [3340] Int.* 295 [4280] peak** 300 [4350] | cont. 230 [3340] Int.* 295 [4280] peak** 300 [4350] | cont. 230 [3340] Int.* 295 [4280] peak** 300 [4350] | cont. 230 [3340] Int.* 295 [4280] peak** 300 [4350] |
| Max. Return Pressure with Drain Line bar [PSI] | cont. 140 [2030] Int.* 175 [2540] peak** 210 [3050] | cont. 140 [2030] Int.* 175 [2540] peak** 210 [3050] | cont. 140 [2030] Int.* 175 [2540] peak** 210 [3050] | cont. 140 [2030] Int.* 175 [2540] peak** 210 [3050] | cont. 140 [2030] Int.* 175 [2540] peak** 210 [3050] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] | 12 [175] | 10 [145] | 10 [145] | 8 [115] | 8 [115] |
| Min. Starting Torque daNm [lb-in] | at max. press. drop cont. 18 [1590] at max. press. drop Int.* 23,5 [2080] | at max. press. drop cont. 23 [2040] at max. press. drop Int.* 30 [2660] | at max. press. drop cont. 29 [2570] at max. press. drop Int.* 38 [3360] | at max. press. drop cont. 37 [3270] at max. press. drop Int.* 46 [4070] | at max. press. drop cont. 47 [4160] at max. press. drop Int.* 56 [4960] |
| Min. Speed***, [RPM] | 10 | 10 | 8 | 8 | 6 |
| Weight, kg [lb] | MS4A 9,9 [21.8] | MS4A 10,1 [22.2] | MS4A 10,4 [22.9] | MS4A 10,8 [23.8] | MS4A 11,2 [24.7] |
| For Rear Ports + 0,40 [.88] | MSWK(WL) 10,4 [22.9] | MSWK(WL) 10,6 [23.3] | MSWK(WL) 10,9 [24] | MSWK(WL) 11,3 [24.6] | MSWK(WL) 11,7 [25.8] |
| | MSSK(S08) 7,9 [17.4] | MSSK(S08) 8,1 [17.8] | MSSK(S08) 8,4 [18.5] | MSSK(S08) 8,8 [19.4] | MSSK(S08) 9,2 [20.2] |

* 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 please ask

- 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.



SPECIFICATION DATA (continued)

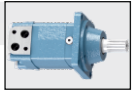
| Type | | MGS 250 | MGS 315 | MGS 400 | MGS 475 | MGS 525 | MGS 565 |
|--|---------------------------|-------------|--------------|-------------|--------------|---------------|--------------|
| Displacement, cm³/rev [in³/rev] | | 250 [15.3] | 314,9 [19.2] | 397 [24.2] | 474,6[28.96] | 522,7 [31.88] | 564,9[34.47] |
| Max. Speed, [RPM] | cont. | 300 | 240 | 190 | 160 | 145 | 130 |
| | Int.* | 360 | 290 | 230 | 190 | 175 | 160 |
| Max. Torque daNm [lb-in] | cont. | 72 [6370] | 82,5 [7300] | 86,5 [7660] | 85 [7520] | 85 [7520] | 85 [7520] |
| | Int.* | 87 [7700] | 100 [8850] | 99 [8760] | 99 [8760] | 99 [8760] | 99 [8760] |
| Max. Output kW [HP] | cont. | 14,5 [19.4] | 15 [20.1] | 11 [14.8] | 8,4 [11] | 7,6 [10.2] | 6,9 [9] |
| | int.* | 18 [24.1] | 17 [22.8] | 12,5 [16.8] | 11,3 [15] | 10,4 [13.9] | 9,6 [13] |
| Max. Pressure Drop bar [PSI] | cont. | 200 [2900] | 200 [2900] | 160 [2320] | 130 [1880] | 115 [1670] | 105 [1520] |
| | Int.* | 250 [3630] | 240 [3480] | 190 [2760] | 150 [2180] | 135 [1960] | 125 [1810] |
| | peak** | 270 [3920] | 260 [3770] | 210 [3050] | 170 [2470] | 155 [2250] | 145 [2100] |
| Max. Oil Flow lpm [GPM] | cont. | 75 [20] | 75 [20] | 75 [20] | 75 [20] | 75 [20] | 75 [20] |
| | Int.* | 90 [24] | 90 [24] | 90 [24] | 90 [24] | 90 [24] | 90 [24] |
| Max. Inlet Pressure bar [PSI] | cont. | 230 [3340] | 230 [3340] | 230 [3340] | 230 [3340] | 230 [3340] | 230 [3340] |
| | Int.* | 295 [4280] | 295 [4280] | 295 [4280] | 295 [4280] | 295 [4280] | 295 [4280] |
| | peak** | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] |
| Max. Return Pressure with Drain Line bar [PSI] | cont. | 140 [2030] | 140 [2030] | 140 [2030] | 140 [2030] | 140 [2030] | 140 [2030] |
| | Int.* | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] |
| | peak** | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] | | 8 [115] | 8 [115] | 8 [115] | 8 [115] | 8 [115] | 8 [115] |
| Min. Starting Torque daNm [lb-in] | at max. press. drop cont. | 56 [4960] | 71 [6280] | 71 [6280] | 71 [6280] | 71 [6280] | 71 [6280] |
| | at max. press. drop Int.* | 70 [6200] | 85 [7520] | 84 [7430] | 84 [7430] | 84 [7430] | 84 [7430] |
| Min. Speed***, [RPM] | | 6 | 5 | 5 | 5 | 5 | 5 |
| Weight, kg [lb] For Rear Ports + 0,40 [.88] | MS4A | 11,7 [25.8] | 12,4 [27.3] | 13,1 [29.3] | 14,1 [31] | 14,6 [32.2] | 15 [33.1] |
| | MSWK(WL) | 12,2 [26.9] | 12,9 [28.4] | 13,8 [30.4] | 14,6 [32.2] | 15,1 [33.3] | 15,5 [34.1] |
| | MSSK(S08) | 9,7 [21.4] | 10,4 [22.9] | 11,3 [24.9] | 12.1 [26.7] | 12,6 [27.8] | 13 [28.6] |

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

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

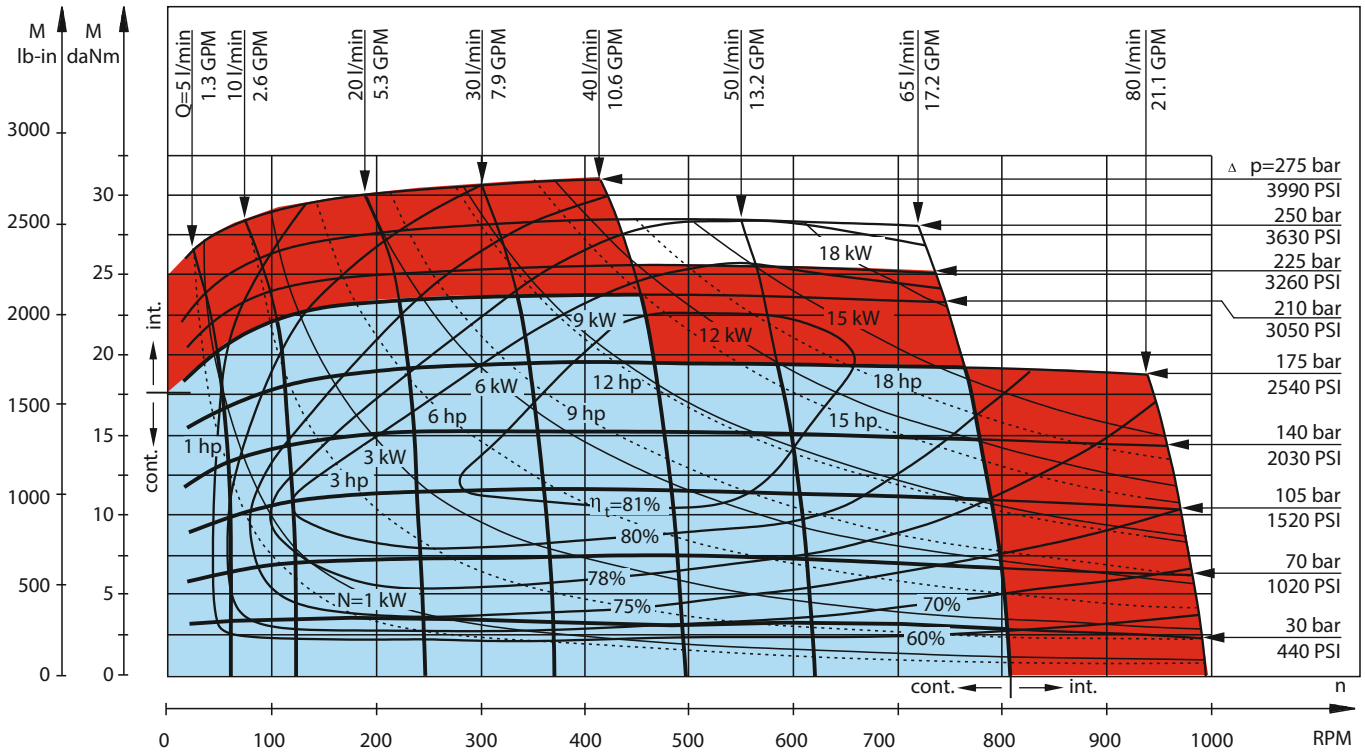
*** For speeds lower than given *please ask*

- 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.

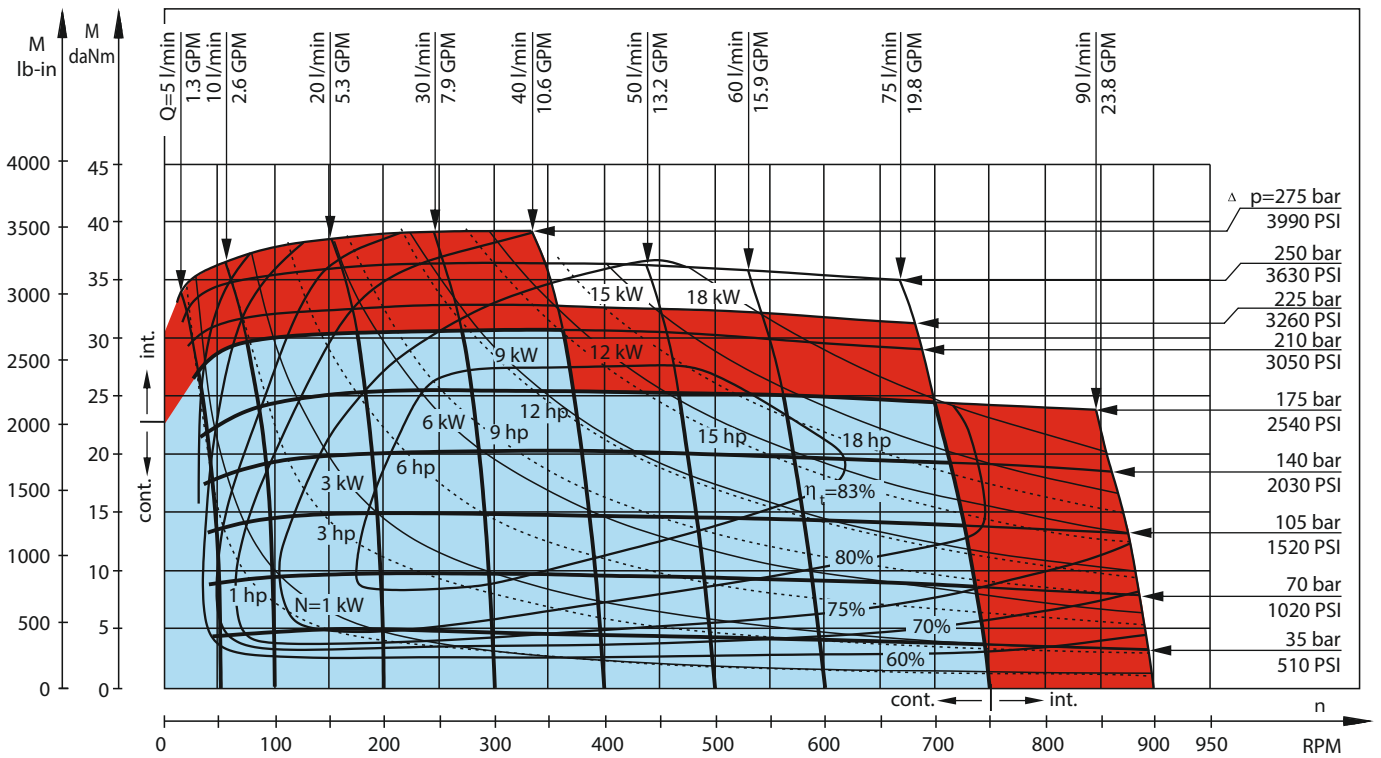


FUNCTION DIAGRAMS

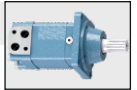
MGS 80



MGS 100

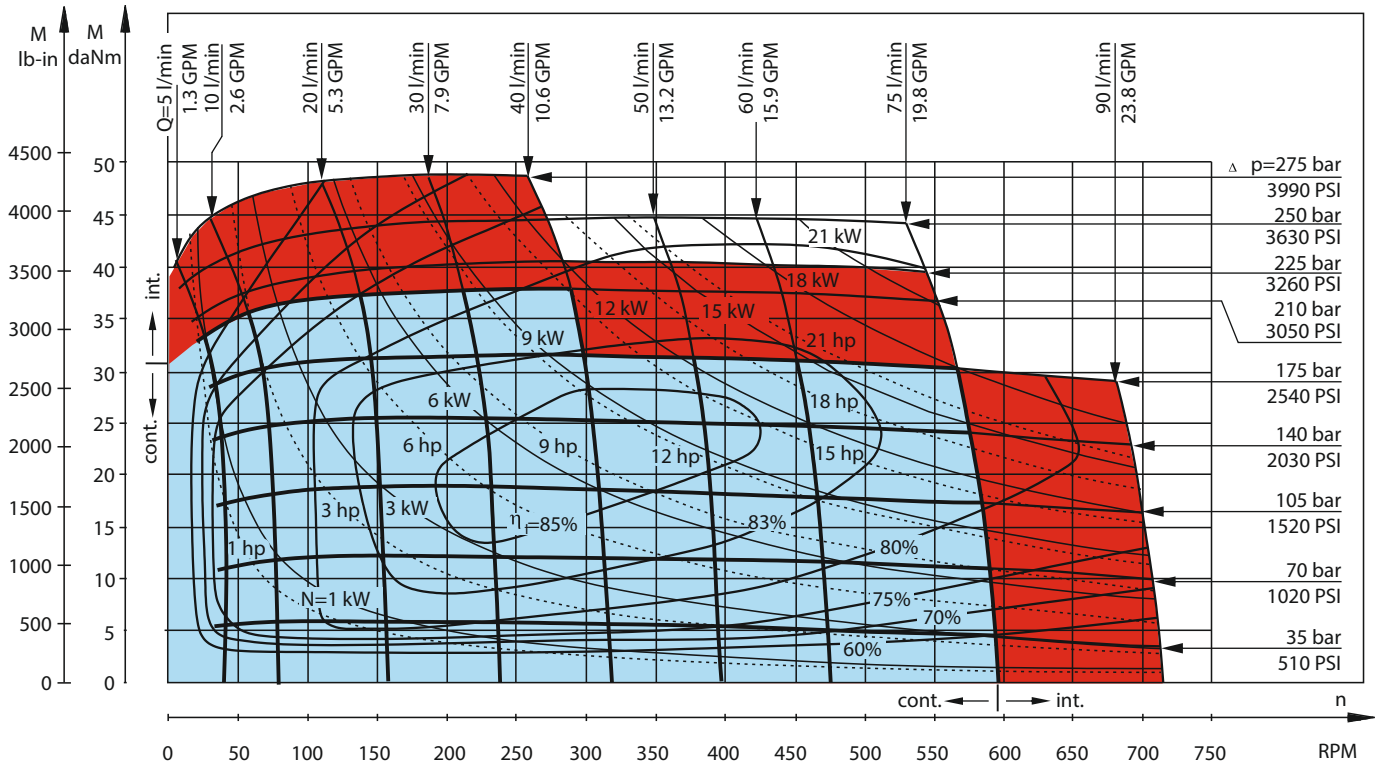


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

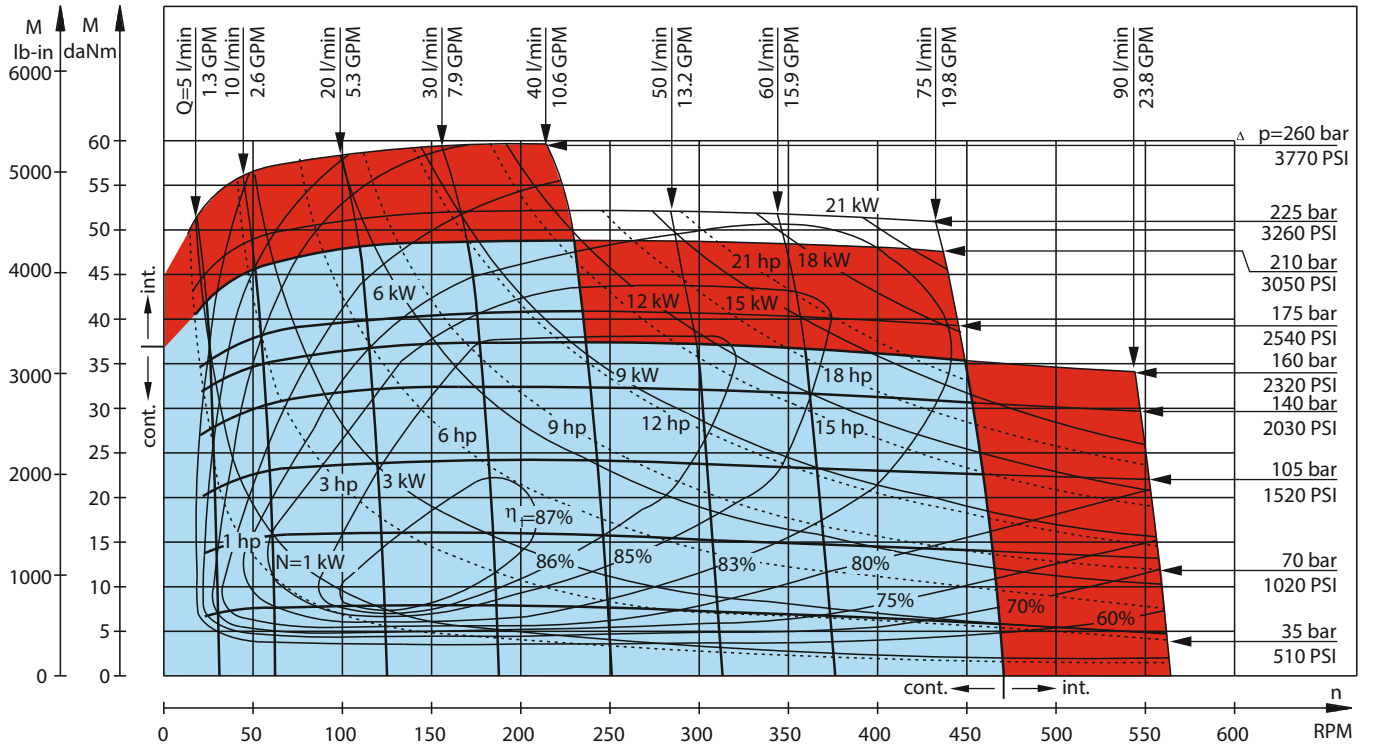


FUNCTION DIAGRAMS

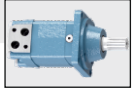
MGS 125



MGS 160

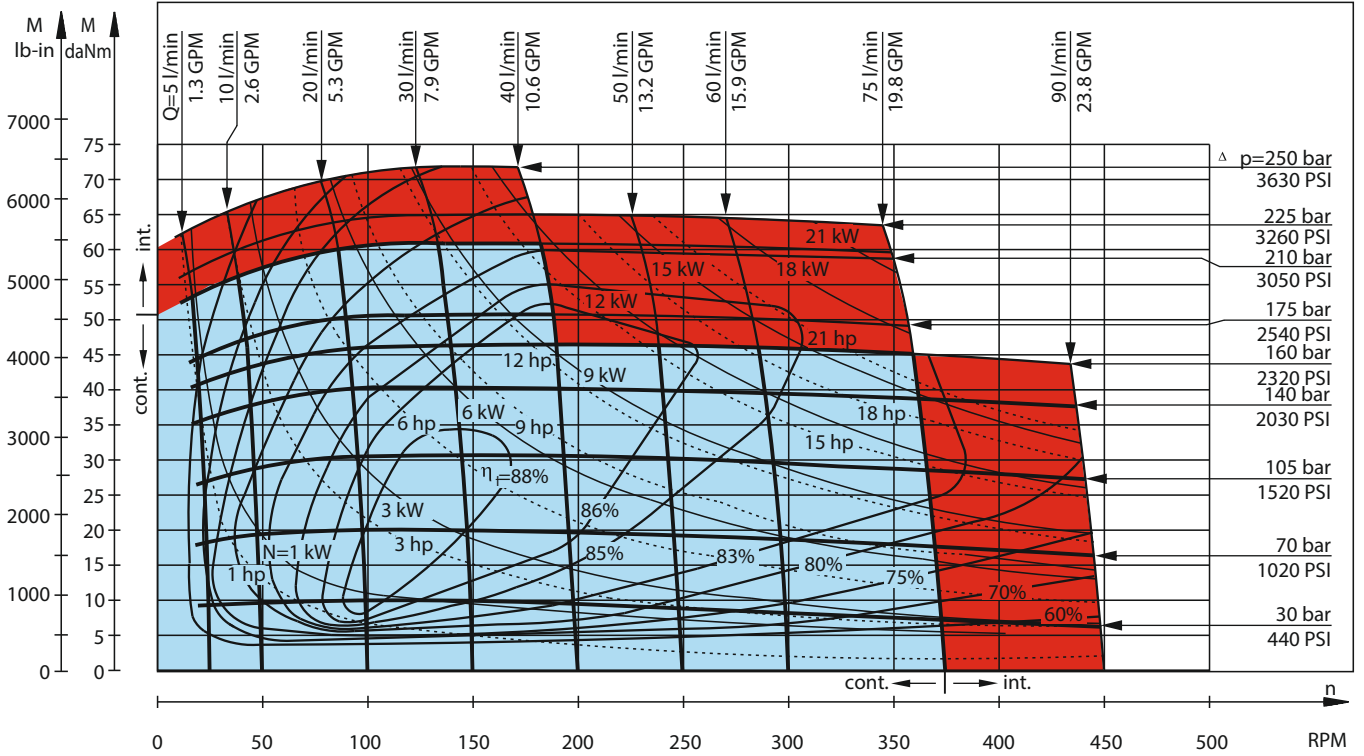


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

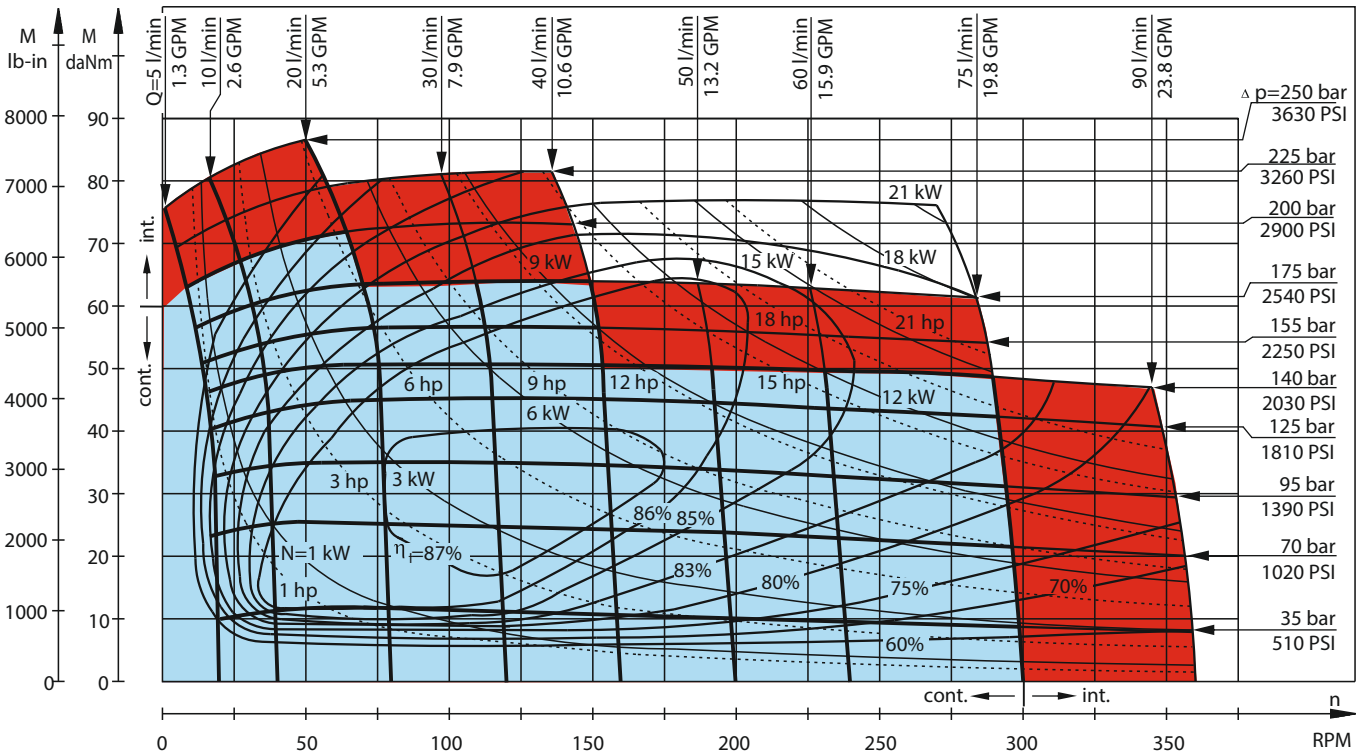


FUNCTION DIAGRAMS

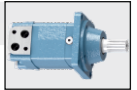
MGS 200



MGS 250

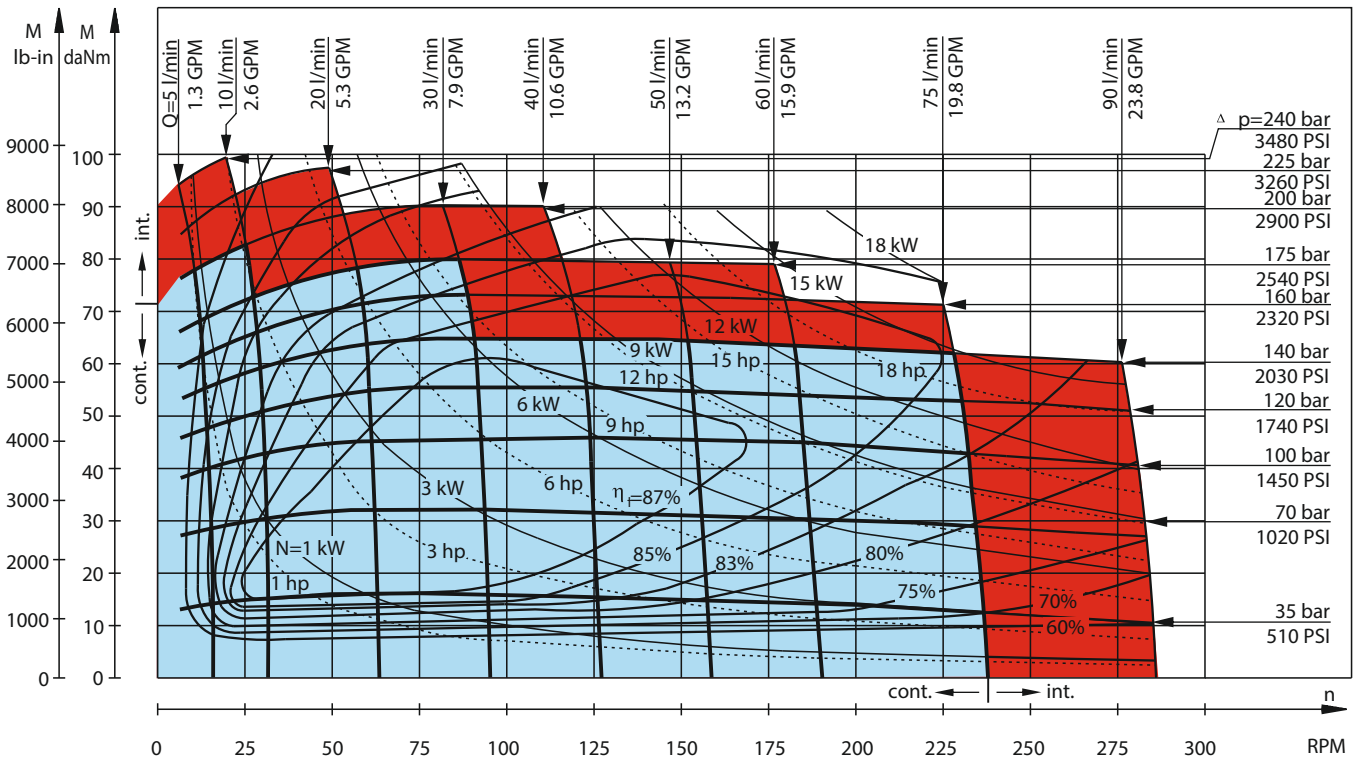


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

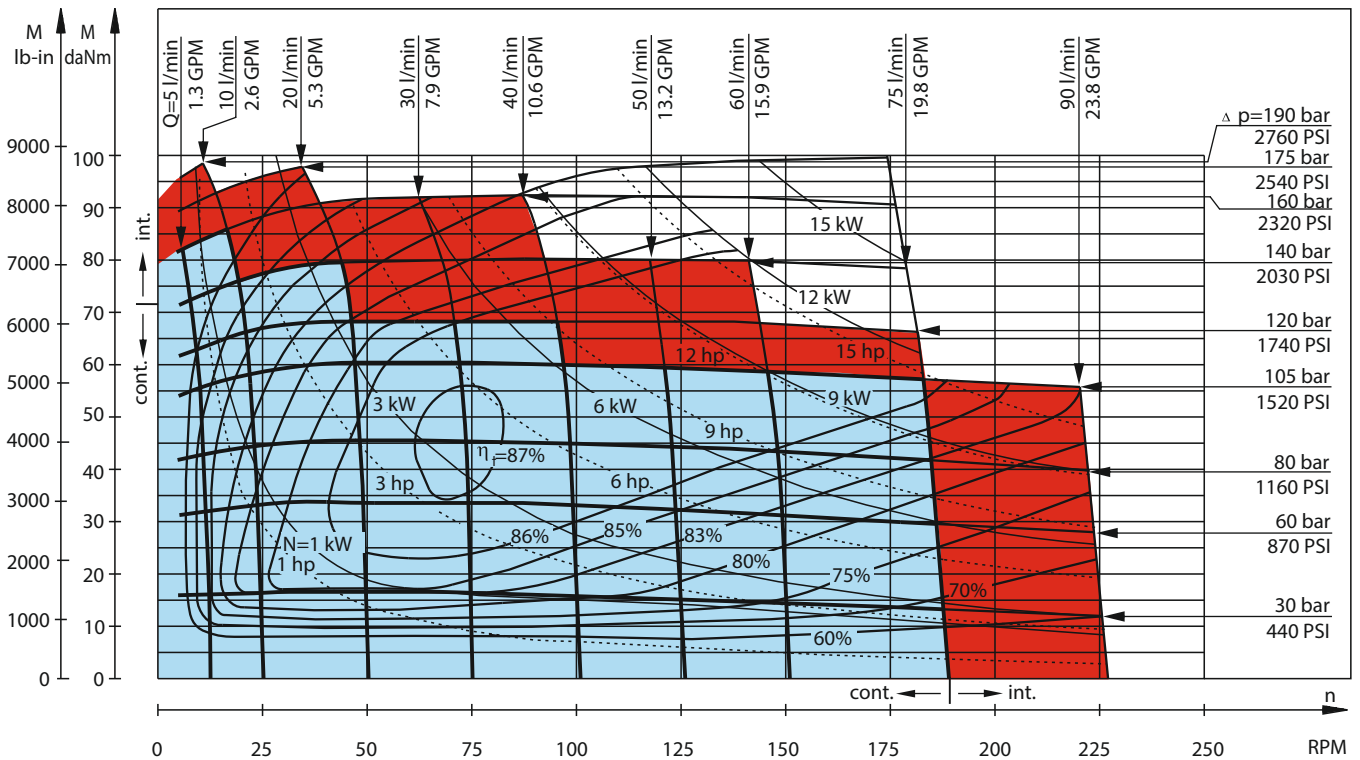


FUNCTION DIAGRAMS

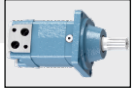
MGS 315



MGS 400

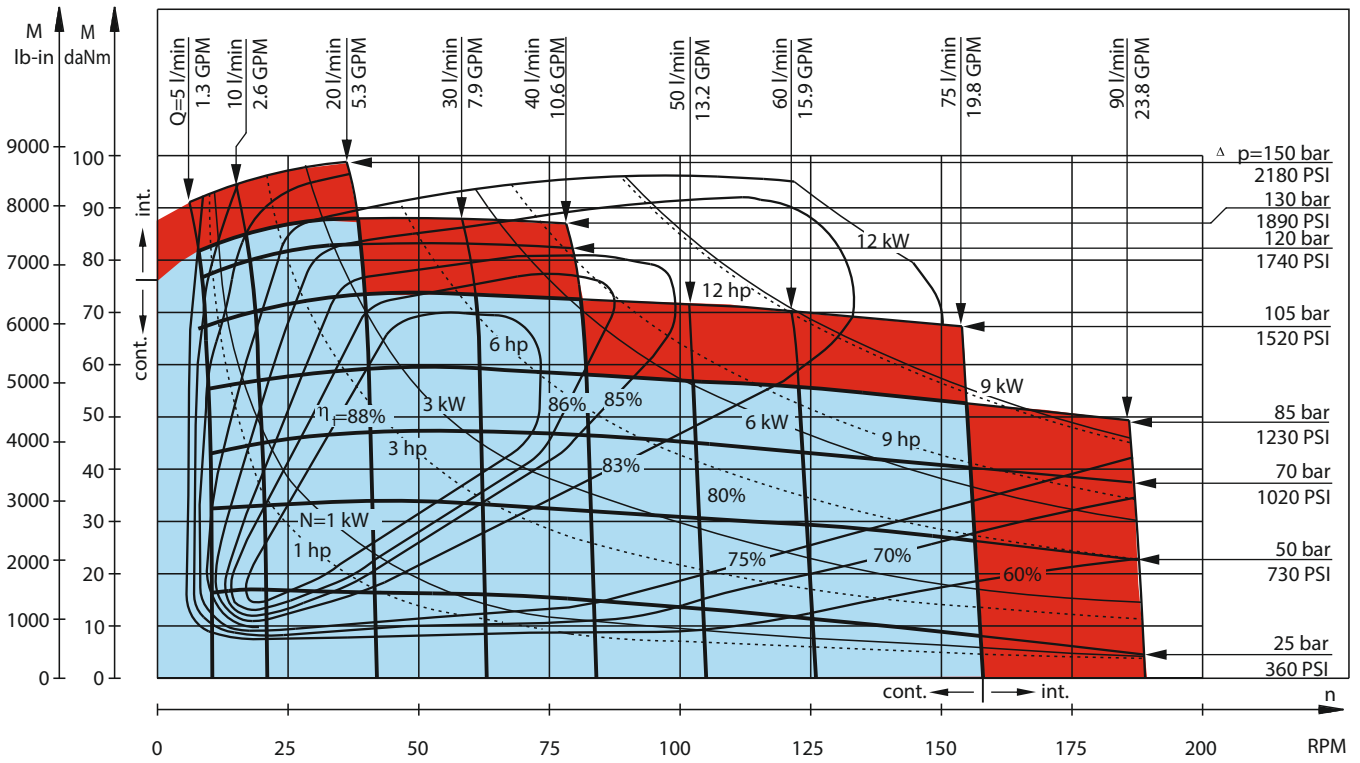


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

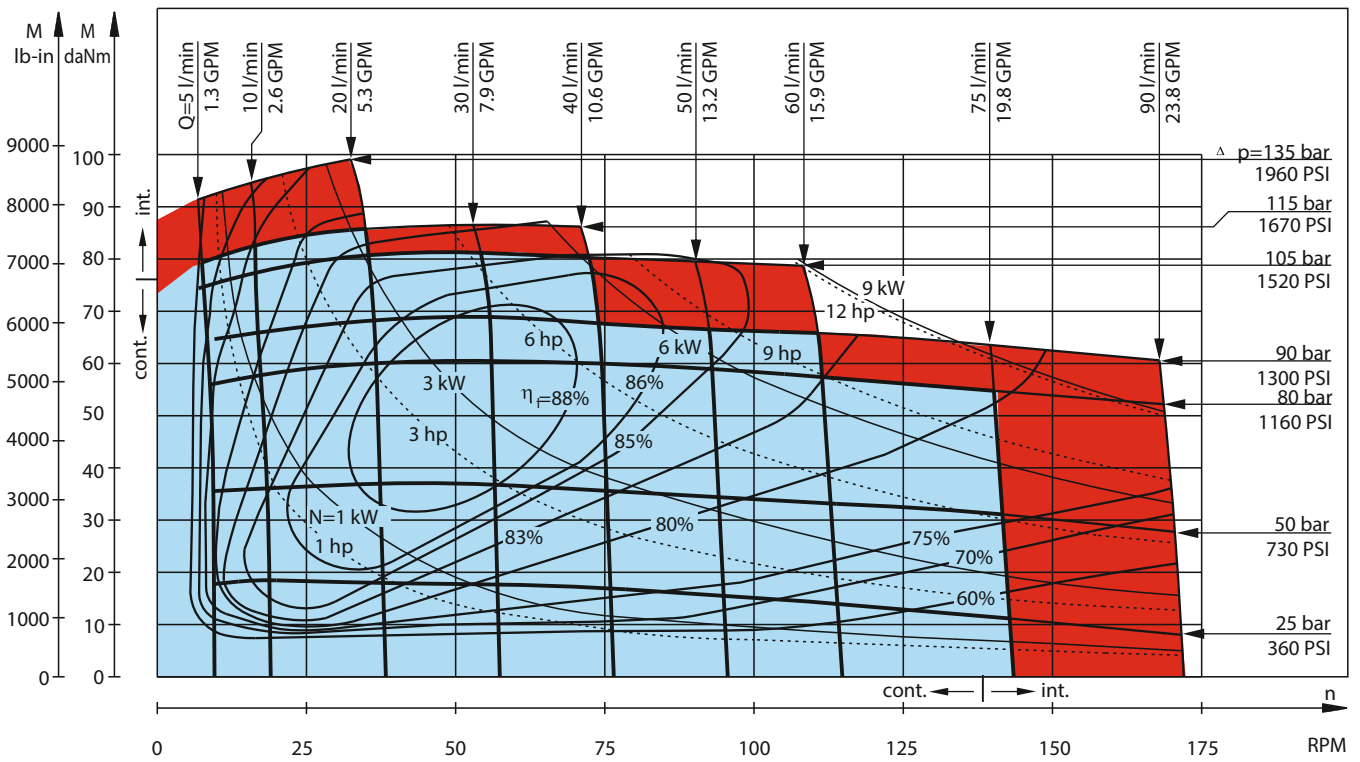


FUNCTION DIAGRAMS

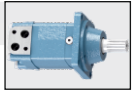
MGS 475



MGS 525

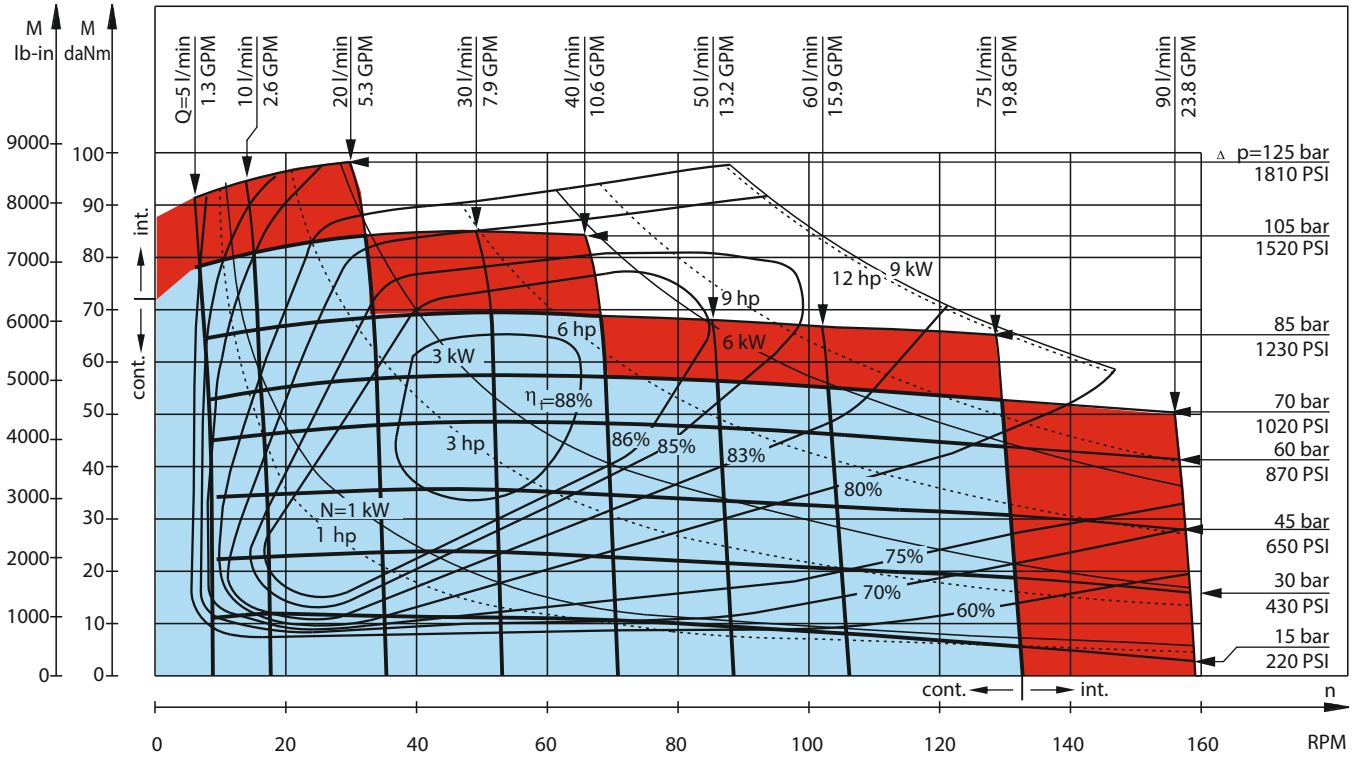


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

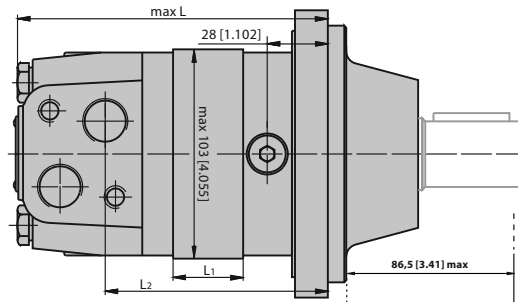
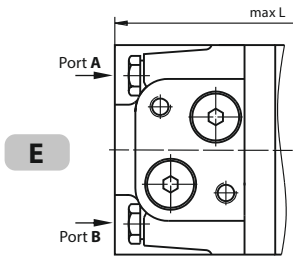
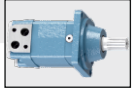


FUNCTION DIAGRAMS

MGS 565

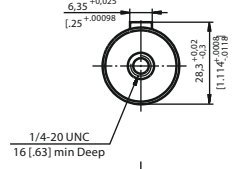


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

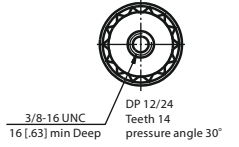


DIMENSIONS AND MOUNTING DATA AND SHAFT EXTENSIONS FOR MGSWK(WL) MOTORS

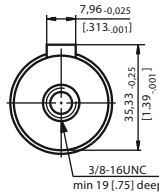
D03 - $\phi 25,4$ [1"] Straight, 1/4-20 UNC thread, EU version
Parallel key 1/4"x1/4"x1/4" BS46
Max. Torque 44 daNm [3900 lb-in]



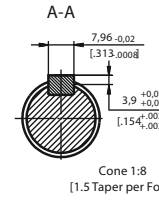
G09 - $\phi 31,75$ [1.25"] Spline SAE 14T 12/24 DP, 3/8-16 UNC thread, SAE version
Max. Torque 95 daNm [8400 lb-in]



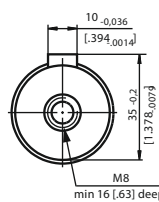
D06 - $\phi 31,75$ [1.25"] Straight, 3/8-16 UNC thread
Parallel key 5/16"x5/16"x1/4" BS46
Max. Torque 77 daNm [6815 lb-in]



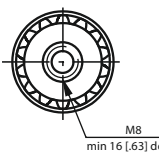
T03 - $\phi 31,75$ [1.25"] Tapered 1:8, 1-20 UNEF thread, SAE J501 version,
Parallel key 5/16"x5/16"x1/4" BS46
Max. Torque 95 daNm [8400 lb-in]



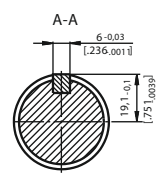
C09 - $\phi 32$ [1.26"] Straight, M8 thread, EU version
Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm [6815 lb-in]



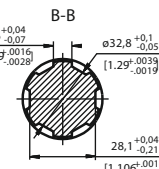
S06 - $\phi 31,75$ [1.25"] Spline SAE 14T 12/24 DP, M8 thread, EU version
Max. Torque 95 daNm [8400 lb-in]



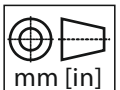
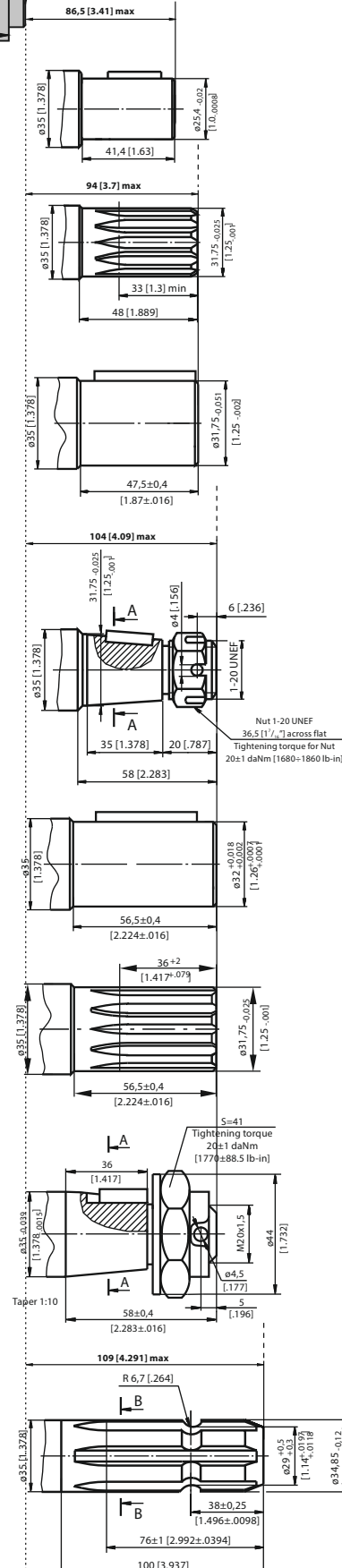
K02 - $\phi 35$ [1.378"] Tapered 1:10, EU version,
Parallel key B6x6x20 DIN 6885
Max. Torque 95 daNm [8400 lb-in]

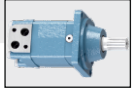


S08 - $\phi 35$ [1.378"] Spline p.t.o. DIN 9611 Form 1
Max. Torque 77 daNm [6815 lb-in]



* Deviated from DIN 961 ISO/R500 without pin hole similar to SAE J1170

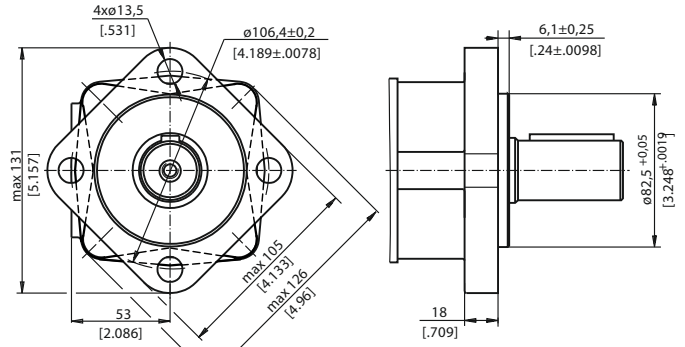




MOUNTING

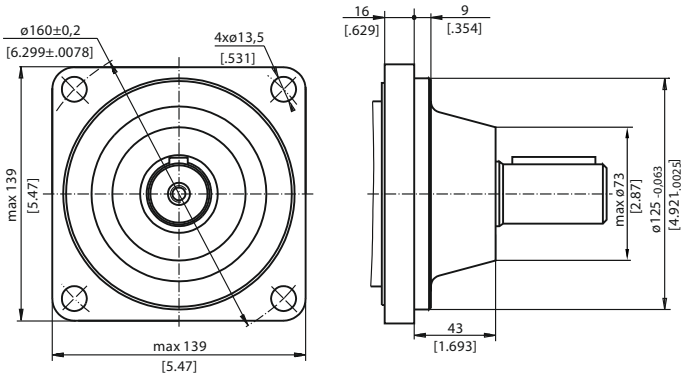
4A

4 Bolt flange, SAE A version,
spigot dia. 82,5 [3.25"] BC 106,35 [4.19"],
Bolt Dia. 13,5 [.53"]



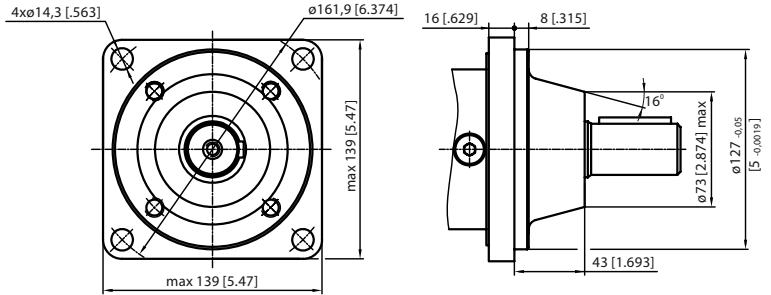
WK

Wheel flange, EU version,
spigot dia. 125 [4.921"] BC 160 [6.266"],
Bolt Dia. 13,5 [.53"]



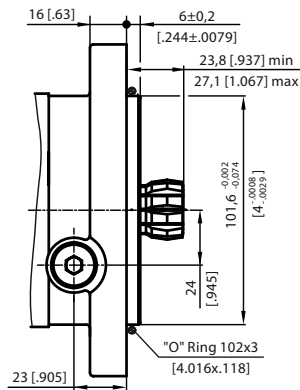
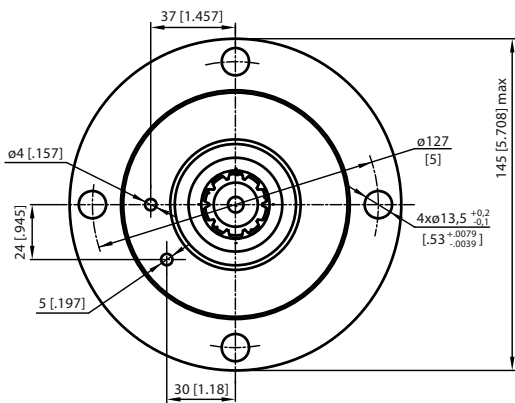
WL

Wheel flange, SAE version,
spigot dia. 127 [5"] BC 161,9 [6.374"],
Bolt Dia. 14,3 [.563"]



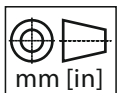
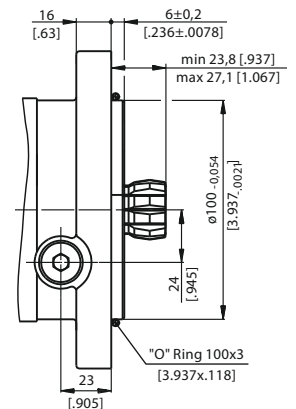
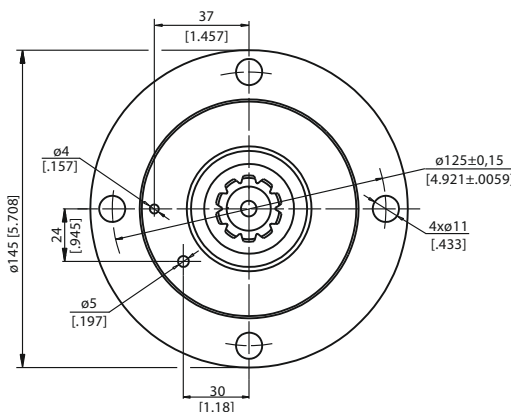
SL

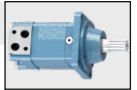
Short flange, SAE version,
spigot dia. 101,6 [4"] BC 127 [5"],
Bolt Dia. 13,5 [.531"]



SK

Short flange, EU version,
spigot dia. 100 [3.937"] BC 125 [4.921"],
Bolt Dia. 11 [.433"]



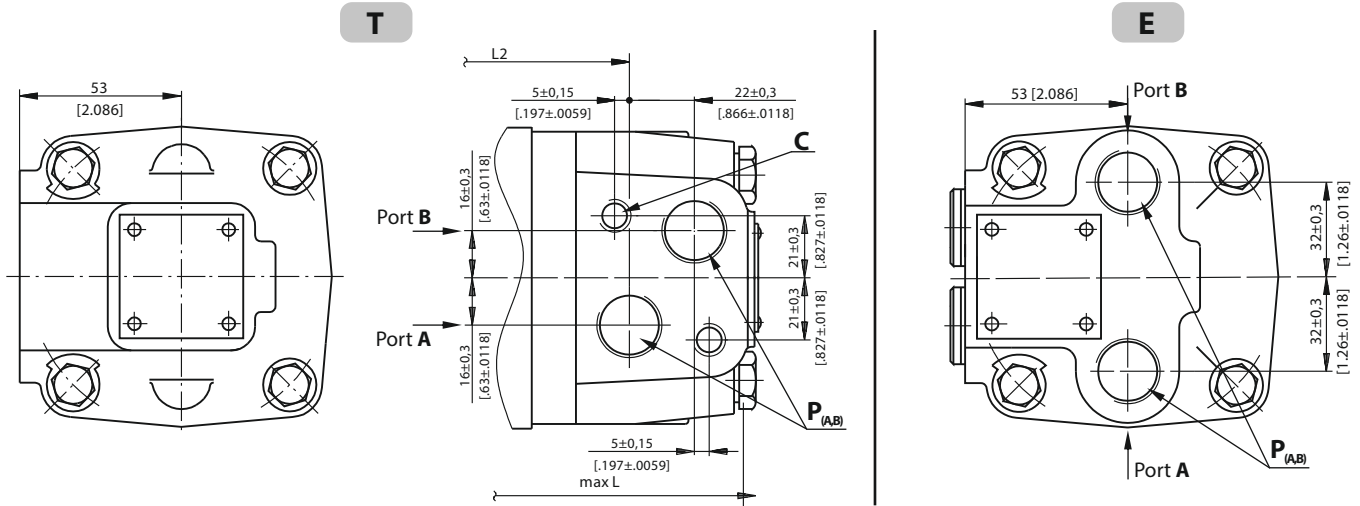


MOUNTING (continued)

| Type | L, mm [in] | L ₂ , mm [in] | *L _E , mm [in] | Type | L, mm [in] | L ₂ , mm [in] | *L _E , mm [in] | Type | L, mm [in] | L ₂ , mm [in] | *L _E , mm [in] | L ₁ , mm [in] |
|-----------|------------|--------------------------|---------------------------|---------------|------------|--------------------------|---------------------------|---------------|------------|--------------------------|---------------------------|--------------------------|
| MGS4A 80 | 168 [6.61] | 124 [4.88] | 173 [6.81] | MGSWK(WL) 80 | 129 [5.08] | 87 [3.43] | 138 [5.43] | MGSSK(SL) 80 | 125 [4.92] | 83 [3.27] | 134 [5.28] | 14,0 [1.55] |
| MGS4A 100 | 171 [6.73] | 128 [5.04] | 177 [6.97] | MGSWK(WL) 100 | 133 [5.23] | 91 [3.58] | 142 [5.59] | MGSSK(SL) 100 | 129 [5.08] | 87 [3.43] | 138 [5.43] | 17,4 [1.69] |
| MGS4A 125 | 176 [6.93] | 132 [5.20] | 181 [7.13] | MGSWK(WL) 125 | 137 [5.39] | 95 [3.74] | 146 [5.75] | MGSSK(SL) 125 | 133 [5.24] | 90 [3.54] | 141 [5.55] | 21,8 [1.86] |
| MGS4A 160 | 182 [7.17] | 138 [5.43] | 187 [7.36] | MGSWK(WL) 160 | 143 [5.63] | 101 [3.98] | 152 [5.99] | MGSSK(SL) 160 | 139 [5.47] | 96 [3.78] | 147 [5.79] | 27,8 [1.09] |
| MGS4A 200 | 189 [7.44] | 145 [5.71] | 194 [7.64] | MGSWK(WL) 200 | 150 [5.91] | 108 [4.25] | 159 [6.26] | MGSSK(SL) 200 | 146 [5.75] | 103 [4.05] | 154 [6.06] | 34,8 [1.37] |
| MGS4A 250 | 197 [7.76] | 154 [6.06] | 203 [7.99] | MGSWK(WL) 250 | 159 [6.26] | 117 [4.61] | 168 [6.62] | MGSSK(SL) 250 | 155 [6.10] | 112 [4.41] | 163 [6.42] | 43,5 [1.71] |
| MGS4A 315 | 209 [8.23] | 165 [6.50] | 214 [8.43] | MGSWK(WL) 315 | 170 [6.69] | 128 [5.04] | 179 [7.05] | MGSSK(SL) 315 | 166 [6.54] | 123 [4.84] | 174 [6.85] | 54,8 [2.16] |
| MGS4A 400 | 223 [8.78] | 179 [7.05] | 228 [8.98] | MGSWK(WL) 400 | 184 [7.24] | 143 [5.63] | 194 [7.64] | MGSSK(SL) 400 | 181 [7.13] | 138 [5.43] | 189 [7.44] | 69,4 [2.73] |
| MGS4A 475 | 237 [9.33] | 193 [7.60] | 242 [9.53] | MGSWK(WL) 475 | 198 [7.79] | 156 [6.14] | 207 [8.15] | MGSSK(SL) 475 | 194 [7.64] | 152 [5.98] | 203 [7.99] | 82,6 [3.25] |
| MGS4A 525 | 229 [9.02] | 185 [7.28] | 234 [9.21] | MGSWK(WL) 525 | 190 [7.48] | 148 [5.83] | 199 [7.84] | MGSSK(SL) 525 | 186 [7.32] | 144 [5.67] | 195 [7.68] | 74,5 [2.93] |
| MGS4A 565 | 235 [9.25] | 191 [7.52] | 240 [9.45] | MGSWK(WL) 565 | 196 [7.72] | 154 [6.06] | 205 [8.07] | MGSSK(SL) 565 | 192 [7.56] | 150 [5.91] | 201 [7.91] | 80,2 [3.16] |

* - For Rear Ported Motors.

PORTS

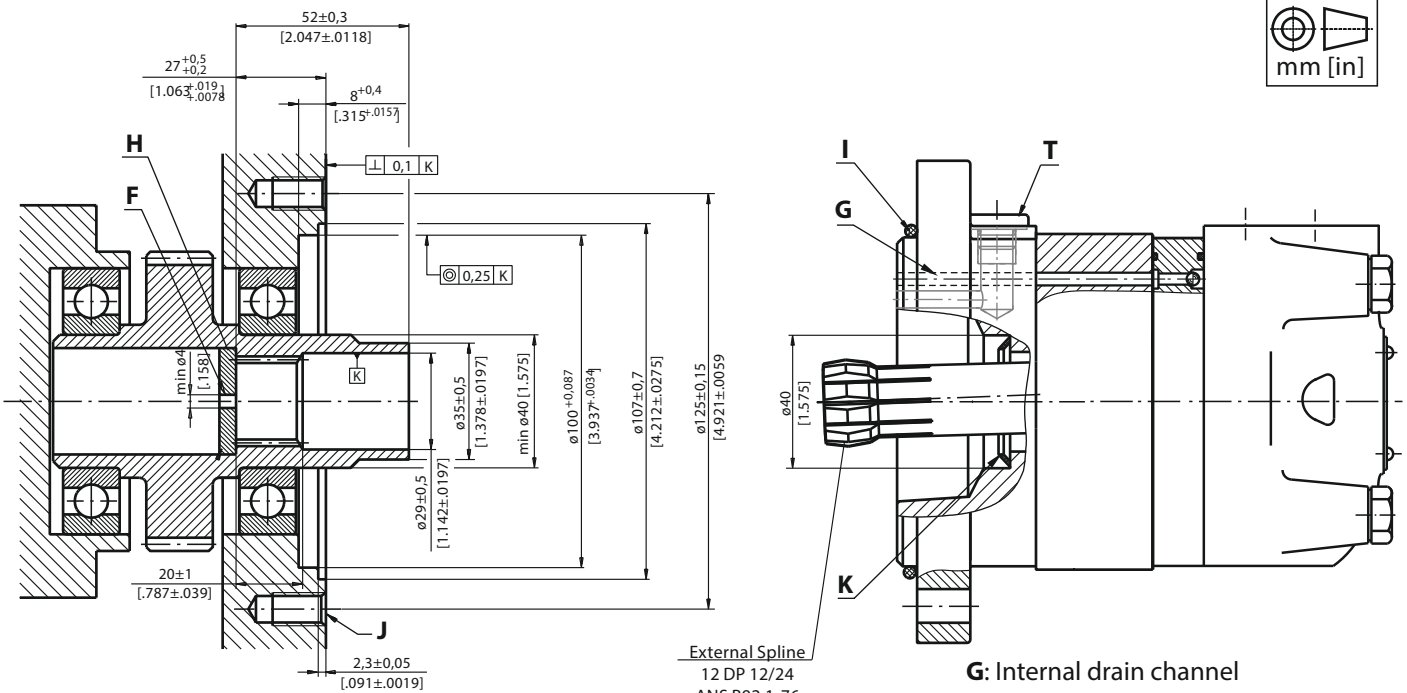


C: 2xM10-12 mm [47 in] depth
P_(A,B): 2xG1/2 or 2xM22x1,5-15 mm [.59 in] depth
T: G ¼ or M14x1,5- 12 mm [.47 in] depth (plugged)

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**

DIMENSIONS OF THE ATTACHED COMPONENT for MGSS



F: Oil circulation hole
H: Hardened stop plate
J: 4xM10-16 mm [.63 in] depth, 90°

G: Internal drain channel
I: O- Ring 100x3 mm [3.94x.12 in]
K: Conical seal ring
T: Drain connection G1/4 or M14x1,5



DRAIN CONNECTION

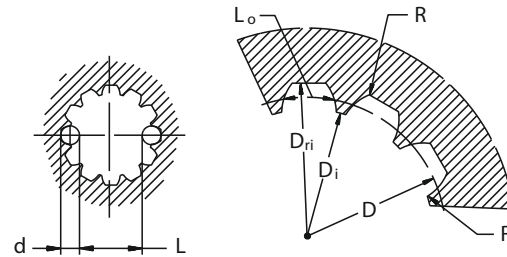
The drain line has to be used when pressure in the return line can exceed the permissible pressure. It can be connected at the drain port of the motor;

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; addendum modification x.m=+0,8]

| Flat Root Side Fit | | mm | inch |
|-------------------------------|-----------------|------------------------|-----------------|
| Number of Teeth | z | 12 | 12 |
| Diametral Pitch | DP | 12/24 | 12/24 |
| Pressure Angle | | 30° | 30° |
| Pitch Dia. | D | 25,4 | 1 |
| Major Dia. | D _{ri} | 28,0 _{-0,1} | 1.1 ÷ 1.098 |
| Minor Dia. | D _i | 23,0 ^{+0,033} | .907 ÷ .905 |
| Circular tooth space | Lo | 4,308±0,020 | .1704 ÷ .1688 |
| Fillet Radius | R | 0,2 | .008 |
| Max. Measurement between Pins | L | 17,62 ^{+0,15} | .699 ÷ .694 |
| Pin Dia. | d | 4,835±0,001 | .19039 ÷ .19031 |



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

ORDER CODE

| | | | | | | | | |
|------------|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| MGS | | | | | | | | |

Pos.1 - Mounting Flange

- 4A** - 4 Bolt flange, SAE A, spigot dia. 82,5 [3.25"], BC 106,35 [4.19"], Bolt Dia. 13,5 [.53"]
- WK** - Wheel flange, EU version, spigot dia. 125 [4.921"], BC 160 [6.266"], Bolt Dia. 13,5 [.53"]
- WL** - Wheel flange, SAE version, spigot dia. 127 [5"], BC 161,9 [6.374"], Bolt Dia. 14,3 [.563"]
- SK** - Short flange, EU version, spigot dia. 100 [3.937"], BC 125 [4.921"], Bolt Dia. 11 [.433"]
- SL** - Short flange, SAE version, spigot dia. 101,6 [4"], BC 127 [5"], Bolt Dia. 13,5 [.531"]

Pos.2 - Port type

- T** - Twin (Two) side ports on one side
- E** - Rear ports

Pos.3 - Displacement code

- 80** - 80,5 cm³/rev [4.91 in³/rev]
- 100** - 100,0 cm³/rev [6.10 in³/rev]
- 125** - 125,7 cm³/rev [7.67 in³/rev]
- 160** - 159,7 cm³/rev [9.74 in³/rev]
- 200** - 200,0 cm³/rev [12.20 in³/rev]
- 250** - 250,0 cm³/rev [15.30 in³/rev]
- 315** - 314,9 cm³/rev [19.20 in³/rev]
- 400** - 397,0 cm³/rev [24.20 in³/rev]
- 475** - 474,6 cm³/rev [28.96 in³/rev]
- 525** - 522,7 cm³/rev [31.88 in³/rev]
- 565** - 564,9 cm³/rev [34.47 in³/rev]

Pos. 4 - Shaft Extensions*

- S06** - ø31,75 [1.25"] Spline SAE 14T 12/24 DP, M8 thread, EU version
- G09** - ø31,75 [1.25"] Spline SAE 14T 12/24 DP, 3/8-16 UNC thread, SAE version
- S08** - ø35 [1.378"] Spline p.t.o. DIN 9611 Form 1
- D03** - ø25,4 [1"] Straight, 1/4-20 UNC thread, Parallel key 1/4"x1/4"x1" BS46
- D06** - ø31,75 [1.25"] Straight, 3/8-16 UNC thread, Parallel key 5/16"x5/16"x1¹/₄" BS46
- C09** - ø32 [1.26"] Straight, M8 thread, EU version, Parallel key A10x8x45 DIN 6885
- T03** - ø31,75 [1.25"] Tapered 1:8, 1-20 UNEF thread, SAE J501 version, Parallel key 5/16"x5/16"x1" BS46
- K02** - ø35 [1.378"] Tapered 1:10, EU version, Parallel key B6x6x20 DIN 6885

Pos. 5 - Shaft Seal Version

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

Pos. 6 - Ports

- B3** - 2xG1/2, drain port G1/4
- A3** - 2x7/8-14 UNF, drain port 7/16-20 UNF

Pos. 7 - Special Features (see pages 66÷75)

Pos. 8 - Design Series

- default - Factory specified

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



HYDRAULIC MOTORS MGT



APPLICATIONS

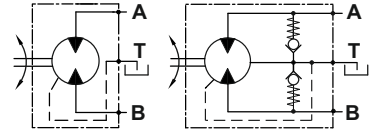
- Sweepers & Scrubbers
- Forklift
- Roadbuilding Machinery
- Forklift
- Wheel Loaders
- Skid Steer Loaders
- Lawn & Turf
- Aerial Work Platforms
- Forestry Machinery
- Harvesters
- Industrial Applications
- Salt Spreaders
- Drilling

OPTIONS

- Flange and wheel mount
- Twin side and rear ports
- Short motor
- Shafts - straight, splined and tapered
- Shaft seal for high and low pressure
- Metric and BSPP ports
- Speed sensors

ADVANTAGES

- High power density
- Roller design
- Strong bearing



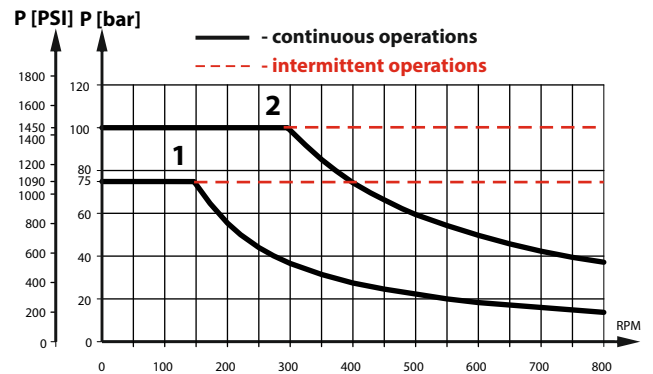
GENERAL

| | |
|---|--|
| Max. Displacement, cm ³ /rev [in ³ /rev] | 161,1 [9.83] ÷ 724,3 [44.2] |
| Max. Speed, [RPM] | 775 |
| Max. Torque, daNm [lb-in] | cont.: 130 [11500] int.: 148 [13100] |
| Max. Output, kW [HP] | 40 [54] |
| Max. Pressure Drop, bar [PSI] | cont.: 200 [2900] int. 240 [3480] |
| Max. Oil Flow, lpm [GPM] | 150 [39.6] |
| 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, °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) |

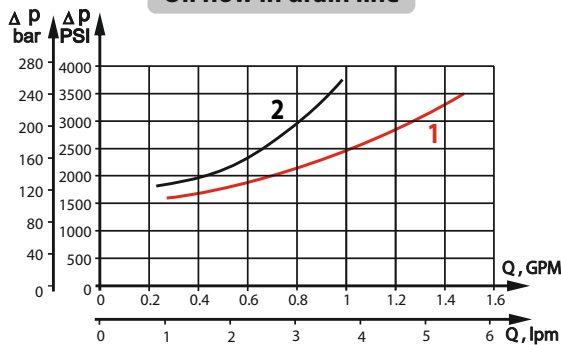
MAX. PERMISSIBLE SHAFT SEAL PRESSURE

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

- 1: Drawing for Standard Shaft Seal
- 2: Drawing for High Pressure Seal ("U" Seal)

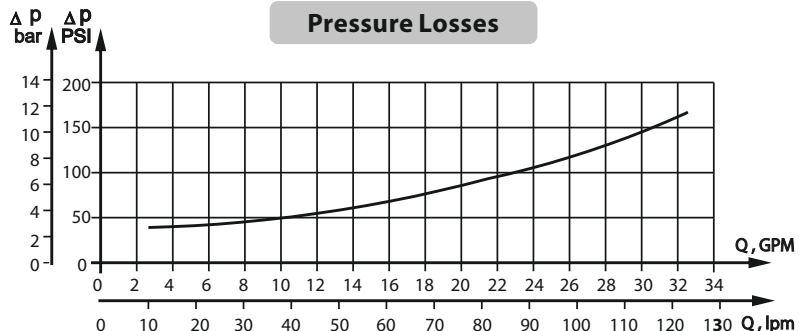


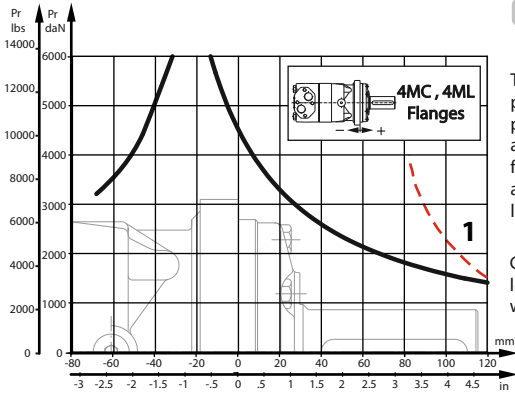
Oil flow in drain line



1: Viscosity 20 [98] mm²/s [SUS] 2: Viscosity 35 [164] mm²/s [SUS]

Pressure Losses

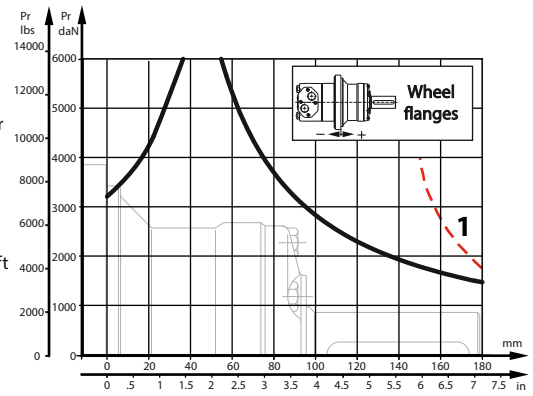




PERMISSIBLE SHAFT LOADS

The output shaft runs in tapered bearings that permit high axial and radial forces. The permissible radial load on the shaft is shown for an axial load of 0 N as function of the distance from the mounting flange to the point of load application. The curves apply to a B10 bearing life of 2000 hours at 100 RPM.

Curve "1" shows max. radial shaft load. Any shaft load exceeding the values shown by the curve will seriously reduce motor life.



SPECIFICATION DATA

| Type | | MGT 160 | MGT 200 | MGT 250 | MGT 315 | MGT 400 | MGT 500 | MGT 630 | MGT 725 |
|---|---------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|
| Displacement, cm ³ /rev [in ³ /rev] | | 161,1 [9.83] | 201,4 [12.29] | 251,8 [15.36] | 326,3 [19.90] | 410,9 [25.06] | 523,6 [31.95] | 631,2 [38.52] | 724,3 [44.2] |
| | Max. Speed, [RPM] | 622 | 620 | 496 | 382 | 304 | 238 | 197 | 172 |
| Max. Torque daNm [lb-in] | Cont. | 47 [4160] | 59 [5220] | 73 [6460] | 95 [8410] | 108 [9560] | 122 [10800] | 130 [11500] | 127 [11240] |
| | Int.* | 56 [4960] | 71 [6285] | 88 [7790] | 114 [10090] | 126 [11150] | 137 [12125] | 148 [13100] | 147 [13010] |
| | Peak** | 66 [5840] | 82 [7260] | 102 [9030] | 133 [11770] | 144 [12745] | 160 [14160] | 176 [15580] | 175 [15490] |
| Max. Output kW [HP] | Cont. | 26,5 [36] | 33,5 [45] | 33,5 [45] | 33,5 [45] | 30 [40] | 26,5 [36] | 24,3 [33] | 20,2 [27] |
| | Int.* | 32 [43] | 40 [54] | 40 [54] | 40 [54] | 35 [47] | 30 [40] | 27,5 [37] | 26,8 [36] |
| Max. Pressure Drop bar [PSI] | Cont. | 200 [2900] | 200 [2900] | 200 [2900] | 200 [2900] | 180 [2610] | 160 [2320] | 140 [2010] | 120 [1740] |
| | Int.* | 240 [3480] | 240 [3480] | 240 [3480] | 240 [3480] | 210 [3050] | 180 [2610] | 160 [2320] | 140 [2010] |
| | Peak** | 280 [4050] | 280 [4050] | 280 [4050] | 280 [4050] | 240 [3480] | 210 [3050] | 190 [2760] | 165 [2395] |
| Max. Oil Flow lpm [GPM] | Cont. | 100 [26] | 125 [33] | 125 [33] | 125 [33] | 125 [33] | 125 [33] | 125 [33] | 125 [33] |
| | Int.* | 125 [33] | 150 [39.6] | 150 [39.6] | 150 [39.6] | 150 [39.6] | 150 [39.6] | 150 [39.6] | 150 [39.6] |
| Max. Inlet Pressure bar [PSI] | Cont. | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3600] | 210 [3050] |
| | Int.* | 250 [3600] | 250 [3600] | 250 [3600] | 250 [3600] | 250 [3600] | 250 [3600] | 250 [4350] | 250 [3600] |
| | Peak** | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] | 300 [2000] | 300 [4350] |
| Max. Return Pressure with Drain Line, bar [PSI] | Cont. | 140 [2030] | 140 [2030] | 140 [2030] | 140 [2000] | 140 [2000] | 140 [2000] | 140 [2500] | 140 [2000] |
| | Int.* | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2500] | 175 [2500] | 175 [2500] | 175 [2500] | 175 [2500] |
| | Peak** | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3000] | 210 [3000] | 210 [3000] | 210 [3000] | 210 [3000] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] | | 10 [150] | 10 [150] | 10 [150] | 10 [150] | 10 [150] | 10 [150] | 10 [150] | 10 [150] |
| Min. Starting Torque daNm [lb-in] | At max. press. drop Cont. | 34 [3010] | 43 [3800] | 53 [4690] | 74 [6550] | 84 [7435] | 95 [8410] | 95 [8410] | 95 [8410] |
| | At max. press. drop Int.* | 41 [3630] | 52 [4600] | 63 [5580] | 89 [7880] | 97 [8585] | 106 [9380] | 110 [9740] | 115 [10180] |
| Min. Speed***, [RPM] | | 10 | 9 | 8 | 7 | 6 | 5 | 5 | 5 |
| Weight, kg [lb] | MGTML(MC) | 20 [44.1] | 21,5 [47.4] | 21 [46.3] | 22 [48.5] | 23 [50.7] | 24 [52.9] | 23,5 [51.8] | 24,5 [54.0] |
| | MGTWU | 22 [48.5] | 22,5 [49.6] | 23 [50.7] | 24 [52.9] | 25 [55.1] | 26 [57.3] | 25,5 [56.2] | 26,5 [58.4] |
| | MGTSM(SN) | 15 [33.1] | 15,5 [34.2] | 16 [35.3] | 17 [37.5] | 18 [39.7] | 19 [41.9] | 18,5 [40.8] | 19,5 [43.0] |

* 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.

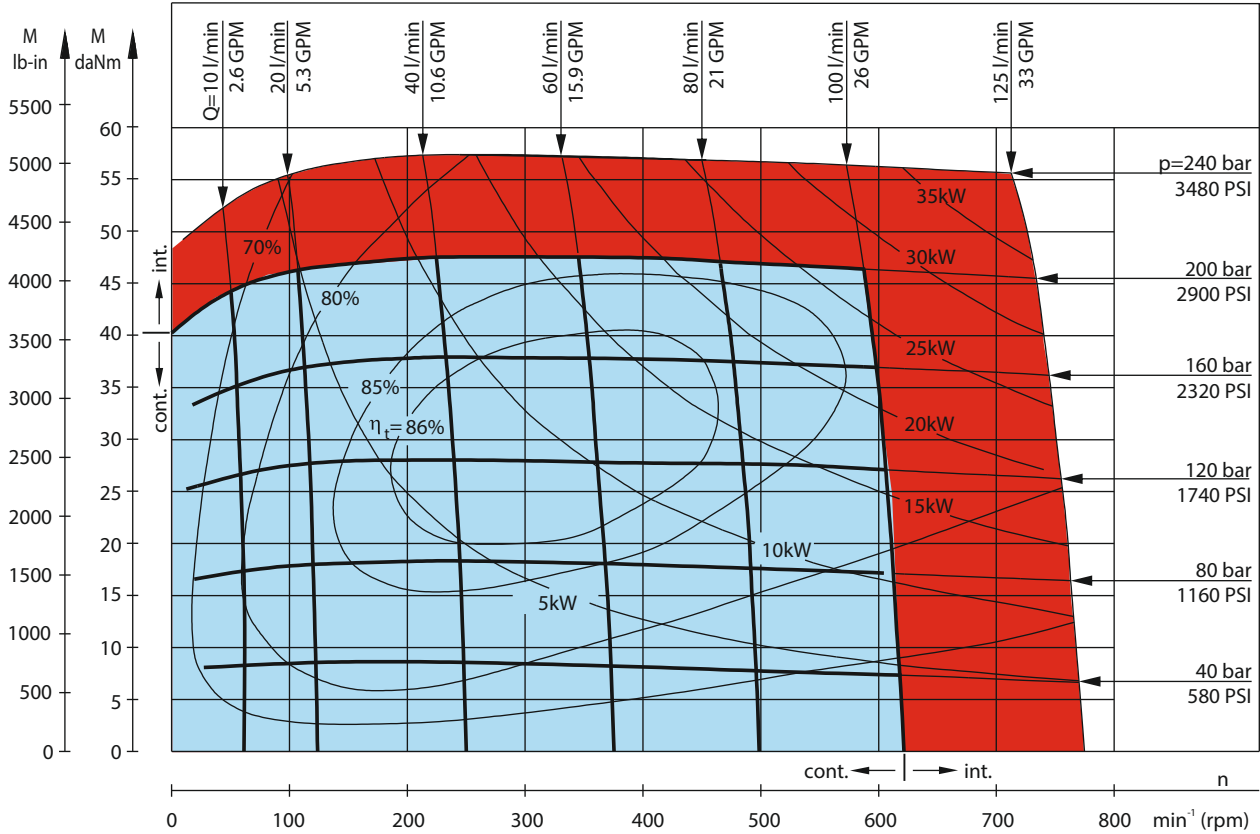
*** For speeds lower than given, consult factory or your regional manager.

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 mm²/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.

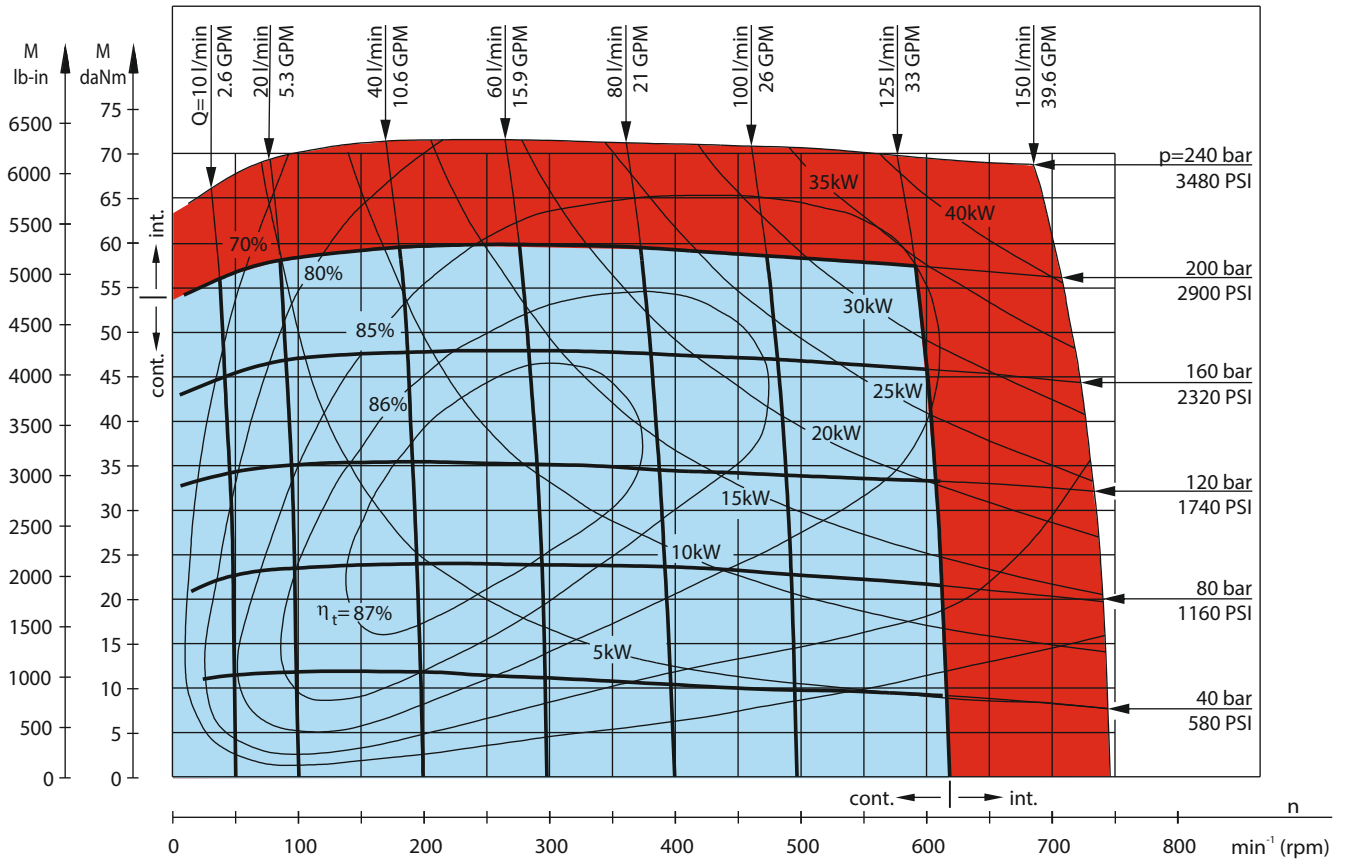


FUNCTION DIAGRAMS

MGT 160



MGT 200

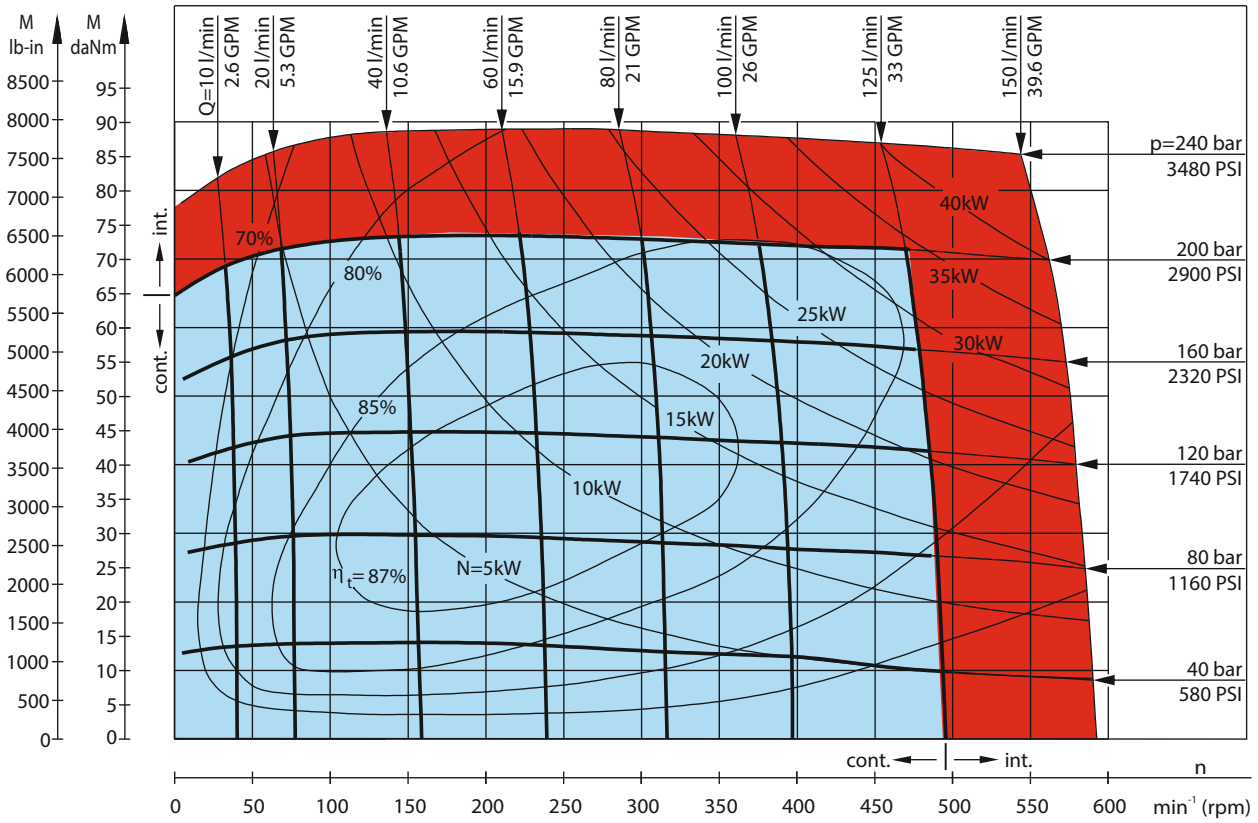


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

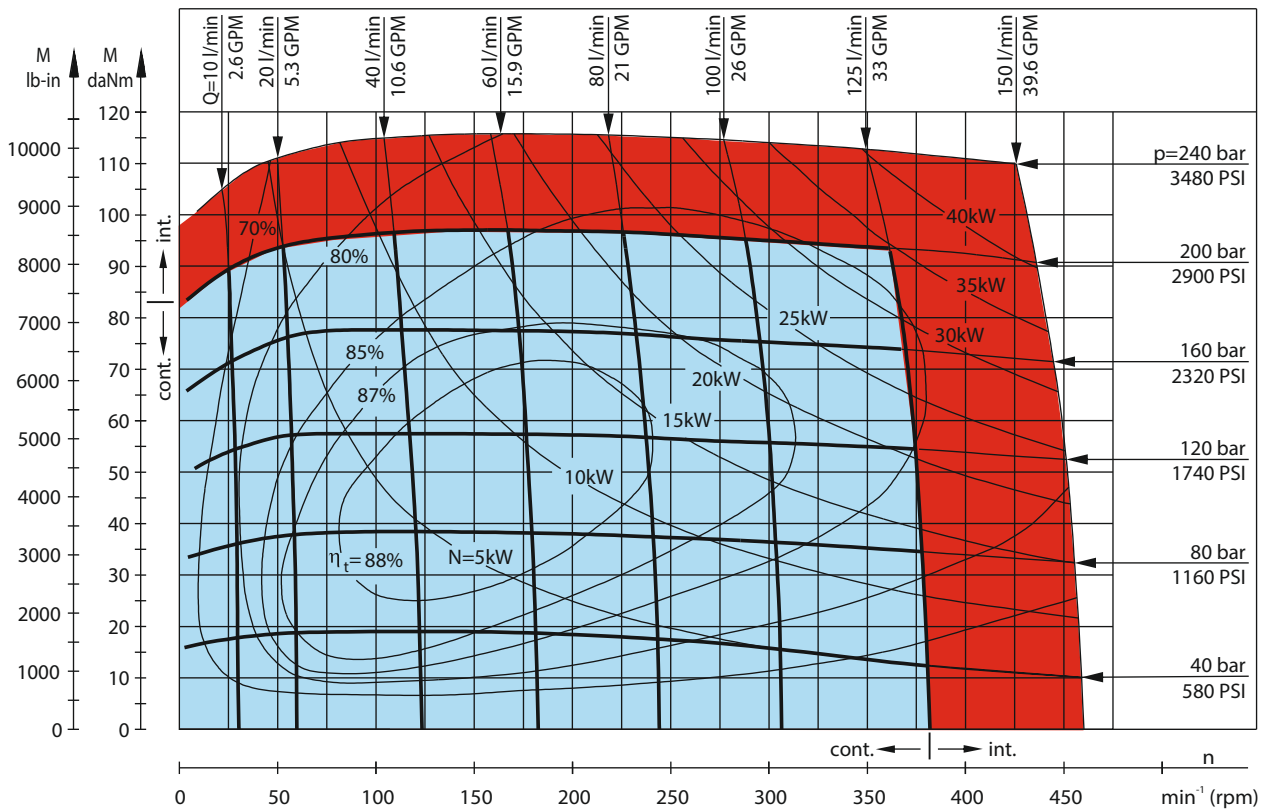


FUNCTION DIAGRAMS

MGT 250



MGT 315

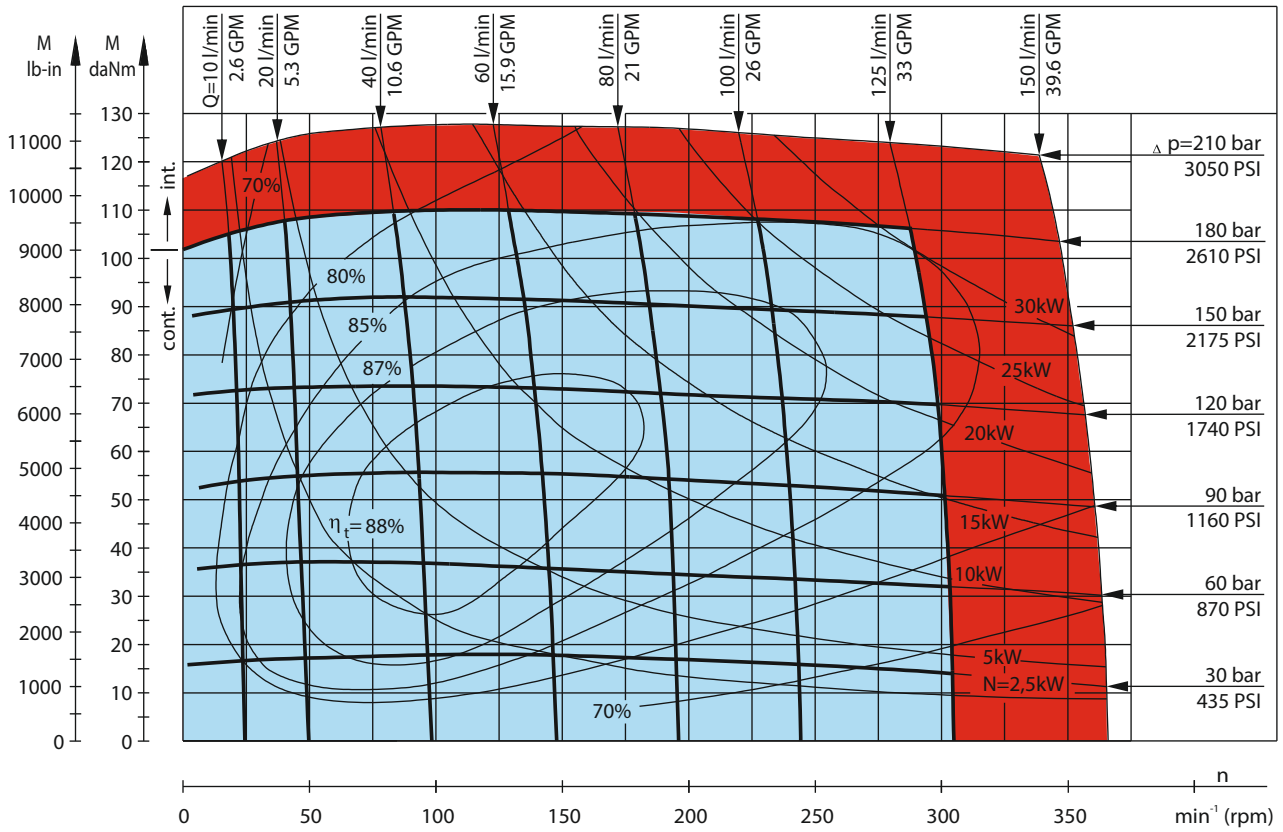


The function diagrams data is for average performance of randomly selected motors at back pressure 5±10 bar

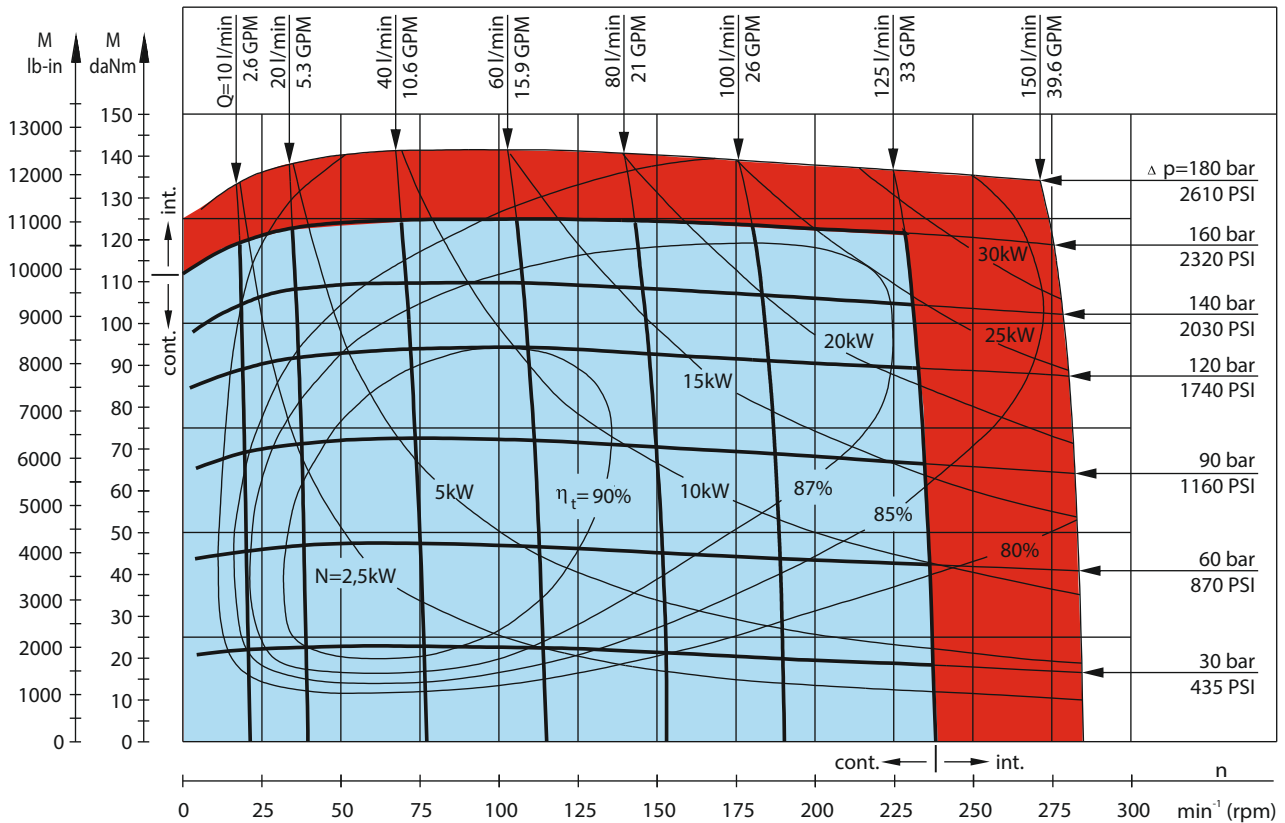


FUNCTION DIAGRAMS

MGT 400



MGT 500

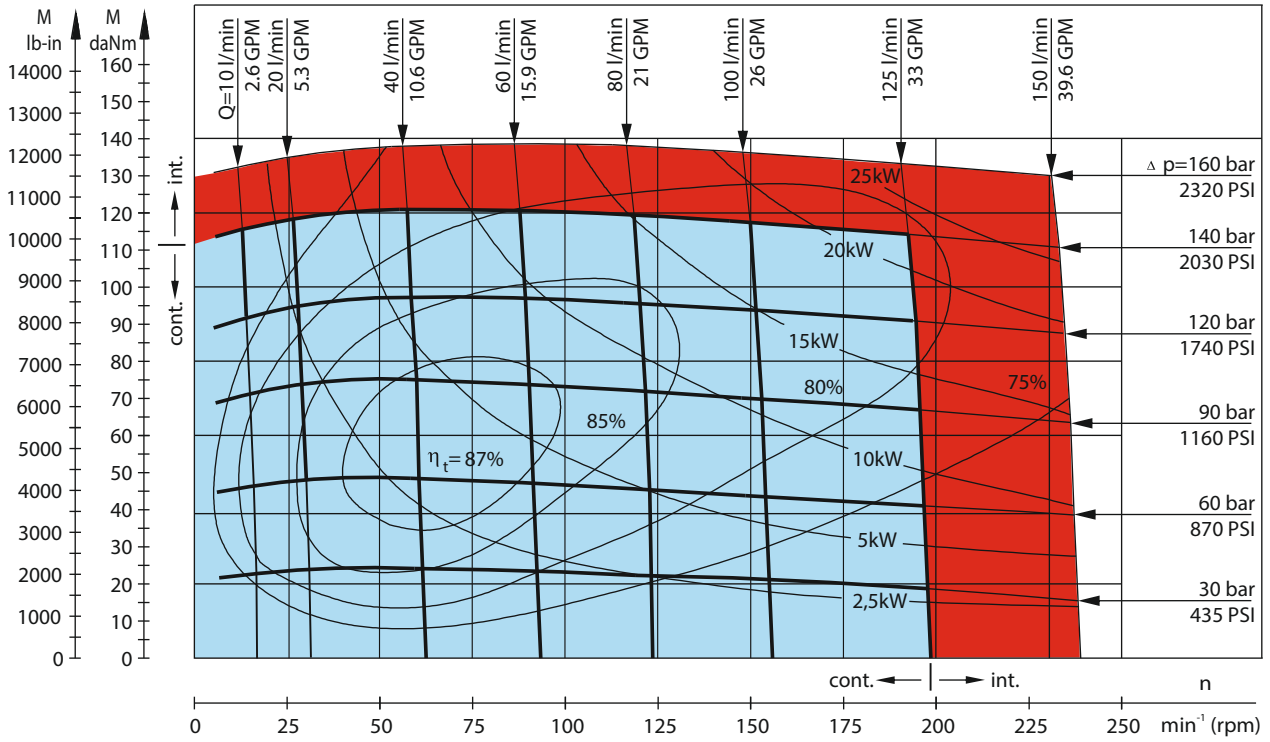


The function diagrams data is for average performance of randomly selected motors at back pressure 5±10 bar

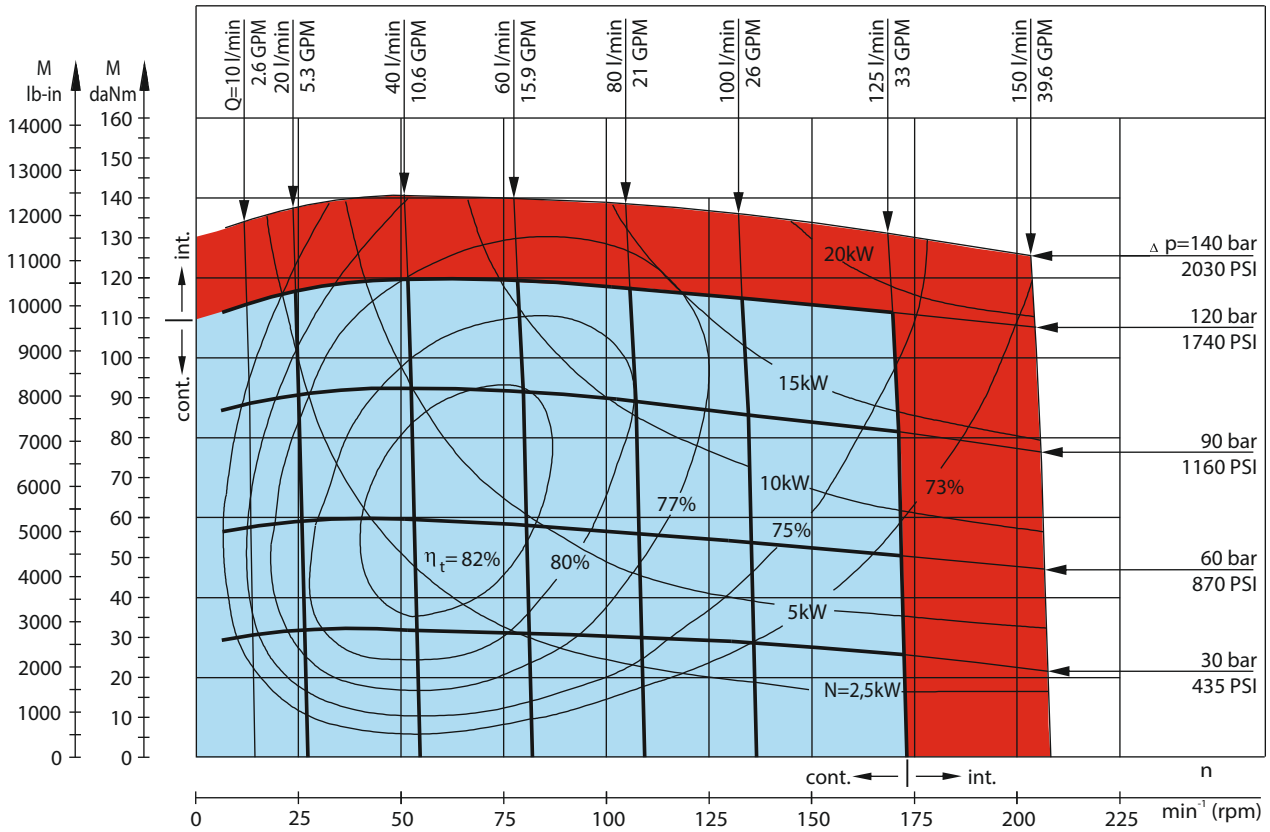


FUNCTION DIAGRAMS

MGT 630



MGT 725

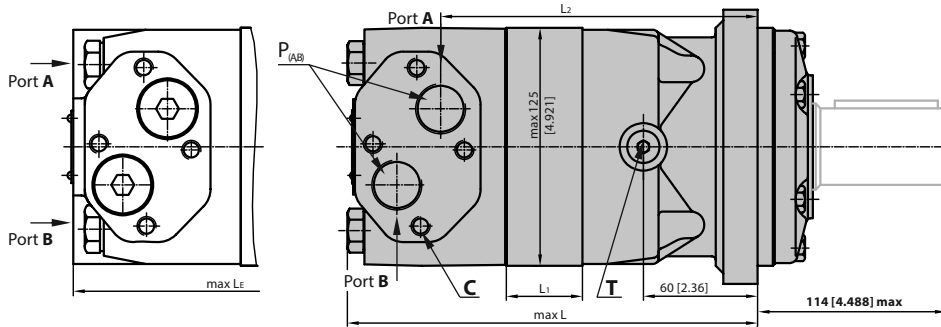


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

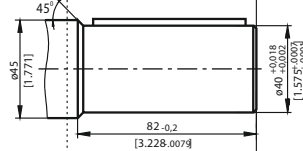
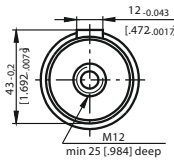


DIMENSIONS AND MOUNTING DATA AND SHAFT EXTENSIONS FOR MGT4ML(4MC) MOTORS

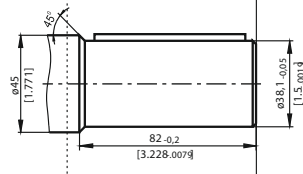
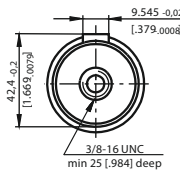
E



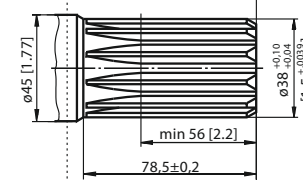
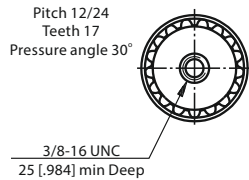
C11 - $\varnothing 40$ [1.575"] Straight, M12 thread, Parallel key A12x8x70 DIN 6885
Max. Torque 132,8 daNm [11755 lb-in]



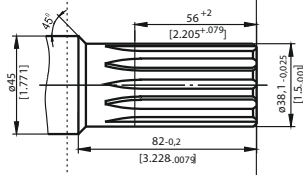
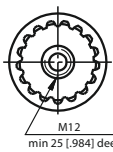
D08 - $\varnothing 38,1$ [1.5"] Straight, 3/8-16 UNC thread, Parallel key 3/8"x3/8"x21/4" BS46
Max. Torque 132,8 daNm [11755 lb-in]



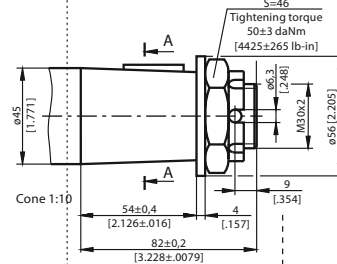
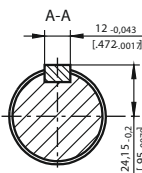
G10 - $\varnothing 38,1$ [1.5"] Spline SAE 17T 12/24 DP, 3/8-16 UNC thread, SAE version
Max. Torque 133 daNm [11750 lb-in]



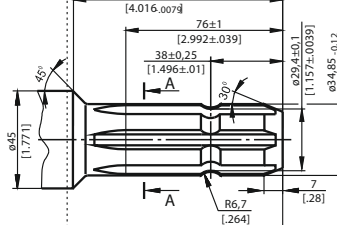
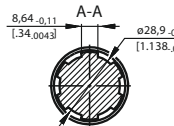
S10 - $\varnothing 38,1$ [1.5"] Spline SAE 17T 12/24 DP, M12 thread, EU version
Max. Torque 132,8 daNm [11755 lb-in]



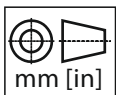
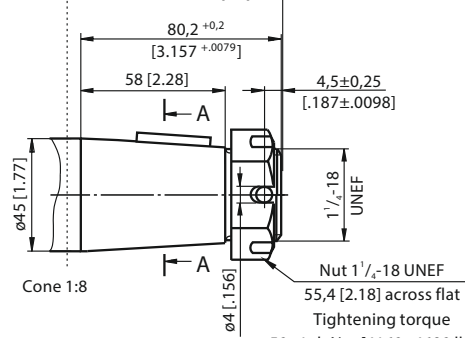
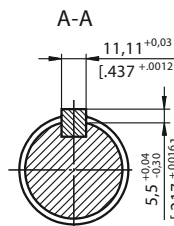
K03 - $\varnothing 45$ [1.771"] Tapered 1:10, M30x2 thread, EU version, Parallel key B12x8x28 DIN 6885
Max. Torque 210,7 daNm [18650 lb-in]



S08 - $\varnothing 35$ [1.378"] p.t.o. DIN 9611 Form 1
Max. Torque 77 daNm [6815 lb-in]



T04 - $\varnothing 45$ [1.771"] Tapered 1:8, 1/4-18 UNEF thread, SAE J501 version, Parallel key 7/16"x7/16"x1/4" BS46
Max. Torque 210 daNm [18650 lb-in]



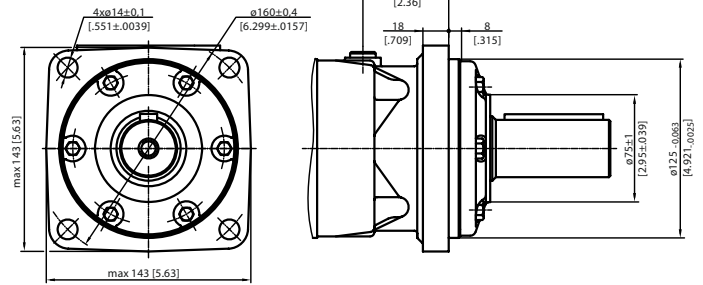
Nut 1/4-18 UNEF
55,4 [2.18] across flat
Tightening torque
50±1 daNm [4160÷4690 lb-in]



MOUNTING

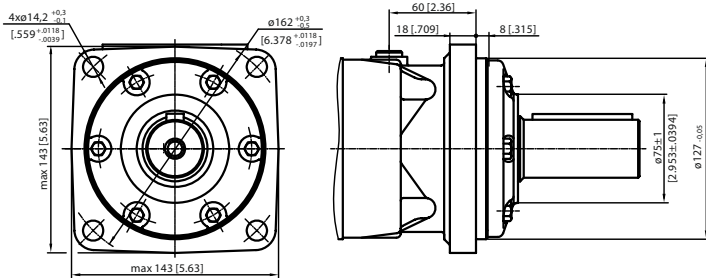
4ML

4 Bolt flange, ISO,
spigot dia. 125 [4.921"] BC 160 [6.299"],
Bolt Dia. 14 [.551"]



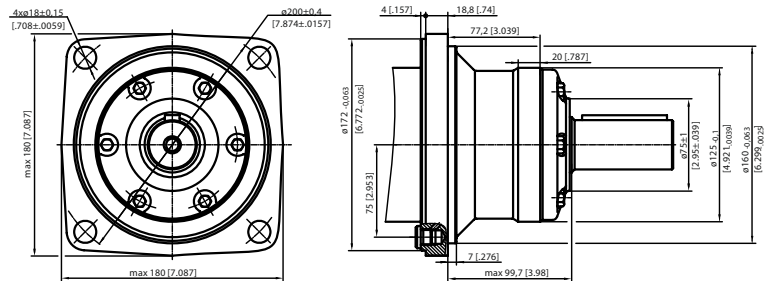
4MC

4 Bolt flange, SAE C
spigot dia. 127 [5"] BC 162.2 [6.39"],
Bolt Dia. 14,5 [.571"]



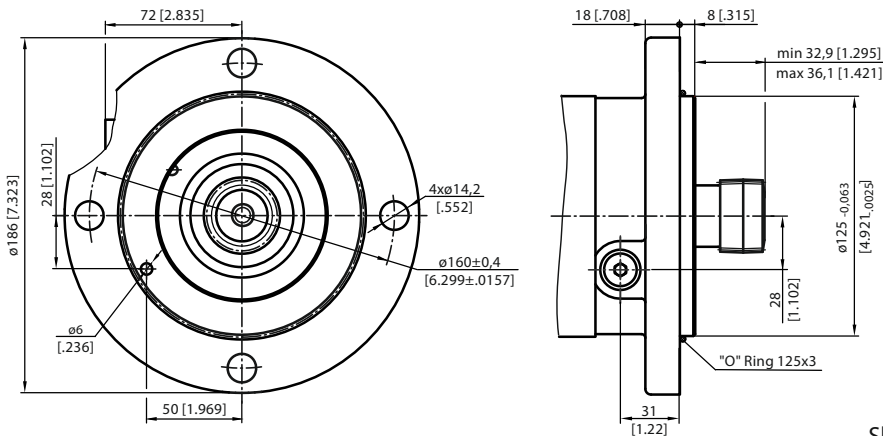
WU

Wheel flange, EU version,
spigot dia. 160 [6.3"] BC 200 [7.874"],
Bolt Dia. 18 [.708"]



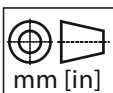
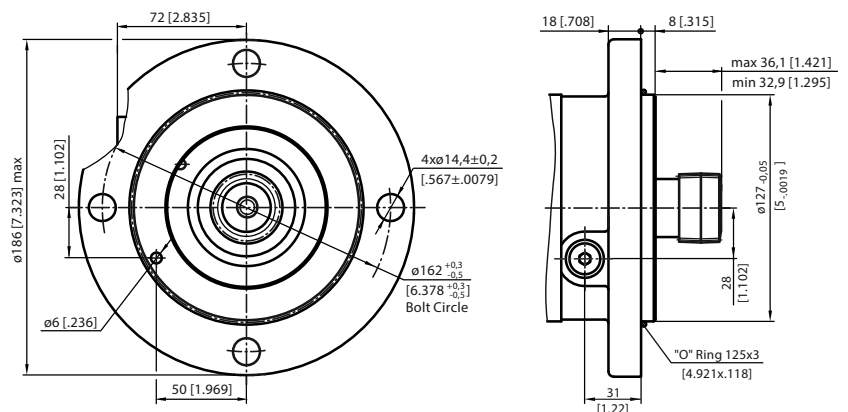
SM

Short flange, EU version,
spigot dia. 125 [4.921"] BC 160 [6.299"],
Bolt Dia. 14,2 [.522"]



SN

Short flange, SAE version,
spigot dia. 127 [5"] BC 162 [.555"],
Bolt Dia. 14,5 [.555"]



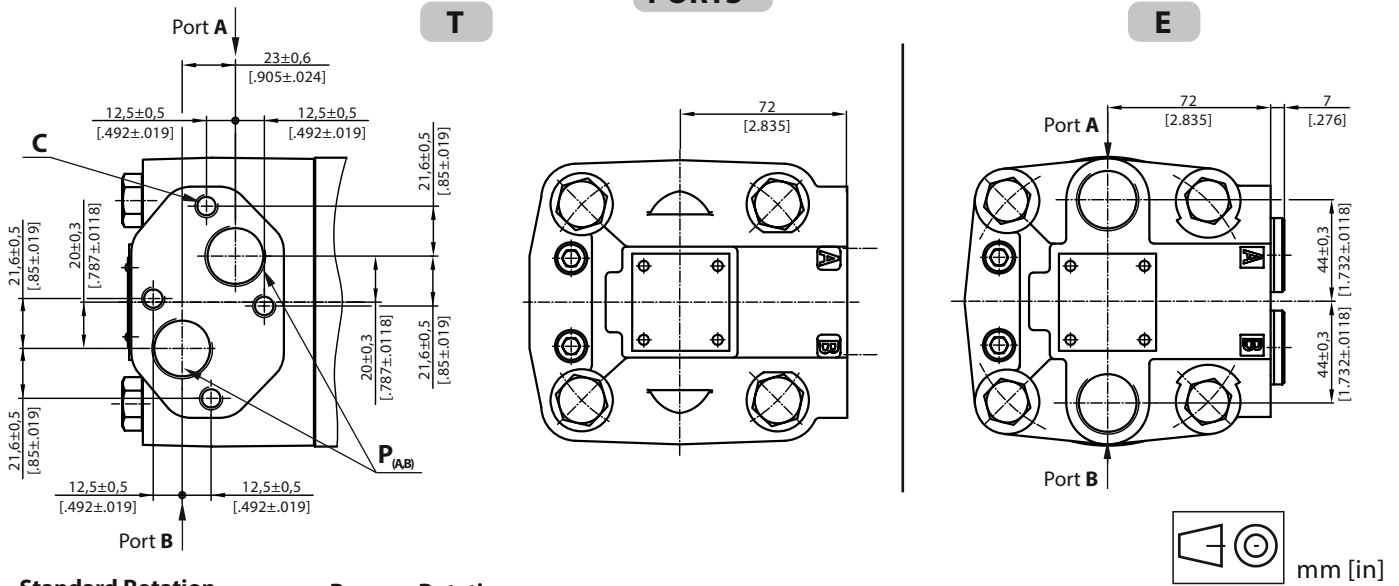


MOUNTING (continued)

| Type | L ₁ , mm [in] | L ₂ , mm [in] | **L _e , mm [in] | Type | L ₁ , mm [in] | L ₂ , mm [in] | **L _e , mm [in] | *L ₁ , mm [in] | Type | L ₁ , mm [in] | L ₂ , mm [in] | **L _e , mm [in] | *L ₁ , mm [in] |
|-----------------|--------------------------|--------------------------|----------------------------|-----------|--------------------------|--------------------------|----------------------------|---------------------------|---------------|--------------------------|--------------------------|----------------------------|---------------------------|
| MGT4ML(4MC) 160 | 190 [7.48] | 140 [5.51] | 200 [7.87] | MGTWU 160 | 123 [4.84] | 73 [2.87] | 133 [5.23] | 16,5 [.65] | MGTSM(SN) 160 | 150 [5.90] | 103,5 [4.07] | 155 [6.10] | 20,0 [.79] |
| MGT4ML(4MC) 200 | 195 [7.68] | 145 [5.71] | 205 [8.07] | MGTWU 200 | 128 [5.04] | 78 [3.07] | 138 [5.43] | 21,5 [.85] | MGTSM(SN) 200 | 155 [6.10] | 108,5 [4.27] | 160 [6.30] | 25,0 [.98] |
| MGT4ML(4MC) 250 | 201 [7.91] | 151 [5.95] | 211 [8.31] | MGTWU 250 | 134 [5.28] | 84 [3.31] | 144 [5.67] | 27,8 [1.09] | MGTSM(SN) 250 | 161 [6.34] | 114,8 [4.52] | 167 [6.57] | 31,3 [1.23] |
| MGT4ML(4MC) 315 | 211 [8.31] | 161 [6.34] | 221 [8.70] | MGTWU 315 | 144 [5.67] | 94 [3.70] | 154 [6.02] | 37,0 [1.46] | MGTSM(SN) 315 | 170 [6.69] | 124,0 [4.88] | 176 [6.93] | 40,5 [1.59] |
| MGT4ML(4MC) 400 | 221 [8.70] | 171 [6.73] | 231 [9.09] | MGTWU 400 | 154 [6.06] | 104 [4.09] | 164 [6.45] | 47,5 [1.87] | MGTSM(SN) 400 | 181 [7.13] | 134,5 [5.30] | 186 [7.32] | 51,0 [2.01] |
| MGT4ML(4MC) 500 | 235 [9.25] | 185 [7.28] | 245 [9.64] | MGTWU 500 | 168 [6.61] | 118 [4.65] | 178 [6.61] | 61,5 [2.42] | MGTSM(SN) 500 | 195 [7.68] | 148,5 [5.85] | 200 [7.87] | 65,0 [2.56] |
| MGT4ML(4MC) 630 | 231 [9.09] | 181 [7.13] | 241 [9.49] | MGTWU 630 | 164 [6.46] | 114 [4.49] | 174 [6.85] | 57,5 [2.26] | MGTSM(SN) 630 | 191 [7.52] | 144,5 [5.69] | 196 [7.72] | 61,0 [2.40] |
| MGT4ML(4MC) 725 | 240 [9.45] | 190 [7.48] | 250 [9.84] | MGTWU 725 | 173 [6.81] | 123 [4.84] | 183 [7.21] | 66,5 [2.62] | MGTSM(SN) 725 | 200 [7.87] | 153,5 [6.04] | 205 [8.07] | 70,0 [2.76] |

* - The width of the roll-gerotor is 3,5 mm [.138 in] greater than L₁.
 ** - For Rear Ported Motors.

PORTS

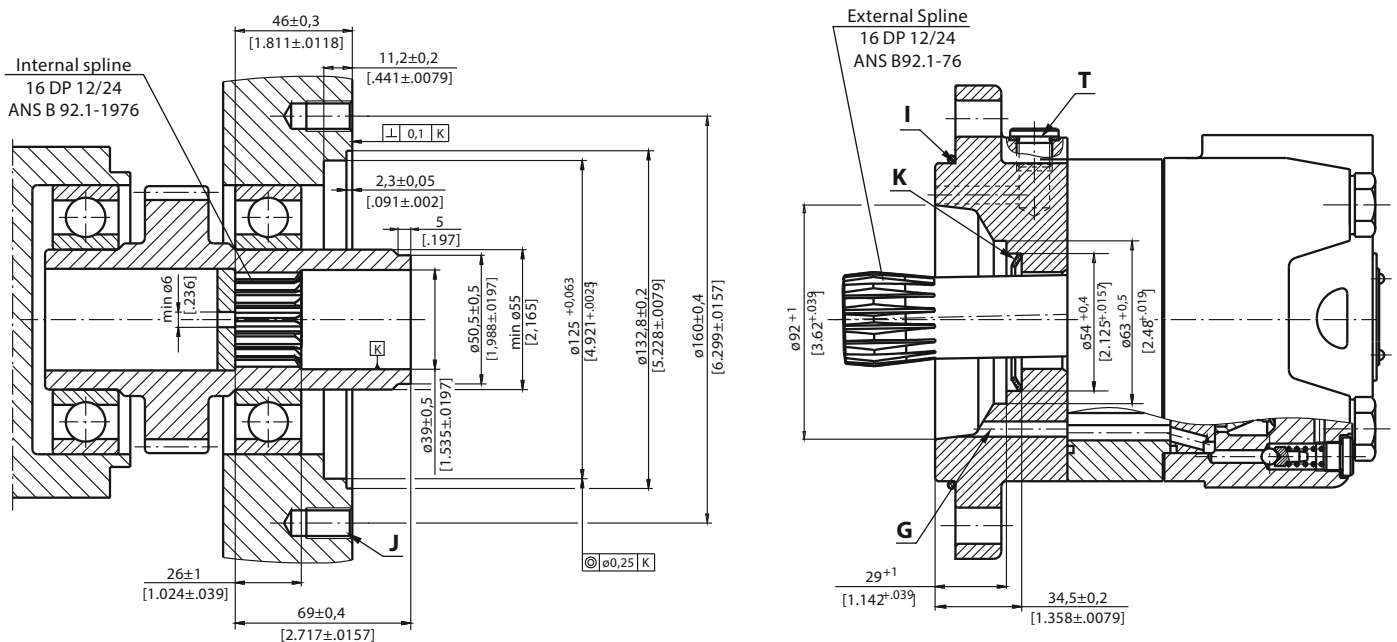


Standard Rotation
 Viewed from Shaft End
 Port A Pressurized - CW
 Port B Pressurized - CCW

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

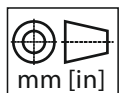
C : 4xM10-10 mm [.39 in] depth
P_(A,B) : 2xG3/4 or 2xM27x2-17 mm [.67 in] depth
T : G 1/4 or M14x1,5 - 12 mm [.47 in] depth (plugged)

DIMENSIONS OF THE ATTACHED COMPONENT for MGTSM(SN)



F: Oil circulation hole
G: Internal drain channel
H: Hardened stop plate

I: O-Ring 125x3 mm [4.921x.118 in]
J: 4xM12-18 mm [.71 in] depth, 90°
K: Conical seal ring
T: Drain connection G1/4 or M14x1,5





DRAIN CONNECTION

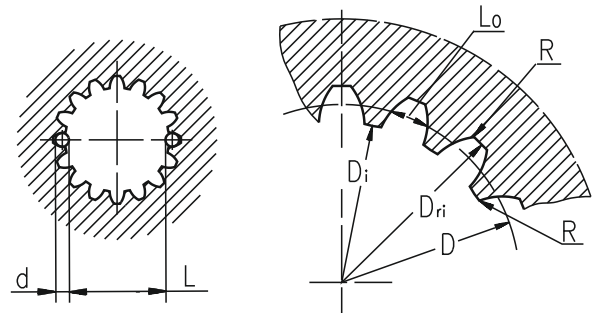
The drain line has to be used when pressure in the return line can exceed the permissible pressure. It can be connected at the drain port of the motor.

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; addendum modification x.m=1]

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



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

ORDER CODE

| | | | | | | | | |
|------------|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| MGT | | | | | | | | |

Pos.1 - Mounting Flange

- 4ML** - 4 Bolt flange, ISO, spigot dia. 125 [4.921"], BC 160 [6.299"], Bolt Dia. 14 [.551"]
- 4MC** - 4 Bolt flange, SAE C, spigot dia. 127 [5"], BC 162.2 [6.39"], Bolt Dia. 14,5 [.571"]
- WU** - Wheel flange, EU version, spigot dia.160 [6.3"], BC 200 [7.874"], Bolt Dia. 18 [.708"]
- SM** - Short flange, EU version, spigot dia. 125 [4.921"], BC 160 [6.299"], Bolt Dia. 14,2 [.522"]
- SN** - Short flange, SAE version, spigot dia. 127 [5"], BC 162 [6.38"], Bolt Dia. 14,5 [.555"]

Pos.2 - Port type

- T** - Twin (Two) side ports on one side
- E** - Rear ports

Pos.3 - Displacement code

- 160** - 61,6 cm³/rev [9.83 in³/rev]
- 200** - 201,4 cm³/rev [12.29 in³/rev]
- 250** - 251,8 cm³/rev [15.36 in³/rev]
- 315** - 326,3 cm³/rev [19.90 in³/rev]
- 400** - 410,9 cm³/rev [25.06 in³/rev]
- 500** - 523,6 cm³/rev [31.95 in³/rev]
- 630** - 631,2 cm³/rev [38.52 in³/rev]
- 725** - 724,3 cm³/rev [44.20 in³/rev]

Pos. 4 - Shaft Extensions*

- G10** - ø38,1 [1.5"] Spline SAE 17T 12/24 DP, 3/8-16 UNC thread, SAE version
- S10** - ø38,1 [1.5"] Spline SAE 17T 12/24 DP, M12 thread, EU version
- S08** - ø35 [1.378"] Spline p.t.o. DIN 9611 Form 1
- D08** - ø38,1 [1.5"] Straight, 3/8-16 UNC thread, Parallel key 3/8"x3/8"x2 1/4" BS46
- C11** - ø40 [1.575"] Straight, M12 thread, Parallel key A12x8x70 DIN6885
- K03** - ø45 [1.771"] Tapered 1:10, M30x2 thread, EU version, Parallel key B12x8x28 DIN 6885
- T04** - ø45 [1.771"] Tapered 1:8, 1 1/4-18 UNEF thread, SAE J501 version, Parallel key 7/16"x7/16"x1 1/4" BS46

Pos. 5 - Shaft Seal Version

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

Pos. 6 - Ports

- B5** - 2xG3/4, drain port G1/4
- A5** - 2x1 1/16-12 UN, drain port 9/16-18 UNF

Pos. 7 - Special Features (see pages 66÷75)

Pos. 8 - Design Series

- default - Factory specified

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



HYDRAULIC MOTORS MGV

APPLICATIONS



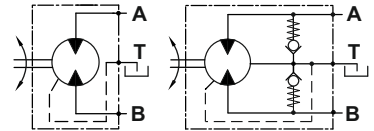
- Sweepers & Scrubbers
- Forklift
- Roadbuilding Machinery
- Forklift
- Wheel Loaders
- Skid Steer Loaders
- Lawn & Turf
- Aerial Work Platforms
- Forestry Machinery
- Harvesters
- Industrial Applications
- Salt Spreaders
- Drilling

OPTIONS

- Flange and wheel mount
- Twin side and rear ports
- Short motor
- Shafts - straight, splined and tapered
- Shaft seal for high and low pressure
- Metric and BSPP ports
- Speed sensors

ADVANTAGES

- High power density
- Roller design
- Strong bearing



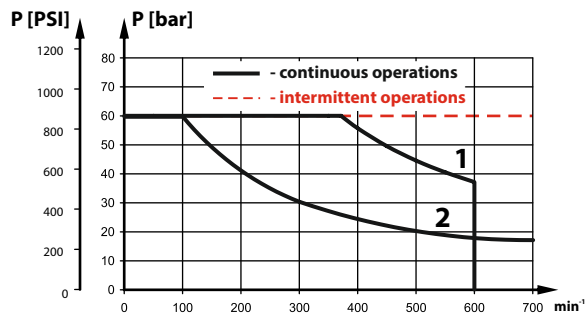
GENERAL

| | | |
|---------------------------------|---|--|
| Displacement, | cm ³ /rev [in ³ /rev] | 314,5 [19.18] ÷ 801,8 [48.91] |
| Max. Speed, | [RPM] | 630 |
| Max. Torque, | daNm [lb-in] | cont.: 188 [16650] int.: 211 [18650] |
| Max. Output, | kW [HP] | 64 [85,8] |
| Max. Pressure Drop, | bar [PSI] | cont.: 200 [2900] int.: 240 [3480] |
| Max. Oil Flow, | lpm [GPM] | 240 [63.4] |
| Min. Speed, | [RPM] | 5 |
| Permissible Shaft Loads | daN [lbs] | P _s =1500 [3300] |
| 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) |

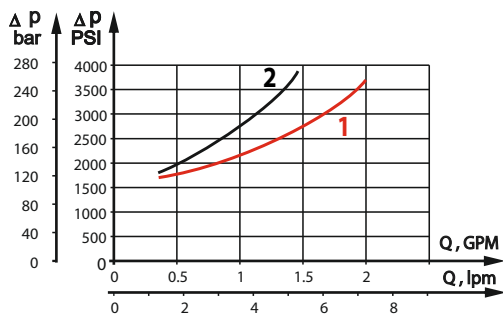
MAX. PERMISSIBLE SHAFT SEAL PRESSURE

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

- 1: Drawing for Standard Shaft Seal
- 2: Drawing for High Pressure Seal ("U" Seal)

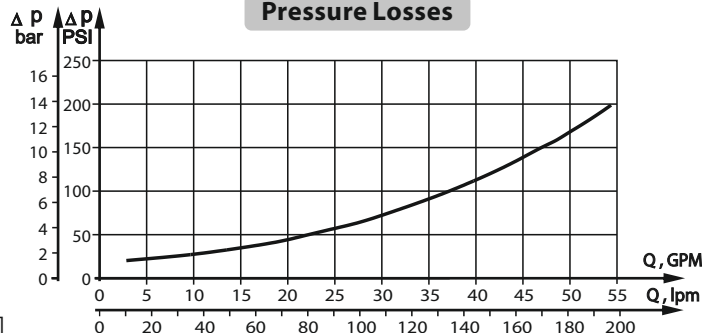


Oil flow in drain line



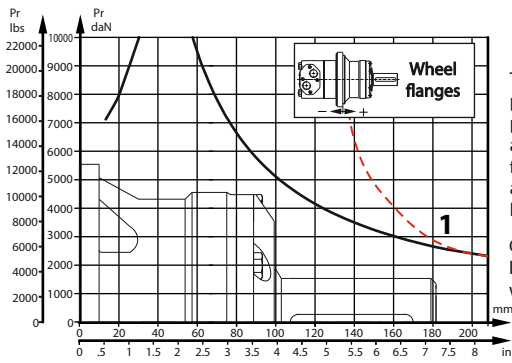
1: Viscosity 20 [98] mm²/s [SUS] 2: Viscosity 35 [164] mm²/s [SUS]

Pressure Losses



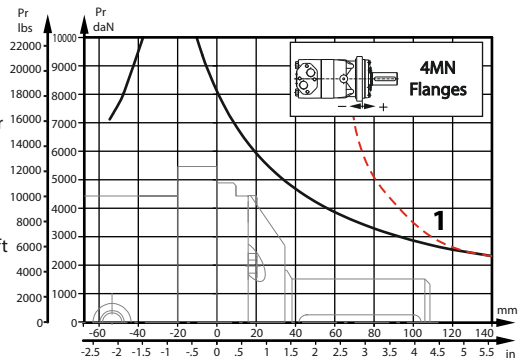


PERMISSIBLE SHAFT LOADS



The output shaft runs in tapered bearings that permit high axial and radial forces. The permissible radial load on the shaft is shown for an axial load of 0 N as function of the distance from the mounting flange to the point of load application. The curves apply to a B10 bearing life of 2000 hours at 100 RPM.

Curve "1" shows max. radial shaft load. Any shaft load exceeding the values shown by the curve will seriously reduce motor life.



SPECIFICATION DATA

| Type | | MGV 315 | MGV 400 | MGV 500 | MGV 630 | MGV 800 |
|--|---------------------------|------------------|------------------|------------------|------------------|------------------|
| Displacement, cm³/rev [In³/rev] | | 314,5 [19.18] | 400,9 [24.45] | 499,6 [30.48] | 629,1 [38.38] | 801,8 [48.91] |
| Max. Speed, [RPM] | Cont. | 510 | 500 | 400 | 320 | 250 |
| | Int.* | 630 | 600 | 480 | 380 | 300 |
| Max. Torque daNm [lb-in] | Cont. | 92 [8150] | 118 [10450] | 146 [12950] | 166 [14700] | 188 [16650] |
| | Int.* | 111 [9800] | 141 [12500] | 176 [15550] | 194 [17150] | 211 [18650] |
| | Peak** | 129 [11400] | 164 [14500] | 205 [18150] | 221 [19550] | 247 [21850] |
| Max. Output kW [HP] | Cont. | 42,5 [57] | 53,5 [71.7] | 53,5 [71.7] | 48 [64.4] | 42,5 [57] |
| | Int.* | 51 [68.4] | 64 [85.8] | 64 [85.8] | 56 [75] | 48 [64.4] |
| Max. Pressure Drop bar [PSI] | Cont. | 200 [2900] | 200 [2900] | 200 [2900] | 180 [2610] | 160 [2320] |
| | Int.* | 240 [3480] | 240 [3480] | 240 [3480] | 210 [3050] | 180 [2610] |
| | Peak** | 280 [4060] | 280 [4060] | 280 [4060] | 240 [3480] | 210 [3050] |
| Max. Oil Flow lpm [GPM] | Cont. | 160 [42.3] | 200 [52.8] | 200 [52.8] | 200 [52.8] | 200 [52.8] |
| | Int.* | 200 [52.8] | 240 [63.4] | 240 [63.4] | 240 [63.4] | 240 [63.4] |
| Max. Inlet Pressure bar [PSI] | Cont. | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] |
| | Int.* | 250 [3620] | 250 [3620] | 250 [3620] | 250 [3620] | 250 [3620] |
| | Peak** | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] | 300 [4350] |
| Max. Return Pressure with Drain Line bar [PSI] | Cont. | 140 [2040] | 140 [2040] | 140 [2040] | 140 [2040] | 140 [2040] |
| | Int.* | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] | 175 [2540] |
| | Peak** | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] | 210 [3050] |
| Max. Starting Pressure with Unloaded Shaft, bar [PSI] | | 8 [120] | 8 [120] | 8 [120] | 8 [120] | 8 [120] |
| Min. Starting Torque daNm [lb-in] | At max. press. drop Cont. | 71 [6300] | 91 [8100] | 113 [10000] | 133 [11800] | 151 [13400] |
| | At max. press. drop Int.* | 85 [7500] | 109 [9600] | 136 [12000] | 155 [13700] | 170 [15000] |
| Min. Speed***, [RPM] | | 10 | 9 | 8 | 6 | 5 |
| Weight, kg [lb] | MGV4MN | 31,8 [70.1] | 32,6 [71.9] | 33,5 [73.8] | 34,9 [76.9] | 36,5 [80.5] |
| | MGVWX | 32,4 [71.4] | 33,2 [73.2] | 34,1 [75.2] | 35,5 [78.3] | 37,1 [81.8] |
| | MGVSP | 22,7 [50] | 23,5 [51.8] | 24,4 [53.8] | 25,6 [56.4] | 27,7 [61.1] |

* 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.

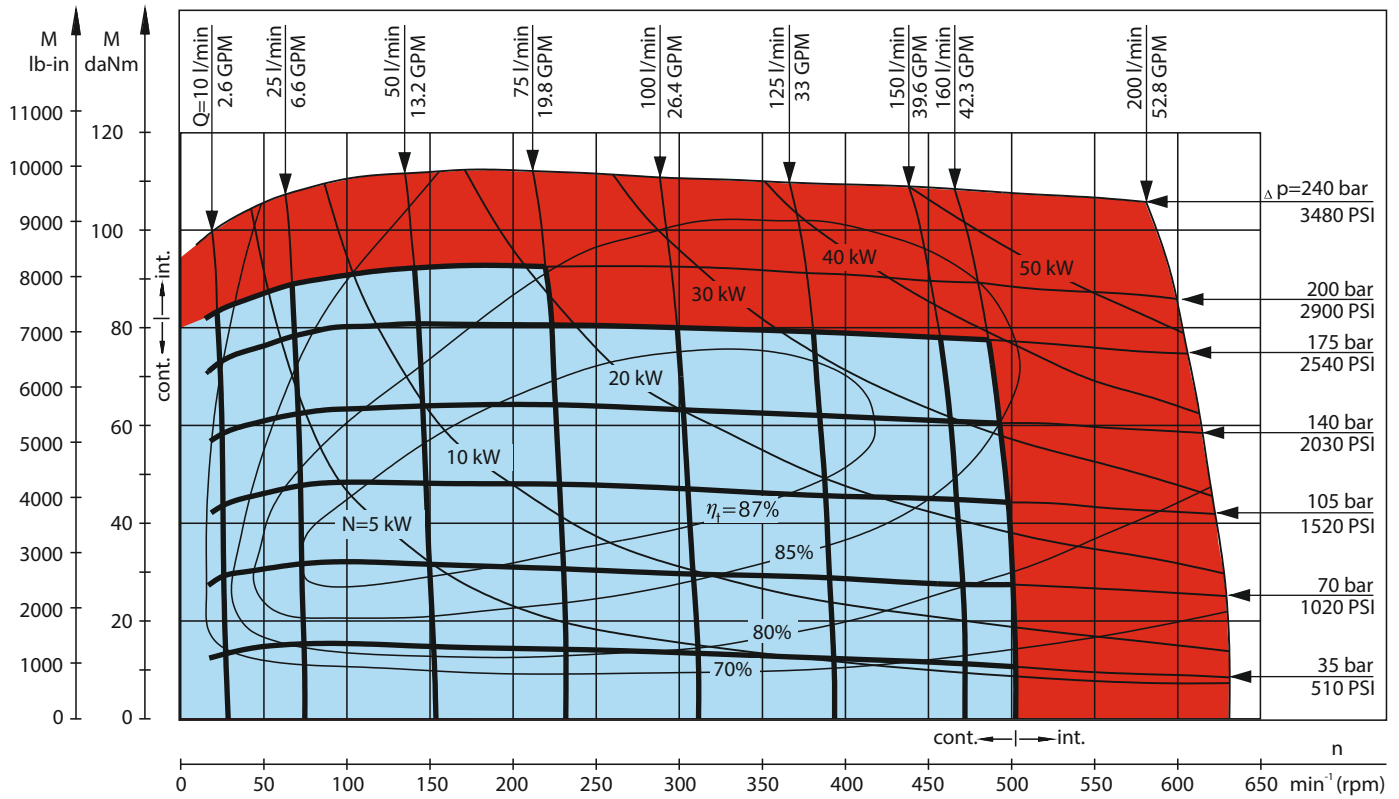
*** For speeds lower than given, consult factory or your regional manager.

- 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.

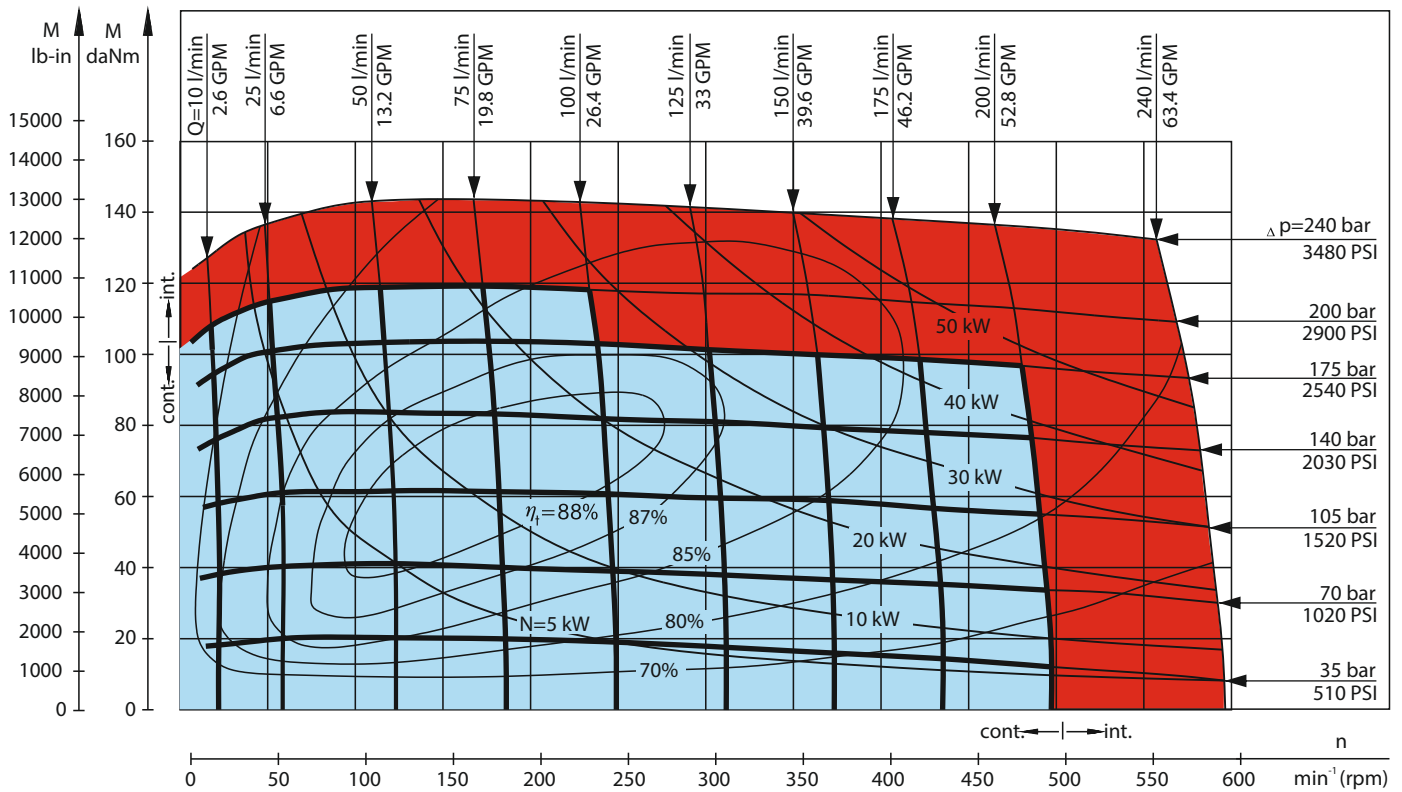


FUNCTION DIAGRAMS

MGV 315



MGV 400

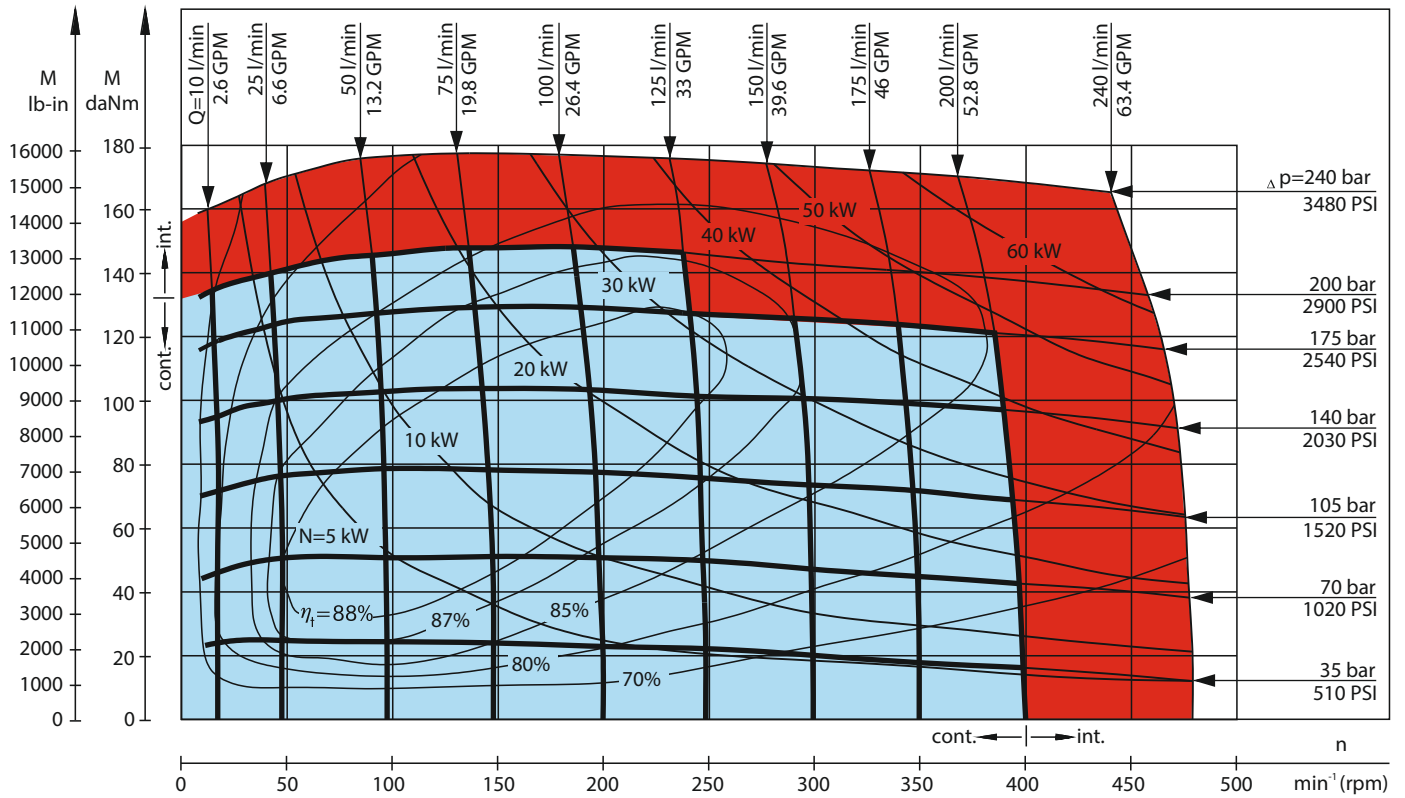


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar

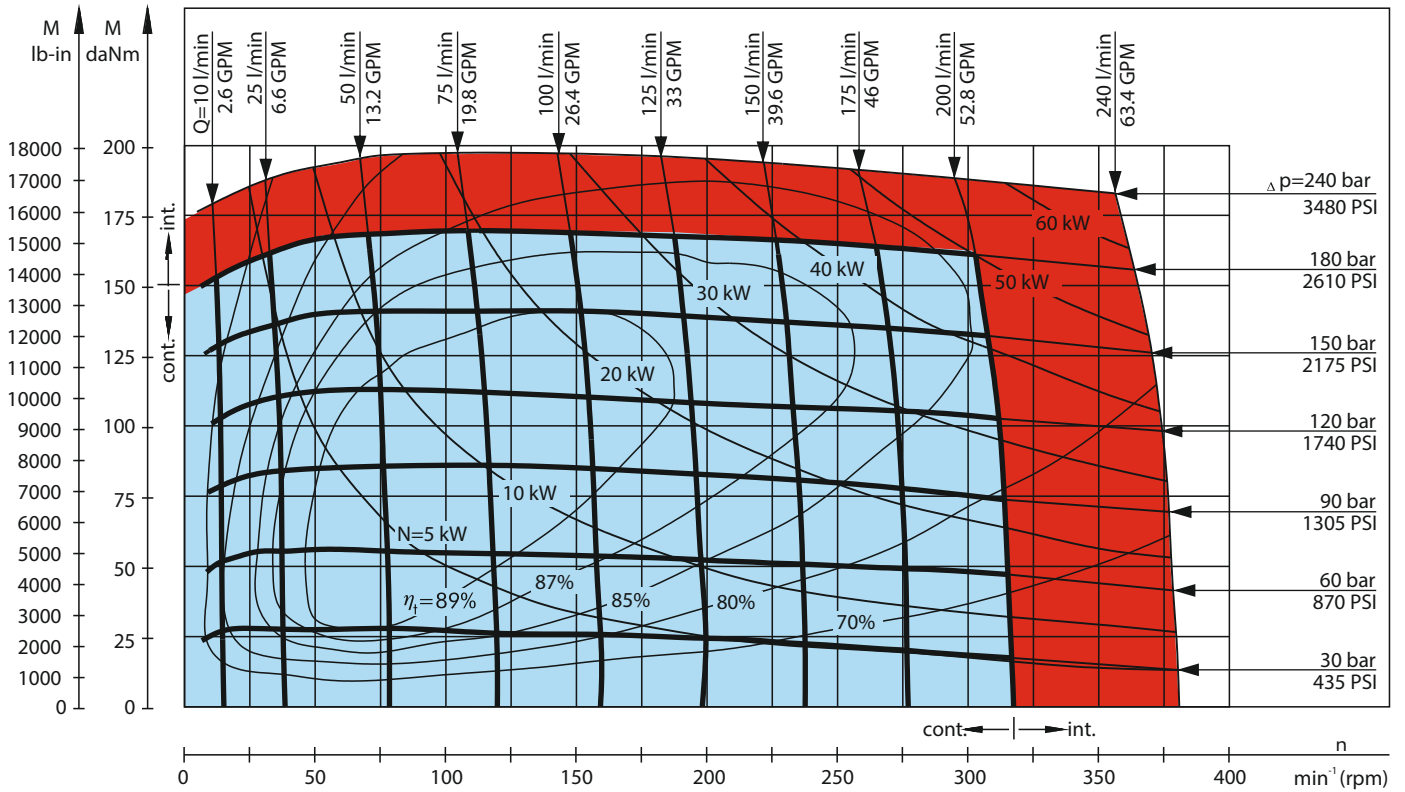


FUNCTION DIAGRAMS

MGV 500



MGV 630

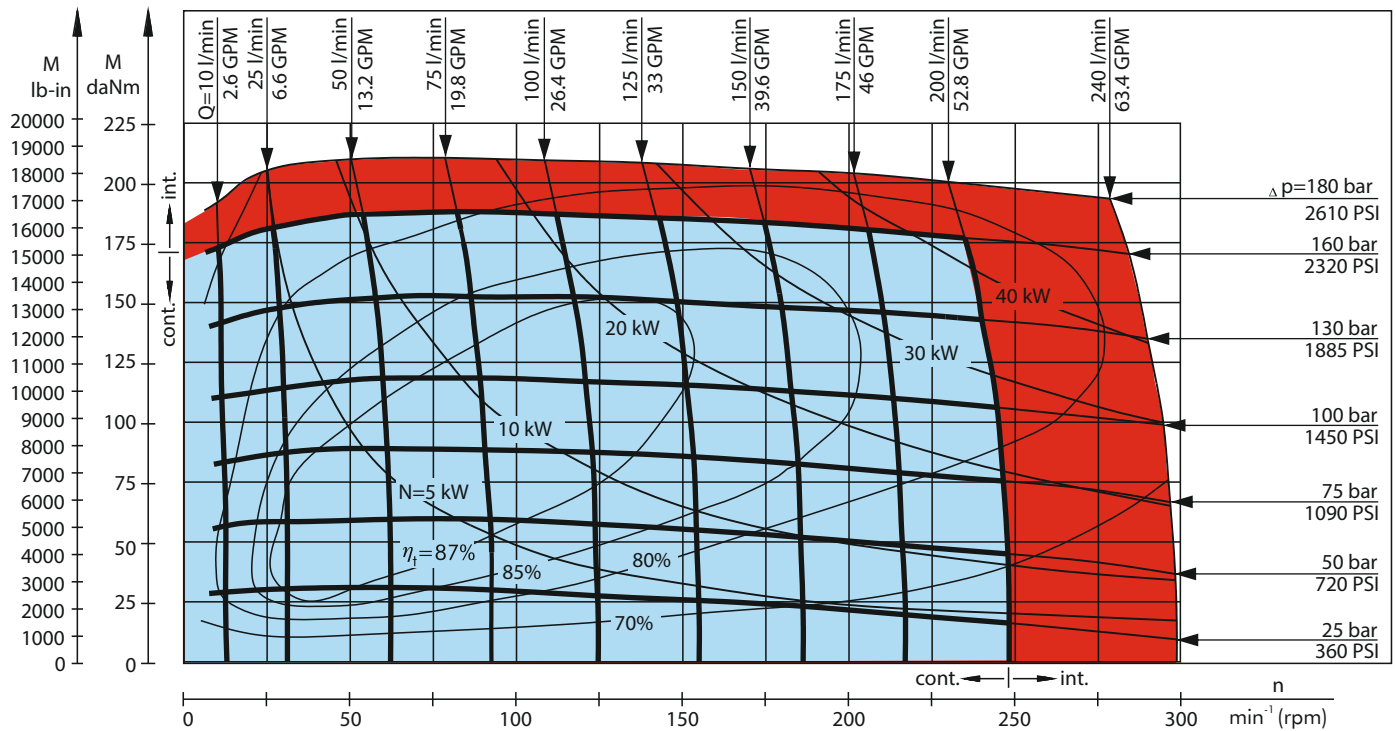


The function diagrams data is for average performance of randomly selected motors at back pressure 5÷10 bar



FUNCTION DIAGRAMS

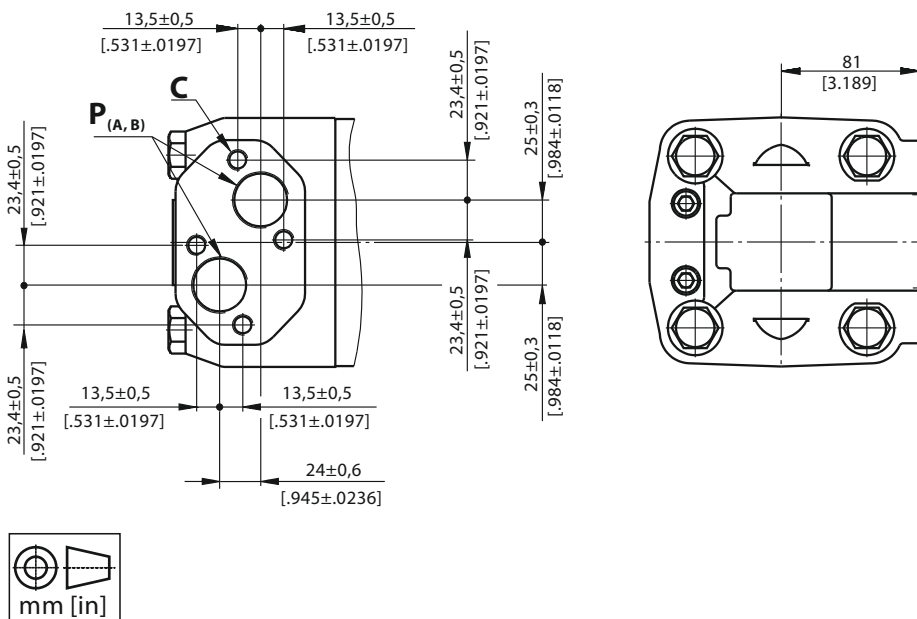
MGV 800



The function diagrams data is for average performance of randomly selected motors at back pressure 5±10 bar

PORTS

Twin Side Ports



- C:** 4xM12 - 12 mm [.47 in] depth
- P_(A,B):** 2xG1 - 20 mm [.79 in] depth
- T:** G 1/4 - 12 mm [.47 in] depth

Standard Rotation

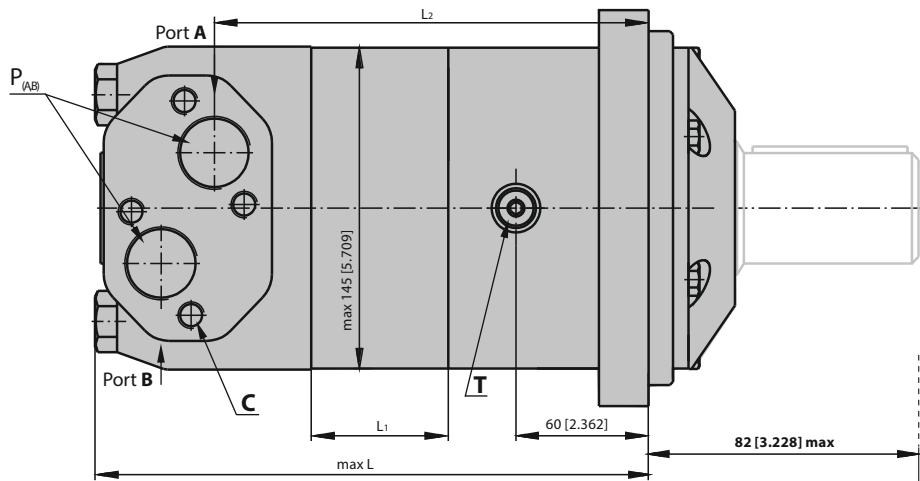
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

Reverse Rotation

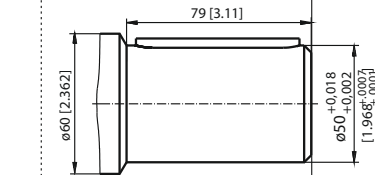
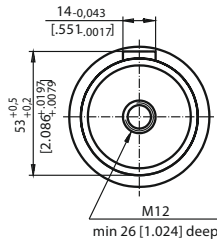
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**



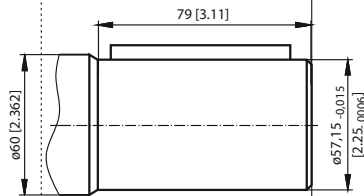
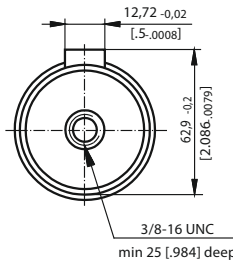
DIMENSIONS AND MOUNTING DATA AND SHAFT EXTENSIONS FOR MGV4MN MOTORS



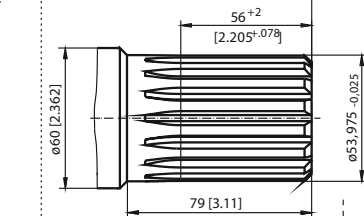
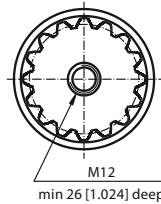
C12 - $\phi 50$ [1.968"] Straight, M12 thread, Parallel key A14x9x70 DIN 6885



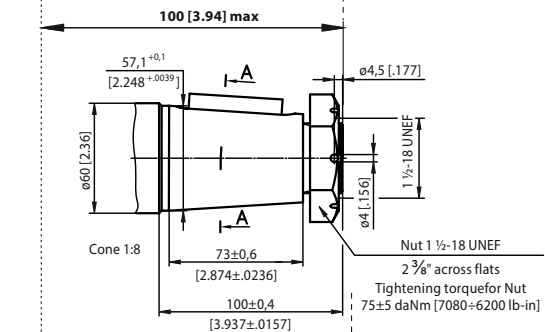
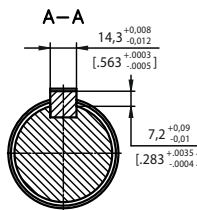
D09 - $\phi 57,15$ [2.25"] Straight, 3/8-16 UNC thread, Parallel key A1/2"x1/2"x2"/4 BS46



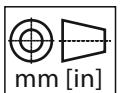
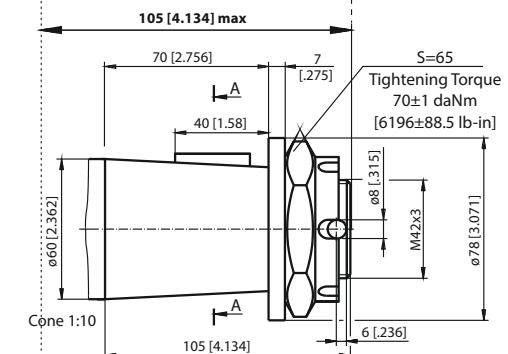
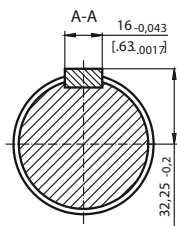
S12 - $\phi 53,975$ [2.125"] Spline SAE 16T 8/16 DP, M12 thread, ISO version



T05 - $\phi 57,2$ [2.25"] Tapered 1:8, 1 1/2-18 UNEF thread, Parallel key 9/16"x9/16"x2" BS46

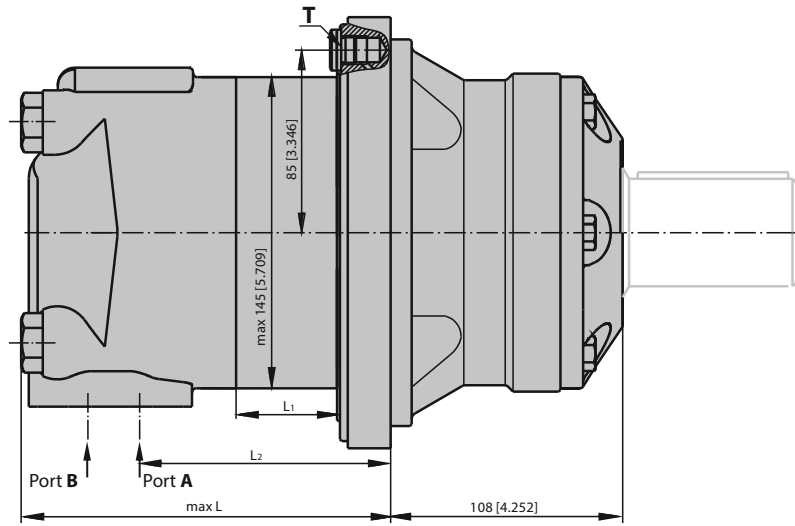


K04 - $\phi 60$ [2.362"] Tapered 1:10, M42x3 thread, Parallel key B16x10x32 DIN 6885

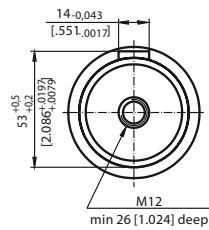




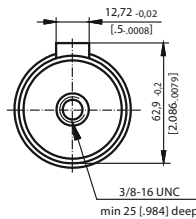
DIMENSIONS AND MOUNTING DATA AND SHAFT EXTENSIONS FOR MGVWX MOTORS



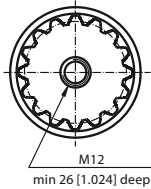
C12 - $\phi 50$ [1.968"] Straight, M12 thread, Parallel key A14x9x70 DIN 6885



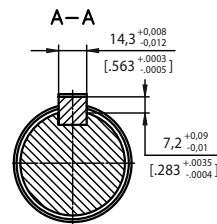
D09 - $\phi 57,15$ [2.25"] Straight, 3/8-16 UNC thread, Parallel key A1/2"x1/2"x2 1/4", BS46



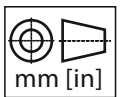
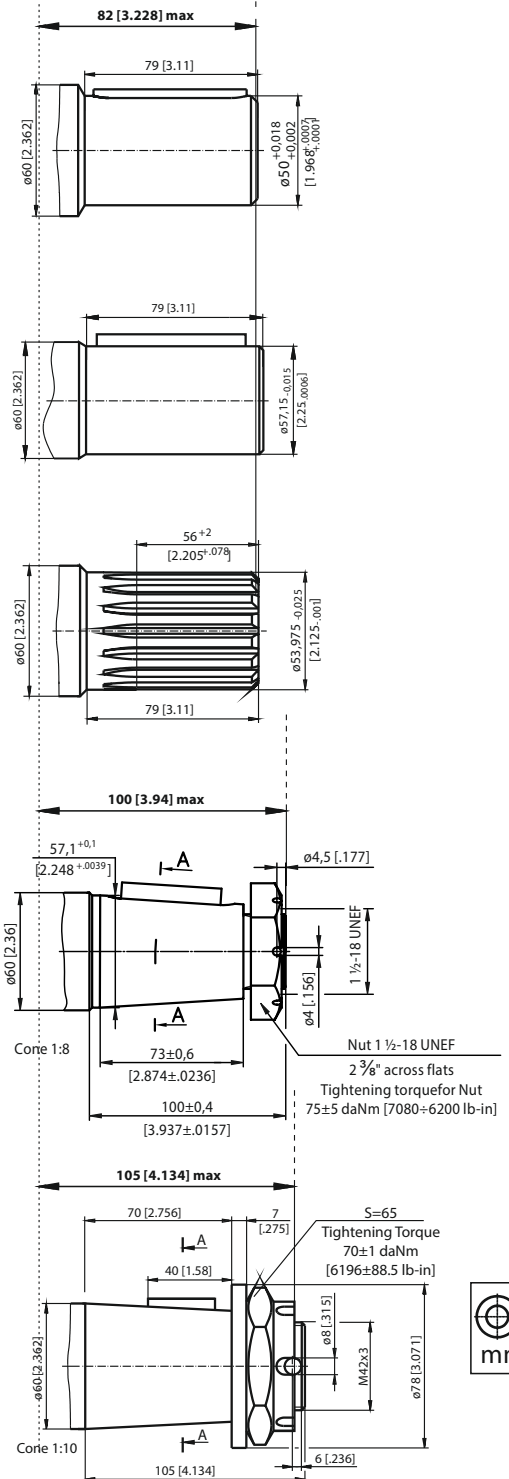
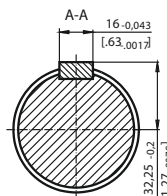
S12 - $\phi 53,975$ [2.125"] Spline SAE 16T 8/16 DP, M12 thread, ISO version



T05 - $\phi 57,2$ [2.25"] Tapered 1:8, 1 1/2-18 UNEF thread, Parallel key 9/16"x9/16"x2" BS46



K04 - $\phi 60$ [2.362"] Tapered 1:10, M42x3 thread, Parallel key B16x10x32 DIN 6885

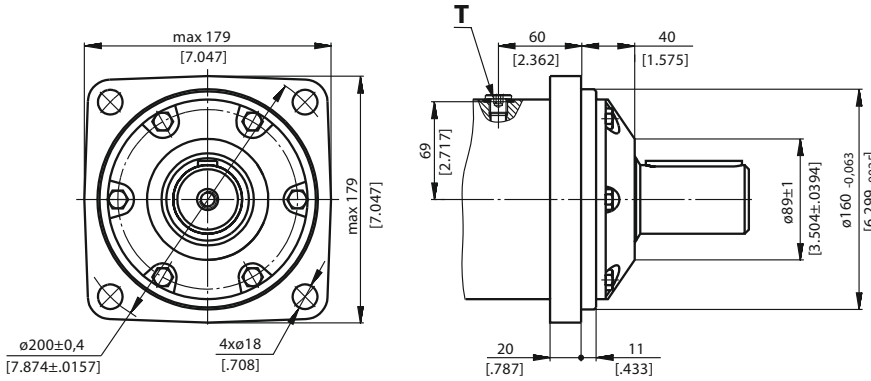




MOUNTING

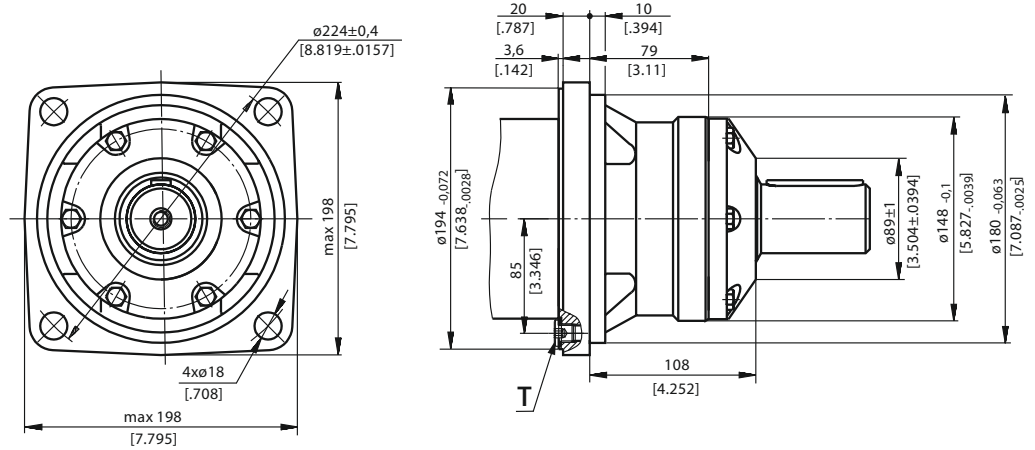
4MN

4 Bolt flange,
spigot dia. 160 [6.299"] BC 200 [7.874"],
Bolt Dia. 18 [.708"]



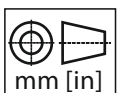
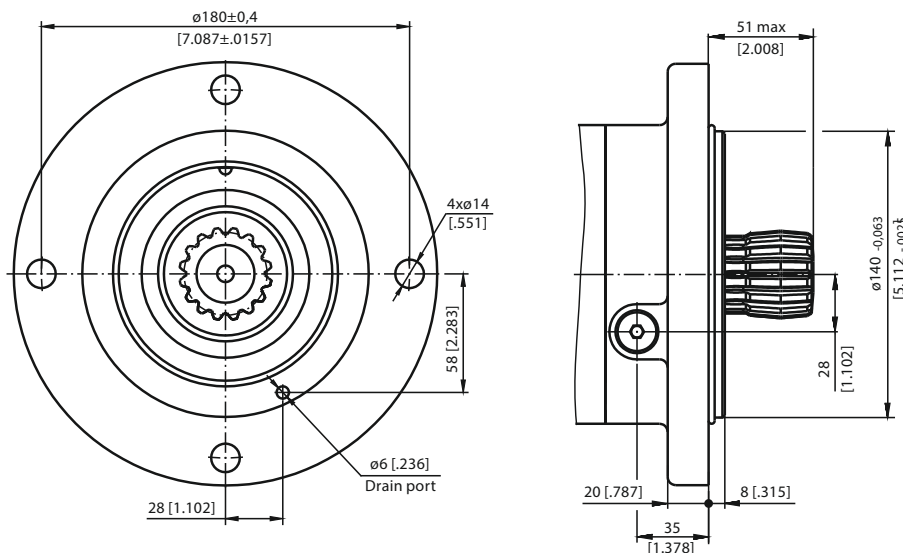
WX

Wheel flange,
spigot dia. 180 [7.087"] BC 224 [8.819"],
Bolt Dia. 18 [.708"]



SP

Short flange,
spigot dia. 140 [5.112"] BC 180 [7.087"],
Bolt Dia. 14 [.551"]





DRAIN CONNECTION

A drain line has to be used when pressure in the return line can exceed the permissible pressure. It can be connected to the drain port of the motor.

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.

ORDER CODE

| | | | | | | | |
|------------|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| MGV | | | | | | | |

Pos.1 - Mounting Flange

- 4MN** - 4 Bolt flange, spigot dia. 160 [6.299"], BC 200 [7.874"], Bolt Dia. 18 [.708"]
- WX** - Wheel flange, spigot dia.180 [7.087"], BC 224 [8.819"], Bolt Dia. 18 [.708"]
- SP** - Short flange, spigot dia. 140 [5.112"], BC 180 [7.087"], Bolt Dia. 14 [.551"]

Pos.2 - Displacement code

- 315** - 314,5 cm³/rev [19.18 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. 3 - Shaft Extensions*

- S12** - ø53,975 [2.125"] Spline SAE 16T 8/16 DP, M12 thread, ISO version
- C12** - ø50 [1.968"] Straight, M12 thread, Parallel key A14x9x70 DIN 6885
- D09** - ø57,15 [2.25"] Straight, 3/8-16 UNC thread, Parallel key 1/2"x1/2"x2¹/₄" BS46
- T05** - ø57,15 [2.25"] Tapered 1:8, 1¹/₂-18-UNEF thread, SAE J501, Parallel key ⁹/₁₆"x⁹/₁₆"x2" BS46
- K04** - ø60 [2.362"] Tapered 1:10, M42x3 thread, Parallel key B16x10x32 DIN 6885

Pos. 4 - Shaft Seal Version

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

Pos. 5 - Ports

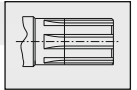
- B9** - side ports, 2xG1, drain port G1/4, BSP thread, ISO 228
- A9** - side ports, 2xG1, drain port G1/4, BSP thread, ISO 228

Pos. 6 - Special Features (see pages 66÷75)

Pos. 7 - Design Series

- default - Factory specified

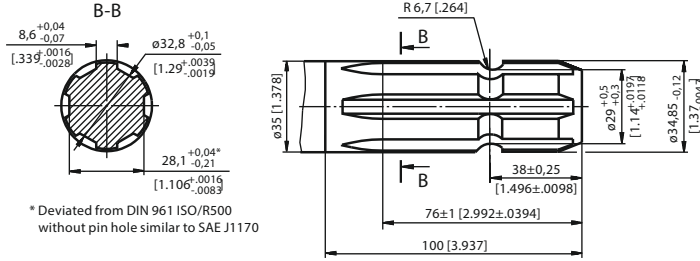
* The permissible output torque for shafts must not be exceeded!



SHAFT TYPES AND DIMENSIONS

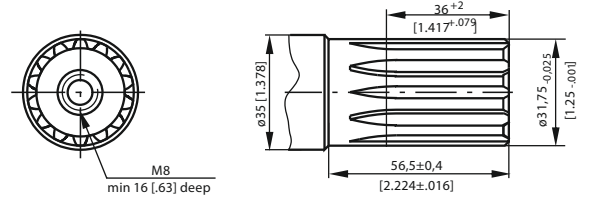
SPLINED

S08 - $\phi 35$ [1.378"] Spline p.t.o. DIN 9611 Form 1
Max. Torque 77 daNm [6815 lb-in]

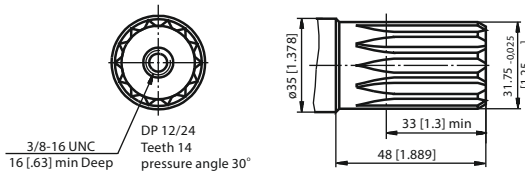


* Deviated from DIN 961 ISO/R500 without pin hole similar to SAE J1170

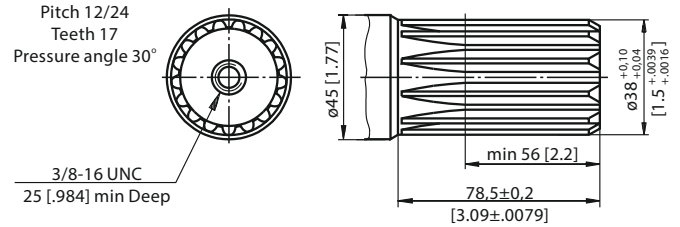
S06 - $\phi 31,75$ [1.25"] Spline SAE 14T 12/24 DP,
M8 thread, EU version
Max. Torque 95 daNm [8400 lb-in]



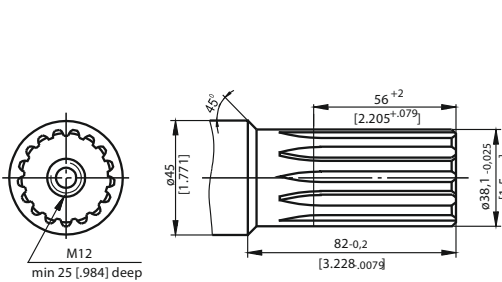
G09 - $\phi 31,75$ [1.25"] Spline SAE 14T 12/24 DP,
3/8-16 UNC thread, SAE version
Max. Torque 95 daNm [8400 lb-in]



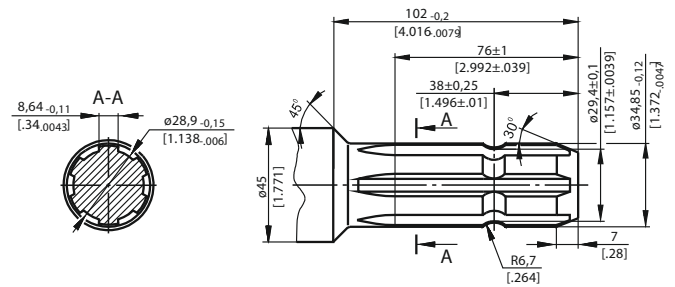
G10 - $\phi 38,1$ [1.5"] Spline SAE 17T 12/24 DP,
3/8-16 UNC thread, SAE version
Max. Torque 133 daNm [11750 lb-in]



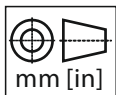
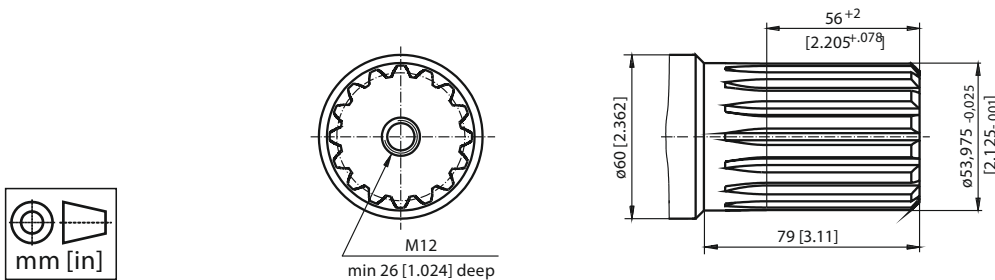
S10 - $\phi 38,1$ [1.5"] Spline SAE 17T 12/24 DP,
M12 thread, EU version
Max. Torque 132,8 daNm [11755 lb-in]



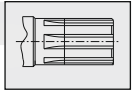
S08 - $\phi 35$ [1.378"] p.t.o. DIN 9611 Form 1
Max. Torque 77 daNm [6815 lb-in]



S12 - $\phi 53,975$ [2.125"] Spline SAE 16T 8/16 DP,
M12 thread, ISO version



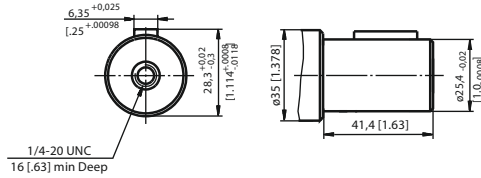
The required max. torque must not be exceeded



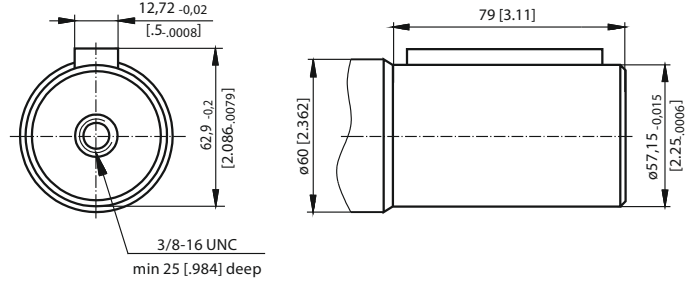
SHAFT TYPES AND DIMENSIONS

STRAIGHT

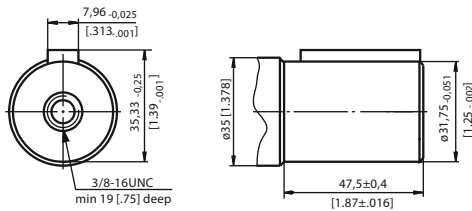
D03 - $\phi 25,4$ [1"] Straight, 1/4-20 UNC thread, EU version
Parallel key 1/4"x1/4"x1/4", BS46
Max. Torque 44 daNm [3900 lb-in]



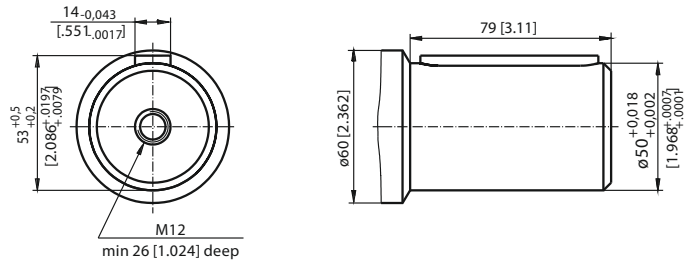
D09 - $\phi 57,15$ [2.25"] Straight, 3/8-16 UNC thread,
Parallel key A1/2"x1/2"x2/4", BS46



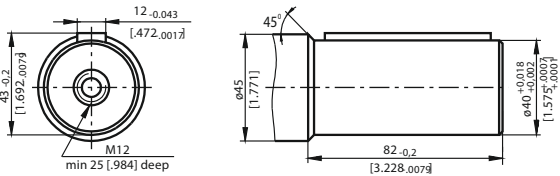
D06 - $\phi 31,75$ [1.25"] Straight, 3/8-16 UNC thread
Parallel key 5/16"x5/16"x1/4", BS46
Max. Torque 77 daNm [6815 lb-in]



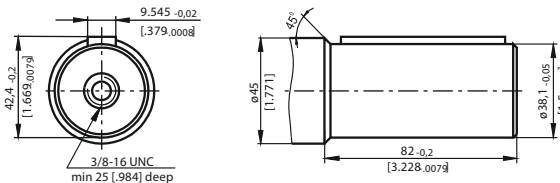
C12 - $\phi 50$ [1.968"] Straight, M12 thread,
Parallel key A14x9x70 DIN 6885



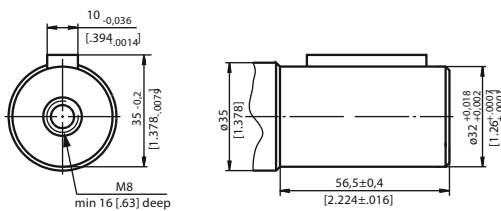
C11 - $\phi 40$ [1.575"] Straight, M12 thread,
Parallel key A12x8x70 DIN 6885
Max. Torque 132,8 daNm [11755 lb-in]



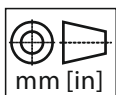
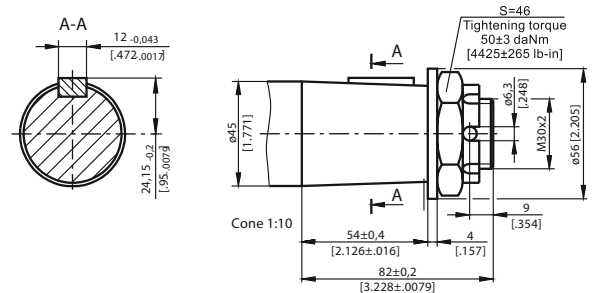
D08 - $\phi 38,1$ [1.5"] Straight, 3/8-16 UNC thread,
Parallel key 3/8"x3/8"x21/4", BS46
Max. Torque 132,8 daNm [11755 lb-in]



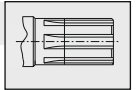
C09 - $\phi 32$ [1.26"] Straight, M8 thread, EU version
Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm [6815 lb-in]



K03 - $\phi 45$ [1.771"] Tapered 1:10, M30x2 thread, EU version,
Parallel key B12x8x28 DIN 6885
Max. Torque 210,7 daNm [18650 lb-in]



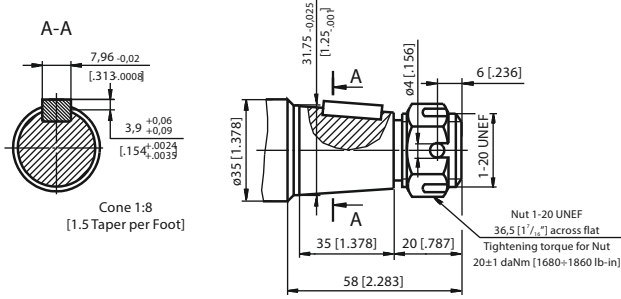
The required max. torque must not be exceeded



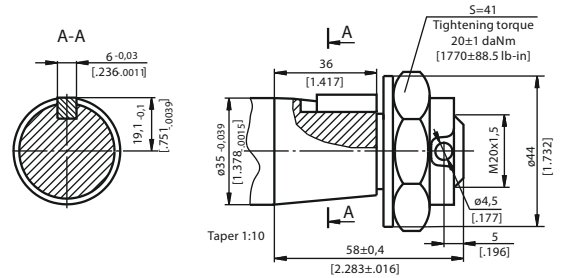
SHAFT TYPES AND DIMENSIONS

TAPERED

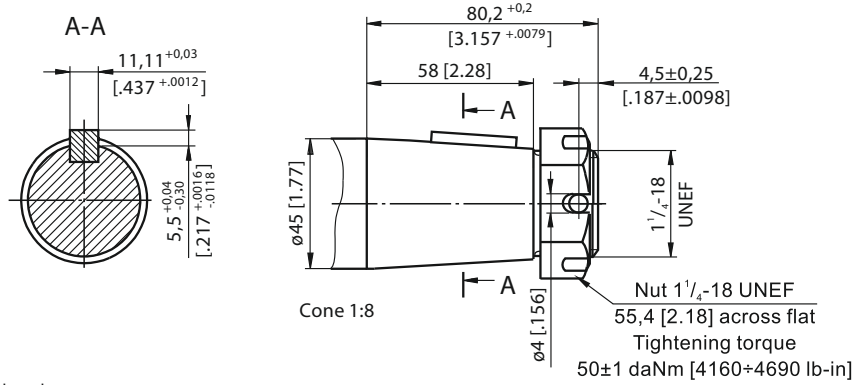
T03 - $\phi 31,75$ [1.25"] Tapered 1:8, 1-20 UNEF thread,
SAE J501 version,
Parallel key 5/16"x5/16"x1/4" BS46
Max. Torque 95 daNm [8400 lb-in]



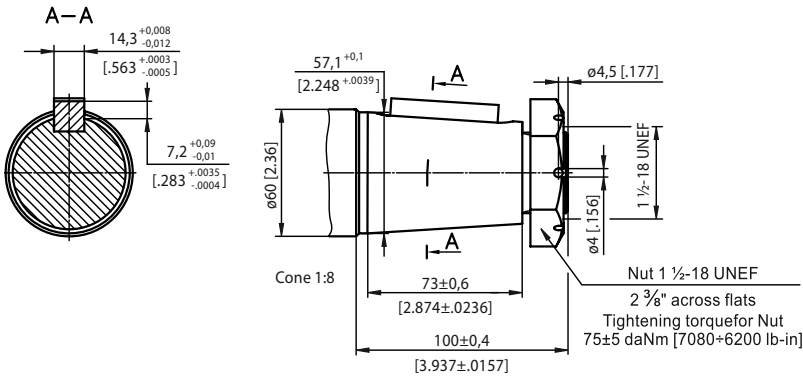
K02 - $\phi 35$ [1.378"] Tapered 1:10, EU version,
Parallel key B6x6x20 DIN 6885
Max. Torque 95 daNm [8400 lb-in]



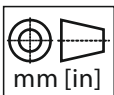
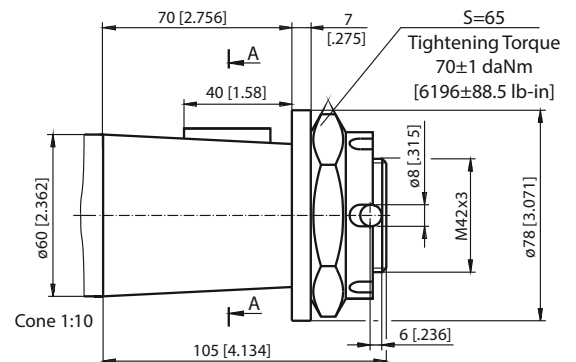
T04 - $\phi 45$ [1.771"] Tapered 1:8, 1 1/4-18 UNEF thread,
SAE J501 version,
Parallel key 7/16"x7/16"x1 1/4" BS46
Max. Torque 210 daNm [18650 lb-in]



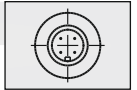
T05 - $\phi 57,2$ [2.25"] Tapered 1:8, 1 1/2-18 UNEF thread,
Parallel key 9/16"x9/16"x2" BS46



K04 - $\phi 60$ [2.362"] Tapered 1:10, M42x3 thread,
Parallel key B16x10x32 DIN 6885

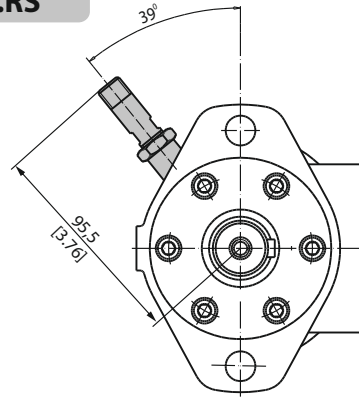
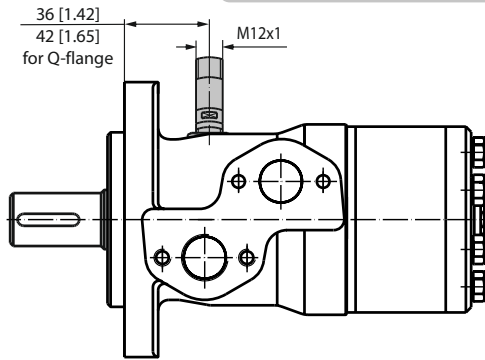


The required max. torque must not be exceeded

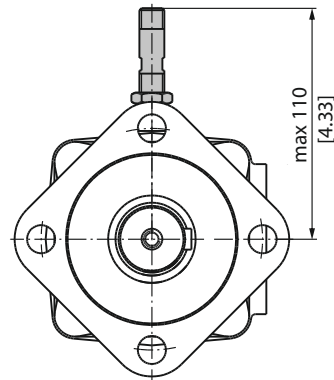
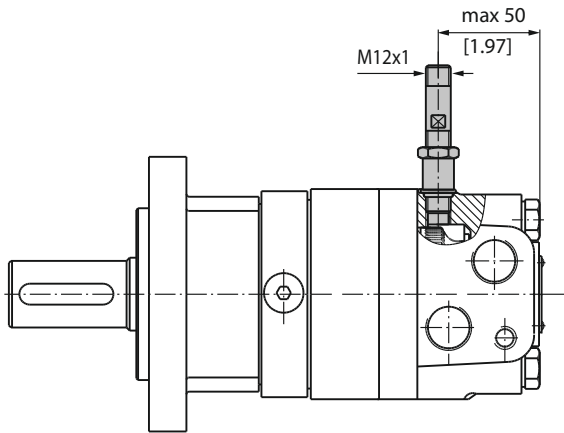
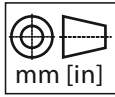


SPEED SENSORS
MOUNTING DIMENSIONS

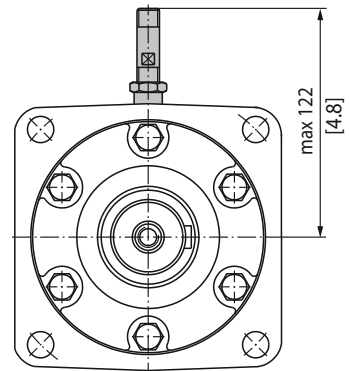
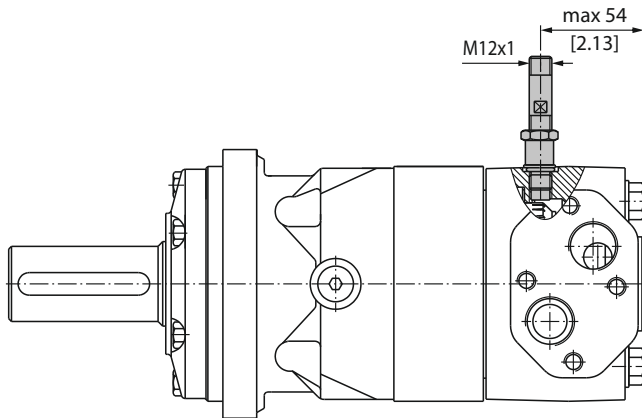
MGP...RS and MGR...RS



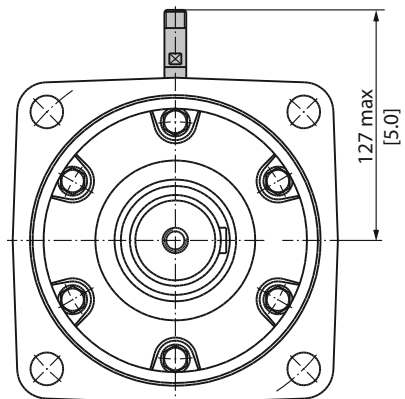
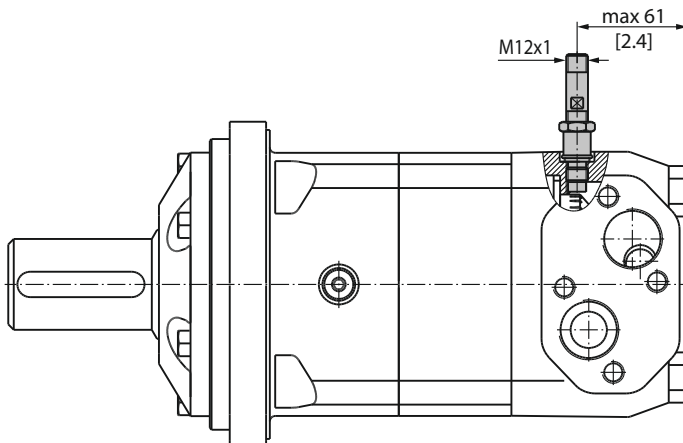
MGS...RS



MGT...RS



MGV...RS





INSTALLATION

1. Remove the plug.
2. Screw in the (CW) sensor by hand until the bottom end gently touches the speed ring.
3. Unscrew (CCW) sensor 1/4 turn. Continue unscrewing until the flats are perpendicular to unit shaft center line (tolerance 20° to 30° is acceptable).
Do not unscrew the sensor more than 3/4 of a turn from the touching.
4. Using the 1/2 inch wrench to hold the sensor, tighten the lock nut to 10⁻⁵ Nm (88.5^{lbf-in}) with an 1/16 inch hew wrench.

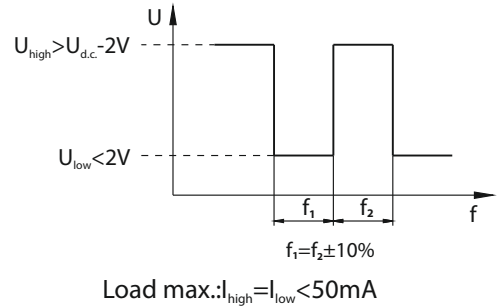
NOTE: The Speed sensor is not fitted at the factory, but is supplied in plastic bag with the unit.
For installations see enclosed instructions.

TECHNICAL DATA

TECHNICAL DATA

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

OUTPUT DIAGRAM



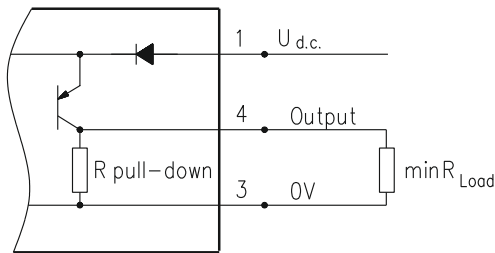
OUTPUT PULSES

| Motor type | MGP | MGR | MGS | MGT | MGV |
|-----------------------|-----|-----|-----|-----|-----|
| Pulses per revolution | 36 | 36 | 54 | 84 | 102 |

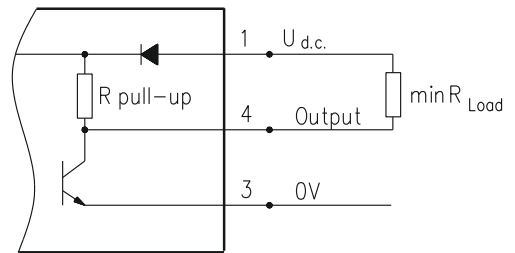
WIRING DIAGRAMS

Sensor could be in use for both type connections.

PNP

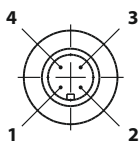


NPN



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

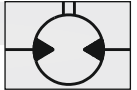
PIN CONNECTOR



| PIN | Connection | Cable Output |
|-----|-------------------|--------------|
| 1 | U _{d.c.} | Brown |
| 2 | No connection | White |
| 3 | 0V | Blue |
| 4 | Output signal | Black |

**ORDER CODE
for Speed Sensor**

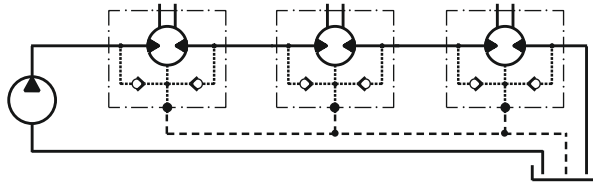
| Sensor Code | Electric connection |
|---------------|--|
| RS | Connector BINDER 713 series |
| RSL2,5 | Cable output 3x0,25; 2,5 m [98 in] long |
| RSL3,5 | Cable output 3x0,25; 3,5 m [138 in] long |
| RSL5 | Cable output 3x0,25; 5 m [196 in] long |
| RSL10 | Cable output 3x0,25; 10 m [394 in] long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



INSTALLATION

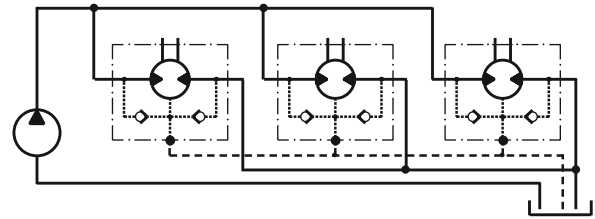
TYPE OF CONNECTION

Series connection
not recommended



open drain line is always required

Parallel connection
recommended



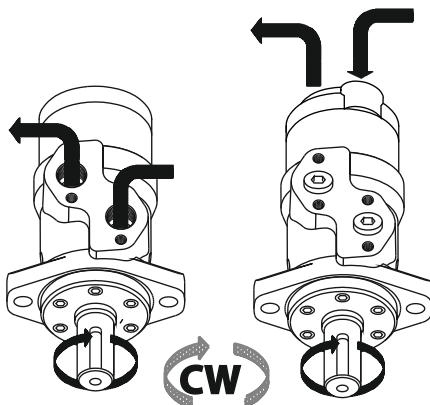
open drain line is always required

DIRECTION of ROTATION

MGP

Standard Rotation

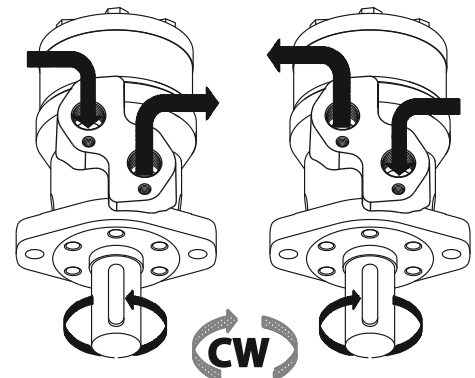
Viewed from shaft end
Port A Pressurized - CW
Port B Pressurized - CCW



MGR

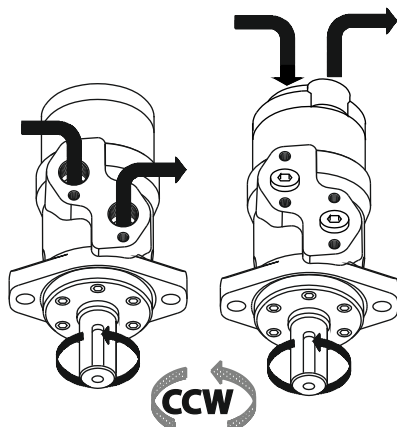
Standard Rotation

Viewed from shaft end
Port A Pressurized - CW
Port B Pressurized - CCW



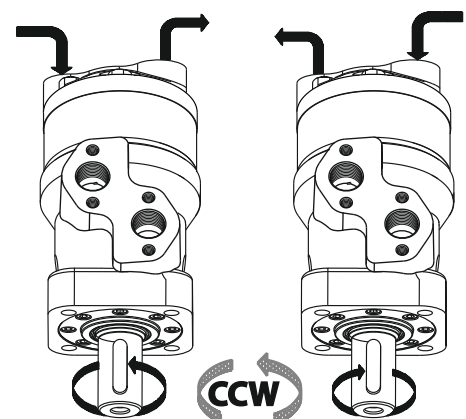
Reverse Rotation

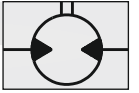
Viewed from shaft end
Port A Pressurized - CCW
Port B Pressurized - CW



Reverse Rotation

Viewed from shaft end
Port A Pressurized - CCW
Port B Pressurized - CW





INSTALLATION

DIRECTION of ROTATION

MGS

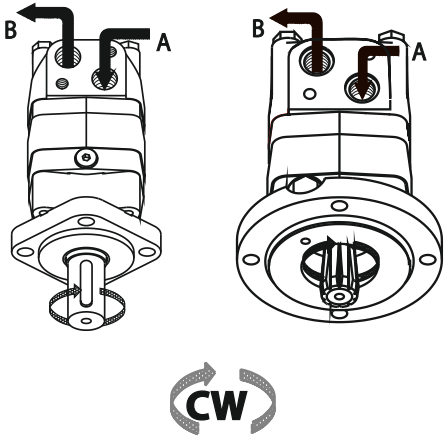
MGSS

MGT

MGV

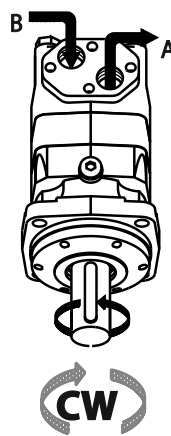
Standard Rotation

Viewed from shaft end
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**



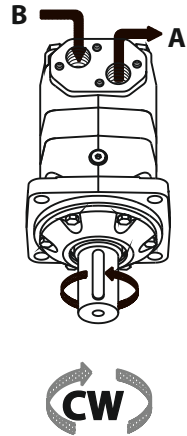
Standard Rotation

Viewed from shaft end
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**



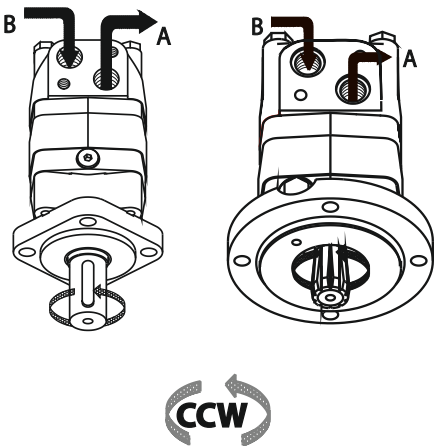
Standard Rotation

Viewed from shaft end
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**



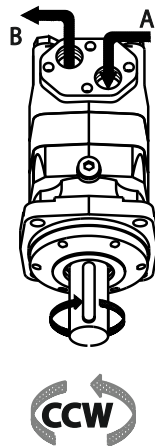
Reverse Rotation

Viewed from shaft end
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**



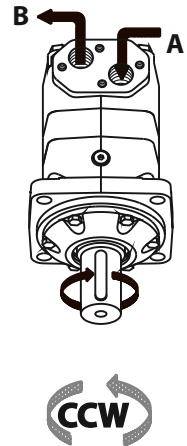
Reverse Rotation

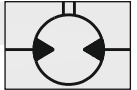
Viewed from shaft end
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**



Reverse Rotation

Viewed from shaft end
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

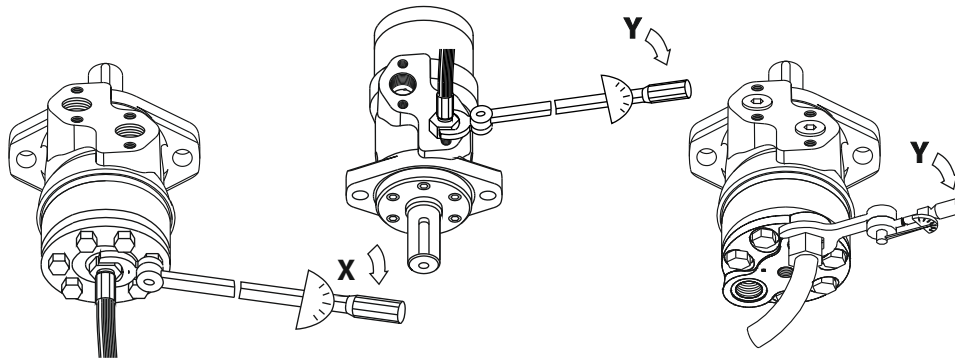




INSTALLATION

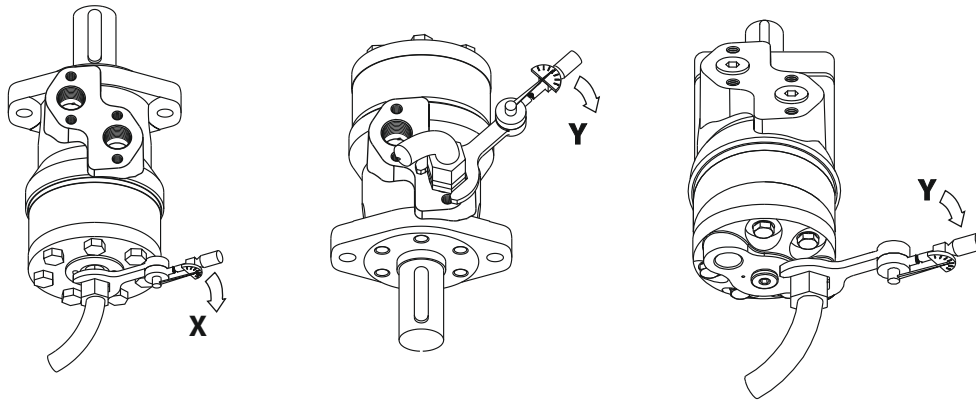
Recommended max. tightening torque X for metal plugs and orifice

MGP

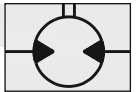


| Screwed connection Anschlussart Raccord Tipo di collegamento Especie de unir Присоединительные резьбы | Max. Tightening Torque, daNm [lb-in] Max. Anzugsmoment, daNm [lb-in] Couple de serrage maxi, daNm [lb-in] | | | Momento di serraggio max., daNm [lb-in] Momento d'apretadura max., daNm [lb-in] Момент затяжки, daNm [lb-in] | | |
|---|---|--|---|--|---|-----------|
| | With copper washer Mit Kupferscheibe Avec rondelle en cuivre Con rondella di rame De arandela de cobre С медной шайбой | With aluminium washer Mit Aluminiumscheibe Avec rondelle en aluminium Con rondella di alluminio De arandela d'aluminio С алюминиевой шайбой | With cutting edge Mit Dichtkante Tranchant Con tagliente di guarnizione De borde compactar С крутым бортиком | With "O" ring Mit "O" Ring Avec joint torique Con "O"-anello De "O"-anillo С резиновым кольцом | The thread is fixed with a glue Filo fisso con una colla | |
| X | G1/4-A (M14x1,5) | 2 [180] | 3 [265] | 4 [360] | 2 [180] | |
| | 7/16-20 UNF | | | | | |
| Y | G1/2-A (M22x1,5) | 3 [265] | 8 [700] | 10 [885] | | |
| | 7/8-14 UNF | | | | 7 [620] | |
| | 1/2-14 NPTF | | | | | 13 [1150] |

MGR



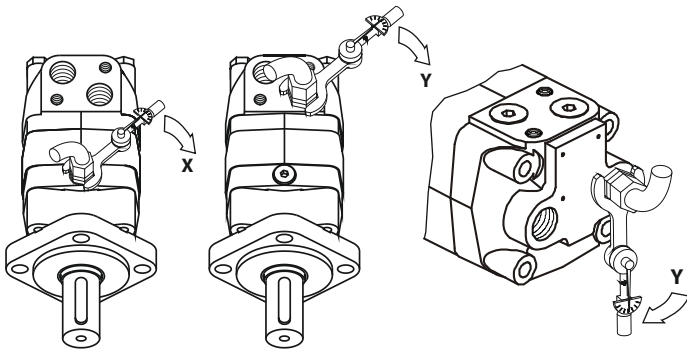
| Screwed connection Anschlussart Raccord Tipo di collegamento Especie de unir Присоединительные резьбы | Max. Tightening Torque, daNm [lb-in] Max. Anzugsmoment, daNm [lb-in] Couple de serrage maxi, daNm [lb-in] Momento di serraggio max., daNm [lb-in] Momento d'apretadura max., daNm [lb-in] Момент затяжки, daNm [lb-in] | | | | |
|---|---|--|---|---|---|
| | With copper washer Mit Kupferscheibe Avec rondelle en cuivre Con rondella di rame De arandela de cobre С медной шайбой | With aluminium washer Mit Aluminiumscheibe Avec rondelle en aluminium Con rondella di alluminio De arandela d'aluminio С алюминиевой шайбой | With cutting edge Mit Dichtkante Tranchant Con tagliente di guarnizione De borde compactar С крутым бортиком | With "O" ring Mit "O" Ring Avec joint torique Con "O"-anello De "O"-anillo С резиновым кольцом | The thread is fixed with a glue Filo fisso con una colla |
| X | G1/4-A (M14x1,5) | 2 [180] | 3 [265] | 4 [360] | |
| | 7/16-20 UNF | | | | 2 [180] |
| Y | G1/2-A (M22x1,5) | 3 [265] | 8 [700] | 10 [885] | |
| | 7/8-14 UNF | | | | 7 [620] |
| | 1/2-14 NPTF | | | | 13 [1150] |



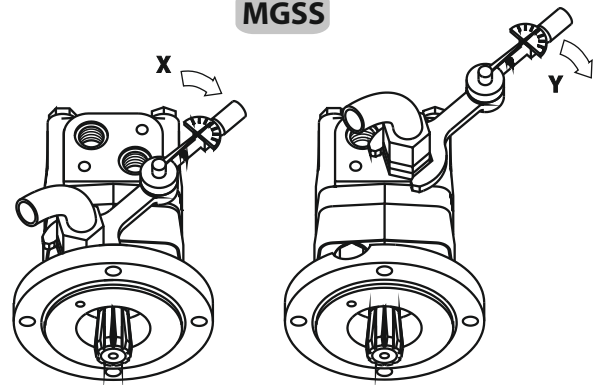
INSTALLATION

Recommended max. tightening torque X for metal plugs and orifice

MGS

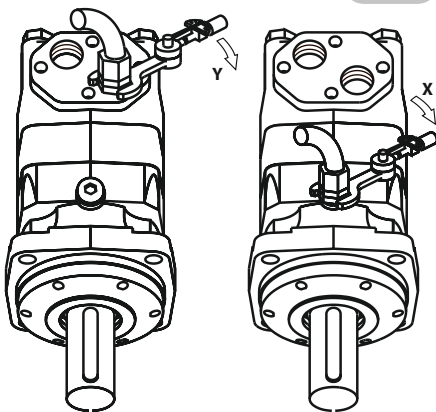


MGSS



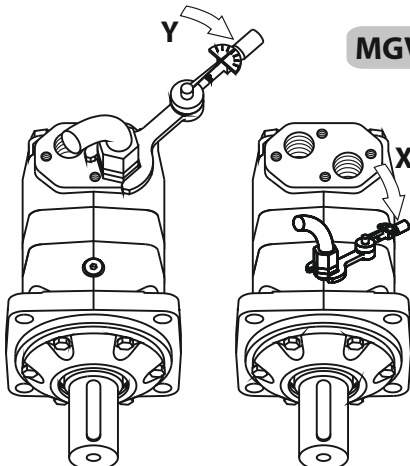
| Screwed connection Anschlussart Raccord Tipo di collegamento Especie de unir Присоединительные резьбы | Max. Tightening Torque, daNm [lb-in] Max. Anzugsmoment, daNm [lb-in] | Couple de serrage maxi, daNm [lb-in] Momento di serraggio max., daNm [lb-in] | Momento d'apretadura max., daNm [lb-in] Момент затяжки, daNm [lb-in] | | |
|--|---|--|---|---|---|
| | With copper washer Mit Kupferscheibe Avec rondelle en cuivre Con rondella di rame De arandela de cobre С медной шайбой | With aluminium washer Mit Aluminiumscheibe Avec rondelle en aluminium Con rondella di alluminio De arandela d'aluminio С алюминиевой шайбой | With cutting edge Mit Dichtkante Tranchant Con tagliente di guarnizione De borde compactar С крутым бортиком | With "O" ring Mit "O" Ring Avec joint torique Con "O"-anello De "O"-anillo С резиновым кольцом | The thread is fixed with a glue Filo fisso con una colla Приклеить резьбу |
| X | G1/4-A | 2 [180] | 3 [265] | 4 [360] | |
| | M14x1,5 | 2 [180] | 3 [265] | 4 [360] | |
| | 7/16-20 UNF | | | | 2 [180] |
| Y | G1/2-A | 3 [265] | 8 [700] | 10 [885] | |
| | M22x1,5 | 3 [265] | 8 [700] | 10 [885] | |
| | 7/8-14 UNF | | | | 7 [620] |
| | 1/2-14 NPTF | | | | 13 [1150] |

MGT

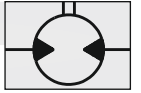


| Screwed connection Anschlussart Raccord Tipo di collegamento Especie de unir Присоединительные резьбы | Max. Tightening Torque, daNm [lb-in] Max. Anzugsmoment, daNm [lb-in] Couple de serrage maxi, daNm [lb-in] Momento di serraggio max., daNm [lb-in] Momento d'apretadura max., daNm [lb-in] Момент затяжки, daNm [lb-in] | | | | |
|--|---|--|---|---|---------|
| | With copper washer Mit Kupferscheibe Avec rondelle en cuivre Con rondella di rame De arandela de cobre С медной шайбой | With aluminium washer Mit Aluminiumscheibe Avec rondelle en aluminium Con rondella di alluminio De arandela d'aluminio С алюминиевой шайбой | With cutting edge Mit Dichtkante Tranchant Con tagliente di guarnizione De borde compactar С крутым бортиком | With "O" ring Mit "O" Ring Avec joint torique Con "O"-anello De "O"-anillo С резиновым кольцом | |
| X | G1/4-A | 2 [180] | 3 [265] | 4 [360] | |
| | M14x1,5 | 2 [180] | 3 [265] | 4 [360] | |
| | 9/16-18 UNF | | | | 2 [180] |
| Y | G3/4-A | 5 [450] | 13 [1150] | 16 [1400] | |
| | M27x2 | 5 [450] | 13 [1150] | 16 [1400] | |
| | 1 1/16-12 UN | | | | 9 [800] |

MGV



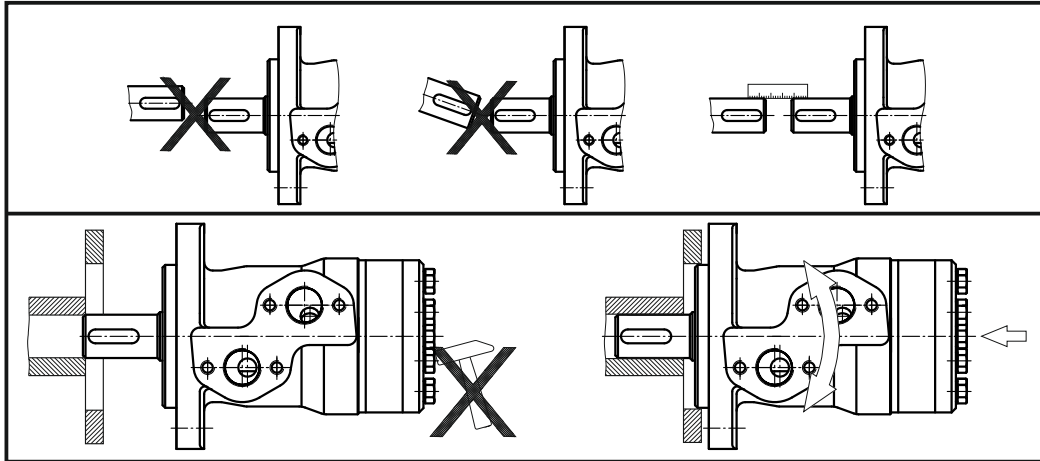
| Screwed connection Anschlussart Raccord Tipo di collegamento Especie de unir Присоединительные резьбы | Max. Tightening Torque, daNm [lb-in] Max. Anzugsmoment, daNm [lb-in] Couple de serrage maxi, daNm [lb-in] Momento di serraggio max., daNm [lb-in] Momento d'apretadura max., daNm [lb-in] Момент затяжки, daNm [lb-in] | | | | |
|--|---|--|---|---|-----------|
| | With copper washer Mit Kupferscheibe Avec rondelle en cuivre Con rondella di rame De arandela de cobre С медной шайбой | With aluminium washer Mit Aluminiumscheibe Avec rondelle en aluminium Con rondella di alluminio De arandela d'aluminio С алюминиевой шайбой | With cutting edge Mit Dichtkante Tranchant Con tagliente di guarnizione De borde compactar С крутым бортиком | With "O" ring Mit "O" Ring Avec joint torique Con "O"-anello De "O"-anillo С резиновым кольцом | |
| X | G1/4-A | 2 [180] | 3 [265] | 4 [360] | |
| | 9/16-18 UNF | | | | 2 [180] |
| Y | G1-20 | 8 [700] | 20 [1770] | 25 [2200] | |
| | 1 5/16-12 UN | | | | 16 [1400] |



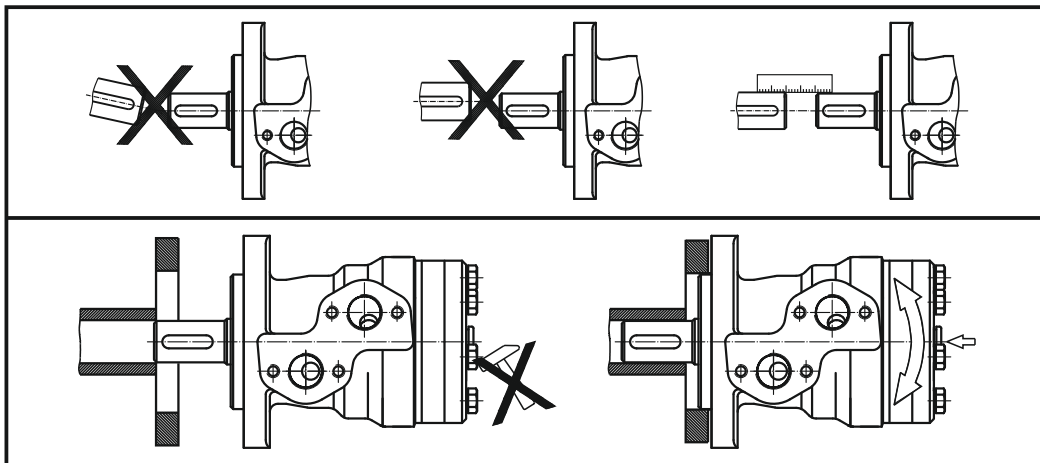
INSTALLATION

At start-up and during operation the unit housing has to be filled up with hydraulic fluid. Start-up has to be carried out at low or moderate speed and without load (for example 1000 rpm and pressure 50 bar [725 PSI]) till the unit and the hydraulic scheme are filled up with oil. Generally the start-up needs 10-15 minutes to finish. The leakage oil in the housing has to be discharged to the tank through the highest positioned drain port T. The max. pressure in the drain line is 5 bar [70 PSI].

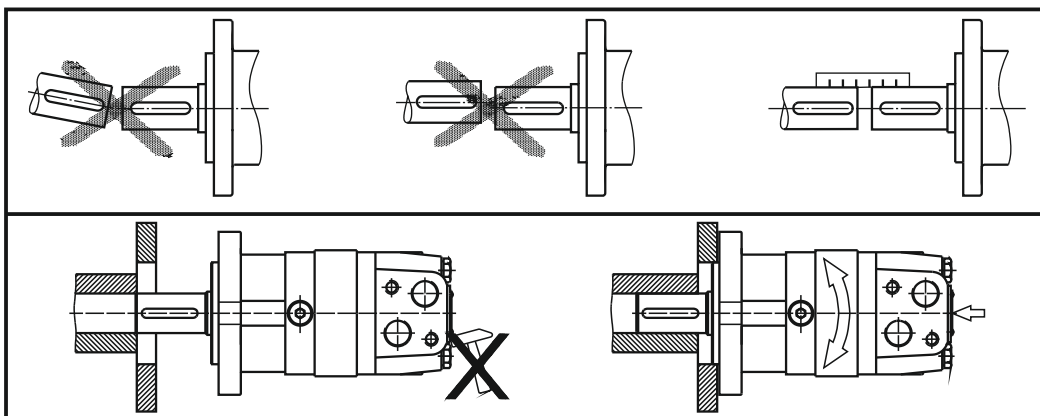
MGP



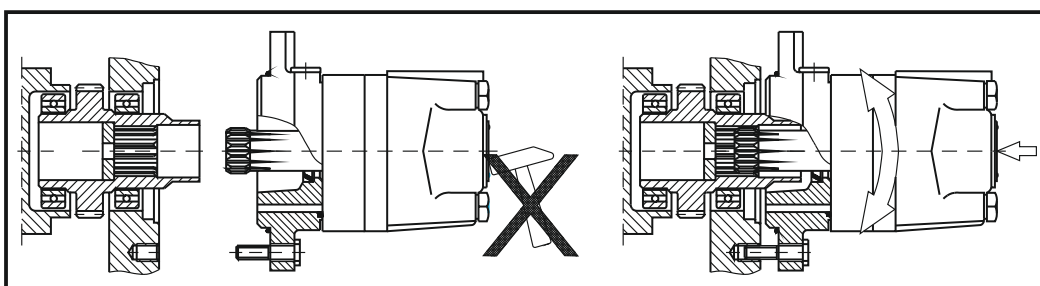
MGR



MGS

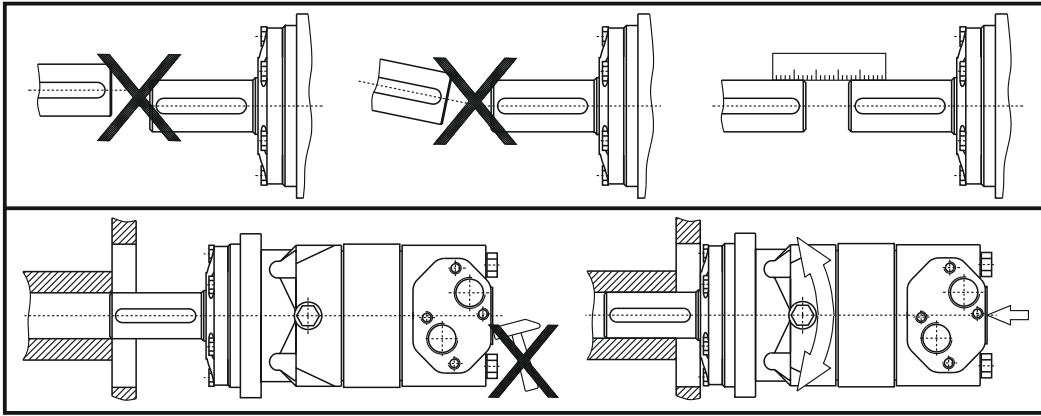


MGSS

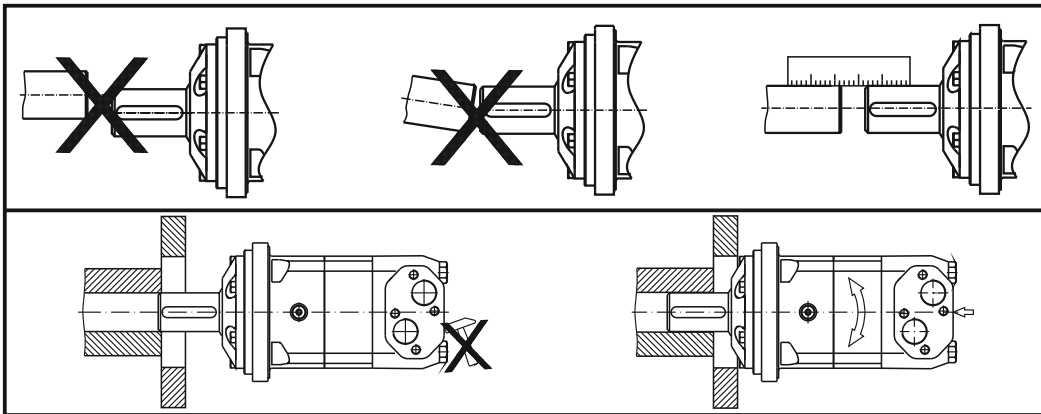




MGT



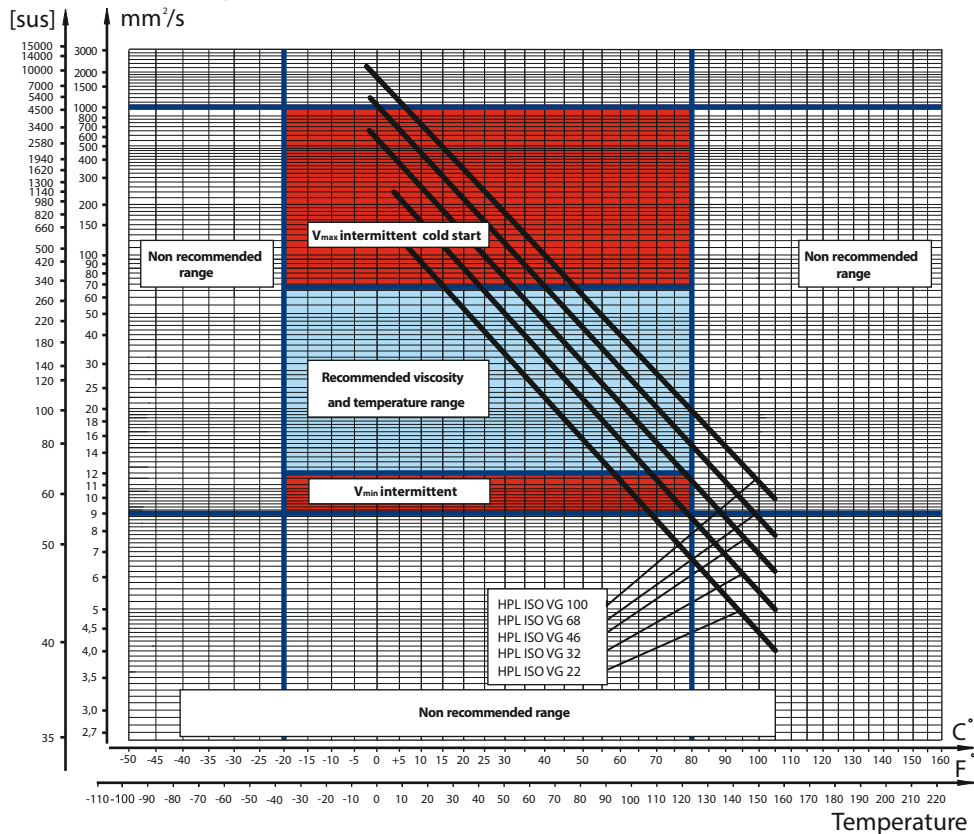
MGV



FLUID VISCOSITY LIMITS

In order to obtain optimum efficiency and service life, we recommend to select the operating

Kinematic viscosity



The above-shown viscosity characteristics are for reference only. Please, check the actual viscosity with the manufacturer of the fluid.



BASIC FORMULAS

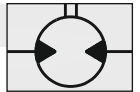
The motor size, pressure and flow required for a specific application can be calculated using the formulas below.

| Metric System | | Inch System | |
|---|---|--|---|
| Efficiency | $\eta_t = \eta_{mh} \cdot \eta_v$ $\eta_{mh} = \frac{\eta_t}{\eta_v}$ $\eta_v = \frac{\eta_t}{\eta_{mh}}$ | Efficiency | $\eta_t = \eta_{mh} \cdot \eta_v$ $\eta_{mh} = \frac{\eta_t}{\eta_v}$ $\eta_v = \frac{\eta_t}{\eta_{mh}}$ |
| Input flow (for Motor) | $Q = \frac{Vg \cdot n}{1000 \cdot \eta_v}$ [l/min] | Input flow (for Motor) | $Q = \frac{Vg \cdot n}{231 \cdot \eta_v}$ [GPM] |
| Output torque (for Motor) | $M = \frac{Vg \cdot \Delta p \cdot \eta_{mh}}{62,8}$ or $M = \Delta p \cdot T_{con.}$ [Nm] | Output torque (for Motor) | $M = \frac{Vg \cdot \Delta p \cdot \eta_{mh}}{2 \cdot \pi}$ or $M = \Delta p \cdot T_{con.}$ [lb-in] |
| Output power (for Motor) | $P = \frac{M \cdot n}{9550} = \frac{Q \cdot \Delta p \cdot \eta_t}{600}$ [kW] | Output power (for Motor) | $P = \frac{Vg \cdot n \cdot \Delta p \cdot \eta_t}{396000}$ [hp] |
| Speed (for Motor) | $n = \frac{Q \cdot 1000}{Vg} \cdot \eta_{v,or}$ or $n = Q \cdot N_{con.}$ [min ⁻¹] | Speed (for Motor) | $n = \frac{Q \cdot 231 \cdot \eta_v}{Vg}$ or $n = Q \cdot N_{con.}$ [min ⁻¹] |
| <p>Vg = Displacement per rev. [cm³] Δp = p_{HP} - p_{LP} [bar] p_{HP} = High pressure [bar] p_{LP} = Low pressure [bar] n = Rotation speed [RPM] Q = Oil flow [l/min] T_{con.} = Toque constant [Nm/bar] N_{con.} = Speed constant [RPM/(l/min)] η_v = Volumetric efficiency η_{mh} = Mechanical-hydraulic efficiency η_t = Overall efficiency</p> | | <p>Vg = Displacement per rev. [in³] Δp = p_{HP} - p_{LP} [PSI] p_{HP} = High pressure [PSI] p_{LP} = Low pressure [PSI] n = Rotation speed [RPM] Q = Oil flow [GPM] T_{con.} = Toque constant [lb-in/PSI] N_{con.} = Speed constant [RPM/GPM] η_v = Volumetric efficiency η_{mh} = Mechanical-hydraulic efficiency η_t = Overall efficiency</p> | |

Depending on the results of the load calculations, the most appropriate type of motor from the catalogue is selected.

Table 1

| Rolling resistance coefficient In case of rubber tire rolling on different surfaces | | | |
|--|----------|---------------------------|-------------|
| Surface | ρ | Surface | ρ |
| Concrete- faultless | 0.010 | Macadam- bad | 0.037 |
| Concrete- good | 0.015 | Snow- 5 cm | 0.025 |
| Concrete- bad | 0.020 | Snow- 10 cm | 0.037 |
| Asphalt- faultless | 0.012 | Polluted covering- smooth | 0.025 |
| Asphalt- good | 0.017 | Polluted covering- sandy | 0.040 |
| Asphalt- bad | 0.022 | Mud | 0.037÷0.150 |
| Macadam- faultless | 0.015 | Sand- Gravel | 0.060÷0.150 |
| Macadam- good | 0.022 | Sand- loose | 0.160÷0.300 |



APPLICATION FORMULAS

1. Motor speed: n, RPM

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

v_{km} - vehicle speed [km/h]

v_{mi} - 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: $RR = G \cdot \rho$

G - total weight loaded on vehicle, daN [lbs];

3. Grade resistance: GR, daN [lbs]

$$GR = G \cdot (\sin \alpha + \rho \cdot \cos \alpha)$$

α - gradient negotiation angle (Table 2)

Table 2

| Grade % | α Degrees | Grade % | α Degrees |
|---------|------------------|---------|------------------|
| 1% | 0° 35' | 12% | 6° 5' |
| 2% | 1° 9' | 15% | 8° 31' |
| 5% | 2° 51' | 20% | 11° 19' |
| 6% | 3° 26' | 25% | 14° 3' |
| 8% | 4° 35' | 32% | 18° |
| 10% | 5° 43' | 60% | 31° |

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 |

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:

$$FA = \frac{v_{km} \cdot G}{3,6 \cdot t} \text{ [daN]} \quad FA = \frac{v_{mi} \cdot G}{22 \cdot t} \text{ [lbs]}$$

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.

$$TE = 1,1 \cdot (RR + GR + FA + DP)$$

RR - force required to overcome the rolling resistance;

GR - force required to slope upwards;

FA - force required to accelerate (acceleration force);

DP - additional tractive effort (trailer).

7. Motor Torque moment: M, daNm [in-lb]

Necessary torque moment for every hydraulic motor:

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

N - motor numbers;

η_M - mechanical gear efficiency (if it is available).

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

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

To avoid wheel slipping, the following condition should be observed $M_w > M$

f - frictional factor;

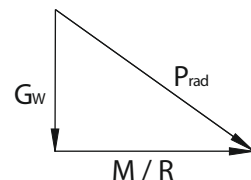
9. Radial motor loading: P_{rad} , daN [lbs]

When the motor is used for motion with a ring or gear mounted directly on the motor shaft, the total radial load of the motor shaft P_{rad} is the sum of the motion force and the

G_w - Weight held by wheel;

P_{rad} - Total radial loading of motor shaft;

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



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