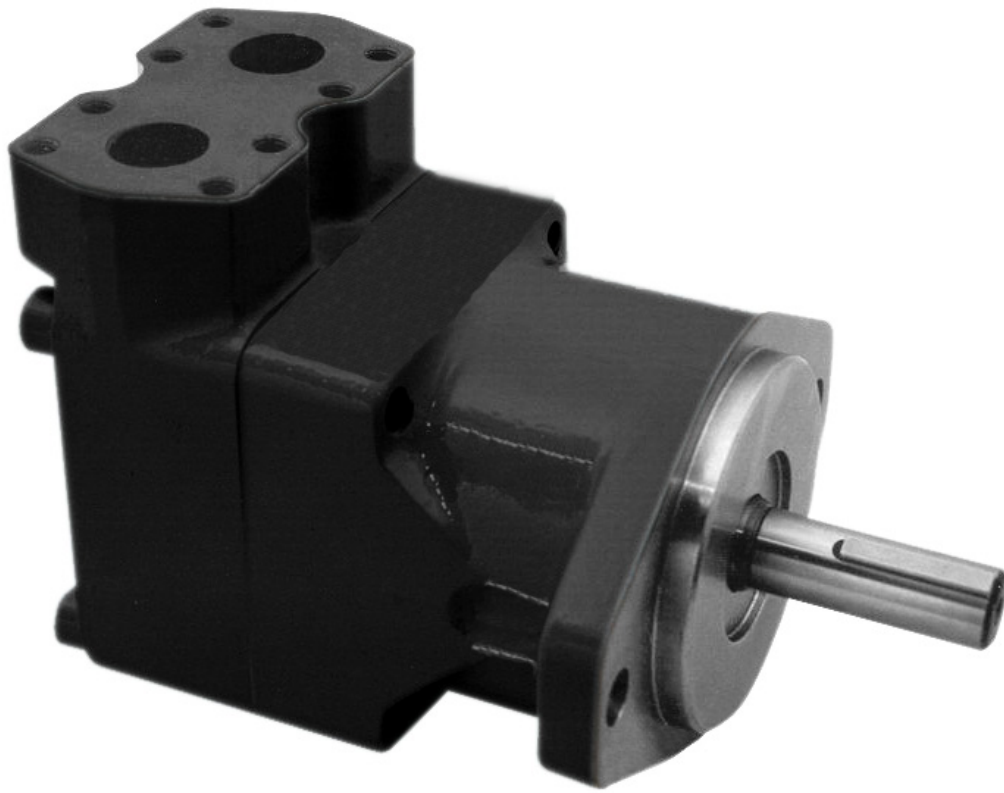




# Hydraulic Motors

## M3B - M4\*

Denison Vane Technology, fixed displacement



ENGINEERING YOUR SUCCESS.

|                     |                                                                  |          |
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**HIGH STARTING TORQUE  
EFFICIENCY**

The high starting torque efficiency of vane type motors makes them especially applicable in load hoist winch drives, swing drives and propulsion drives. This high starting torque efficiency allows the motor to start under high load without pressure overshoots, jerks and high instantaneous horsepower loads.

**HIGH VOLUMETRIC EFFICIENCY**

Vane motors begin life with high volumetric efficiency and maintain that efficiency throughout their operating life.

**LOW TORQUE RIPPLE AT LOW  
SPEED**

When operating at very low speeds on applications such as swing and load hoist drives, the vane motor exhibits very low torque ripple.

**2 AND 3-SPEED VERSIONS  
AVAILABLE**

The M4DC, because of its unequal size cartridges, allows the use of 3 speed operation. This makes them more applicable in traction drive circuits to replace manually shifted gear-boxes. 2-speed motors are available in a wider range of ratios than standard gear motors.

**BALANCED DESIGN**

Vane, rotor and cam ring are pressure balanced to increase life and efficiency over full speed range.

**INTERCHANGEABLE ROTATING  
GROUPS**

Rotating groups may be easily replaced to renew the motor or change displacement to suit altered requirements for speed or torque.

**REVERSIBLE ROTATION**

The motors may be stopped or reversed repeatedly and rapidly driving or braking the connected shaft load at controlled torque levels.

**WIDE SPEED RANGE**

Starting to maximum RPM, with full torque capability during acceleration.

**PORTS AND MOUNTING**

Conform fully to SAE J744c (ISO-3019-1) standards to simplify refitting and installation.

**FIRE RESISTANT FLUIDS**

Are easily used in the standard M3B and M4\* versions of these motors. These include phosphate or organic ester fluids and blends, water-glycol solutions and water-oil invert emulsions.

**M3B AND M4\* SERIES MOTORS**

The M3B and M4\* have been designed especially for severe duty applications which require high pressure up to 230 bar, high speed up to 4000 RPM and low fluid lubricity (HF-1, HF-2A, HF-3, HF-4, HF-5).

| Series | Size                     | Displ,                              | Theor, Displ,<br>V <sub>i</sub> | Torque T | Power at<br>100 RPM | Torque T                    | Power P |
|--------|--------------------------|-------------------------------------|---------------------------------|----------|---------------------|-----------------------------|---------|
|        |                          |                                     | ml/rev,                         | Nm/bar   | kW/bar              | n = 2000 RPM at Δ p 175 bar |         |
|        |                          |                                     |                                 |          |                     | N,m                         | kW      |
| M3     | B<br>B1                  | 009                                 | 9,2                             | 0,130    | 0,0015              | 19,7                        | 4,3     |
|        |                          | 012                                 | 12,3                            | 0,186    | 0,0020              | 26,7                        | 5,8     |
|        |                          | 018                                 | 18,5                            | 0,304    | 0,0032              | 46,6                        | 10,0    |
|        |                          | 027                                 | 27,8                            | 0,485    | 0,0050              | 77,4                        | 16,3    |
|        |                          | 036                                 | 37,1                            | 0,624    | 0,0065              | 102,0                       | 21,1    |
| M4     | C<br>C1<br>SC<br>SC1     | 024                                 | 24,4                            | 0,39     | 0,0040              | 60,5                        | 12,7    |
|        |                          | 027                                 | 28,2                            | 0,45     | 0,0047              | 70,0                        | 14,7    |
|        |                          | 031                                 | 34,5                            | 0,55     | 0,0058              | 86,8                        | 18,0    |
|        |                          | 043                                 | 46,5                            | 0,74     | 0,0078              | 120,0                       | 25,1    |
|        |                          | 055                                 | 58,8                            | 0,93     | 0,0098              | 149,0                       | 31,2    |
|        |                          | 067                                 | 71,1                            | 1,13     | 0,0120              | 170,0                       | 35,6    |
|        |                          | 075                                 | 80,1                            | 1,27     | 0,0130              | 198,0                       | 41,5    |
|        | D<br>D1<br>SD<br>SD1     | 062                                 | 65,1                            | 1,04     | 0,0110              | 165,0                       | 34,6    |
|        |                          | 074                                 | 76,8                            | 1,22     | 0,0130              | 200,0                       | 41,9    |
|        |                          | 088                                 | 91,1                            | 1,45     | 0,0150              | 236,0                       | 49,4    |
|        |                          | 102                                 | 105,5                           | 1,68     | 0,0180              | 264,0                       | 55,3    |
|        |                          | 113                                 | 116,7                           | 1,86     | 0,0200              | 300,0                       | 62,8    |
|        |                          | 128                                 | 132,4                           | 2,11     | 0,0220              | 340,0                       | 71,2    |
|        |                          | 138                                 | 144,4                           | 2,30     | 0,0240              | 372,0                       | 77,9    |
|        | E<br>E1<br>SE/SE1        | 153                                 | 158,5                           | 2,52     | 0,0260              | 398,0                       | 83,4    |
|        |                          | 185                                 | 191,6                           | 3,05     | 0,0320              | 484,0                       | 101,4   |
|        |                          | 214                                 | 222,0                           | 3,53     | 0,0370              | 567,0                       | 118,8   |
|        | DC<br>DC1<br>SDC<br>SDC1 | See M4C/C1/SC/SC1 and M4D/D1/SD/SD1 |                                 |          |                     |                             |         |

Internal drain : All these motors may be equipped with internal drain. Then the model numbers will be M3B1, M4C1, M4SC1, M4D1, M4SD1, M4E1, M4SE1, M4DC1, M4SDC1.

For further information or if the performance characteristics outlined above do not meet your own particular requirements, please consult your local Parker representative.

#### GENERAL CHARACTERISTICS

|          | Mounting<br>standard          | Weight without<br>connector and<br>bracket - kg | Moment of<br>inertia<br>kgm <sup>2</sup> x 10 <sup>-4</sup> | Option for inlet and outlet port                                         |                          |
|----------|-------------------------------|-------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------|
| M3B      | SAE J744c<br>ISO/3019-1 SAE A | 8,0                                             | 3,0                                                         | SAE threaded<br>SAE 4 bolts J718c ISO/DIS 6162-1 - 3/4"<br>BSPP threaded |                          |
| M4C/SC   | SAE J744c<br>ISO/3019-1 SAE B | 15,4                                            | 7,9                                                         | SAE threaded<br>SAE 4 bolts J718c ISO/DIS 6162-1 - 1"                    |                          |
| M4D/SD   | SAE J744c<br>ISO/3019-1 SAE C | 27,0                                            | 21,8                                                        | SAE threaded<br>SAE 4 bolts J718c ISO/DIS 6162-1 - 1.1/4"                |                          |
| M4E/SE   | SAE J744c<br>ISO/3019-1 SAE C | 45,0                                            | 58,5                                                        | SAE threaded<br>SAE 4 bolts J718c ISO/DIS 6162-1 - 2"                    |                          |
| M4DC/SDC | SAE J744c<br>ISO/3019-1 SAE C | 40,0                                            | 29,4                                                        | SAE 4 bolts J718c<br>ISO/DIS 6162-1 - 1.1/4"                             | <b>P2 = See M4C/M4SC</b> |

| Series | Size        | Displ.       | Max. pressure |       |      |           |      | Operating pressure range drain | Max. speed for low loaded condition <sup>1)</sup> | Max. speed for max. pressure ratings |      |       |      |      |     |     |
|--------|-------------|--------------|---------------|-------|------|-----------|------|--------------------------------|---------------------------------------------------|--------------------------------------|------|-------|------|------|-----|-----|
|        |             |              | HF-0 HF-2     | HF-2A | HF-1 | HF-3 HF-5 | HF-4 |                                |                                                   | HF-0, HF-2                           |      | HF-2A |      | HF-1 |     |     |
|        |             |              | bar           | bar   | bar  | bar       | bar  |                                |                                                   | bar                                  | bar  | bar   | bar  | bar  | bar |     |
| M3     | B<br>B1     | 009          | 175           |       |      |           |      |                                | 1.5                                               | 4000                                 | 3000 | 3600  |      |      |     |     |
|        |             | 012          | 210           |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 018          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 027          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 036          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
| M4     | C<br>C1     | 024          | 175           | 175   | 175  |           |      | 4000                           | 2500                                              | 3600                                 | 2500 | 3000  | 2000 | 2500 |     |     |
|        |             | 027          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 031          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 043          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 055          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 067          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 075          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        | SC<br>SC1   | 024          | 230           | 210   | 175  | 175       | 140  |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 027          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 031          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 043          | 210           | 210   |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 055          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 067          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        | 075         | 175          | 175           |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        | D<br>D1     | 062          | 175           | 175   | 140  |           |      | 4000                           | 2500                                              | 3000                                 | 2500 | 2800  | 2000 | 2500 |     |     |
|        |             | 074          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 088          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 102          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 113          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 128          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 138          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        | SD<br>SD1   | 062          | 230           | 190   | 140  | 140       | 140  |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 074          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 088          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 102          | 210           | 190   |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 113          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 128          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      | 190 | 190 |
|        | 138         | 175          | 175           |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        | E<br>E1     | 153          | 175           | 175   | 140  |           |      | 3600                           | 2500                                              | 3000                                 | 2500 | 2800  | 1800 | 2200 |     |     |
|        |             | 185          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 214          |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        | SE<br>SE1   | 153          | 190           | 175   | 140  | 140       | 140  |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 185          | 180           |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | 214          | 175           |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        | DC<br>DC1   | All models   | 175           | 175   | 140  |           |      | 4000                           | 2500                                              | 3000                                 | 2500 | 2800  | 200  | 2500 |     |     |
|        | SDC<br>SDC1 | D-062 at 088 | 230           | 190   | 140  | 140       | 140  |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | C-024 at 043 |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | D-102        |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | D-113        | 210           | 190   |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | C-055        |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | C-067        |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | D-128        | 175           | 175   |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | D-138        |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |
|        |             | C-075        |               |       |      |           |      |                                |                                                   |                                      |      |       |      |      |     |     |

<sup>1)</sup> Low loaded condition 35 bar for M3 and M4, 80 bar max. for M4S (see page 6).

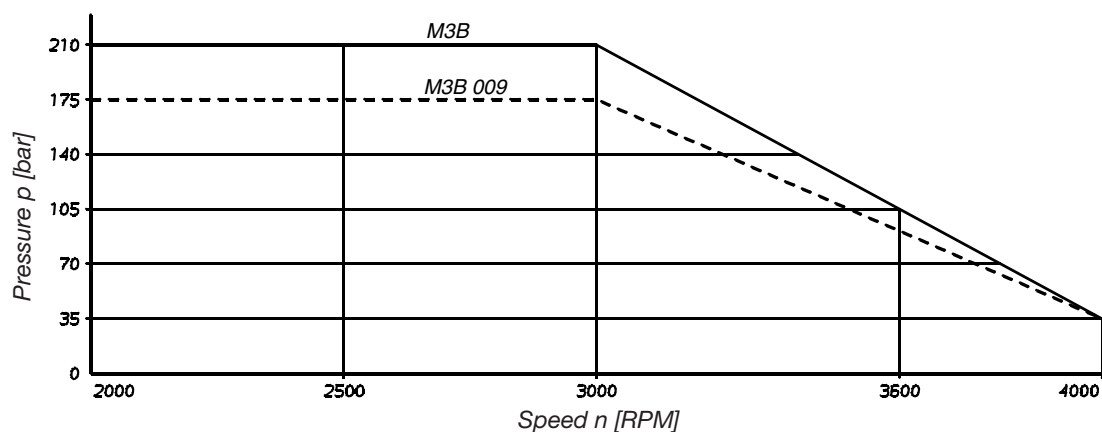
<sup>2)</sup> Intermittent speed - Do not exceed 6 seconds per minute of operation.

HF-0, HF-2 = Antiwear petroleum base. HF-2A = Crankcase. HF-1 = Non antiwear petroleum base. HF-5 = Synthetic fluids.

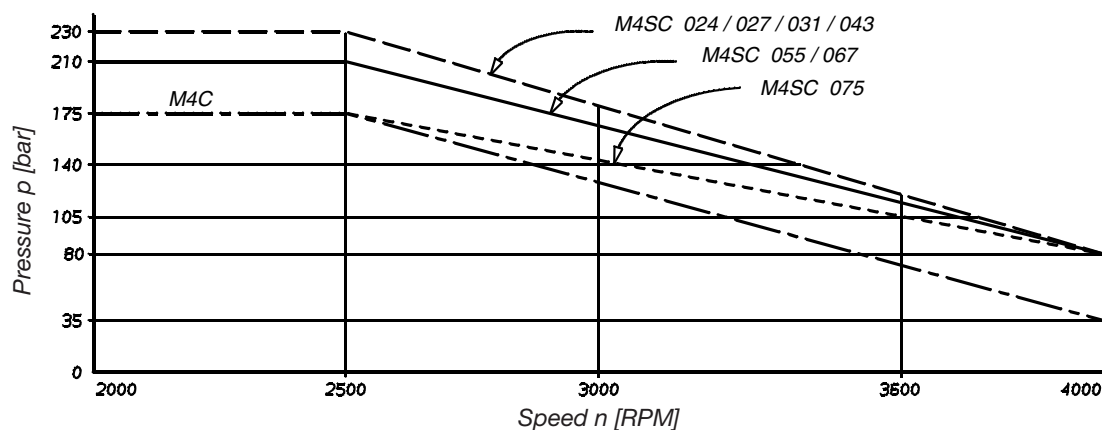
HF-3 = Water in oil emulsions. HF-4 = Water glycols.

Internal drain : All these motors may be equipped with internal drain. Then the model numbers will be M3B1, M4C1, M4SC1, M4D1, M4SD1, M4E1, M4SE1, M4DC1, M4SDC1.

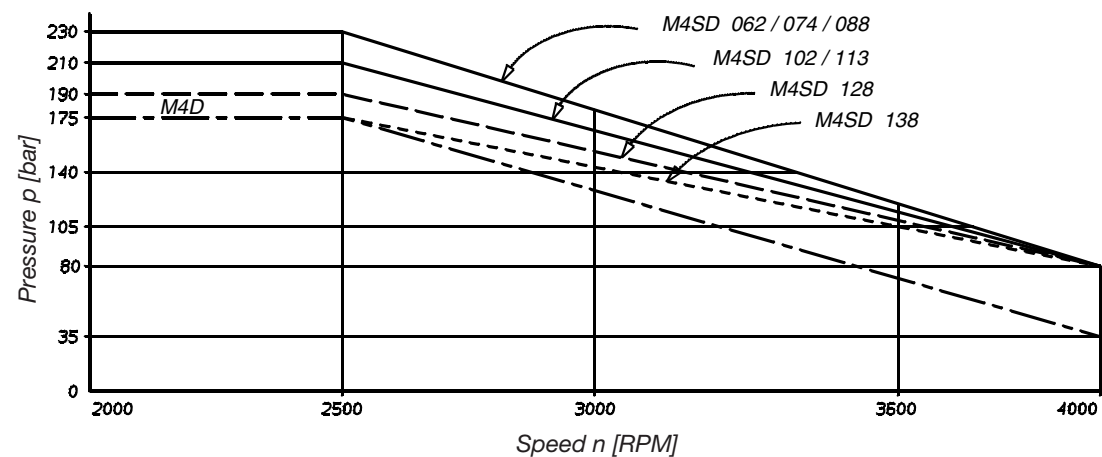
## M3B



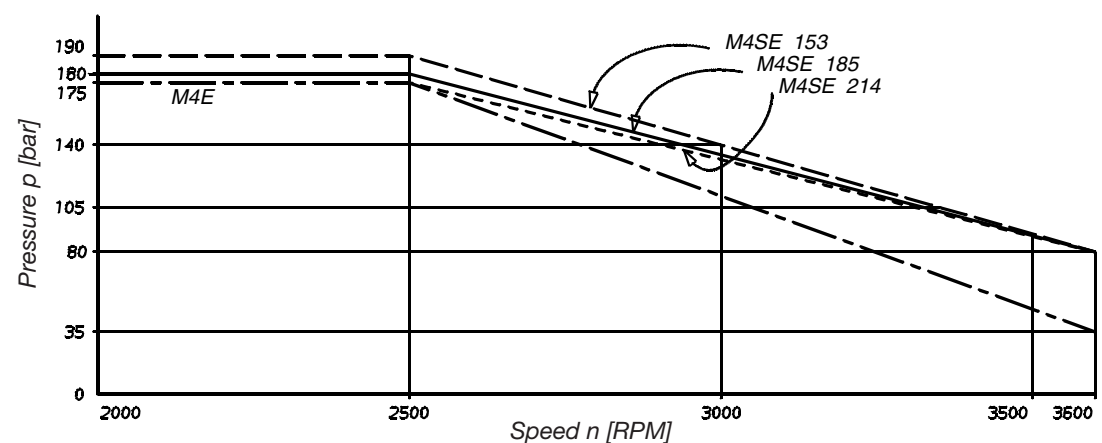
## M4C/M4SC



## M4D/M4SD



## M4E/M4SE



*Performances required*

|                                 |   |         |      |
|---------------------------------|---|---------|------|
| Torque                          | T | [N.m.]  | 140  |
| Pump flow (available) at 24 cSt | Q | [l/min] | 115  |
| Speed                           | n | [RPM]   | 1500 |
| Pressure                        | p | [bar]   | 175  |

1. Check if available power is compatible with required power (0,85 estimated overall efficiency).

$$0.85 \times \frac{Q \times p}{600} \geq \frac{T \times \pi \times n}{30 \times 1000}$$

$$0.85 \times \frac{115 \times 175}{600} \geq \frac{140 \times \pi \times 1500}{30 \times 1000}$$

$$28,5 > 22 \text{ kW}$$

*Two ways of calculation :*

2a. Calculate  $V_i$  from T required torque

$$V_i = \frac{20 \pi \times T}{p} = \frac{20 \pi \times 140}{175} = 50,28 \text{ ml/rev.}$$

3a. Choose motor from  $V_i$  immediately greater

M4C 055  $V_i = 58,8 \text{ ml/rev.}$  (see page 22)

4a. Check real motor pressure for  $T = 140 \text{ Nm.}$  around 1500 RPM

M4C 055  $T = 140 \text{ N.m}$   $n = 1500 \text{ RPM}$   
 $p = 160 \text{ bar}$  (see M4C 055 curve on page 15)

5a. Flow loss at this pressure : 16 l/min

(see page 22)

Real flow used by the motor :

$$Q_{\text{eff.}} = 115 - 16 = 99 \text{ l/min}$$

6a. Real speed of the motor : 1683 RPM

$$n_{\text{eff.}} = \frac{Q_{\text{eff.}} \times 1000}{V_i} = \frac{99 \times 1000}{58,8} =$$

Real performances

|                     |              |           |
|---------------------|--------------|-----------|
| $V_i =$             | 58,8 ml/rev. | } M4C 055 |
| $n_{\text{eff.}} =$ | 1683 RPM     |           |
| $T =$               | 140 Nm.      |           |
| $p_{\text{eff.}} =$ | 160 bar      |           |

2b. Calculate  $V_i$  from Q available flow

$$V_i = \frac{1000 \times 115}{1500} = 76,7 \text{ ml/rev.}$$

3b. Choose motor from  $V_i$  immediately smaller

M4C 067  $V_i = 71,1 \text{ ml/rev.}$  (see page 22)

4b. Check motor pressure with  $T = 140 \text{ Nm.}$  at 1500 RPM

M4C 067  $T = 140 \text{ Nm.}$   $n = 1500 \text{ RPM}$   
 $p = 140 \text{ bar}$  (see M4C 067 curve on page 15)

5b. Flow loss at this pressure : 14 l/min

(see page 22)

Real flow used by the motor :

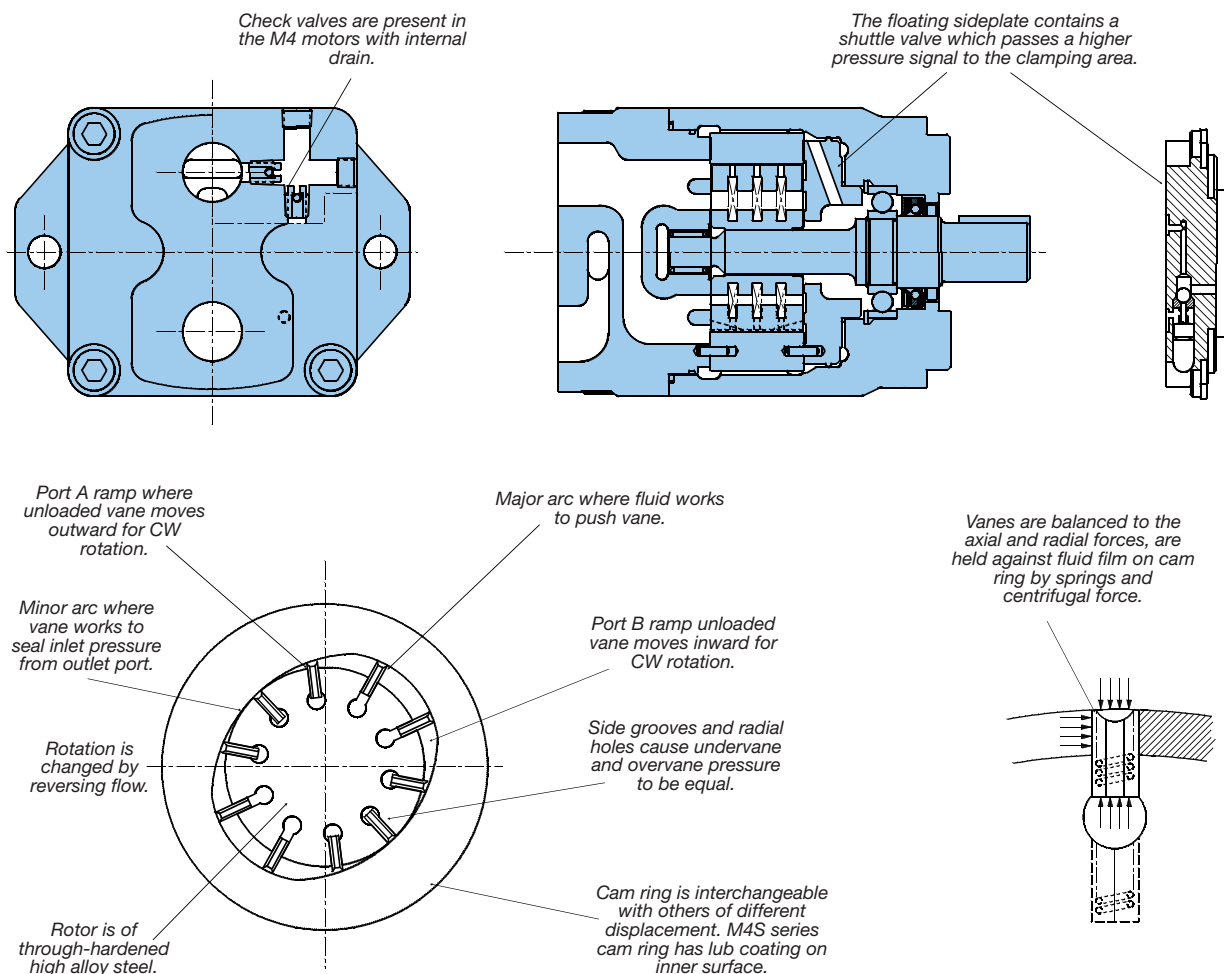
$$Q_{\text{eff.}} = 115 - 14 = 101 \text{ l/min}$$

6b. Real speed of the motor :

$$n_{\text{eff.}} = \frac{Q_{\text{eff.}} \times 1000}{V_i} = \frac{101 \times 1000}{71,1} = 1420 \text{ RPM}$$

Real performances

|                     |              |           |
|---------------------|--------------|-----------|
| $V_i =$             | 71,1 ml/rev. | } M4C 067 |
| $n_{\text{eff.}} =$ | 1420 RPM     |           |
| $T =$               | 140 Nm.      |           |
| $p_{\text{eff.}} =$ | 140 bar      |           |



## OPERATION - SINGLE CARTRIDGE

- The motor shaft is driven by the rotor. Vanes, closely fitted into the rotor slots move radially to seal against the cam ring. The ring has two major and two minor radial sections joined by transitional sections called ramps. These contours and the pressures exposed to them are balanced diametrically.
- Light springs urge the vanes radially against the cam contour assuring a seal at zero speed so the motor can develop starting torque. The springs are assisted by centrifugal force at higher speeds. Radial grooves and holes through the vanes equalize radial hydraulic forces on the vanes at all times. Fluid enters and leaves the motor cartridge through opening in the side plates at the ramps. Each motor port connects to two diametrically opposed ramps. Pressurized fluid entering at Port A torques the rotor clockwise. The rotor transports it to the ramp openings which connect to Port B from which it returns to the low pressure side of the system. Pressure at Port B torques the rotor counter-clockwise.
- The rotor is separated axially from the sideplate surfaces by the fluid film. The front sideplate is clamped against the cam ring by the pressure, maintains optimum clearance as dimensions change with temperature and pressure. A 3-way shuttle valve in the sideplate causes clamping pressure in Port A or B, whichever is the highest.
- Materials are chosen for long life efficiency. Vanes, rotor and cam ring are made out of hardened high alloy steels. Cast semi-steel sideplates are chemically etched to have a fine crystalline surface for good lubrication at start-up. out of hardened high alloy steels. Cast semi-steel sideplates are chemically etched to have a fine crystalline surface for good lubrication at start-up.

**PORTS**  
**EXTERNALLY DRAINED**  
**SINGLE CARTRIDGE MOTORS**

These motors may be alternately pressurized at Ports A & B to 230 bar max. Whichever port is at low pressure should not be subjected to more than 35 bar. If it is necessary to exceed these limitations, please contact Parker representative for application assistance.

**INTERNALLY DRAINED**  
**TANDEM CARTRIDGE MOTORS**

These motors must have a drain line connected to the center housing drain connection of sufficient size to prevent back pressure in excess of 3.5 bar, and returned to the reservoir below the surface of the oil as far away from the supply pump suction as possible. Model M4DC1 does not require an external drain line, however the outlet pressure must not exceed 3,5 bar.

**INTERNALLY DRAINED MOTORS**  
**(M4C1, M4D1, M4E1, M4DC1)**

May be alternately pressurized at Ports A & B to 230 bar max. Whichever port is at low pressure must not be subjected to more than 1,5 bar for M3B, 3,5 bar for M4\* (pressure peak 7 bar).

To insure maximum motor performance in conjunction with your specific application consult your Parker representative if your application requires :

- minimum speed of less than 100 RPM,
- indirect drive,
- overrunning loads,
- braking or retarding.

**M4S SEVERE DUTY MOTORS**

M4S motors are recommended to be used when back pressure is over 140 bar and speed is over 2000 RPM. They are also recommended when fluid viscosity can be under 25 cSt and speed over 2000 RPM. For such severe duty applications M4S motors will exhibit longer life time at high efficiency.

**RECOMMENDED FLUIDS**

Petroleum based antiwear R & O fluids.

These fluids are the recommended fluids for M3B and M4\* series motors. Maximum catalog ratings and performance data are based on operation with these fluids. These fluids are covered by Denison fluid HF-0 and HF-2 specifications.

Acceptable alternate fluids :

**ACCEPTABLE ALTERNATE**  
**FLUIDS**

The use of fluids other than petroleum based antiwear R & O fluids requires that the maximum ratings of the motors will be reduced. In some cases, the minimum replenishment pressures must be increased. Refer to the following chart and the operating characteristics chart for each M3B and M4\* motor model for specific details of the reduced ratings.

**VISCOSITY**

Max. (cold start, low speed & pressure) ..... 860 mm<sup>2</sup>/s (cSt)  
 Max. (full speed & pressure) ..... 108 mm<sup>2</sup>/s (cSt)  
 Optimum (max. life) ..... 30 mm<sup>2</sup>/s (cSt)  
 Min. (full speed & pressure for HF-1 fluid) ..... 18 mm<sup>2</sup>/s (cSt)  
 Min. (full speed & pressure for HF-0 & HF-2 fluids) ..... 10 mm<sup>2</sup>/s (cSt)

**VISCOSITY INDEX**

90° min. Higher values extend range of operating temperatures and life time.

Maximum fluid temperature (θ) °C

HF-0, HF-1, HF-2 ..... + 100°

Minimum fluid temperature (θ) °C

HF-0, HF-1, HF-2 ..... - 18°

**FLUID CLEANLINESS**

The fluid must be cleaned before and during operation to maintain contamination level of NAS 1638 class 8 (or ISO 19/17/14) or better. Filters with 25 micron (or better, β<sub>10</sub> ≥ 100) nominal ratings may be adequate but do not guarantee the required cleanliness levels.

**OPERATING TEMPERATURES**  
**AND VISCOSITIES**

Operating temperatures are a function of fluid viscosities, fluid type, and the pump. Fluid viscosity should be selected to provide optimum viscosity at normal operating temperatures. For cold starts the pumps should be operated at low speed and pressure until fluid warms up to an acceptable viscosity for full power operation.

**WATER CONTAMINATION IN**  
**THE FLUID**

Maximum acceptable content of water.

- 0,10% for mineral base fluids.
- 0,05% for synthetic fluids, crankcase oils, biodegradable fluids.

If amount of water is higher then it should be drained off the circuit.

**SPLINED SHAFTS  
COUPLINGS SPLINES**

- The mating female spline should be free to float and find its own center. If both members are rigidly supported, they must be aligned within 0,15 TIR or less to reduce fretting. The angular alignment of two spline axes must be less than  $\pm 0,002$  mm/mm.
- The coupling spline must be lubricated with a lithium molydisulfide grease or a similar lubricant.
- The coupling must be hardened to a hardness between 27 and 45 HRc.
- The female spline must be made to conform to the Class 1 fit as described in SAE-J498b (1971). This is described as a Flat Root Side Fit.

**KEYED SHAFT**

Parker supplies the M3B and M4\* series keyed shaft motors with high strength heat-treated keys. Therefore, when installing or replacing these motors, the heat-treated keys must be used in order to ensure maximum life in the application. If the key is replaced, it must be a heat-treated key between 27 and 34 R.C. hardness. The corners of the keys must be chamfered 0,76 to 1,02 at 45° to clear radii in the key way.

**NOTE**

Alignment of keyed shafts must be within tolerances given for splined shafts.

**SHAFT LOADS**

Axial or radial load are permissible. Consult specific sections for more details.

**MINIMUM REPLENISHMENT PRESSURE (BAR)**

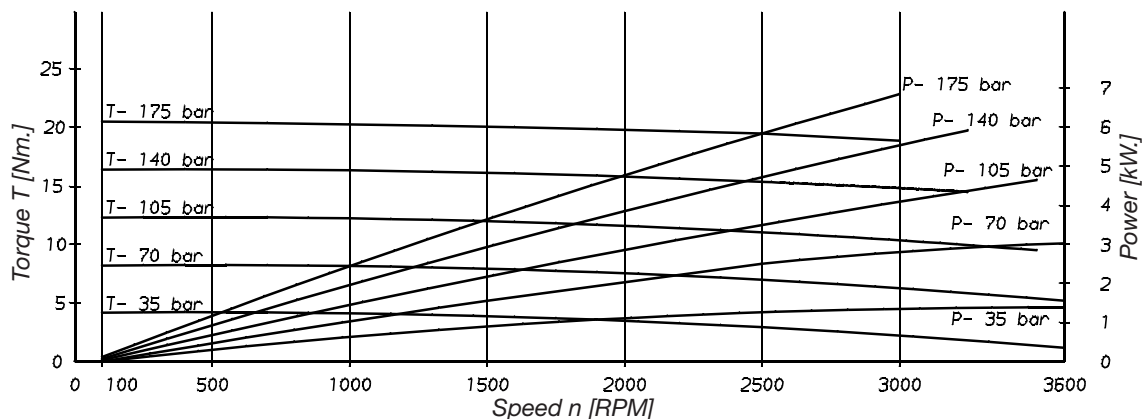
| Series          | Speed [RPM] - Oil viscosity = 32 cSt |      |      |      |      |
|-----------------|--------------------------------------|------|------|------|------|
|                 | 500                                  | 1000 | 2000 | 3000 | 3600 |
| <b>M3B</b>      | 0,6                                  | 1,0  | 1,9  | 3,5  | 5,8  |
| <b>M4C/SC</b>   | 0,7                                  | 1,4  | 3,1  | 5,5  | 9,3  |
| <b>M4D/SD</b>   | 0,7                                  | 1,4  | 3,1  | 5,5  | 9,3  |
| <b>M4E/SE</b>   | 1,4                                  | 2,8  | 5,2  | 11,0 |      |
| <b>M4DC/SDC</b> |                                      |      |      |      |      |
| <b>2-C-DC</b>   | 1,7                                  | 3,8  | 10,0 | 22,4 | 28,3 |
| <b>2-D-DC</b>   | 1,1                                  | 1,7  | 5,5  | 10,7 | 15,1 |
| <b>3-D-C-DC</b> | 1,7                                  | 3,8  | 10,0 | 22,4 | 28,3 |

The inlet port of the fluid motor must be supplied with replenishment pressure as listed above to prevent cavitation during dynamic braking. These pressures should be multiplied by a coefficient of 1,5 for M4S motors used with fire resistant fluids (HF-3, HF-4, HF-5).

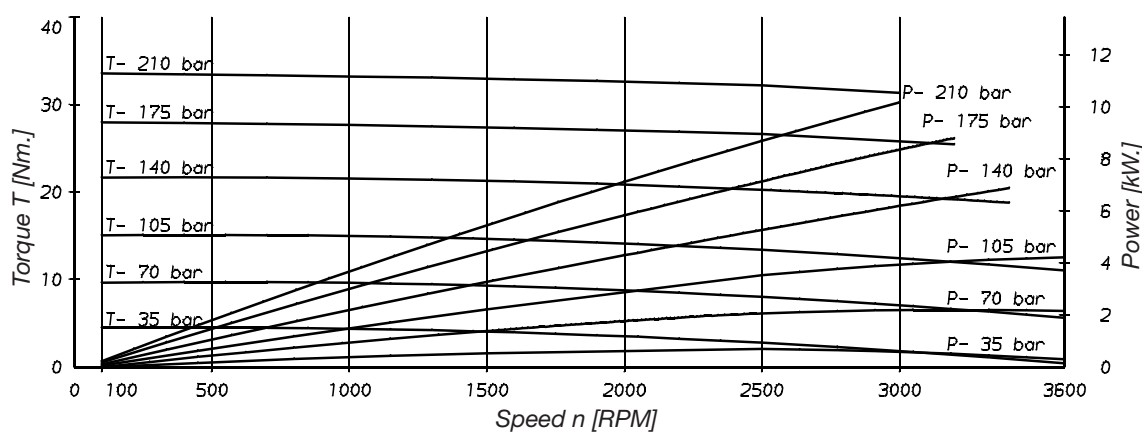
Replenishment pressure for tandem 2 & 3-speed motors must be provided during periods when the motor is dynamic braking, shutting down or coasting. When the motor is operating in the high speed mode and the nonworking cartridge is at low pressure, it is necessary to create a back pressure, as listed above, at the motor discharge port. The above mentioned minimum replenishment pressure chart is for maximum displacement cartridges. Smaller cartridges require lower minimum pressures. Contact Parker representative for further information.

[illegible]

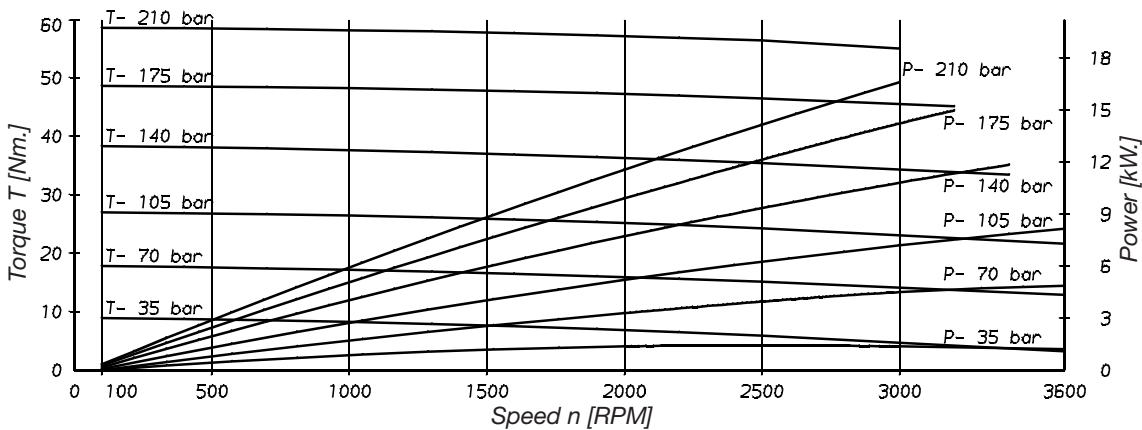
M3B 009



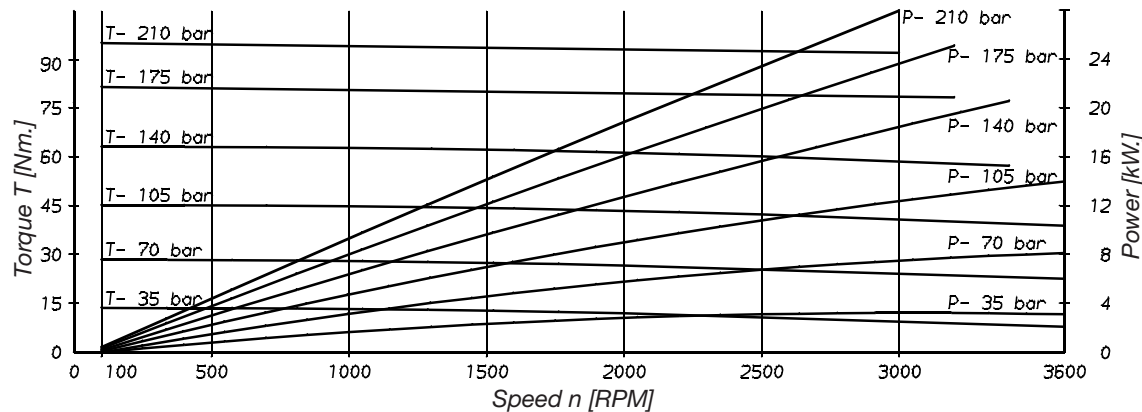
M3B 012



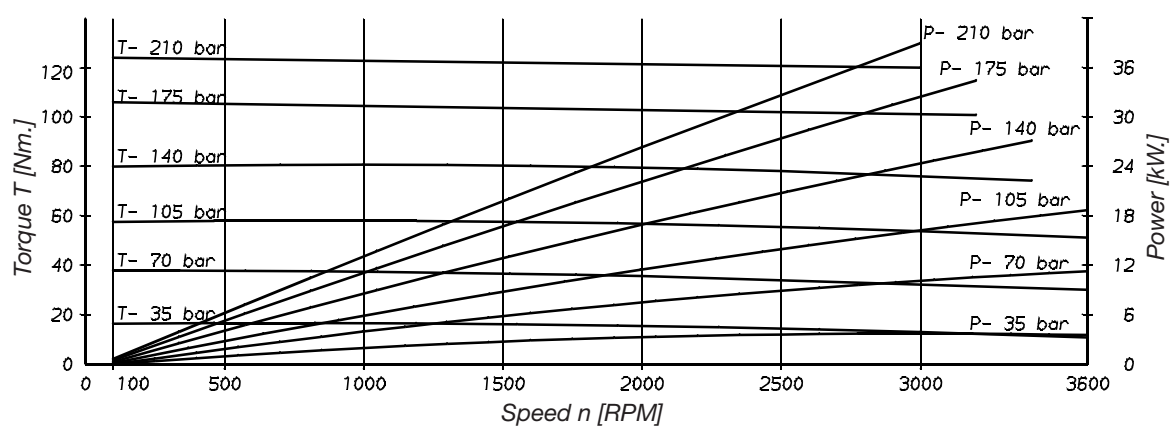
M3B 018



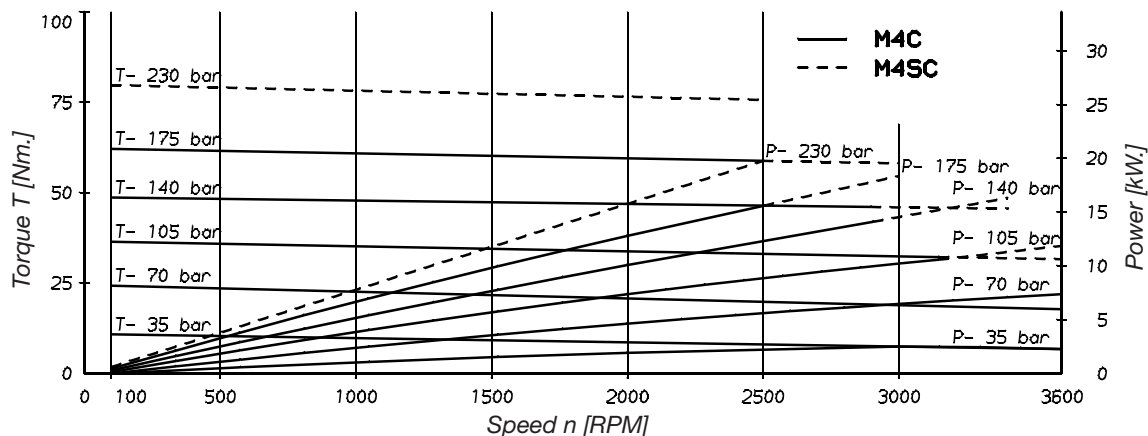
M3B 027



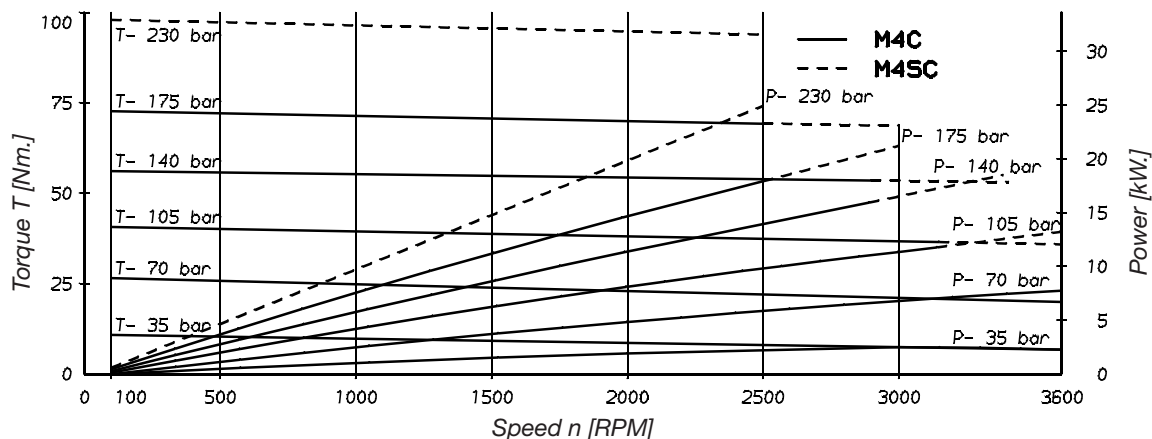
## M3B 036



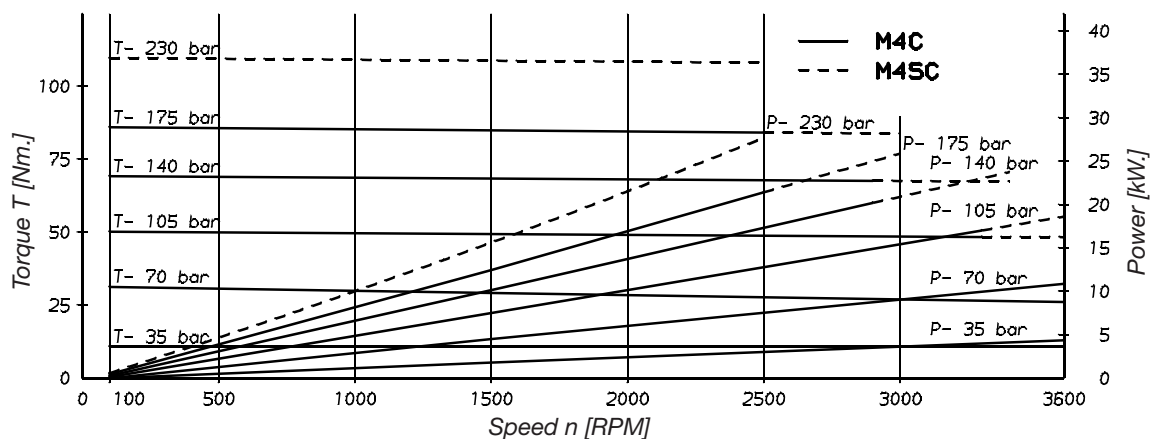
M4C 024



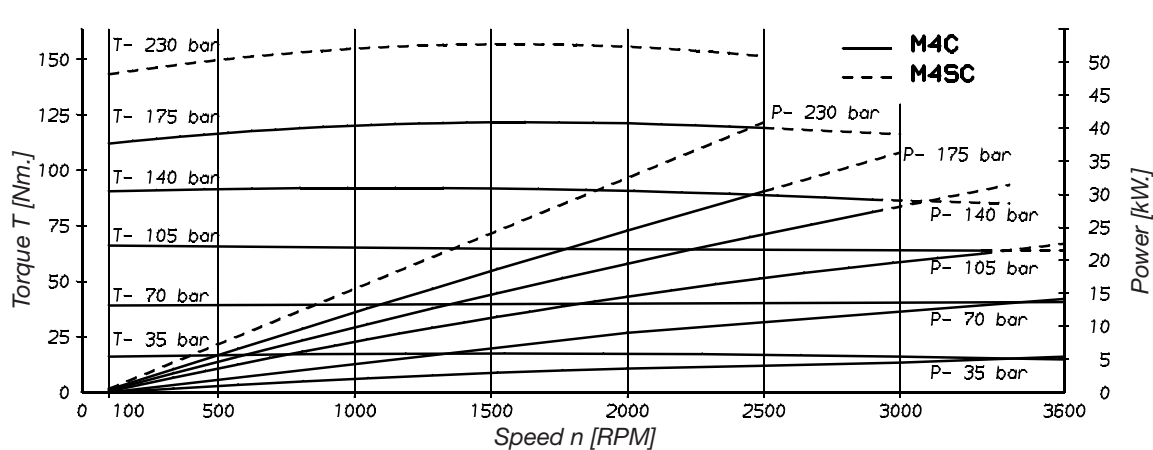
M4C 027



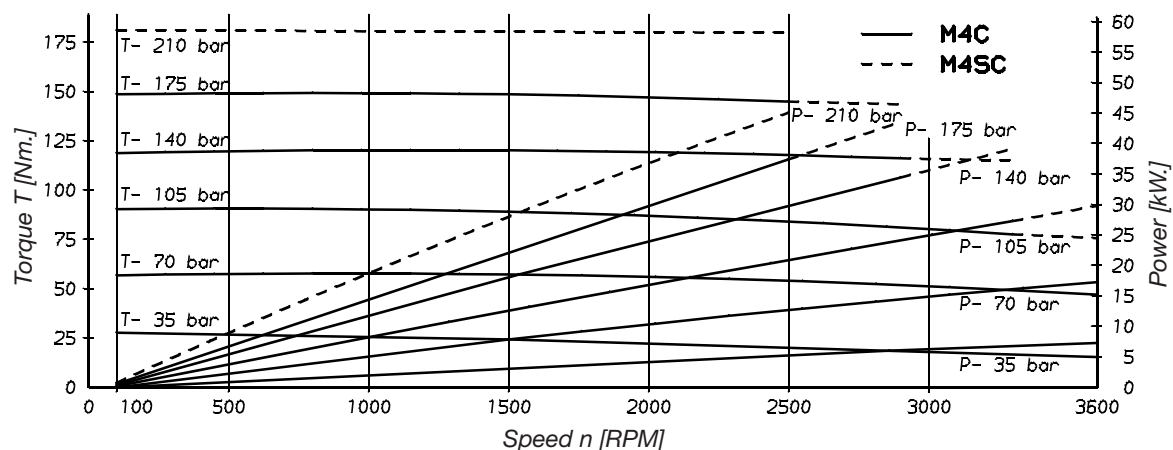
M4C 031



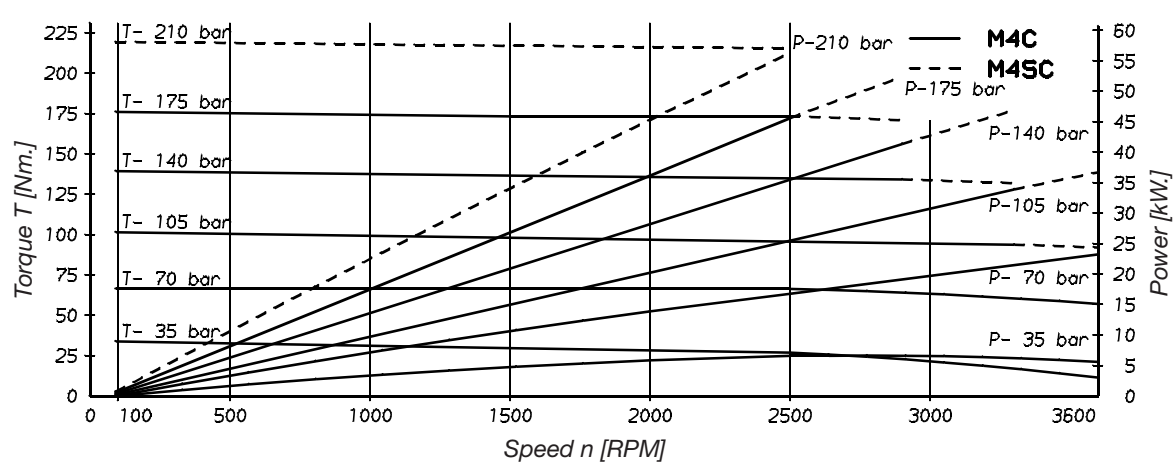
M4C 043



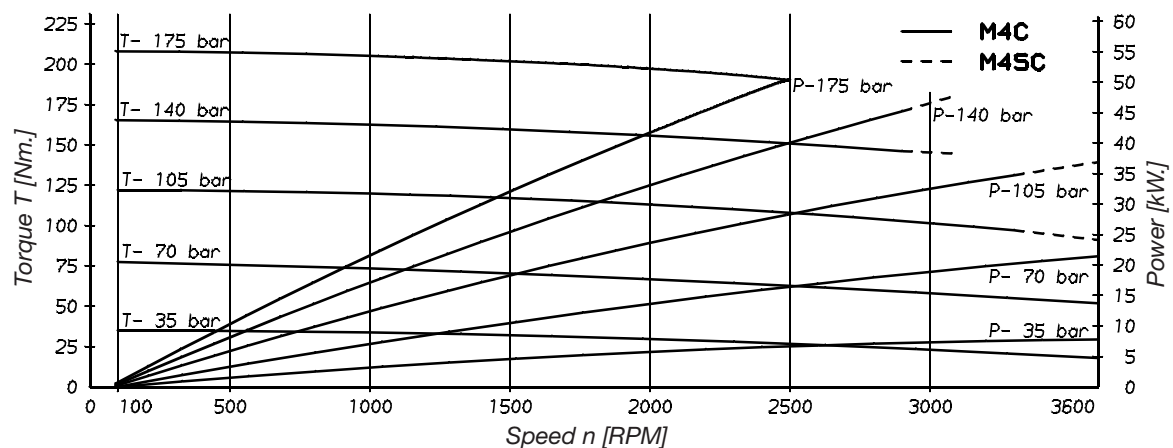
M4C 055



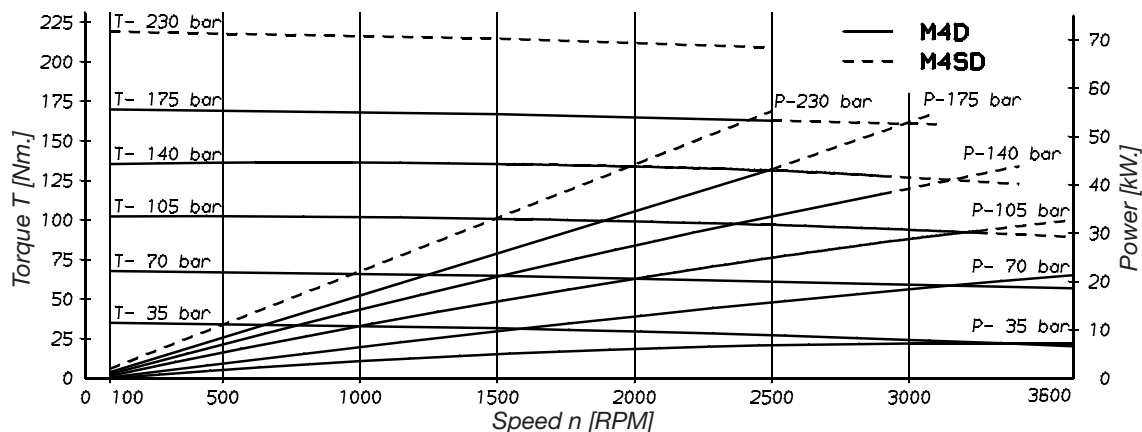
M4C 067



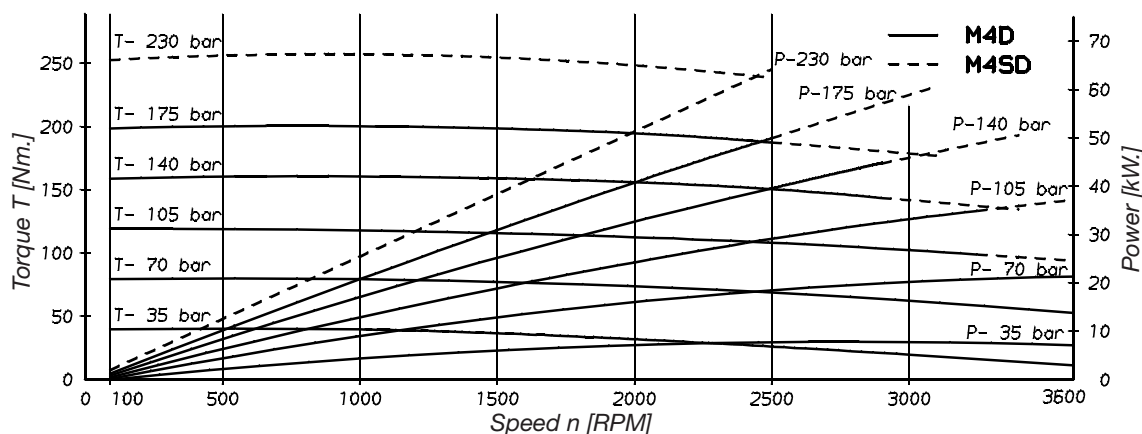
M4C 075



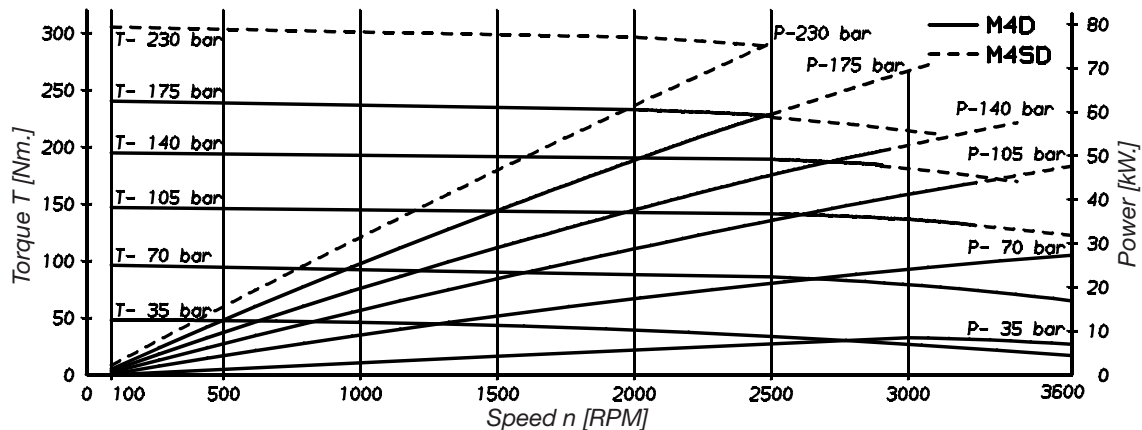
M4D 062



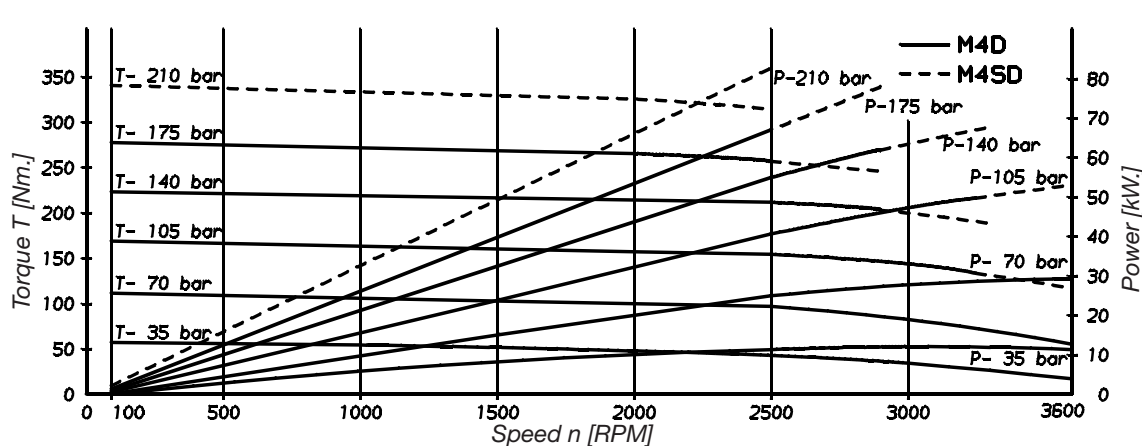
M4D 074



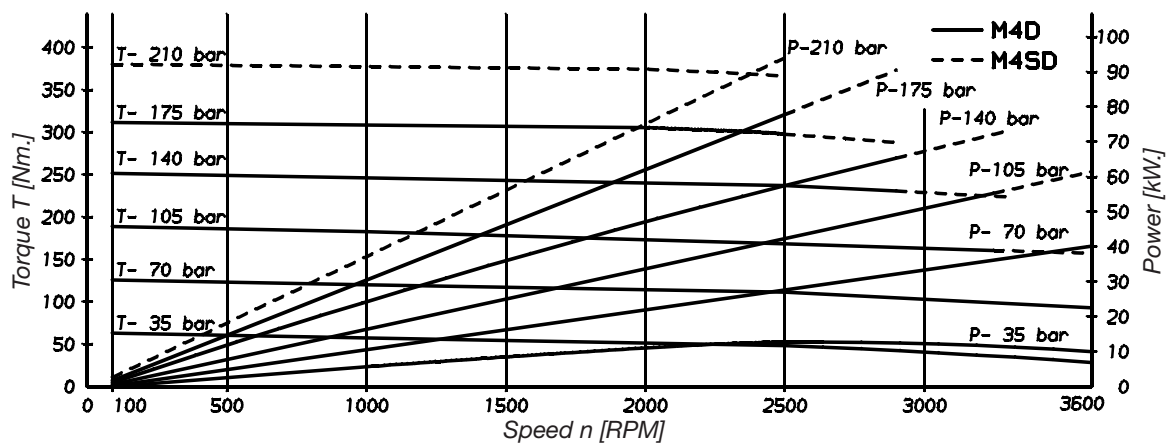
M4D 088



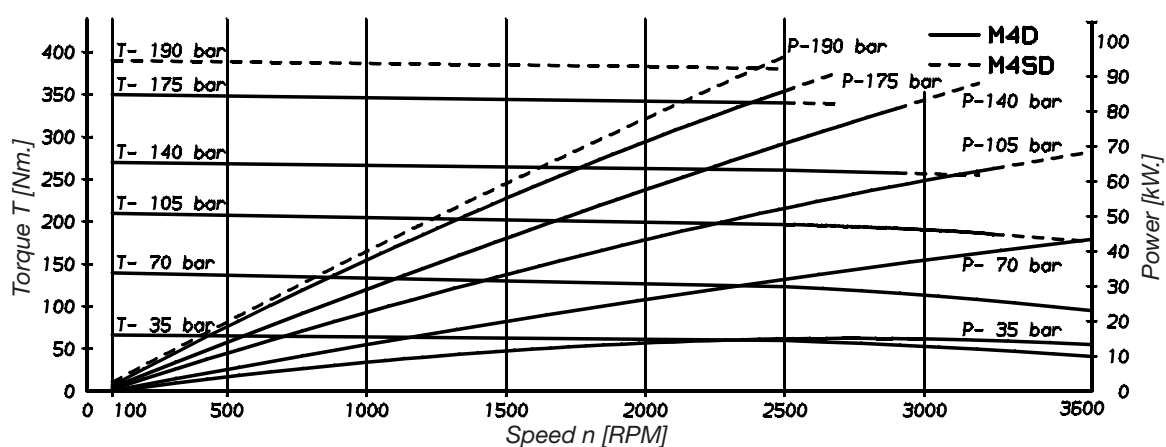
M4D 102



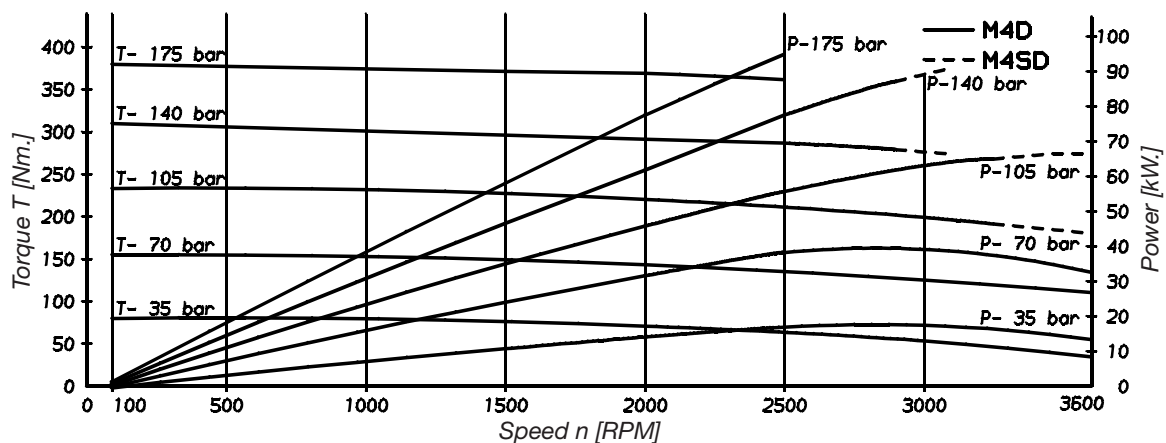
M4D 113



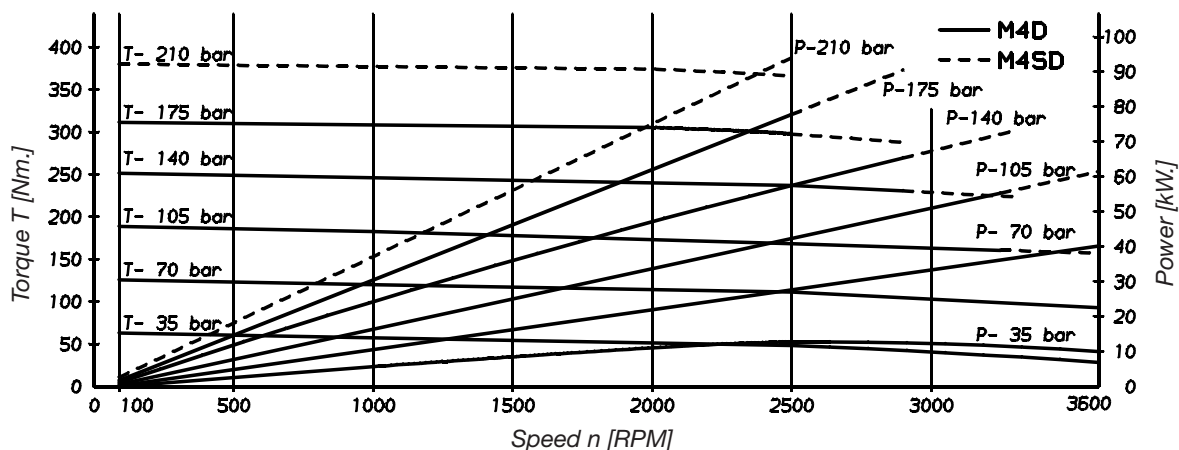
M4D 128



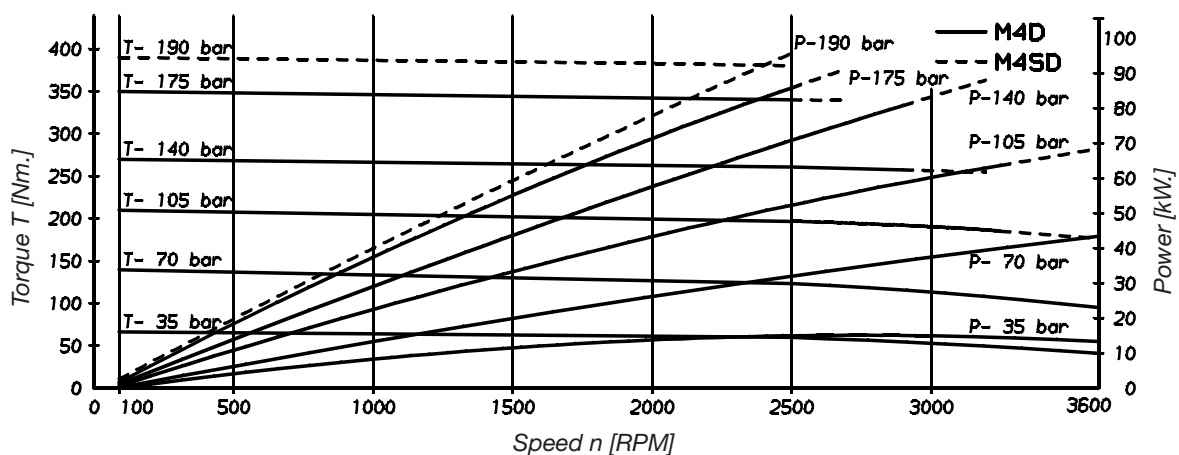
M4D 138



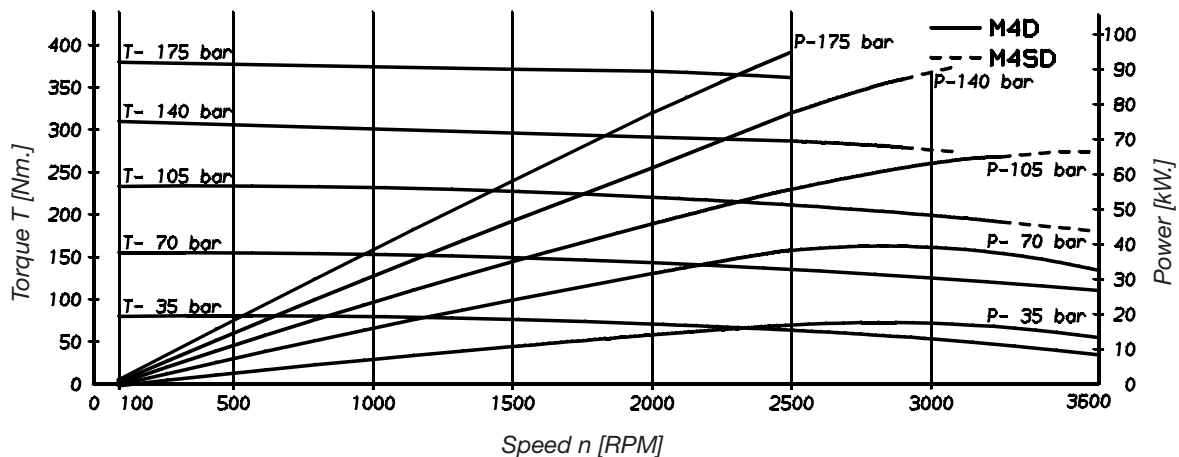
M4E 153



M4E 185



M4E 214

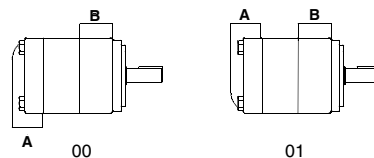


[illegible]

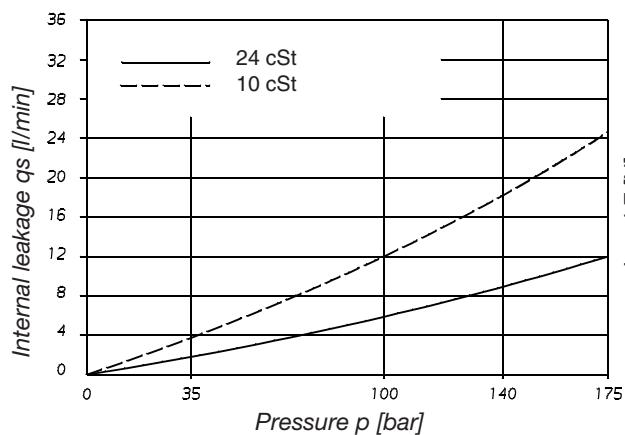
|                              |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
|------------------------------|---------------------------------------|------------|----------|------------|----------|----------|----------|-----------|----------|----------|----------|-----------|----------|
| <b>Model No.</b>             | <b>M3B1</b>                           | <b>M3B</b> | <b>-</b> | <b>036</b> | <b>-</b> | <b>1</b> | <b>N</b> | <b>00</b> | <b>-</b> | <b>B</b> | <b>1</b> | <b>01</b> | <b>-</b> |
| <b>Series external drain</b> |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| <b>Series internal drain</b> |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| <b>Torque</b>                |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 009 = 0,130 Nm/bar           |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 012 = 0,186 Nm/bar           |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 018 = 0,304 Nm/bar           |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 027 = 0,485 Nm/bar           |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 036 = 0,624 Nm/bar           |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| <b>Type of shaft</b>         |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 1 = keyed (non SAE)          |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 3 = splined (SAE A)          |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| 4 = splined (SAE B)          |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| <b>Rotation</b>              |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
| N = bi-directional           |                                       |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | <b>Modification</b>                   |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | <b>Port connections</b>               |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | 00 = SAE threaded port<br>SAE drain   |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | 01 = SAE 4 bolt flange<br>BSPP drain  |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | 02 = BSPP threaded port<br>BSPP drain |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | <b>Seal class</b>                     |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | 1 = S1 - BUNA N                       |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | 4 = S4 - EPDM                         |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | 5 = S5 - VITON®                       |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | <b>Design letter</b>                  |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | <b>Porting combination</b>            |            |          |            |          |          |          |           |          |          |          |           |          |
|                              | 00 = standard                         |            |          |            |          |          |          |           |          |          |          |           |          |

View from shaft end :

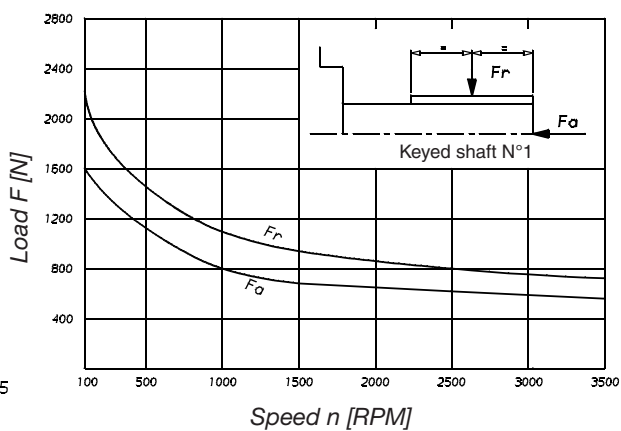
CW rotation A = inlet CCW rotation A = outlet  
 B = outlet B = inlet



#### INTERNAL LEAKAGE



#### PERMISSIBLE RADIAL AND AXIAL LOADS

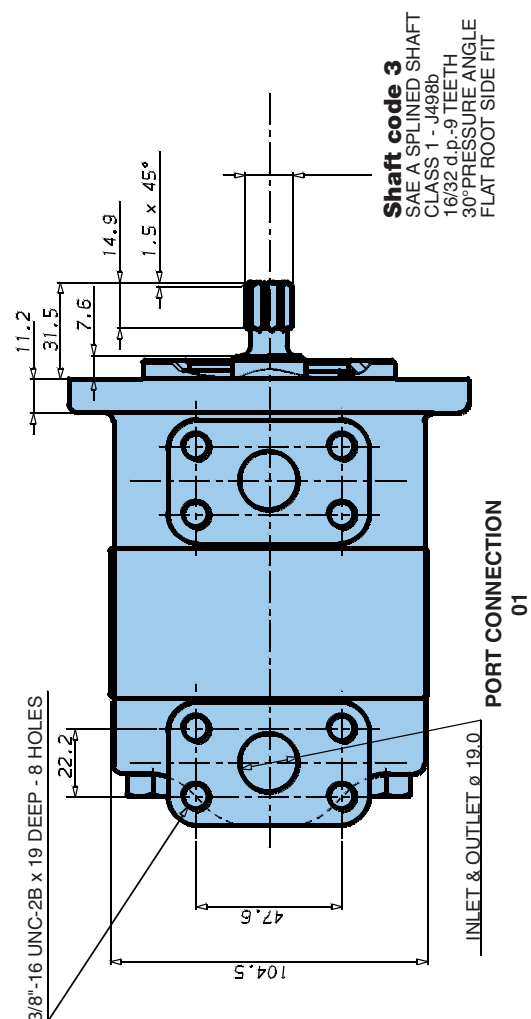
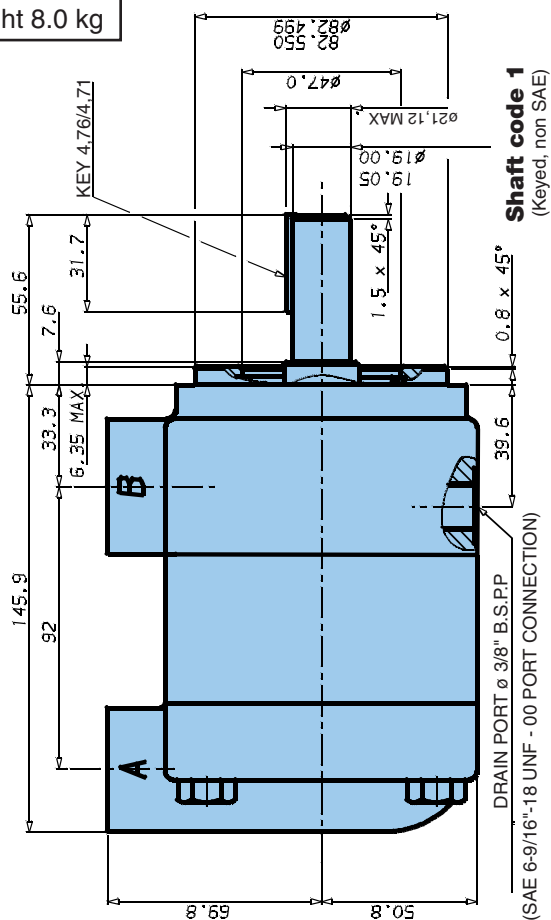


Do not apply Fr and Fa loads simultaneously

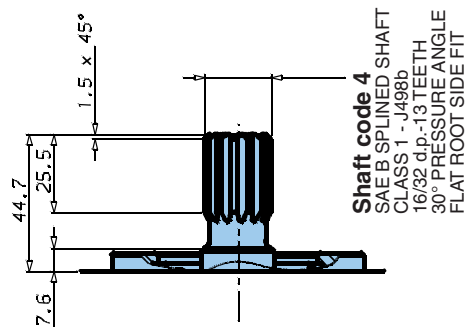
#### OPERATING CHARACTERISTICS - TYPICAL [24 cSt]

| Model   | Volumetric displacement $V_i$<br>ml/rev, | Input flow at $n = 2000$ RPM |                       | Torque T<br>at $n = 2000$ RPM | Power output<br>at $n = 2000$ RPM |
|---------|------------------------------------------|------------------------------|-----------------------|-------------------------------|-----------------------------------|
|         |                                          | Theoretical                  | at 175 bar $\Delta p$ | at 175 bar $\Delta p$         | at 175 bar $\Delta p$             |
|         |                                          | l/min                        | l/min                 | Nm                            | kW                                |
| M3B 009 | 9,2                                      | 18,4                         | 30,4                  | 19,7                          | 4,3                               |
| M3B 012 | 12,3                                     | 24,6                         | 36,6                  | 26,7                          | 5,8                               |
| M3B 018 | 18,5                                     | 37,0                         | 49,0                  | 46,6                          | 10,0                              |
| M3B 027 | 27,8                                     | 55,6                         | 67,6                  | 77,4                          | 16,3                              |
| M3B 036 | 37,1                                     | 74,2                         | 86,2                  | 102,0                         | 21,1                              |

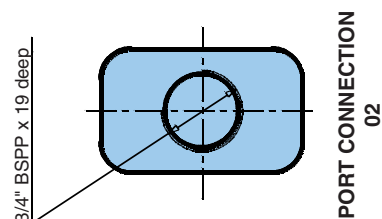
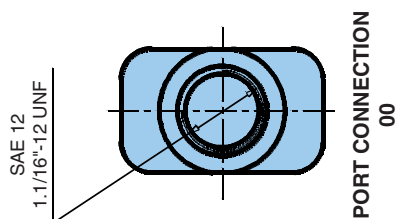
Weight 8.0 kg



**Shaft code 3**  
 SAE A SPLINED SHAFT  
 CLASS 1 - J498b  
 16/32 d.p.-9 TEETH  
 30° PRESSURE ANGLE  
 FLAT ROOT SIDE FIT



**Shaft code 4**  
 SAE B SPLINED SHAFT  
 CLASS 1 - J498b  
 16/32 d.p.-13 TEETH  
 30° PRESSURE ANGLE  
 FLAT ROOT SIDE FIT



**Model No.** M4C1  
M4C - 067 - 1 N 00 - A 1 02 -

**Series external drain** \_\_\_\_\_  
**Series internal drain** \_\_\_\_\_

**Torque** \_\_\_\_\_  
 024 = 0,39 Nm/bar  
 027 = 0,45 Nm/bar  
 031 = 0,55 Nm/bar  
 043 = 0,74 Nm/bar  
 055 = 0,93 Nm/bar  
 067 = 1,13 Nm/bar  
 075 = 1,27 Nm/bar

**Type of shaft** \_\_\_\_\_  
 1 = keyed (SAE B)  
 2 = keyed (non SAE)  
 3 = splined (SAE B)

**Rotation** \_\_\_\_\_  
 N = bi-directional

**Modification** \_\_\_\_\_  
**Port connections**  
 01 = SAE threaded port  
       SAE drain  
 02 = SAE 4 bolt flange  
       UNC threaded - SAE drain  
 04 = SAE 4 bolt flange  
       UNC threaded - BSPP drain  
 M4 = SAE 4 bolt flange  
       metric threaded - BSPP drain

**Seal class**  
 1 = S1 - BUNA N (M4C)  
 5 = S5 - VITON® (M4SC)

**Design letter** \_\_\_\_\_  
**Porting combination**  
 00 = standard

\* = S = Severe duty motor.

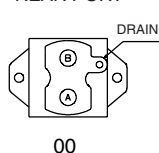
M4C1 - M4SC1 : Drain port is plugged.

**Porting combination**

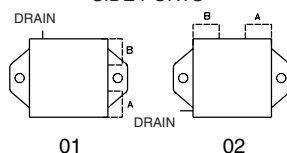
**View from shaft end :**

CW rotation A = inlet  
 B = outlet  
 CCW rotation A = outlet  
 B = inlet

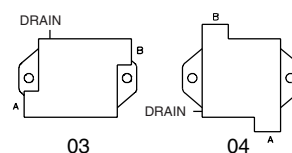
REAR PORT



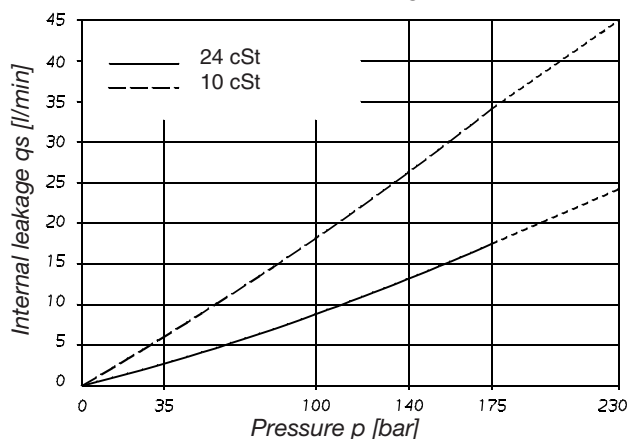
SIDE PORTS



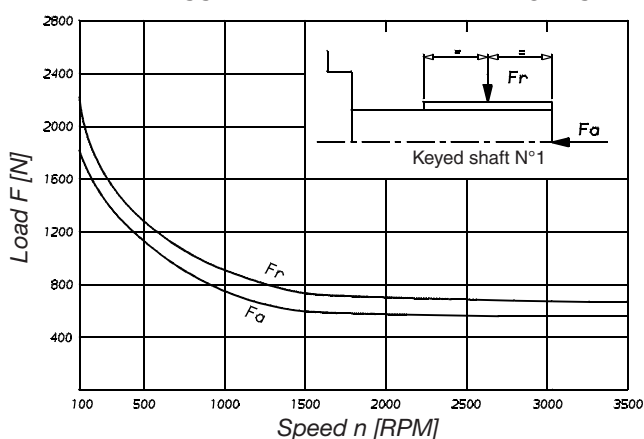
OPPOSITE PORTS



**INTERNAL LEAKAGE**



**PERMISSIBLE RADIAL AND AXIAL LOADS**

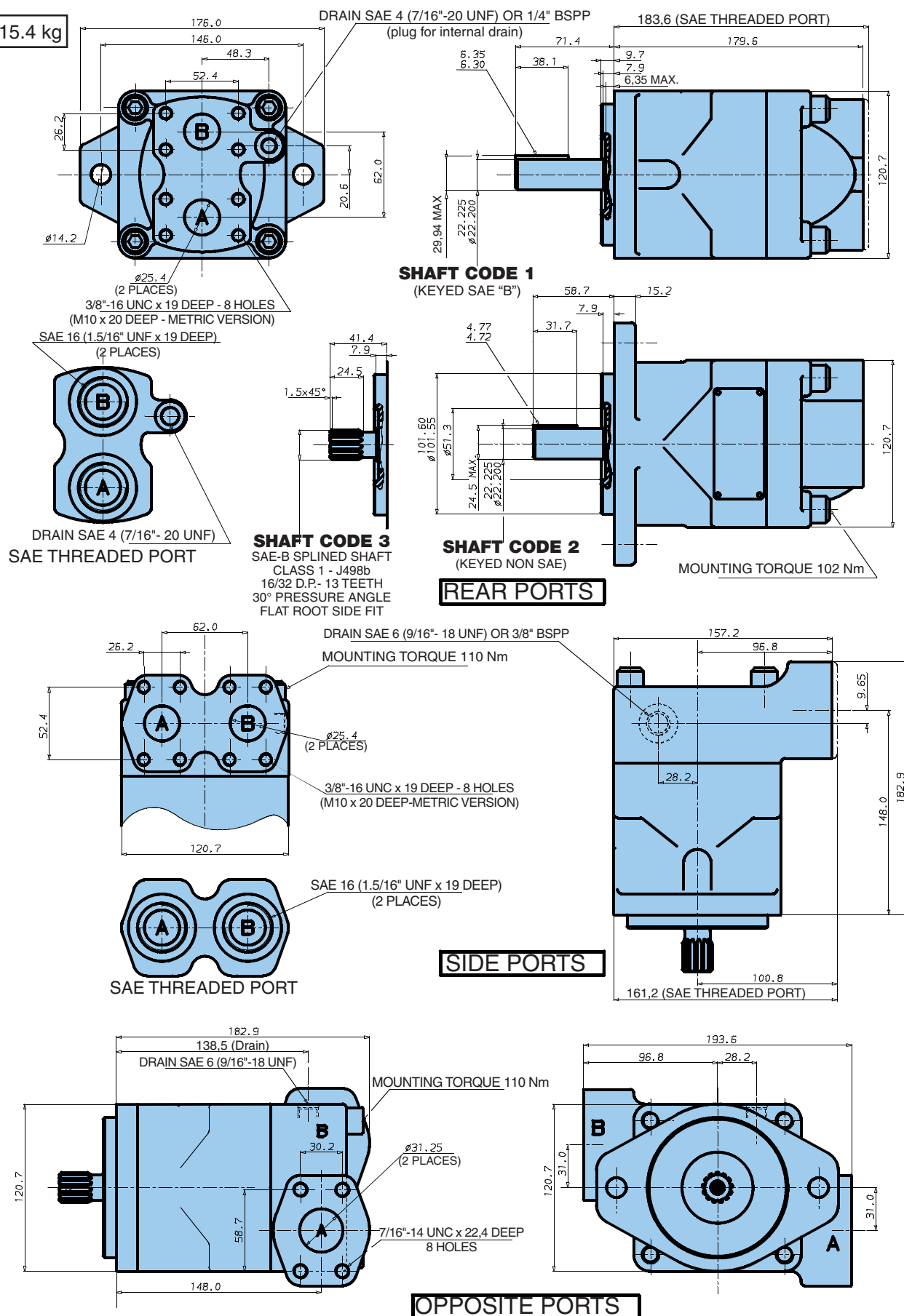


Do not apply Fr and Fa loads simultaneously

**OPERATING CHARACTERISTICS - TYPICAL [24 cSt]**

| Model          | Volumetric displacement $V_i$<br>ml/rev. | Input flow at n = 2000 RPM |                       | Torque T<br>at n = 2000 RPM | Power output<br>at n = 2000 RPM |
|----------------|------------------------------------------|----------------------------|-----------------------|-----------------------------|---------------------------------|
|                |                                          | Theoretical                | at 175 bar $\Delta p$ | at 175 bar $\Delta p$       | at 175 bar $\Delta p$           |
|                |                                          | l/min                      | l/min                 | Nm                          | kW                              |
| M4C - M4SC 024 | 24,4                                     | 49,0                       | 67,0                  | 60,5                        | 12,7                            |
| M4C - M4SC 027 | 28,2                                     | 56,0                       | 74,0                  | 70,0                        | 14,7                            |
| M4C - M4SC 031 | 34,5                                     | 69,0                       | 87,0                  | 86,8                        | 10,8                            |
| M4C - M4SC 043 | 46,5                                     | 93,0                       | 110,0                 | 120,0                       | 25,1                            |
| M4C - M4SC 055 | 58,8                                     | 118,0                      | 136,0                 | 149,0                       | 31,2                            |
| M4C - M4SC 067 | 71,1                                     | 142,0                      | 160,0                 | 170,0                       | 35,6                            |
| M4C - M4SC 075 | 80,1                                     | 160,0                      | 178,0                 | 198,0                       | 41,5                            |

Weight 15.4 kg



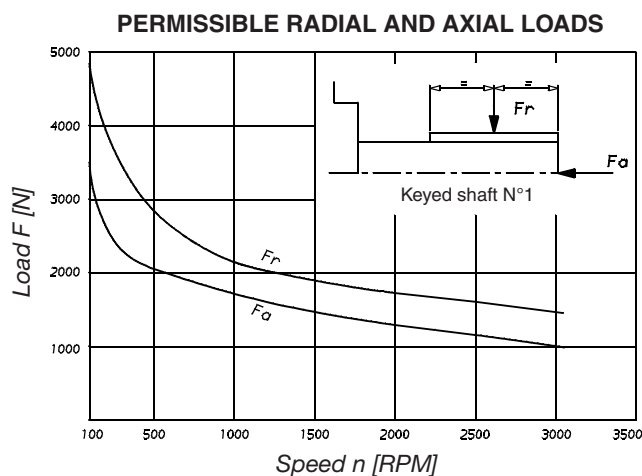
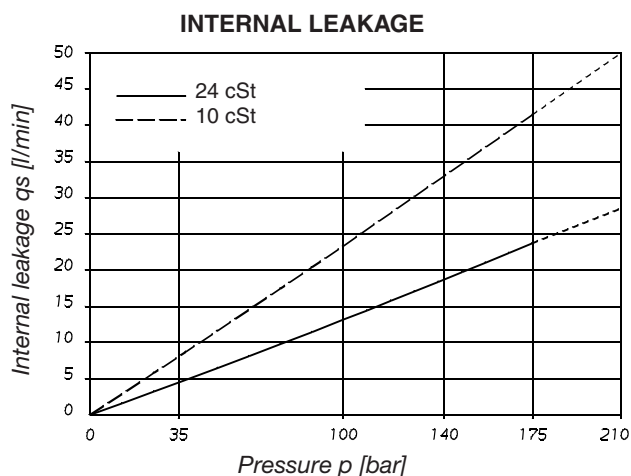
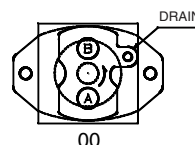
|                              |                                                        |                                                        |
|------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| <b>Model No.</b>             | <b>M4*D1</b><br><b>M4*D</b> - 138 - 1 N 00 - B 1 02 .. |                                                        |
| <b>Series external drain</b> |                                                        | <b>Modification</b>                                    |
| <b>Series internal drain</b> |                                                        | <b>Port connections</b>                                |
| <b>Torque</b>                |                                                        | 01 = SAE threaded port<br>SAE drain                    |
| 062 = 1,04 Nm/bar            |                                                        | 02 = SAE 4 bolt flange<br>UNC threaded - SAE drain     |
| 074 = 1,22 Nm/bar            |                                                        | 04 = SAE 4 bolt flange<br>UNC threaded - BSPP drain    |
| 088 = 1,45 Nm/bar            |                                                        | M4 = SAE 4 bolt flange<br>metric threaded - BSPP drain |
| 102 = 1,68 Nm/bar            |                                                        | <b>Seal class</b>                                      |
| 113 = 1,86 Nm/bar            |                                                        | 1 = S1 - BUNA N (M4D)                                  |
| 128 = 2,11 Nm/bar            |                                                        | 5 = S5 - VITON® (M4SD)                                 |
| 138 = 2,30 Nm/bar            |                                                        | <b>Design letter</b>                                   |
| <b>Type of shaft</b>         |                                                        | <b>Porting combination</b>                             |
| 1 = keyed (SAE C)            |                                                        | 00 = standard                                          |
| 3 = splined (SAE C)          |                                                        |                                                        |
| <b>Rotation</b>              |                                                        |                                                        |
| N = bi-directional           |                                                        |                                                        |

\* = S = Severe duty motor.

M4D1 - M4SD1 : Drain port is plugged.

**View from shaft end :**

CW rotation A = inlet CCW rotation A = outlet  
 B = outlet B = inlet



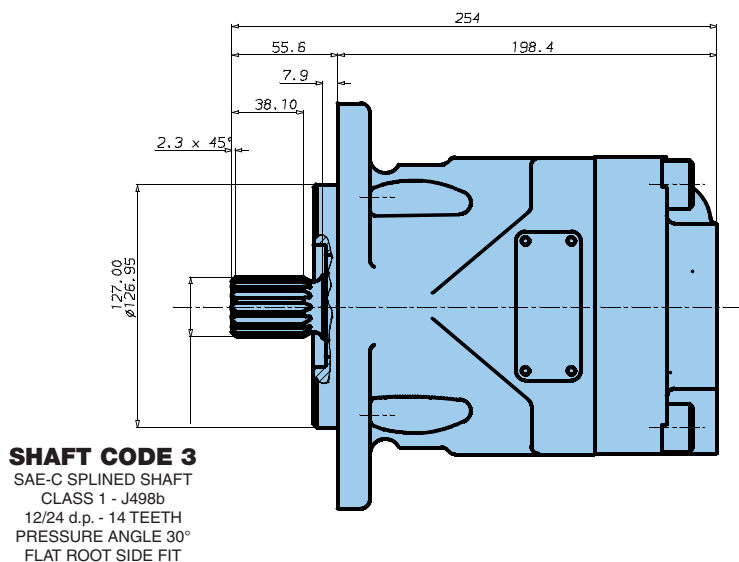
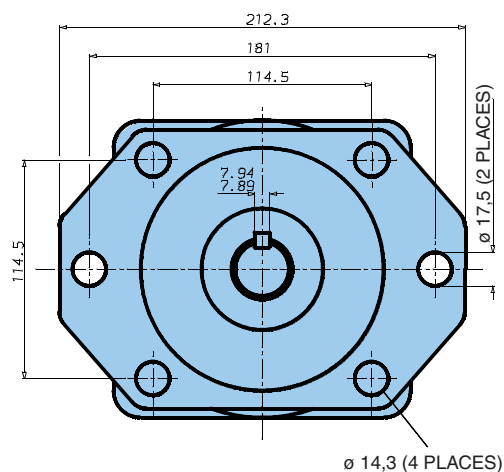
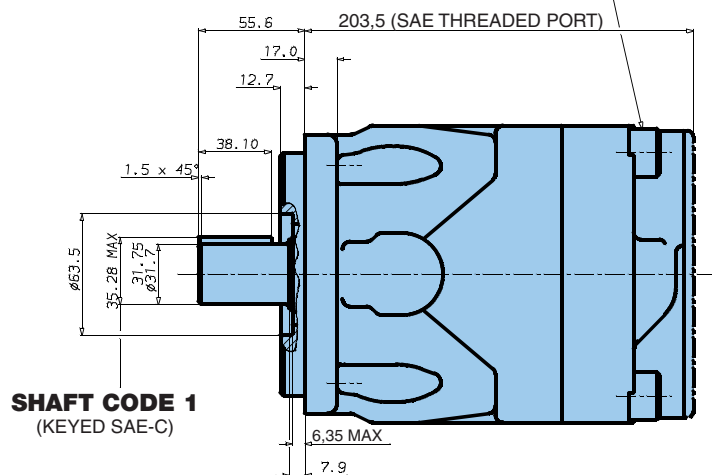
Do not apply Fr and Fa loads simultaneously

**OPERATING CHARACTERISTICS - TYPICAL [24 cSt]**

| Model          | Volumetric displacement $V_i$<br>ml/rev. | Input flow at $n = 2000$ RPM |                                | Torque T<br>at $n = 2000$ RPM | Power output<br>at $n = 2000$ RPM |
|----------------|------------------------------------------|------------------------------|--------------------------------|-------------------------------|-----------------------------------|
|                |                                          | at 175 bar $\Delta p$        |                                | at 175 bar $\Delta p$         | at 175 bar $\Delta p$             |
|                |                                          | Theoretical<br>l/min         | at 175 bar $\Delta p$<br>l/min | Nm                            | kW                                |
| M4D - M4SD 062 | 65,1                                     | 130,0                        | 154,0                          | 165,0                         | 34,6                              |
| M4D - M4SD 074 | 76,8                                     | 154,0                        | 178,0                          | 200,0                         | 41,9                              |
| M4D - M4SD 088 | 91,0                                     | 182,0                        | 206,0                          | 236,0                         | 49,4                              |
| M4D - M4SD 102 | 105,5                                    | 211,0                        | 241,0                          | 264,0                         | 55,3                              |
| M4D - M4SD 113 | 116,7                                    | 233,0                        | 257,0                          | 300,0                         | 62,8                              |
| M4D - M4SD 128 | 132,4                                    | 265,0                        | 289,0                          | 340,0                         | 71,2                              |
| M4D - M4SD 138 | 144,4                                    | 289,0                        | 313,0                          | 372,0                         | 77,9                              |

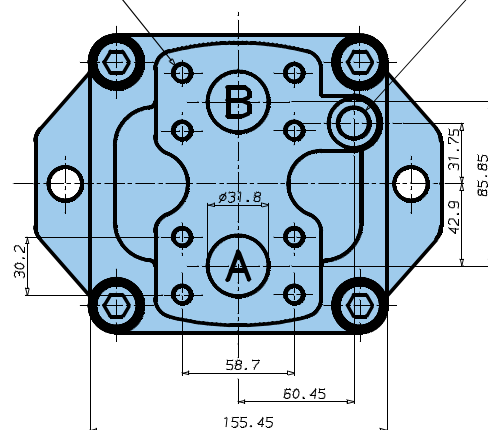
Weight 27.0 kg

MOUNTING TORQUE: 180 N.m



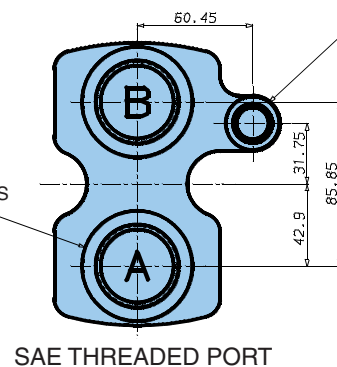
7/16"-14 UNC x 22 DEEP - 8 HOLES  
 (M12 x 22,1 DEEP-METRIC VERSION)

DRAIN SAE 8 (3/4"-16 UNF) OR 3/8" BSPP



DRAIN SAE 8 (3/4" 16 UNF) 14,2 DEEP

SAE 20 (1" 5/8-16 UNF) x 19 DEEP-2 HOLES



**Model No.** M4\*E1  
M4\*E - 214 - 1 N 00 - B 5 02 ..

**Series external drain** \_\_\_\_\_  
**Series internal drain** \_\_\_\_\_

**Torque** \_\_\_\_\_  
 153 = 2,52 Nm/bar  
 185 = 3,05 Nm/bar  
 214 = 3,53 Nm/bar

**Type of shaft** \_\_\_\_\_  
 1 = keyed (SAE C)  
 3 = splined (SAE C)

**Rotation** \_\_\_\_\_  
 N = bi-directional

**Modification** \_\_\_\_\_  
**Port connections**  
 01 = SAE threaded port  
       SAE drain  
 02 = SAE 4 bolt flange  
       UNC threaded - SAE drain  
 04 = SAE 4 bolt flange  
       UNC threaded - BSPP drain

**Seal class**  
 5 = S5 - VITON®

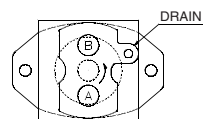
**Design letter** \_\_\_\_\_  
**Porting combination**  
 00 = standard

\* = S = Severe duty motor.

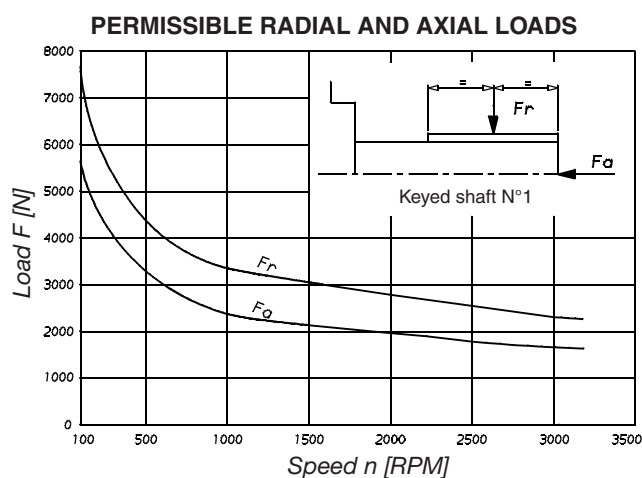
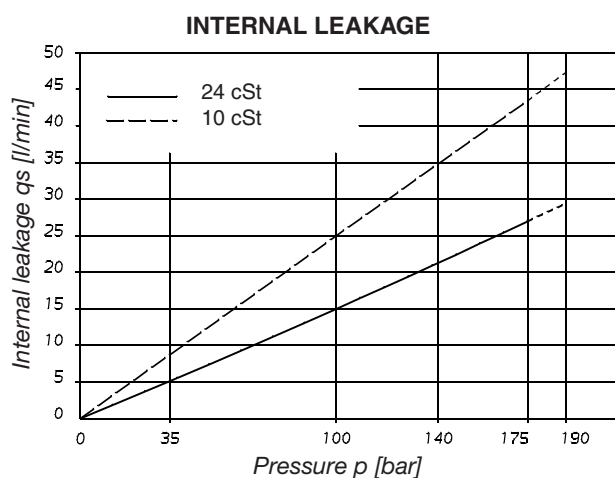
M4E1 - M4SE1 : Drain port is plugged.

**View from shaft end :**

CW rotation    A = inlet    CCW rotation    A = outlet  
                   B = outlet                            B = inlet



00

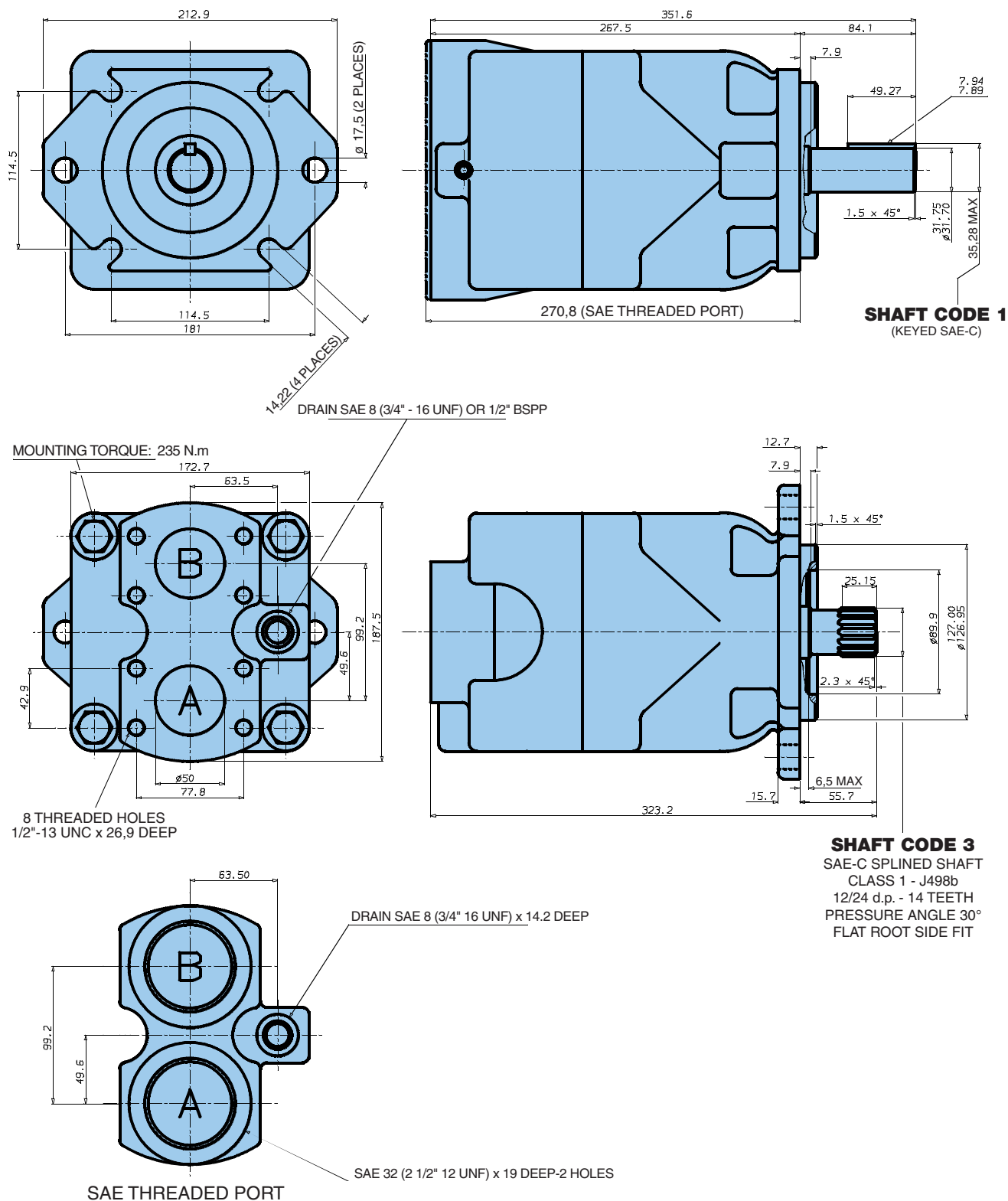


Do not apply Fr and Fa loads simultaneously

**OPERATING CHARACTERISTICS - TYPICAL [24 cSt]**

| Model          | Volumetric displacement $V_i$ | Input flow at $n = 2000$ RPM |       | Torque T at $n = 2000$ RPM | Power output at $n = 2000$ RPM |
|----------------|-------------------------------|------------------------------|-------|----------------------------|--------------------------------|
|                |                               | at 175 bar $\Delta p$        |       | at 175 bar $\Delta p$      | at 175 bar $\Delta p$          |
|                | ml/rev.                       | l/min                        | l/min | Nm                         | kW                             |
| M4E - M4SE 153 | 158,5                         | 317,0                        | 343,0 | 398,0                      | 83,4                           |
| M4E - M4SE 185 | 191,6                         | 383,0                        | 409,0 | 484,0                      | 101,4                          |
| M4E - M4SE 214 | 222,0                         | 444,0                        | 470,0 | 567,0                      | 188,8                          |

Weight 45.0 kg

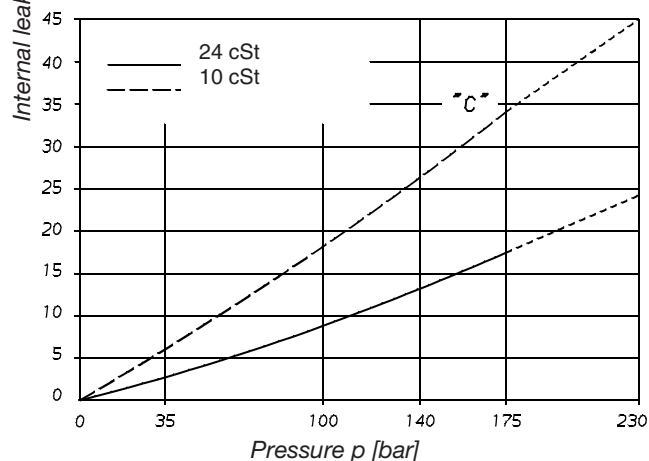
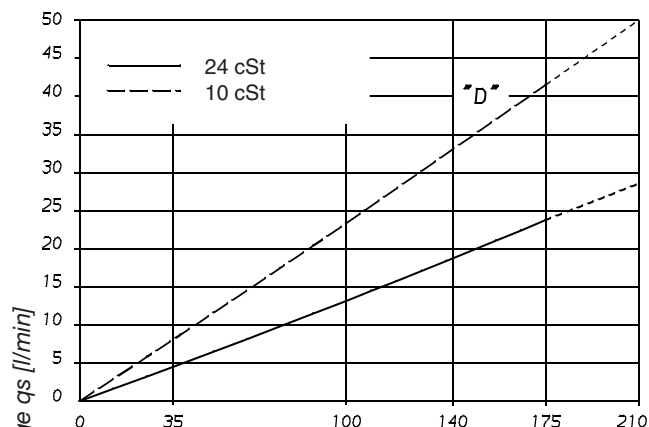


|                              |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
|------------------------------|---------------|--------------|----------|------------|----------|------------|----------|----------|-----------|----------|----------|----------|-----------|-----------|-----------|
| <b>Model No.</b>             | <b>M4*DC1</b> | <b>M4*DC</b> | <b>-</b> | <b>138</b> | <b>-</b> | <b>031</b> | <b>1</b> | <b>N</b> | <b>00</b> | <b>-</b> | <b>B</b> | <b>1</b> | <b>02</b> | <b>00</b> | <b>..</b> |
| <b>Series external drain</b> |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Series internal drain</b> |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Torque for A1 - B1</b>    |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 062 = 1,04 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 074 = 1,22 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 088 = 1,45 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 102 = 1,68 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 113 = 1,86 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 128 = 2,11 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 138 = 2,30 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Torque for A2 - B2</b>    |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 024 = 0,39 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 027 = 0,45 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 031 = 0,55 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 043 = 0,74 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 055 = 0,93 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 067 = 1,13 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 075 = 1,27 Nm/bar            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Type of shaft</b>         |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 1 = keyed (SAE C)            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 3 = splined (SAE C)          |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Modification</b>          |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>No control</b>            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Port connections (P2)</b> |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 01 = SAE threaded            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| SAE drain                    |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 02 = SAE 4 bolt flange       |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| SAE drain                    |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 04 = SAE 4 bolt flange       |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| BSPP drain                   |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Seal class</b>            |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 1 = S1 - BUNA N (M4DC)       |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| 5 = S5 - VITON® (M4SDC)      |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Design letter</b>         |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Porting combination</b>   |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| See below                    |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| <b>Rotation</b>              |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |
| N = bi-directional           |               |              |          |            |          |            |          |          |           |          |          |          |           |           |           |

\* = S = Severe duty motor.

M4DC1 - M4SDC1 : Drain port is plugged.

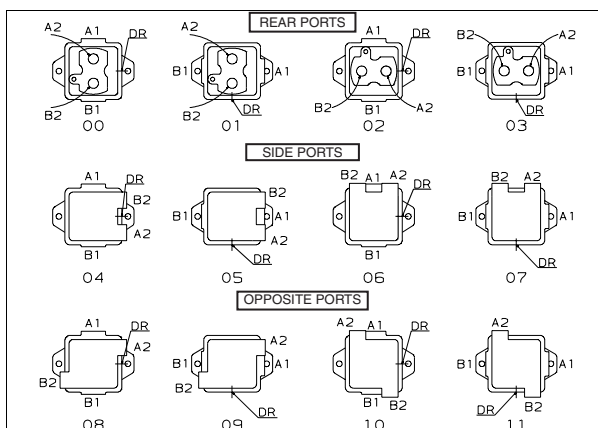
#### INTERNAL LEAKAGE



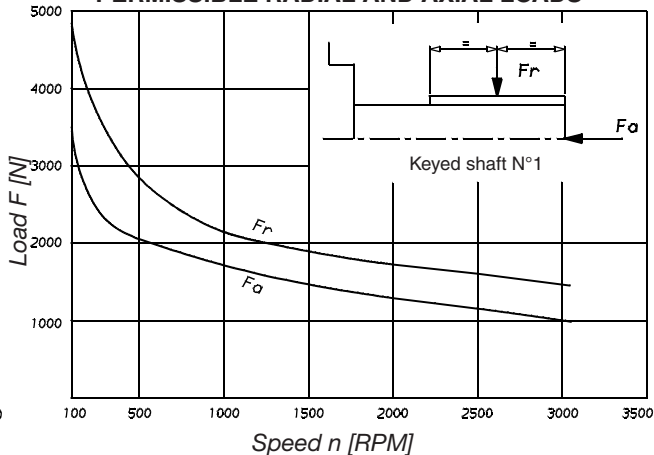
#### View from shaft end :

CW rotation A = inlet CCW rotation A = outlet  
 B = outlet B = inlet

#### PORTING COMBINATION

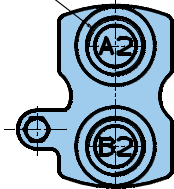
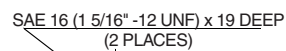
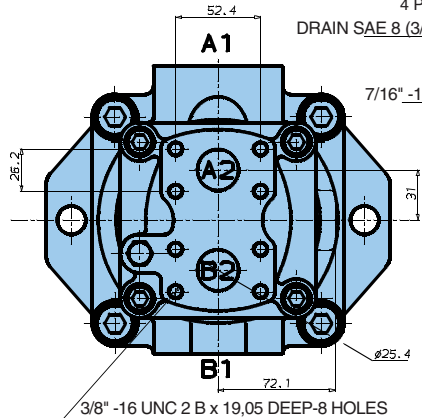
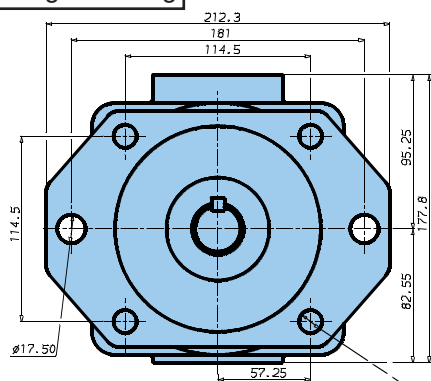


#### PERMISSIBLE RADIAL AND AXIAL LOADS

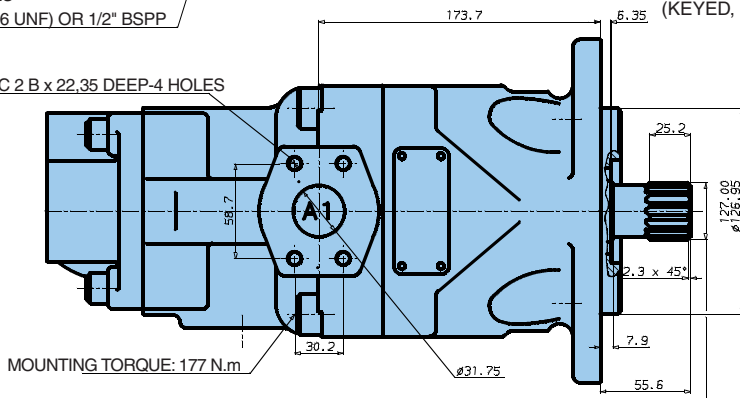
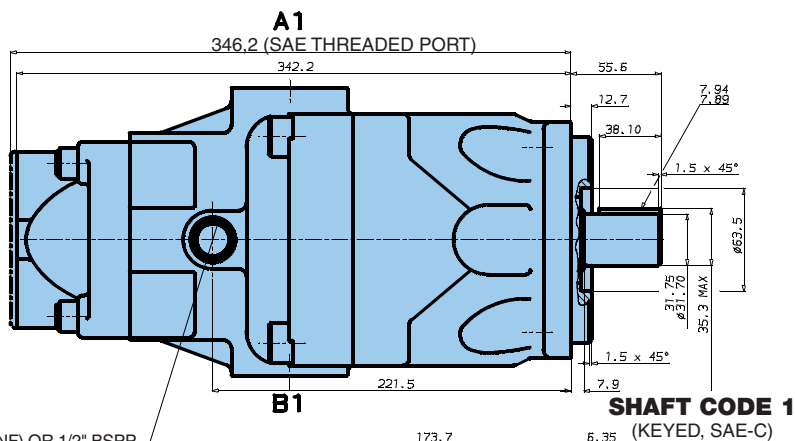


Do not apply Fr and Fa loads simultaneously

Weight 40.0 kg



SAE THREADED PORT



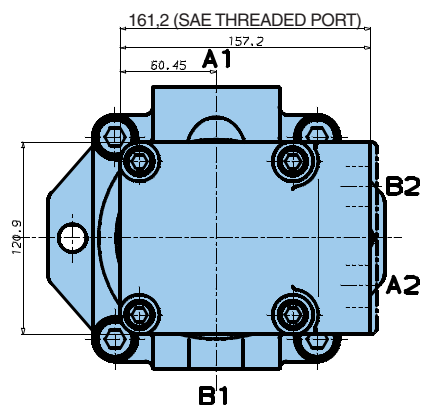
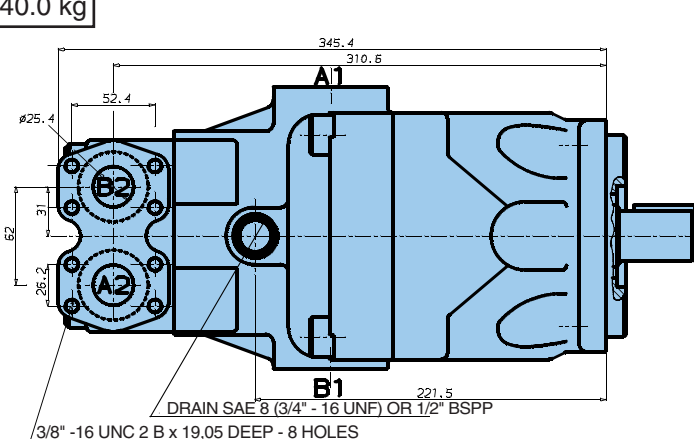
**SHAFT CODE 3**  
SAE-C SPLINED SHAFT  
CLASS 1 - J498b  
12/24 d.p. - 14 TEETH  
PRESSURE ANGLE 30°  
FLAT ROOT SIDE FIT

## REAR PORTS

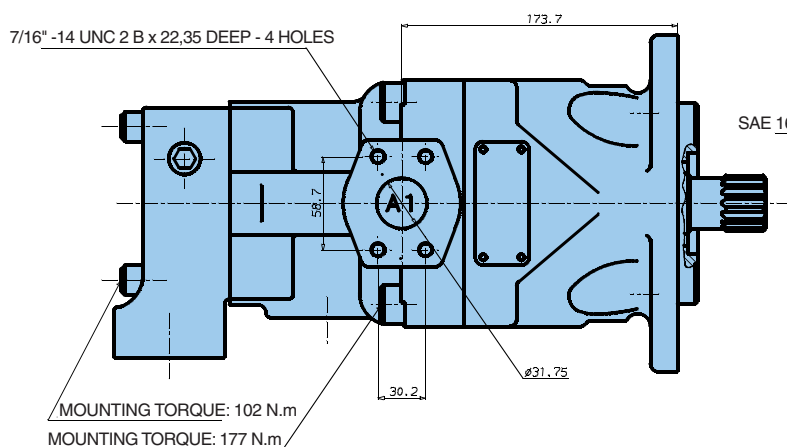
### OPERATING CHARACTERISTICS - TYPICAL [24 cSt]

| Model          | Volumetric displacement V <sub>i</sub> | Input flow at n = 2000 RPM |                | Torque T<br>at n = 2000 RPM | Power output<br>at n = 2000 RPM |
|----------------|----------------------------------------|----------------------------|----------------|-----------------------------|---------------------------------|
|                |                                        | Theoretical                | at 175 bar Δ p | at 175 bar Δ p              | at 175 bar Δ p                  |
|                | ml/rev.                                | l/min                      | l/min          | Nm                          | kW                              |
| M4D - M4SD 062 | 65,1                                   | 130,0                      | 154,0          | 165,0                       | 34,6                            |
| M4D - M4SD 074 | 76,8                                   | 154,0                      | 178,0          | 200,0                       | 41,9                            |
| M4D - M4SD 088 | 91,0                                   | 182,0                      | 206,0          | 236,0                       | 49,4                            |
| M4D - M4SD 102 | 105,5                                  | 211,0                      | 241,0          | 264,0                       | 55,3                            |
| M4D - M4SD 113 | 116,7                                  | 233,0                      | 257,0          | 300,0                       | 62,8                            |
| M4D - M4SD 128 | 132,4                                  | 265,0                      | 289,0          | 340,0                       | 71,2                            |
| M4D - M4SD 138 | 144,4                                  | 289,0                      | 313,0          | 372,0                       | 77,9                            |
| M4C - M4SC 024 | 24,4                                   | 49,0                       | 67,0           | 60,5                        | 12,7                            |
| M4C - M4SC 027 | 28,2                                   | 56,0                       | 74,0           | 70,0                        | 14,7                            |
| M4C - M4SC 031 | 34,5                                   | 69,0                       | 87,0           | 86,8                        | 18,0                            |
| M4C - M4SC 043 | 46,5                                   | 93,0                       | 111,0          | 120,0                       | 25,1                            |
| M4C - M4SC 055 | 58,8                                   | 118,0                      | 136,0          | 149,0                       | 31,2                            |
| M4C - M4SC 067 | 71,1                                   | 142,0                      | 160,0          | 170,0                       | 35,6                            |
| M4C - M4SC 075 | 80,1                                   | 160,0                      | 178,0          | 198,0                       | 41,5                            |

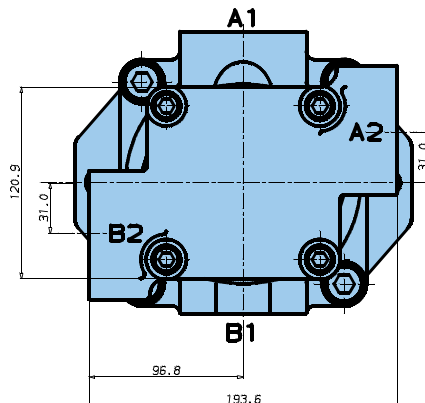
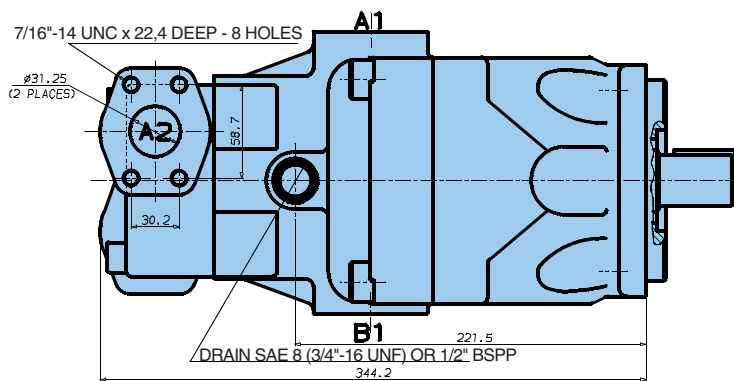
Weight 40.0 kg



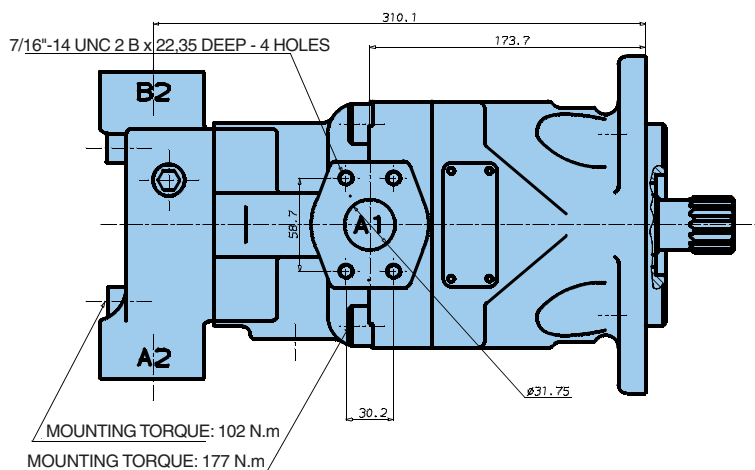
**SIDE PORTS**



SAE THREADED PORT



**OPPOSITE PORTS**



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