



## 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, V <sub>i</sub>	Torque T	Power at 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 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 C1 SC 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 D1 SD 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 E1 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 DC1 SDC 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 standard	Weight without connector and bracket - kg	Moment of inertia kgm <sup>2</sup> x 10 <sup>-4</sup>	Option for inlet and outlet port	
M3B	SAE J744c ISO/3019-1 SAE A	8,0	3,0	SAE threaded SAE 4 bolts J718c ISO/DIS 6162-1 - 3/4" BSPPP threaded	
M4C/SC	SAE J744c ISO/3019-1 SAE B	15,4	7,9	SAE threaded SAE 4 bolts J718c ISO/DIS 6162-1 - 1"	
M4D/SD	SAE J744c ISO/3019-1 SAE C	27,0	21,8	SAE threaded SAE 4 bolts J718c ISO/DIS 6162-1 - 1.1/4"	
M4E/SE	SAE J744c ISO/3019-1 SAE C	45,0	58,5	SAE threaded SAE 4 bolts J718c ISO/DIS 6162-1 - 2"	
M4DC/SDC	SAE J744c ISO/3019-1 SAE C	40,0	29,4	SAE 4 bolts J718c 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-2A	HF-1	HF-3	HF-4			HF-0, HF-2		HF-2A		HF-1		
			HF-2	bar	bar	bar	bar			bar	Cont.	Int. <sup>2)</sup>	Cont.	Int. <sup>2)</sup>	Cont.	Int. <sup>2)</sup>
		bar	bar	bar	bar	bar	bar	RPM	RPM	RPM	RPM	RPM	RPM			
M3	B B1	009	175						1.5	4000	3000	3600				
		012	210													
		018														
		027														
		036														
M4	C C1	024	175	175	175			3.5	4000	2500	3600	2500	3000	2000	2500	
		027														
		031														
		043														
		055														
		067														
	075															
	SC SC1	024	230	210	175	175	140		4000	2500	3600	2500	3000	2000	2500	
		027														
		031														
		043	210													
		055														
		067														
	075	175	175													
	D D1	062	175	175	140				4000	2500	3000	2500	2800	2000	2500	
		074														
		088														
		102														
		113														
		128														
		138														
	SD SD1	062	230	190	140	140	140		4000	2500	3000	2500	2800	2000	2500	
		074														
		088														
		102	210													
		113														
		128														
	138	190	190													
	175	175														
	E E1	153	175	175	140				3600	2500	3000	2500	2800	1800	2200	
		185														
		214														
	SE SE1	153	190	175	140	140	140		3600	2500	3000	2500	2800	1800	2200	
185		180														
214		175														
DC DC1	All models	175	175	140			4000	2500	3000	2500	2800	200	2500			
	SDC SDC1	D-062 at 088	230	190	140	140								140		
C-024 at 043																
D-102		210	190	140	140	140										
D-113																
C-055																
C-067		175	175													
D-128																
D-138																
C-075																

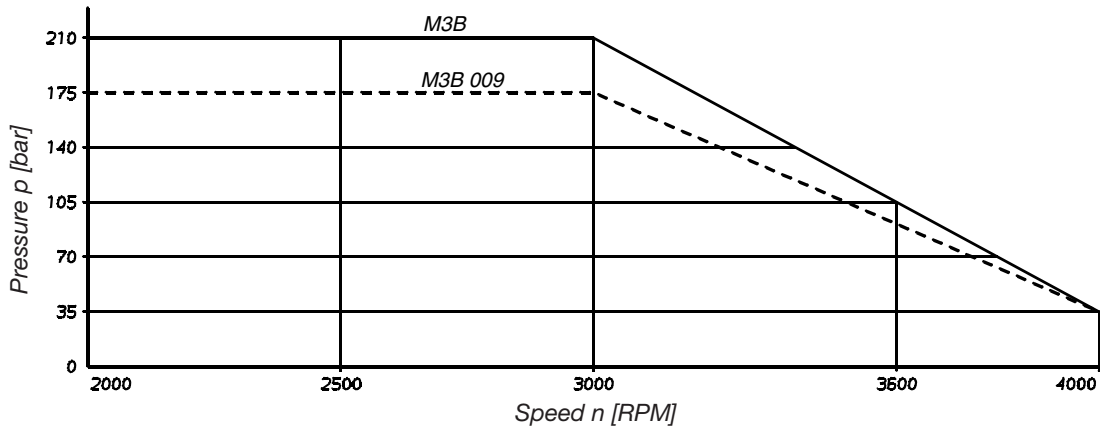
<sup>1)</sup> Low loaded condition 35 bar for M3 and M4, 80 bar max. for M4S (see page 6).

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

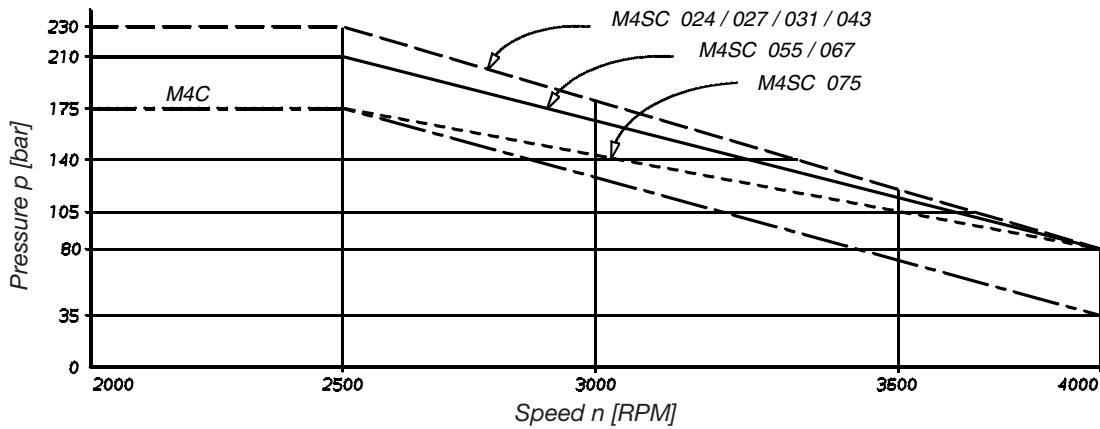
HF-0, HF-2 = Antiwear petroleum base. HF-2A = Crankcase. HF-1 = Non antiwear petroleum base. HF-5 = Synthetic fluids. HF-3 = Water in oil emulsions. HF-4 = Water glycols.

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.

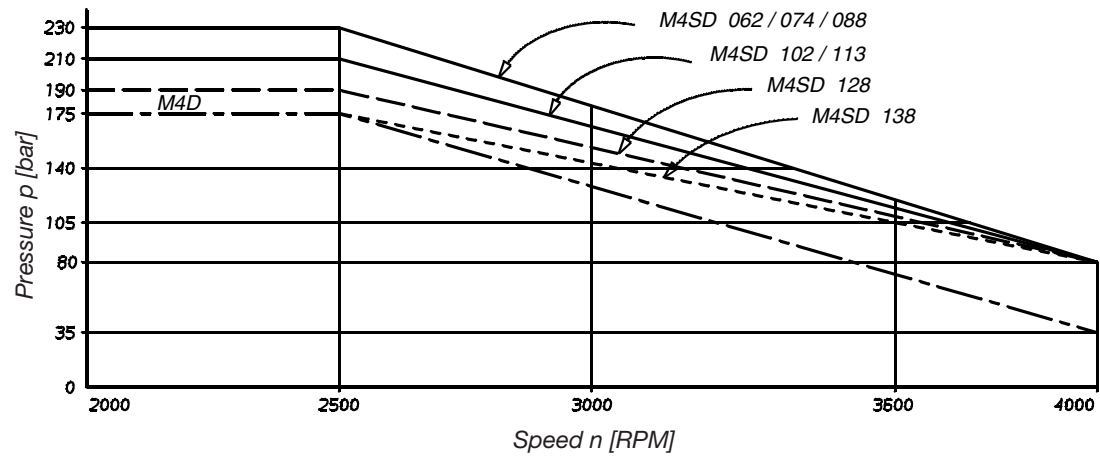
M3B



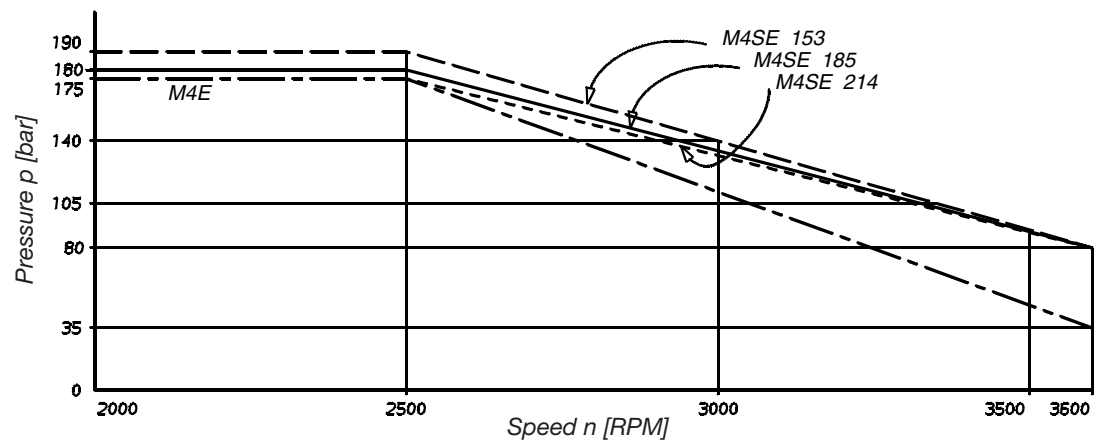
M4C/M4SC



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 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 Nm. around 1500 RPM

M4C 055 T = 140 N.m n = 1500 RPM  
p = 160 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 Nm. at 1500 RPM

M4C 067 T = 140 Nm. n = 1500 RPM  
p = 140 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 :

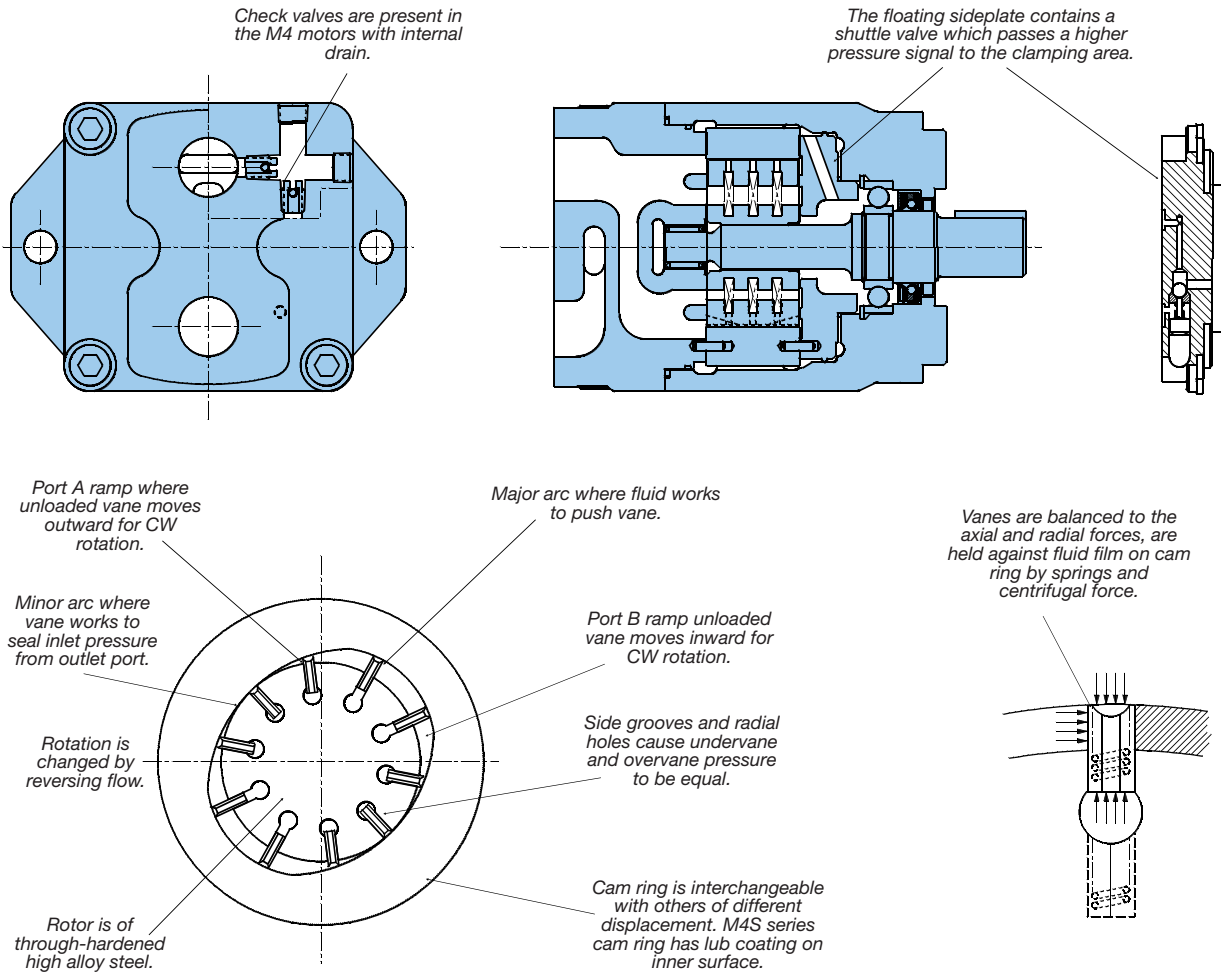
$$Q_{\text{eff.}} = 115 - 14 = 101 \text{ l/min}$$

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, β10 ≥ 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)**

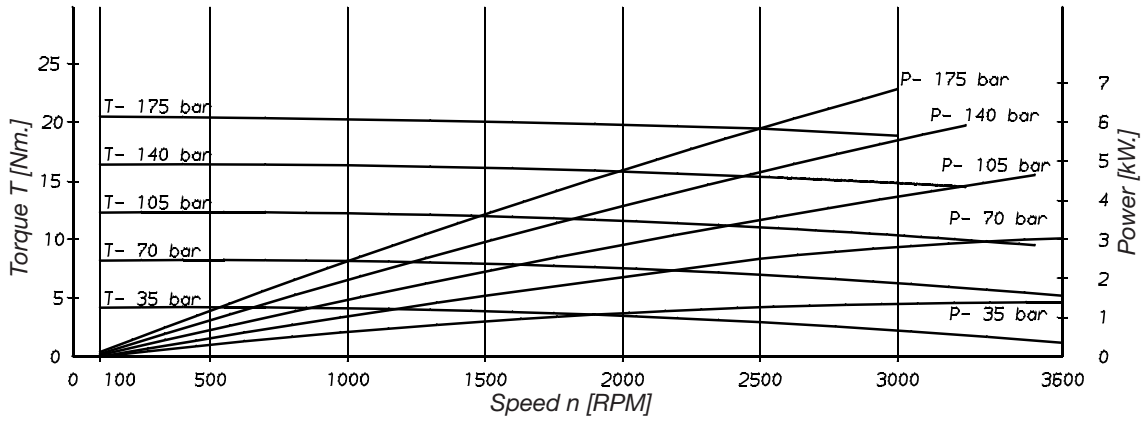
Series	Speed [RPM] - Oil viscosity = 32 cSt				
	500	1000	2000	3000	3600
<b>M3B</b>	0,6	1,0	1,9	3,5	5,8
<b>M4C/SC</b>	0,7	1,4	3,1	5,5	9,3
<b>M4D/SD</b>	0,7	1,4	3,1	5,5	9,3
<b>M4E/SE</b>	1,4	2,8	5,2	11,0	
<b>M4DC/SDC</b>					
<b>2-C-DC</b>	1,7	3,8	10,0	22,4	28,3
<b>2-D-DC</b>	1,1	1,7	5,5	10,7	15,1
<b>3-D-C-DC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

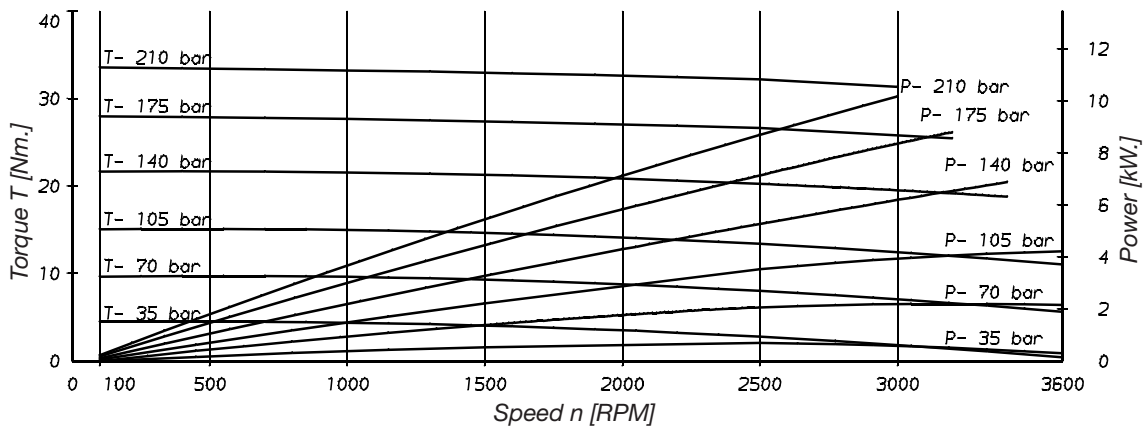
Replenishment pressure for tandem 2 & 3-speed motors must be provided during periods when the motor is dynamic braking, shutting down or coasting. When the motor is operating in the high speed mode and the nonworking cartridge is at low pressure, it is necessary to create a back pressure, as listed above, 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.



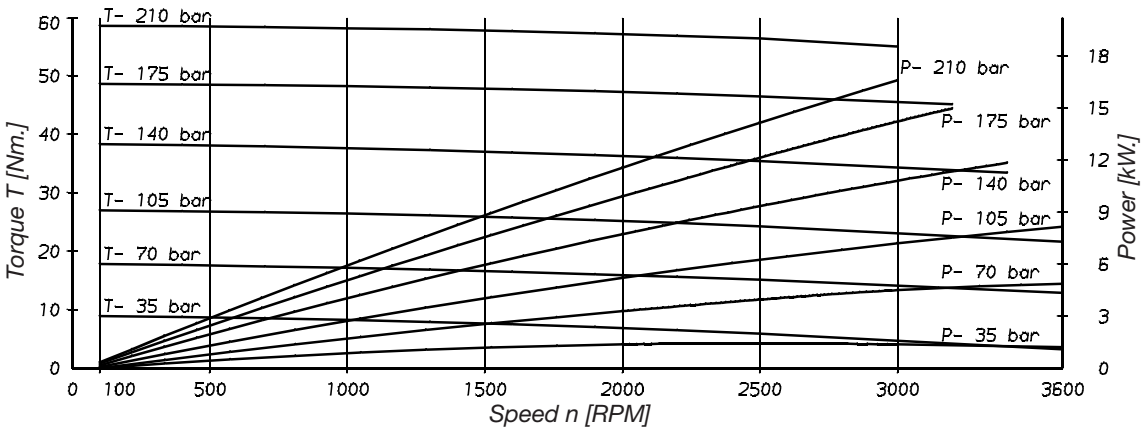
M3B 009



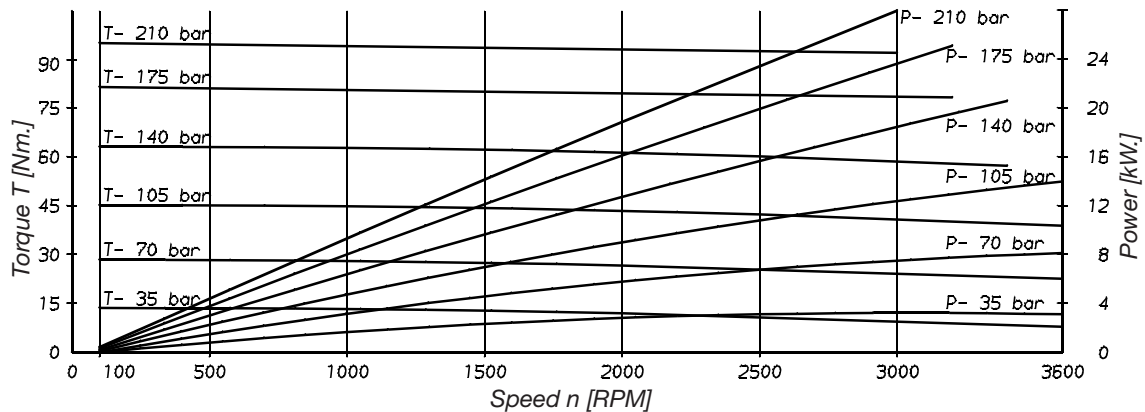
M3B 012



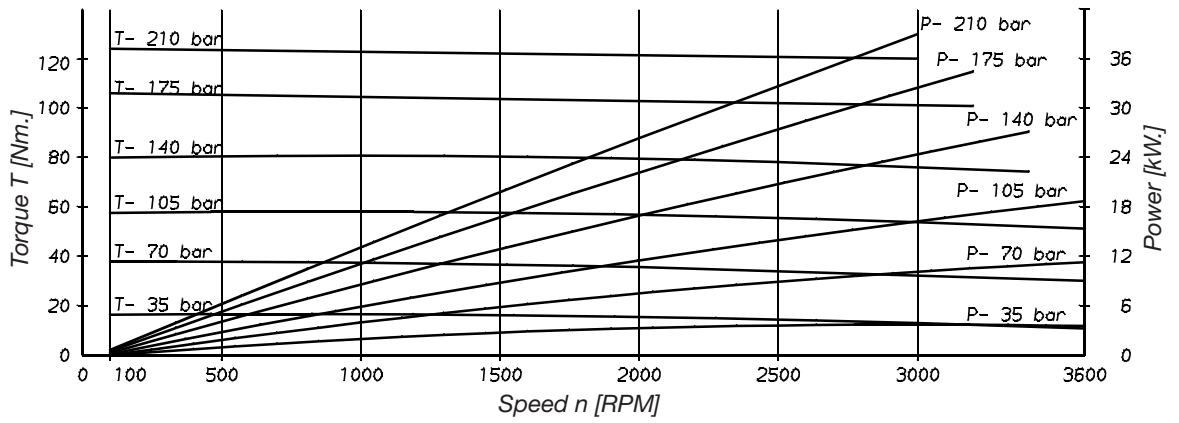
M3B 018



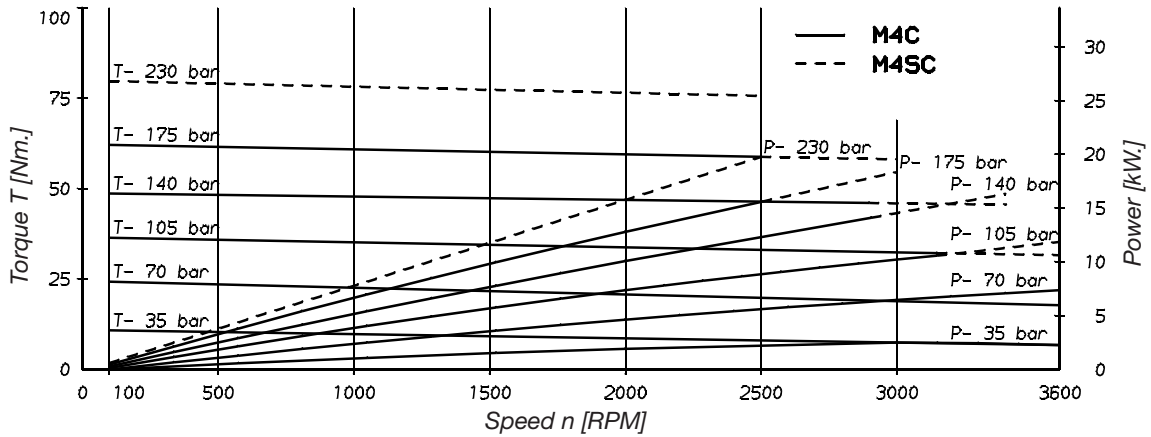
M3B 027



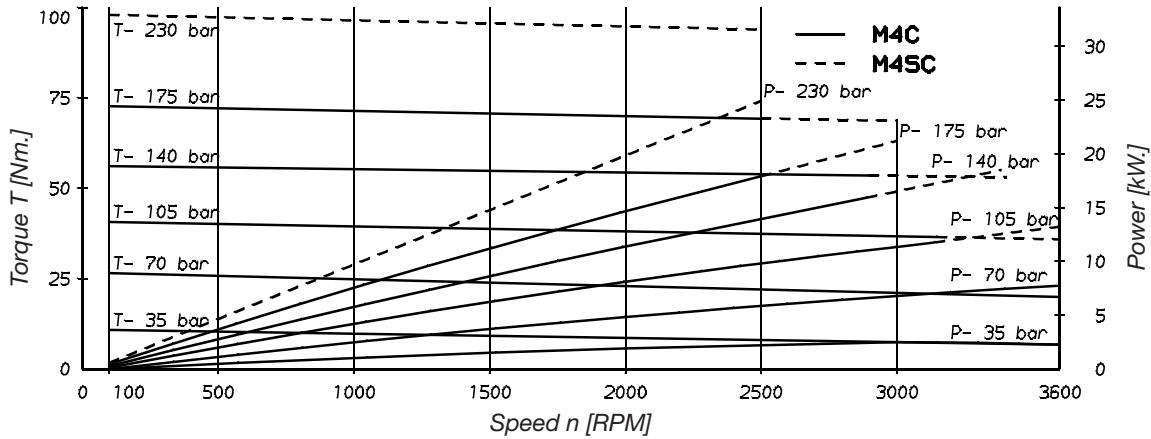
M3B 036



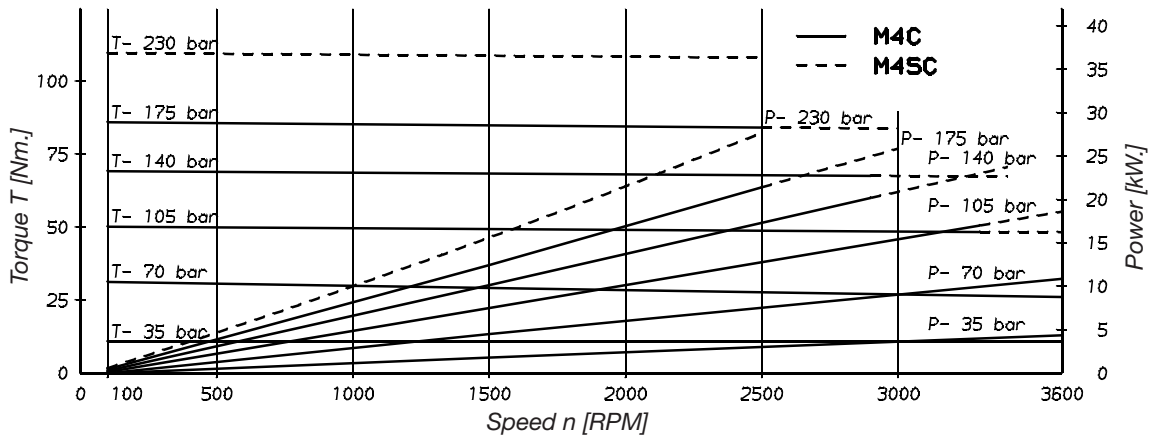
M4C 024



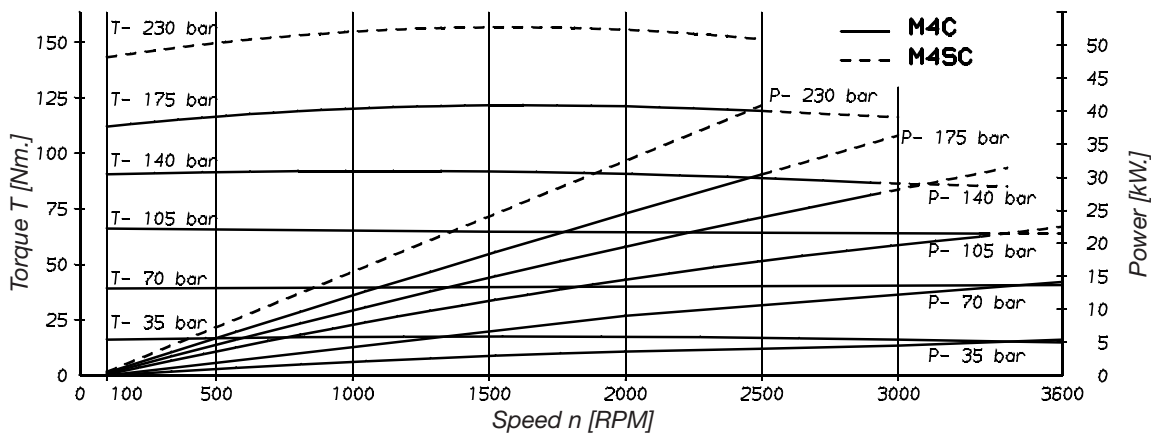
M4C 027



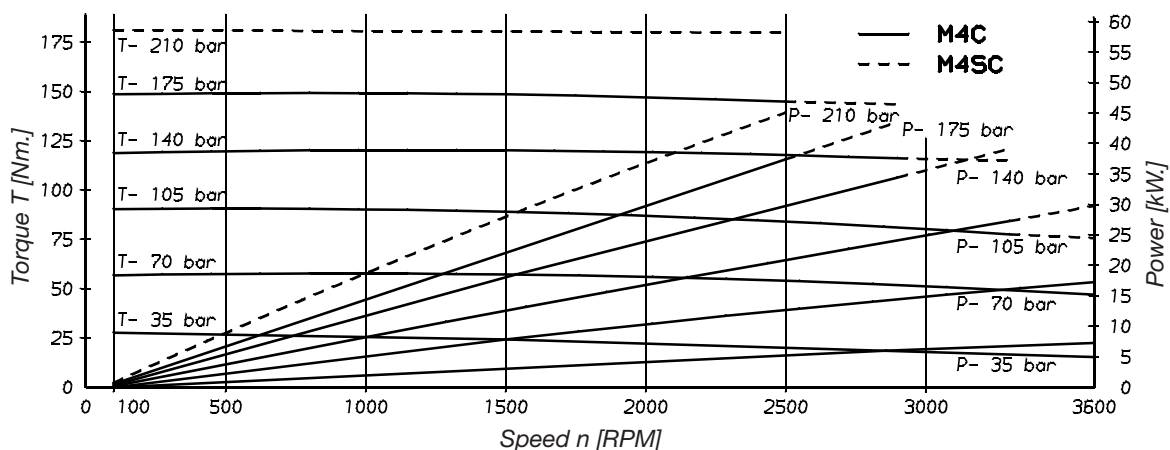
M4C 031



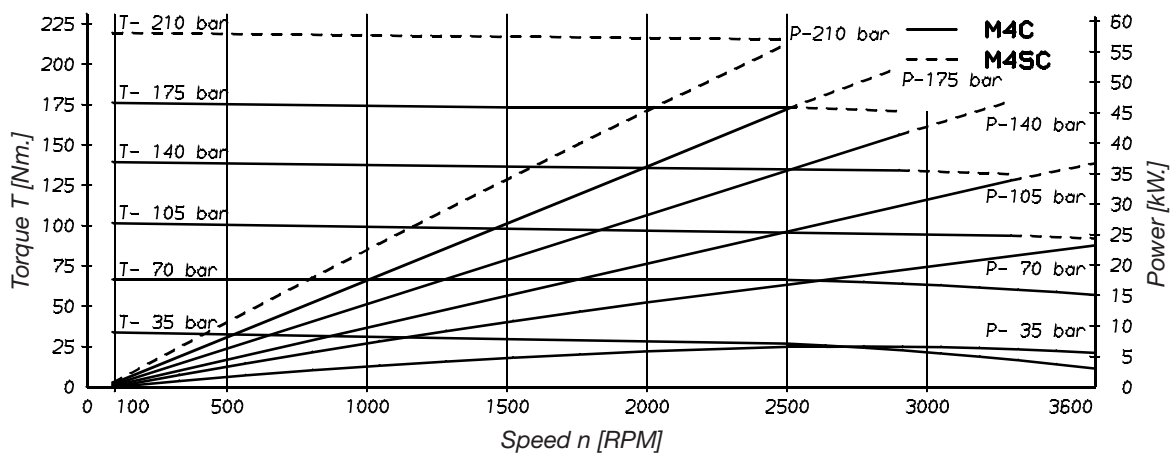
M4C 043



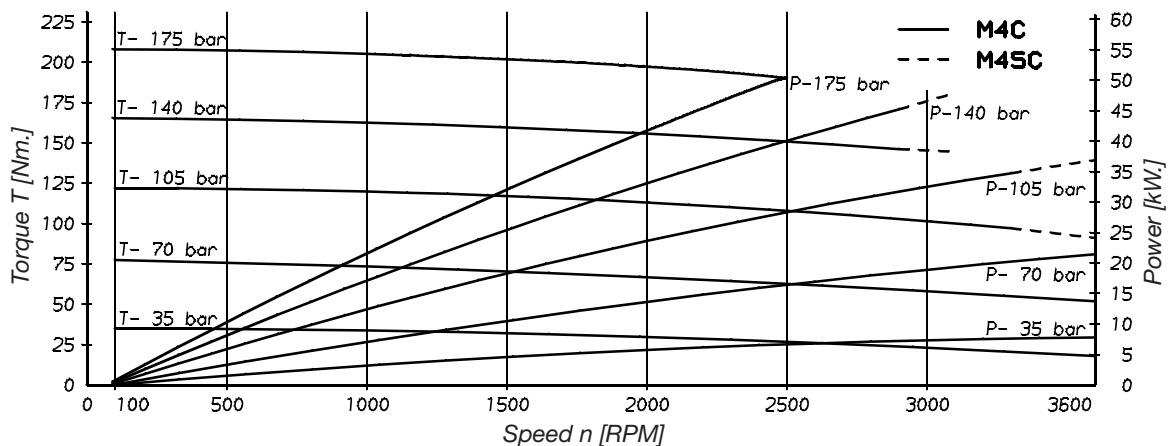
M4C 055



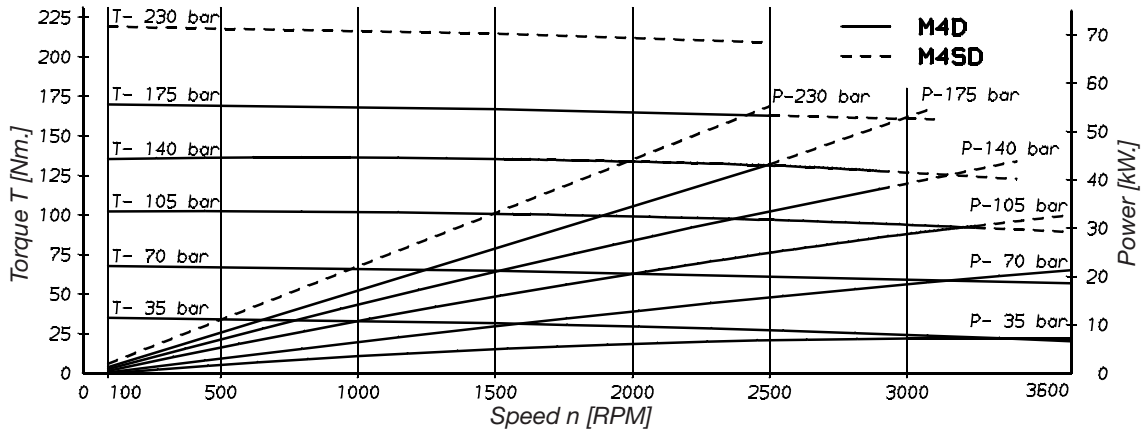
M4C 067



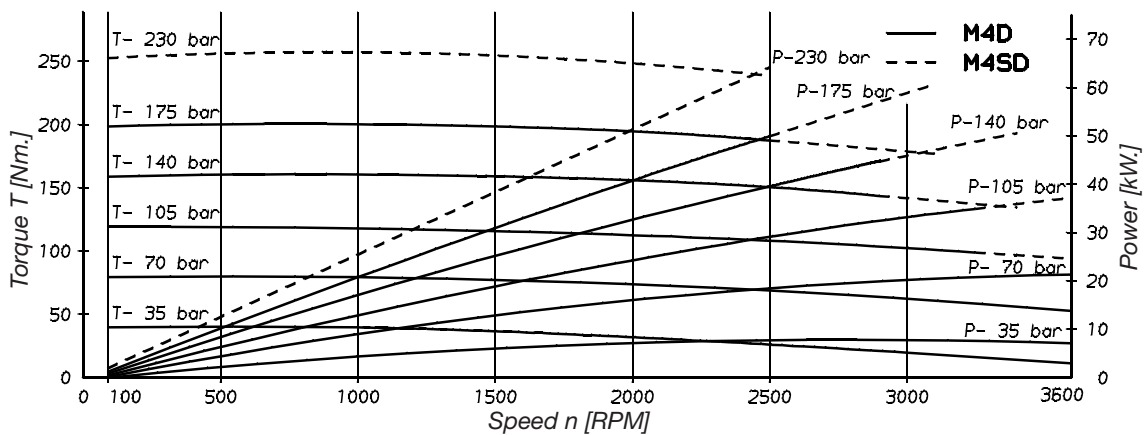
M4C 075



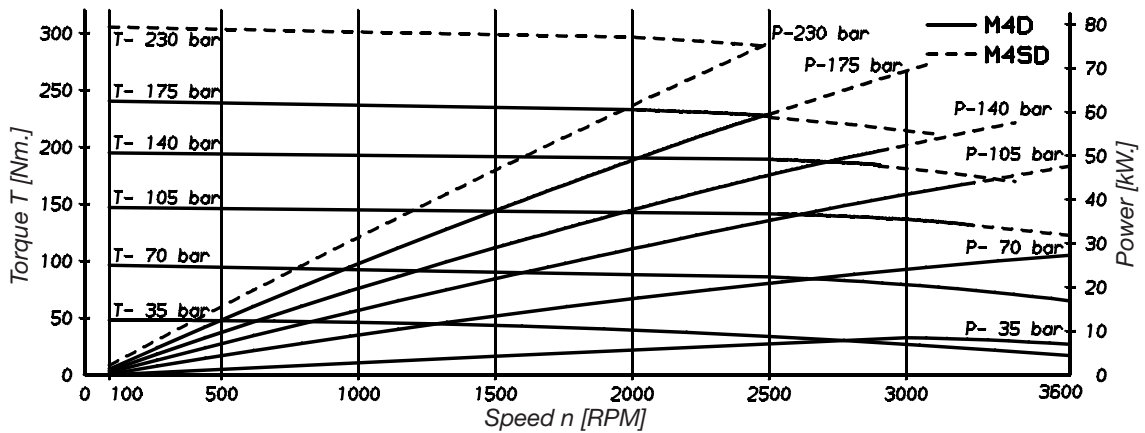
M4D 062



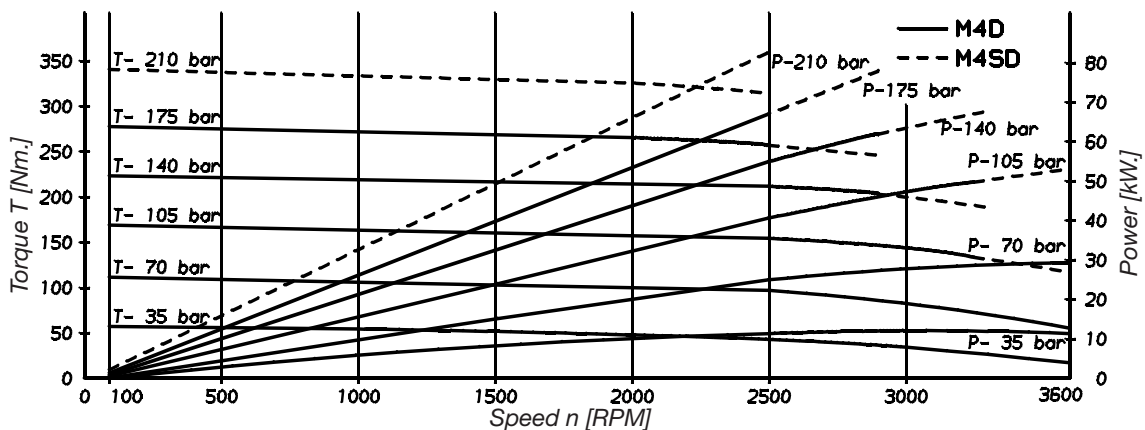
M4D 074



M4D 088

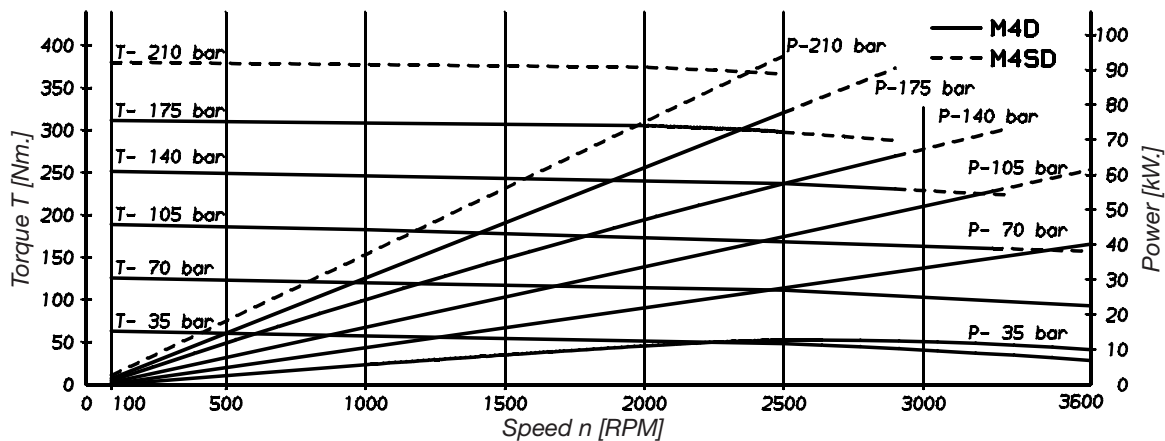


M4D 102

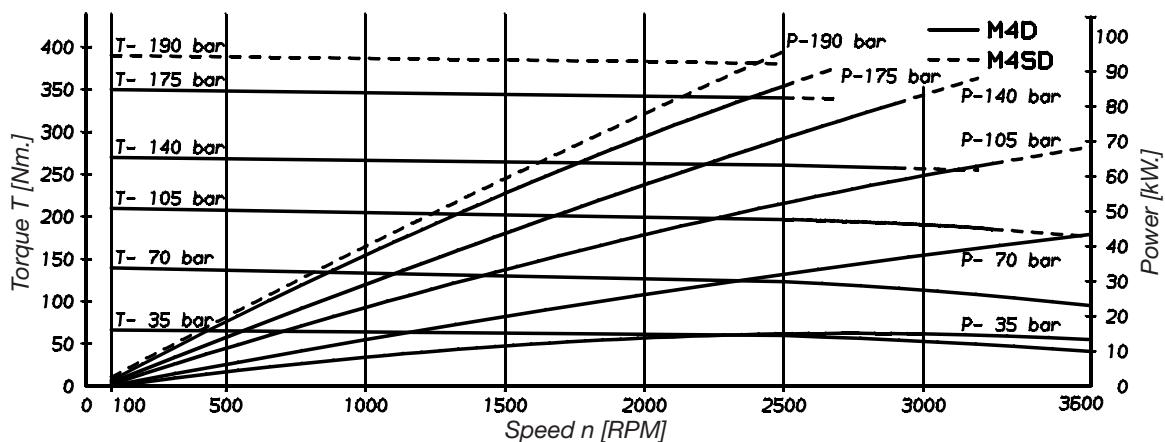




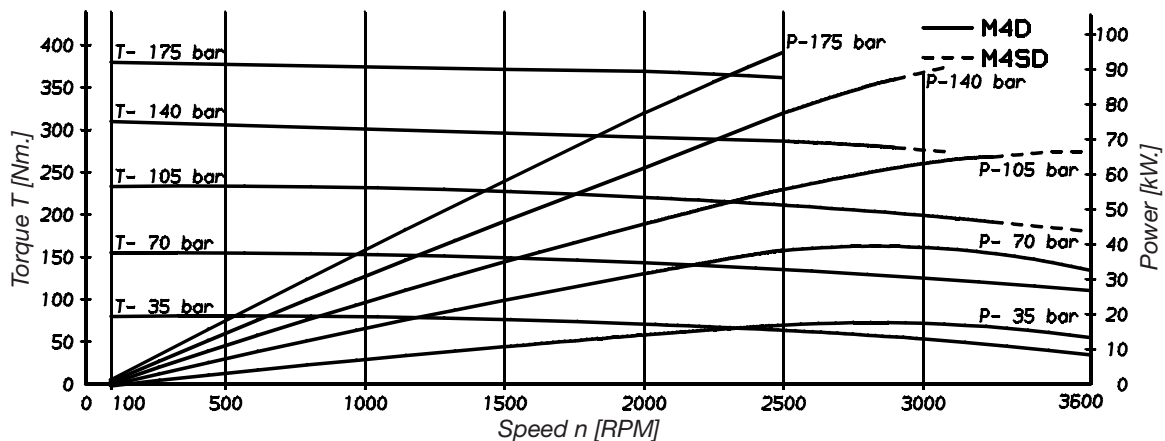
M4D 113



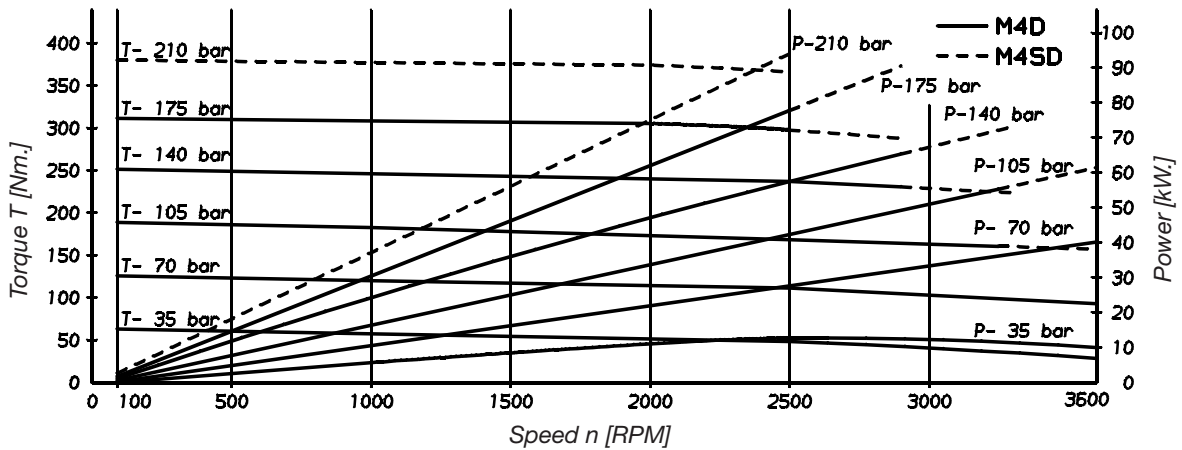
M4D 128



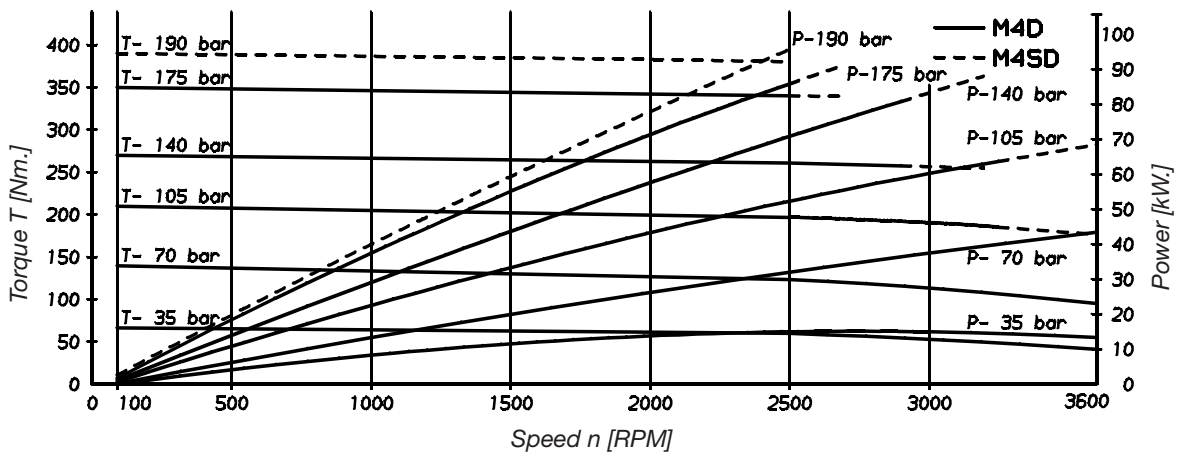
M4D 138



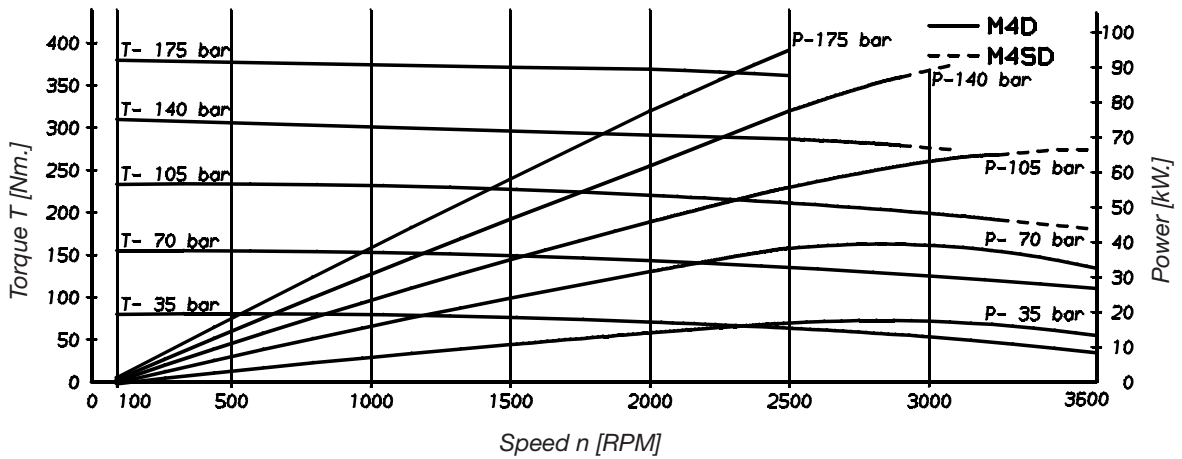
M4E 153



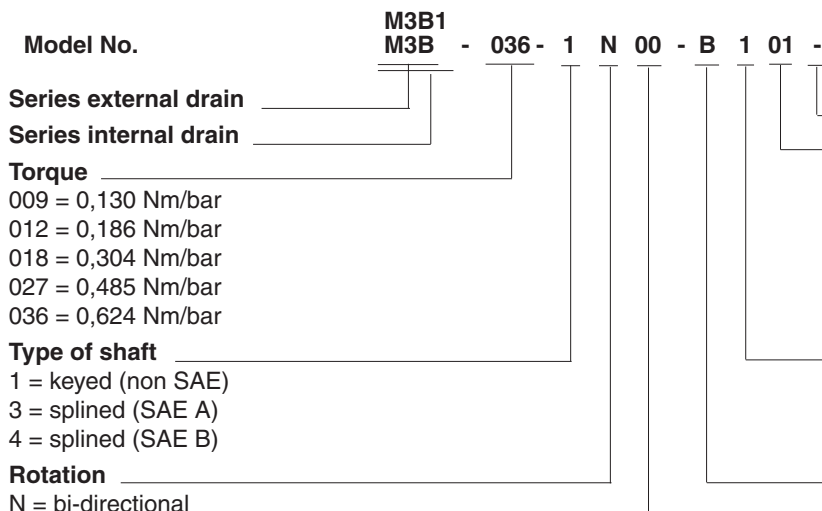
M4E 185



M4E 214

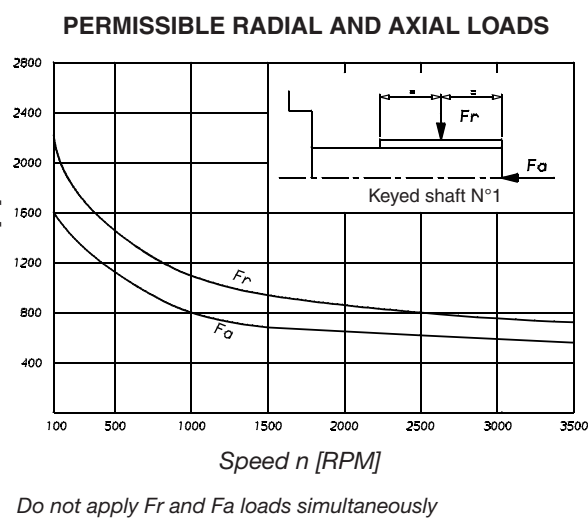
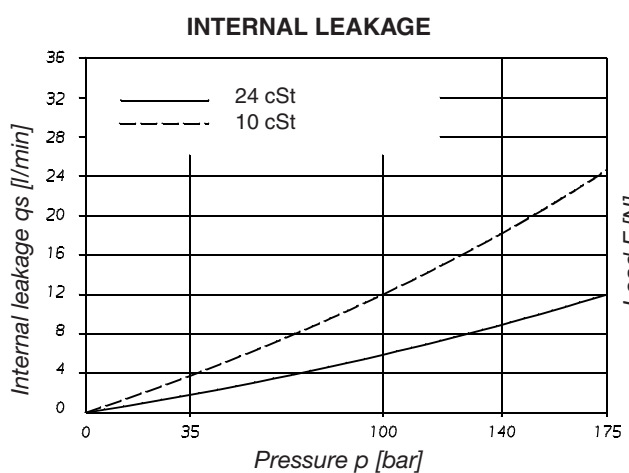
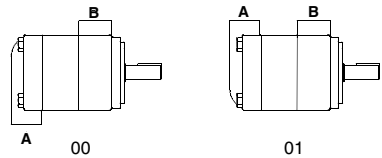






- Modification**
- Port connections**  
00 = SAE threaded port  
SAE drain  
01 = SAE 4 bolt flange  
BSPP drain  
02 = BSPP threaded port  
BSPP drain
- Seal class**  
1 = S1 - BUNA N  
4 = S4 - EPDM  
5 = S5 - VITON®
- Design letter**
- Porting combination**  
00 = standard

View from shaft end :  
CW rotation A = inlet CCW rotation A = outlet  
B = outlet B = inlet

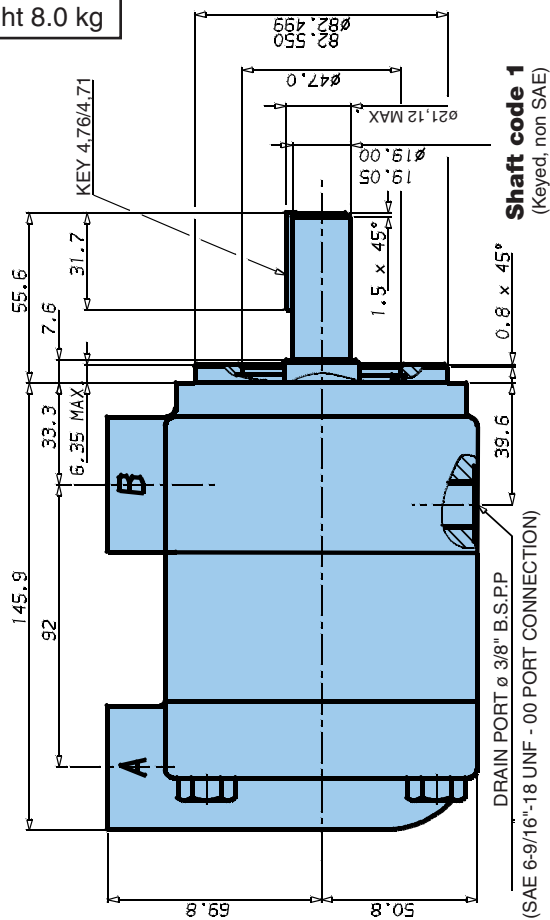


**OPERATING CHARACTERISTICS - TYPICAL [24 cSt]**

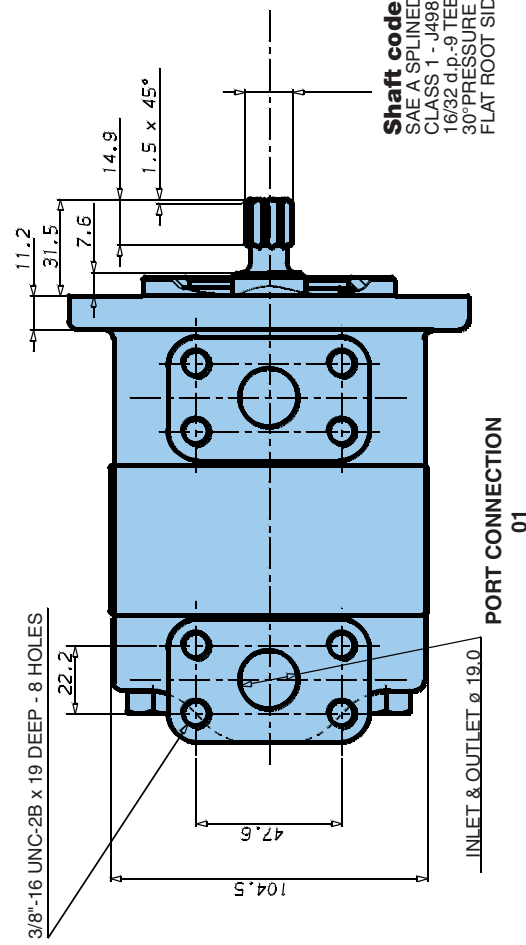
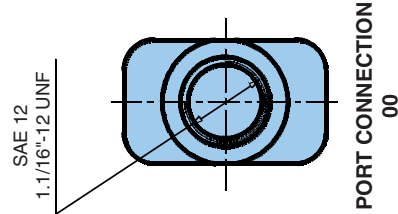
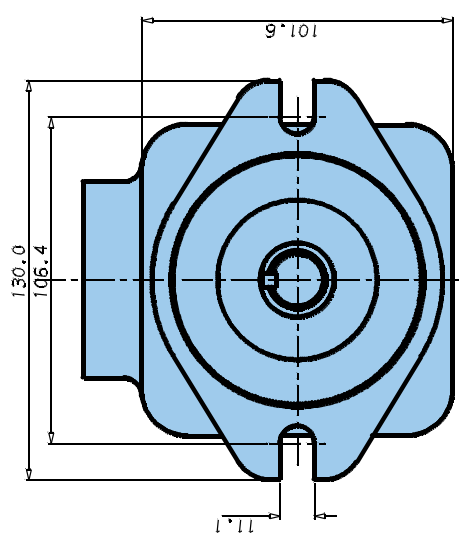
Model	Volumetric displacement $V_i$ ml/rev,	Input flow at n = 2000 RPM		Torque T at n = 2000 RPM	Power output at n = 2000 RPM
		Theoretical	at 175 bar $\Delta p$	at 175 bar $\Delta p$	at 175 bar $\Delta p$
		l/min	l/min	Nm	kW
M3B 009	9,2	18,4	30,4	19,7	4,3
M3B 012	12,3	24,6	36,6	26,7	5,8
M3B 018	18,5	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



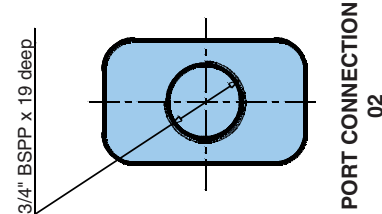
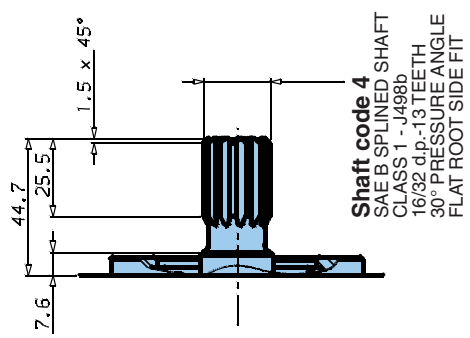
Weight 8.0 kg



**Shaft code 1**  
 (Keyed, non SAE)



**Shaft code 3**  
 SAE A SPLINED SHAFT  
 CLASS 1 - J498b  
 16/32 d.p.-9 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  
 \* = S = Severe duty motor.

**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)

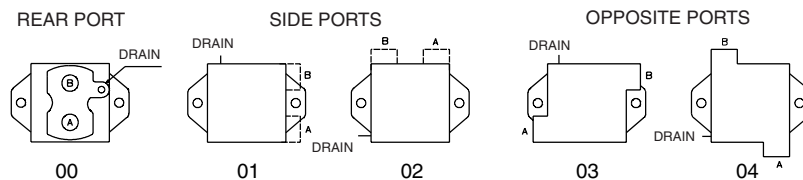
**Design letter** \_\_\_\_\_  
**Porting combination**  
 00 = standard

M4C1 - M4SC1 : Drain port is plugged.

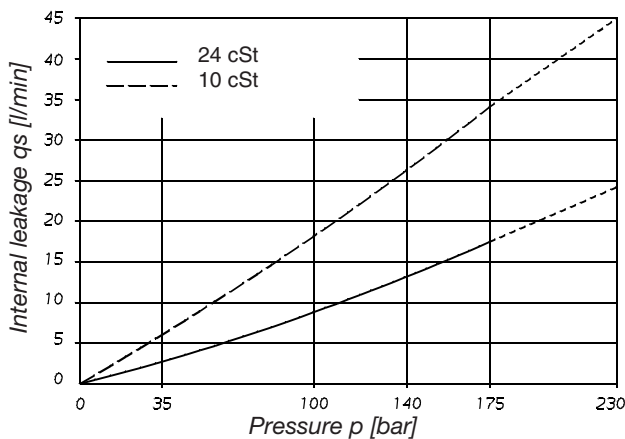
**Porting combination**

**View from shaft end :**

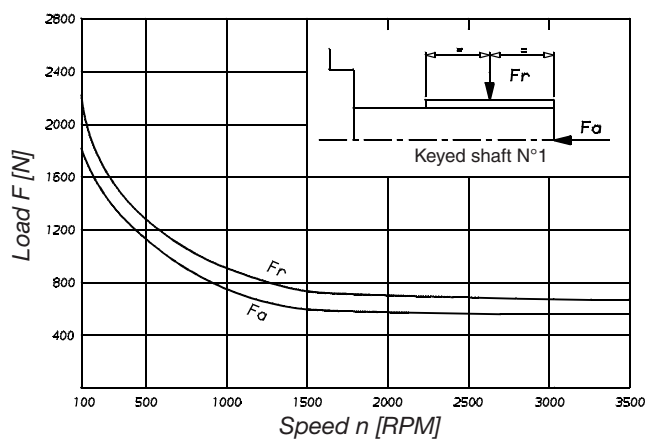
CW rotation A = inlet  
 B = outlet  
 CCW rotation A = outlet  
 B = inlet



**INTERNAL LEAKAGE**



**PERMISSIBLE RADIAL AND AXIAL LOADS**

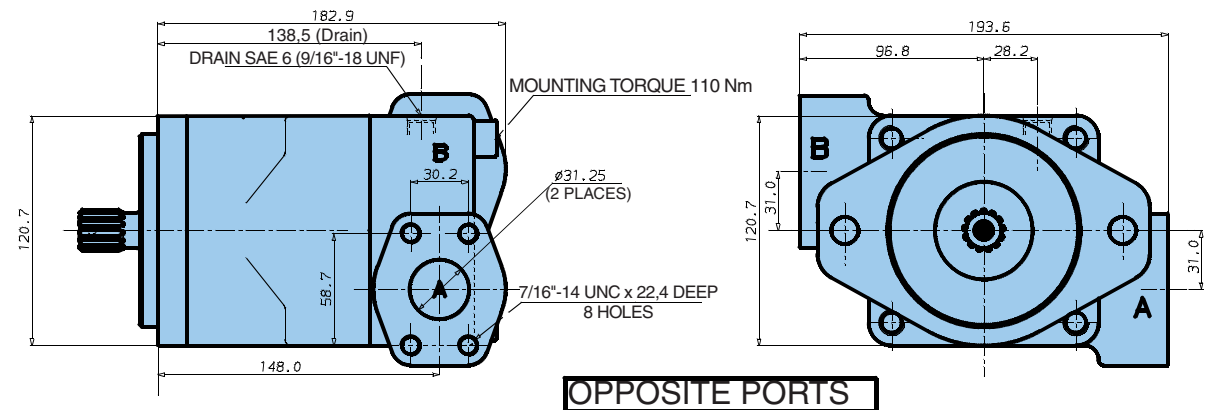
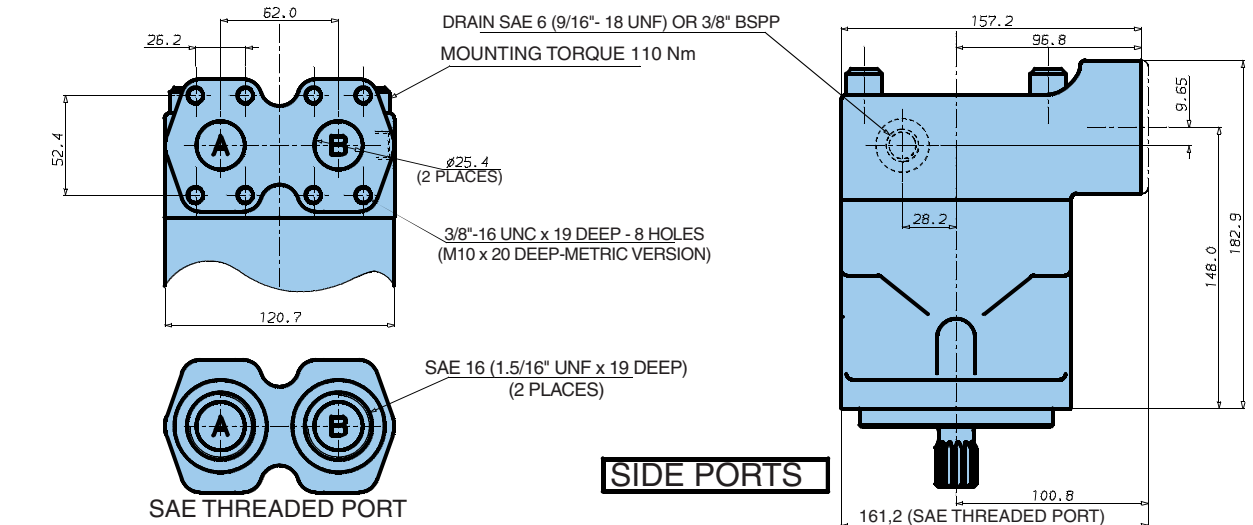
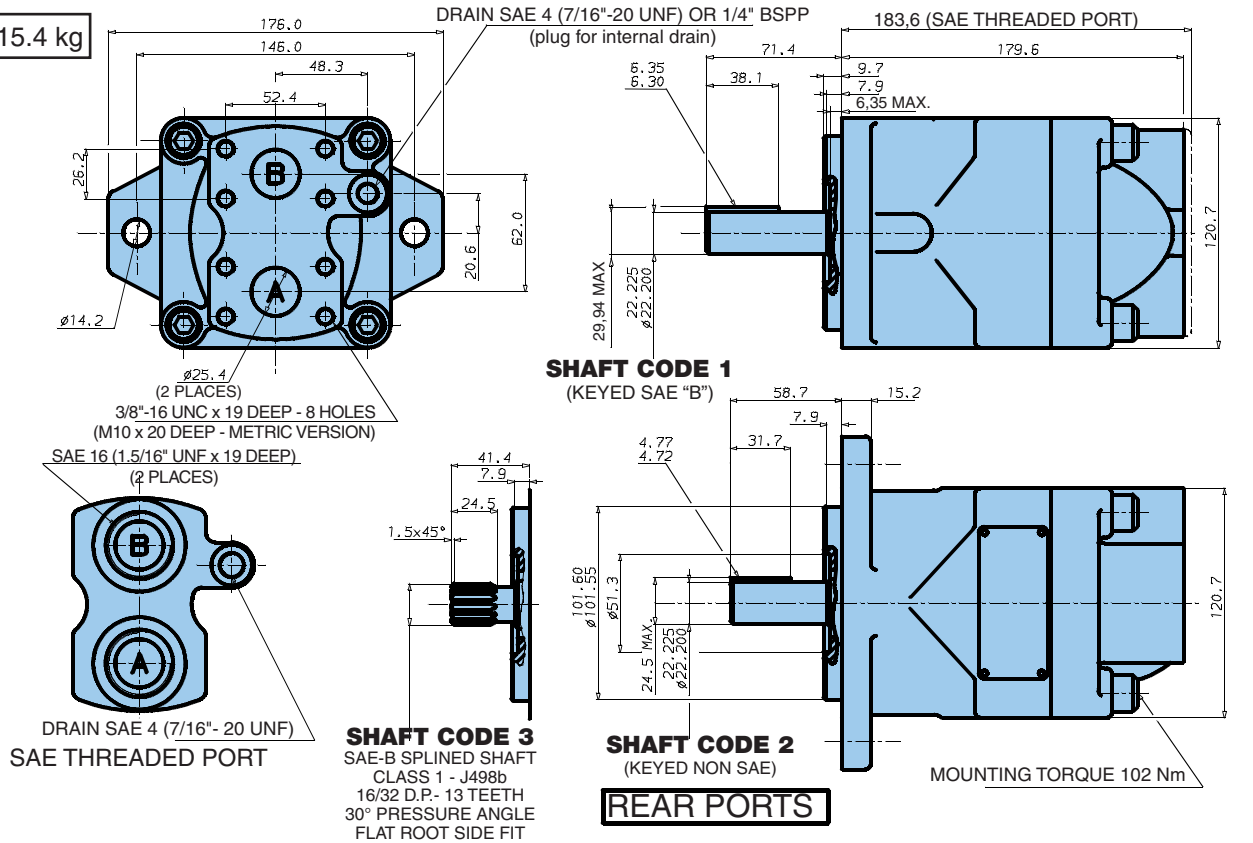


Do not apply Fr and Fa loads simultaneously

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

Model	Volumetric displacement $V_i$ ml/rev.	Input flow at n = 2000 RPM		Torque T at n = 2000 RPM	Power output at n = 2000 RPM
		Theoretical l/min	at 175 bar $\Delta p$ l/min	at 175 bar $\Delta p$	at 175 bar $\Delta p$
				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



**Model No.** M4\*D1  
M4\*D - 138 - 1 N 00 - B 1 02 ..

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

**Torque** \_\_\_\_\_  
 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

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

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

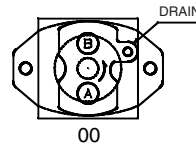
**Modification**  
**Port connections**  
 01 = SAE threaded port  
 SAE drain  
 02 = SAE 4 bolt flange  
 UNC threaded - SAE drain  
 04 = SAE 4 bolt flange  
 UNC threaded - BSPP drain  
 M4 = SAE 4 bolt flange  
 metric threaded - BSPP drain

**Seal class**  
 1 = S1 - BUNA N (M4D)  
 5 = S5 - VITON® (M4SD)

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

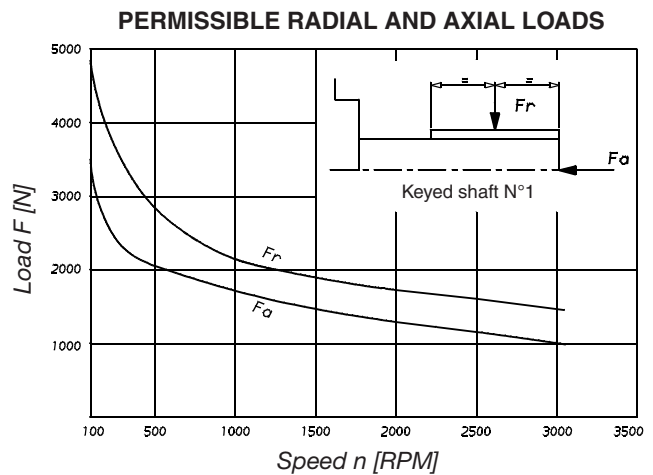
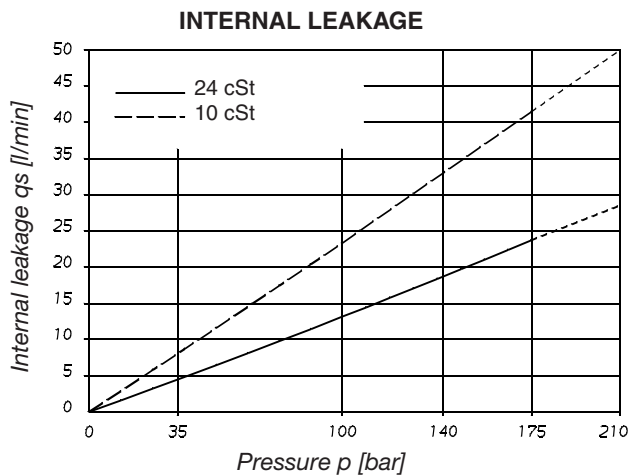
\* = S = Severe duty motor.

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

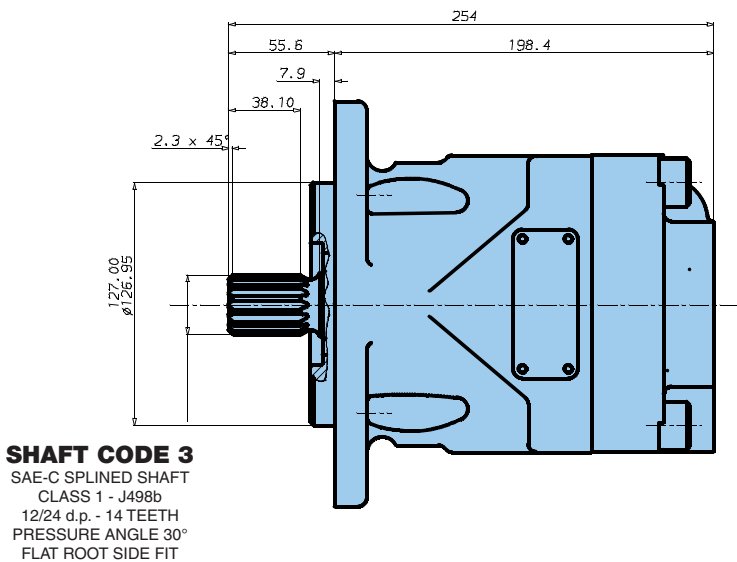
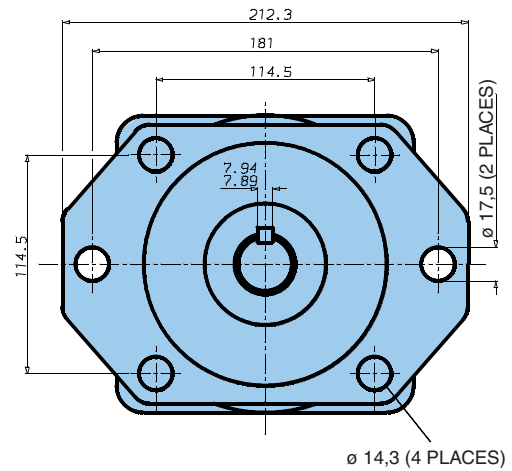
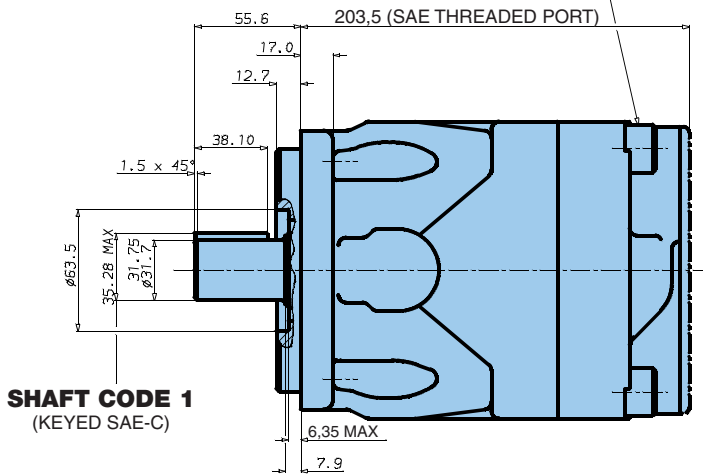
**OPERATING CHARACTERISTICS - TYPICAL [24 cSt]**

Model	Volumetric displacement $V_i$ ml/rev.	Input flow at n = 2000 RPM		Torque T at n = 2000 RPM	Power output at n = 2000 RPM
		Theoretical l/min	at 175 bar $\Delta p$ l/min	at 175 bar $\Delta p$ Nm	at 175 bar $\Delta p$ 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



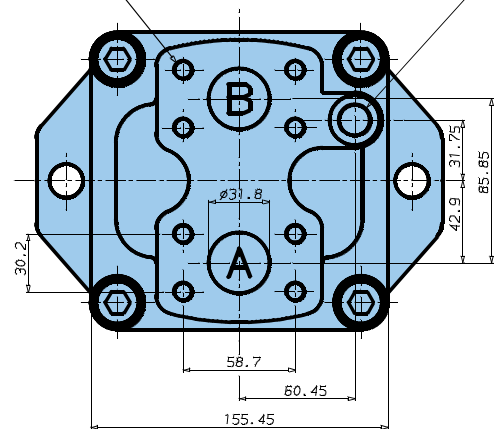
Weight 27.0 kg

MOUNTING TORQUE: 180 N.m



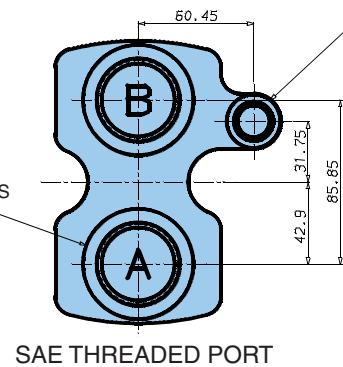
7/16"-14 UNC x 22 DEEP - 8 HOLES  
 (M12 x 22,1 DEEP-METRIC VERSION)

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®

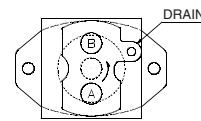
**Design letter**  
**Porting combination**  
 00 = standard

\* = S = Severe duty motor.

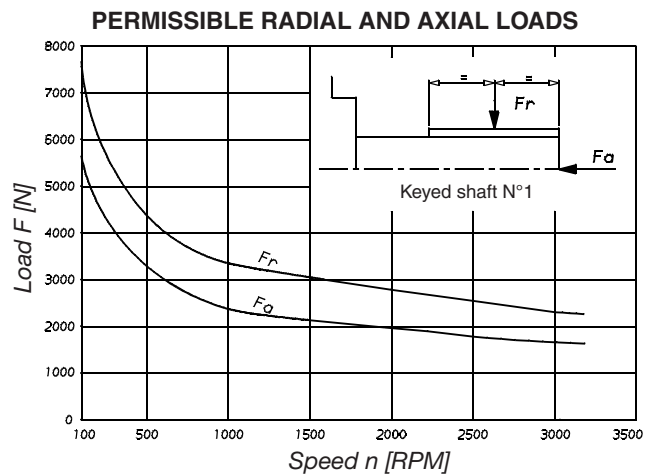
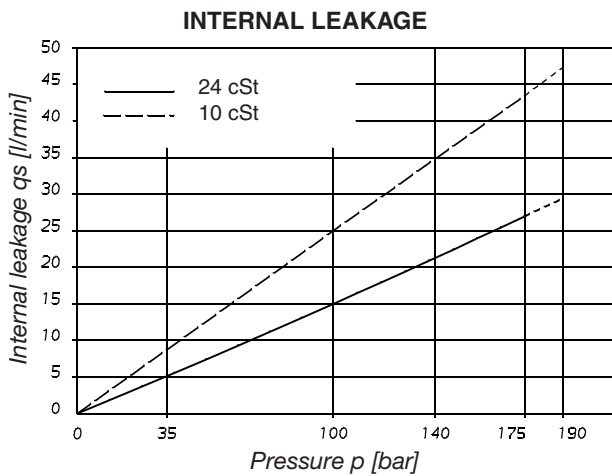
M4E1 - M4SE1 : Drain port is plugged.

**View from shaft end :**

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



00

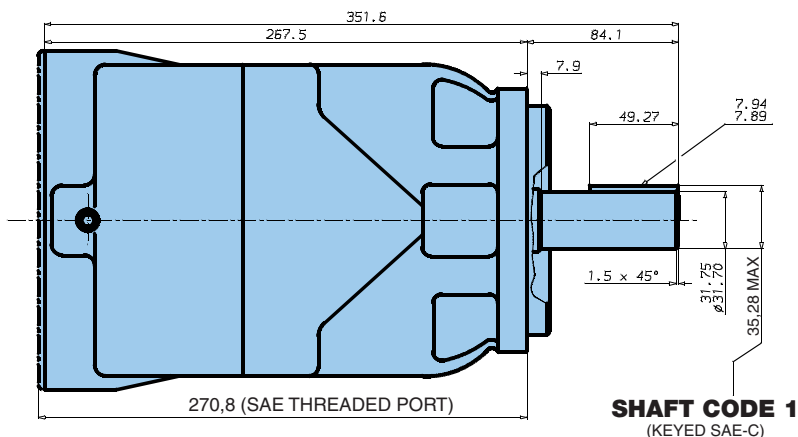
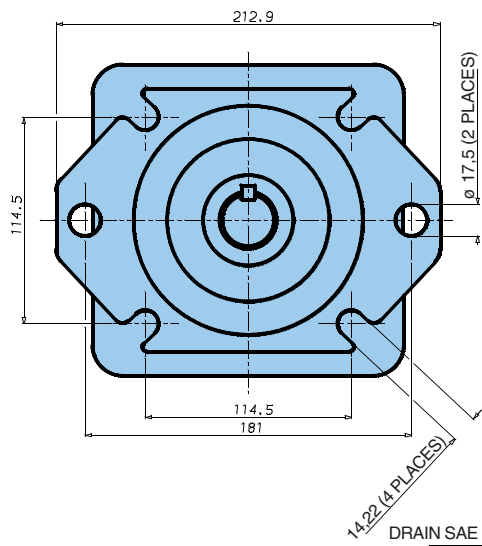


Do not apply Fr and Fa loads simultaneously

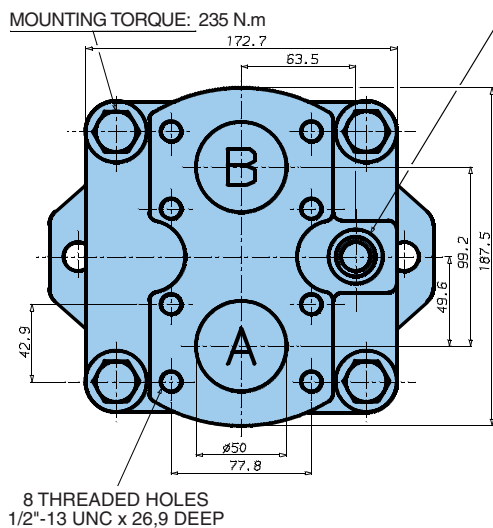
**OPERATING CHARACTERISTICS - TYPICAL [24 cSt]**

Model	Volumetric displacement $V_i$ ml/rev.	Input flow at n = 2000 RPM		Torque T at n = 2000 RPM	Power output at n = 2000 RPM
		Theoretical l/min	at 175 bar $\Delta p$ l/min	at 175 bar $\Delta p$	at 175 bar $\Delta p$
				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

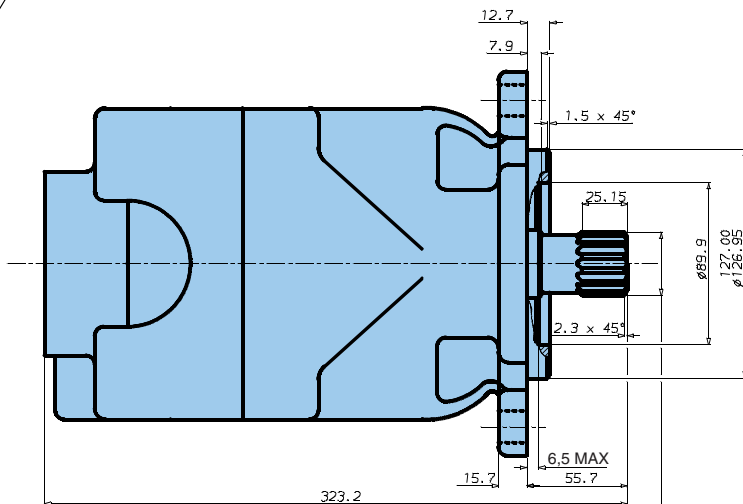
Weight 45.0 kg



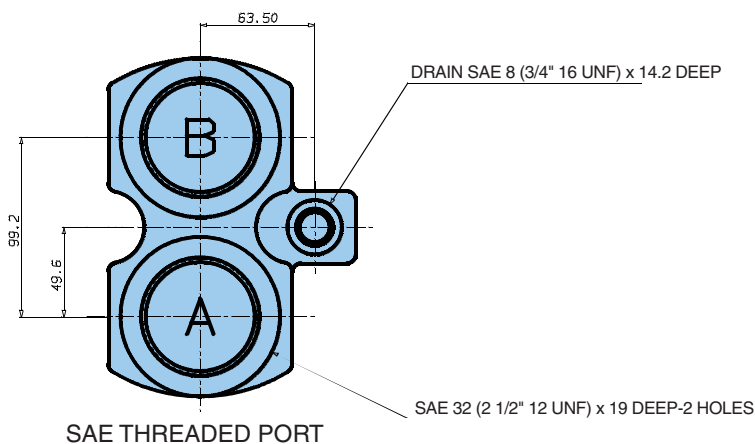
**SHAFT CODE 1**  
 (KEYED SAE-C)



DRAIN SAE 8 (3/4" - 16 UNF) OR 1/2" BSPP



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



**Model No.** M4\*DC1  
M4\*DC - 138 - 031 1 N 00 - B 1 02 00 ..

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

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

**Torque for A1 - B1** \_\_\_\_\_

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

**Torque for A2 - B2** \_\_\_\_\_

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 C)  
3 = splined (SAE C)

**Modification**

**No control**

**Port connections (P2)**

01 = SAE threaded  
SAE drain  
02 = SAE 4 bolt flange  
SAE drain  
04 = SAE 4 bolt flange  
BSPP drain

**Seal class**

1 = S1 - BUNA N (M4DC)  
5 = S5 - VITON® (M4SDC)

**Design letter**

**Porting combination**  
See below

**Rotation**  
N = bi-directional

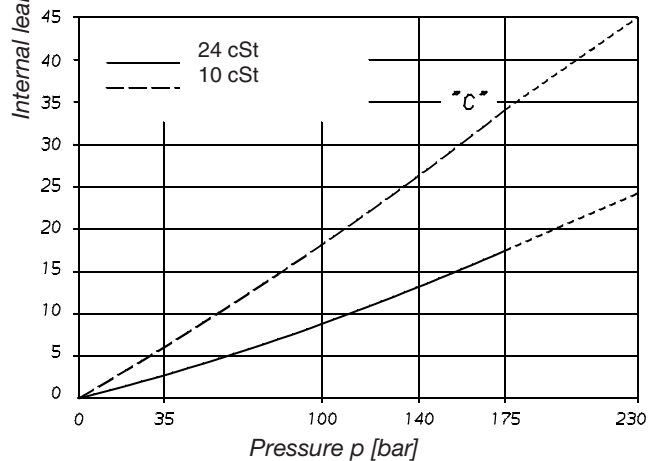
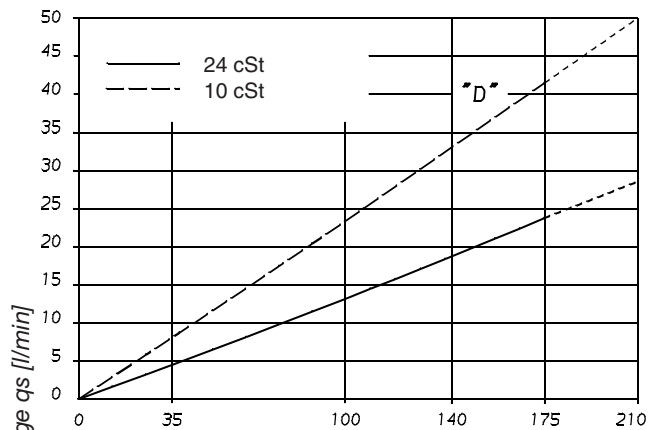
\* = S = Severe duty motor.

M4DC1 - M4SDC1 : Drain port is plugged.

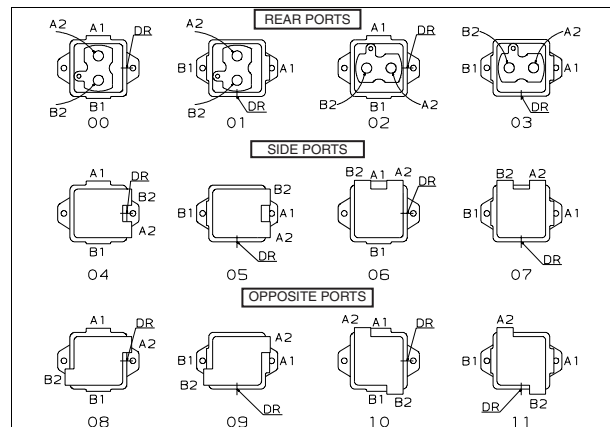
**View from shaft end :**

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

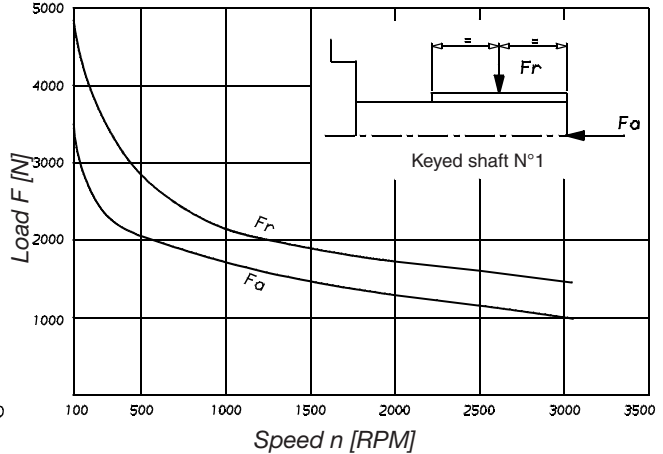
**INTERNAL LEAKAGE**



**PORTING COMBINATION**

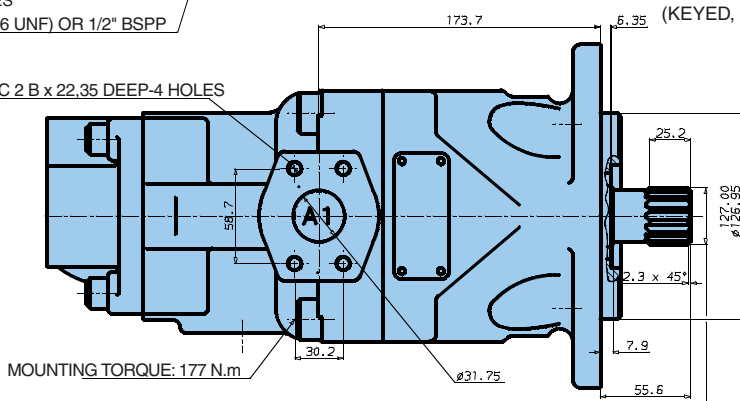
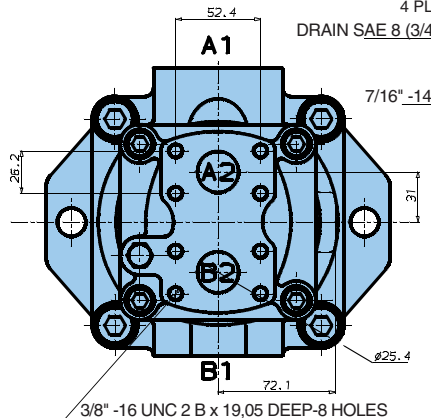
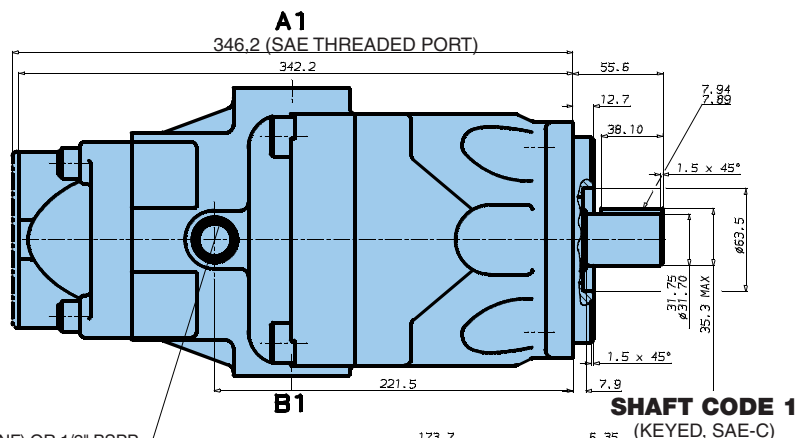
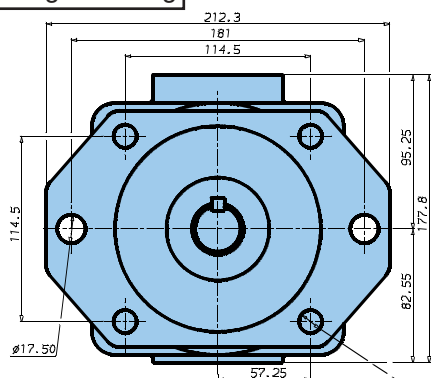


**PERMISSIBLE RADIAL AND AXIAL LOADS**

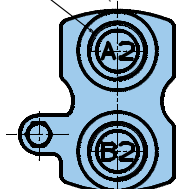


Do not apply Fr and Fa loads simultaneously

Weight 40.0 kg



SAE 16 (1 5/16" -12 UNF) x 19 DEEP (2 PLACES)



SAE THREADED PORT

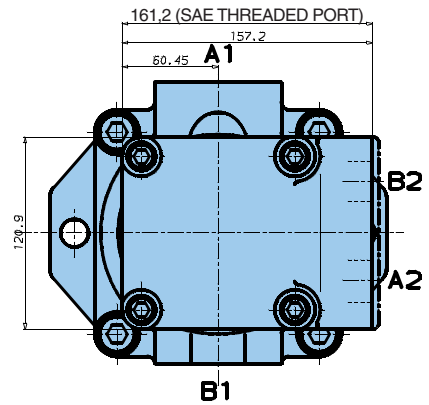
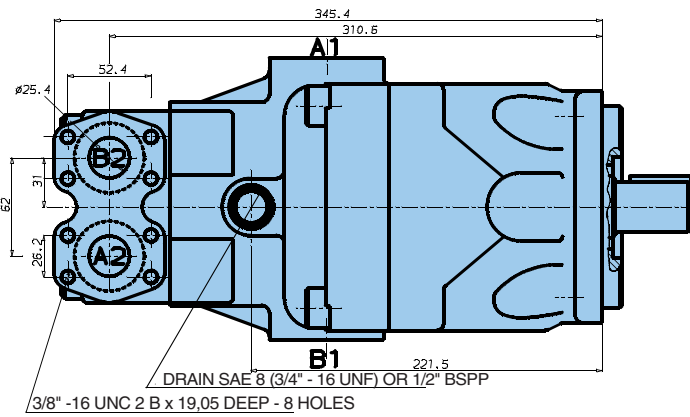
REAR PORTS

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

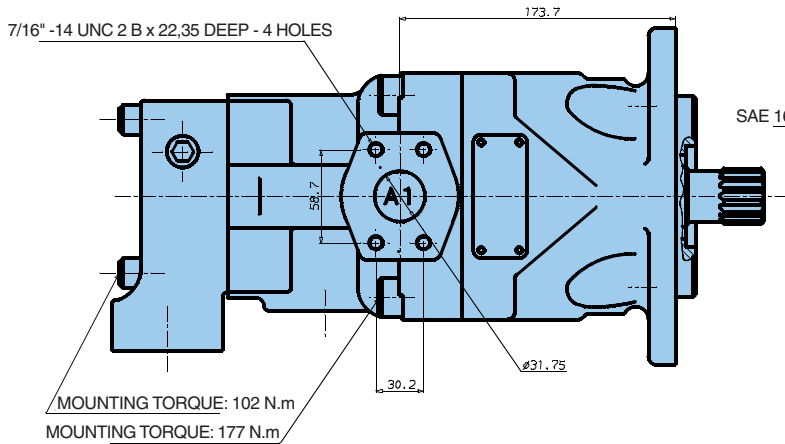
**OPERATING CHARACTERISTICS - TYPICAL [24 cSt]**

Model	Volumetric displacement $V_i$ ml/rev.	Input flow at n = 2000 RPM		Torque T at n = 2000 RPM	Power output at n = 2000 RPM
		Theoretical l/min	at 175 bar $\Delta p$ l/min	at 175 bar $\Delta p$ Nm	at 175 bar $\Delta p$ 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

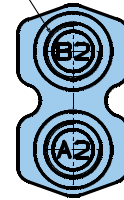
Weight 40.0 kg



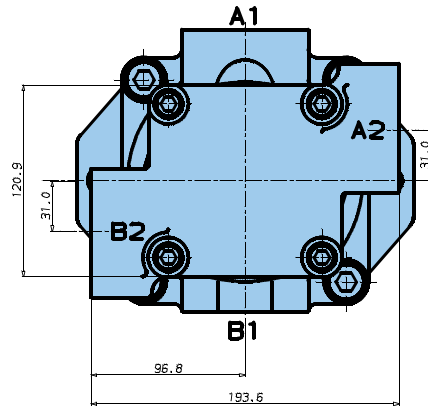
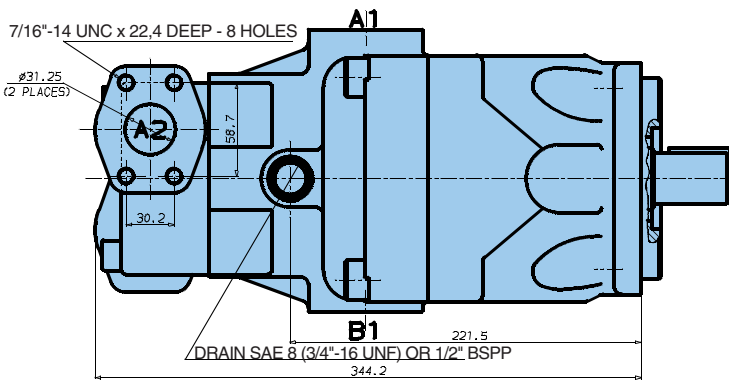
**SIDE PORTS**



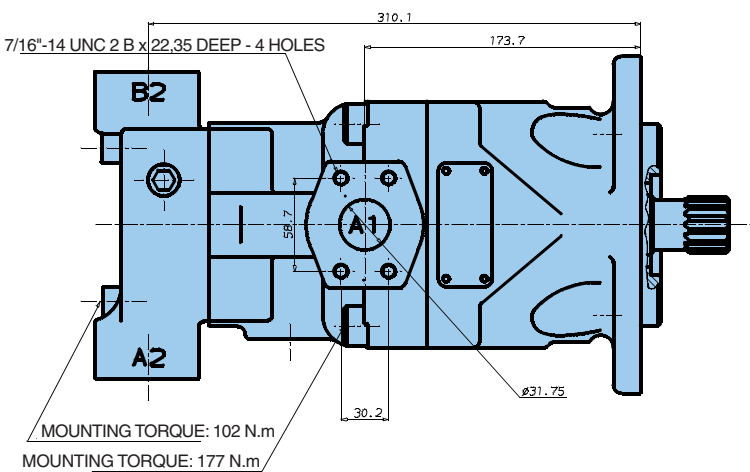
SAE 16 (1 5/16\"-12 UNF) x 19 DEEP  
 (2 PLACES)



SAE THREADED PORT



**OPPOSITE PORTS**



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IS, IT, LU, MT, NL, NO, PL, PT, RU, SE, SK, UK, ZA)

### US Product Information Centre

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