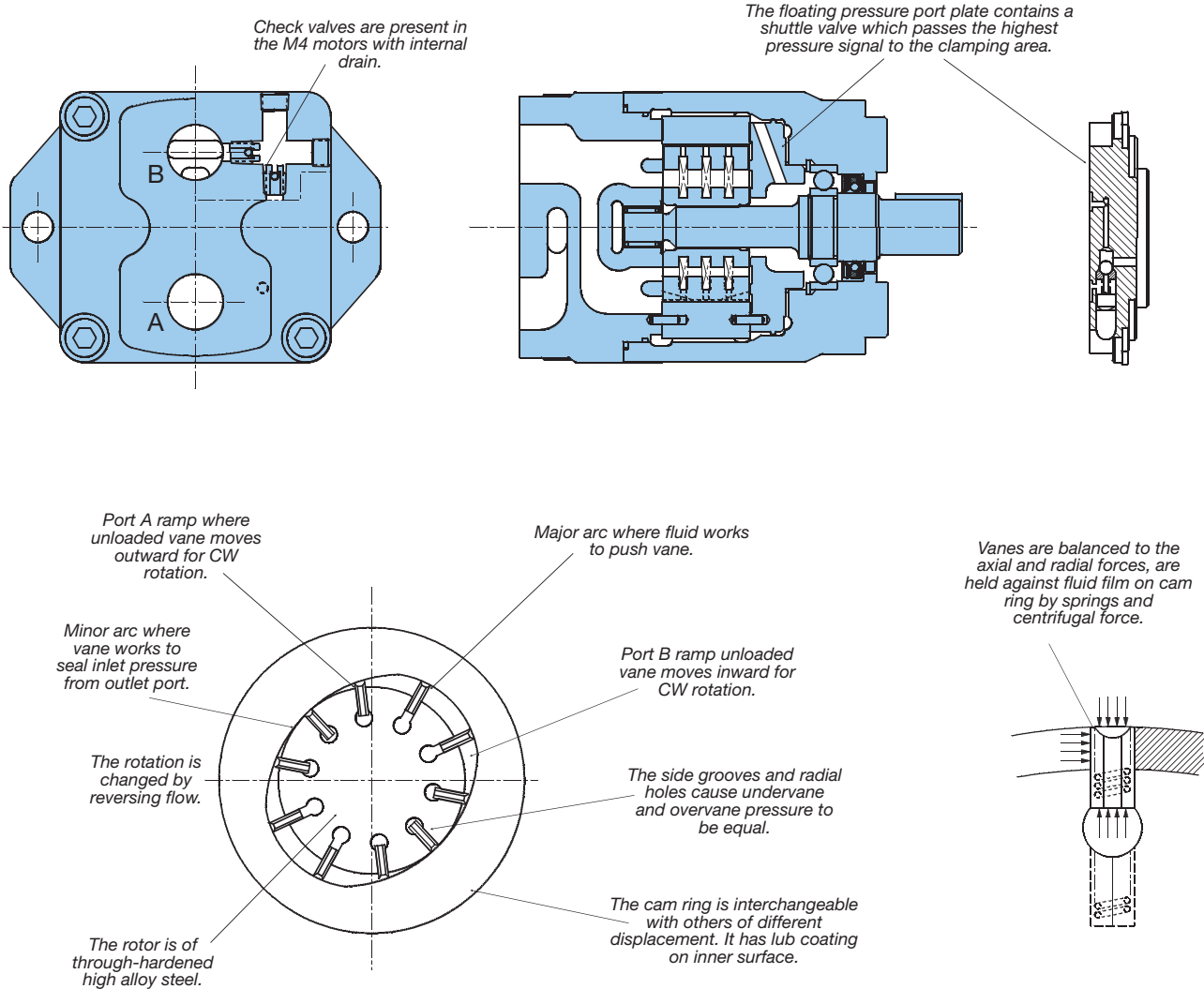


Hydraulic Motors M3 - M4 Series

Denison Vane Technology, fixed displacement



ENGINEERING YOUR SUCCESS.



Operation

- The motor shaft is driven by the rotor. The 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 axially separated from the sideplate surface by the fluid film. The front pressure port plate 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 port plate causes clamping pressure in Port A or B, whichever is the highest.
- Materials are chosen for long life efficiency. The vanes, rotor and cam ring are made out of hardened high alloy steels. The cast iron port plate and the end cap are chemically etched to offer a fine crystalline surface allowing a better lubrication at start-up.

Installation and connection

	Mounting flange	Weight without connector and bracket - kg	Moment of inertia $\text{kgm}^2 \times 10^{-4}$	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" BSPP threaded
M4C	SAE J744c ISO/3019-1 SAE B	15,4	7,9	SAE threaded SAE 4 bolts J718c ISO/DIS 6162-1 - 1"
M4D	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	SAE J744c ISO/3019-1 SAE C	45,0	58,5	SAE threaded SAE 4 bolts J718c ISO/DIS 6162-1 - 2"

Drain line option

All these motors may be equipped with internal drain. Then the model numbers will be M3B1, M4C1, M4D1, M4E1.

- Externally drained motors M3B, M4C, M4D, M4E : These motors may be alternately pressurized at Ports A & B. 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 your Parker representative for application assistance.

- Internally drained motors M3B1, M4C1, M4D1, M4E1 : These motors may be alternately pressurized at Ports A & B. 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).

Displacement and specific Torque

Series	Size	Ring size	Theor. Displ. V_i	Theoretical Torque T	Power at 100 rpm	Torque T		Power P	
			cm/rev.	Nm/bar	kW/bar	n = 2000 rpm at Δp 175 bar		n = 2000 rpm at Δp 175 bar	
						Nm	kW		
M3	B	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	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		
	D	075	80,1	1,27	0,0130	198,0	41,5		
		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		
E	138	144,4	2,30	0,0240	372,0	77,9			
	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			

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

To insure maximum motor performance in conjunction with your specific application, consult your local Parker representative if your application requires, minimum speed of less than 100 rpm, indirect drive, overrunning loads, braking or retarding.

Maximum Speed and pressure

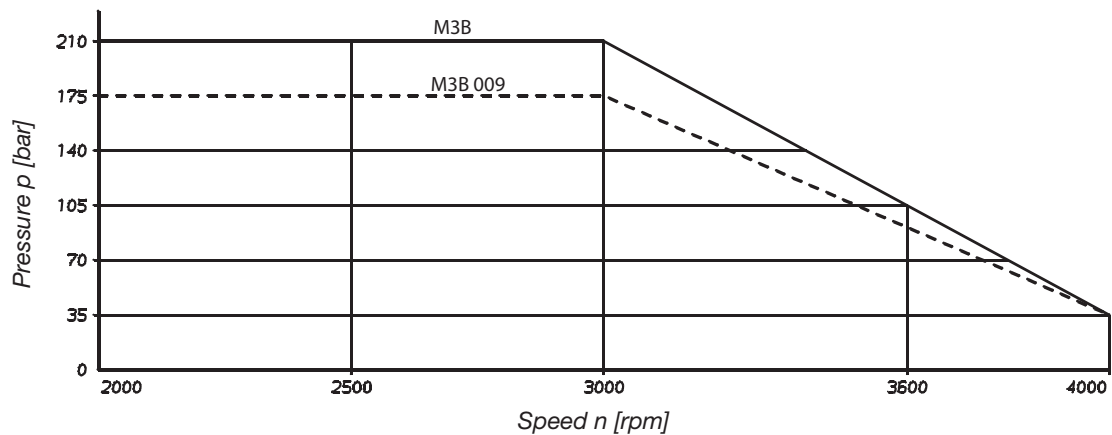
Series	Size	Displ.	Max. pressure					Operating pressure range drain	Max. speed for low loaded condition ¹⁾	Max. speed for max. pressure ratings						
			HF-0	HF-6a	HF-1	HF-3	HF-4			HF-0, HF-2		HF-6a, HF6b		HF-1		
			HF-2	HF-6b		HF-5				Cont.	Int. ²⁾	Cont.	Int. ²⁾	Cont.	Int. ²⁾	
			bar	bar	bar	bar	bar	bar	rpm	rpm	rpm	rpm	rpm	rpm	rpm	
M3	B	009	175						1.5	4000	3000	3600				
		012	210													
		018														
		027														
		036														
M4	C	024	230		175	175	140	3.5	4000	2500	3600	2500	3600	2000	2500	
		027														
		031														
		043														
		055														210
	067	175														
	075	175														
	D	062	230		140	140	140	3.5	4000	2500	3000	2500	3000	2000	2500	
		074														
		088														
		102														210
		113														190
		128														175
	138	175														
	E	153	190	140	140	140	3.5	3600	2500	3000	2500	3000	1800	2200		
185		180														
214		175														

¹⁾ Low loaded condition 35 bar for M3, 80 bar max. for M4 (see page 8).
²⁾ Intermittent speed - Do not exceed 6 seconds per minute of operation.

- HF-0, HF-2 = Antiwear petroleum base.
- HF-1 = Non antiwear petroleum base.
- HF-3 = Water in oil emulsions.
- HF-4 = Water glycols.
- HF-5 = Synthetic fluids.
- HF-6a = Saturated HEES Bio fluids.
- HF-6b = Partially saturated HEES Bio fluids.

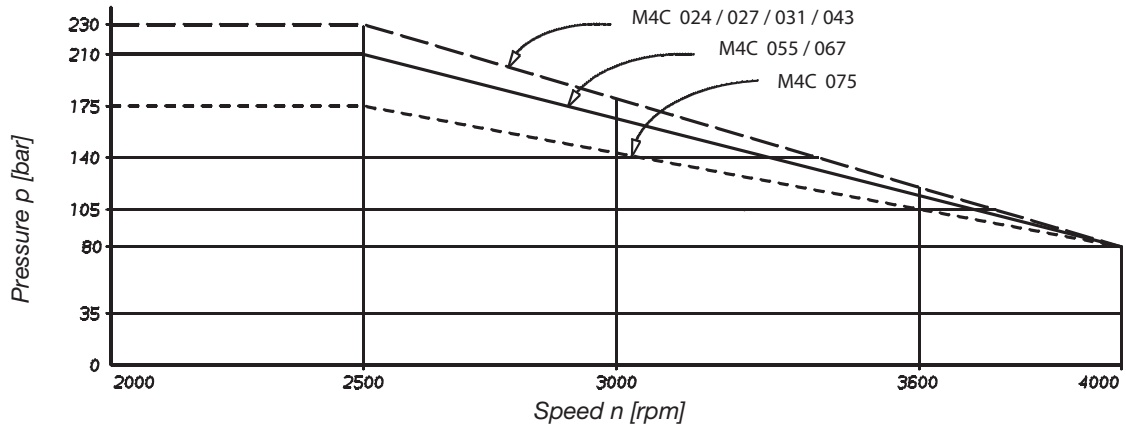
Internal drain : All these motors may be equipped with internal drain. Then the model will be M3B1, M4C1, M4D1, M4E1.

Maximum ratings M3B

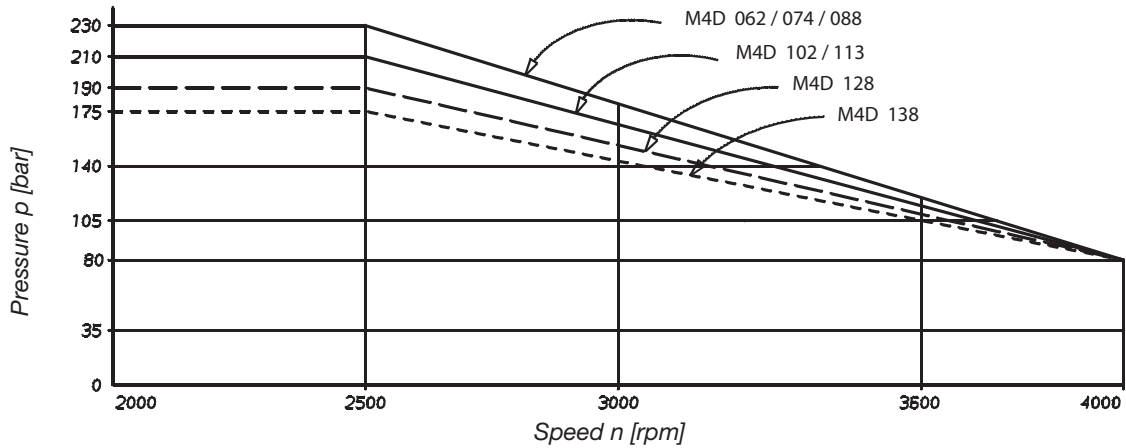


- Running condition limits - Typical curves at 26 cSt @ 45°.
 - For higher specifications or for operating speed under < 100 rpm, please consult Parker.

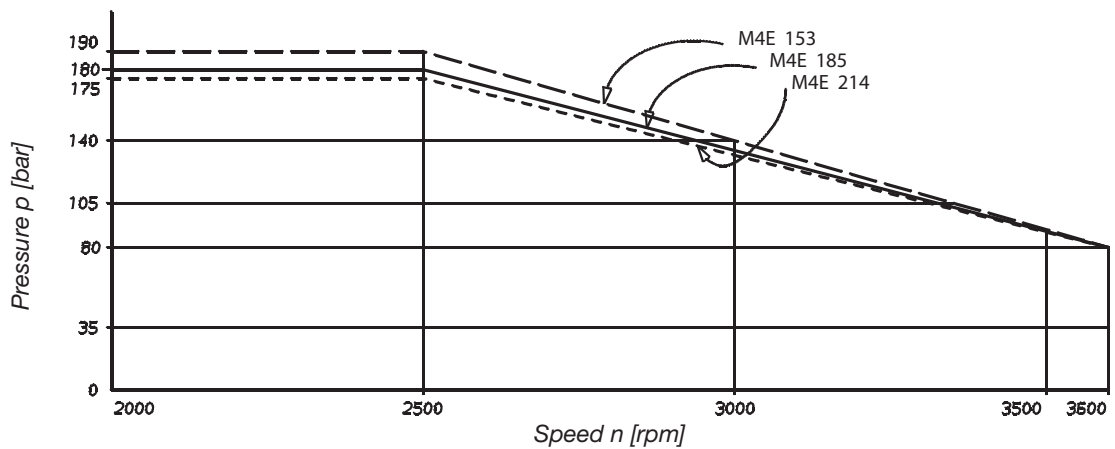
Maximum ratings M4C



Maximum ratings M4D



Maximum ratings M4E



- Running condition limits - Typical curves at 26 cSt @ 45°.
- For higher specifications or for operating speed under < 100 rpm, please consult Parker.

Model No. **M4C1**
M4C - 067 - 1 N 00 - A 1 02 .. **M4C-055-1N00-A102**

M4C - Series external drain

M4C1 - 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)

Direction of rotation (shaft end view)

N = bi-directional

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

Modifications

Ports

- 01 = SAE threaded port
SAE drain

**02 = 4 bolt SAE flange with UNC threads
SAE drain**

M4 = 4 bolt SAE flange with Metric threads
BSPP drain

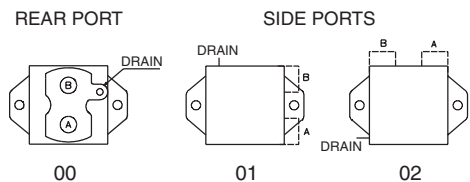
Seal class

- 1 = S1 - BUNA N**
- 5 = S5 - VITON®

Design letter

Porting combination

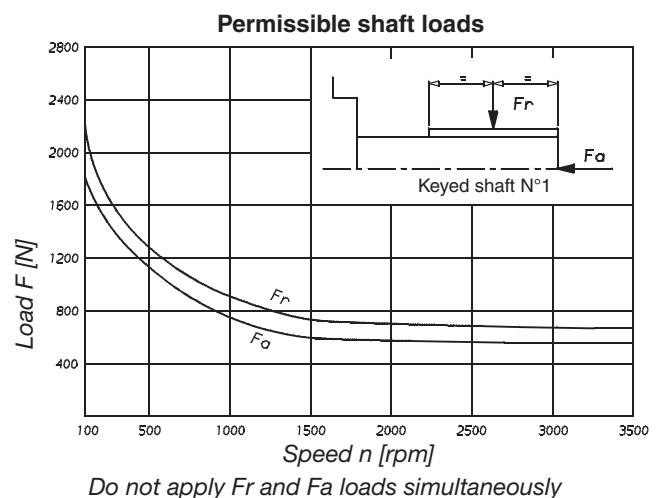
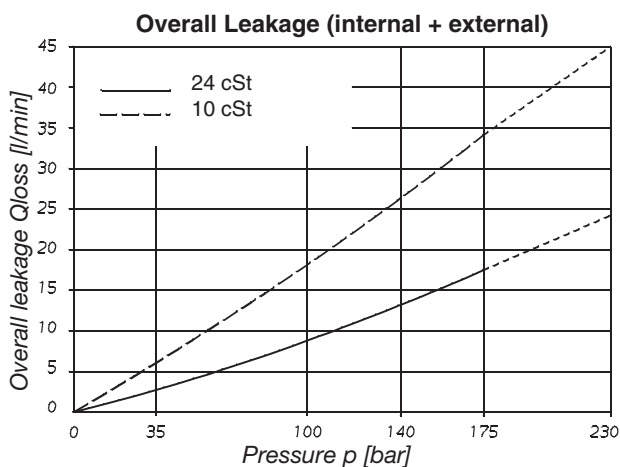
00 = standard



M4C1 : Drain port is plugged.

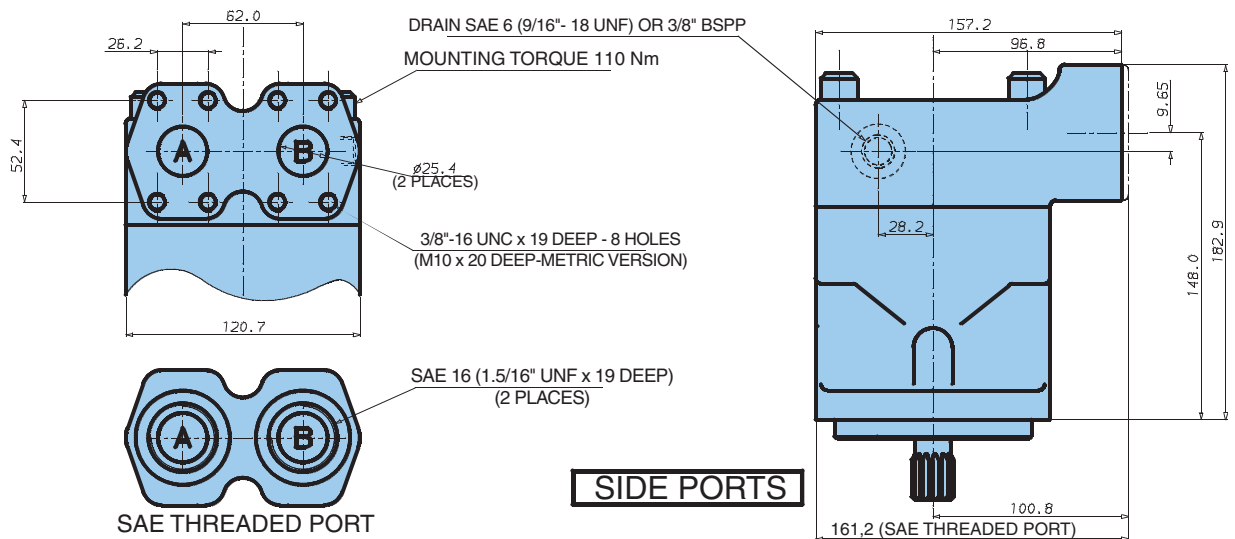
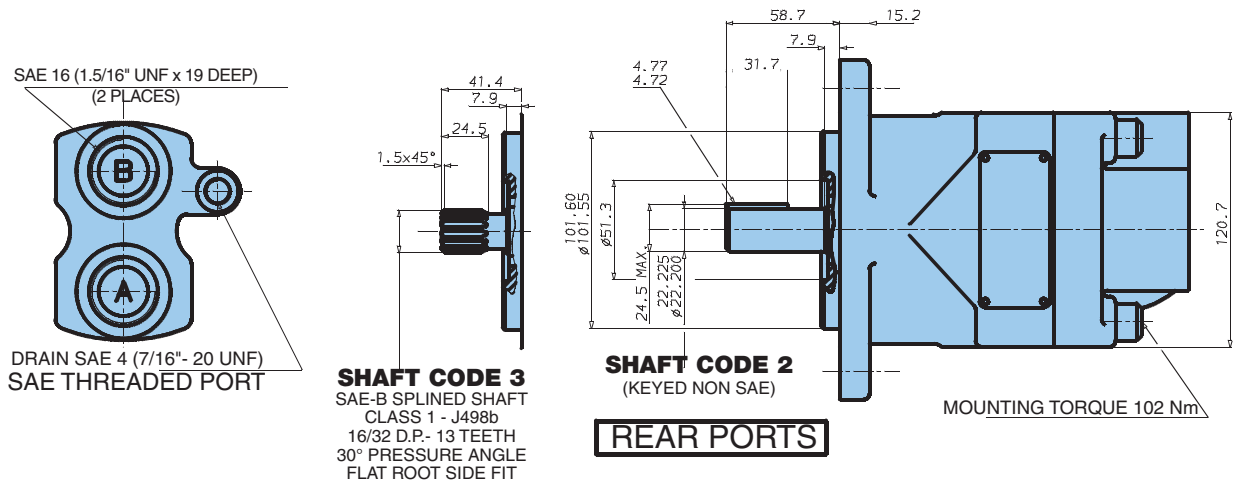
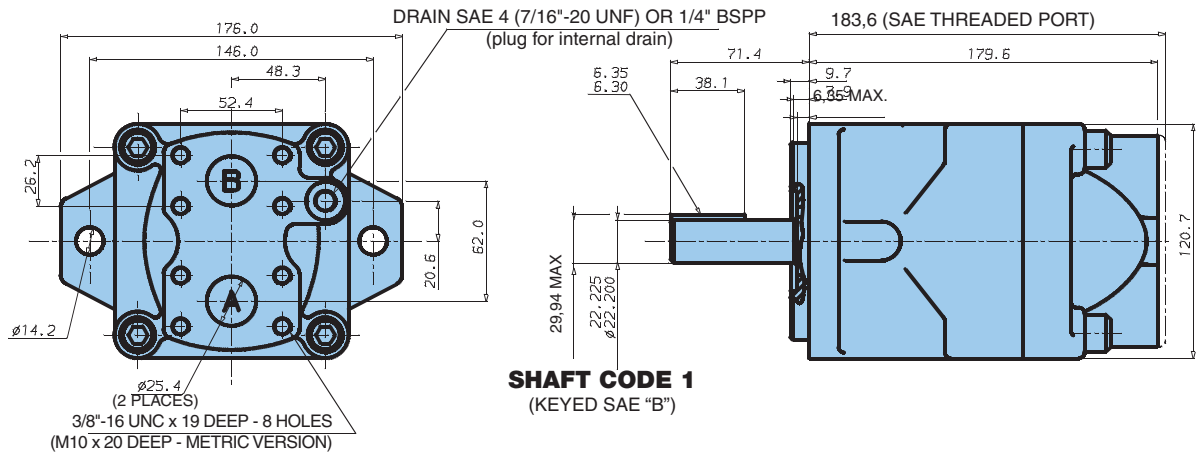
Operating Characteristics - Typical [24 cSt]

Model	V _i Volumetric displacement cm ³ /rev.	Input flow at n = 2000 rpm		Torque T at n = 2000 rpm	Power output at n = 2000 rpm
		Theoretical	at 175 bar Δp	at 175 bar Δp	at 175 bar Δp
		l/min	l/min	Nm	kW
M4C 024	24,4	49,0	67,0	60,5	12,7
M4C 027	28,2	56,0	74,0	70,0	14,7
M4C 031	34,5	69,0	87,0	86,8	10,8
M4C 043	46,5	93,0	110,0	120,0	25,1
M4C 055	58,8	118,0	136,0	149,0	31,2
M4C 067	71,1	142,0	160,0	170,0	35,6
M4C 075	80,1	160,0	178,0	198,0	41,5

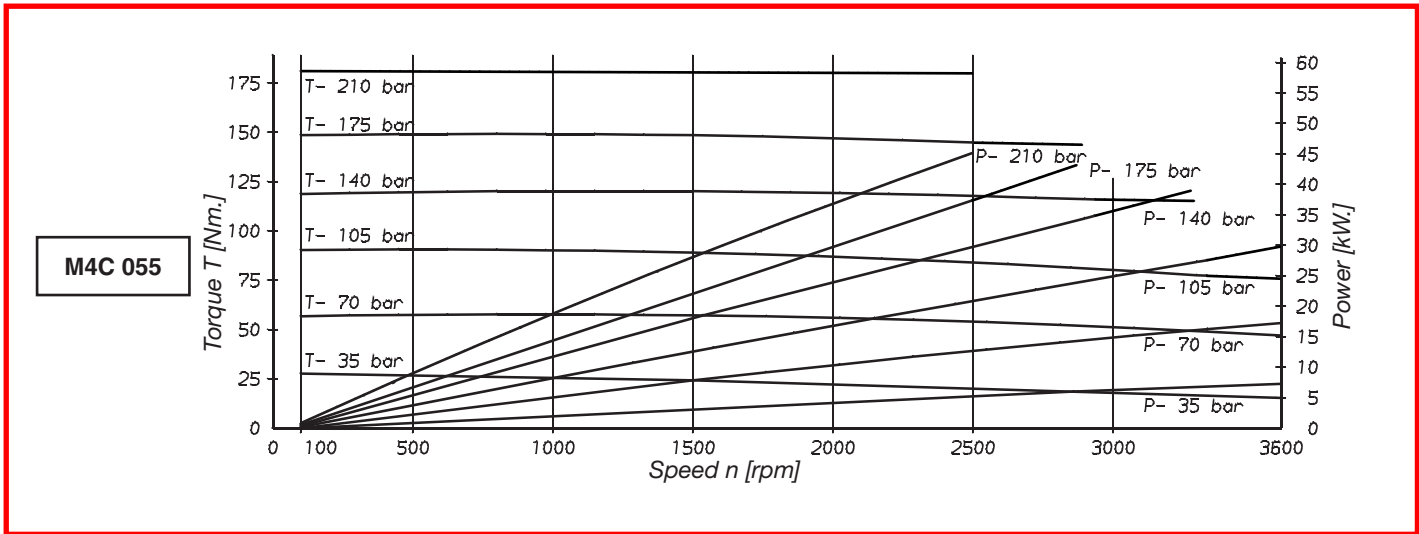


M4C - M4C1 motor

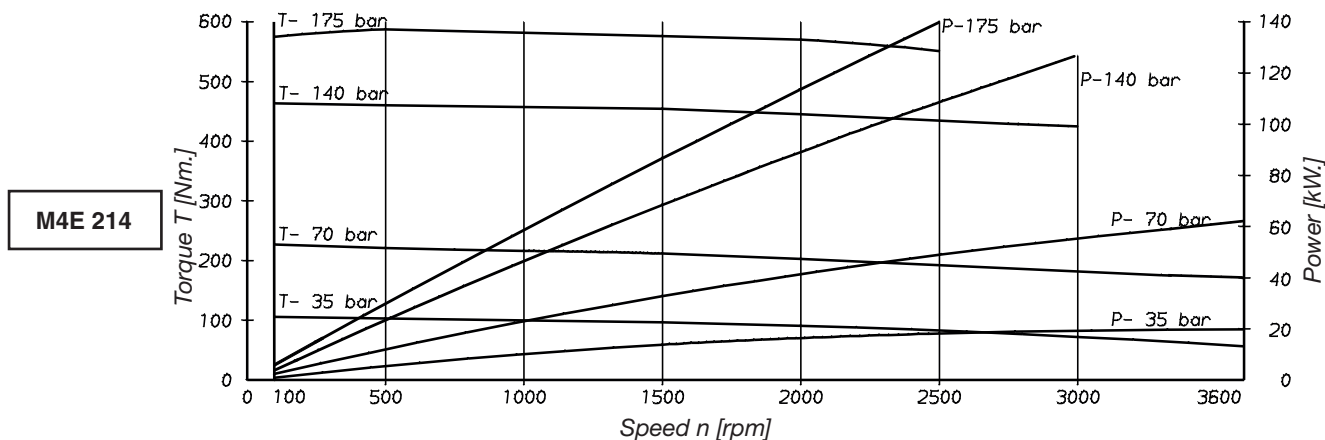
Weight : 15,4 kg



Performance charts



Performance charts



- Running condition limits - Typical curves at 26 cSt @ 45°.
 - For higher specifications or for operating speed under < 100 rpm, please consult Parker.

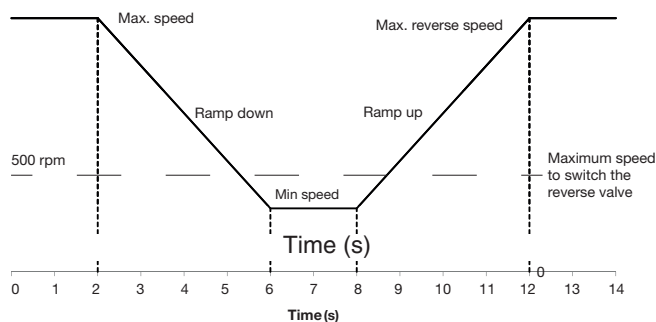
Minimum replenishment pressure during deceleration

The hydraulic circuit should be designed in a way that when switching off the hydraulic motor, it remains supplied with fluid, without risk of cavitation (anti-cavitation valve may be needed).

The inlet port of the fluid motor must be supplied with replenishment pressure as listed below to prevent cavitation during dynamic braking. These pressures should be multiplied by a coefficient of 1,5 for M4 motors used with fire resistant fluids (HF-3, HF-4, HF-5).

Minimum replenishment pressure (bar)					
Series	Speed [rpm] - Oil viscosity = 32 cSt				
	500	1000	2000	3000	3600
M3B	0,6	1,0	1,9	3,5	5,8
M4C	0,7	1,4	3,1	5,5	9,3
M4D	0,7	1,4	3,1	5,5	9,3
M4E	1,4	2,8	5,2	11,0	

Reverse cycles for fan drives



The motor must be decelerated from its (max.) rotation speed to less than 500 rpm in no less than 4 seconds time before energizing the solenoid of the reverse valve.

In the same way the motor must be ramped up to its (max.) reverse rotation speed in no less than 4 seconds time.

There should be no signs of cavitation during the reverse cycle (abnormal noise or lack of replenishment pressure).

Connection of several motors in the same circuit

For application requiring several motors to be driven simultaneously, we recommend to connect these in parallel circuits.

The use of several motors connected in series is not recommended. Depending on the different inertia of the loads, the displacements and torque requirements, the motors may be subjected to pressure instability and noise. Also hydraulic pressure valves will not admit high levels of back pressure, restricting this use to motors without pressure valves. Please consult Parker.