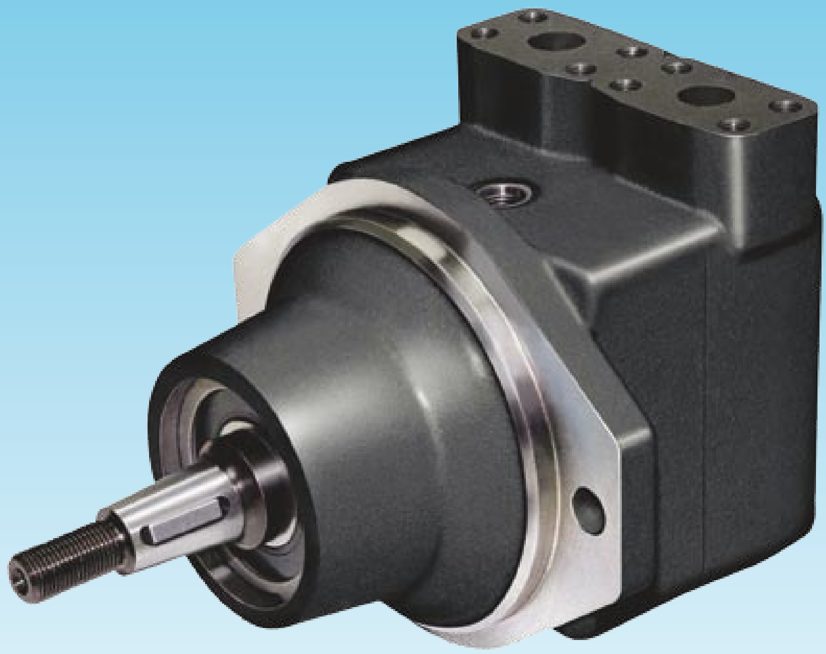
# Hydraulic Motor M5A*/M5B* Series Vane Motors

***Pressure up to 320 bar***
***Fixed Displacement from 6 to 45 ml/rev.***

*Catalogue HY29-0018/UK*
*December 2006*



**GENERAL**



**M5AF / M5AF1**



**M5B / M5BS**



**M5BF / M5BF1**



## WARNING

**FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.**

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## Offer of Sale

Please contact your Parker representation for a detailed ”Offer of Sale”.

**LOW NOISE MOTOR**

12 vanes and a patented cartridge design allows a very low noise level, whatever the speed.

**HIGH PERFORMANCE MOTOR**

The M5B series have been designed especially for severe duty applications wich require high pressure , high speed and low fluid lubricity.
Max. pressure (intermittent)
M5A* 006 to 018 ........................................................... : 300 bar
M5A* 023 - 025 ........................................................... : 280 bar
M5B* 012 to 036 ........................................................... : 320 bar
M5B* 045 ........................................................... : 280 bar

Max. speed (intermittent, low loaded cond.)
M5A* 006 to 018 ........................................................... : 4000 RPM
M5A* 023 - 025 ........................................................... : 3000 RPM
M5B* 012 - 018........................................................... : 6000 RPM
M5B* 023 - 028 - 036........................................................... : 4000 RPM
M5B* 045 ........................................................... : 3000 RPM

**HIGH EFFICIENCY**

Up to 90 % overall at 300 bar for M5A* and 320 bar for M5B*.
Vane motors begin life with a high volumetric efficiency, and maintain that efficiency throughout their operating life.
Vane pin holdout design improves the mechanical efficiency at low pressure.

**HIGH STARTING TORQUE**

The high starting torque efficiency of the vane type motors allows them to start under high load without pressure overshoots, jerks and high instantaneous horsepower loads.

**LOW TORQUE RIPPLE**

This 12 vane type motor exhibits a very low torque ripple (typical ± 1,5%), even at low speeds.

**HIGH LIFETIME**

The vane, rotor and cam ring are pressure balanced to increase life over the full speed range. Double lip vanes reduce the sensitivity to fluid pollution.

**INTERCHANGEABLE ROTATING GROUPS**

Our precise manufacturing allows any component to be interchangeable. Rotating groups may be easily replaced to renew the motor or change the displacement to suit altered requirements for speed or torque.

**ROTATION AND DRAIN**

The M5B-M5BS are bi-directional motors, externally drained.
The M5AF and M5BF, externally drained, are available in three types of rotation : bi-directional, clockwise, counter-clockwise.
The M5AF1 and M5BF1, internally drained, are available in two types of rotation : clockwise, and counter-clockwise.

**CROSS PORT CHECK VALVE**

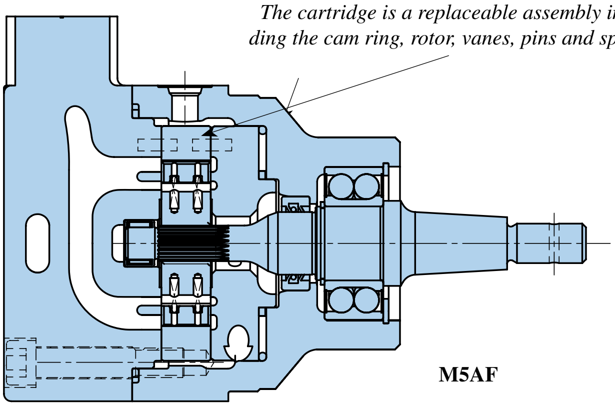
The uni-directional M5AF, M5AF1, M5BF and M5BF1 are designed with an internal valve that allows smooth dynamic braking, with a very simple hydraulic circuit and without risk of motor cavitation.

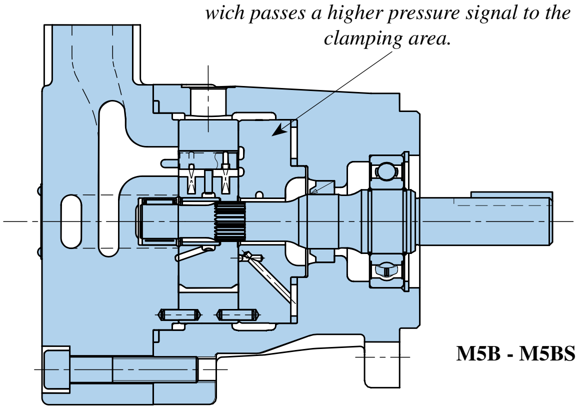
**MOUNTING**

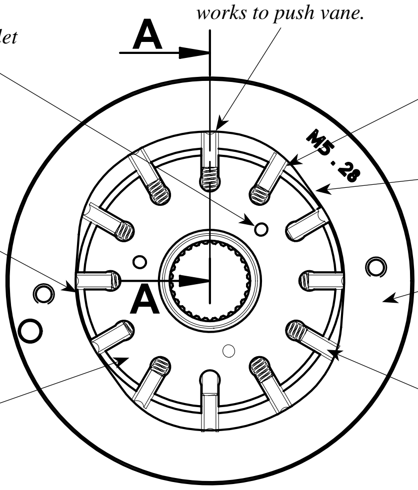
M5B - M5BS : Cylindrical keyed or splined shaft according to SAE J744, ISO 3019-2 or J498.
These products are designed primarily for coaxial drives which do not impose axial or side loading on the shaft.

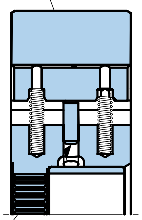
M5AF - M5AF1 : Cylindrical keyed or taper shaft, and a high load capacity double ball bearing allows the direct mounting on shaft (fan, ...).

M5BF : A stiff taper or cylindrical keyed shaft and a high load capacity double ball bearing allow the direct mounting on shaft (fan, ...).




Section A-A

**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.

- Hydraulic pins and light springs urge the vanes radially against the cam contour assuring a seal at zero speed so that the motor can develop starting torque. The springs and pins 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 wich connect to Port B from wich 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 surface 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. The 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 lubrification at start-up.

**EXTERNAL DRAIN MOTOR**

This motor may be alternately pressurizes on ports A and B to 300 bar max. int. (280 bar for 025) for M5AF and 320 bar max. int. (280 bar for 045) for M5BF. Whichever port is at low pressure, it should not be subjected to more than 60% of the high pressure, eg. for M5B* : When 320 bar in A, B is limited to 200 bar.
This motor 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 as possible from the suction pipe of the pump.

**INTERNAL DRAIN MOTOR**

This unidirectional motor may be pressurized only on the port corresponding to its rotation type.
The outlet pressure must not be higher than 3,5 bar.

**RECOMMENDED FLUIDS**

Petroleum base anti-wear R & O fluids (covered by DENISON HF-0 and HF-2 specifications).
Maximum catalog ratings and performance data are based on operation with these fluids.

**FIRE RESISTANT FLUIDS**

They are easily used in the M5A* and M5B* motors. These include phosphate or organic ester fluids and blends, water-glycol solutions and water-oil invert emulsions.

**ACCEPTABLE ALTERNATE FLUIDS**

The use of fluids other than petroleum base anti-wear R & O fluids requires that the maximum ratings of the motor will be reduced. In some cases, the minimum replenishment pressure must be increased.

HF-1 : non antiwear petroleum base.
HF-3 : water in oil invert emulsion.
HF-4 : water glycols solutions.
HF-5 : synthetic fluids.

| Model of motor | Maximum speed | Maximum pressure | | | |
|---|---|---|---|---|---|
| | | HF-1, HF-4, HF-5 | | HF-3 | |
| | | Int. | Cont. | Int. | Cont. |
| | RPM | bar | bar | bar | bar |
| **M5A*** | 1500 | 225 | 195 | 165 | 130 |
| **M5B*** | 1800 | 240 | 210 | 175 | 140 |

**VISCOSITY**

Max. (cold start, low speed and pressure) 860 $mm^2/s$ (cSt)
Max. (full speed and pressure) 100 $mm^2/s$ (cSt)
Optimum (max. lifetime) 30 $mm^2/s$ (cSt)
Min. (full speed and pressure, HF-1 fluid) 18 $mm^2/s$ (cSt)
Min. (full speed and pressure, HF-0 & HF-2 fluids) 10 $mm^2/s$ (cSt)
For cold starts, the motor should operate at low speed and pressure until fluid warms up to an acceptable viscosity for full power operation.

**VISCOSITY INDEX**

90 min.
Higher values extend the range of operating temperatures and lifetime.

**TEMPERATURE**

Max. fluid temperature (HF-0, HF-1 & HF-2) + 100° C
Min. fluid temperature (HF-0, HF-1 & HF-2) - 18° C

**FLUID CLEANLINESS**

The fluid must be cleaned before and during operation to maintain a contamination level of NAS 1638 class 8 (or ISO 18/14) or better. Filters with 25 micron (or better, $\beta_{10} \geqslant 100$) nominal ratings may be adequate but do not guarantee the required cleanliness levels.

**WATER CONTAMINATION IN FLUID**

Maximum acceptable content of water is :
- 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.

*Motor performances required*

| | | | |
|---|---|---|---|
| *Torque*.................. | *T* | *[Nm.]* | *110* |
| *Speed*.................... | *n* | *[RPM]* | *1500* |

*Pump available data*

| | | | |
|---|---|---|---|
| *Flow*..................... | $q_{Ve}$ | *[l/min]* | *55* |
| *Pressure*................ | *P* | *[bar]* | *280* |

*Check if available power is greater than required power (0.85 estimated overall efficiency).*

$$0.85 \times \frac{q_{Ve} \times p}{600} \geqslant \frac{T \times \pi \times n}{30 \times 1000} \qquad 0.85 \times \frac{55 \times 280}{600} \geqslant \frac{110 \times \pi \times 1500}{30 \times 1000}$$

*21,8 > 17,3 kW*

*Two ways of calculation :* Calculate $V_i$ from T required torque, or from $q_{Ve}$ available flow.

***2a.***

$$Vi = \frac{20 \times \pi \times T}{p} = \frac{20 \times \pi \times 110}{280} = 28{,}0 \text{ ml/rev.}$$

***3a.*** *Choose motor from Vi immediately greater*
*M5B* 028 :* $V_i$ *= 28,0 ml/rev.*

***4a.*** *Check theoretical motor pressure*

$$p = \frac{20 \times \pi \times T}{V_i} = \frac{20 \times \pi \times 110}{28{,}0} = 247 \text{ bar}$$

*Torque loss at this pressure = 9,5 Nm*
*(See page 12)*
*Calculate real pressure*

$$p = \frac{20 \times \pi \times (T + Tl)}{V_i} = \frac{20 \times \pi \times 119{,}5}{28{,}0} = 268 \text{ bar}$$

***5a.*** *Flow loss at this pressure : 5 l/min*
*(See page 12)*
*Real flow used by the motor :*
*55 - 5 = 50 l/min*

***6a.*** *Real speed of the motor :*

$$n = \frac{q_V \times 1000}{V_i} = \frac{50 \times 1000}{28{,}0} = 1785 \text{ RPM}$$

*Real performances*
$V_i$ *= 28,0 ml/rev.*
*n = 1785 RPM*
*T = 110 Nm.*
*p = 268 bar*

***2b.***

$$Vi = \frac{1000 \times q_{Ve}}{n} = \frac{1000 \times 55}{1500} = 36{,}7 \text{ ml/rev.}$$

***3a.*** *Choose motor from Vi immediately smaller*
*M5B* 036 :* $V_i$ *= 36,0 ml/rev.*

***4a.*** *Check theoretical motor pressure with T = 110 Nm.*

$$p = \frac{20 \times \pi \times T}{V_i} = \frac{20 \times \pi \times 110}{36{,}0} = 192 \text{ bar}$$

*Torque loss at this pressure = 8,0 Nm*
*(See page 12)*
*Calculate real pressure*

$$p = \frac{20 \times \pi \times (T + Tl)}{V_i} = \frac{20 \times \pi \times 118}{36{,}0} = 206 \text{ bar}$$

***5a.*** *Flow loss at this pressure : 4 l/min*
*(See page 12)*
*Real flow used by the motor :*
*55 - 4 = 51 l/min*

***6a.*** *Real speed of the motor :*

$$n = \frac{q_V \times 1000}{V_i} = \frac{50 \times 1000}{36{,}0} = 1416 \text{ RPM}$$

*Real performances*
$V_i$ *= 36,0 ml/rev.*
*n = 1416 RPM*
*T = 110 Nm.*
*p = 206 bar*

*In each case always choose the smallest motor wich will operate at the highest speed and pressure, and will offer the most efficient solution.*

## FLUID POWER FORMULAS

*Volumetric efficiency*

$$\frac{1}{1 + \dfrac{\text{total leakage} \times 1000}{\text{speed} \times \text{displacement}}}$$

*Mechanical efficiency*

$$1 - \frac{\text{torque loss} \times 20 \times \pi}{\Delta \text{ pressure} \times \text{displacement}}$$

*Fluid motor speed* — rpm

$$\frac{1000 \times \text{flow rate} \times \text{volumetric eff.}}{\text{displacement}}$$

*Fluid motor torque* — N.m

$$\frac{\Delta \text{ pressure} \times \text{displacement} \times \text{mech. eff.}}{20 \times \pi}$$

*Fluid motor power* — kW

$$\frac{\text{speed} \times \text{displacement} \times \Delta \text{ pressure} \times \text{overall eff.}}{600\,000}$$

kW

$$\frac{\text{torque} \times \text{speed} \times 20 \times \pi}{600\,000}$$

| | |
|---|---|
| *Speed* | *[tr/min]* |
| *Displacement* | *[cm³/tr]* |
| *pressure* | *[bar]* |
| *Flow rate* | *[l/min]* |
| *Leakage* | *[l/min]* |
| *Torque* | *[Nm]* |
| *Torque loss* | *[Nm]* |

# Performance data

## M5A* / M5B*

<table>
<tr><th></th><th>Mounting flange</th><th>Ports</th><th>Drain</th><th>Shaft ends</th></tr>
<tr><td>M5AF</td><td rowspan="2">Special mounting<br>(2 bolts - Ø 120)</td><td rowspan="2">SAE 3/4” - 4 bolts UNC<br>or<br>SAE 3/4” - 4 bolts metric<br>(ISO/DIS 6162 - SAE J518)<br>or<br>SAE 12 1”1/16 - 12 UNF-2B J1926<br>or<br>ISO 6149 - M22 x 1,5)</td><td>ISO 6149 - M12 x 1,5<br>or<br>SAE 6 - J1926 - SAE 9/16”</td><td rowspan="2">Keyed taper non SAE<br>Keyed non SAE</td></tr>
<tr><td>M5AF1</td><td>No drain connection</td></tr>
<tr><td>M5B</td><td>ISO 3019-2<br>100 A2/B4 HW<br>(2/4 bolts - Ø 100)</td><td rowspan="3">SAE 3/4” - 4 bolts UNC<br>or<br>SAE 3/4” - 4 bolts metric<br>(ISO/DIS 6162 SAE J518)</td><td>M18 x 1,5</td><td rowspan="2">Keyed cyl. SAE “B”<br>Keyed cyl. ISO E 25M<br>Splined SAE “B”<br>Splined SAE “BB”</td></tr>
<tr><td>M5BS</td><td>SAE “B” J744<br>(2/4 bolts - Ø 101,6)</td><td rowspan="2">M18 x 1,5<br>or<br>SAE 9/16”</td></tr>
<tr><td>M5BF</td><td rowspan="2">Special mounting<br>(2 bolts - Ø 135)</td><td rowspan="2">Keyed taper non SAE<br>Keyed cyl. SAE “C”<br>Keyed cyl. ISO G32N</td></tr>
<tr><td>M5BF1</td><td>SAE 3/4” - 4 bolts metric<br>(ISO/DIS 6162 SAE J518)</td><td>No drain connection</td></tr>
</table>

| Series | Theoretical displacement | Theoretical torque | Theoretical power at 100 RPM | Typical data 2000 RPM - 300 bar | |
|---|---|---|---|---|---|
| | ml/rev | N.m/bar | kW/bar | N.m | kW |
| **M5A*** | 6,3 | 0,100 | 0,0011 | 26,1 | 5,5 |
| | 10,0 | 0,159 | 0,0017 | 43,7 | 9,2 |
| | 12,5 | 0,199 | 0,0021 | 55,7 | 11,7 |
| | 16,0 | 0,255 | 0,0027 | 72,4 | 15,2 |
| | 18,0 | 0,286 | 0,0030 | 81,2 | 17,0 |
| | 23,0 | 0,366 | 0,0038 | 102,5[1)] | 21,5[1)] |
| | 25,0 | 0,398 | 0,0042 | 107,4[1)] | 22,5[1)] |

*1) 023 - 025 = 280 bar max.*

| Series | Theoretical displacement | Theoretical torque | Theoretical power at 100 RPM | Typical data 2000 RPM - 320 bar | |
|---|---|---|---|---|---|
| | ml/rev | N.m/bar | kW/bar | N.m | kW |
| **M5B*** | 12,0 | 0,191 | 0,0020 | 50,6 | 10,6 |
| | 18,0 | 0,286 | 0,0030 | 81,2 | 17,0 |
| | 23,0 | 0,366 | 0,0038 | 117,1 | 24,5 |
| | 28,0 | 0,446 | 0,0047 | 132,1 | 27,7 |
| | 36,0 | 0,572 | 0,0060 | 172,8 | 36,2 |
| | 45,0 | 0,716 | 0,0075 | 190,0[1)] | 39,8[1)] |

*1) 045 = 280 bar max.*

### STARTING PERFORMANCES

Typical data at 24 cSt / 45° C

| | M5A* | M5B* |
|---|---|---|
| Maximum cross-flow 100 bar : | 0,6 l/min | 1,8 l/min |
| 200 bar : | 7,4 l/min | 7,8 l/min |
| 320 bar : | 10,7 l/min[1)] | 12,5 l/min |

1) 300 bar

Minimum stalled torque efficiency for M5B* only 100 bar : 78,3 %
200 bar : 81,0 %
320 bar : 80,8 %

### PERMISSIBLE AXIAL AND RADIAL LOADS

**1 - Max. axial load :** Fa max. = 6 000 N

**2 - Max. radial load cylindrical shaft :** Fr max. = 8 000 N

**taper shaft :** Fr max. = 5 500 N

**3 - Theoretical lifetime [hour] :** $L_{10H}\,[\text{hour}] = \dfrac{16\,666}{N\,[\text{rpm}]} \times L_{10}$

**4 - Theoretical lifetime [$10^6$ rev] :** $L_{10}$

**5 - Eg** of theoretical life time calculation

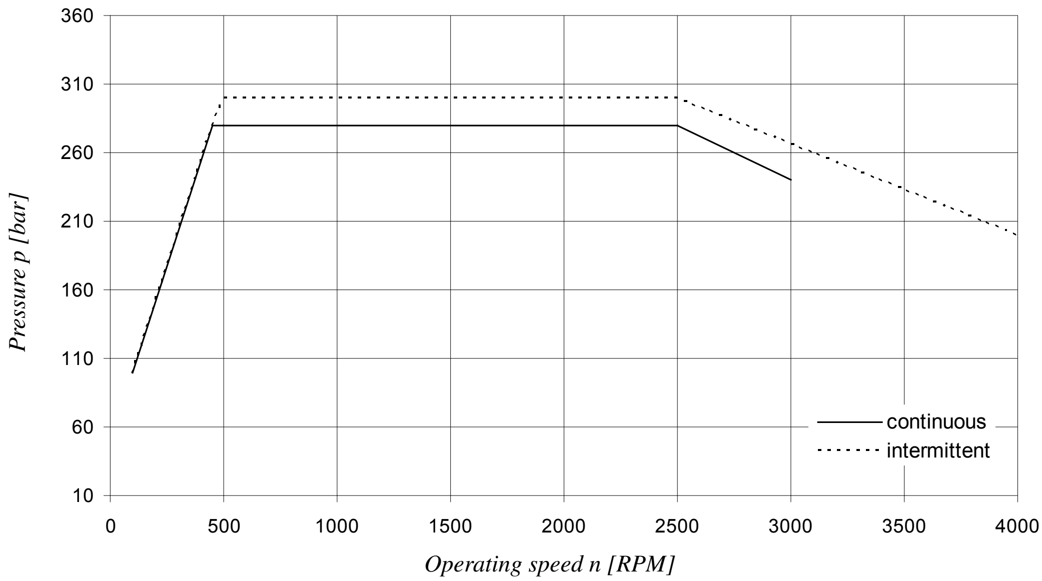
Axial load Fa = 2000 N
Radial load Fr = 1000 N
Operating speed N = 2000 RPM
L10 = 2000 [$10^6$ rev] (see on curve page )

$$L_{10H} = \frac{16\,666}{2000} \times 2000 \qquad L_{10H} = 16\,666 \text{ hours.}$$

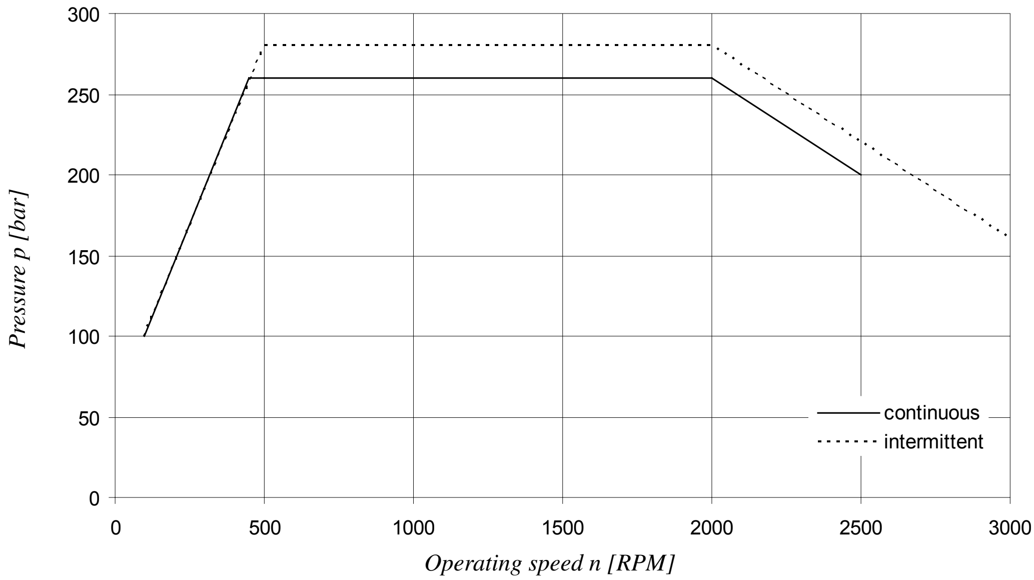


Parker Hannifin
Denison Vane Pump Division
Vierzon - France

**006 - 010 - 012 - 016 - 018**

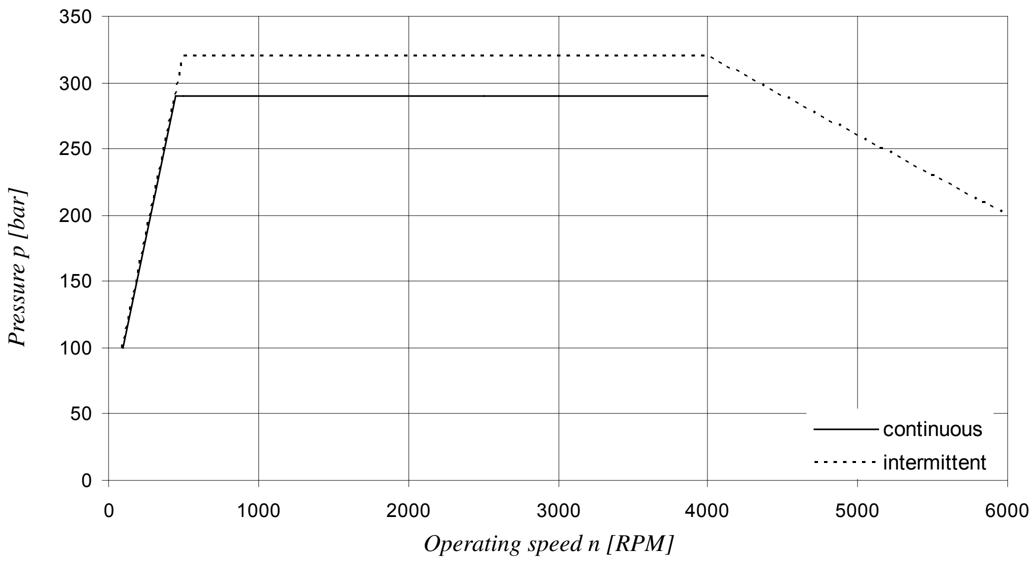



**023 - 025**

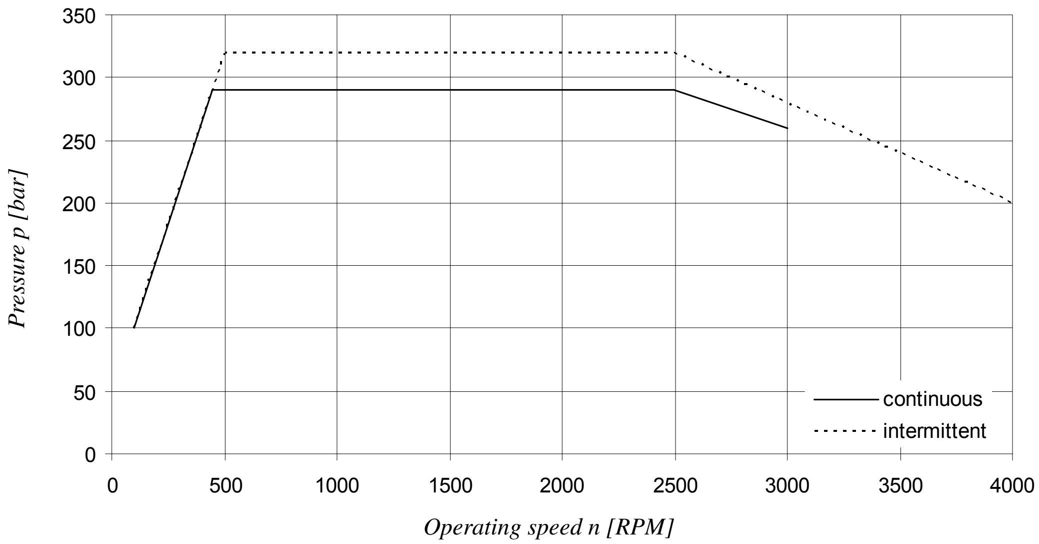



- These are running condition limits; for starting performances see page 7.
- Intermittent conditions : do not exceed 6seconds per minute of rotation.
- Typical curves, at 24 cSt 45° C.
- For higher specifications or for operating speed under 100 RPM, please consult our technical department.

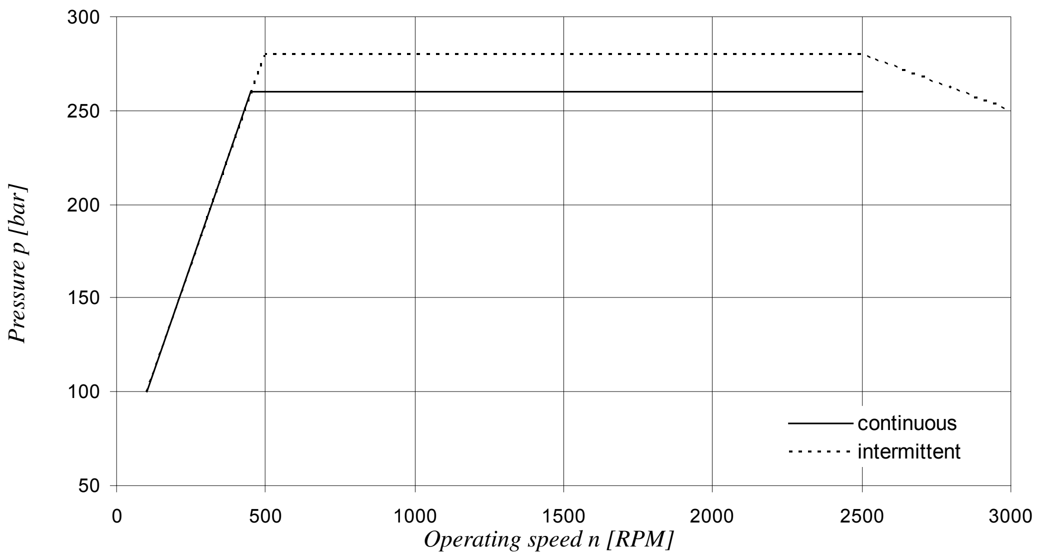
**012 - 018**




**023 - 028 - 036**




**045**




- These are running condition limits; for starting performances see page 7.
- Intermittent conditions : do not exceed 6seconds per minute of rotation.
- Typical curves, at 24 cSt 45° C.
- For higher specifications or for operating speed under 100 RPM, please consult our technical department.

**Model No.** **M5AF1 - 018 - 1 N 02 - B 1 - M 3 - AP21**

**Series External drain**
**Series Internal drain**

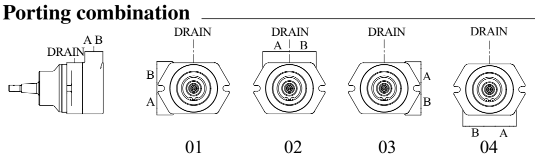
**Displacement**
Volumetric displacement (ml/rev.)

| | |
|---|---|
| 006 = 6,3 | 018 = 18,0 |
| 010 = 10,0 | 023 = 23,0 |
| 012 = 12,5 | 025 = 25,0 |
| 016 = 16,0 | |

**Type of shaft**
1 = taper (non SAE)
2 = keyed (non SAE)

**Direction of rotation (view on shaft end) - M5AF - M5AF1**
R = Clockwise
L = Counter-clockwise
**Direction of rotation (view on shaft end) - M5AF**
N = Bi-rotational

**Porting combination**




**Modifications or special option**
Ex. : AP21 = Anti-starve valve + proportional pressure relief valve set at 210 bar.
For a flow above 75 l/min a special cap is needed, please consult Parker Denison.

**Drain variables - M5AF**
2 = 9/16” 18 - SAE drain
3 = M12 x 1,5 metric drain
**Drain variables - M5AF1**
X = no drain connection

**End cap variables - All motors except with proportional pressure relief valve** [1]
M = 3/4" - 4 bolts SAE flange J518 - Metric thread
0 = 3/4" - 4 bolts SAE flange J518 - UNC thread
Y[2] = Metric threaded ports (ISO 6149) - M22 x 1,5
W[2] = SAE str. threaded ports - 1”1/16-12 UNF-2B

**Design letter**

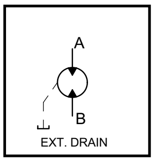
**Seal class**
1 = S1 BUNA N    5 = S5 - VITON

[1] For other end cap variables, please contact Parker Denison.
[2] Anti-starve valve not available.

**ROTATION = BI-ROTATIONAL (N)**

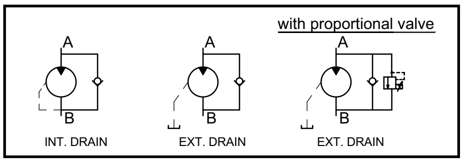
**View from shaft end :**

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

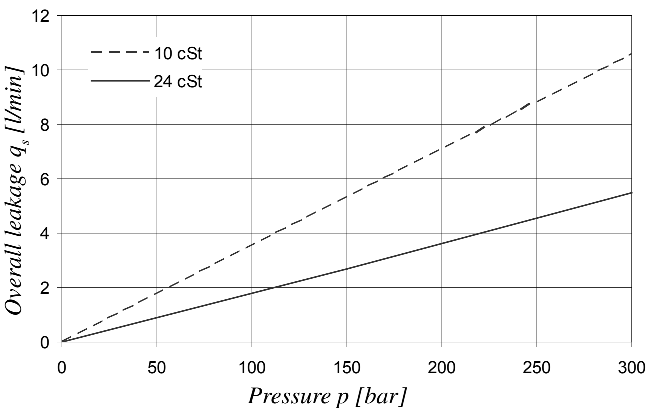



**R OR L ROTATION (New rotation concept - patent pending)[3]**

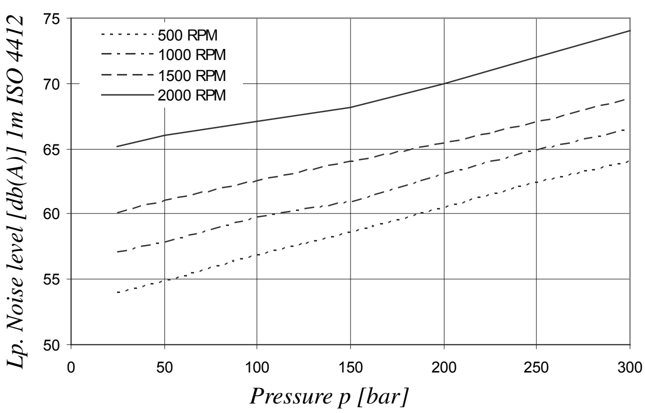
**View from shaft end :**
CW & CCW rotations
A = inlet
B = outlet



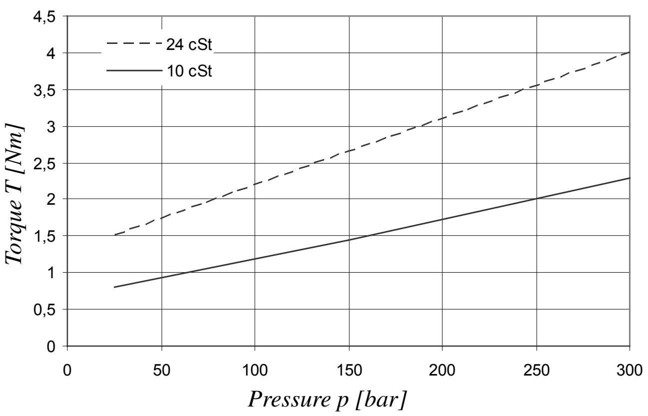

**OVERALL LEAKAGE (internal + external)**



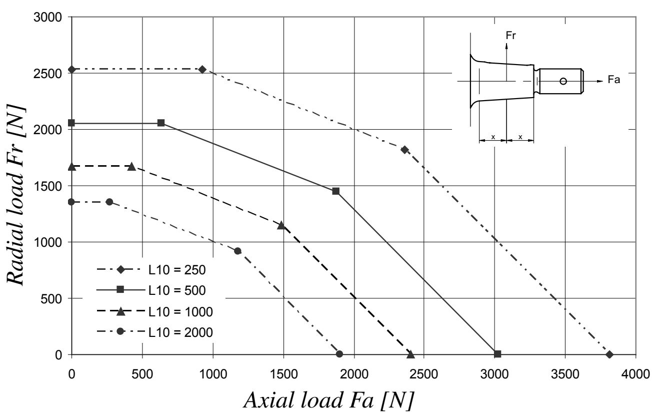

**NOISE LEVEL - M5AF 025**




**TORQUE LOSS**



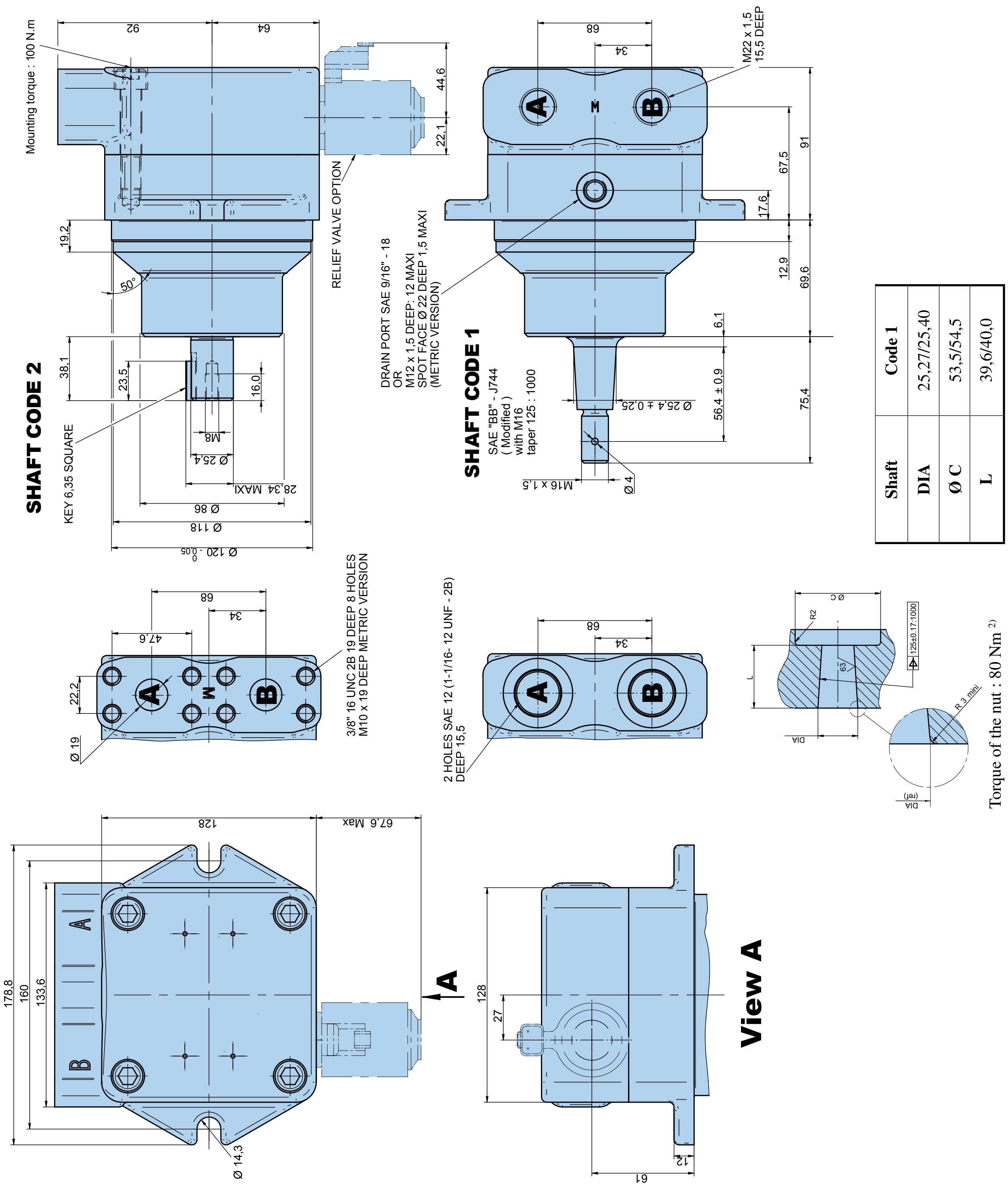

**PERMISSIBLE AXIAL AND RADIAL LOADS**




*[3] L or R rotation is a new internal concept : A is always «in» and B always «out».*

*L10 = Theoretical lifetime [$10^6$ rev.]*

## M5AF - Dimensions - Weight : 15 kg




### PERFORMANCES : PRESSURE & SPEED

| Displacement | 006 | 010 | 012 | 016 | 018 | 023 | 025 |
|---|---|---|---|---|---|---|---|
| Pressure max (bar) | 300 | | | | | | 280 |
| Speed max (RPM) | 4000 | | | | | | 2500 |

### MINIMUM REPLENISHMENT PRESSURE (BAR ABSOLUTE AT THE B PORT) for M5AF with an internal check valve [1]

| Flow (l/min) | 5 | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|
| Min pressure (bar) | 1,3 | 1,8 | 2,5 | 3,0 | 4,2 | 6,2 | 9,0 |

[1] 60 l/min is the maximum flow allowed through the internal check valve.

[2] This torque is for a steel coupling and a nut of at least grade 8.8 quality. It is compulsory to install a castle nut and cotter pin for right-hand rotation - bi-rotational.

## Model No. M5BS - 036 - 1 N 02 - B 1 - M 3 - ..

**Series External drain**
ISO 3019-2 - 100 A2/B4 HW

**Series External drain**
SAE B - J744

**Displacement**
Volumetric displacement (ml/rev.)

| | |
|---|---|
| 012 = 12,0 | 028 = 28,0 |
| 018 = 18,0 | 036 = 36,0 |
| 023 = 23,0 | 045 = 45,0 |

**Type of shaft**
1 = taper (SAE B)
2 = keyed (ISO E25M)
3 = splined (SAE B)
4 = splined (SAE BB)

**Direction of rotation (view on shaft end)**
N = Bi-rotational

**Modifications**

**Drain variables - M5BS**
2 = 9/16" 18 SAE drain
3 = M18 x 1,5 metric drain

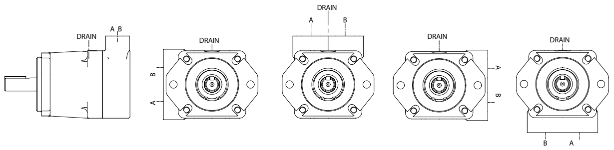
**Drain variables - M5B**
3 = M18 x 1,5 metric drain

**End cap variables**
M = 3/4" - 4 bolts SAE flange J518 - Metric thread
0 = 3/4" - 4 bolts SAE flange J518 - UNC thread

**Seal class**
1 = S1 - BUNA N
5 = S5 - VITON

**Design letter**

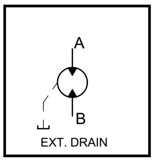
**Porting combination**




**ROTATION = BI-ROTATIONAL (N)**

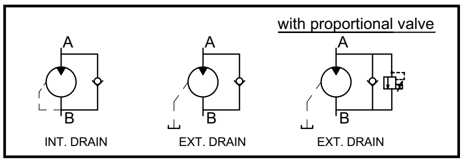
**View from shaft end :**

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

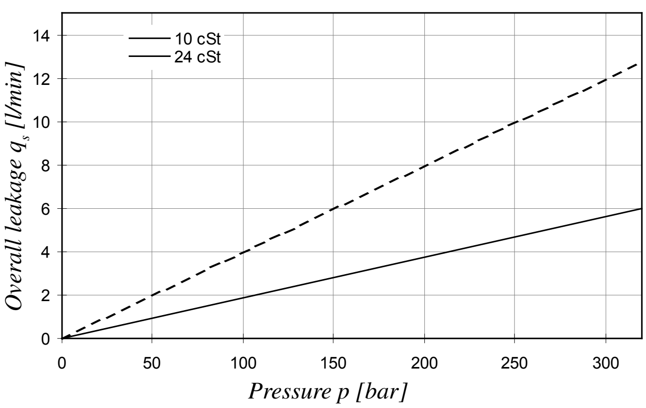



**R OR L ROTATION (New rotation concept - patent pending)[3)]**

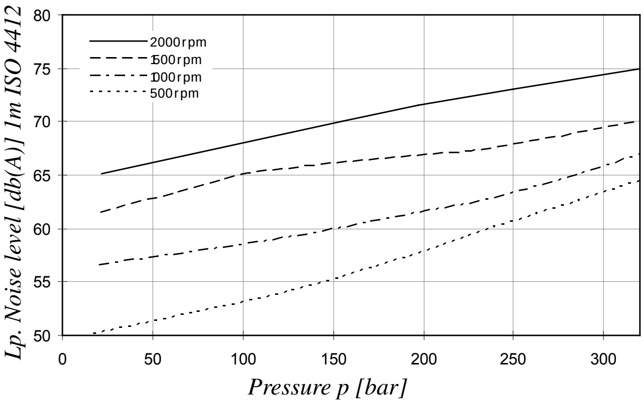
**View from shaft end :**
CW & CCW rotations
A = inlet
B = outlet



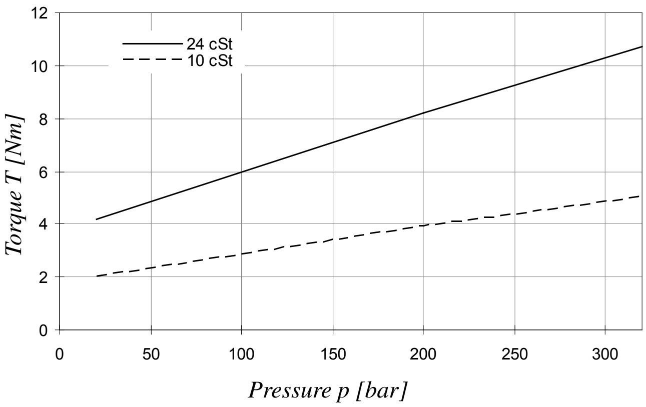

### OVERALL LEAKAGE (internal + external)



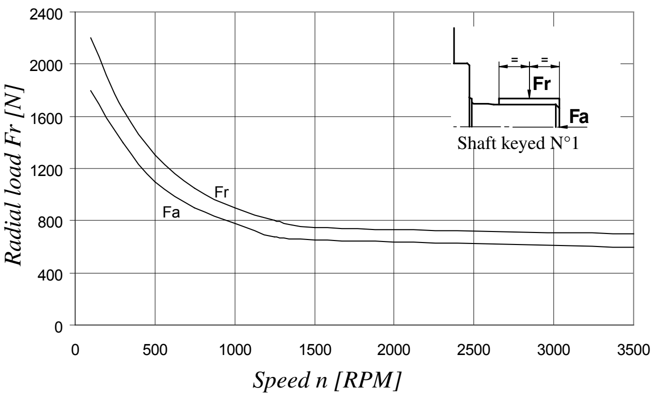

### NOISE LEVEL - M5BF - 036




### TORQUE LOSS




### PERMISSIBLE AXIAL AND RADIAL LOADS

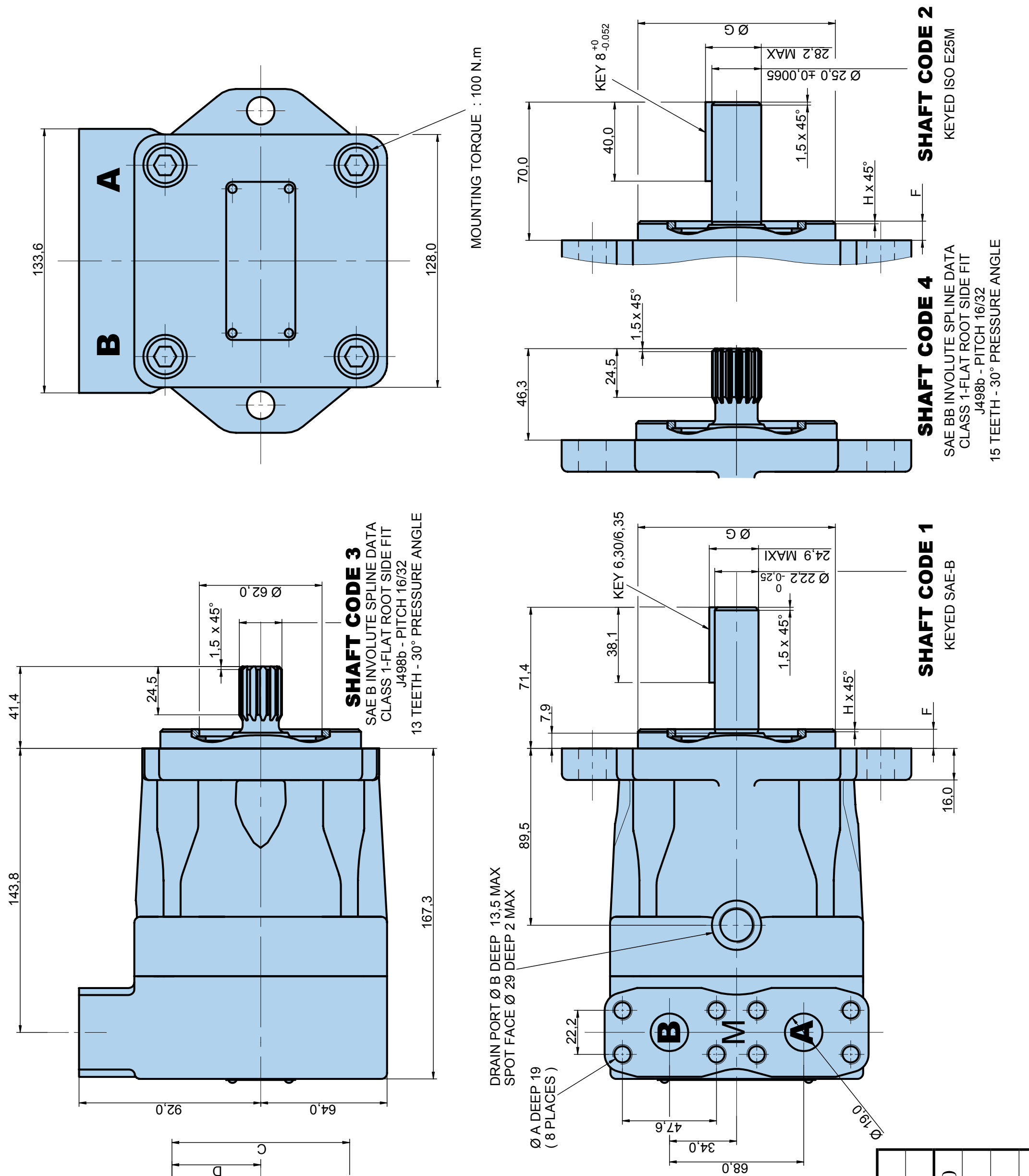


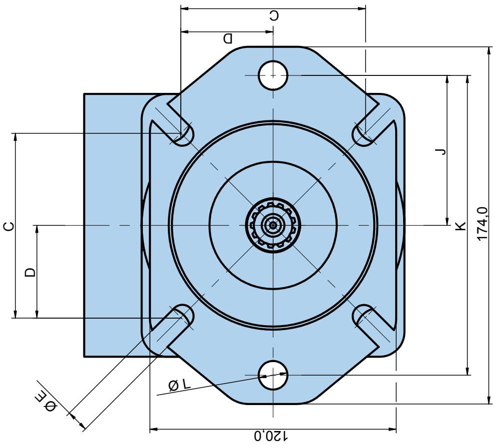

3) *L or R rotation is a new internal concept : A is always «in» and B always «out».*

*L10 = Theoretical lifetime [$10^6$ rev.]*

# M5B / M5BS - Dimensions - Weight : 18,5 kg

## M5A* / M5B*




| | M5BS | | M5B | |
|---|---|---|---|---|
| Port code | 0 | M | 0 | M |
| Ø A | 3/8" - 16 UNC | M10 | 3/8" - 16 UNC | M10 |
| Drain code | 2 | 3 | 3 | |
| Ø B | SAE 9/16" - 18 | M18 x 1,5 | M18 x 1,5 | |
| C | 88,9 | | 88,4 | |
| D | 44,9 | | 44,2 | |
| Ø E | 14,3 | | 11,0 | |
| F | 9,7 | | 9,0 | |
| Ø G | 101,6 | | 100,0 | |
| H | 1,5 | | 2,0 | |
| J | 73,0 | | 70,0 | |
| K | 146,0 | | 140,0 | |
| Ø L | 14,3 | | 14,0 | |

**Model No.** **M5BF1 - 036 - 1 N 02 - B 1 - M 3 - AP21**

**Series External drain**
**Series Internal drain**

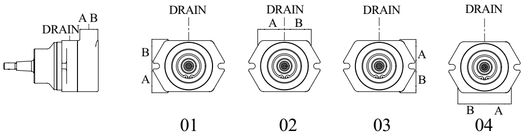
**Displacement**
Volumetric displacement (ml/rev.)

| | |
|---|---|
| 012 = 12,0 | 028 = 28,0 |
| 018 = 18,0 | 036 = 36,0 |
| 023 = 23,0 | 045 = 45,0 |

**Type of shaft**
1 = keyed taper (non SAE)
2 = keyed (SAE C)
W = keyed (ISO G32N)

**Direction of rotation (view on shaft end) - M5BF - M5BF1**
R = Clockwise
L = Counter-clockwise
**Direction of rotation (view on shaft end) - M5BF**
N = Bi-rotational

**Porting combination**




**Modifications or special option**
Ex. : AP21 = Anti-starve valve + proportional pressure relief valve set at 210 bar.
For a flow above 75 l/min a special cap is needed, please consult Parker Denison.

**Drain variables - M5BF**
2 = 9/16" 18 SAE drain
3 = M18 x 1,5 metric drain
**Drain variables - M5BF1**
x = no drain connection

**End cap variables M5BF**
M = 3/4" - 4 bolts SAE flange J518 - Metric thread
0 = 3/4" - 4 bolts SAE flange J518 - UNC thread
**End cap variables M5BF1**
M = 3/4" - 4 bolts SAE flange J518 - Metric thread

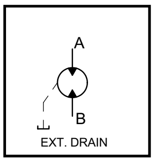
**Seal class**
1 = S1 - BUNA N
5 = S5 - VITON

**Design letter**

**ROTATION = BI-ROTATIONAL (N)**

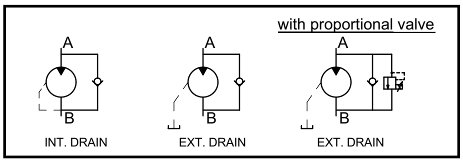
**View from shaft end :**

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

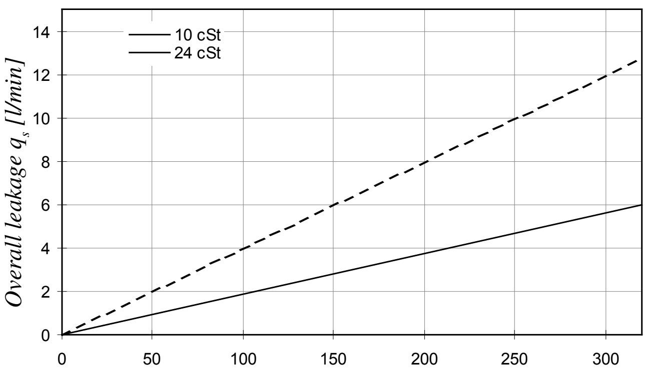



**R OR L ROTATION** **(New rotation concept - patent pending)[1]**

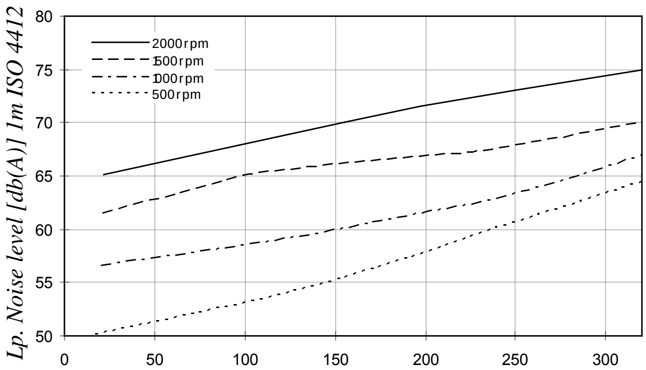
**View from shaft end :**
CW & CCW rotations
A = inlet
B = outlet



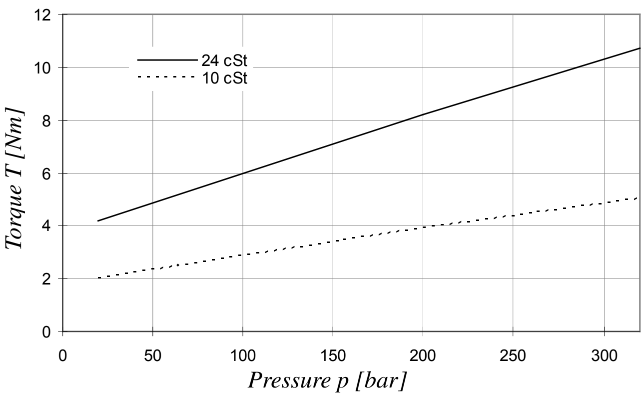

## OVERALL LEAKAGE (internal + external)



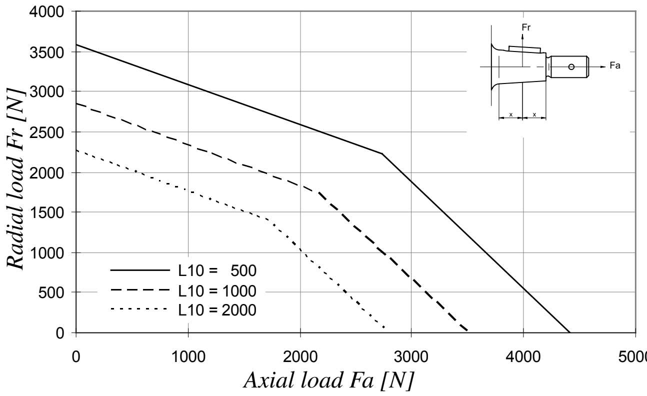

## NOISE LEVEL - M5BF - 036




## TORQUE LOSS



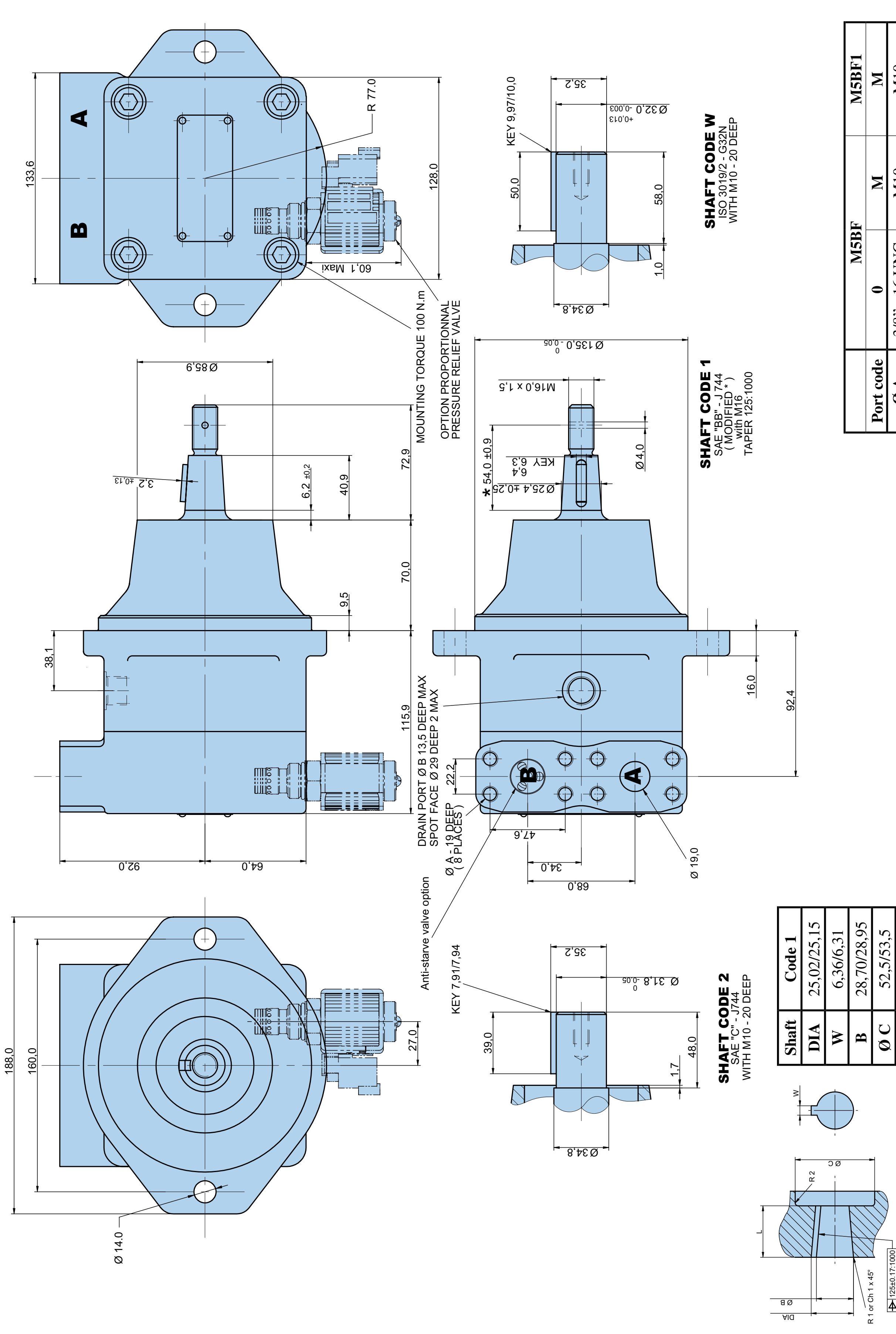

## PERMISSIBLE AXIAL AND RADIAL LOADS




[1] *L or R rotation is a new internal concept : A is always "in" and B always "out".*

*L10 = Theoretical lifetime [$10^6$ rev.]*

## M5BF/M5BF1 - Dimensions - Weight : 18,5 kg




| Port code | M5BF | | M5BF1 |
|---|---|---|---|
| | 0 | M | M |
| Ø A | 3/8" - 16 UNC | M10 | M10 |
| Drain code | 2 | 3 | X |
| Ø B | SAE 9/16" - 18 | M18 x 1,5 | No drain connection |

| Shaft | Code 1 |
|---|---|
| DIA | 25,02/25,15 |
| W | 6,36/6,31 |
| B | 28,70/28,95 |
| Ø C | 52,5/53,5 |
| L | 35,2/35,45 |

Torque of the nut : 80 Nm [1)]

1) This torque is for a steel coupling and a nut of at least grade 8.8 quality.
It is compulsory to install a castle nut and cotter pin for right-hand rotation - bi-rotational.

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