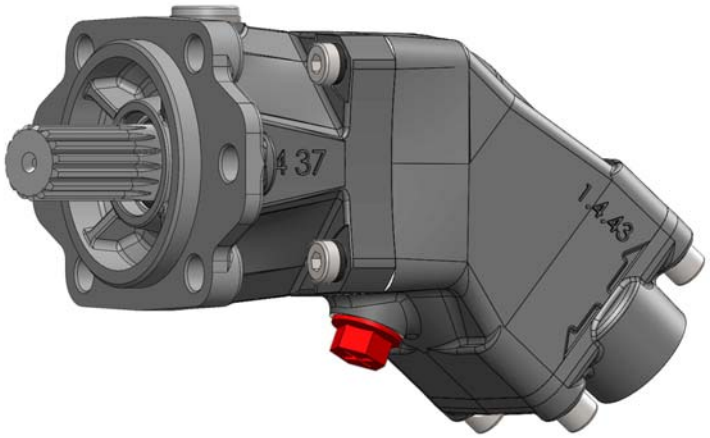
BENT AXIS PISTON MOTORS SERIES "HPM3" FLANGE SAE J-744 SAE B2/4 - SAE C

SAE B2/4
SAE C

HPM3



VERSIONS CODING

FLANGE TYPE	SHAFT	REAR COVER & PORTINGS	DISPLACEMENT	VARIANTS

Flange type	OMFB code
SAE B 2/4 holes	213
SAE C 4 holes	214
SAE D 4 holes	215

Shaft type	OMFB code
SAE B - 13T 16/32	074
SAE BB - 15T 16/32	077
SAE C - 14T 12/24	080
SAE C - 21T 16/32	083
SAE D - 13T 8/16	086
SAE J 744	091

Rear cover and portings	OMFB code
BSPP (GAS) 40°	01
BSPP (GAS) 90° + LATERAL	02
UN 40°	05
SAE 6000 - 40° METRIC SCREWS VERTICAL	10
SAE 6000 - 40° METRIC SCREWS HORIZONTAL	11
SAE 6000 - 90° METRIC SCREWS VERTICAL	12
SAE 6000 - 90° METRIC SCREWS HORIZONTAL	13
SAE 6000 - METRIC SCREWS LATERAL	14
SAE 6000 - 40° UNC SCREWS VERTICAL	20
SAE 6000 - 40° UNC SCREWS HORIZONTAL	21

012
017
025
034
040
047
055
064
084
108
130

CODING EXAMPLE

HPM code	Description	
21307401064	Flange	SAE B 2/4 holes
	Shaft	SAE B - 13T 16/32
	Portings	BSPP (GAS) 40°
	Displacement	064 cc

Codice fascicolo:997-400-24411
Data: Martedì 18 giugno 2019
Rev: AE
Codice foglio:997-244-00031

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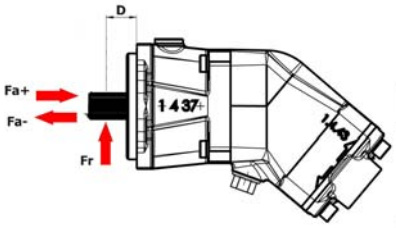
Fax: +39.030.9839207-208 Internet:www.omfb.it e-mail:contatti@omfb.it

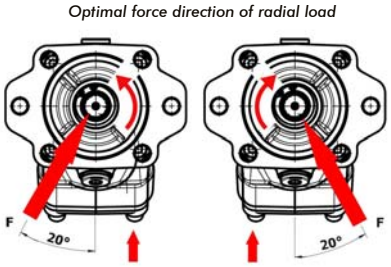
BENT AXIS PISTON MOTORS SERIES "HPM3" FLANGE SAE J-744

TECHNICAL FEATURES													
Displacement	cm^3/rev		**12**	**17**	**25**	**34**	**40**	**47**	**55**	**64**	**84**	**108**	**130**
Working pressure	bar	Max. intermittent					400	340	280	250			
		Max. continuous					350						
Rotation speed	rpm	Max. intermittent					2500						
		Max. continuous					1900						
		Min. continuous					100						
Power	kW	Max. theoric intermittent					67	67	64	67			
		Max. continuous work					22	22	21	22			
Torque	Nm/bar						0,63	0,7	0,83	0,97			
Mass inertial moment (x 10^{-4})	$kg\ m^2$						35,5						
Weight	kg						14,2						

SHAFT LOADS

The lifetime of the motor depends on how the bearings are working. Operational parameters such as speed, pressure, oil viscosity and grade of cleanness when are dimensioned and applied correctly can guarantee a longer lifetime to the motor along with higher performances and reduced noise level. Also external factors such as dimensions, weight and position of the external load on the shaft can influence the lifetime of the bearings. For different conditions and/or check of your working conditions please contact our technical/sales department.





Pressure ANTICLOCKWISE rotation

Pressure CLOCKWISE rotation

MAX RECOMMENDED SHAFT LOADS		DISPLACEMENT										
		12	**17**	**25**	**34**	**40**	**47**	**55**	**64**	**84**	**108**	**130**
Fr (radial) max	kN					9	8	3,5	2			
Distance D (to point of force) - HPM code 213	mm					24						
Distance D (to point of force) - HPM code 214						34						
Fa (axial) + (at standstill/ 0 bar pressure) max	kN					4						
Fa (axial) - (at standstill/ 0 bar pressure) max	kN					7		10	11			
Fa (axial) + (at 350 bar pressure) max *	kN					16		20				
Fa (axial) - (at 350 bar pressure) max *	kN					2,8		3,5	1,8			

* Fa (axial) + Will increase bearing life
* Fa (axial) - Will decrease bearing life

HOSE SIZING

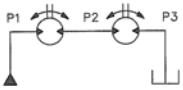
The recommended flow of the delivery hose should not exceed a fluid maximum speed of 5m/s.

FILTRATION

We recommend a cleanness grade according to ISO 4406-1999
- *code 19/17/14 up to 140 bar.*
- *code 18/16/13 from 140 bar to 200 bar.*
- *code 17/15/12 over 200 bar.*

Thread	Max. fittings tightening torque
M10 x 1	50 Nm
M12 x 1,5	80 Nm
G 1/2	80 Nm
G 3/4	100-120 Nm
G 1	180-200 Nm
G 1-1/4	310-330 Nm

SERIES CONNECTION OF HPM MOTORS



The maximum allowed pressure on the ports is 350 bar continuous and 400 bar intermittent. In case of series connection we recommend to limit the total working pressure P1+P2 always to 350 bar continuous and 400 bar intermittent.

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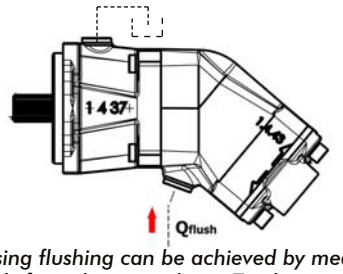
TEMPERATURE/COOLING OF MOTOR CASING

High oil temperature reduces the lifetime of shaft oil seal and can lower the oil viscosity below the recommended level- The temperature of the system shall not exceed 60°C while temperature of return line shall not exceed 90°C.
Cooling/flushing of motor casing might be necessary to keep return temperature within the recommended level.

MOTOR	FLUSHING	CONT.
12-34	2-8 l/min.	≥ 2800 rev/min.
40-64	4-10 l/min.	≥ 2500 rev/min.
84-130	6-12 l/min.	> 2200 rev/min.

Reference value for motor casing flushing.



The motor casing flushing can be achieved by means of a flushing valve or directly from the return hose. Too low return pressure must be compensated by a back-pressure valve. The tank hose must be connected into the highest point as shown in the picture.

TYPES OF FLUID

The table below shows the main types of hydraulic fluid as set out in ISO 6743-4 standard.

- HL RECOMMENDED
(For other type of fluid please contact our sales/technical dept).

Mineral oil-based fluids	
HH	Additive-free
HL	Anticorrosive, antioxidant (RECOMMENDED)
HM	HL and anti-wear additives
HV	HM additives and viscosity controls
Flame-resitant fluids	
HFA	Oil-based emulsion in water (water > 90%)
HFB	Water-based emulsion in oil (water > 40%)
HFC	Water in glycol solution (polyhydrate alcohols)
HFD	Water-free synthetic fluids (phosphoric esters)
Organic fluids	
HETG	Vegetable-based fluids
HEPG	Synthetic polyglycol-based fluids
HEE	Synthetic ester-based fluids

VISCOSITY INDEX

The optimum viscosity of the fluid Vopt at the operating temperature (temperature of the tank for open circuits or temperature of the circuit for closed circuits) must fall between the minimum and maximum values shown in the table below. The minimum viscosity Vmin shown in the table is permitted in extreme conditions and for short periods. This value refers to a maximum fluid temperature of 90°C (temperature of drainage fluid). The maximum viscosity Vmax for short intervals and during cold starts is shown in the table below. The temperature of the fluid must never exceed a maximum of +90°C and a minimum of -25°C.

	Vopt (cSt)	Vmin (cSt)	Vmax (cSt)
HPM	15÷40	10	800

VISCOSITY GRADES

Under the ISO standard, hydraulic fluids are divided into 6 grades of viscosity (see table below). Viscosity grades are shown by the letters VG followed by the viscosity of the fluid in cSt at a temperature of 40 °C.

VISCOSITY GRADES ISO	V (40°) (cSt)
VG 10	9÷11
VG 22	19.8÷24.2
VG 32	28.8÷35.2
VG 46	41.4÷50.6
VG 68	61.2÷71.5
VG 188	90÷110

In order to choose the correct type of fluid, it is essential to know the operating temperature of the fluid (temperature of the tank for open circuits or temperature of the circuit for closed circuits) and its viscosity index. At the operating temperature, the viscosity of the fluid must fall within the optimum viscosity values (Vopt). The diagram below shows the variations of viscosity at various temperatures of a class of fluids sharing the same viscosity index.

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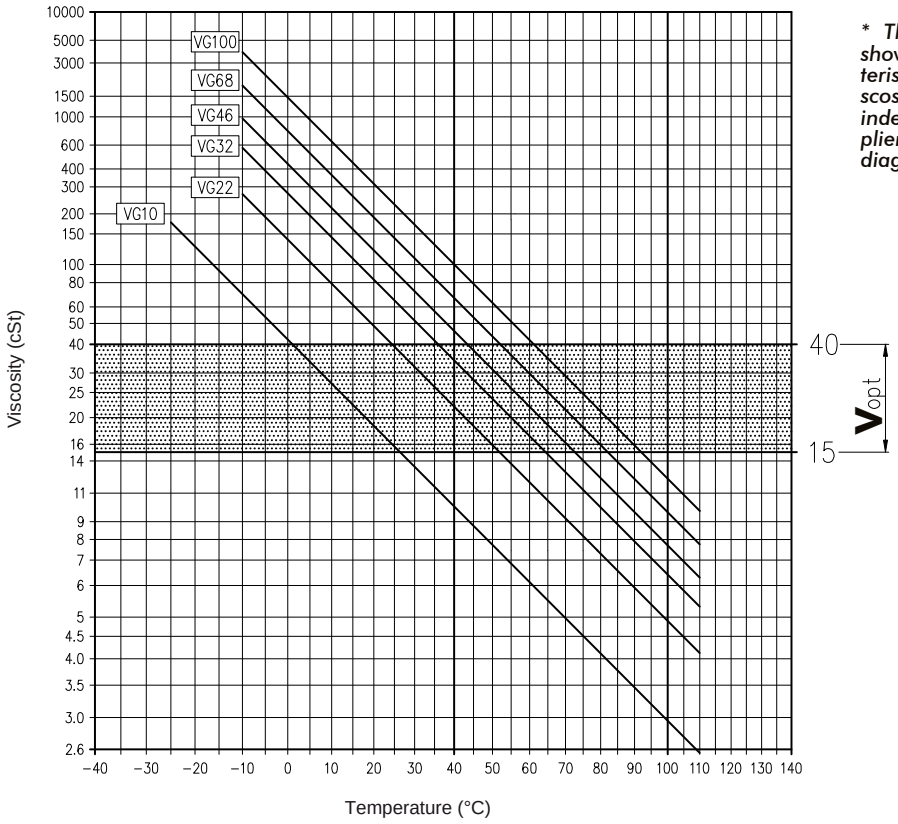
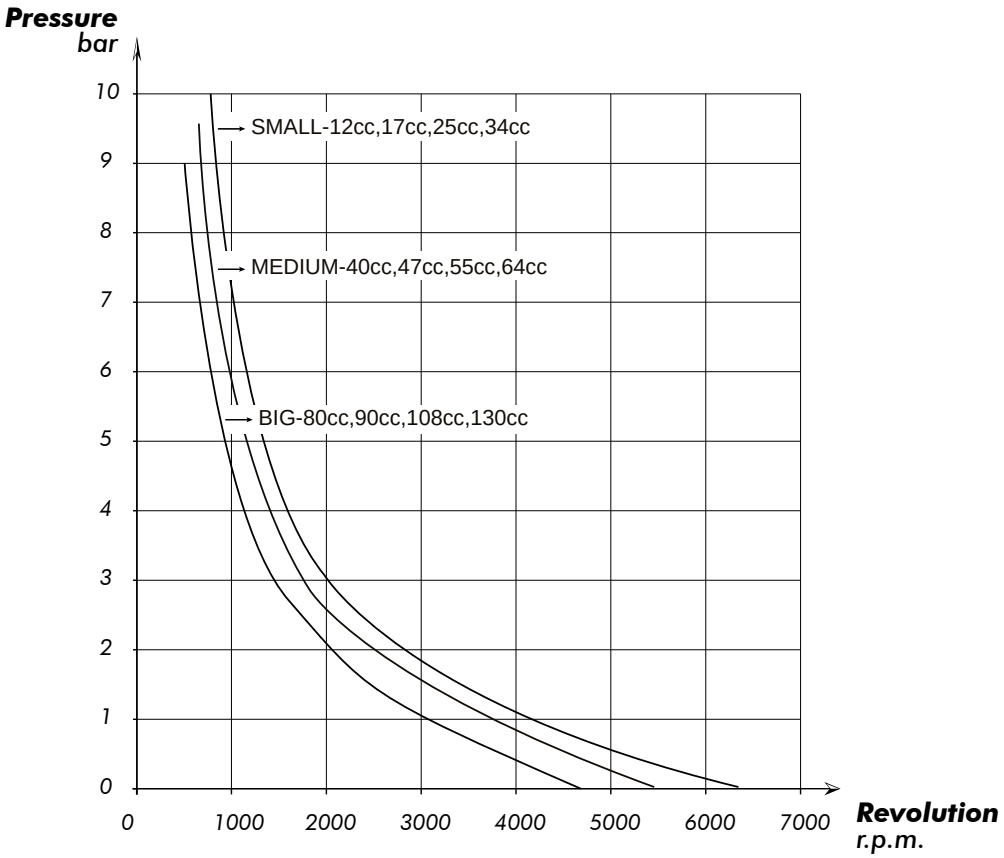
Viscosity - temperature diagram*



** The diagram is only an example. It shows the viscosity temperature characterisics of typical fluids with different viscosities but sharing the same viscosity index. Ask to your hydraulic fluid supplier for the real viscosity-temperature diagram of the fluid used in your system.*

MAX. PRESSURE IN THE HOUSING



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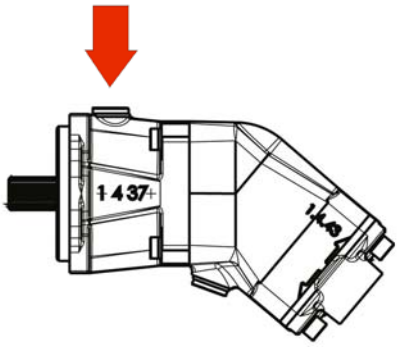
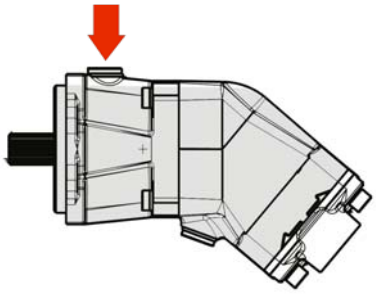
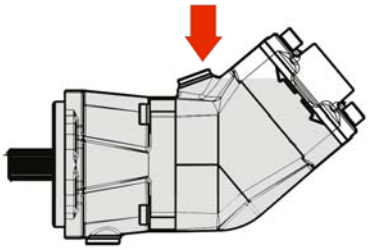
PRELIMINARY OPERATION

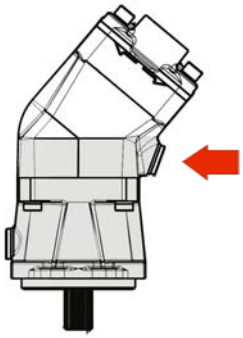
Before to start up the motor please fill-up the the casing with oil.
We recommend the highest level of cleanness during the operations of oil filling-up and change.
Plugs tightening torque: 20-25 Nm



Connect the drain line before using the motor.
Use always the upper drain port according to the motor position and in any case always use the drain port that can ensure the casing being filled-up.



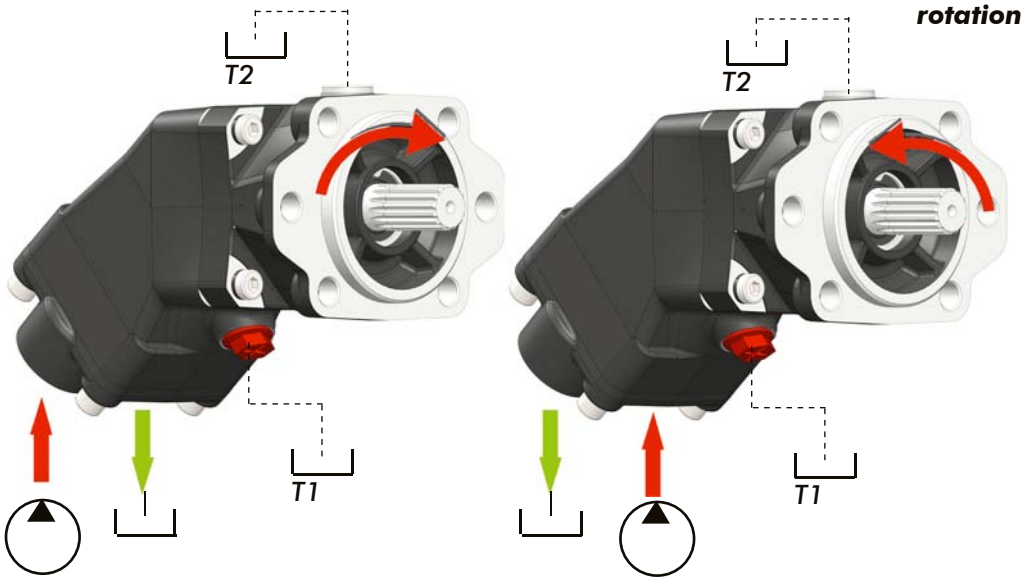




The direction of rotation of the motor depends from direction of delivery oil as shown in the picture below. Make sure about the correct sizing and positioning of the oil hoses. Insufficient diameter, kinks and/or tight elbows may lead to cavitation and consequently further damages and high noise level.

CLOCKWISE rotation

ANTICLOCKWISE rotation



It is essential to drain the motor (T1 or T2) to relief the shaft seal from excessive pressure.
The maximum internal pressure allowed depends on the rotating speed of the motor. However, we can take into consideration the following values:
- Max internal pressure independent from the rotating speed (continue): 4 bar
- Max internal pressure independent from the rotating speed (peak): 5.5 bar

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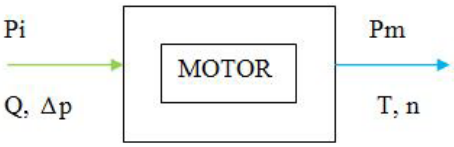
FORMULAS FOR MOTORS

INPUT HYDRAULIC POWER
In a motor the input hydraulic power is proportional to the pressure difference between the ports and to the flow according to the ratio
where
Pi is the hydraulic power in kW
Q is the flow in l/min
Δp is the pressure difference in bar between the ports

$$Pi = \frac{Q \cdot \Delta p}{600}$$



MECHANICAL POWER TO THE SHAFT
In a motor the mechanical power available is proportional to the torque at the shaft and to the angular speed of the shaft according to the ratio
where
Pm is the mechanical power in kW
T is the torque in Nm
n is the rpm

$$P_m = \frac{T \cdot n}{9550}$$

INPUT FLOW FOR ROTATING THE SHAFT AT SPEED n
where:
Q is the flow in l/min
n is the rpm
c is the displacement of the motor in cc/rev
ηv is the volumetric efficiency of the motor

$$Q = \frac{n \cdot c}{1000 \cdot \eta_v}$$

MOTOR SPEED WHEN IN INPUT YOU HAVE FLOW Q
where
Q is the flow in l/min
n is the rpm
c is the displacement of the motor in cc/rev
ηv is the volumetric efficiency of the motor

$$n = 1000 \cdot \frac{Q}{c} \cdot \eta_v$$

TORQUE TO THE SHAFT WITH A PRESSURE DIFFERENCE p BETWEEN THE PORTS
where
T is the torque in Nm
c is the displacement of the motor in cc/rev
Δp is the pressure difference in bar between the ports
ηm is the mechanical efficiency of the motor

$$T = \frac{c \cdot \Delta p}{62.8} \eta_m$$

PRESSURE DIFFERENCE REQUIRED BETWEEN INPUT PORTS TO OBTAIN TORQUE T AT THE SHAFT
where
Δp is the pressure difference in bar between the ports
T is the torque in Nm
c is the displacement of the motor in cc/rev
ηm is the mechanical efficiency of the motor

$$\Delta p = 62.8 \cdot \frac{T}{c \cdot \eta_m}$$

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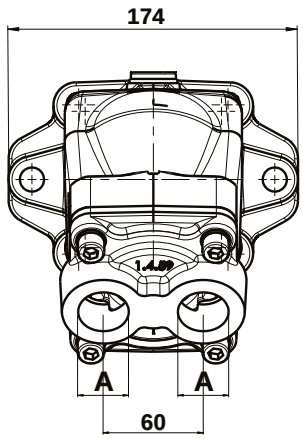
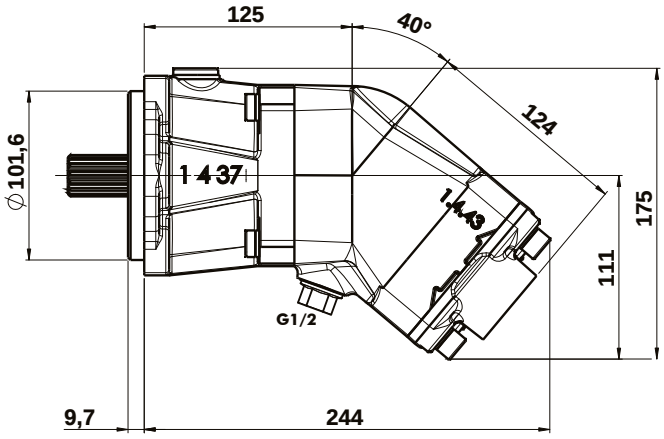
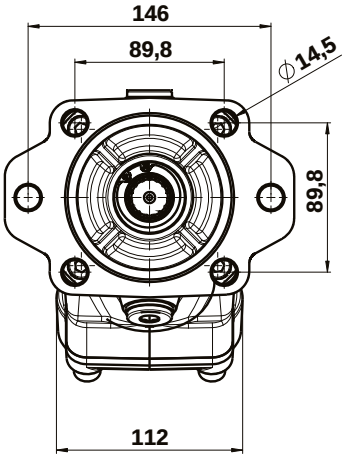
OVERALL MOTORS DIMENSIONS

FLANGE SAE B 2-4 HOLES

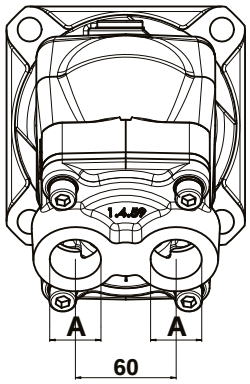


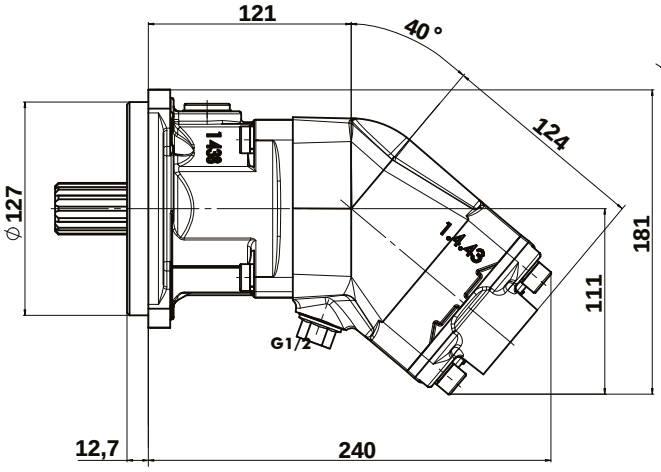


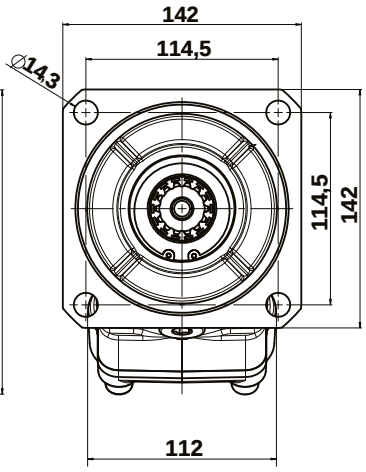


PORTINGS		OMFB code
A	G 1	01 ●
	1 5/16-12 UN-2B	05 ●

FLANGE SAE C



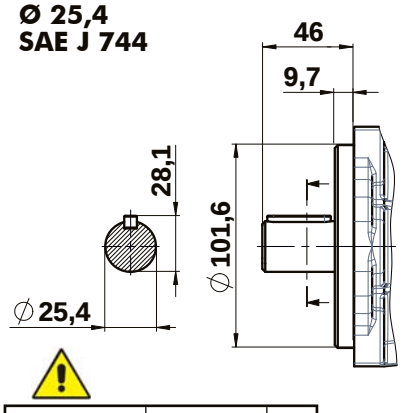




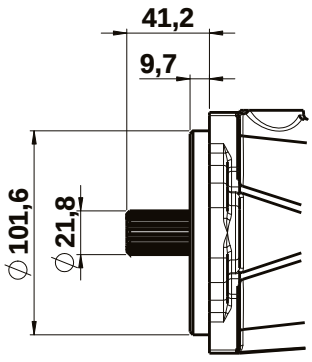
PORTINGS		OMFB code
A	G 1	01 ●
	1 5/16-12 UN-2B	05 ●

SHAFTS

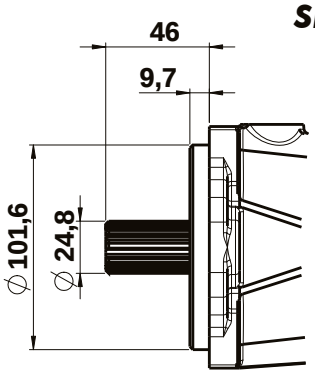
Ø 25,4
SAE J 744



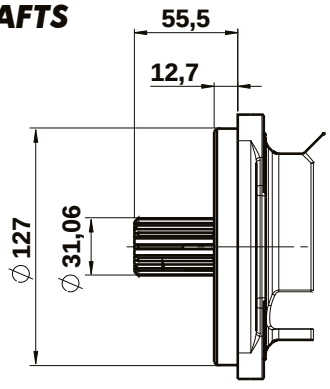
SAE B
13T 16/32DP



SAE BB
15T 16/32DP



SAE C
14T 12/24DP



Displacement	cm^3/rev	47
Working pressure bar	Max. intermittent	210
	Max. continuous	160

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GASKETS KIT	
CODE	**DESCRIPTION**
21390000018	HPM3 motors gaskets kit - Flange 213 - Shaft 047 - Displacements 40/47
21390000027	HPM3 motors gaskets kit - Flange 213 - Shaft 074/077 - Displacements 40/47/55/64
21490000016	HPM3 motors gaskets kit - Flange 214 - Shaft 080 - Displacements 40/47/55/64

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