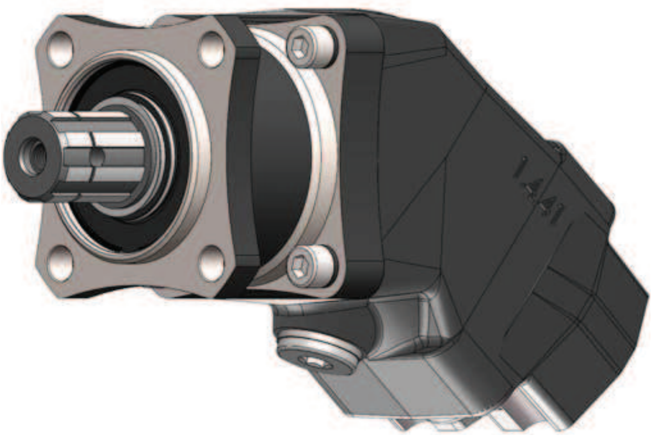
BENT AXIS PISTON MOTORS SERIES "HPM3" FLANGE ISO 7653-D

HPM3



VERSIONS CODING

FLANGE TYPE | **SHAFT** | **REAR COVER & PORTINGS** | **DISPLACEMENT** | **VARIANTS**

Flange type	OMFB code
ISO 7653 4 holes Ø80	201

Shaft type	OMFB code
DIN 5462 8x32x36 (ISO 14)	001

Rear cover and portings	OMFB code
BSPP (GAS) 40°	01
BSPP (GAS) 90° + LATERAL	02
UNF 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

Displacement
012
017
025
034
040
047
055
064
084
108
130

HPM code	Description	
20100101064	Flange	ISO 7653 4 holes Ø80
	Shaft	DIN 5462 8x32x36 (ISO 14)
	Portings	BSPP (GAS) 40°
	Displacement	064 cc

CODING EXAMPLE

Codice foglio:997-400-24411
Data: Lunedì 21 marzo 2016
Rev: //
Codice foglio:997-244-00021

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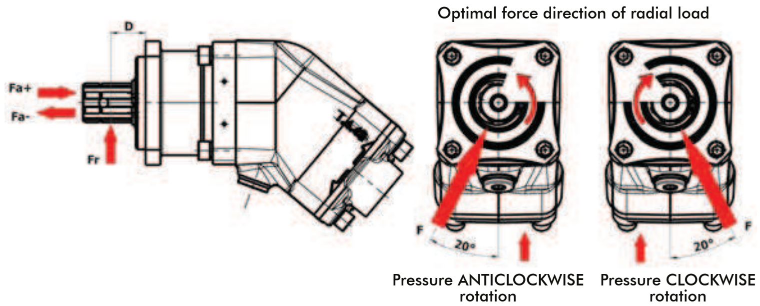
TECHNICAL FEATURES

Displacement	cm^3/rev		**12**	**17**	**25**	**34**	**40**	**47**	**55**	**64**	**84**	**108**	**130**
Working pressure	bar	Max. intermittent	400										270
		Max. continuous	350										250
Rotation speed	rpm	Max. intermittent	3000				2500				2000		
		Max. continuous	2300				1900				1500		
		Min. continuous	100										
Power	kW	Max. intermittent	24	34	50	68	67	78	92	107	112	144	117
		Max. continuous	8	11	17	23	22	26	31	36	38	48	39
Torque	Nm/bar		0,26	0,33	0,43	0,56	0,63	0,7	0,83	0,97	1,3	1,6	1,8
Mass inertial moment ($x 10^{-4}$)	$kg\ m^2$		11,5		12,5		35,5				61		
Max. pressure in the housing	bar		20										
Weight	kg		8,8				13,2				18,2		

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.



MAX RECOMMENDED SHAFT LOADS		DISPLACEMENT										
		12	**17**	**25**	**34**	**40**	**47**	**55**	**64**	**84**	**108**	**130**
Fr (radial) max	kN	7,5			4,2	9	8	3,5	2	10,75		12,5
Distance D (to point of force)	mm	32				32				32		
Fa (axial) + (at standstill/ 0 bar pressure) max	kN	3				4				4	5	
Fa (axial) - (at standstill/ 0 bar pressure) max	kN	4	5	7		7		10	11	13	16	19
Fa (axial) + (at 350 bar pressure) max *	kN	6	8	10,8	12	16		20		13	16	19
Fa (axial) - (at 350 bar pressure) max *	kN	1,2		2,08		2,8		3,5	1,8	4,16	5,16	

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

HOSE SIZING

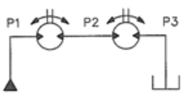
The recommended flow of the delivery hose should not exceed a fluid maximum speed of 5m/s.

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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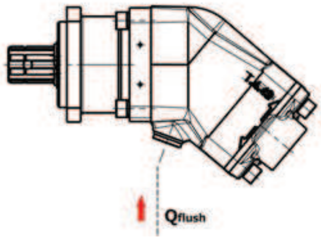
TEMPERATURE/COOLING OF MOTOR CASING

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

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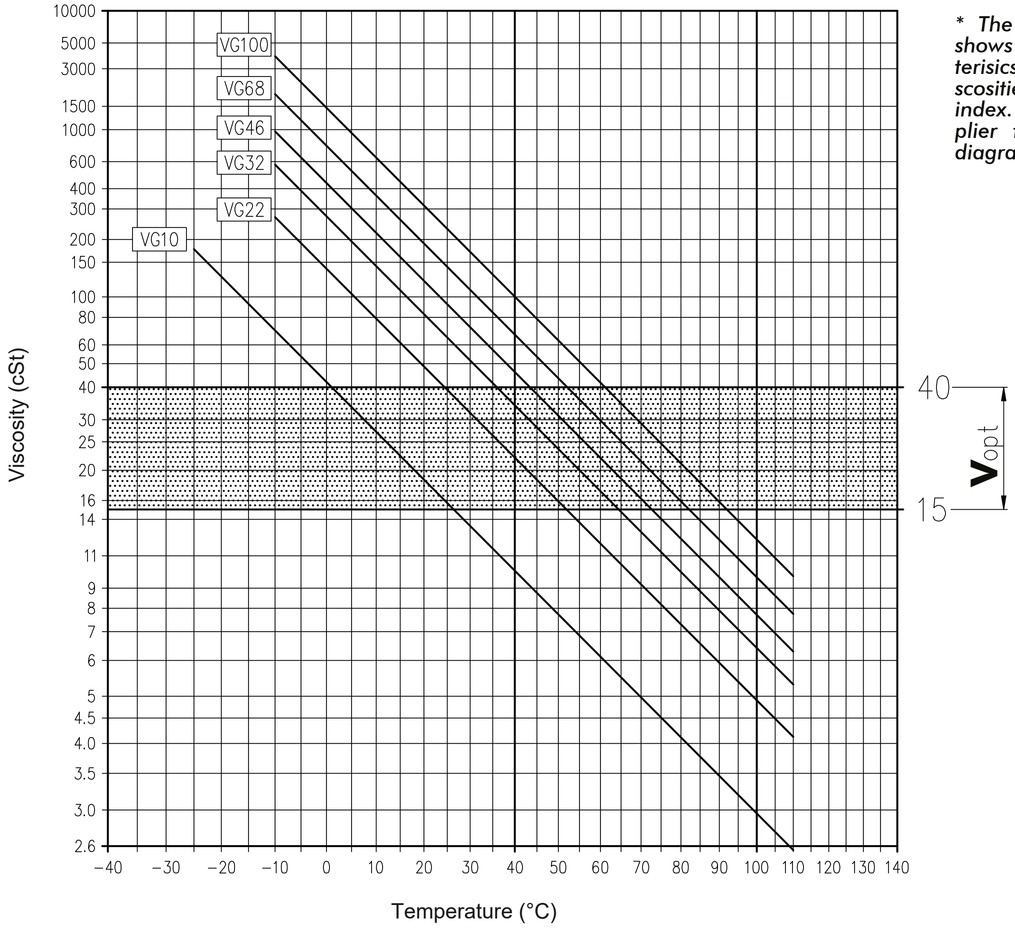
VISCOSITY GRADES

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.

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.*

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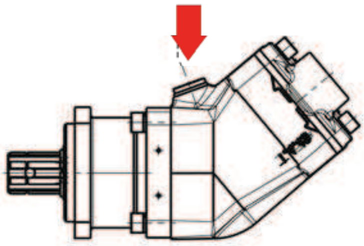
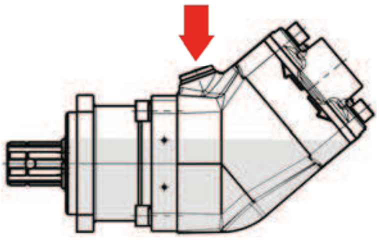
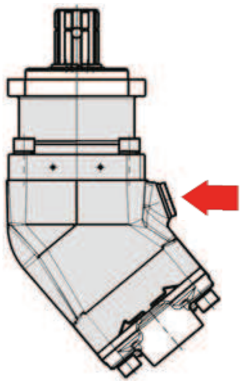
PRELIMINARY OPERATION

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.





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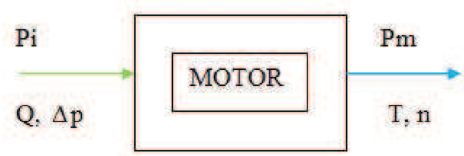
INPUT HYDRAULIC POWER

In a motor the input hydraulic power is proportional to the pressure difference between the ports and to the flow according to the ratio

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

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



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

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

where
Pm is the mechanical power in kW
T is the torque in Nm
n is the rpm

INPUT FLOW FOR ROTATING THE SHAFT AT SPEED n

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

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

MOTOR SPEED WHEN IN INPUT YOU HAVE FLOW Q

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

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

TORQUE TO THE SHAFT WITH A PRESSURE DIFFERENCE p BETWEEN THE PORTS

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

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

PRESSURE DIFFERENCE REQUIRED BETWEEN INPUT PORTS TO OBTAIN TORQUE T AT THE SHAFT

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

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

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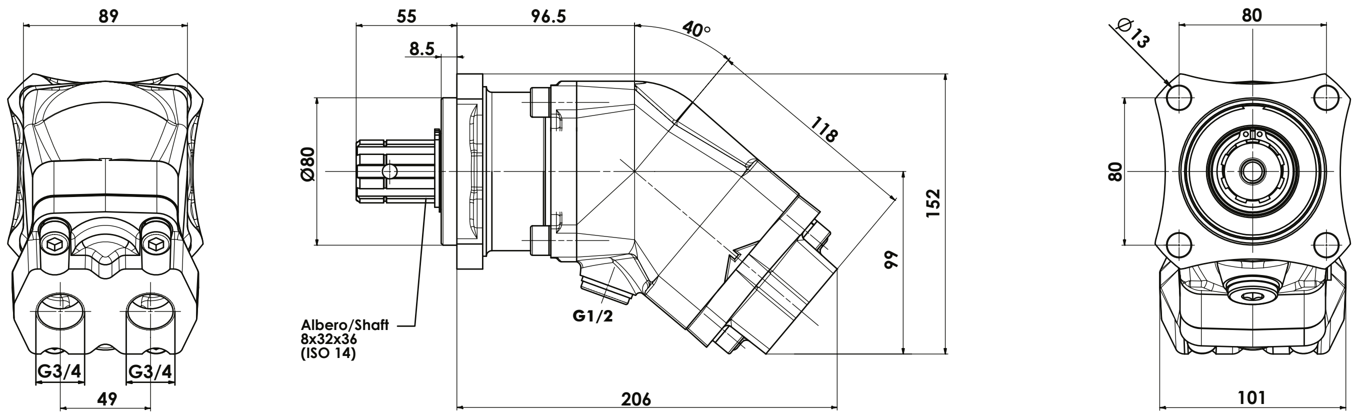
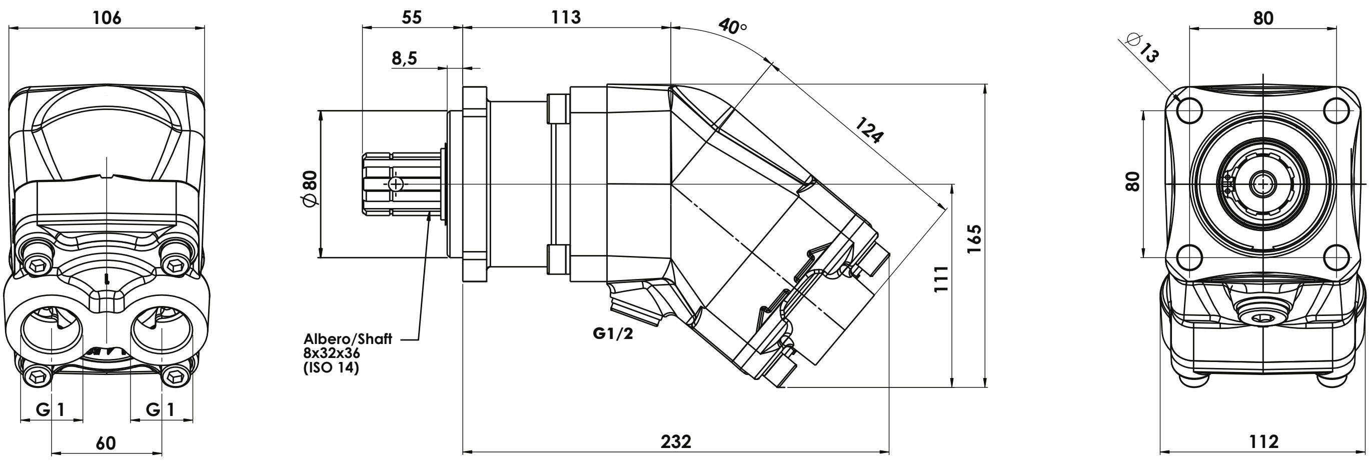
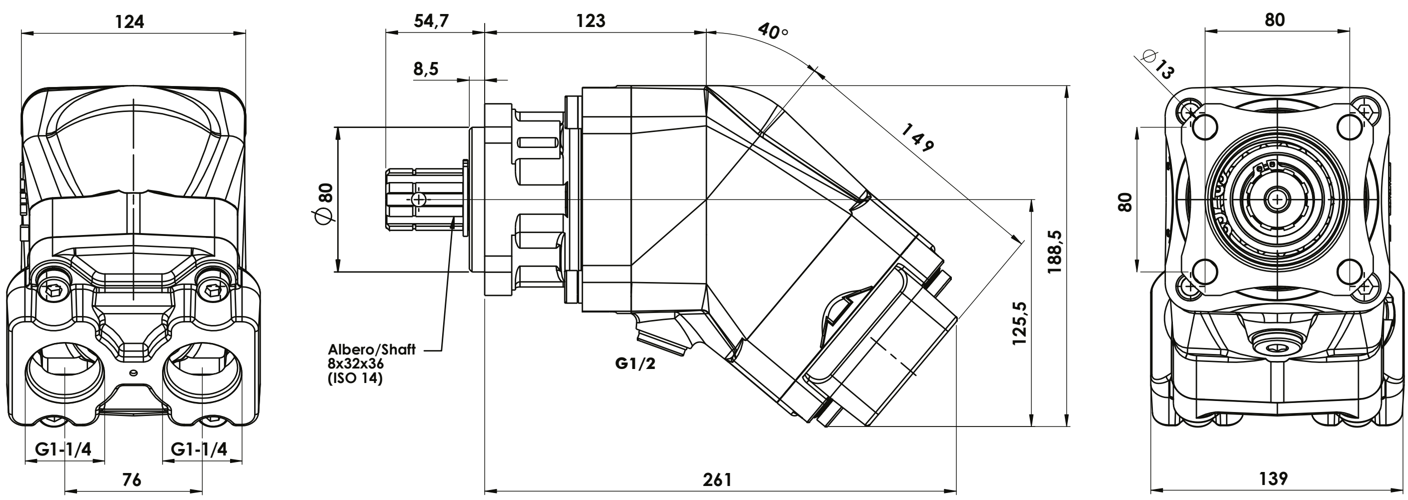


BSPP (GAS) 40° - G 3/4 - DISPLACEMENT 12-17-25-34



BSPP (GAS) 40° - G 1 - DISPLACEMENT 40-47-55-64



BSPP (GAS) 40° - G 1-1/4 - DISPLACEMENT 84-108-130

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