

## Content

Content .....	1
Product range .....	3
General Information .....	8
<b>Gear Pump – Lightline Version</b>	
GP0L .....	12
GP1L .....	16
GP2L .....	22
GP3L .....	28
<b>Gear Pump – High Performance Version</b>	
GP0 .....	32
GP1 .....	38
GP2 .....	46
GP3 .....	56



**Filtration**

Suction filters



Clogging indicators



Ventilating filters



Return filters



Pressure filters



Return-suction filters



High pressure filters



Return-suction filters

**Description**

ARGO-HYTOS produces sophisticated filter solutions together with hydraulic and lubrication systems. The range of solutions we have implemented extends from fixed-position industrial plants to mobile applications.

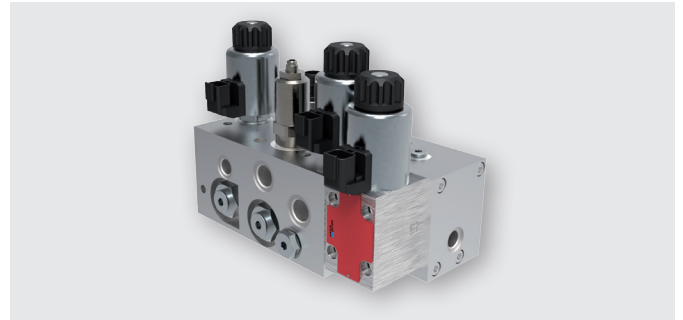
As well as customized developments, exactly adjusted to the individual requirements of the customer, ARGO-HYTOS offers a comprehensive range of innovative standard solutions for a wide variety of applications:

- › Suction filters
- › Return-suction filters and return filters
- › Pressure and high-pressure filters
- › Filling and ventilating filters
- › Filter accessories

## Fluid and Motion Control



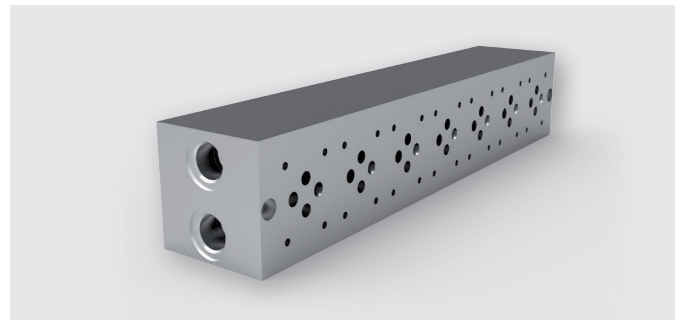
Customized solutions



Control solutions

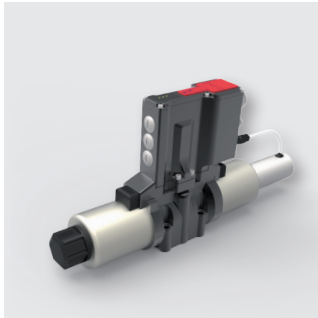


Gear pumps



Plates

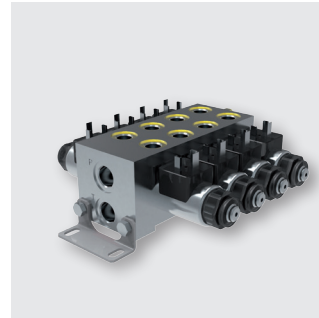
## Fluid and Motion Control



Directional and proportional valves



Modular valves



Sandwich valves



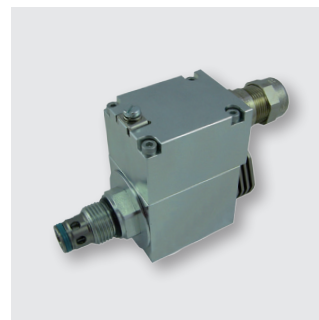
Screw-in cartridge valves



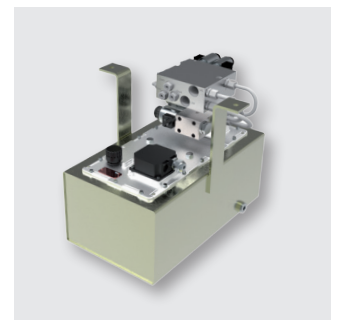
Slip-in cartridge valves



Load motion cartridges



Explosion proof valves



Hydraulic power packs

### Description

ARGO-HYTOS' expertise in control technology is the fruit of more than 65 years' experience. We focus here on a wide range of valves, power units and integrated manifolds featuring all commonly used design features and functions, together with proportional valves and the associated control electronics:

- › Directly operated directional valves in CETOP 02 to CETOP 05 and pilot operated directional valves in CETOP 07 and CETOP 08
- › Valves sub-plate and sandwich type – flow control, pressure and check valves in CETOP 02 to CETOP 05
- › Cartridge valves
- › Directly activated proportional valves with compensator sandwich valve, in CETOP 02 to CETOP 05
- › Analog and digital control electronics – on-board, or for installation in control cabinets
- › Power pack assembly kits
- › Customized control blocks

## Fluid Management



Off-line filter



Off-line filter



Off-line filter unit



Off-line filter unit



Oil service unit



Oil service unit



Dewatering system



Dewatering system

### Description

As well as reducing maintenance and servicing costs, effective fluid management is also a key factor in boosting the reliability, productivity and cost-effectiveness of the operation. ARGO-HYTOS supplies application-oriented products for manual and automatic cleaning of hydraulic fluids:

- › Off-line filters
- › Off-line filter units
- › Filter cooling systems
- › Oil service units
- › Dewatering systems

**Sensors and Measurement**

Portable particle counter



Portable oil lab



Particle monitor



Wear sensor



Condition sensors



Pressure sensor



Remote interfaces / display units



Valve electronics

**Description**

Systems that provide reliable assessment of the condition of hydraulic fluids are the key feature of continuous fluid monitoring.

Sensors and measurement technology from ARGO-HYTOS precisely target this range of tasks. Our fluid monitoring products comprise equipment and system solutions to enable online monitoring during continuous operation as well as analysis of bottled samples under laboratory conditions.

- › Portable oil diagnosis equipment
- › Stationary and portable particle monitor
- › Oil condition sensors
- › Software to evaluate data and analyze trends

## Gear Pumps

### Long-standing tradition

Experience, innovation, continuous optimization by means of mathematical analysis and testing – these are important prerequisites for the development and production of advanced products with wide application potential in both stationary and mobile applications. Our product portfolio includes valves for hydraulic circuit control, manifolds and HICs, as well as complete hydraulic drives. We manufacture standard catalog products as well as tailor-made products for specific applications.

We collaborate in the development and realization of our customers' technical projects. We participate in the development and production of technical projects of our customers and we achieve excellence in our quality approach regarding people, products, processes and services.

### Quality of products

The satisfaction of our clients is our top priority. When our customer's machines operate properly and function flawlessly, we know that our efforts have been successful. Our certified quality assurance system is fully implemented in production and assembly processes. Our parts are produced using high-quality materials, purchased with an attestation from renowned suppliers. Machining is done with high accuracy and precision, using CNC machining centers. Key components of valves are heat-treated in order to withstand high wear and to meet the high requirements on service life. All of our products are tested on computer-controlled test benches in order to guarantee that they function properly and comply with the specifications; (thus, the risk of human error in testing is eliminated). The environmental resistance of surface finishes against corrosion is verified by an accredited laboratory. Selected products are certified by internationally recognized certification companies such as TÜV or CSA.

### Gear pumps

External gear pumps are used to convert mechanical power into hydraulic energy. They are the source of flow and pressure in hydraulic circuits. They are characterized by a simple construction, reliability and lower purchase costs in comparison with other types of pumps. They are suitable for high loads over long periods of time. They are produced in a wide range of models and performances. Gear wheels and the input shaft are thermally processed in order to achieve high durability. The pumps are used in mobile technology, such as agricultural machines, construction machines and material handling equipment, as well as in the construction of various stationary hydraulic devices.

### Overview of gear pumps

<p><b>GP0</b></p> <p>The GP0 series pumps are intended for lower outputs of up to 2,3 kW with a wide spectrum of rated speeds ranging from 600 to 8000 RPM. Flange, cover, and body are made of a high-quality aluminum alloy. These pumps are characterized by high efficiency and low noise levels through the entire rotation range.</p>	
<p><b>GP1</b></p> <p>The GP1 series pumps have displacements <math>V_g</math> ranging from 0,8 to 11,8 cm<sup>3</sup>/ revolution and are intended for outputs of up to 10 kW. They are characterized by high operational reliability and durability. A wide range of construction designs is available with different connection dimensions and port locations. Flange, cover, and body are made of a high-quality aluminum alloy. Hydraulic compensation of axial clearance in our new generation of gear pumps improves the efficiency and reduces the noise level of the pumps. Our pumps can also be arranged as multiple pump units.</p>	
<p><b>GP2</b></p> <p>The GP2 series pumps have displacements <math>V_g</math> ranging from 4 to 31 cm<sup>3</sup>/ revolution. Flange and cover are made of cast iron, the body is made of high-strength aluminum alloy. Pumps use a 12-tooth gear to ensure a low level of noise.</p>	
<p><b>GP3</b></p> <p>The GP3 series pumps have displacements <math>V_g</math> ranging from 10 to 100 cm<sup>3</sup>/revolution. Flange and cover are made of gray cast iron, the body is made of high-strength aluminum alloy. Pumps use a 12-tooth gear to ensure a low level of noise. The maximum driving moment of a multi-sectional group of pumps is 340 Nm. The maximum torque transferred by the coupling between sections is 190 Nm.</p>	
<p><b>GP0L, GP1L, GP2L, GP3L</b></p> <p>GP0L, GP1L, GP2L, GP3L, GP4L pumps are "Lightline" products. These pumps are generally intended for circuits with a lower operating pressure. The pumps are not designed to be combined in multiple pump units.</p>	



## Overview of parameters of the basic series

(This table provides an overview of comparative performance. Precise values are stated in the catalogue of individual pumps).

Series	Geometrical volume $V_g$ [cm <sup>3</sup> /rotation]	Nominal Flow Q [l·min <sup>-1</sup> ] at 1500 RPM	Minimum rotations [min <sup>-1</sup> ]	Maximum rotations [min <sup>-1</sup> ]	Operating pressure $p_2$ [bar]	*Nominal input $P_n$ [kW]
GP0	0,18 – 3,20	0,19 – 4,45	500	8000	230	0,10 – 0,56
GP1	0,80 – 11,80	1,07 – 16,30	500	5000	280	0,7 – 2,94
GP2	4 – 31	3,0 – 47,8	500	4000	280	3,33 – 13,74
GP3	10 - 100	13,50 – 135,00	350	3000	290	8,0 -25,6

\*1 Nominal input for nominal rotations and nominal output pressure

## Basic technical parameters

### 1. Working liquids

The pumps are designed to be used with mineral hydraulic oils and environmentally-friendly vegetable oil-based fluids.

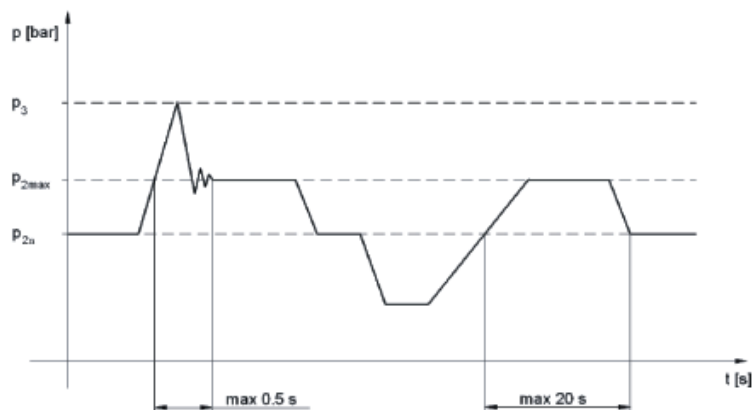
Kinematic viscosity	
Recommended for permanent operation	20 to 80 mm <sup>2</sup> s <sup>-1</sup>
Maximum (starting)*	1200 mm <sup>2</sup> s <sup>-1</sup>
Minimum**	10 mm <sup>2</sup> s <sup>-1</sup>

\* At viscosity > 1000 mm<sup>2</sup>s<sup>-1</sup> the permitted operating pressure is < 10 bar and rotations < 1500 min<sup>-1</sup>

\*\* The operating mode in the viscosity range of 10 to 20 mm<sup>2</sup>s<sup>-1</sup> needs to be consulted with the manufacturer.

Maximum degree of fluid contamination		
Operating pressure $p_2$	Contamination – class ISO 4406	Filtration coefficient $\beta_\alpha$
< 200 bar	1200 mm <sup>2</sup> s <sup>-1</sup>	$\beta_{25} 75 \geq$
> 200 bar	10 mm <sup>2</sup> s <sup>-1</sup>	$\beta_{10} 75 \geq$

### 2. Pressure load



Maximum continuous pressure	$p_{2n}$	The maximum operating pressure of the pump for permanent operation without time limitation
Maximum intermittent pressure	$p_{2max}$	Maximum intermittent pressure, not exceeding 20 s
Peak pressure	$p_3$	Short-time pressure (fragments of a second) created during a sudden change of the operation mode. This pressure rate must not be exceeded.

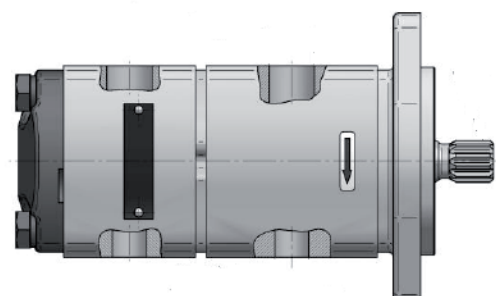
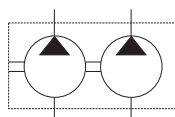
### 3. Joining of pumps into groups

#### Multiple designs

Gear pumps are suitable for multiple setups, whereby the drive shaft for the 1<sup>st</sup> pump is extended to a second and even a 3<sup>rd</sup> pump. A coupling is fitted between each pair of pumps. In most cases each pump is isolated from its neighbor, i.e. the suction ports are separate from one another. A common suction port is also possible as an option.

**Caution:** Basically, the specifications for the single pumps apply, but with certain restrictions:

**Max. speed:** This is determined by the highest rated pump speed in use.

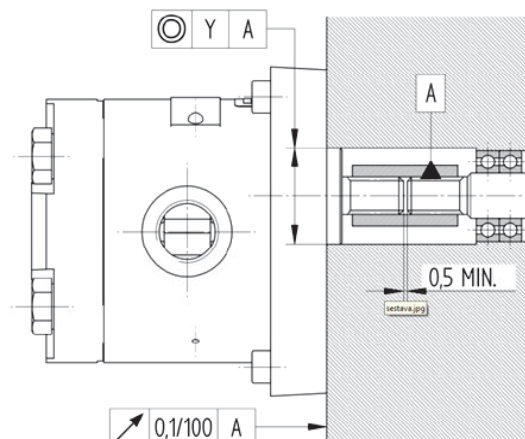


4. Calculation formulas

Flow		$V_g - \text{geometric volume of the pump [cm}^3\text{]}$ $n - \text{rotations [min}^{-1}\text{]}$ $\eta_v - \text{volumetric efficiency [-]}$
	$Q = \frac{V_g \cdot n}{1000} \cdot \eta_v [\text{dm}^3 \text{min}^{-1}]$	
Geometric volume		$V_g - \text{geometric volume of the pump [cm}^3\text{]}$ $n - \text{rotations [min}^{-1}\text{]}$ $\eta_v - \text{volumetric efficiency [-]}$
	$V_g = \frac{Q \cdot 1000}{n \cdot \eta_v} [\text{cm}^3]$	
Torque		$p - \text{required pressure at the output [bar]}$ $\eta_m - \text{mechanical efficiency [-]}$
	$M_k = \frac{V_g \cdot p}{20 \cdot \pi \cdot \eta_m} [\text{Nm}]$	
Input		$\eta_t - \text{total efficiency [-]}$
	$P = \frac{V_g \cdot n \cdot p}{600 \cdot 1000 \cdot \eta_t} [\text{kW}]$	
Volume efficiency $\eta_v$	Represents volume losses. It depends on rotations and the output pressure and its value $\eta_v$ ranges from 0,92 to 0,98.	
	$\eta_v = \frac{Q_{\text{eff}}}{Q_{\text{th}}}$	$Q_{\text{eff}} - \text{effective flow [l} \cdot \text{min}^{-1}\text{]}$ $Q_{\text{th}} - \text{theoretical flow [l} \cdot \text{min}^{-1}\text{]}$
Mechanical efficiency $\eta_m$	Represents mechanical losses. Its values $\eta_m$ is around 0,85	
	$\eta_m = \frac{M_{\text{th}}}{M_{\text{eff}}}$	$M_{\text{eff}} - \text{effective torque [Nm]}$ $M_{\text{th}} - \text{theoretical torque [Nm]}$
Total efficiency $\eta_t$	It is calculated as the product of the mechanical and volume efficiency and it represents the difference between theoretical and actual required input.	
	$\eta_t = \eta_v \cdot \eta_m = \frac{P_{\text{th}}}{P_{\text{eff}}}$	$P_{\text{eff}} - \text{effective performance [kW]}$ $P_{\text{th}} - \text{theoretical performance [kW]}$

5. Coupling

The construction design of the drive shafts ends corresponds to the transferred torque. The pump shaft must not be loaded by an additional external force in either the axial or radial direction. This is why it is recommended to use a flexible coupling. The maximum deviation of mutual alignment of the motor shaft and the centering pump diameter is 0.04 mm when using a coupling without a flexible element, and 0.1 mm when using a coupling with a flexible element, which partially balances alignment deviations. The perpendicularity of the seating front flange to the motor shaft is expressed as axial run-out and must not exceed 0.1 mm / 100 mm. The minimum distance of shaft ends is 0.5 mm. The selected coupling type must be able to transfer the maximum torque with sufficient safety.



### 6. Mounting, dismounting and operating instructions

The gear pump can be mounted in any position.

Make sure that the gear pump is clean and free of visible damage prior to mounting it. Protective covers prevent ingress of dirt into the inlet and outlet ports. These covers must not be removed until the pump is connected to the hydraulic circuit.

In order to make sure that proper mounting is possible, ascertain that all flange faces are clean and free of damage. The pump and the bellhousing are positioned with the help of the pilot diameter and fastened to each other with screws. The drive shaft of the pump is to be connected to the drive unit by means of a corresponding coupling. If this shaft is toothed, we recommend using a suitable lubricant for mounting.

Prior to initial operation, the sealing surfaces of the inlet and outlet ports must be checked for damages and dirt. It is vital that the threads be undamaged. Once the pump has been connected, it must be operated at minimum speed and without counter-pressure for at least 2 minutes. During this time, make sure that the pump runs freely, without excessive heating and unusual noise. If the operating fluid temperature is significantly higher than the temperature of the pump, the pump must not be subjected to loads before its temperature is equal to the temperature of the hydraulic fluid.

Protect the pump interior from dirt ingress by immediately closing the inlet and outlet ports as soon as the pump is disconnected from the hydraulic circuit. It is imperative to bleed the hydraulic circuit completely after the pump has been connected to it and whenever repair and/or maintenance work, as well as mounting operations have taken place anywhere in the circuit.

The quality of the hydraulic fluid must meet the required standards throughout the entire service life in order to maintain a permanent and sufficient level of lubrication of the pump. Furthermore, it is essential to not let the amount of fluid fall below the prescribed limit. If the fluid level is too low there may be turbulence, aeration, as well as an increase in fluid temperature, which then may lead to damaging of the pump.

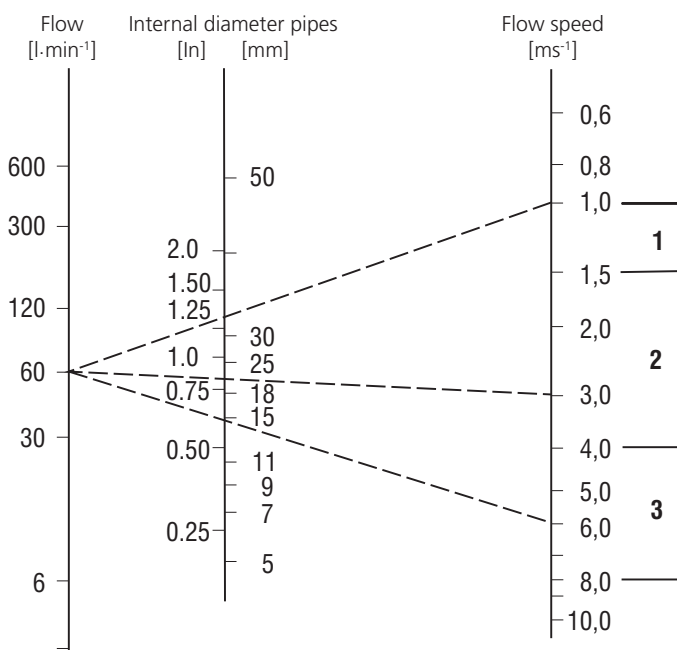
A pressure relief function, which limits system pressure to the max. permissible pump pressure, must be integrated into the hydraulic system. This valve must be installed in such a way as to protect it from improper handling. If multiple pumps are used, a suitable pressure relief valve must be installed in the circuit of each self-contained system.

#### Hydraulic Lines:

At a viscosity of 100 mm<sup>2</sup>/s and a flow rate of 1 to 1.5 m/s, the nominal inside diameter of the suction line must be dimensioned in such a way that the pressure in the suction port of the pump does not fall below -0.3 bar and does not exceed + 0.5 bar. In dimensioning the suction line, make sure that the flow rate will not exceed 8 m/s.

#### Operation:

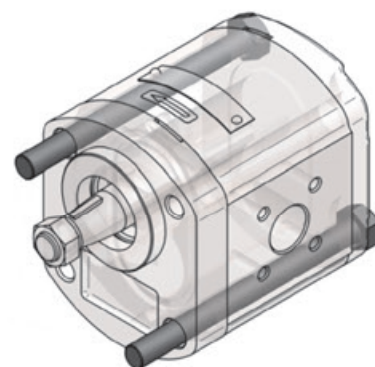
Gear pumps are low-maintenance components, as long as the maintenance intervals are adhered to, and tests of the hydraulic medium, the connections and fastening points are performed according to schedule. Regular fluid changes are necessary to ensure that the entire hydraulic circuit functions properly. The intervals for changing the hydraulic medium are determined through inspections performed by the operator.



**Graph for determining approximate diameter of the pipes** for the given flow and liquid flow speed (area 1 for suction pipes, area 2 for return pipes, area 3 for pressure pipes).

When assembling the pump using two screws going through the pump, the following tightening torque of screws is required:

Connection screws	Tightening torque
2 screws with M8 thread	20 ± 3 Nm
2 screws with M10 thread	45 ± 2 Nm



### 7. Storage

The storage time should not exceed one calendar year. Storage conditions: Temperature: from -20°C to +40°C, Humidity: from 40% to 80%

### 8. Warranty period and conditions

**For "High performance" series:** 3000 operation hours or two years from the sale date, whichever comes first.

**For "Lightline" series:** 1800 operation hours or one year from the sale date, whichever comes first.

The seller shall recognize a warranty claim and guarantee the product quality only if the operation conditions specified in the operation manual are adhered to.

In order to apply a warranty claim, the client must submit a failure report containing at least the following data:

type identification, serial number, number of operated hours.

The defective product must be sent to the seller complete, clean, with all connection ports plugged, and with the flange and drive shaft protected.

Adjustments or modifications of the pump are not allowed.

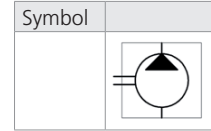
If the requirements specified above are not met, the warranty claim will be rejected and the product will be repaired only at the expense of the customer.

The seller does not accept any liability for damage caused by incorrect installation or use of the pump.



**Technical Features**

- › Operating pressure 200 bar, Peak pressure 250 bar
- › Cost effective design for circuits with a lower operating pressure
- › High quality aluminum alloys pump with axial play compensation
- › Service life for 1800 operation hours
- › Volumetric efficiency up to 96%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



**Technical Data**

Nominal Size Parameters	Symbol	Unit	Displacement												
			[cm <sup>3</sup> ]	0,19	0,26	0,38	0,50	0,65	0,75	0,88	1,00	1,25	1,50	1,75	2,00
Actual displacement	V <sub>g</sub>	[in <sup>3</sup> ]	0.011	0.016	0.023	0.031	0.040	0.046	0.054	0.061	0.076	0.092	0.107	0.122	
Rotation speed	nominal	n <sub>n</sub>	[min <sup>-1</sup> ]	1500											
	minimum	n <sub>min</sub>	[min <sup>-1</sup> ]	1000						850	700	600		500	
	maximum	n <sub>max</sub>	[min <sup>-1</sup> ]	7000						6000	5000	4000		3000	
Pressure at inlet	minimum	p <sub>1min</sub>	[bar]	-0,3 (-4.4 PSI)											
	maximum	p <sub>1max</sub>	[bar]	0,5 (7.3 PSI)											
Pressure at outlet	max. continuous	p <sub>2n</sub>	[bar]	200						180		160			
			[PSI]	2901						2611		2321			
	maximum	p <sub>2max</sub>	[bar]	230						210		190			
			[PSI]	3625						3336		2756			
	peak	p <sub>3</sub>	[bar]	250						230		210			
			[PSI]	3626						3625		3336			
Weight	m	[kg]	0,37	0,38	0,38	0,38	0,39	0,39	0,40	0,40	0,40	0,41	0,41	0,43	
		[lbs]	0.82	0.84	0.84	0.84	0.86	0.86	0.88	0.88	0.88	0.90	0.90	0.95	

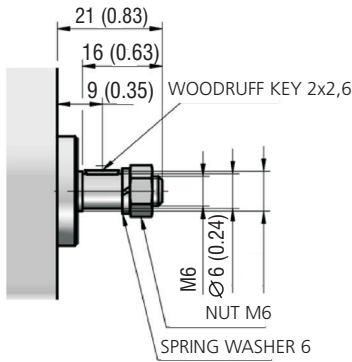
- 1) **p<sub>2n</sub>** maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 2) **p<sub>2max</sub>** maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 3) **p<sub>3</sub>** peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

Gear Pump / Size		GPOL - 0,19 ...2,0 ccm
Volumetric efficiency	%	89 ÷ 96
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for p <sub>2</sub> ≤ 200 bar		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for p <sub>2</sub> ≥ 200 bar		Class 20/17/14 acc. to ISO 4406

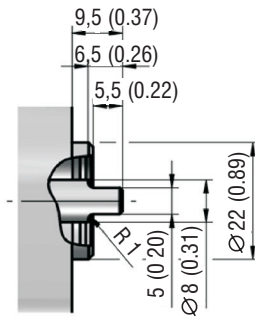


## Shaft design in millimeters (inches)

VZ

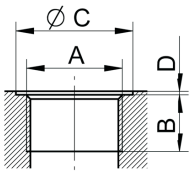


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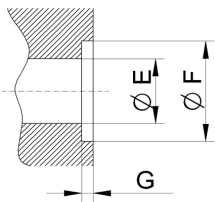
## Ports design in millimeters (inches)

### Dimensions of thread



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Code	Inlet / Outlet			
		A	B	C	D
All	MA	M10x1	8 (0.31)	15 (0.59)	1 (0.04)
	GA	G1/4	13 (0.51)	26 (1.02)	
	GB	G3/8		24 (0.94)	

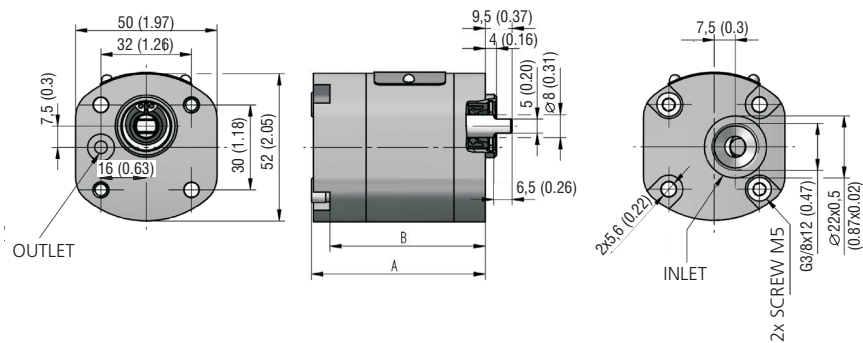
### Inlet / outlet



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Code	Inlet / Outlet		
		E	F	G
All	PA	5,5 (0.22)	9,6 (0.38)	1,1 (0.04)

## Pump design in millimeters (inches)

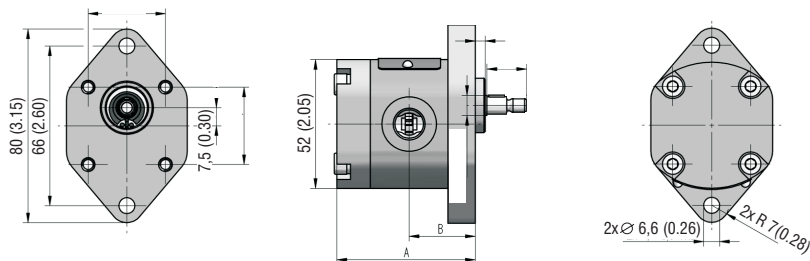
### GP0-\*L-ABKA-AGBPA-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,19 (0.011)	60,0 (2.36)	51,0 (2.01)	0,88 (0.054)	65,5 (2.58)	56,5 (2.22)
0,26 (0.016)	60,5 (2.38)	51,5 (2.03)	1,00 (0.061)	66,5 (2.62)	57,5 (2.26)
0,38 (0.023)	61,5 (2.42)	52,5 (2.07)	1,25 (0.076)	68,5 (2.70)	59,5 (2.34)
0,50 (0.031)	62,5 (2.46)	53,5 (2.11)	1,50 (0.092)	70,5 (2.78)	61,5 (2.42)
0,65 (0.040)	63,5 (2.50)	54,5 (2.15)	1,75 (0.107)	72,5 (2.85)	63,5 (2.50)
0,75 (0.046)	64,5 (2.54)	55,5 (2.19)	2,00 (0.122)	74,5 (2.93)	65,5 (2.58)

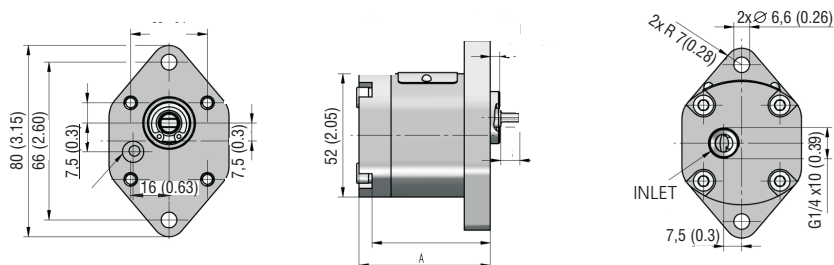
Pump design in millimeters (inches)

**GP0L-\*R(L)-RAVZ-SGAGA-N**



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,19 (0.011)	60,0 (2.36)	27,2 (1.07)	0,88 (0.054)	65,5 (2.58)	30,0 (1.18)
0,26 (0.016)	60,5 (2.38)	27,5 (1.08)	1,00 (0.061)	66,5 (2.62)	30,5 (1.20)
0,38 (0.023)	61,5 (2.42)	28,0 (1.10)	1,25 (0.076)	68,5 (2.70)	31,5 (1.24)
0,50 (0.031)	62,5 (2.46)	28,5 (1.12)	1,50 (0.092)	70,5 (2.78)	32,5 (1.28)
0,65 (0.040)	63,5 (2.50)	29,0 (1.14)	1,75 (0.107)	72,5 (2.85)	33,5 (1.32)
0,75 (0.046)	64,5 (2.54)	29,5 (1.16)	2,00 (0.122)	74,5 (2.93)	34,5 (1.36)

**GP0L-\*L-RAKA-AGAPA-N**

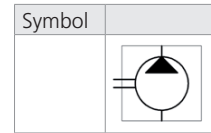


Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A
0,19 (0.011)	60,0 (2.36)	0,88 (0.054)	65,5 (2.58)
0,26 (0.016)	60,5 (2.38)	1,00 (0.061)	66,5 (2.62)
0,38 (0.023)	61,5 (2.42)	1,25 (0.076)	68,5 (2.70)
0,50 (0.031)	62,5 (2.46)	1,50 (0.092)	70,5 (2.78)
0,65 (0.040)	63,5 (2.50)	1,75 (0.107)	72,5 (2.85)
0,75 (0.046)	64,5 (2.54)	2,00 (0.122)	74,5 (2.93)



**Technical Features**

- › Operating pressure 230 bar, Peak pressure 270 bar
- › Cost effective design for circuits with a lower operating pressure
- › High quality aluminum alloys pump with axial play compensation
- › Service life for 1800 operation hours
- › Volumetric efficiency up to 96%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



**Technical Data**

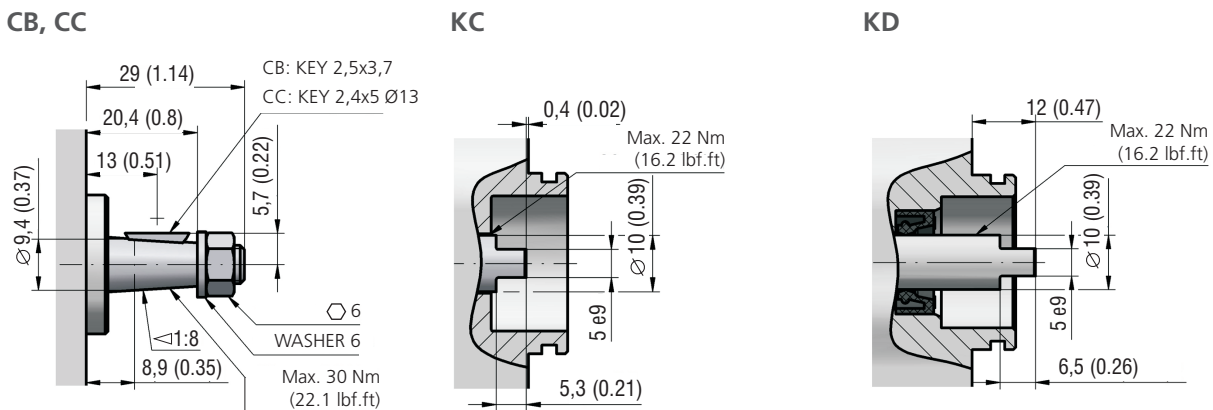
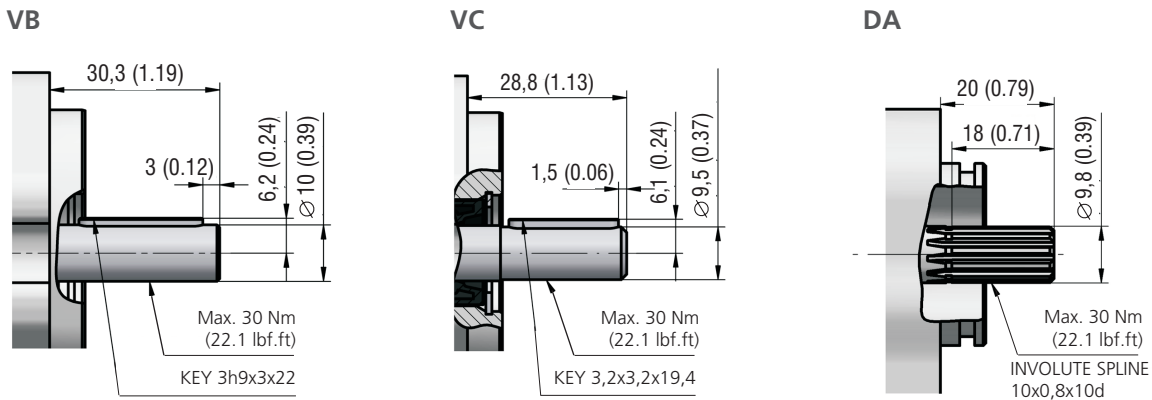
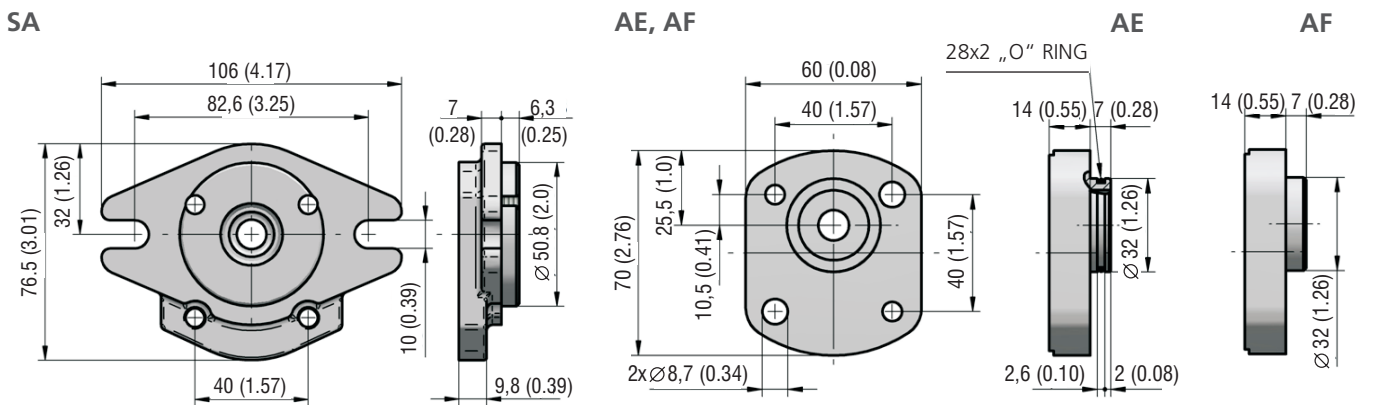
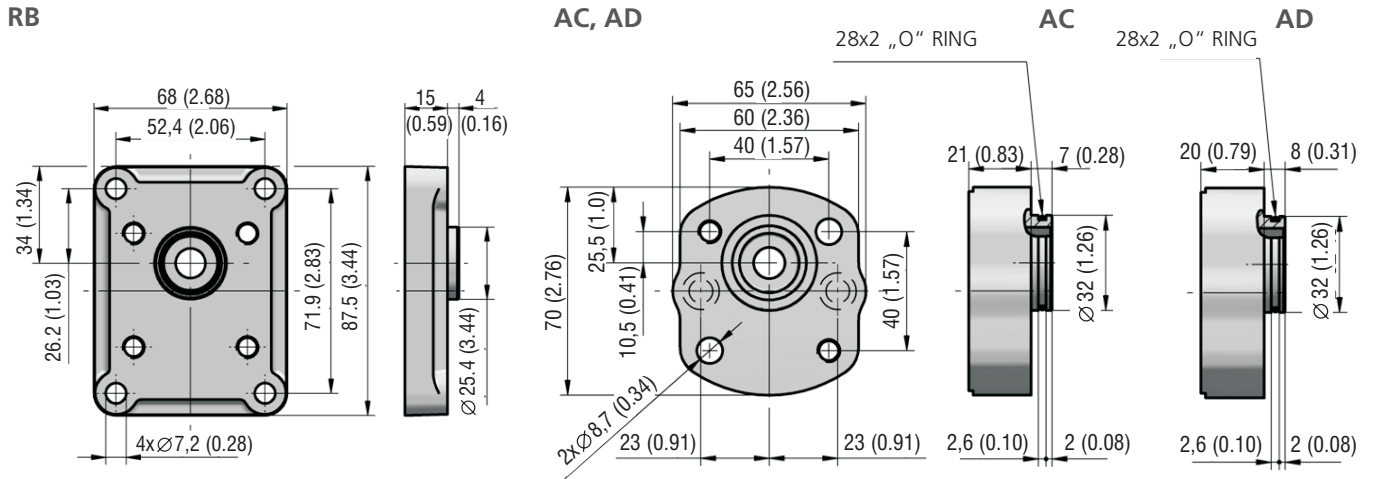
Nominal Size Parameters		Symbol	Unit	Displacement													
				0,8	1,3	1,6	1,8	2,1	2,7	3,2	3,7	4,2	4,8	5,8	7,0	8,0	
			[cm <sup>3</sup> ]	0.049	0.079	0.098	0.110	0.128	0.165	0.195	0.226	0.256	0.293	0.354	0.427	0.488	
Rotation speed	nominal	n <sub>n</sub>	[min <sup>-1</sup> ]	1500													
	minimum	n <sub>min</sub>	[min <sup>-1</sup> ]	1000				800				600					
	maximum	n <sub>max</sub>	[min <sup>-1</sup> ]	6000						5000	4500	4000	3500	3000	2500	2100	
Pressure at inlet	minimum	p <sub>1min</sub>	[bar]	-0,3 (-4.4 PSI)													
	maximum	p <sub>1max</sub>	[bar]	0,5 (7.3 PSI)													
Pressure at outlet	max. continuous	p <sub>2n</sub>	[bar]	230				210				190		160			
			[PSI]	3336				3046				2756		2321			
	maximum	p <sub>2max</sub>	[bar]	250				230				210		180			
			[PSI]	3626				3336				3046		2611			
	peak	p <sub>3</sub>	[bar]	270				250				230		200			
			[PSI]	3916				3626				3336		2901			
Weight	m	[kg]	0,82	0,85	0,87	0,89	0,92	0,93	0,96	0,98	1,02	1,04	1,08	1,10	1,20		
		[lbs]	1.81	1.87	1.92	1.96	2.03	2.05	2.12	2.16	2.25	2.29	2.38	2.43	2.65		

- 1) **p<sub>2n</sub>** maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 2) **p<sub>2max</sub>** maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 3) **p<sub>3</sub>** peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

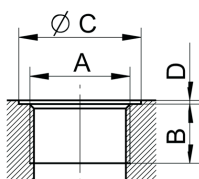
Gear Pump / Size		GP1L - 0,8 ...8 ccm
Volumetric efficiency	%	89 ÷ 98
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Fluid temperature range (FPM)	°C (°F)	-20...120 (-4...248)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for p <sub>2</sub> ≤ 200 bar		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for p <sub>2</sub> ≥ 200 bar		Class 20/17/14 acc. to ISO 4406





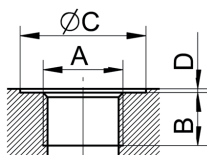


**Metric thread according to ISO 6149**



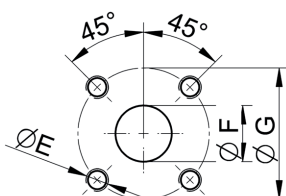
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Displacement [cm <sup>3</sup> (in <sup>3</sup> )]
		A	B	C	D		
ALL	xx	M14x1,5	13 (0.51)	26 (1.02)	1 (0.04)	MC	ALL
ALL	ME	M18x1,5	13 (0.51)	30 (1.18)		xx	ALL

**BSPP pipe thread according to 228-1**



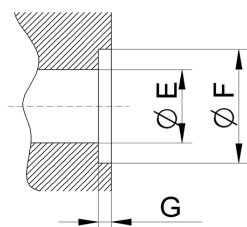
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code
		A	B	C	D	
ALL	GA	G1/4	13 (0.51)	26 (1.02)	1 (0.04)	GA
	GB	G3/8		24 (0.94)		GB

**Flanged fittings according to DIN 8901/8902**



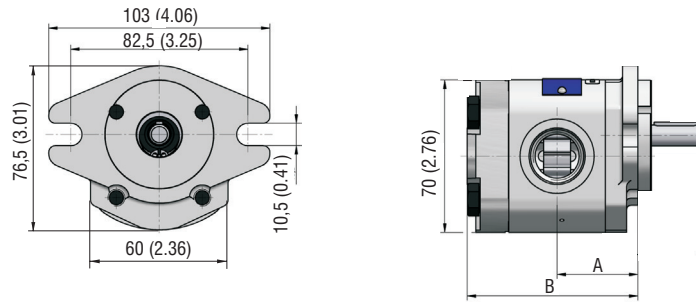
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension			Outlet Code
		E	F	G	
ALL	HD	M6 depth 12	12 (0.47)	30 (1.18)	HD

**Inlet / Outlet in flange**



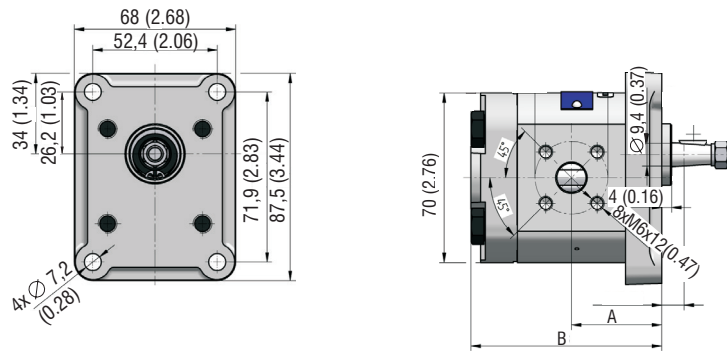
Code	Dimension		
	E	F	G
PA	9 (0.35)	12,7 (0.50)	1,4 (0.06)

GP1L-\*R(L)-SAVC-SUDUD-N



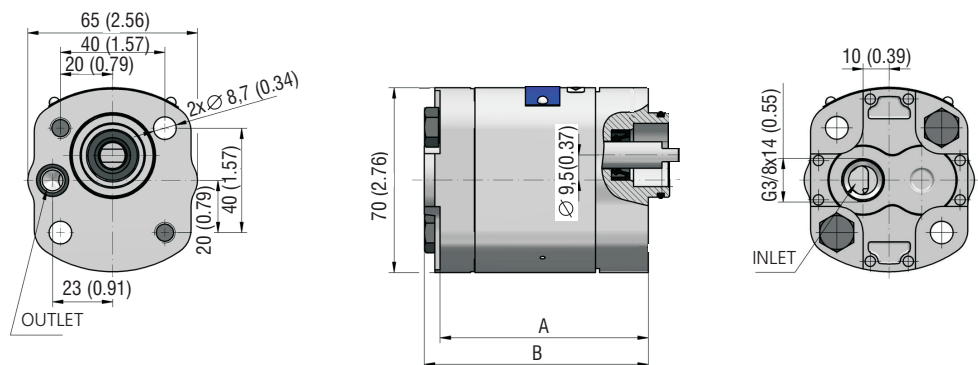
Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.049)	32,6 (1.28)	69,0 (2.73)	3,7 (0.226)	37,8 (1.49)	79,6 (3.13)
1,3 (0.079)	33,4 (1.31)	70,5 (2.78)	4,2 (0.256)	38,5 (1.52)	81,0 (3.19)
1,6 (0.098)	34,0 (1.34)	72,0 (2.83)	4,8 (0.293)	40,0 (1.65)	84,0 (3.31)
1,8 (0.110)	34,5 (1.36)	73,0 (2.87)	5,8 (0.354)	41,9 (1.65)	87,8 (3.46)
2,1 (0.128)	34,9 (1.37)	74,0 (2.91)	7,0 (0.427)	44,0 (1.73)	92,0 (3.62)
2,7 (0.165)	35,7 (1.41)	76,0 (2.99)	8,0 (0.488)	45,8 (1.80)	95,6 (3.76)
3,2 (0.195)	37,0 (1.46)	78,0 (3.07)			

GP1L-\*R-RBCC-SHDUD-N



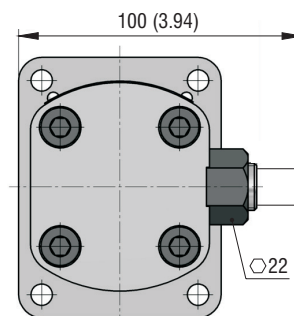
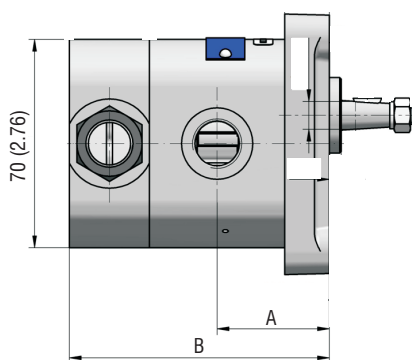
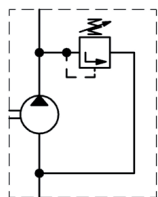
Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.049)	32,8 (1.29)	73,5 (2.89)	3,7 (0.226)	38,0 (1.50)	84,0 (3.31)
1,3 (0.079)	33,5 (1.32)	75,0 (2.95)	4,2 (0.256)	39,0 (1.54)	86,0 (3.39)
1,6 (0.098)	34,0 (1.34)	76,0 (2.99)	4,8 (0.293)	40,0 (1.57)	88,0 (3.46)
1,8 (0.110)	34,5 (1.36)	77,0 (3.03)	5,8 (0.354)	42,0 (1.65)	92,0 (3.62)
2,1 (0.128)	35,0 (1.38)	78,0 (3.07)	7,0 (0.427)	44,0 (1.73)	96,0 (3.78)
2,7 (0.165)	36,0 (1.42)	80,0 (3.15)	8,0 (0.488)	46,0 (1.81)	100,0 (3.94)
3,2 (0.195)	37,0 (1.46)	82,0 (3.23)			

GP1L-\*L-ADKD-AGBPA-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.049)	61,5 (2.42)	73,5 (2.89)	3,7 (0.226)	72,0 (2.83)	84,0 (3.31)
1,3 (0.079)	63,0 (2.48)	75,0 (2.95)	4,2 (0.256)	74,0 (2.91)	86,0 (3.39)
1,6 (0.098)	64,0 (2.52)	76,0 (2.99)	4,8 (0.293)	76,0 (2.99)	88,0 (3.46)
1,8 (0.110)	65,0 (2.56)	77,0 (3.03)	5,8 (0.354)	80,0 (3.15)	92,0 (3.62)
2,1 (0.128)	66,0 (2.60)	78,0 (3.07)	7,0 (0.427)	84,0 (3.31)	96,0 (3.78)
2,7 (0.165)	68,0 (2.68)	80,0 (3.15)	8,0 (0.488)	88,0 (3.46)	100,0 (3.94)
3,2 (0.195)	70,0 (2.76)	82,0 (3.23)			

GP1L-\*R-RBCB-SGBGB-N.002

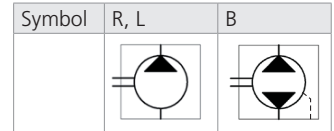


Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.049)	32,8 (1.29)	82,5 (3.25)	3,7 (0.226)	38,0 (1.50)	93,0 (3.66)
1,3 (0.079)	33,5 (1.32)	84,0 (3.31)	4,2 (0.256)	39,0 (1.54)	95,0 (3.74)
1,6 (0.098)	34,0 (1.34)	85,0 (3.35)	4,8 (0.293)	40,0 (1.57)	97,0 (3.82)
1,8 (0.110)	34,5 (1.36)	86,0 (3.39)	5,8 (0.354)	42,0 (1.65)	101,0 (3.98)
2,1 (0.128)	35,0 (1.38)	87,0 (3.43)	7,0 (0.427)	44,0 (1.73)	105,0 (4.13)
2,7 (0.165)	36,0 (1.42)	89,0 (3.50)	8,0 (0.488)	46,0 (1.81)	109,0 (4.29)
3,2 (0.195)	37,0 (1.46)	91,0 (3.58)			

**Technical Features**



- › Operating pressure 270 bar, Peak pressure 300 bar
- › Cost effective design for circuits with a lower operating pressure
- › High quality aluminum alloys pump with axial play compensation
- › Service life for 1800 operation hours
- › Volumetric efficiency up to 96%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



**Technical Data**

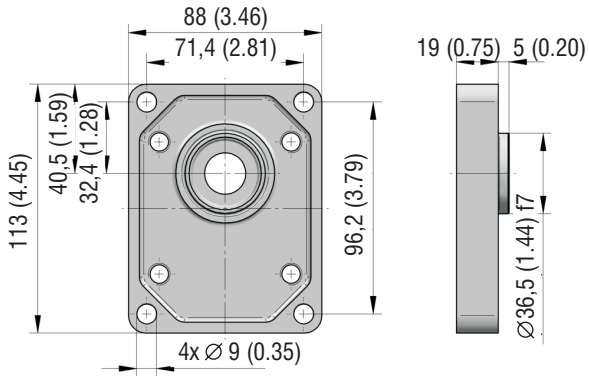
Nominal Size Parameters	Symbol	Unit	Displacement													
			3	4	6	8	10	12	14	16	18	20	22	25	28	30
Actual displacement	$V_g$	[in <sup>3</sup> ]	0.183	0.244	0.366	0.488	0.610	0.732	0.854	0.976	1.098	1.220	1.343	1.526	1.709	1.831
Rotation speed	nominal	$n_n$	1500													
	minimum	$n_{min}$	800	600			500				400					
	maximum	$n_{max}$	4000			3500	3000		4000		3600	3200	3000		2500	
Pressure at inlet*	minimum	$p_{1min}$	-0,3 (-4.4 PSI)													
	maximum	$p_{1max}$	0,5 (7.3 PSI)													
Pressure at outlet**	max. continuous	$p_{2n}$	270				250				220		200	180	160	
		[PSI]	3916				3626				3191		2901	2611	2321	
	maximum	$p_{2max}$	285				265				235		215	190	170	
		[PSI]	4134				3844				3408		3118	2756	2466	
	peak	$p_3$	300				280				250		230	200	180	
		[PSI]	4351				4061				3626		3336	2901	2611	
Weight	m	[kg]	2,6	2,63	2,65	2,75	2,8	2,95	3,03	3,1	3,22	3,35	3,4	3,5	3,8	3,97
		[lbs]	5.73	5.80	5.84	6.06	6.17	6.50	6.68	6.83	7.10	7.39	7.50	7.72	8.38	8.75

- 1) \*Inlet pressure in the reversible design can be up to  $p_1 = p_{2n} - 70 \text{ bar max.}$  External drainage must be used in case of the reversible design.
- 2) \*\*Outlet pressure in the reversible design is 10% lower than shown in the table (depending on operating conditions).
- 3)  $p_{2n}$  maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 4)  $p_{2max}$  maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 5)  $p_3$  peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

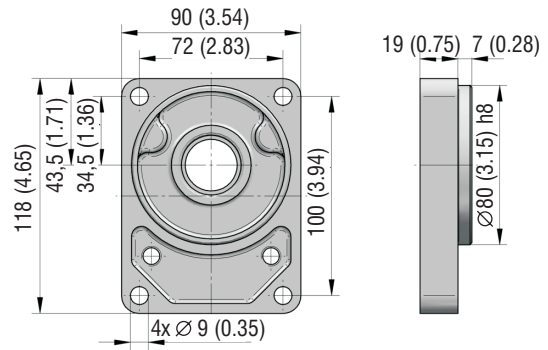
Gear Pump / Size		GP2L - 3 ...30 ccm
Volumetric efficiency	%	89 ÷ 96
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Fluid temperature range (FPM)	°C (°F)	-20...120 (-4...248)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for $p_2 \leq 200 \text{ bar}$		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for $p_2 \geq 200 \text{ bar}$		Class 20/17/14 acc. to ISO 4406



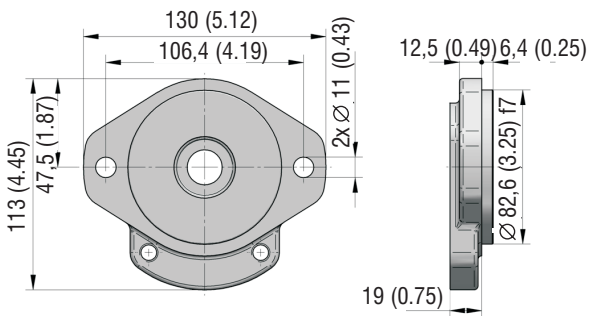
RE



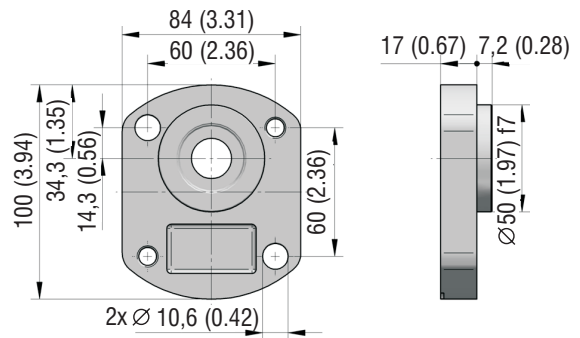
RF



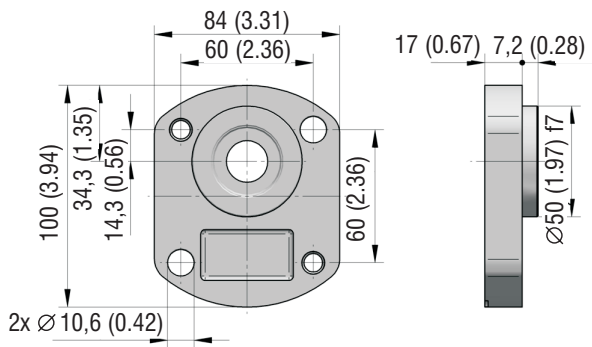
SB



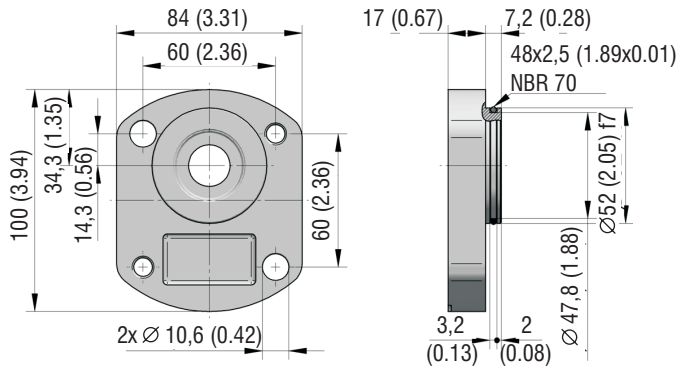
AH



AI

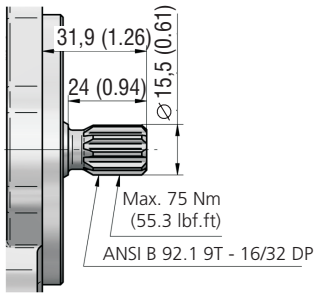


AJ

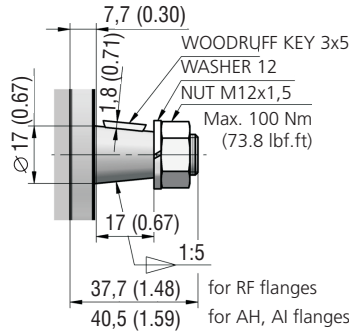




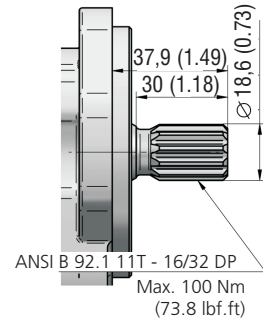
**DD**



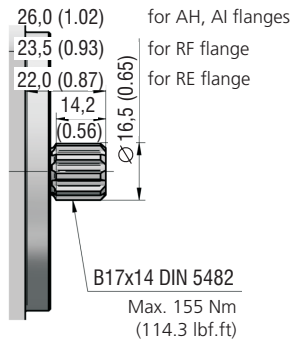
**CK**



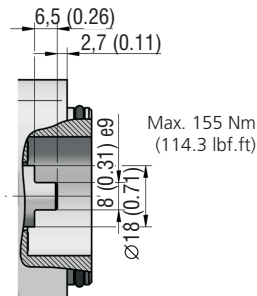
**DH**



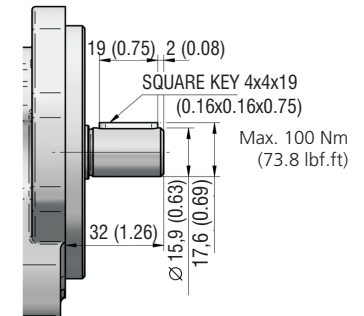
**DJ**



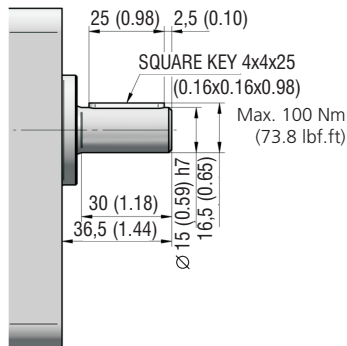
**KH**



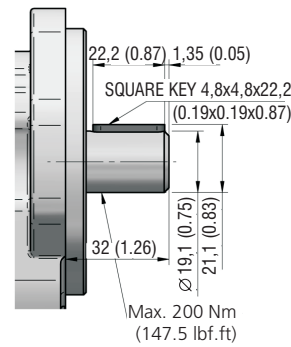
**VJ**



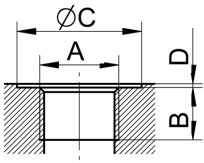
**VL**



**VM**

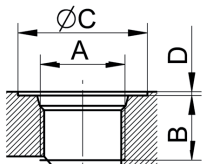


**BSPP pipe thread according to ISO 228 -1**



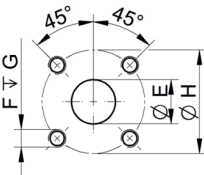
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
3-6 (0.18-0.34)	GC	G1/2	14 (0.55)	33 (1.30)	1 (0.04)	GC	G1/2	14 (0.55)	33 (1.30)	1 (0.04)
8-30 (0.49-1.83)	GD	G3/4	16 (0.63)	39 (1.53)						
16-30 (0.98-1.83)	GE	G1	18 (0.71)	45 (1.77)						

**UNF thread according to SAE**



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
ALL	UD	7/8-14 UNF-2B	17 (0.67)	34 (1.34)	1 (0.04)	UD	7/8-14 UNF-2B	17 (1.04)	33 (1.30)	1 (0.04)
	UE	1-1/16-12 UNF-2B	19 (0.75)	41 (1.61)						
	UH	1-5/16 UNF-2B	23 (0.91)	49 (1.93)						

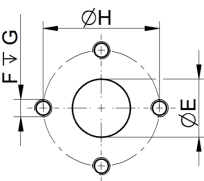
**Flanged fittings according to DIN 8901/8902**



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	HF	20 (0.79)	M6	13 (0.51)	40 (1.57)	HE	15 (0.59)	M6	13 (0.51)	35 (1.38)
16-30 (0.98-1.83)	HK	25 (0.98)	M8	13 (0.51)	55 (2.17)					

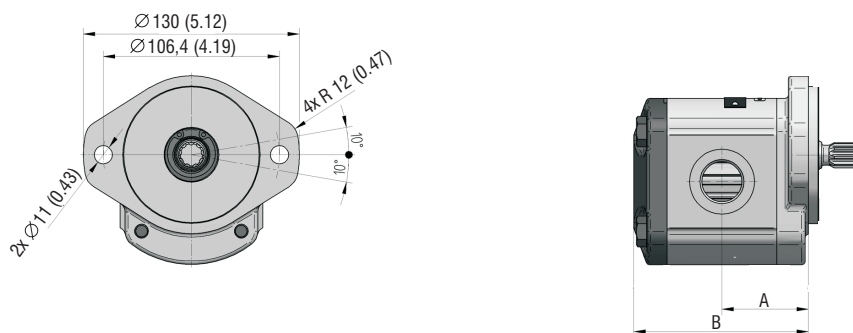
Note: H10H05 - for multiple version - for with one common inlet

**Flanged fittings - „cross“**



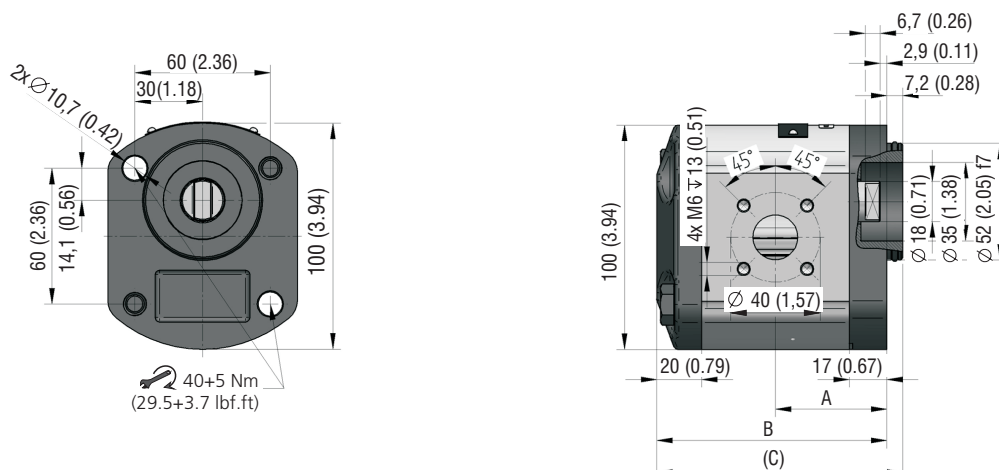
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	KB	20 (0.79)	M8	13 (0.51)	40 (1.57)	KA	13,5 (0.53)	M6	13 (0.51)	30 (1.18)
	KH	14 (0.55)			38 (1.50)					38 (1.50)
	KI	19 (0.75)			38 (1.50)					38 (1.50)

GP2L-\*R-SBDD-SG\*G\*-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
3 (0.18)	43,6 (1.72)	91,1 (3.59)	16 (0.98)	54,4 (2.14)	112,7 (4.44)
4 (0.24)	44,4 (1.75)	92,7 (3.65)	18 (1.10)	56,0 (2.20)	116,0 (4.57)
6 (0.37)	46,0 (1.81)	96,0 (3.78)	20 (1.22)	57,7 (2.27)	119,3 (4.70)
8 (0.49)	47,7 (1.88)	99,3 (3.91)	22 (1.34)	59,3 (2.33)	122,6 (4.83)
10 (0.61)	49,3 (1.94)	102,6 (4.04)	25 (1.53)	61,8 (2.43)	127,6 (5.02)
12 (0.73)	51,0 (2.01)	105,9 (4.17)	28 (1.71)	64,3 (2.53)	132,6 (5.22)
14 (0.85)	52,7 (2.07)	109,3 (4.30)	30 (1.83)	66,0 (2.60)	135,9 (5.35)

GP2L-\*R-AJKH-SH\*H\*-N

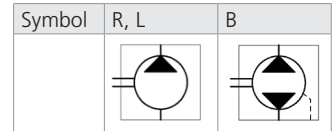


Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C
3 (0.18)	37,4 (1.47)	88,6 (3.49)	95,8 (3.77)	16 (0.98)	45,0 (1.77)	110,2 (4.34)	117,4 (4.62)
4 (0.24)	37,4 (1.47)	90,2 (3.55)	97,4 (3.83)	18 (1.10)	45,0 (1.77)	113,5 (4.47)	120,7 (4.75)
6 (0.37)	38,6 (1.52)	93,5 (3.68)	100,7 (3.96)	20 (1.22)	45,0 (1.77)	116,8 (4.60)	124,0 (4.88)
8 (0.49)	40,7 (1.60)	96,8 (3.81)	104,0 (4.09)	22 (1.34)	52,6 (2.07)	120,1 (4.73)	127,3 (5.01)
10 (0.61)	41,2 (1.62)	100,1 (3.94)	107,3 (4.22)	25 (1.53)	59,3 (2.33)	125,1 (4.93)	132,3 (5.21)
12 (0.73)	45,0 (1.77)	103,4 (4.07)	110,6 (4.35)	28 (1.71)	61,8 (2.43)	130,1 (5.12)	137,3 (5.41)
14 (0.85)	45,0 (1.77)	106,8 (4.20)	114,0 (4.49)	30 (1.83)	63,5 (2.50)	133,4 (5.25)	140,6 (5.54)

**Technical Features**



- › Operating pressure 250 bar, Peak pressure 280 bar
- › Cost effective design for circuits with a lower operating pressure
- › High quality aluminum alloys pump with axial play compensation
- › Service life for 1800 operation hours
- › Volumetric efficiency up to 96%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



**Technical Data**

Nominal Size Parameters	Symbol	Unit	Displacement											
			[cm <sup>3</sup> ]	20	22	26	33	39	46	50	52	55	63	71
Actual displacement	V <sub>g</sub>	[in <sup>3</sup> ]	1.22	1.34	1.59	2.01	2.38	2.81	3.05	3.17	3.36	3.84	4.33	
Rotation speed	nominal	n <sub>n</sub>	1500											
	minimum	n <sub>min</sub>	600				500				400			
	maximum	n <sub>max</sub>	3500			3000				2800		2500		
Pressure at inlet*	minimum	p <sub>1min</sub>	-0,3 (-4.4 PSI)											
	maximum	p <sub>1max</sub>	0,5 (7.3 PSI)											
Pressure at outlet**	max. continuous	p <sub>2n</sub>	[bar]	250			230			220		200		180
		[PSI]	3626			3336			3191		2901		2611	
	maximum	p <sub>2max</sub>	[bar]	265			250			240		230		200
		[PSI]	3844			3626			3481		3336		2901	
	peak	p <sub>3</sub>	[bar]	280			270			260		250		220
		[PSI]	4061			3916			3771		3626		3191	
Weight	m	[kg]												
		[lbs]												

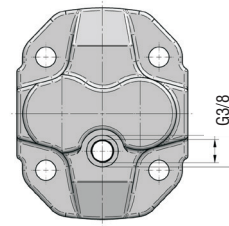
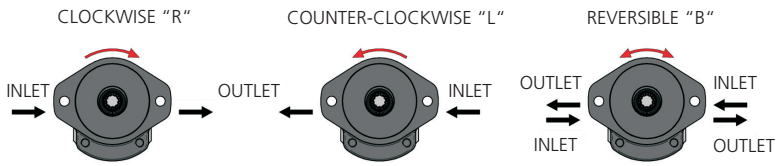
- 1) \*Inlet pressure in the reversible design can be up to **p<sub>1</sub> = p<sub>2n</sub>-70 bar max.** External drainage must be used in case of the reversible design.
- 2) \*\*Outlet pressure in the reversible design is 10% lower than shown in the table (depending on operating conditions).
- 3) **p<sub>2n</sub>** maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 4) **p<sub>2max</sub>** maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 5) **p<sub>3</sub>** peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

Gear Pump / Size		GF3 - 20 ...71 ccm
Volumetric efficiency	%	89 ÷ 96
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Fluid temperature range (FPM)	°C (°F)	-20...120 (-4...248)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for p <sub>2</sub> ≤ 200 bar		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for p <sub>2</sub> ≥ 200 bar		Class 20/17/14 acc. to ISO 4406

### Direction of rotation, reversible design

Determine direction of rotation by looking at the drive shaft.  
The pump can be used only in the specified direction of rotation.

The pumps B codes (Bi-directional) have an external drainage with an orifice located in the cover or the flange.



### Ordering Code

**GP3 L** - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

<b>Gear pump serie 3</b>											
<b>Lightline</b>											
<b>Displacement</b>	20	22	26	33	39	46	50	52	55	63	71
<b>Direction of rotation</b>	Counter clockwise		Clockwise		Bi-directional						
<b>Flange design</b>											
<b>Shaft Type</b>											

**Shaft seal**  
No designation 004: standard without shaft seal

**Seals**  
NBR  
FPM (Viton)  
HNBR

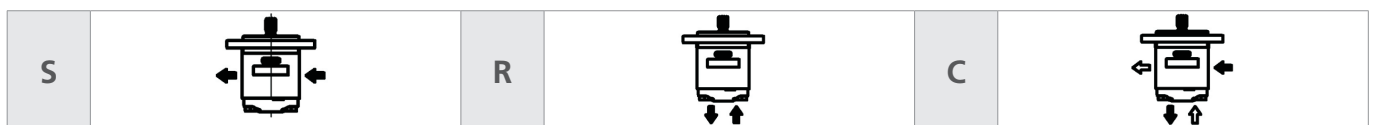
**MI, MJ, ML, MM, MP, GC, GD, GE, GF, UD, UE, UH, UI, UJ**  
HI, HJ, HK, HL, AB, AC, AD, AE  
KC, KD, KE, KF, SI, SJ, SK, SL

**S, R, C**  
Inlet / Outlet ports  
Ports orientation

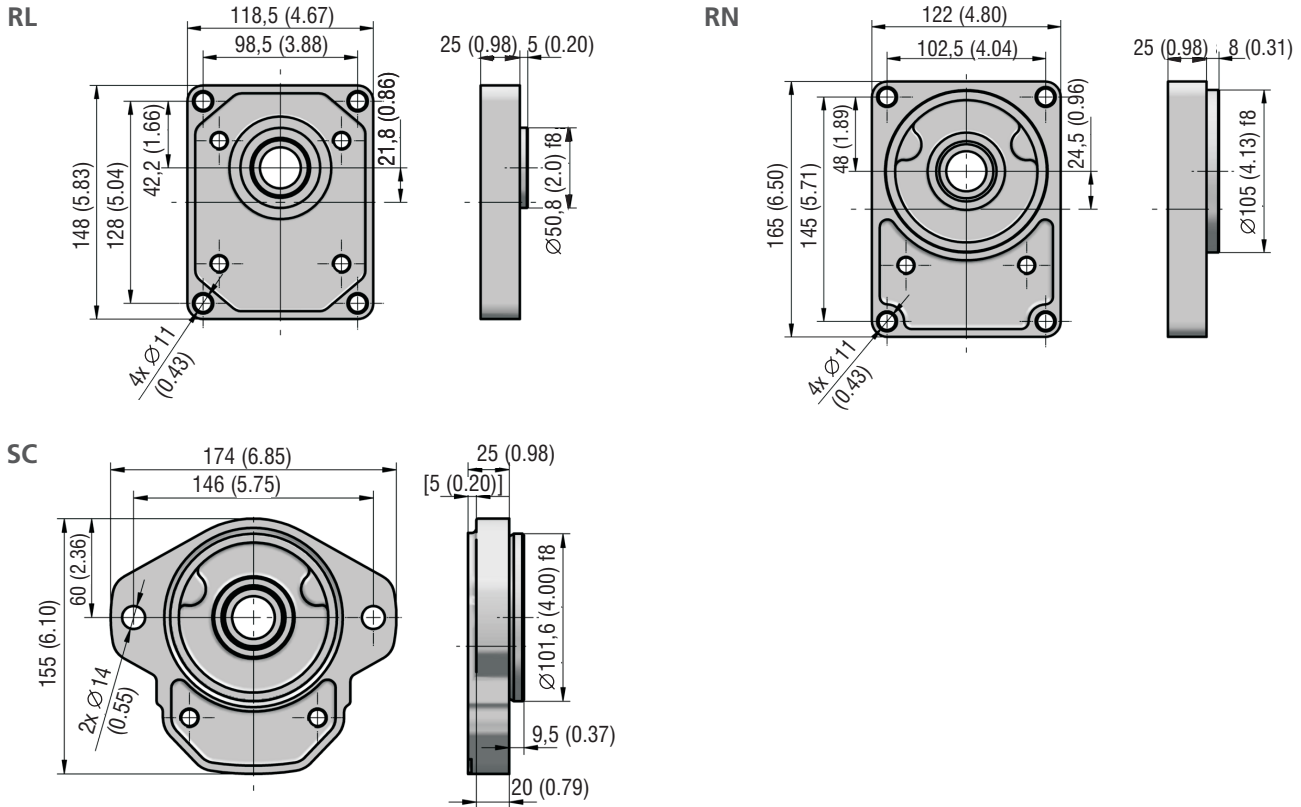
### Combination of Flanges and Shafts

Flange Design	RL	RN	SC
Shaft Type			
CL	●		
CM		●	
DN			●
DP			●
VO			●
VP	●		

### Port orientation

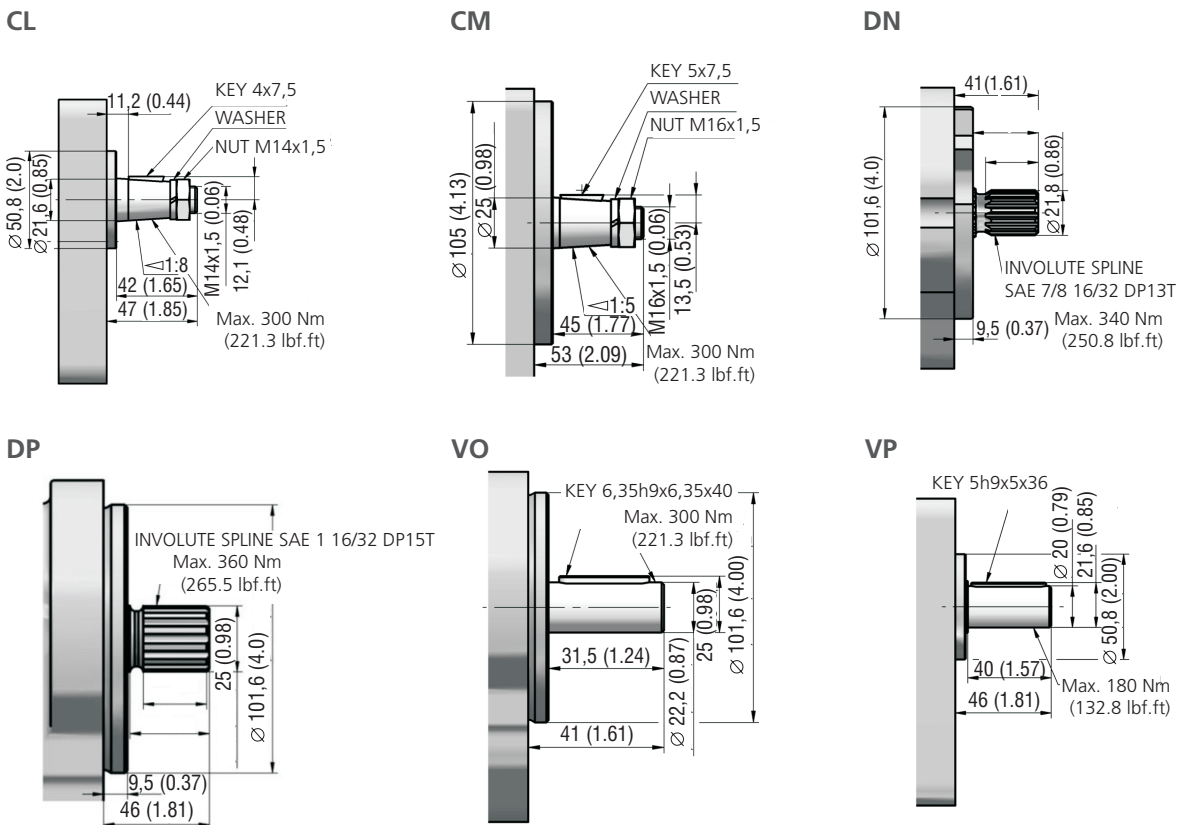


**Flange design** in millimeters (inches)

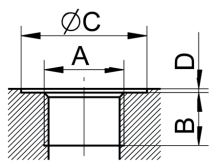


**Shaft design** in millimeters (inches)

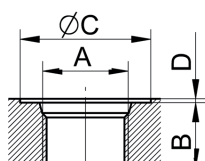
A driving device must not generate an axial or a radial load of the pump shaft, unless this is exclusively permitted for the pump with a front-end bearing.  
 Ask producer for the version with front-end bearing.  
 Maximal torque for clutch between sections in multiple version is 220 Nm.



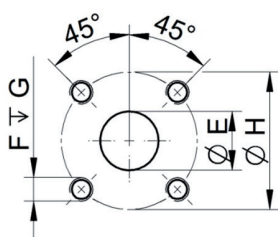
**Ports design** in millimeters (inches)

**BSPP pipe thread according to 228-1**


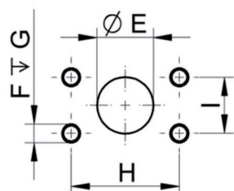
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
20 - 22 (1.22 - 1.34) including	GD	G 3/4	16 (0.63)	39 (1.54)	1 (0.04)	GD	G 3/4	16 (0.63)	39 (1.54)	1 (0.04)
26 - 39 (1.59 - 2.38) including	GE	G 1	18 (0.71)	45 (1.77)						
46 - 63 (2.81 - 3.84) including	GF	G 1 1/4		57 (2.24)						
71 (4.33)	GH	G 1 1/2	24 (1.46)	60 (3.66)						

**UNF thread according to SAE**


Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
20 - 33 (1.22 - 2.01) including	UH	1-5/16-12UNF	23 (0.91)	49 (1.93)	1 (0.04)	UE	1-1/16-12UNF	19 (0.75)	41 (1.61)	1 (0.04)
39 - 52 (2.38 - 3.17) including	UI	1-5/8-12UNF 2B								
55 - 71 (3.36 - 4.33) including	UJ	1-7/8-12UNF	UH	1-5/16-12UNF						

**Flanged fittings according to DIN 8901/8902**


Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	HK	25 (0.98)	M8	16 (0.63)	55 (2.17)	HJ	18 (0.71)	M8		55 (2.17)

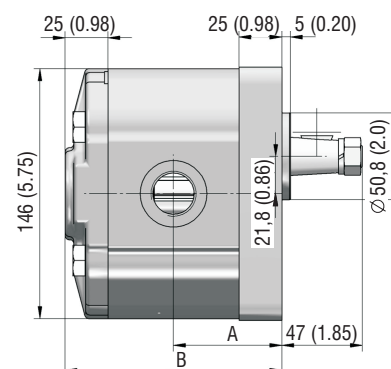
**Flanged fittings according to SAE, UNC thread**


Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension					Outlet Code	Dimension				
		E	F	G	H	I		E	F	G	H	I
20 - 52 (1.22 - 3.17) including	AC	25,4 (1.00)	3/8-16-UNC	22 (0.87)	52,4 (2.06)	26,2 (1.03)	AB	19 (0.75)	3/8-16-UNC	22 (0.87)	47,6 (1.87)	22,2 (0.87)
55 - 71 (3.36 - 4.33) including	AD	30,5 (1.20)	7/16-14-UNC		58,7 (2.31)	30,2 (1.19)	AC	25,4 (1.00)			52,4 (2.06)	26,2 (1.03)

**GPP Pumps - basic design** in millimeters (inches)

**GP3L-\*R-RLCL-SG\*G\*-N**

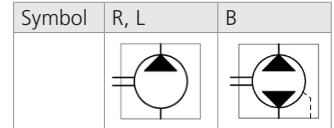
Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
20 (1.22)	63 (2.48)	128 (5.04)	50 (3.05)	77 (3.03)	156 (6.14)
22 (1.34)	64 (2.52)	130 (5.12)	52 (3.17)	78 (3.07)	158 (6.22)
26 (1.59)	65 (2.56)	133(5.24)	55 (3.36)	79 (3.11)	160 (6.30)
33 (2.01)	68 (2.68)	139 (5.47)	63 (3.84)	83 (3.27)	168 (6.61)
39 (2.38)	72 (2.83)	146 (5.75)	71 (4.33)	86 (3.39)	175 (6.89)
46 (2.81)	75 (2.95)	152 (5.98)			





**Technical Features**

- › Operating pressure 230 bar, Peak pressure 260 bar
- › High-strength quality aluminum alloys pump with axial play compensation
- › Low noise level in whole operating range
- › High operational reliability and service life for 3000 operation hours
- › High volumetric efficiency up to 98%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



**Technical Data**

Nominal Size Parameters	Symbol	Unit	Displacement														
			0,18	0,25	0,32	0,36	0,40	0,50	0,63	0,70	0,80	1,00	1,25	1,50	2,00	2,50	3,20
Actual displacement	V <sub>g</sub>	[cm <sup>3</sup> ]	0,175	0,256	0,327	0,361	0,408	0,501	0,630	0,711	0,804	1,001	1,258	1,514	2,004	2,505	3,192
		[in <sup>3</sup> ]	0,011	0,016	0,020	0,022	0,025	0,031	0,038	0,043	0,049	0,061	0,077	0,092	0,122	0,153	0,195
Rotation speed	nominal	n <sub>n</sub>	1500														
	minimum	n <sub>min</sub>	1000						800			600		500			
	maximum	n <sub>max</sub>	8000	7000			6000			5000	4000	3000	2800	2500	1800		
Pressure at inlet*	minimum	p <sub>1min</sub>	-0,3 (-4.4 PSI)														
	maximum	p <sub>1max</sub>	0,5 (7.3 PSI)														
Pressure at outlet**	max. continuous	p <sub>2n</sub>	[bar]	200	230			220			200	160	120	90	60		
		[PSI]	2901	3336			3191			2901	2321	1740	1305	870			
	maximum	p <sub>2max</sub>	[bar]	250			240			220	180	150	100	70			
		[PSI]	3625			3481			3191	2611	2176	1450	1015				
peak	p <sub>3</sub>	[bar]	260			250			230	190	160	110	80				
	[PSI]	3771			3625			3336	2756	2321	1595	1160					
Nominal flow rate (min.) at n <sub>n</sub> and p <sub>2n</sub>	Q <sub>n</sub>	[l min <sup>-1</sup> ]	0,19	0,30	0,40	0,44	0,50	0,65	0,85	0,95	1,05	1,35	1,70	2,00	2,70	3,40	4,45
		[GPM]	0,05	0,08	0,11	0,12	0,13	0,17	0,22	0,25	0,28	0,36	0,45	0,53	0,71	0,90	1,18
Maximum flow rate at n <sub>max</sub> and p <sub>2max</sub>	Q <sub>max</sub>	[l min <sup>-1</sup> ]	1,39	1,77	2,27	2,50	2,83	2,98	3,74	4,22	4,78	4,95	4,98	4,50	5,56	6,20	5,69
		[GPM]	0,37	0,47	0,60	0,66	0,75	0,79	0,99	1,11	1,26	1,31	1,32	1,19	1,47	1,64	1,50
Nominal input power (max.) at n <sub>n</sub> and p <sub>2n</sub>	P <sub>n</sub>	[kW]	0,10	0,17	0,22	0,24	0,28	0,34	0,41	0,46	0,52	0,59	0,74	0,71	0,71	0,66	0,56
Maximum input power at n <sub>max</sub> and p <sub>2max</sub>	P <sub>max</sub>	[kW]	0,69	0,88	1,12	1,24	1,40	1,40	1,78	2,01	2,27	2,16	2,17	1,60	1,65	1,23	0,79
Weight	m	[kg]	0,37	0,38	0,38	0,38	0,39	0,39	0,40	0,40	0,40	0,41	0,41	0,43	0,45	0,48	0,53
		[lbs]	0,82	0,84	0,84	0,84	0,86	0,86	0,88	0,88	0,88	0,90	0,90	0,95	0,99	1,06	1,17

- 1) \*Inlet pressure in the reversible design can be up to **p<sub>1</sub> = p<sub>2n</sub> -70 bar max.** External drainage must be used in case of the reversible design.
- 2) \*\*Outlet pressure in the reversible design is 10% lower than shown in the table (depending on operating conditions).
- 3) **p<sub>2n</sub>** maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 4) **p<sub>2max</sub>** maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 5) **p<sub>3</sub>** peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

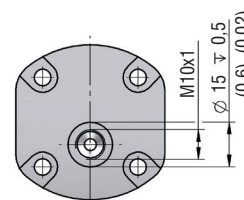
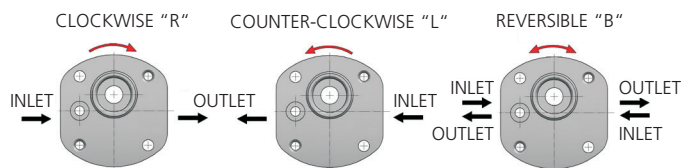
Gear Pump / Size		GPO - 0,18 ...3,2 ccm
Volumetric efficiency	%	92 ÷ 98
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for p <sub>2</sub> ≤ 200 bar		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for p <sub>2</sub> ≥ 200 bar		Class 20/17/14 acc. to ISO 4406



## Direction of rotation, reversible design

Determine direction of rotation by looking at the drive shaft.  
The pump can be used only in the specified direction of rotation.

The pumps B codes (Bi-directional) have an external drainage located in the cover.



## Ordering Code

**GPO -** [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

**Gear pump serie 0**

**Displacement**

- 0,18
- 0,25
- 0,32
- 0,36
- 0,40
- 0,50
- 0,63
- 0,70
- 0,80
- 1,00
- 1,25
- 1,50
- 2,00
- 2,50
- 3,20

**Direction of rotation**

- Counter clockwise: L
- Clockwise: R
- Bi-directional: B

**Flange design**

- Flange with two bolts M6 - centre ring Ø 22 mm (0,87 in): RA
- Flange with two bolts M5 - centre ring Ø 22 mm (0,87 in) screw pitch 32x32 mm (1,26x1,26 in): AA
- Flange with two bolts M5 - centre ring Ø 22 mm (0,87 in) screw pitch 30x32 mm (1,18x1,26 in): AB

**Shaft seal**

- No designation: standard
- 004: without shaft seal

**Seals**

- N: NBR

**Inlet / Outlet port**

- PA: Flange side port
- GA: BSP G1/4
- GB: BSP G3/8
- MA: M10x1

**Ports orientation**

- S
- F
- A
- C
- D

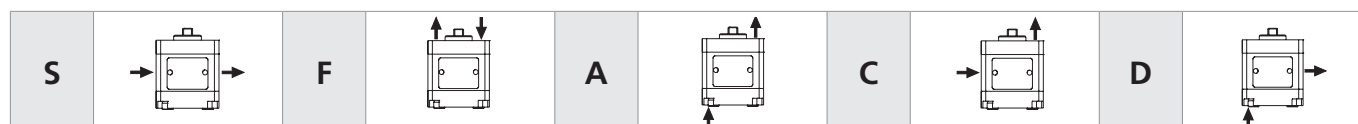
**Shaft Type**

- CA
- VA
- KA
- KB

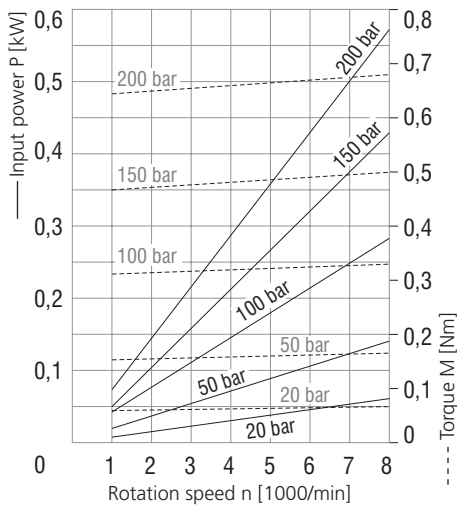
## Combination of Flanges and Shafts

Code	Drive shaft design	RA	AA	AB
CA	Taper 1:8 Woodruff key 2x2,6	●	●	●
VA	Cylindric Woodruff key 2x2,6	●	●	●
KA	Cross coupling	●	●	●
KB	Cross coupling	●	●	●

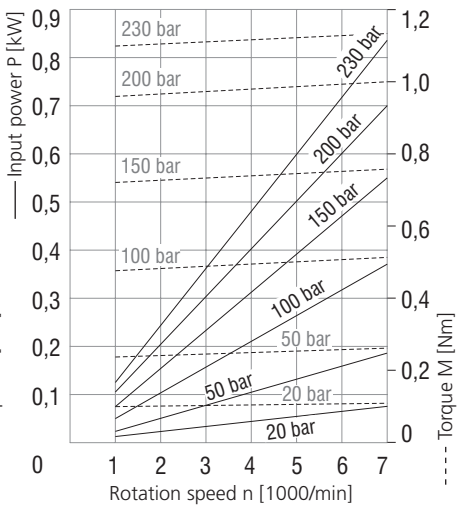
## Ports orientation



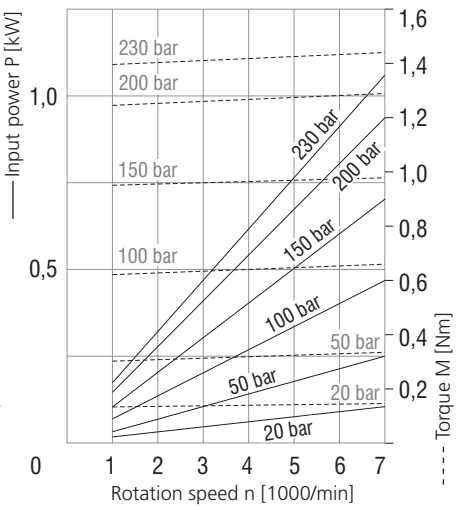
0,18 ccm



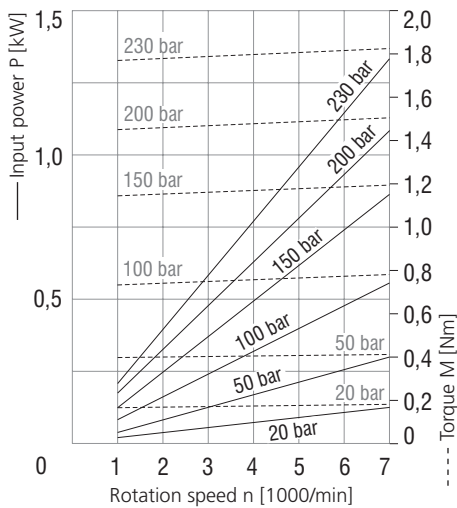
0,25 ccm



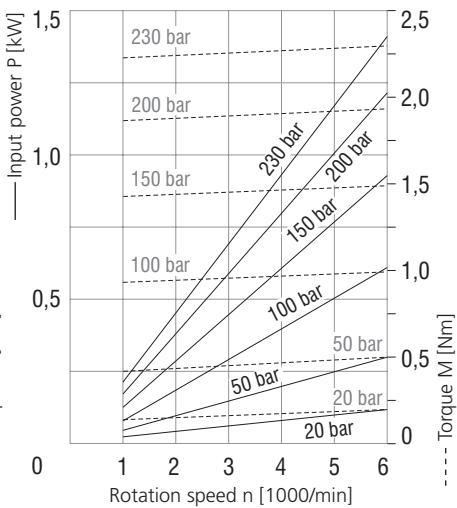
0,32 ccm



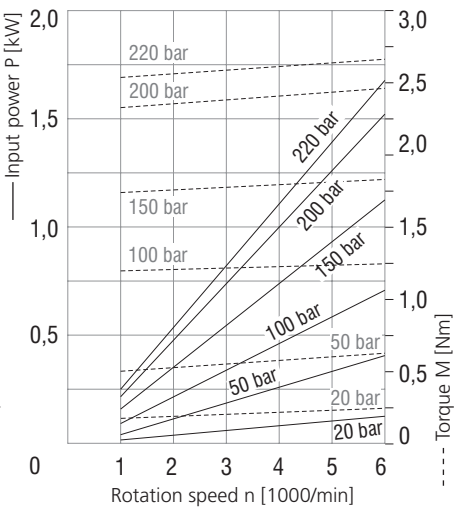
0,40 ccm



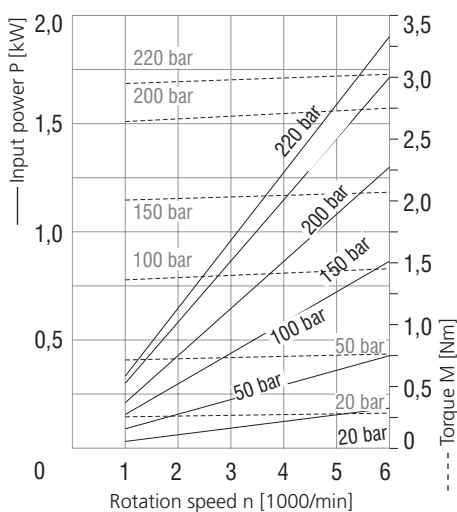
0,50 ccm



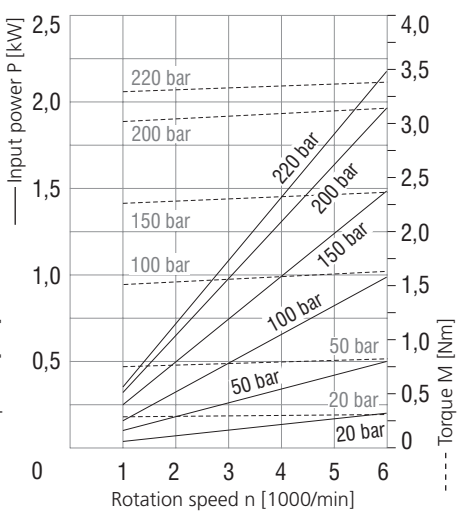
0,63 ccm



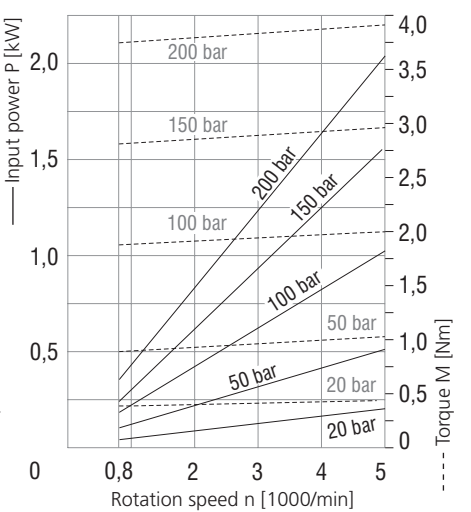
0,70 ccm



0,80 ccm

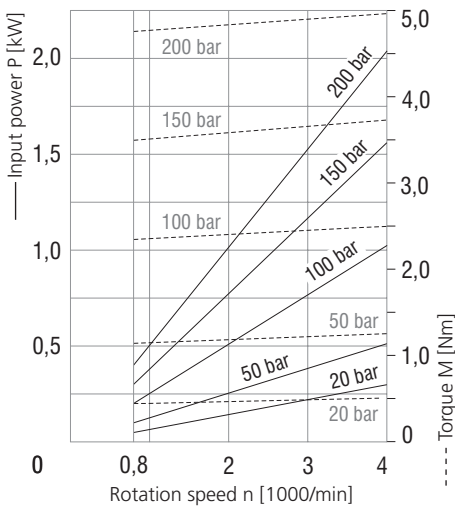


1,00 ccm

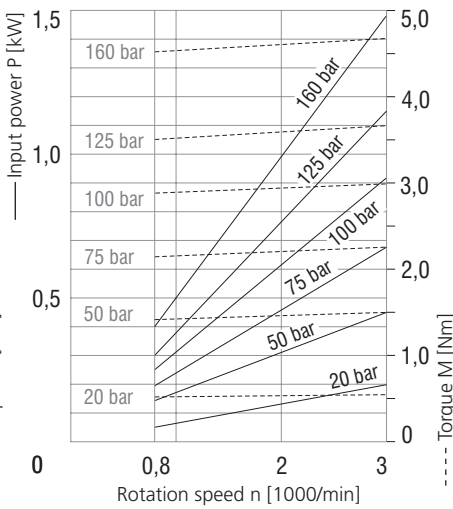


Characteristics measured at  $v = 32 \text{ mm}^2/\text{s}$  (156 SUS)

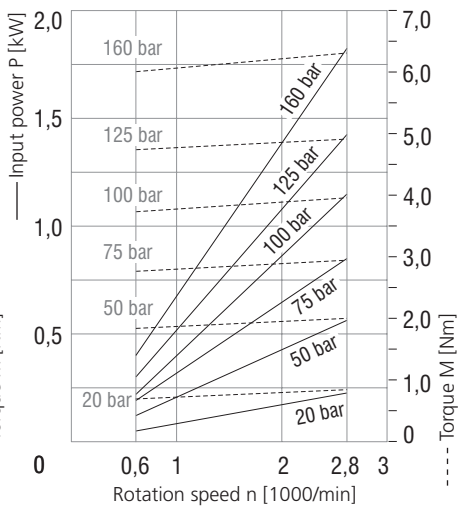
**1,25 ccm**



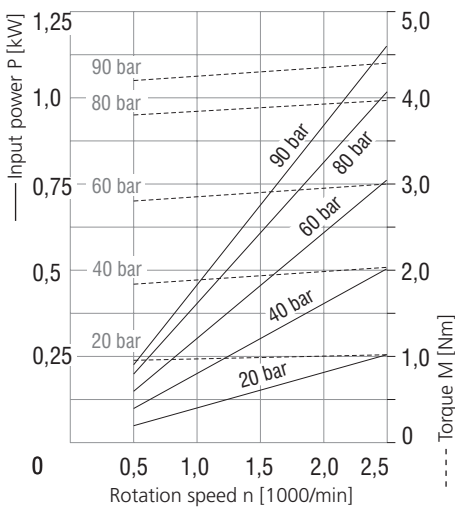
**1,50 ccm**



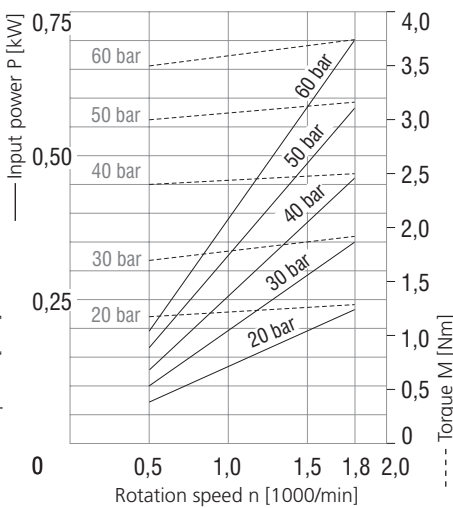
**2,00 ccm**



**2,50 ccm**

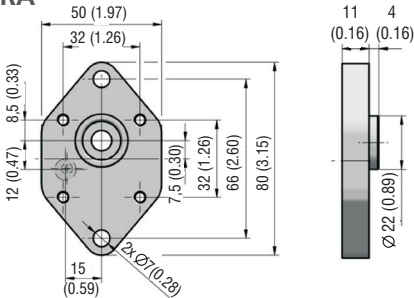


**3,20 ccm**

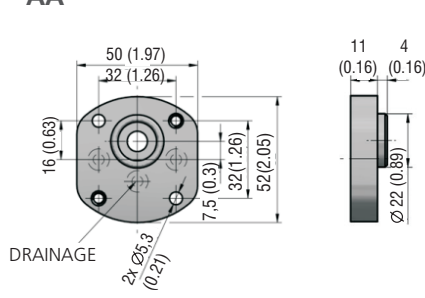


**Flange design** in millimeters (inches)

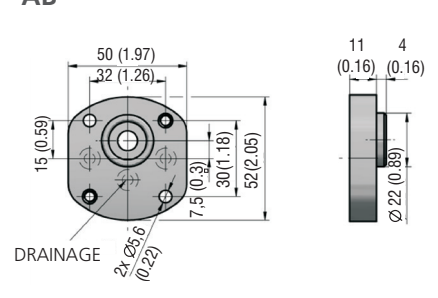
**RA**



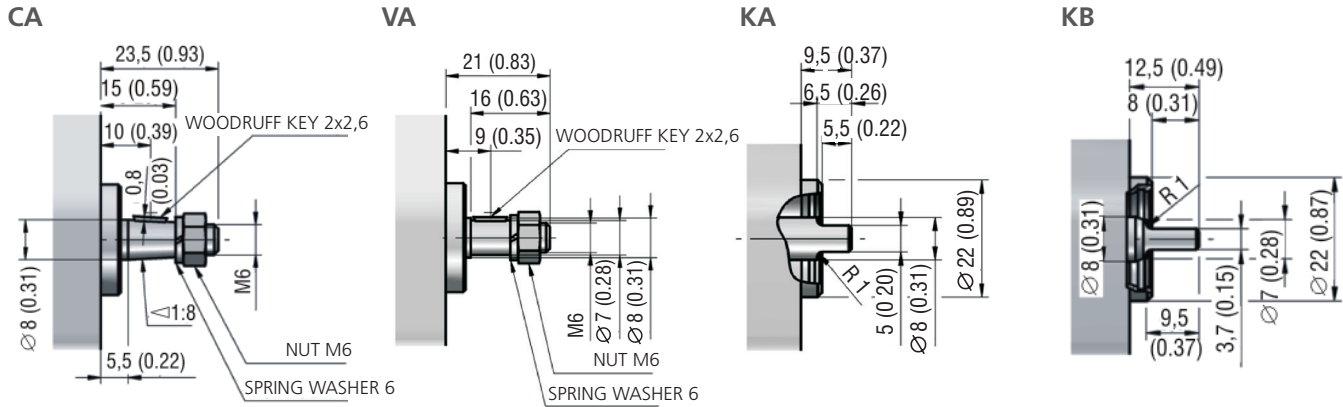
**AA**



**AB**

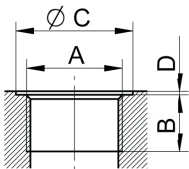


## Shaft design in millimeters (inches)



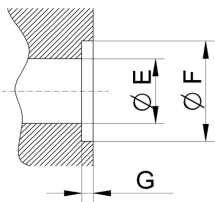
## Ports design in millimeters (inches)

### Dimensions of thread



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Code	Inlet / Outlet			
		A	B	C	D
0,18-0,5 (0.01-0.03)	MA	M10x1	8 (0.31)	15 (0.59)	1 (0.04)
All	GA	G1/4	13 (0.51)	26 (1.02)	
	GB	G3/8		24 (0.94)	

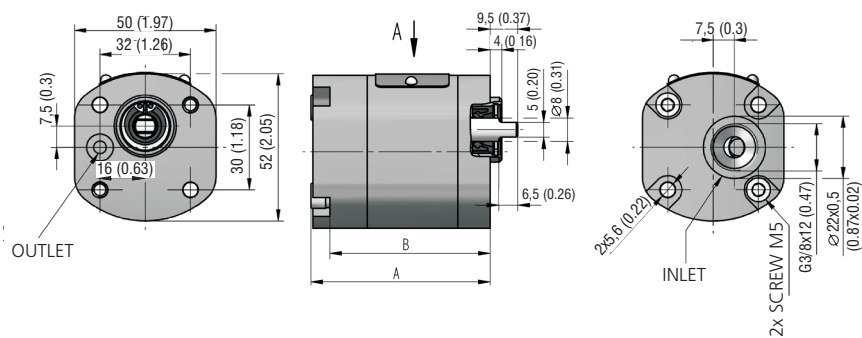
### Inlet / outlet



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Code	Inlet / Outlet		
		E	F	G
All	PA	4,5 (0.18)	8,9 (0.35)	1,1 (0.04)

## Pump design in millimeters (inches)

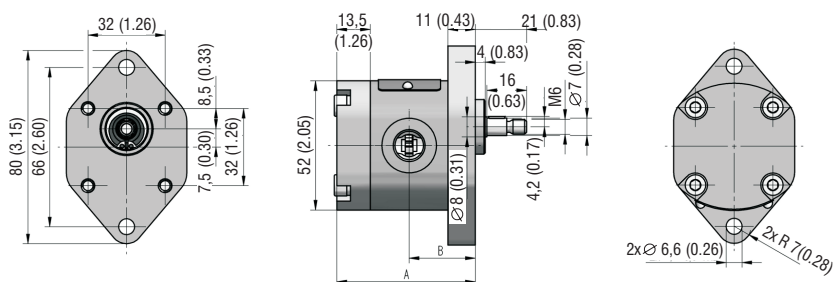
### GP0-\*L-ABKA-AGBPA-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,18 (0.01)	59,1 (2.33)	53,3 (2.10)	0,80 (0.05)	64,5 (2.54)	58,7 (2.31)
0,25 (0.02)	59,8 (2.35)	54,0 (2.13)	1,00 (0.06)	66,2 (2.61)	60,4 (2.38)
0,32 (0.02)	60,4 (2.38)	54,6 (2.15)	1,25 (0.08)	68,4 (2.69)	62,6 (2.46)
0,36 (0.02)	60,7 (2.39)	54,9 (2.16)	1,50 (0.09)	70,6 (2.78)	64,8 (2.55)
0,40 (0.02)	61,1 (2.41)	55,3 (2.18)	2,00 (0.12)	74,8 (2.94)	69 (2.72)
0,50 (0.03)	61,9 (2.44)	56,1 (2.21)	2,50 (0.15)	79,1 (3.11)	73,3 (2.89)
0,63 (0.04)	63,0 (2.48)	57,2 (2.25)	3,20 (0.20)	85,0 (3.35)	79,2 (3.12)
0,70 (0.04)	63,7 (2.51)	57,9 (2.28)			

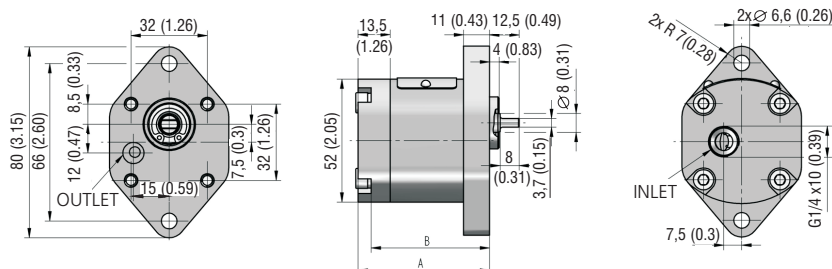
Pump design in millimeters (inches)

GPO-\*R(L)-RAVA-SGAGA-N



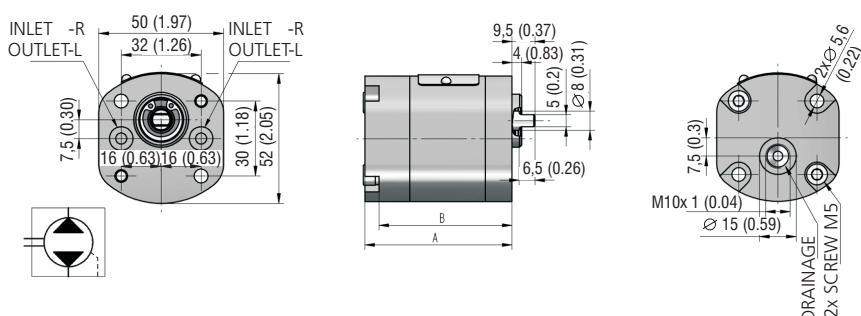
Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,18 (0.01)	54,1 (2.13)	25,8 (1.02)	0,80 (0.05)	59,5 (2.34)	28,5 (1.12)
0,25 (0.02)	54,8 (2.16)	26,2 (1.03)	1,00 (0.06)	61,2 (2.41)	29,4 (1.16)
0,32 (0.02)	55,4 (2.18)	26,5 (1.04)	1,25 (0.08)	63,4 (2.50)	30,5 (1.20)
0,36 (0.02)	55,7 (2.19)	26,6 (1.05)	1,50 (0.09)	65,6 (2.58)	31,6 (1.24)
0,40 (0.02)	56,1 (2.21)	26,8 (1.06)	2,00 (0.12)	69,8 (2.75)	33,7 (1.33)
0,50 (0.03)	56,9 (2.24)	27,2 (1.07)	2,50 (0.15)	74,1 (2.92)	35,8 (1.41)
0,63 (0.04)	58,0 (2.28)	27,8 (1.09)	3,20 (0.20)	80,0 (3.15)	38,8 (1.53)
0,70 (0.04)	58,7 (2.31)	28,1 (1.11)			

GPO-\*R(L)-RAKB-AGAPA-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,18 (0.01)	54,1 (2.13)	48,6 (1.91)	0,80 (0.05)	59,5 (2.34)	54,0 (2.13)
0,25 (0.02)	54,8 (2.16)	49,3 (1.94)	1,00 (0.06)	61,2 (2.41)	55,7 (2.19)
0,32 (0.02)	55,4 (2.18)	49,9 (1.96)	1,25 (0.08)	63,4 (2.50)	57,9 (2.28)
0,36 (0.02)	55,7 (2.19)	50,2 (1.98)	1,50 (0.09)	65,6 (2.58)	60,1 (2.37)
0,40 (0.02)	56,1 (2.21)	50,6 (1.99)	2,00 (0.12)	69,8 (2.75)	64,3 (2.53)
0,50 (0.03)	56,9 (2.24)	51,4 (2.02)	2,50 (0.15)	74,1 (2.92)	68,6 (2.70)
0,63 (0.04)	58,0 (2.28)	52,5 (2.07)	3,20 (0.20)	80,0 (3.15)	74,5 (2.93)
0,70 (0.04)	58,7 (2.31)	53,2 (2.09)			

GPO-\*B-ABKA-FPAPA-N

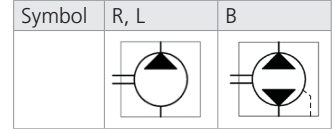


Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,18 (0.01)	59,1 (2.33)	59,1 (2.33)	0,80 (0.05)	64,5 (2.54)	58,7 (2.31)
0,25 (0.02)	59,8 (2.35)	59,8 (2.35)	1,00 (0.06)	66,2 (2.61)	60,4 (2.38)
0,32 (0.02)	60,4 (2.38)	60,4 (2.38)	1,25 (0.08)	68,4 (2.69)	62,6 (2.46)
0,36 (0.02)	60,7 (2.39)	60,7 (2.39)	1,50 (0.09)	70,6 (2.78)	64,8 (2.55)
0,40 (0.02)	61,1 (2.41)	61,1 (2.41)	2,00 (0.12)	74,8 (2.94)	69,0 (2.72)
0,50 (0.03)	61,9 (2.44)	61,9 (2.44)	2,50 (0.15)	79,1 (3.11)	73,3 (2.89)
0,63 (0.04)	63,0 (2.48)	63,0 (2.48)	3,20 (0.20)	85,0 (3.35)	79,2 (3.12)
0,70 (0.04)	63,7 (2.51)	57,9 (2.28)			

Technical Features



- › Operating pressure 280 bar, Peak pressure 310 bar
- › High-strength quality aluminum alloys pump with axial play compensation
- › Low noise level in whole operating range
- › High operational reliability and service life for 3000 operation hours
- › High volumetric efficiency up to 98%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



Technical Data

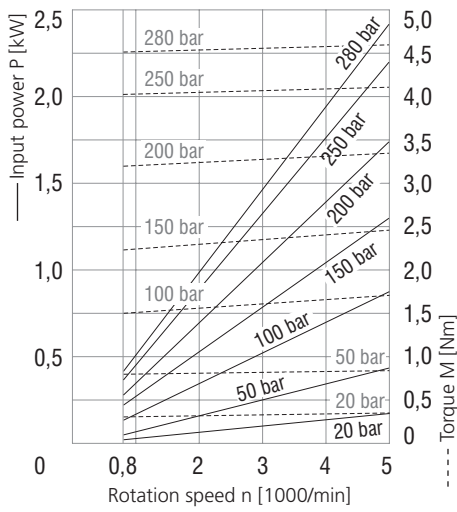
Nominal Size Parameters	Symbol	Unit	Displacement														
			0,8	1,2	1,6	2,1	2,5	3,3	3,6	4,4	4,8	5,8	6,2	7,0	7,9	10,0	11,8
Actual displacement	V <sub>g</sub>	[cm <sup>3</sup> ]	0,855	1,257	1,686	2,086	2,514	3,316	3,611	4,386	4,787	5,804	6,205	7,007	7,890	10,003	11,795
		[in <sup>3</sup> ]	0.052	0.077	0.103	0.127	0.153	0.202	0.220	0.268	0.292	0.354	0.379	0.428	0.481	0.610	0.720
Rotation speed	nominal	n <sub>n</sub>	1500														
	minimum	n <sub>min</sub>	800			600			500								
	maximum	n <sub>max</sub>	5000		4500		4000			3800		3500		3000		1800	
Pressure at inlet*	minimum	p <sub>1min</sub>	-0,3 (-4.4 PSI)														
	maximum	p <sub>1max</sub>	0,5 (7.3 PSI)														
Pressure at outlet**	max. continuous	p <sub>2n</sub>	280				260		250	230	200	180	170	160	100		
		[PSI]	4061				3771		3625	3336	2901	2611	2466	2321	1450		
	maximum	p <sub>2max</sub>	300				280		270	250	220	200	190	180	150		
		[PSI]	4351				4061		3916	3625	3191	2901	2756	2611	2176		
	peak	p <sub>3</sub>	310				290		280	260	230	210	200	190	160		
		[PSI]	4496				4206		4061	3771	3336	3046	2901	2756	2321		
Nominal flow rate (min.) at n <sub>n</sub> and p <sub>2n</sub>	Q <sub>n</sub>	[l min <sup>-1</sup> ]	1,07	1,60	2,13	2,71	3,35	4,54	4,98	6,06	6,61	8,00	8,56	9,65	10,90	13,90	16,30
		[GPM]	0.28	0.42	0.56	0.72	0.88	1.20	1.32	1.60	1.75	2.11	2.26	2.55	2.88	3.67	4.31
Maximum flow rate at n <sub>max</sub> and p <sub>2max</sub>	Q <sub>max</sub>	[l min <sup>-1</sup> ]	3,92	5,88	7,06	9,26	9,80	12,94	14,11	17,25	17,88	21,60	21,27	20,58	23,23	17,64	20,82
		[GPM]	1.04	1.55	1.87	2.45	2.59	3.42	3.73	4.56	4.72	5.71	5.62	5.44	6.14	4.66	5.50
Nominal input power (max.) at n <sub>n</sub> and p <sub>2n</sub>	P <sub>n</sub>	[kW]	0,7	1,04	1,39	1,72	2,07	2,97	3,35	3,23	3,24	3,41	3,29	3,50	3,71	2,94	3,47
Maximum input power at n <sub>max</sub> and p <sub>2max</sub>	P <sub>max</sub>	[kW]	2,51	3,70	4,96	5,52	6,65	7,80	7,93	9,29	8,29	9,51	8,52	7,83	8,35	5,30	6,06
Weight	m	[kg]	0,82	0,84	0,85	0,87	0,89	0,92	0,93	0,96	0,98	1,02	1,04	1,08	1,10	1,20	1,25
		[lbs]	1.81	1.85	1.87	1.92	1.96	2.03	2.05	2.12	2.16	2.25	2.29	2.38	2.43	2.65	2.76

- 1) \*Inlet pressure in the reversible design can be up to **p<sub>1</sub> = p<sub>2n</sub> -70 bar max.** External drainage must be used in case of the reversible design.
- 2) \*\*Outlet pressure in the reversible design is 10% lower than shown in the table (depending on operating conditions).
- 3) **p<sub>2n</sub>** maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 4) **p<sub>2max</sub>** maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 5) **p<sub>3</sub>** peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

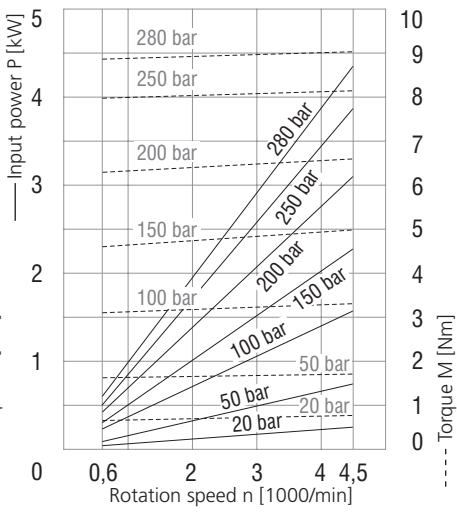
Gear Pump / Size		GP1 - 0,8 ...11,8 ccm
Volumetric efficiency	%	92 ÷ 98
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Fluid temperature range (FPM)	°C (°F)	-20...120 (-4...248)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for p <sub>2</sub> ≤ 200 bar		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for p <sub>2</sub> ≥ 200 bar		Class 20/17/14 acc. to ISO 4406



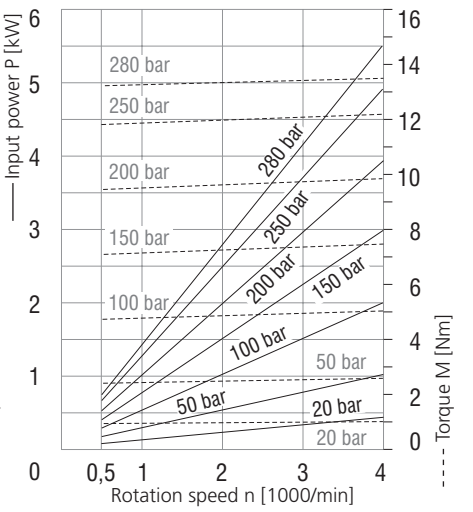
**0,8 ccm**



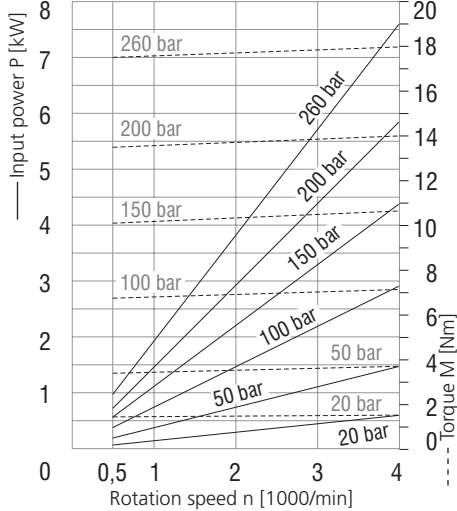
**1,6 ccm**



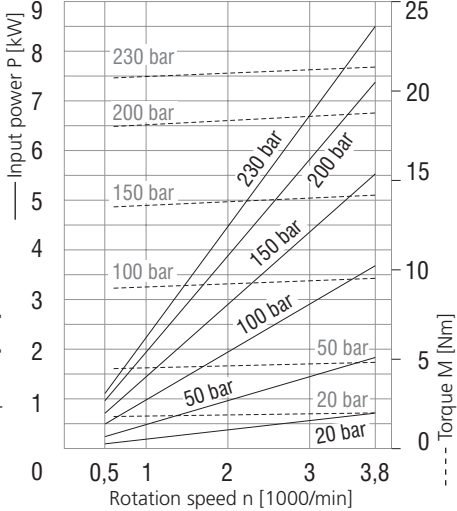
**2,5 ccm**



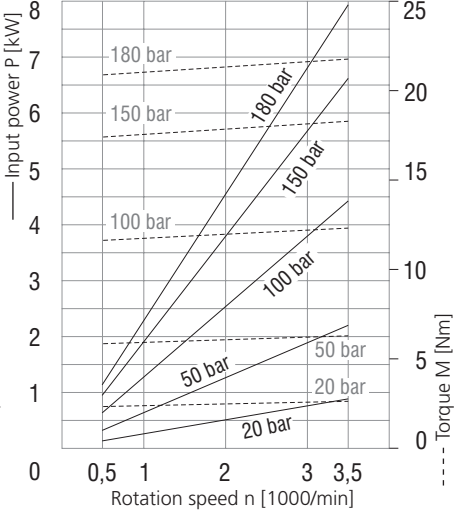
**3,6 ccm**



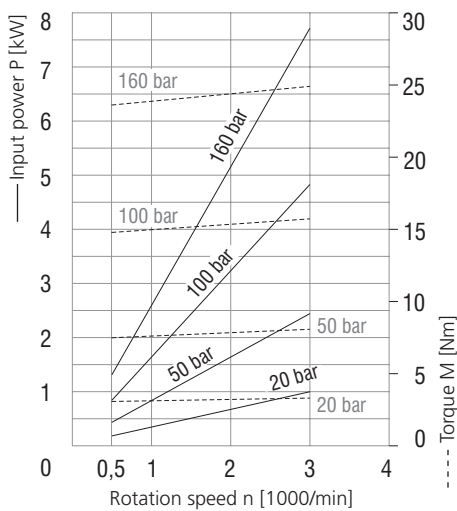
**4,8 ccm**



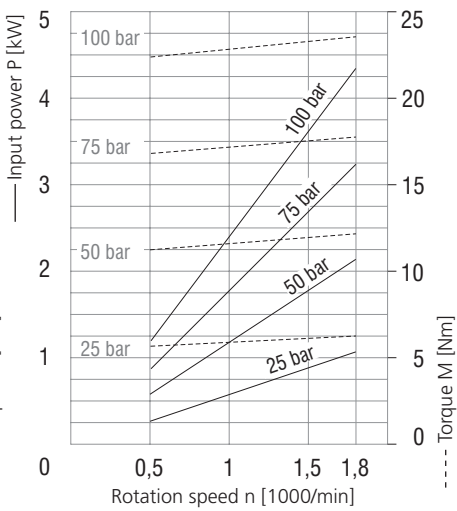
**6,2 ccm**



**7,9 ccm**



**11,8 ccm**

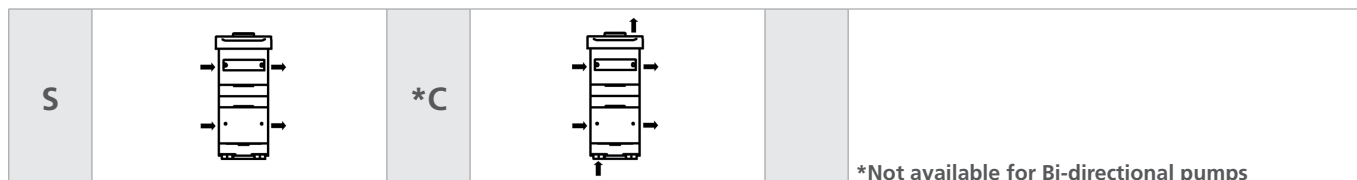




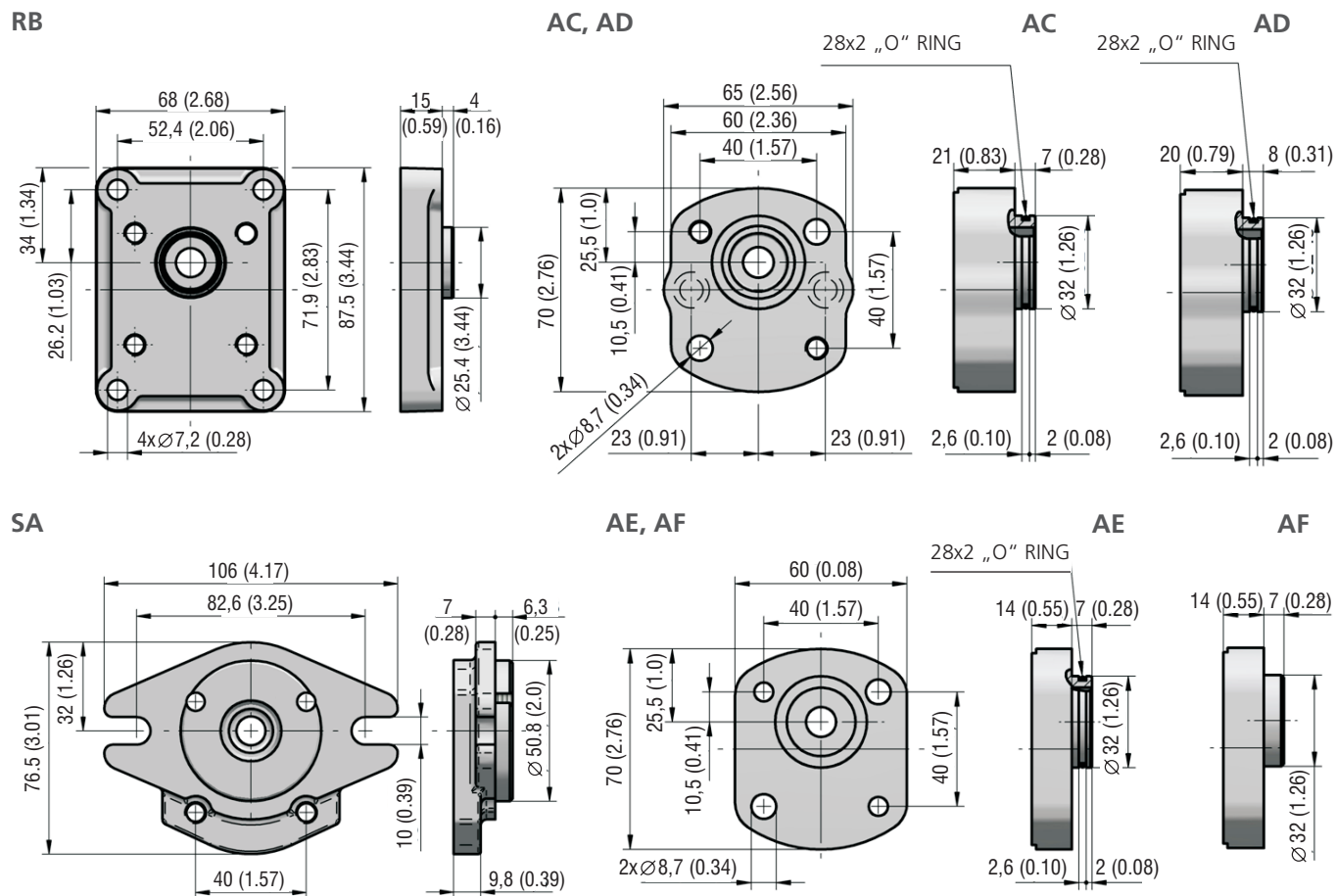
## Ordering Code - Multiple Version

<b>GP1</b>	<b>- 3,3 / 3,3</b>	<b>R</b>	<b>- SA</b>	<b>DA</b>	<b>- S</b>	<b>GBGB / BAGA</b>	<b>- V</b>	<b>004</b>	
<b>Gear pump serie 1</b>	Front pump (shaft side) Rear pump					Front pump (shaft side) - inlet, outlet port. Rear pump - inlet, outlet port.		No designation 004	
<b>Displacement</b>								Shaft seal standard without shaft seal	
<b>Direction of rotation</b>								Seals NBR PM (Viton)	
Counter clockwise									
Clockwise									
Bi-directional		L R B	RB SA AC AD AE AF *G	CB CC DA KC KD VB VC *G				Inlet / Outlet ports	
<b>Flange design</b>									Ports orientation Use blind plug for not used suction ports
*G Customized									Shaft Type *G Customized

## Ports orientation

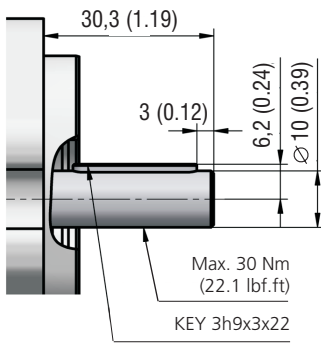


## Flange design in millimeters (inches)

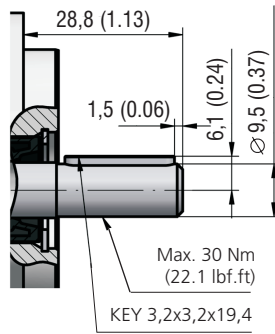


**Shaft design** in millimeters (inches)

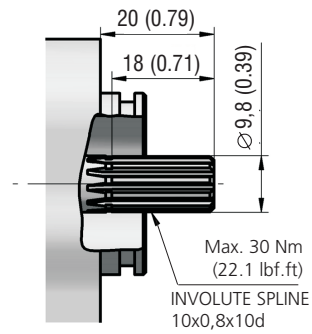
**VB**



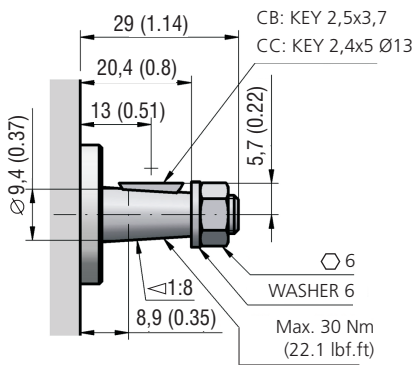
**VC**



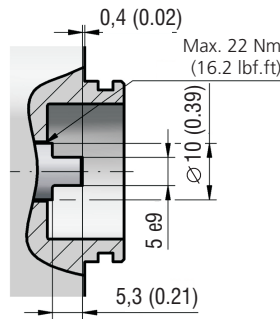
**DA**



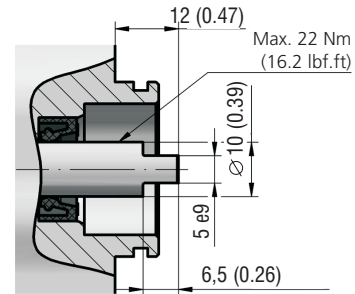
**CB, CC**



**KC**

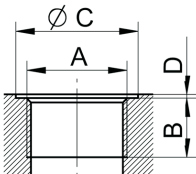


**KD**

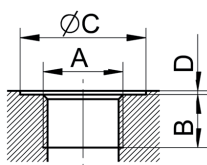


**Ports design** in millimeters (inches)

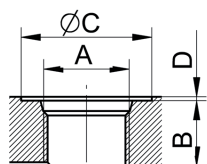
**Metric thread according to ISO 6149**



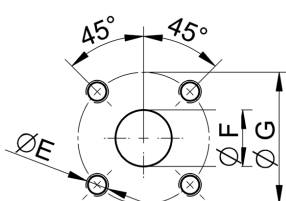
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Displacement [cm <sup>3</sup> (in <sup>3</sup> )]
		A	B	C	D		
	xx	M12x1,5	12 (0.47)	20 (0.79)	1 (0.04)	MB	ALL
0,18-0,5 (0.01-0.03)	MC	M14x1,5	13 (0.51)	26 (1.02)		MC	ALL
ALL	MD	M16x1,5	14 (0.55)	22 (0.89)		MD	ALL
ALL	ME	M18x1,5	13 (0.51)	30 (1.18)		ME	ALL
ALL	MF	M20x1,5	14 (0.55)	26 (1.02)		xx	
3,3-11,8 (0.20-0.72)	MH	M22x1,5	13 (0.51)	35 (1.38)		xx	
DRAIN	MA	M10x1	8 (0.31)	15 (0.59)		xx	

**BSPP pipe thread according to 228-1**


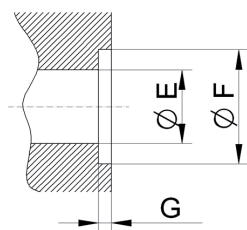
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code
		A	B	C	D	
ALL	xx	G1/4	13 (0.51)	26 (1.02)	1 (0.04)	GA
	GB	G3/8		24 (0.94)		GB
	GC	G1/2		34 (1.34)		GC

**UNF thread according to SAE**


Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code
		A	B	C	D	
ALL	xx	9/16-18UNF	13 (0.51)	24,6 (0.97)	1 (0.04)	UB
	UC	3/4-16UNF				UC
	UD	7/8-14UNF		16 (0.63)		34 (1.34)

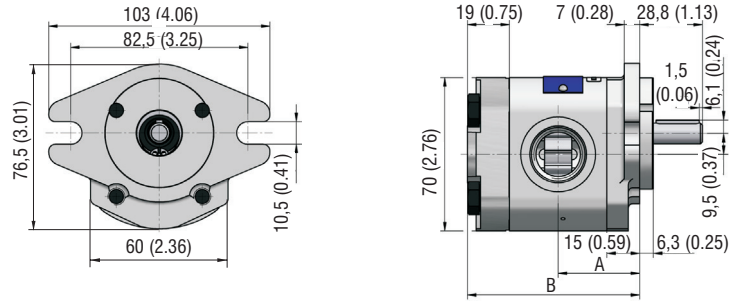
**Flanged fittings according to DIN 8901/8902**


Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension			Outlet Code
		E	F	G	
ALL	HA	M5, depth 12	8 (0.31)	26 (1.02)	HA
	HB		10 (0.39)		HB
	HC	M6 depth 12	8 (0.31)	30 (1.18)	HC
	HD		12 (0.47)		HD

**Inlet / Outlet in flange**


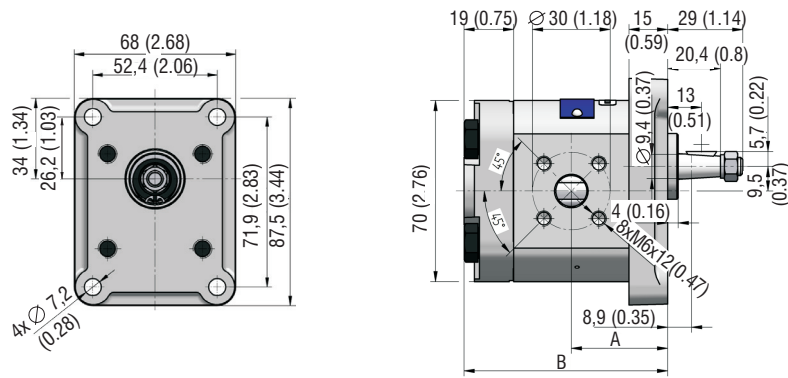
Code	Dimension		
	E	F	G
PA	8 (0.31)	12,4 (0.49)	1,4 (0.06)

GP1-\*R(L)-SAVC-SUDUD-N



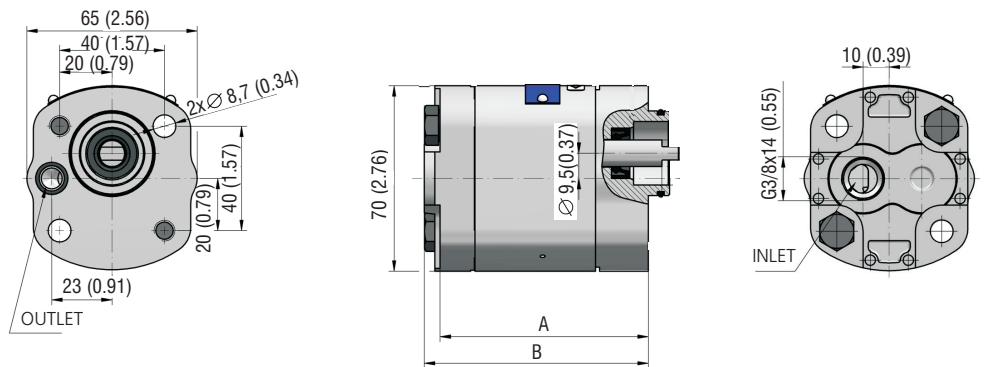
Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.05)	32,6 (1.28)	69,3 (2.73)	3,6 (0.22)	37,8 (1.49)	79,6 (3.13)
1,2 (0.07)	33,4 (1.31)	70,8 (2.79)	4,4 (0.27)	39,2 (1.54)	82,5 (3.25)
1,6 (0.10)	34,1 (1.34)	72,3 (2.85)	4,8 (0.29)	40,0 (1.57)	84,0 (3.31)
2,1 (0.13)	34,9 (1.37)	73,9 (2.91)	5,8 (0.35)	41,9 (1.65)	87,8 (3.46)
2,5 (0.15)	35,7 (1.41)	75,5 (2.97)	6,2 (0.38)	42,6 (1.68)	89,3 (3.53)
3,3 (0.20)	37,2 (1.46)	78,5 (3.09)	7,9 (0.48)	45,8 (1.80)	95,6 (3.76)

GP1-\*R-RBCC-SHDUD-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.05)	32,6 (1.28)	69,3 (2.73)	3,6 (0.22)	37,8 (1.49)	79,6 (3.13)
1,2 (0.07)	33,4 (1.31)	70,8 (2.79)	4,4 (0.27)	39,2 (1.54)	82,5 (3.25)
1,6 (0.10)	34,1 (1.34)	72,3 (2.85)	4,8 (0.29)	40,0 (1.57)	84,0 (3.31)
2,1 (0.13)	34,9 (1.37)	73,9 (2.91)	5,8 (0.35)	41,9 (1.65)	87,8 (3.46)
2,5 (0.15)	35,7 (1.41)	75,5 (2.97)	6,2 (0.38)	42,6 (1.68)	89,3 (3.53)
3,3 (0.20)	37,2 (1.46)	78,5 (3.09)	7,9 (0.48)	45,8 (1.80)	95,6 (3.76)

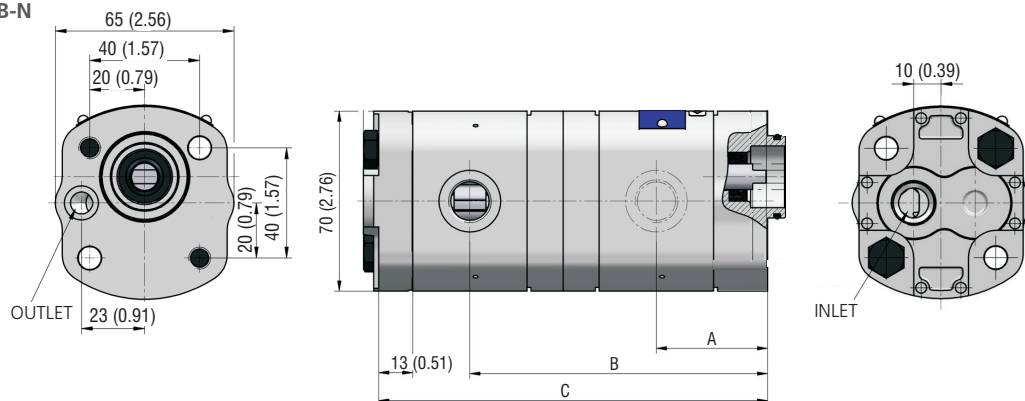
GP1-\*L-ADKD-AGBPA-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.05)	68,3 (2.69)	74,3 (2.93)	3,6 (0.22)	78,6 (3.09)	84,6 (3.33)
1,2 (0.07)	69,8 (2.75)	75,8 (2.98)	4,4 (0.27)	81,5 (3.21)	81,5 (3.21)
1,6 (0.10)	71,3 (2.81)	77,3 (3.04)	4,8 (0.29)	83,0 (3.27)	89,0 (3.50)
2,1 (0.13)	72,9 (2.87)	78,9 (3.11)	5,8 (0.35)	86,8 (3.42)	92,8 (3.65)
2,5 (0.15)	74,5 (2.93)	80,5 (3.17)	6,2 (0.38)	88,3 (3.48)	94,3 (3.71)
3,3 (0.20)	77,5 (3.05)	83,5 (3.29)	7,9 (0.48)	94,6 (3.72)	100,6 (3.96)

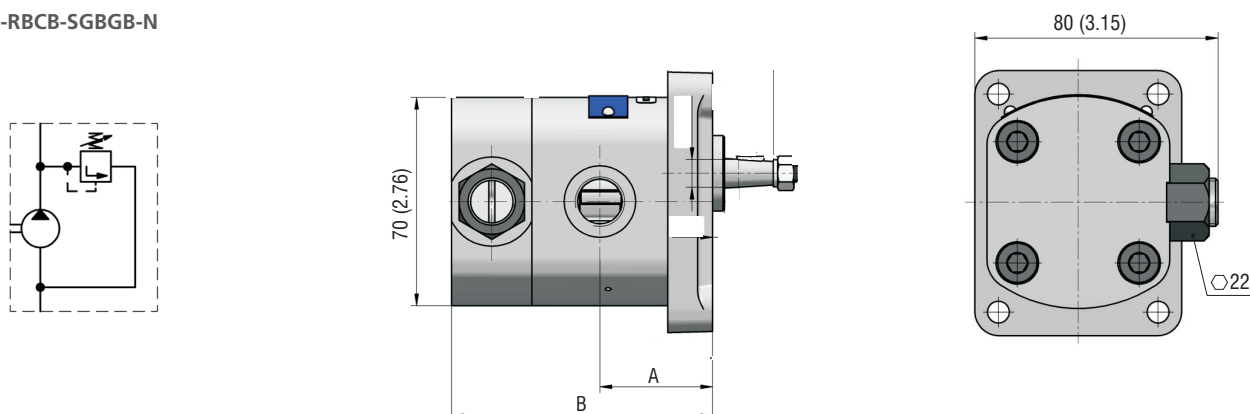
**GP1 Pumps - basic design** in millimeters (inches)

**GP1-\*/L-ACKA-CGBPA/GBGBGB-N**



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C
1,6 / 4,8 (0.10 / 0.29)	40,1 (1.58)	112,3 (4.42)	150,3 (5.92)	3,3 / 4,4 (0.20 / 0.27)	43,2 (1.70)	117,7 (4.63)	155,0 (6.10)
1,6 / 5,8 (0.10 / 0.35)	40,1 (1.58)	114,2 (4.50)	154,1 (6.07)	6,2 / 1,6 (0.38 / 0.10)	48,6 (1.91)	123,4 (4.86)	155,6 (6.13)
1,6 / 6,2 (0.10 / 0.38)	40,1 (1.58)	115,0 (4.53)	155,6 (6.13)	7,9 / 1,2 (0.48 / 0.07)	51,8 (2.04)	129,0 (5.08)	160,4 (6.31)
2,5 / 4,4 (0.15 / 0.27)	41,7 (1.64)	114,7 (4.52)	152,0 (5.98)	7,9 / 2,5 (0.48 / 0.15)	51,8 (2.04)	131,4 (5.17)	165,1 (6.50)
2,5 / 4,8 (0.15 / 0.29)	41,7 (1.64)	115,5 (4.55)	153,5 (6.04)				

**GP1-\*R-RBCB-SGBGB-N**



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
0,8 (0.05)	32,6 (1.28)	77,3 (3.04)	3,6 (0.22)	37,8 (1.49)	87,6 (3.45)
1,2 (0.07)	33,4 (1.31)	78,8 (3.10)	4,4 (0.27)	39,2 (1.54)	90,5 (3.56)
1,6 (0.10)	34,1 (1.34)	80,3 (3.16)	4,8 (0.29)	40,0 (1.57)	92,0 (3.62)
2,1 (0.13)	34,9 (1.37)	81,9 (3.22)	5,8 (0.35)	41,9 (1.65)	95,8 (3.77)
2,5 (0.15)	35,7 (1.41)	83,5 (3.29)	6,2 (0.38)	42,6 (1.68)	97,3 (3.83)
3,3 (0.20)	37,2 (1.46)	86,5 (3.41)	7,9 (0.48)	45,8 (1.80)	103,6 (4.08)

**GP1 Pumps - special design** in millimeters (inches)

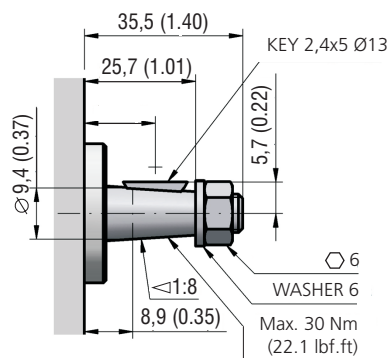
**Single pump P23-\*\*L-AGCG-AGBPA-N014**

**Double pump P23-\*\*/\*\*L-AGCG-CGBPA/GBGBGB-N014**

**014 - Special design for SMA 05 hydraulic units:**

**Flange AE with pressure port PA**

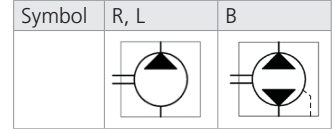
**Shaft prolonged**



**Technical Features**



- › Operating pressure 280 bar, Peak pressure 310 bar
- › High-strength quality aluminum alloys pump with axial play compensation
- › Low noise level in whole operating range
- › High operational reliability and service life for 3000 operation hours
- › High volumetric efficiency up to 98%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



**Technical Data**

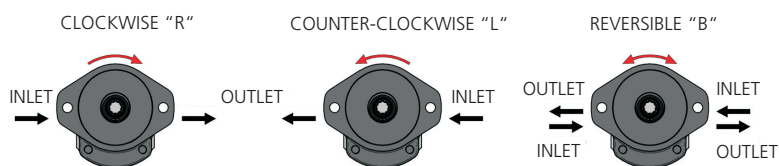
Nominal Size Parameters	Symbol	Unit	Displacement										
			4	5	6	8	10	12	16	20	22	25	31
Actual displacement	V <sub>g</sub>	[cm <sup>3</sup> ]	4,03	5,00	6,02	8,05	10,00	12,08	16,10	20,12	22,00	25,16	31,21
		[in <sup>3</sup> ]	0.246	0.305	0.367	0.491	0.610	0.737	0.982	1.228	1.344	1.535	1.905
Rotation speed	nominal	n <sub>n</sub>	1500										
	minimum	n <sub>min</sub>	500										
	maximum	n <sub>max</sub>	4000		3600			3200		3000	2800	2200	
Pressure at inlet*	minimum	p <sub>1min</sub>	-0,3 (-4.4 PSI)										
	maximum	p <sub>1max</sub>	0,5 (7.3 PSI)										
Pressure at outlet**	max. continuous	p <sub>2n</sub>	280				260		240	230	200	150	
		[PSI]	4061				3771		3481	3336	2901	2176	
	maximum	p <sub>2max</sub>	290				280		250	240	220	170	
		[PSI]	4206				4061		3626	3481	3191	2466	
	peak	p <sub>3</sub>	310				300		270	250	240	190	
		[PSI]	4496				4351		3916	3626	3481	2756	
Nominal flow rate (min.) at n <sub>n</sub> and p <sub>2n</sub>	Q <sub>n</sub>	[l·min <sup>-1</sup> ]	5,40	6,44	8,10	11,04	13,40	16,56	22,56	28,20	30,96	35,25	43,71
		[GPM]	1.43	1.70	2.14	2.92	3.54	4.37	5.96	7.45	8.18	9.31	11.55
Maximum flow rate at n <sub>max</sub> and p <sub>2max</sub>	Q <sub>max</sub>	[l·min <sup>-1</sup> ]	15,68	20,00	23,52	28,22	35,89	42,34	50,18	62,72	61,40	68,60	66,84
		[GPM]	4.14	5.28	6.21	7.45	9.48	11.19	13.26	16.57	16.22	18.12	17.66
Nominal input power (max.) at n <sub>n</sub> and p <sub>2n</sub>	P <sub>n</sub>	[kW]	3,33	4,14	5,00	6,52	8,29	9,06	11,82	11,82	16,29	13,30	13,74
Maximum input power at n <sub>max</sub> and p <sub>2max</sub>	P <sub>max</sub>	[kW]	8,77	11,86	13,15	15,78	21,32	22,04	26,12	29,02	31,00	26,46	21,91
Weight	m	[kg]	2,6	2,63	2,65	2,75	2,8	2,95	3,1	3,35	3,4	3,5	3,8
		[lbs]	5.73	5.80	5.84	6.06	6.17	6.50	6.83	7.39	7.50	7.72	8.38

- 1) \*Inlet pressure in the reversible design can be up to **p<sub>1</sub> = p<sub>2n</sub>-70 bar max.** External drainage must be used in case of the reversible design.
- 2) \*\*Outlet pressure in the reversible design is 10% lower than shown in the table (depending on operating conditions).
- 3) **p<sub>2n</sub>** maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 4) **p<sub>2max</sub>** maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 5) **p<sub>3</sub>** peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

Gear Pump / Size		GP2 - 4 ...31 ccm
Volumetric efficiency	%	92 ÷ 98
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Fluid temperature range (FPM)	°C (°F)	-20...120 (-4...248)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for p <sub>2</sub> ≤ 200 bar		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for p <sub>2</sub> ≥ 200 bar		Class 20/17/14 acc. to ISO 4406

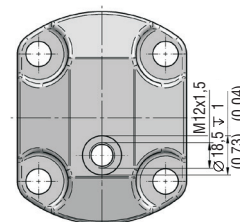
## Direction of rotation, reversible design

Determine direction of rotation by looking at the drive shaft.  
The pump can be used only in the specified direction of rotation.



The pumps B codes (Bi-directional) have an external drainage located in the cover.

Pressure in this port:  
min. -0,3 bar (-4,4 PSI)  
max. +0,5 bar (+7,3 PSI)



## Ordering Code

<b>GP2</b>	-		-		-		-		-		-	
<b>Gear pump serie 2</b>		4 5 6 8 10 12 16 20 22 25 31										
<b>Displacement</b>												
<b>Direction of rotation</b>												
Counter clockwise												
Clockwise												
Bi-directional												
<b>Flange design</b>												
<b>Shaft Type</b>												

**Shaft seal**  
No designation standard  
004 without shaft seal

**Seals**  
NBR  
FPM (Viton)  
HNBR

N  
V  
H

GA HH  
GC HI  
GD HK  
GE KA  
UA KB  
UB KH  
UD KI  
UE MB  
HE ME  
HF MJ

S  
R  
C

**Inlet / Outlet ports**

**Ports orientation**

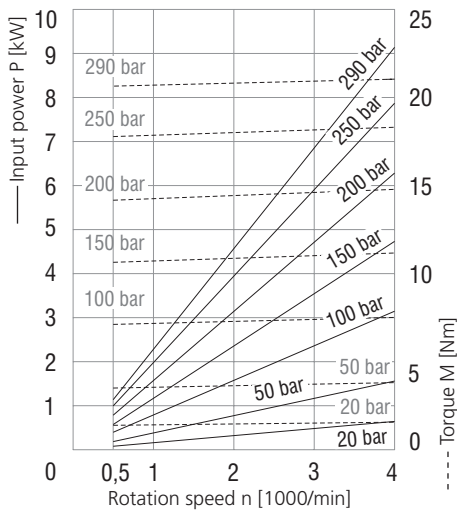
## Ports orientation



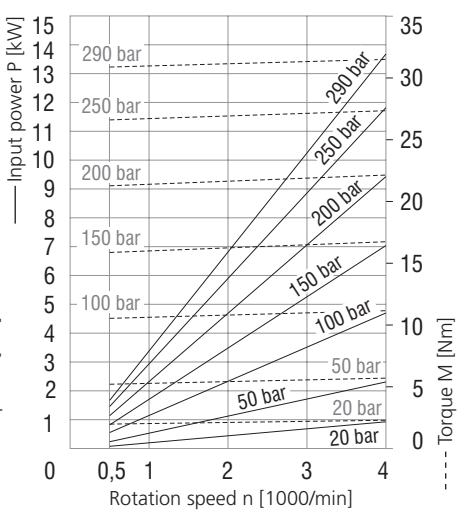
## Combination of Flanges and Shafts

Flange Design	FB	RE	RF	RH	SB	SC	AH	AI	AJ	AK
Shaft Type										
CH		●								
CI		●								
CJ		●								
CK			●				●	●		
DD					●	●				
DF					●	●				
DH					●	●				
DI		●								
DJ			●				●	●		
DK	●									
DL				●						
KH									●	●
VJ					●	●				
VL		●								
VM					●	●				
VN	●									

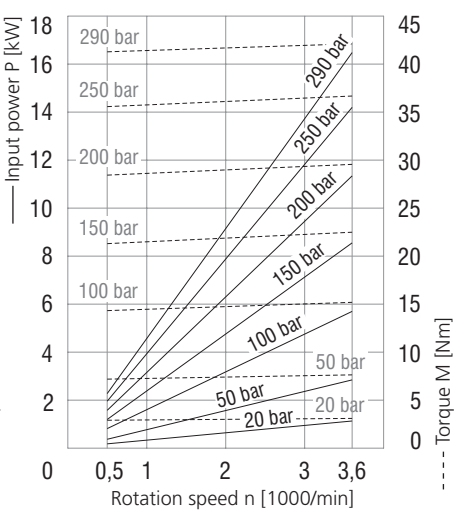
**4 ccm**



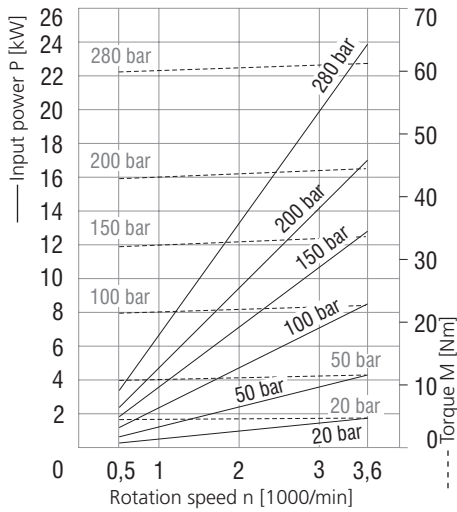
**6 ccm**



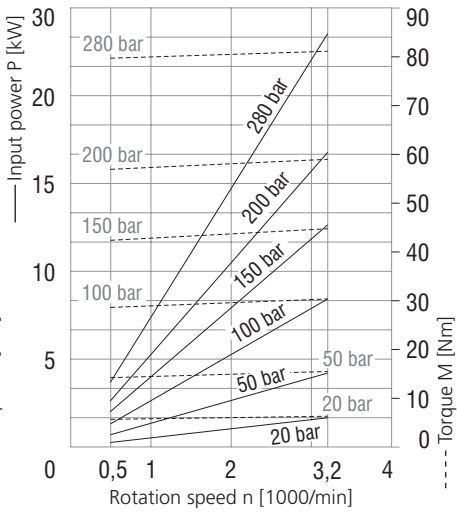
**8 ccm**



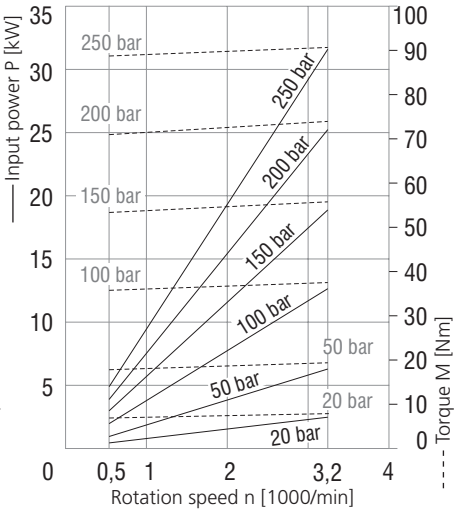
**12 ccm**



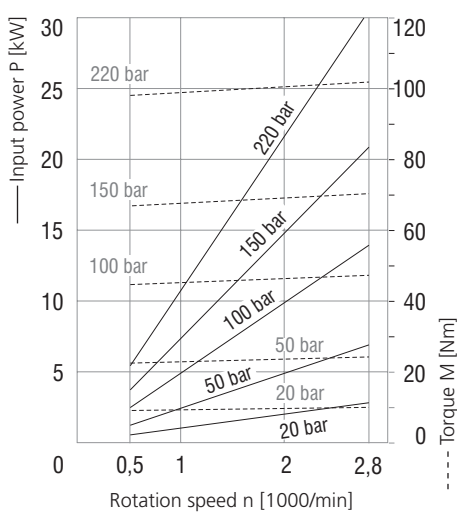
**16 ccm**



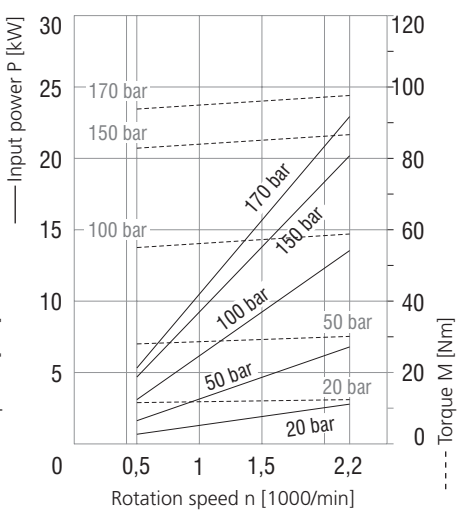
**20 ccm**



**25 ccm**



**31 ccm**





Ordering Code - Multiple Version

**GP2** - [ ] / [ ] / [ ] - [ ] - [ ] - [ ] [ ] / [ ] / [ ] - [ ] [ ]

**Gear pump serie P**

Front pump (shaft side) Middle pump Rear pump

Displacement

4	10
5	12 22
6	16 25
8	20 31

Direction of rotation

Counter clockwise L  
Clockwise R  
Bi-directional B

Shaft seal

No designation standard  
004 without shaft seal

Seals

NBR  
FPM (Viton)  
HNBR

Inlet / Outlet ports

Always from left: Inlet - Outlet

Ports orientation

Use blind plug for not used ports

MB UA HH  
ME UB HI  
MJ UD KA  
GA UE KB  
GC HE KC  
GD HF KD  
GE HK

S  
C

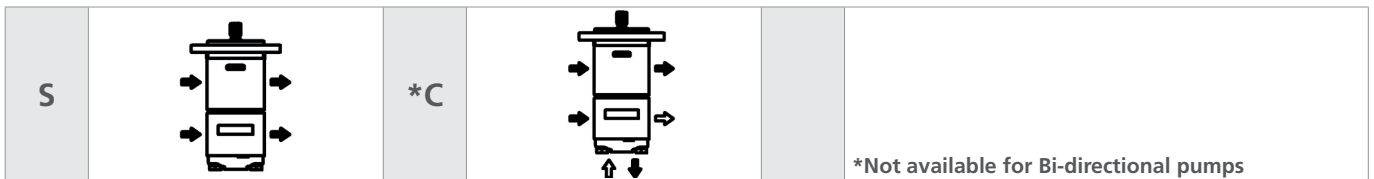
Flange design

FB	SC
RE	AH
RF	AI
RH	AJ
SB	AK

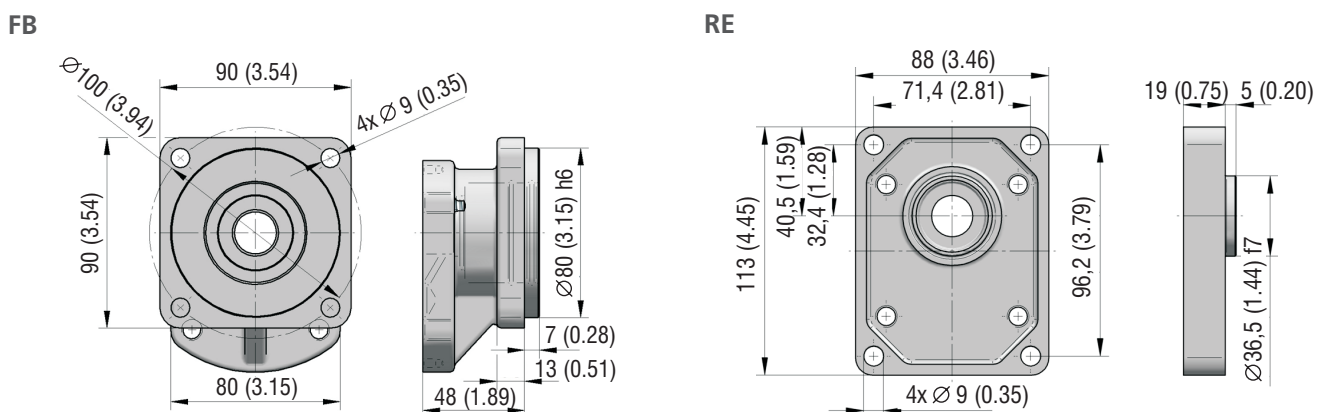
CH	DI
CI	DJ VL
CJ	DK VJ
CK	DL VM
DD	KH VN

Shaft Type

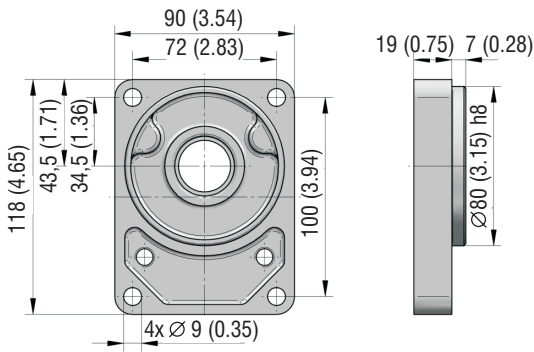
Ports orientation



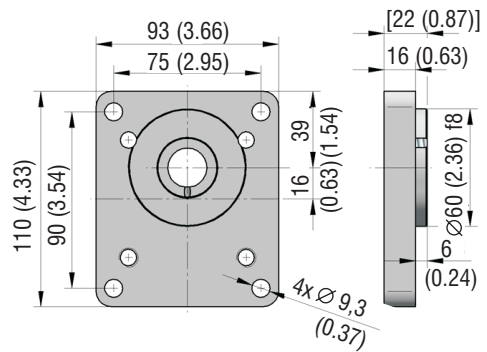
Flange design in millimeters (inches)



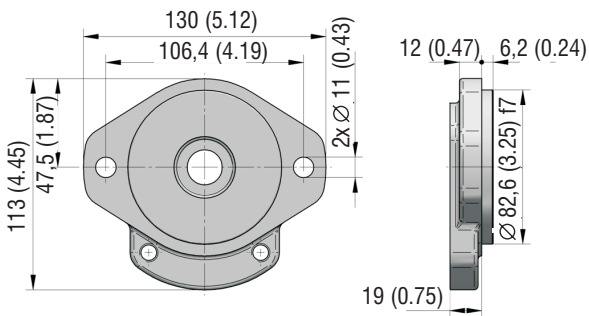
RF



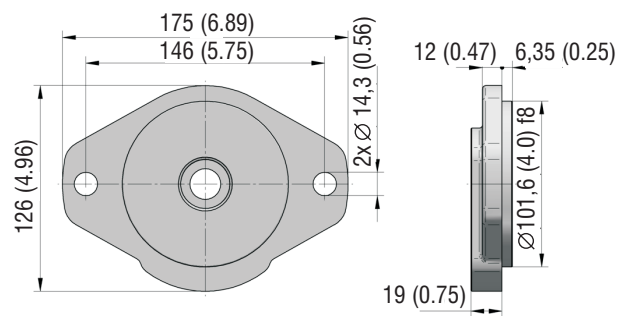
RH



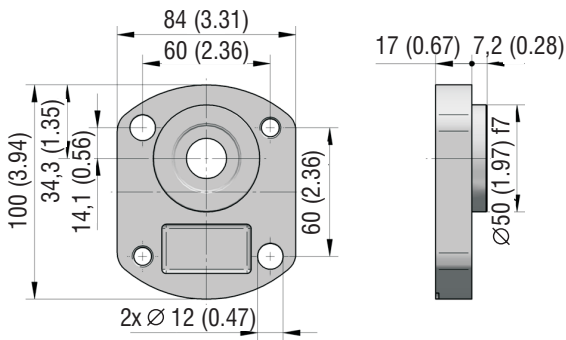
SB



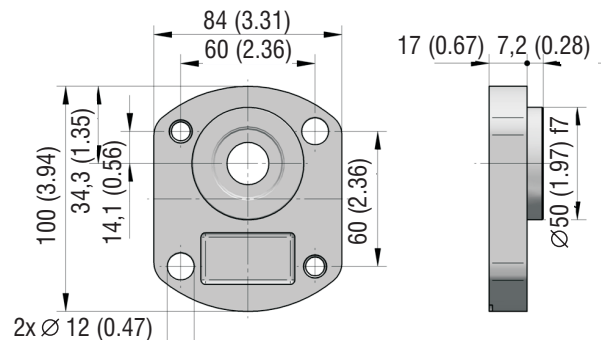
SC



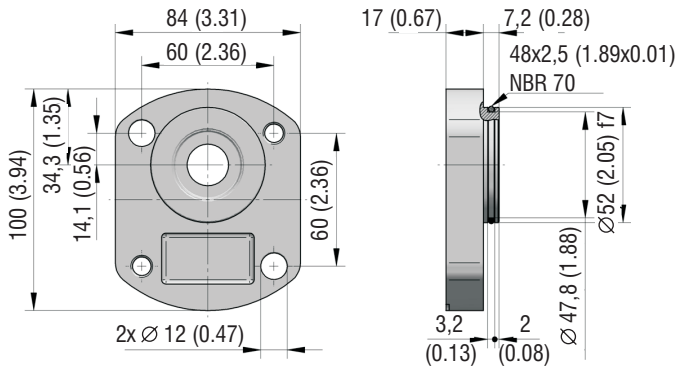
AH



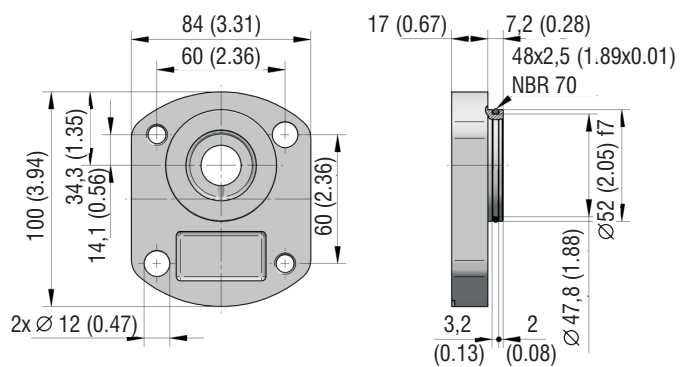
AI



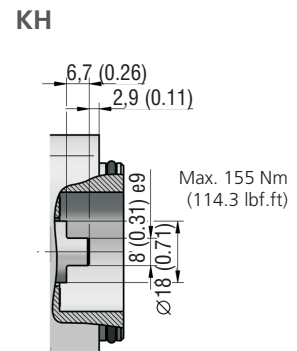
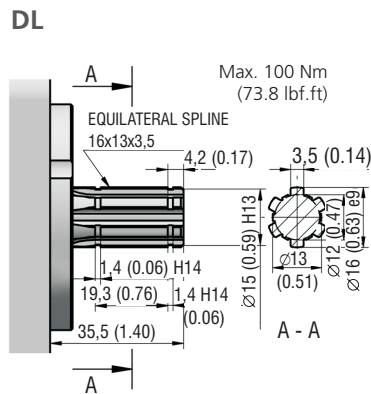
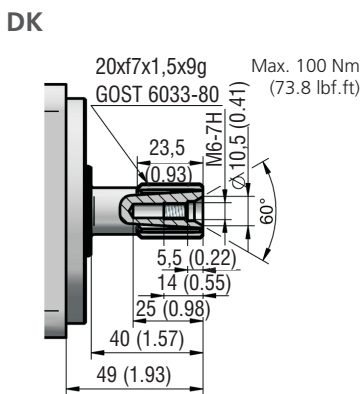
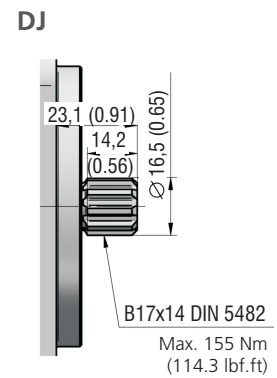
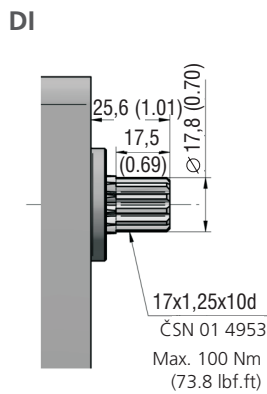
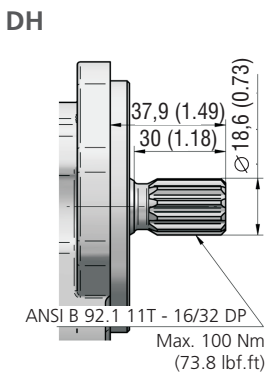
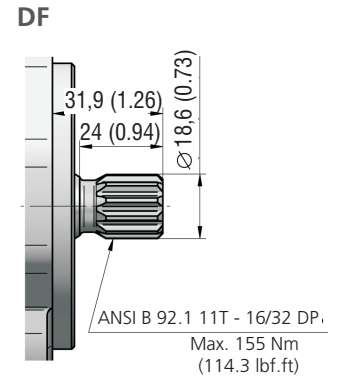
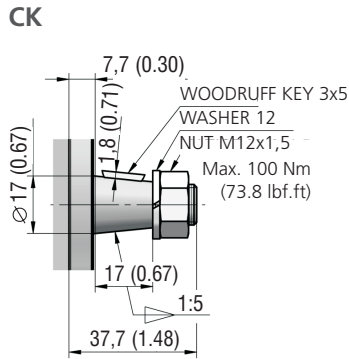
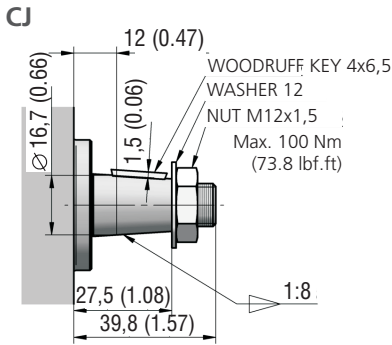
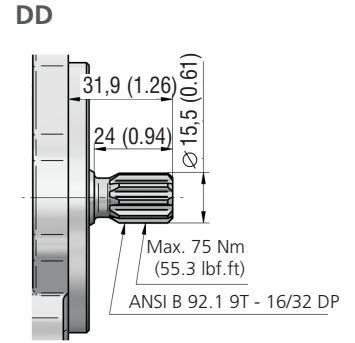
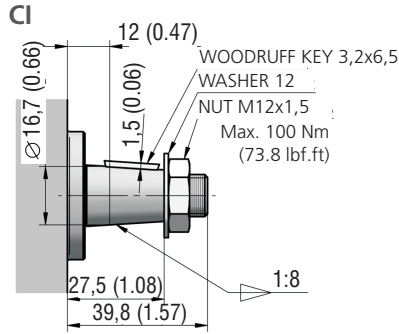
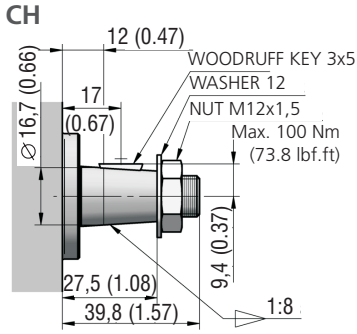
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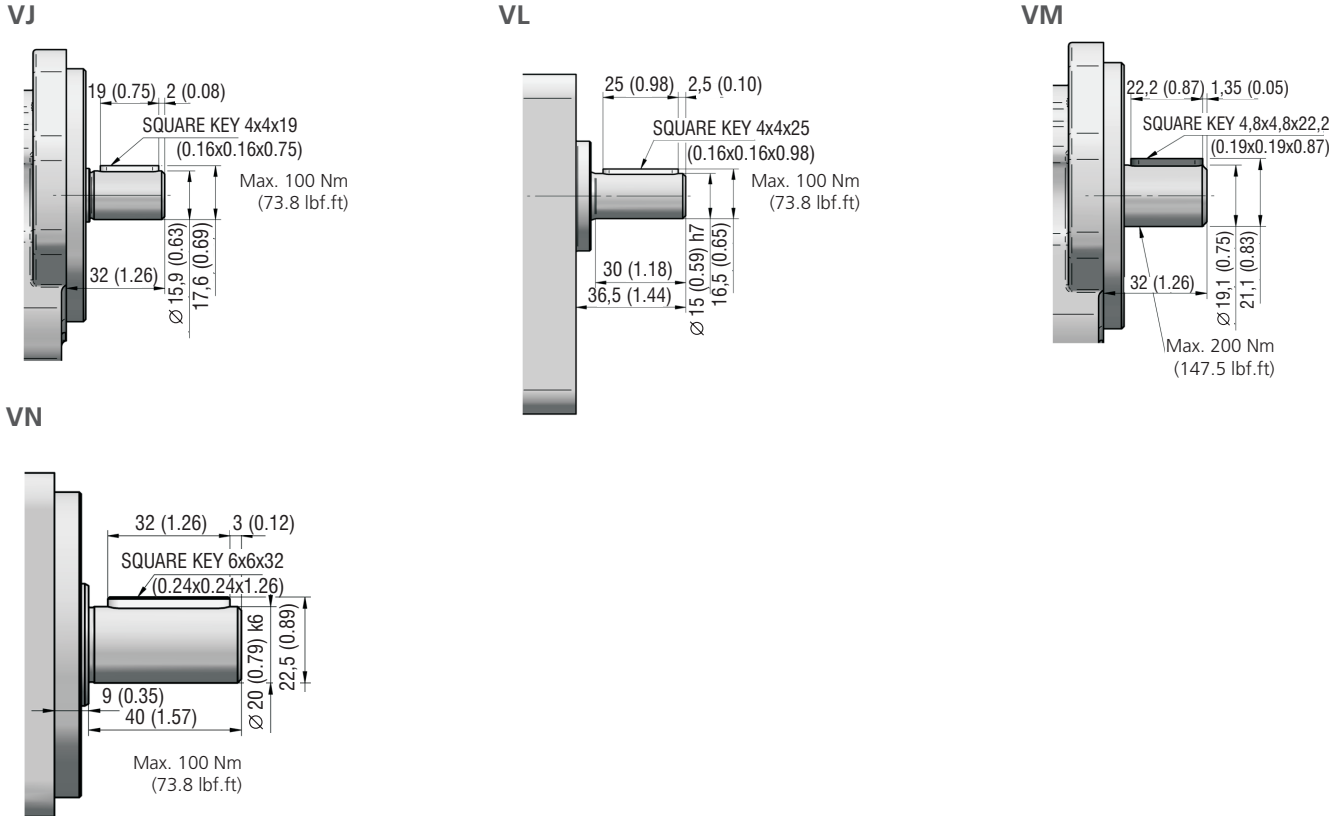
AK



Shaft design in millimeters (inches)

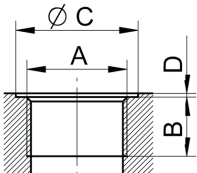


## Shaft design in millimeters (inches)



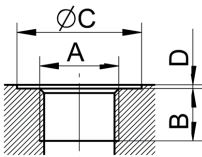
## Ports design in millimeters (inches)

### Metric thread according to ISO 6149



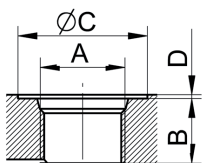
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
ALL	MJ	M27x2	16 (0.63)	33 (1.30)	1 (0.04)	ME	M18x1,5	14 (0.55)	24 (0.94)	1 (0.04)

### BSPP pipe thread according to ISO 228 -1



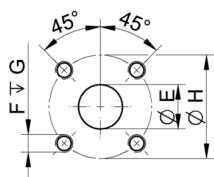
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
to 10 (0.61)	GC	G1/2	14 (0.55)	33 (1.30)	1 (0.04)	GC	G1/2	14 (0.55)	33 (1.30)	1 (0.04)
10-25 (0.61-1.53)	GD	G3/4	16 (0.63)	39 (1.53)						
above 25 (1.53)	GE	G1	18 (0.71)	45 (1.77)						

### UNF thread according to SAE



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
to 10 (0.61)	UD	7/8-14 UNF-2B	17 (0.67)	34 (1.34)	1 (0.04)	UD	7/8-14 UNF-2B	17 (1.04)	33 (1.30)	1 (0.04)
11-31 (0.67-1.89)	UE	1-1/16-12 UNF-2B	19 (0.75)	41 (1.61)						

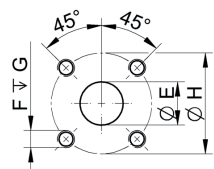
**Flanged fittings according to DIN 8901/8902**



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	HF	20 (0.79)	M6	13 (0.51)	40 (1.57)	HE	15 (0.59)	M6	13 (0.51)	35 (1.38)
	HK	25 (0.98)	M8	13 (0.51)	55 (2.17)					

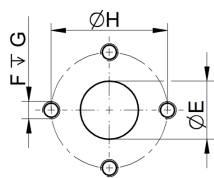
Note: H10H05 - for multiple version - for with one common inlet

**Flanged fittings - „square“**



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	HI	20 (0.79)	M8	13 (0.51)	40 (1.57)	HH	13,5 (0.53)	M6	13 (0.51)	30 (1.18)

**Flanged fittings - „cross“**

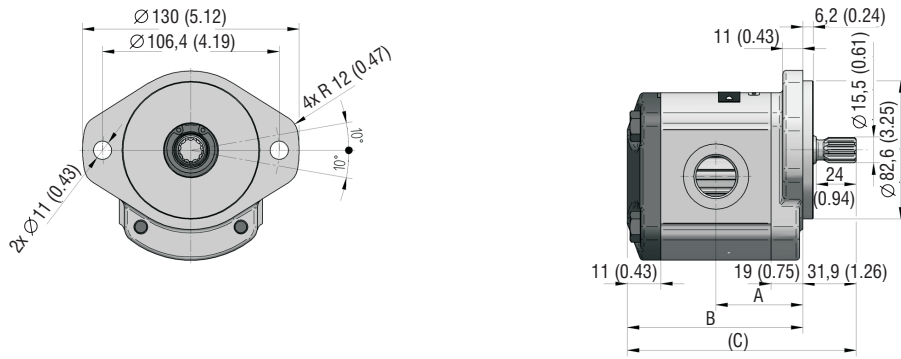


Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	KB	20 (0.79)	M8	13 (0.51)	40 (1.57)	KA	13,5 (0.53)	M6	13 (0.51)	30 (1.18)
to 10 (0.61)	KH	14 (0.55)			38 (1.50)	KH	14 (0.55)	M8		38 (1.50)
above 10 (0.61)	KI	19 (0.75)								

**Drains:**

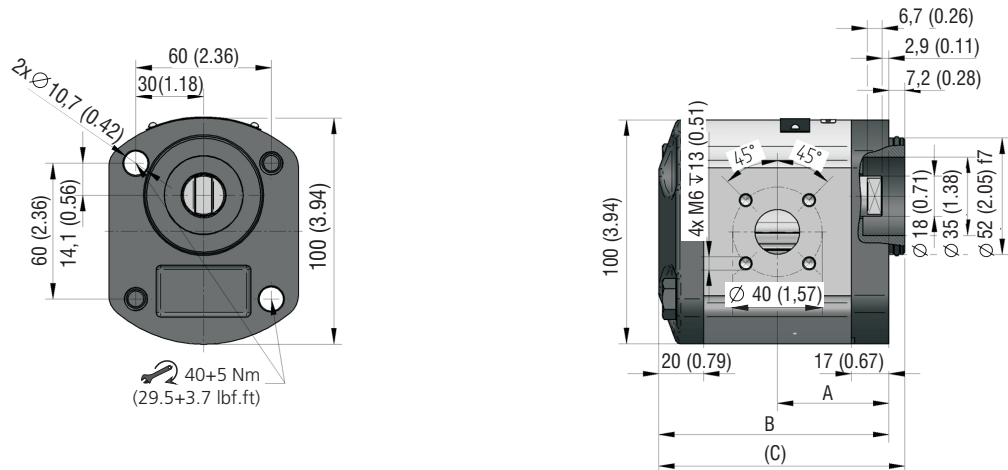
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension			
		A	B	C	D
ALL	MB	M12x1,5	12 (0.47)	20 (0.79)	1 (0.04)
	GA	G1/4	12 (0.47)	45 (1.77)	
	UA	7/16-20 UNF-2B	13 (0.51)	21 (0.83)	
	UB	9/16-18 UNF-2B	14 (0.55)	25 (0.98)	

GP2-\*R-SBDD-SG\*G\*-N



Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C
4 (0.24)	42,5 (1.67)	86,0 (3.39)	118,1 (4.65)	16 (0.98)	51,9 (2.04)	104,9 (4.13)	137,0 (5.39)
6 (0.37)	44,0 (1.73)	89,2 (3.51)	121,3 (4.78)	20 (1.22)	55,0 (2.17)	111,2 (4.38)	143,3 (5.64)
8 (0.49)	45,6 (1.80)	92,3 (3.63)	124,4 (4.90)	25 (1.53)	59,0 (2.32)	119,1 (4.69)	151,2 (5.95)
12 (0.73)	48,8 (1.92)	98,6 (3.88)	130,7 (5.15)	31 (1.89)	63,7 (2.51)	128,5 (5.06)	160,6 (6.32)

GP2-\*R-AJKH-SH\*H\*-N



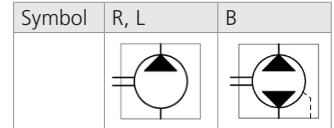
Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	C
4 (0.24)	40,5 (1.59)	84,0 (3.31)	91,2 (3.59)	16 (0.98)	49,9 (1.96)	102,9 (4.05)	110,1 (4.33)
6 (0.37)	42,0 (1.65)	87,2 (3.43)	94,4 (3.72)	20 (1.22)	53,0 (2.09)	109,2 (4.30)	116,4 (4.58)
8 (0.49)	43,6 (1.72)	90,3 (3.56)	97,5 (3.84)	25 (1.53)	57,0 (2.24)	117,1 (4.61)	124,3 (4.89)
12 (0.73)	46,8 (1.84)	96,6 (3.80)	103,8 (4.09)	31 (1.89)	61,7 (2.43)	126,5 (4.98)	133,7 (5.26)



**Technical Features**



- › Operating pressure 290 bar, Peak pressure 320 bar
- › High-strength quality aluminum alloys pump with axial play compensation
- › Low noise level in whole operating range
- › High operational reliability and service life for 3000 operation hours
- › High volumetric efficiency up to 98%
- › International standard flanges acc.to SAE, ISO, DIN, GOST



**Technical Data**

Nominal Size Parameters		Symbol	Unit	Displacement													
				10	13,5	17	22,5	27	34	43	51	61	71	82	100		
Actual displacement		V <sub>g</sub>	[cm <sup>3</sup> ]	10,14	13,76	17,39	22,46	27,53	34,05	43,47	51,44	61,59	71,01	81,87	99,98		
			[in <sup>3</sup> ]	0.62	0.84	1.06	1.37	1.68	2.08	2.65	3.14	3.76	4.34	5.00	6.10		
Rotation speed	nominal	n <sub>n</sub>	[min <sup>-1</sup> ]	1500													
	minimum	n <sub>min</sub>	[min <sup>-1</sup> ]	400				350									
	maximum	n <sub>max</sub>	[min <sup>-1</sup> ]	3200					3000	2500		2000	1800				
Pressure at inlet*	minimum	p <sub>1min</sub>	[bar]	-0,3 (-4.4 PSI)													
	maximum	p <sub>1max</sub>	[bar]	0,5 (7.3 PSI)													
Pressure at outlet**	max. continuous	p <sub>2n</sub>	[bar]	270	290				280	270	250	230	200	180			
			[PSI]	3916	4206				4061	3916	3625	3336	2901	2611			
	maximum	p <sub>2max</sub>	[bar]	290	310				300	290	270	250	220	200			
			[PSI]	4206	4496				4351	4206	3916	3625	3191	2901			
	peak	p <sub>3</sub>	[bar]	300	320				310	300	280	260	230	210			
			[PSI]	4351	4641				4496	4351	4061	3771	3336	3046			
Nominal flow rate (min.) at n <sub>n</sub> and p <sub>2n</sub>		Q <sub>n</sub>	[l min <sup>-1</sup> ]	14,1	19,2	24,2	31,3	38,4	47,5	60,6	71,8	85,9	99,0	114,2	139,5		
			[GPM]	3.72	5.07	6.39	8.27	10.14	12.55	16.01	18.97	22.69	26.15	30.17	36.85		
Maximum flow rate at n <sub>max</sub> and p <sub>2max</sub>		Q <sub>max</sub>	[l min <sup>-1</sup> ]	31,9	43,4	54,8	70,8	86,8	100,6	119,9	131,7	145,6	153,9	161,3	177,3		
			[GPM]	8.43	11.47	14.48	18.70	22.93	26.58	31.67	34.79	38.46	40.66	42.61	46.84		
Nominal input power (max.) at n <sub>n</sub> and p <sub>2n</sub>		P <sub>n</sub>	[kW]	8,0	11,7	14,8	19,2	23,5	29,0	35,8	40,8	45,3	48,0	48,2	52,9		
Maximum input power at n <sub>max</sub> and p <sub>2max</sub>		P <sub>max</sub>	[kW]	18,4	26,7	33,8	43,7	53,5	62,1	71,6	76,0	78,2	76,6	70,6	70,6		
Weight		m	[kg]														
			[lbs]														

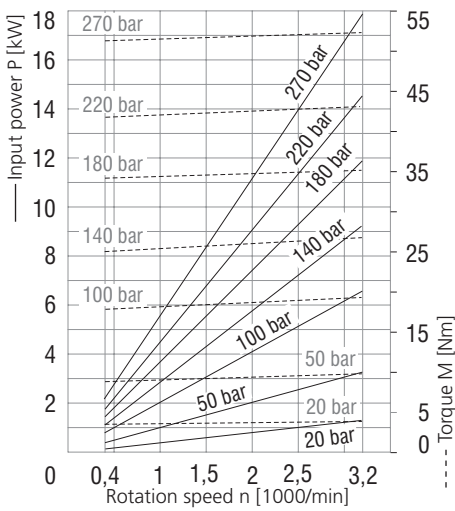
- 1) \*Inlet pressure in the reversible design can be up to **p<sub>1</sub> = p<sub>2n</sub>-70 bar max.** External drainage must be used in case of the reversible design.
- 2) \*\*Outlet pressure in the reversible design is 10% lower than shown in the table (depending on operating conditions).
- 3) **p<sub>2n</sub>** maximum continuous pressure - maximum working pressure, at which the pump can be operated without time limitation.
- 4) **p<sub>2max</sub>** maximum pressure - maximum pressure permissible for a short time, max. 20 s.
- 5) **p<sub>3</sub>** peak pressure - short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

Gear Pump / Size		GP3 - 10 ...100 ccm
Volumetric efficiency	%	92 ÷ 98
Mechanical efficiency	%	85
Fluid temperature range (NBR)	°C (°F)	-20...80 (-4...176)
Fluid temperature range (FPM)	°C (°F)	-20...120 (-4...248)
Viscosity range	mm <sup>2</sup> /s (SUS)	20 ...80 (97 ...390), 1200 (5849) for cold start
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Max. degree of fluid contamination for p <sub>2</sub> ≤ 200 bar		Class 21/18/15 acc. to ISO 4406
Max. degree of fluid contamination for p <sub>2</sub> ≥ 200 bar		Class 20/17/14 acc. to ISO 4406

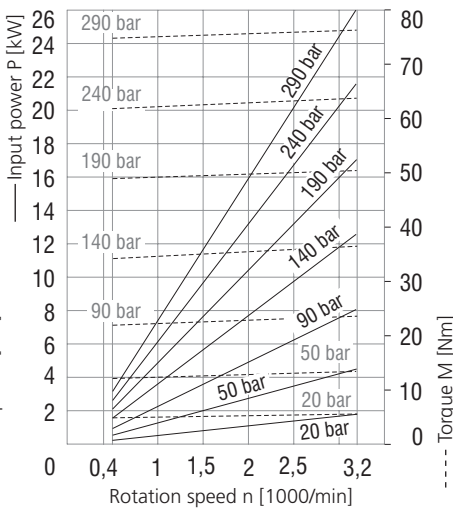




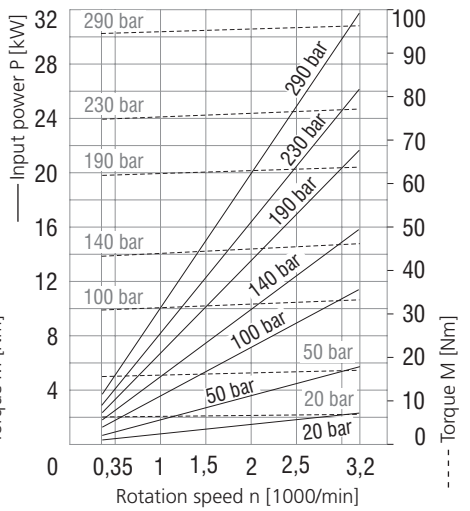
10 ccm



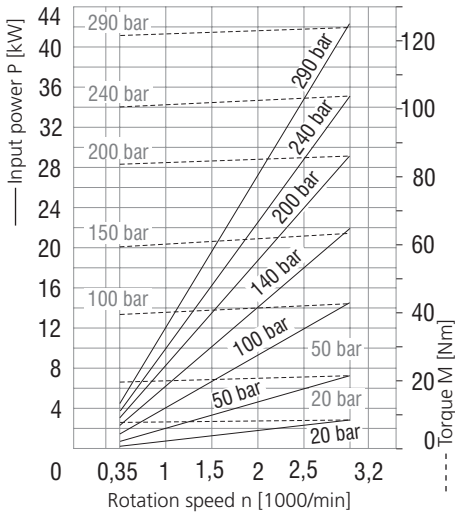
13,5 ccm



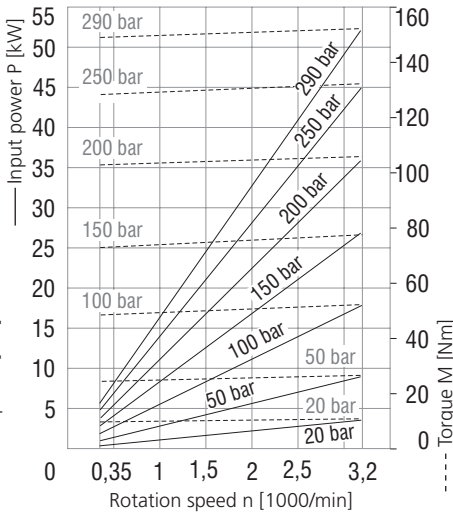
17 ccm



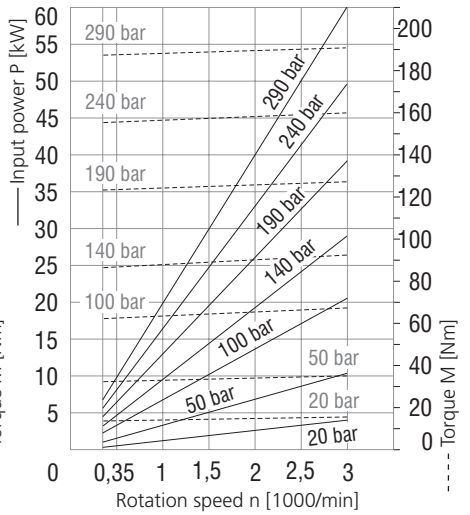
22,5 ccm



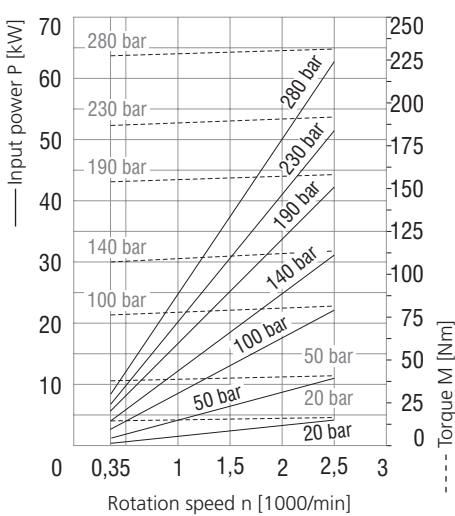
27 ccm



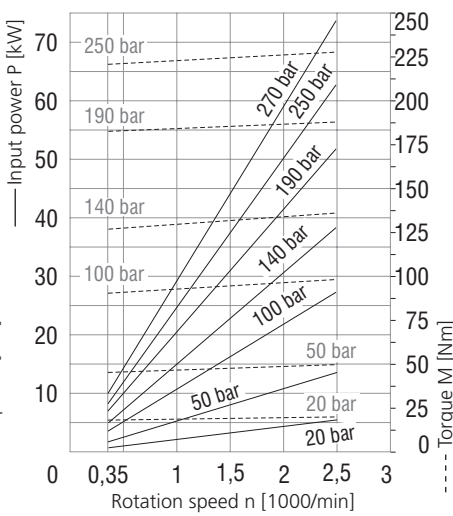
34 ccm



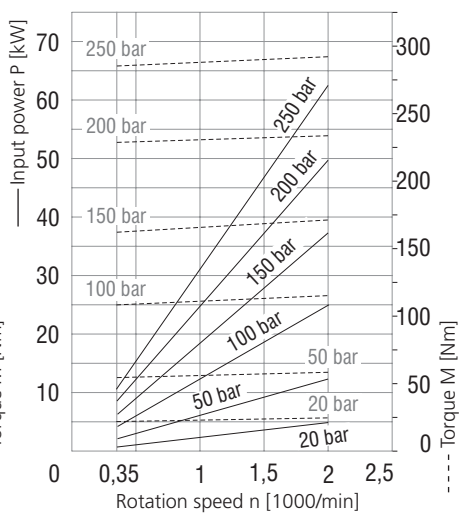
43 ccm



51 ccm

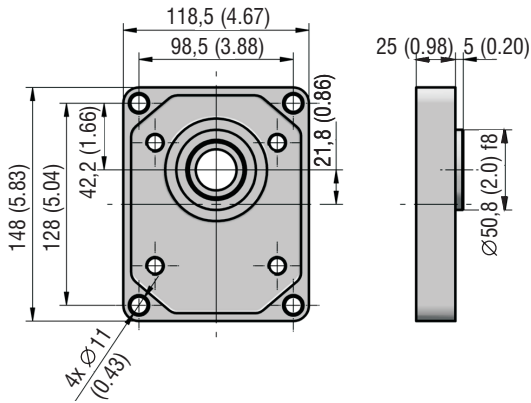


61 ccm

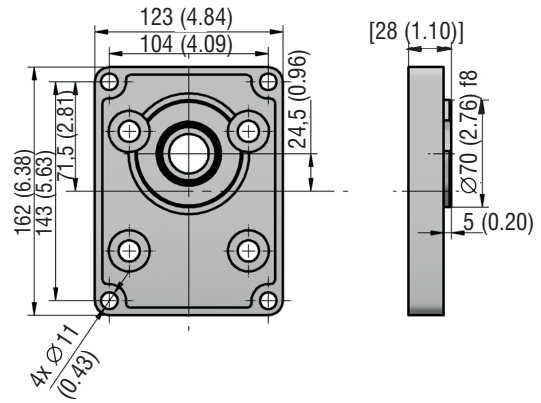




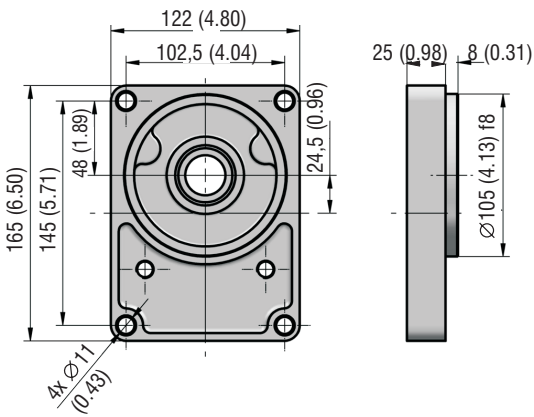
RL



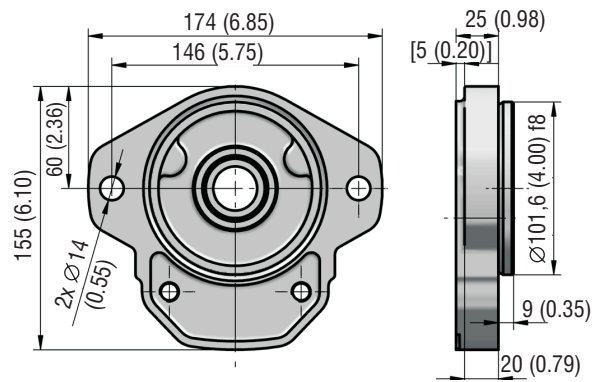
RM



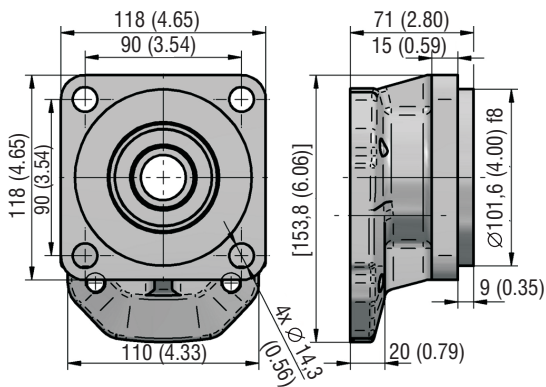
RN



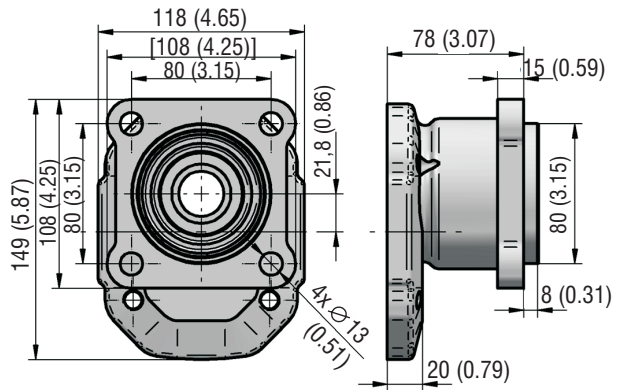
SC



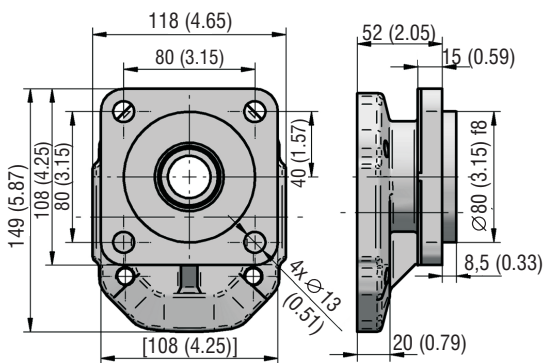
SE



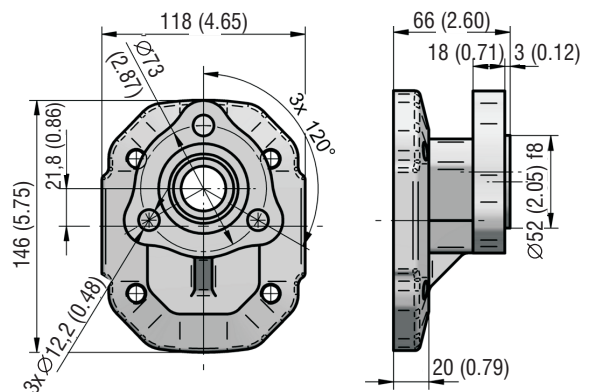
IA



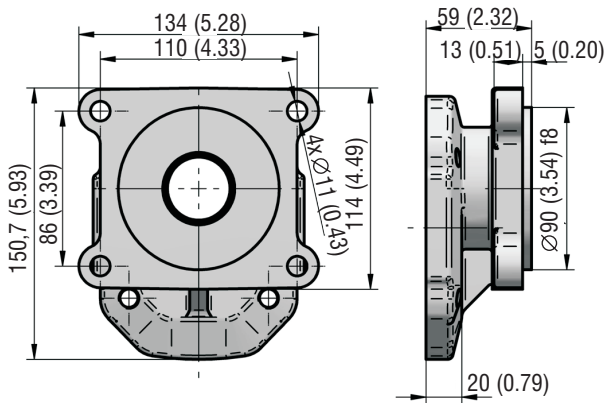
IB



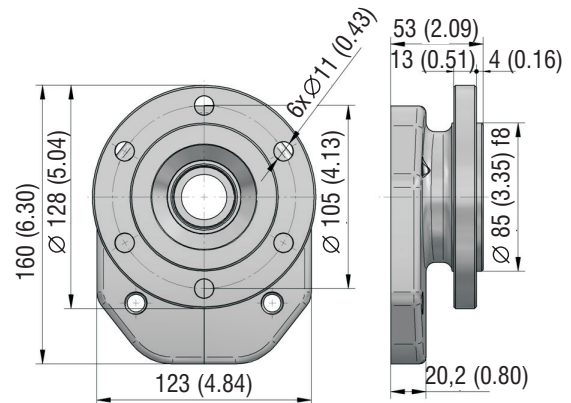
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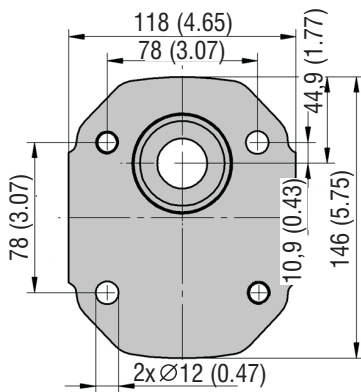
**BA**



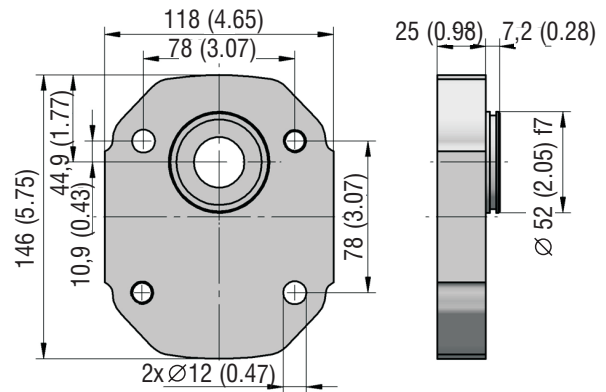
**KB**



**AM**



**AL**

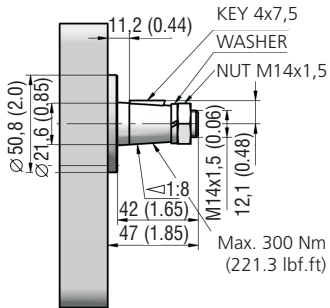


A driving device must not generate an axial or a radial load of the pump shaft, unless this is exclusively permitted for the pump with a front-end bearing.

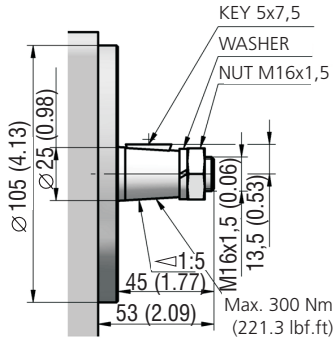
Ask producer for the version with front-end bearing.

Maximal torque for clutch between sections in multiple version is 220 Nm.

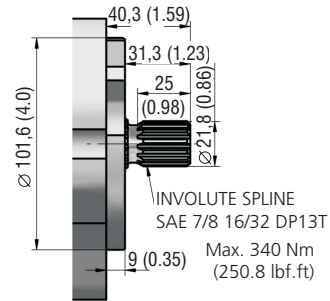
CL



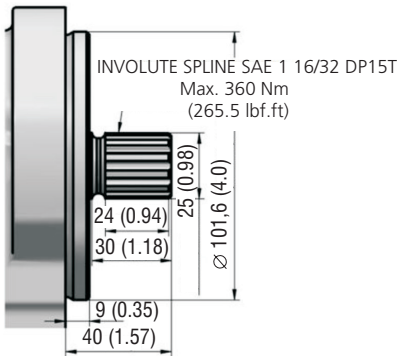
CM



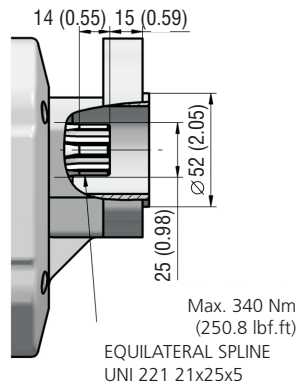
DN



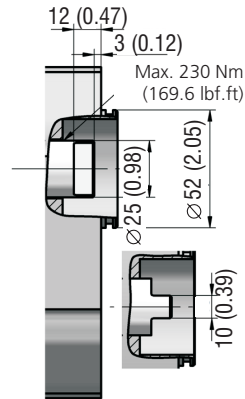
DP



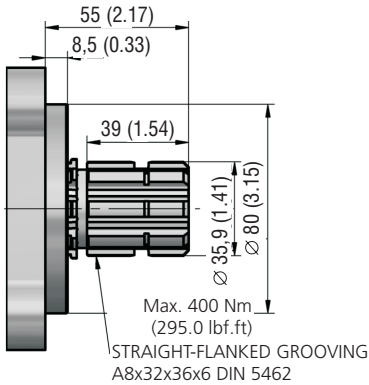
DR



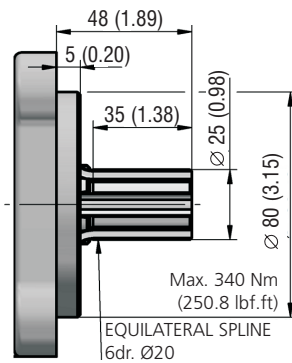
KJ



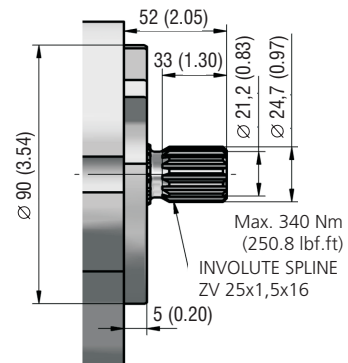
DS



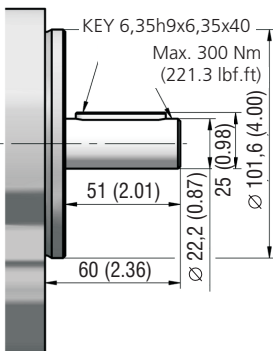
DT



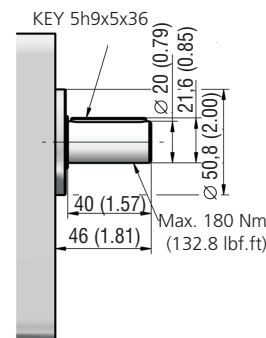
DW



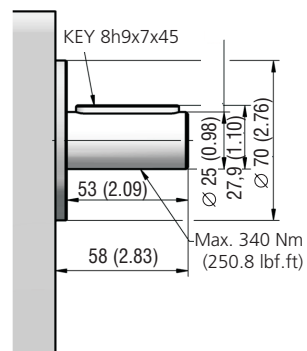
VO



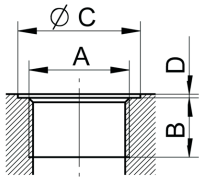
VP



VQ

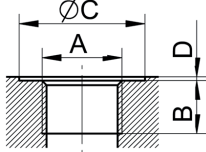


**Metric thread according to ISO 6149**



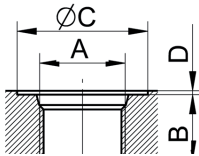
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
to 51 (3.11) including	MM	M33x2	18 (0.71)	40 (1.57)	1 (0.04)	MJ	M27x2	16 (0.63)	33 (1.30)	1 (0.04)
above 51 (3.11)	MP	M48x2		56 (2.20)		MM	M33x2	18 (0.71)	40 (1.57)	
drain	MD	M16x1,5	14 (0.55)	22 (0.89)						
	ME	M18x1,5		24 (0.94)						

**BSPP pipe thread according to 228-1**



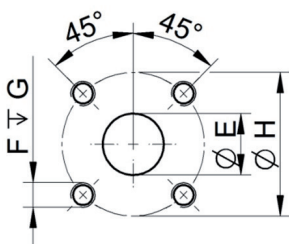
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
to 17 (1.04) including	GC	G 1/2	14 (0.55)	33 (1.30)	1 (0.04)	GC	G 1/2	14 (0.55)	33 (1.30)	1 (0.04)
17 - 34 (1.04 - 2.07) including	GD	G 3/4	16 (0.63)	39 (1.54)		GD	G 3/4	16 (0.63)	39 (1.54)	
34 - 51 (2.07 - 3.11) including	GE	G 1	18 (0.71)	45 (1.77)		GE	G 1	18 (0.71)	45 (1.77)	
above 51 (3.11)	GF	G 1 1/4		57 (2.24)		GE	G 1	18 (0.71)	45 (1.77)	

**UNF thread according to SAE**



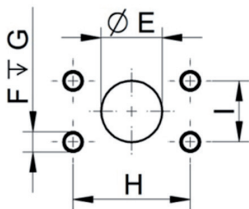
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		A	B	C	D		A	B	C	D
to 17 (1.04) including	UE	1-1/16-12UNF	19 (0.75)	41 (1.61)	1 (0.04)	UD	7/8-14UNF	17 (0.67)	34 (1.34)	1 (0.04)
17 - 27 (1.04 - 1.65) including	UH	1-5/16-12UNF	23 (0.91)	49 (1.93)		UE	1-1/16-12UNF	19 (0.75)	41 (1.61)	
27 - 39 (1.65 - 2.38) including				UH		1-5/16-12UNF	23 (0.91)	49 (1.93)		
above 39 (2.38)	UI	1-5/8-12UNF 2B		58 (2.28)		UH	1-5/16-12UNF	23 (0.91)	49 (1.93)	

**Flanged fittings according to DIN 8901/8902**



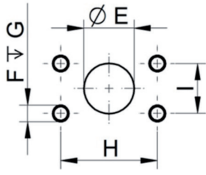
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	HL	26 (1.02)	M10	16 (0.63)	51 (2.01)	HI	18 (0.71)	M8	16 (0.63)	40 (1.57)
	HK	25 (0.98)	M8		55 (2.17)	HJ				55 (2.17)

**Flanged fittings according to SAE, metric thread**



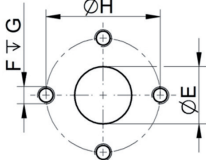
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension					Outlet Code	Dimension				
		E	F	G	H	I		E	F	G	H	I
to 61 (3.72) including	EC	25,4 (1.00)	M10	22 (0.87)	52,4 (2.06)	26,2 (1.03)	EB	9 (0.75)	M10	22 (0.87)	47,6 (1.87)	22,2 (0.87)
above 61 (3.72)	ED	30,5 (1.20)			58,7 (2.31)	30,2 (1.19)	EC	25,4 (1.00)			52,4 (2.06)	26,2 (1.03)
		EE	39,3 (1.55)	M12	27 (1.06)	69,8 (2.75)	35,7 (1.41)	ED	30,5 (1.20)		58,7 (2.31)	30,2 (1.19)

Flanged fittings according to SAE, UNC thread



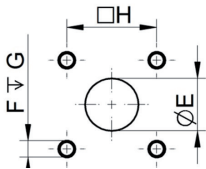
Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension					Outlet Code	Dimension				
		E	F	G	H	I		E	F	G	H	I
to 61 (3.72) including	AC	25,4 (1.00)	3/8-16-UNC	22 (0.87)	52,4 (2.06)	26,2 (1.03)	AB	19 (0.75)	3/8-16-UNC	22 (0.87)	47,6 (1.87)	22,2 (0.87)
above 61 (3.72)	AD	30,5 (1.20)	7/16-14-UNC		58,7 (2.31)	30,2 (1.19)	AC	25,4 (1.00)			52,4 (2.06)	26,2 (1.03)
	AE	39,3 (1.55)	1/2-13-UNC	27 (1.06)	69,8 (2.75)	35,7 (1.41)	AD	30,5 (1.20)	7/16-14-UNC	29 (1.14)	58,7 (2.31)	30,2 (1.19)

Flanged fittings - „ cross “



Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
ALL	KD	26 (1.02)	M10	16 (0.63)	51 (2.01)	KC	18 (0.71)	M8	16 (0.63)	40 (1.57)
	KF	25 (0.98)	M8		55 (2.17)	KE				55 (2.17)

Flanged fittings - „ square “

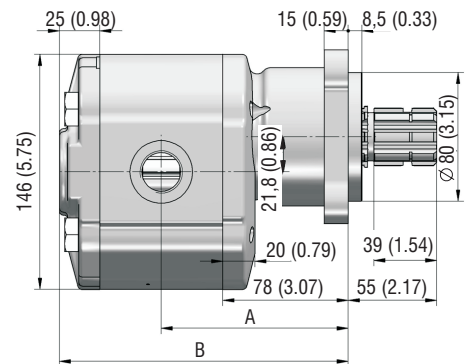
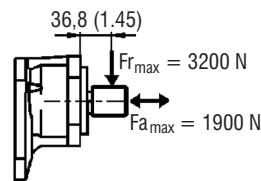


Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Inlet Code	Dimension				Outlet Code	Dimension			
		E	F	G	H		E	F	G	H
to 43 (2.62) including	SL	23 (0.91)	M8	22 (0.87)	46 (1.81)	SK	16 (0.63)	M8	22 (0.87)	46 (1.81)
above 43 (2.62)	SJ	27 (1.06)	M10		54 (2.13)	SI	19 (0.75)	M10		54 (2.13)

Drain

Displacement [cm <sup>3</sup> (in <sup>3</sup> )]	Outlet Code	Dimension			
		A	B	C	D
ALL	MD	M16x1,5	14 (0.55)	22 (0.87)	1 (0.04)
	ME	M18x1,5		24 (0.94)	

GP3-\*R-IADS-SG\*G\*-N



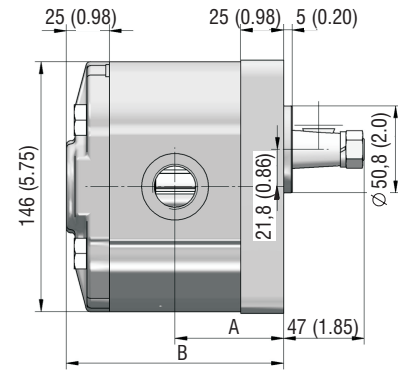
Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
17 (1.06)	112 (4.41)	171 (6.73)	61 (3.76)	130,5 (5.14)	208 (8.20)
27 (1.68)	116,3 (4.58)	179,5 (7.07)	71 (4.34)	134,8 (5.31)	216,5 (8.52)
34 (2.08)	119 (4.69)	185 (7.28)	82 (5.00)	139,3 (5.48)	225,5 (8.88)
43 (2.65)	122,8 (4.43)	192,5 (7.58)	100 (6.10)	150,8 (5.94)	248,5 (9.78)
51 (3.14)	126,3 (4.97)	199,5 (7.85)			



GP3 Pumps - basic design in millimeters (inches)

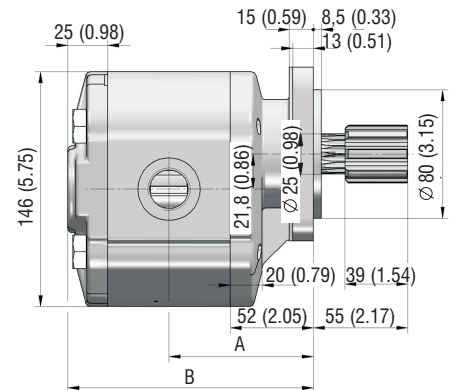
GP3-\*R-RLCL-SG\*G\*-N

Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
10 (0.62)	56 (2.20)	112 (4.41)	43 (2.65)	69,8 (2.75)	139,5 (5.49)
13,5 (0.84)	57,5 (2.26)	115 (4.53)	51 (3.14)	73,3 (2.89)	146,5 (5.77)
17 (1.06)	59 (2.32)	118 (4.65)	61 (3.76)	77,5 (3.05)	155 (6.10)
22,5 (1.37)	61,3 (2.41)	122,5 (4.82)	71 (4.34)	81,8 (3.22)	163,5 (6.44)
27 (1.68)	63,3 (2.49)	126,5 (4.98)	82 (5.00)	86,3 (3.40)	172,5 (6.79)
34 (2.08)	66 (2.60)	132 (5.20)	100 (6.10)	97,8 (3.85)	195,5 (7.70)



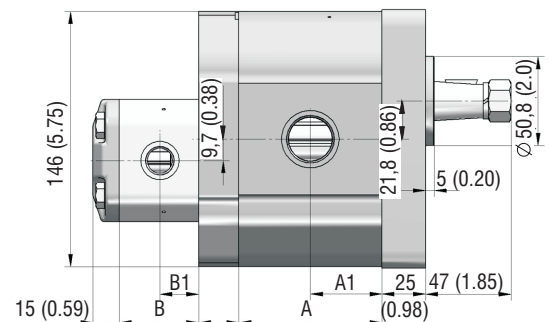
GP3-\*R-IBDS-SG\*G\*-N

Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B	Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	B
10 (0.62)	83 (3.27)	139 (5.47)	51 (3.14)	100,3 (3.95)	173,5 (6.83)
17 (1.06)	86 (3.39)	145 (5.71)	61 (3.76)	104,5 (4.11)	182 (7.17)
27 (1.68)	90,3 (3.56)	153,5 (6.04)	71 (4.34)	108,8 (4.28)	190,5 (7.85)
34 (2.08)	93 (3.66)	159 (6.26)	82 (5.00)	113,3 (4.46)	199,5 (6.44)
43 (2.65)	96,8 (3.81)	166,5 (6.56)	100 (6.10)	124,8 (4.91)	222,5 (8.76)



GP3-\*/GP1-\*L-RLCL-SM\*M\*/M\*M\*-N

Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	A1	B	B1
17 / 1,6 (1.06 / 0.10)	68 (2.68)	34 (1.34)	38,3 (1.51)	19,2 (0.76)
17 / 2,5 (1.06 / 0.15)	68 (2.68)	34 (1.34)	41,5 (1.63)	20,8 (0.82)
17 / 3,6 (1.06 / 0.22)	68 (2.68)	34 (1.34)	45,6 (1.80)	22,8 (0.90)
27 / 1,6 (1.65 / 0.10)	76,5 (3.01)	38,3 (1.51)	38,3 (1.51)	19,2 (0.76)
27 / 2,5 (1.65 / 0.15)	76,5 (3.01)	38,3 (1.51)	41,5 (1.63)	20,8 (0.82)
27 / 3,6 (1.65 / 0.22)	76,5 (3.01)	38,3 (1.51)	45,6 (1.80)	22,8 (0.90)
34 / 1,6 (2.08 / 0.10)	82 (3.23)	41 (1.61)	38,3 (1.51)	19,2 (0.76)
34 / 2,5 (2.08 / 0.15)	82 (3.23)	41 (1.61)	41,5 (1.63)	20,8 (0.82)
34 / 3,6 (2.08 / 0.22)	82 (3.23)	41 (1.61)	45,6 (1.80)	22,8 (0.90)
43 / 1,6 (2.62 / 0.10)	89,5 (3.52)	44,8 (1.76)	38,3 (1.51)	19,2 (0.76)



GP3-\*/GP2-\*R-RLCL-SK\*K\*/K\*K\*-N

Displacement [cm <sup>3</sup> (in <sup>3</sup> )/rev]	A	A1	B	B1
51 / 8 (3.11 / 0.49)	96,5 (3.78)	48,3 (1.90)	57 (2.24)	28,5 (1.12)
34 / 11 (2.08 / 0.67)	82 (3.23)	41 (1.61)	62,5 (2.46)	31,3 (1.23)
51 / 11 (3.11 / 0.67)	96,5 (3.78)	48,3 (1.90)	62,5 (2.46)	31,3 (1.23)

