

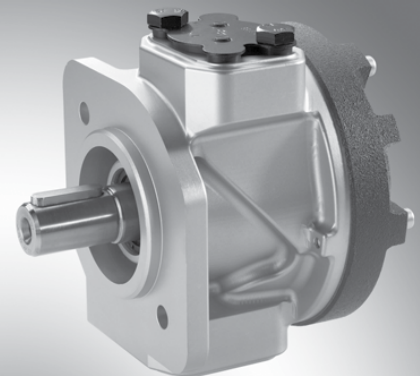
# Gerotor pump, fixed displacement volume

RE 10545/12.11

1/12

## Type PGZ

Component series 1X  
Maximum operating pressure 15 bar  
Maximum displacement 140 cm<sup>3</sup>



H7572\_d

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## Features

- Low-pressure pump with fixed displacement
- Very low operating noise
- Suitable for wide viscosity and speed ranges
- Very good suction behavior
- Flexible combination possibilities with Rexroth axial piston, internal gear and vane pumps
- Use:  
For cooling, filtration or lubrication circuits at low pressures in industrial or mobile applications, e.g. plastics processing machines, machine tools, presses and wind turbines.

Information on available spare parts:  
[www.boschrexroth.com/spc](http://www.boschrexroth.com/spc)

## Ordering code

PG	Z	-1X/	R	07	V	*
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### Series

Gerotor pump, low-pressure = Z

### Frame size

BG4 = 4  
BG5 = 5

**Component series:** Component series 10 to 19 = 1X  
(10 to 19: Unchanged installation and connection dimensions)

### Size

	Size	Displacement volume/ rotation	
<b>BG4</b>	20	21.0 cm <sup>3</sup>	= 20
	32	33.4 cm <sup>3</sup>	= 32
	40	42.1 cm <sup>3</sup>	= 40
	50	52.0 cm <sup>3</sup>	= 50
	63	64.4 cm <sup>3</sup>	= 63
<b>BG5</b>	80	84.2 cm <sup>3</sup>	= 80
	63	64.4 cm <sup>3</sup>	= 63
	80	84.2 cm <sup>3</sup>	= 80
	100	105.3 cm <sup>3</sup>	= 100
	140	136.3 cm <sup>3</sup>	= 140

### Direction of rotation

Clockwise (viewed on the shaft end) = R

Further details in the plain text  
e.g. special designs

### Type of connection

**E4 =** ISO 4-hole mounting flange  
according to ISO 3019-2 and  
VDMA 24560

**U2 =** SAE 2-hole mounting flange

**B2 =** ISO 2-hole mounting flange  
according to ISO 3019-2,  
secondary pump for  
through-drive KB2

**B3 =** ISO 2-hole mounting flange  
according to ISO 3019-2,  
secondary pump for  
through-drive KB3

### Seal material

**V =** FKM seals

### Line connection

**07 =** SAE flange standard pressure series

### Shaft design

**A =** Cylindrical

**T =** SAE involute gear 11T

**R =** SAE involute gear 13T

### Standard types PGZ-1X

Type	Size	Material No.
PGZ4-1X/020RA07VE4		R901230020
PGZ4-1X/032RA07VE4		R901230024
PGZ4-1X/040RA07VE4		R901230028
PGZ4-1X/050RA07VE4		R901230032
PGZ4-1X/063RA07VE4		R901230036
PGZ4-1X/080RA07VE4		R901230040
PGZ5-1X/100RA07VE4		R901230052
PGZ5-1X/140RA07VE4		R901230056

The possible flange shaft configurations can be found in the selection tables on the pages 6 to 9.

## Function, section

### Construction

Hydraulic pumps of the PGZ type are gerotor pumps with fixed displacement.

They mainly consist of: Flange housing (1), shaft (2), the displacer elements inner rotor (3) and outer rotor (4), as well as driving disk (5) and cover (6).

### Suction and displacement procedure

Via the driving disk the shaft drives the inner rotor in the direction of rotation shown. The inner rotor meshes with the outer rotor and causes the same to rotate as well.

The tooth clearances opening in the suction area (S) prime the hydraulic fluid. The suction and pressure area are separated on the opposite side of the meshing area (Z) by a radial gap (R) created by the tooth profile of the outer and the inner rotor sliding against each other.

Within the pressure area (P) the hydraulic fluid is pumped into the pressure port as the chambers become.

### Properties

The gearing with cycloid contour is characterized by a large meshing length. Filling zone and displacement area cover a large rotation angle. This results in low flow pulsation and thus very low operating noise.

The shaft and the displacer are supported by a slide bearing and work in a wear-free manner when used as intended.

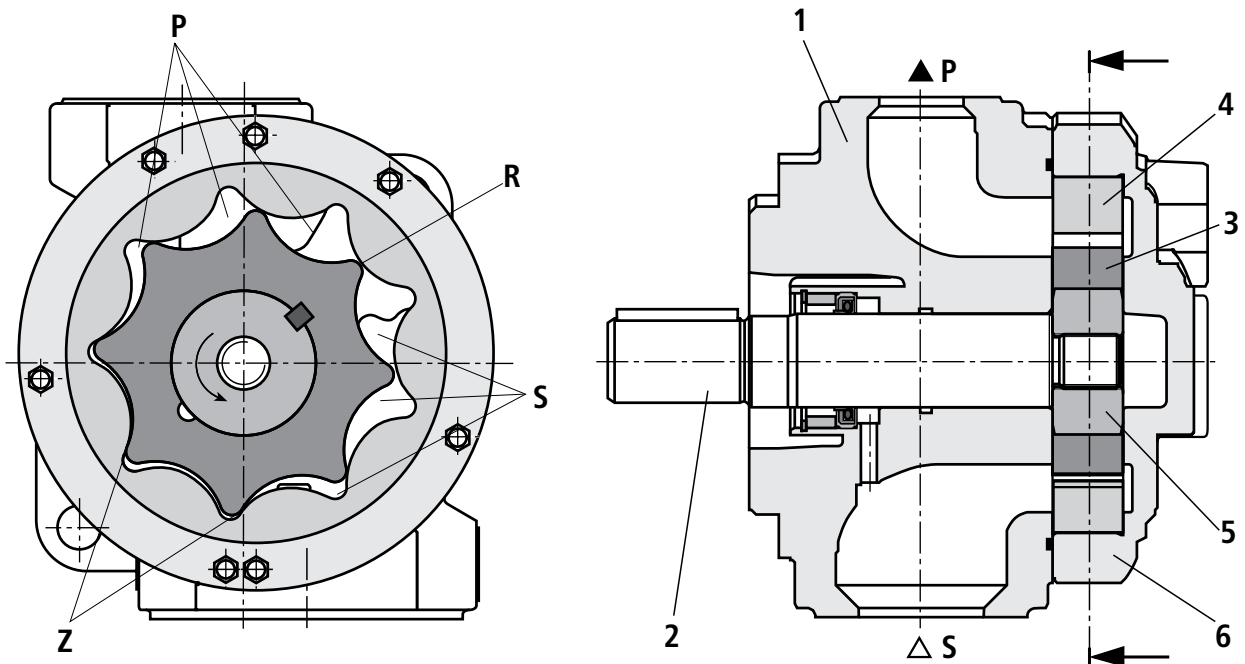
Gerotor pumps PGZ are self-priming.

### Materials used

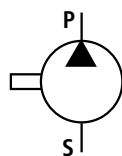
Flange housing (1): Aluminum

Shaft (2), inner rotor (3), outer rotor (4), and driving disk (5): Steel

Cover (6): Cast iron



## Symbol



**Technical data** (For applications outside these parameters, please consult us!)**general**

Type	Gerotor pump
Type of connection	ISO 4-hole mounting flange according to ISO 3019-2 and VDMA 24560 SAE 2-hole mounting flange ISO 2-hole mounting flange according to ISO 3019-2, matching through-drive KB2 ISO 2-hole mounting flange according to ISO 3019-2, matching through-drive KB3
Line connection	Flange connection
Shaft load	Radial and axial forces cannot be transmitted
Direction of rotation (viewed on shaft end)	Clockwise

**hydraulic**

Hydraulic fluid	HLP - mineral oil according to DIN 51524 part 2 <b>Please observe our specification according to data sheet RE 90220</b> <b>Other fluids upon request!</b>							
Hydraulic fluid temperature range	°C	-20 to +80, observe the admissible viscosity range!						
Ambient temperature range	°C	-20 to +80						
Viscosity range	mm <sup>2</sup> /s	10 to 2000						
Max admissible degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)	Class 21/18/15 <sup>1)</sup>							
<b>Frame size 4</b>	<b>Frame size</b>	<b>PGZ4</b>						
<b>Size</b>	<b>Size</b>	<b>20</b>	<b>32</b>	<b>40</b>	<b>50</b>	<b>63</b>	<b>80</b>	
Displacement	<i>V</i> cm <sup>3</sup>	21.0	33.4	42.1	52.0	64.4	84.2	
Weight	<i>m</i> kg	4.7	5.3	5.6	6.0	6.7	7.8	
Flow <sup>2)</sup>	<i>q<sub>v</sub></i> l/min	28	46	58	71	88	116	
Mass moment of inertia (around drive axis)	<i>J</i> kgm <sup>2</sup>	0.00086	0.00134	0.00167	0.00205	0.00253	0.00329	
Speed range	<i>n<sub>min</sub></i> rpm	200	200	200	200	200	200	
	<i>n<sub>max</sub></i> rpm	3000	3000	3000	3000	2300	1800	
Operating pressure, absolute – Inlet	<i>p</i> bar	0.7 to 2 (short-time during start 0.5 bar)						
Nominal pressure – Outlet, continuous	<i>p<sub>N</sub></i> bar	15						
Min required driving power – at $\Delta p \approx 1$ bar, $n = 1,450$ min <sup>-1</sup>	kW	0.75	1.1	1.1	1.1	1.1	1.1	
– at $\Delta p \approx 10$ bar, $n = 1,450$ min <sup>-1</sup>		1.5	2.2	2.2	2.2	3.0	3.0	
Sound pressure level at 0 – 15 bar <sup>3)</sup>	dB(A)	55	56	57	59	60	62	

<sup>1)</sup> The cleanliness classes specified for the components must be adhered to in hydraulic systems.  
An efficient filtration prevents failures and simultaneously increases the lifetime of the components.  
For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

<sup>2)</sup> Measured at  $n = 1.450$  rpm,  $p = 10$  bar, and  $v = 30$  mm<sup>2</sup>/s

<sup>3)</sup> Measured in sound-absorbent acoustic room at  $n = 1450$  rpm and  $v = 30$  mm<sup>2</sup>/s

**Technical data** (For applications outside these parameters, please consult us!)

Frame size 5	Frame size		PGZ5			
Size	Size		63	80	100	140
Displacement	$V$	cm <sup>3</sup>	64.4	84.2	105.3	136.3
Weight	$m$	kg	6,6	7,7	8,9	10,7
Flow <sup>1)</sup>	$q_V$	l/min	88	116	144	186
Mass moment of inertia (around drive axis)	$J$	kgm <sup>2</sup>	0.00253	0.00329	0.00410	0.00529
Speed range	$n_{min}$	rpm	200	200	200	200
	$n_{max}$	rpm	3000	2300	1800	1500
Operating pressure, absolute – Inlet	$p$	bar	0.7 to 2 (short-time during start 0.5 bar)			
Nominal pressure – Outlet, continuous	$p_N$	bar	15			
Min required driving power		kW				
– at $\Delta p \approx 1$ bar, $n = 1,450$ min <sup>-1</sup>			1.1	1.1	1.5	1.5
– at $\Delta p \approx 10$ bar, $n = 1,450$ min <sup>-1</sup>			3.0	3.0	4.0	5.5
Sound pressure level at 0 – 15 bar <sup>2)</sup>		dB(A)	60	62	63	66

<sup>1)</sup> Measured at  $n = 1,450$  rpm,  $p = 10$  bar, and  $v = 30$  mm<sup>2</sup>/s

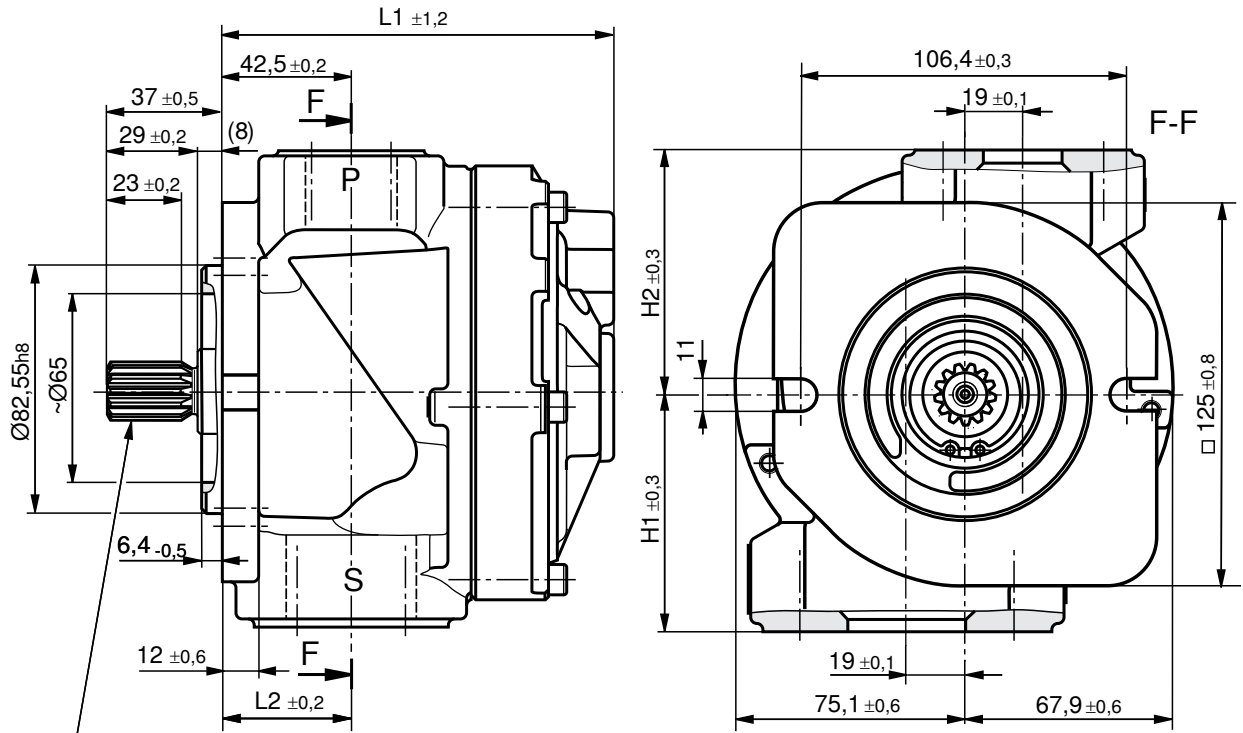
<sup>2)</sup> Measured in sound-absorbent acoustic room at  $n = 1450$  rpm and  $v = 30$  mm<sup>2</sup>/s



## Unit dimensions frame sizes 4 and 5, type...VU2 (dimensions in mm)

PGZ<sup>4</sup><sub>5</sub> -1X/ ... RT07VU2

Drive shaft splined,  
SAE 2-hole mounting flange



Involute gear ANSI B92.1-1996  
11T 16/32 DP30°

Type	Size	Material No.	L1	L2	H1	H2	S <sup>1)</sup>	P <sup>1)</sup>
PGZ4-1X/020RT07VU2		R901230021	116,5	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/032RT07VU2		R901230025	121,5	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/040RT07VU2		R901230029	125	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/050RT07VU2		R901230033	129	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/063RT07VU2		R901230037	134	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/080RT07VU2		R901230041	142	42,5	77,4	79,6	1 1/2"	1"
PGZ5-1X/063RT07VU2		R901230045	134	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/080RT07VU2		R901230049	142	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/100RT07VU2		R901230053	150,5	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/140RT07VU2		R901230057	163	48,5	72,9	76,1	2"	1 1/4"

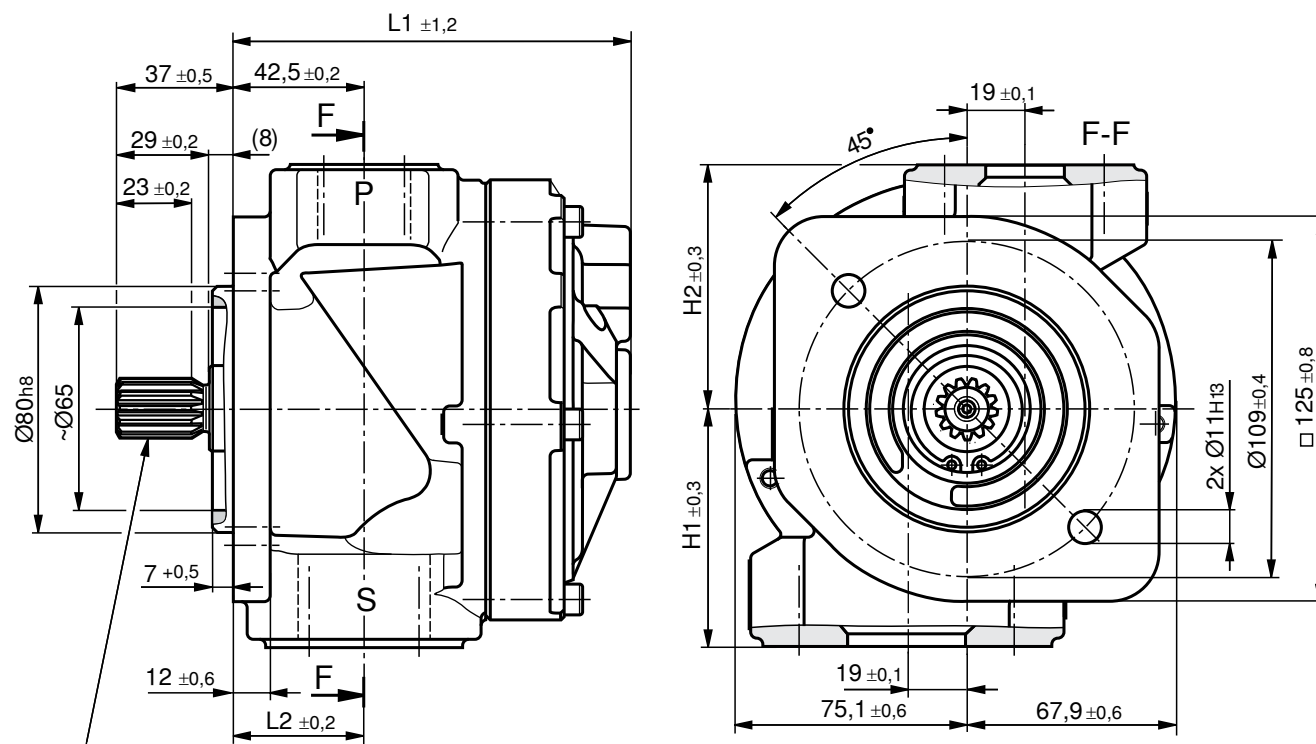
<sup>1)</sup> Exact dimensions see table page 10

## Unit dimensions frame sizes 4 and 5, type...VB2 (dimensions in mm)

### PGZ <sup>4</sup>/<sub>5</sub> -1X/ ... RT07VB2

Drive shaft splined,  
ISO 2-hole mounting flange according to ISO 3019-2

(Secondary pump for through-drive KB2)



Involute gear ANSI B92.1-1996  
11T 16/32 DP30°

Type	Size	Material No.	L1	L2	H1	H2	S <sup>1)</sup>	P <sup>1)</sup>
PGZ4-1X/020RT07VB2		R901230022	116,5	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/032RT07VB2		R901230026	121,5	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/040RT07VB2		R901230030	125	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/050RT07VB2		R901230034	129	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/063RT07VB2		R901230038	134	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/080RT07VB2		R901230042	142	42,5	77,4	79,6	1 1/2"	1"
PGZ5-1X/063RT07VB2		R901230046	134	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/080RT07VB2		R901230050	142	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/100RT07VB2		R901230054	150,5	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/140RT07VB2		R901230058	163	48,5	72,9	76,1	2"	1 1/4"

<sup>1)</sup> Exact dimensions see table page 10

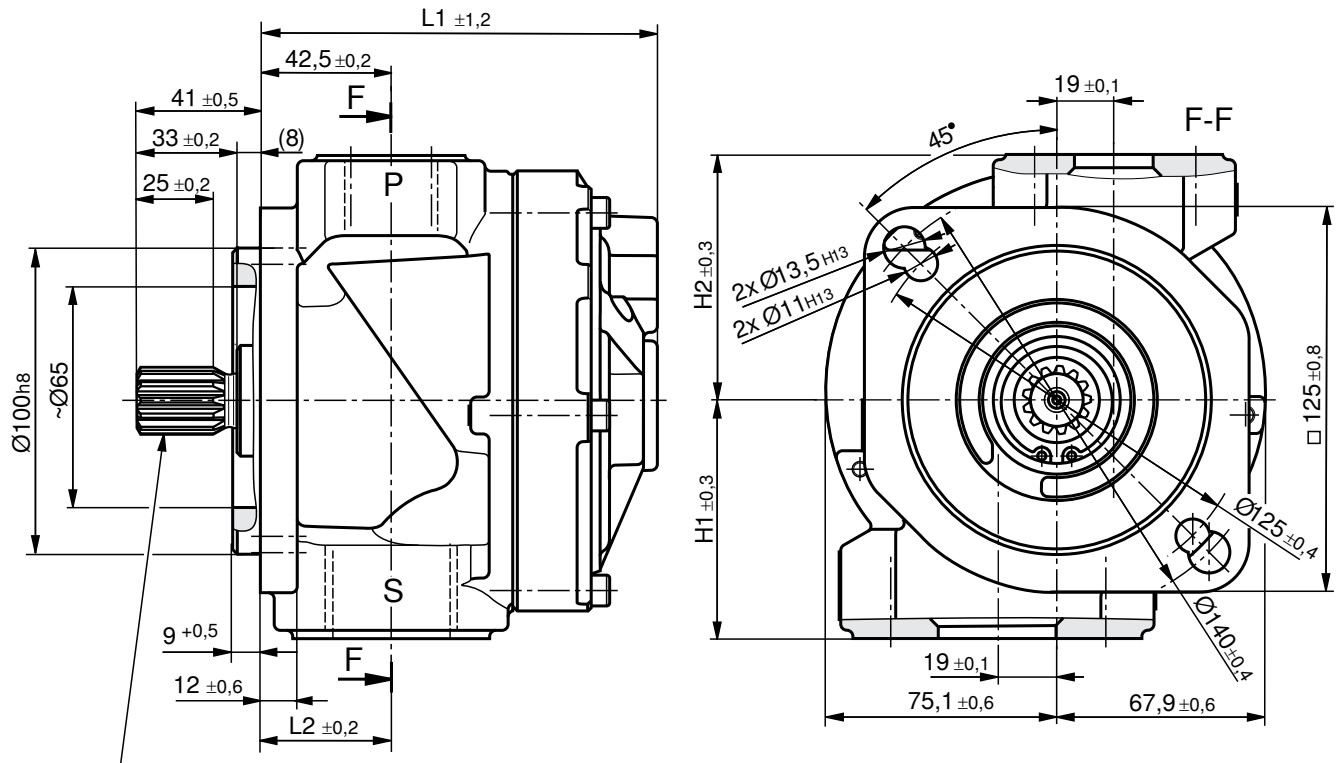


## Unit dimensions frame sizes 4 and 5, type...VB3 (dimensions in mm)

### PGZ<sup>4</sup><sub>5</sub>-1X/...RR07VB3

Drive shaft splined,  
ISO 2-hole mounting flange according to ISO 3019-2

(Secondary pump for through-drive KB3)



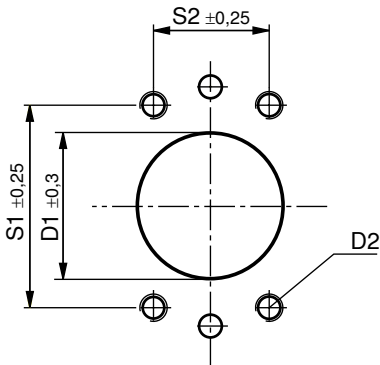
Involute gear ANSI B92.1-1996  
13T 16/32 DP30°

Type	Size	Material No.	L1	L2	H1	H2	S <sup>1)</sup>	P <sup>1)</sup>
PGZ4-1X/020RR07VB3		R901230023	116,5	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/032RR07VB3		R901230027	121,5	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/040RR07VB3		R901230031	125	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/050RR07VB3		R901230035	129	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/063RR07VB3		R901230039	134	42,5	77,4	79,6	1 1/2"	1"
PGZ4-1X/080RR07VB3		R901230043	142	42,5	77,4	79,6	1 1/2"	1"
PGZ5-1X/063RR07VB3		R901230047	134	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/080RR07VB3		R901230051	142	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/100RR07VB3		R901230055	150,5	48,5	72,9	76,1	2"	1 1/4"
PGZ5-1X/140RR07VB3		R901230059	163	48,5	72,9	76,1	2"	1 1/4"

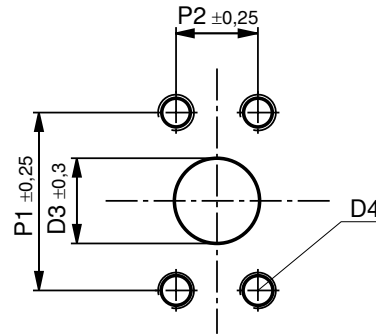
<sup>1)</sup> Exact dimensions see table page 10

## Ports (dimensions in mm)

### Hole pattern of suction port "S"



### Hole pattern of discharge port "P"



Frame size	Hole pattern / suction port S	D1	D2	S1	S2	Hole pattern / discharge port P	D3	D4	P1	P2
4	1 1/2"	Ø38,1	M12; 21	69,9	35,7	1"	Ø25,4	M10; 16	52,4	26,2
5	2"	Ø50,8	M12; 21	77,8	42,9	1 1/4"	Ø31,8	M10; 18	58,7	30,2

## Project planning information

### 1. General notes

This project planning information relates to the specific properties of the Rexroth PGZ.-1X gerotor pump. Please find comprehensive general information and suggestions in The Hydraulic Trainer, Volume 3 "Planning and Design of Hydraulic Power Systems", RE 00281.

#### 1.1 Intended use

Rexroth gerotor pumps are intended for the use in cooling, filtration, and lubrication circuits in the fields of machine and plant engineering. During project planning, the basic principles of the EU Machinery Directive or comparable national regulations outside of the EU have to be observed.

The pumps must not be used in potentially explosive atmospheres in accordance with Directive 94/9/EC (ATEX). The use as hydraulic motor is inadmissible!

#### 1.2 Technical data

The plant or machine manufacturer has to ensure the compliance with the admissible technical data and operating conditions. The pump itself does not contain a device to prevent operation outside of the admissible data.

All mentioned technical features are average values and are applicable for the specified boundary conditions. In case of modifications to the boundary conditions (e.g. viscosity), the technical data may change as well. Tolerances are possible in accordance with state of the art.

Operating the pump outside of the admissible technical data (pages 4, 5) is possible to a certain extent, however, this requires an explicit written approval of Bosch Rexroth.

### 2. Hydraulic project planning

#### 2.1 Installation location

When installing the pump more than 10 m below the tank, take additional measures to ensure that the inlet pressure is reduced to the maximum admissible value.

#### 2.2 Suction line

The line cross-sections have to be dimensioned for the rated flows in a manner that an ideal suction speed of 0.6 to 1.2 m/s is achieved on average. The suction speed must not exceed a maximum value of 2 m/s.

The suction cross-sections at the very pump are dimensioned for the maximum flow and thus are a reference only. During continuous operation at speeds lower than the admissible maximum speed, the suction tube diameter is to be dimensioned smaller than the suction port of the pump in accordance with the actual suction speed.

All in all the suction line has to be designed in a way that the admissible inlet operating pressure is complied with (0.7 to 2 bar absolute)! Bends and a combination of the suction tubes of several pumps must be avoided.

If suction filters have to be used, it has to be ensured on the system side that the lowest admissible inlet operating pressure is not exceeded even when the filter is clogged.

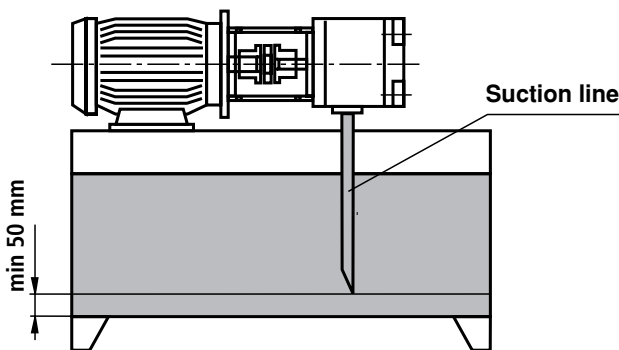
Please observe air tightness of the transitions and dimensional stability of the suction hose as regards to the external air pressure.

## Project planning information

(continuation of 2.2 Suction line)

The value for the immersion depth of the suction tube should be selected as high as possible. Depending on the internal tank pressure, the viscosity of the hydraulic fluid, and the flow situation within the tank, no vortex must be formed even at maximum flow. Otherwise there is the risk of aspirating air.

We recommend selecting suction tubes according to AB 23-03.



### 2.3 Pressure limitation

The gerotor pump PGZ is not equipped with devices for not exceeding the maximum operating pressure. Setting and limiting the admissible operating pressure has to be ensured on the system side.

## 3. Mechanical project planning

### 3.1 Installation and disassembly option

For installing and disassembling the pump on or from the drive the accessibility has to be provided for on the system side.

Screws of the property class 8.8 or 10.9 have to be provided for mounting purposes.

### 3.2 Mounting

On the machine side, the screws have to be accessible in a way that the required tightening torque can be applied. The tightening torque is oriented on the operating conditions and elements involved in the screw connection and has to be specified by the manufacturer when engineering the power unit, the machine, or the plant.

### 3.3 Required power unit functions

Hydraulic power units should be equipped with the following features at least:

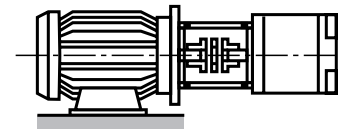
- Tanks, the internal pressure of which corresponds to the ambient pressure in accordance with the design, have to be equipped with breather filters for pressure compensation purposes.
- The hydraulic fluid should be filled in through filling connections with rule out filling with unfiltered hydraulic fluid.
- The ingress of contaminants or moisture into the system must be avoided. When using the pump in a highly contaminated environment, the tank is to be pre-loaded by means of air pressure for this. If external cleansing of the tank is intended or to be expected during the period of use, tank fittings for tubes, lines, or hoses have to be selected ensuring a safe seal against external pressurization with water jet.

### 3.4 Ambient conditions

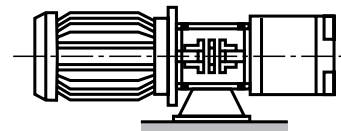
When operating the pump in salt-containing or corrosive environments or when the pump can be exposed to strongly abrasive substances, it has to be ensured on the system side that the shaft seal and the sealing area of the shaft do not make direct contact with the environment and that the pump is equipped with a suitable corrosion protection.

### 3.5 Installation positions

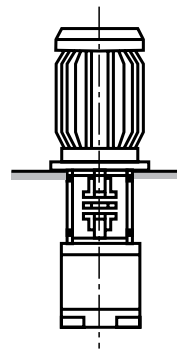
IM B3



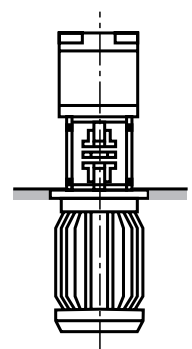
IM B5



IM V1



IM V2



## Project planning information

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### 4. Maintenance schedule and operational safety

For safe operation and a long lifetime of the pump a maintenance schedule has to be developed for the power unit, the machine, or the plant. The maintenance schedule has to ensure that the planned or admissible operating conditions of the pump are complied with during the period of use.

In particular, compliance with the following operating parameters has to be ensured:

- The required oil cleanliness
- The operating temperature range
- The level of the hydraulic fluid

Furthermore, the pump and the plant have to be checked for modifications of the following parameters on a regular basis:

- Vibrations
- Noise
- Temperature pump – hydraulic fluid in tank
- Foam formation in the tank
- Leak-proofness
- Operating pressure when using lubrication systems

Modifications of these parameters indicate wear of components (e.g. drive motor, coupling, pump, etc.). The reason has to be determined and remedied immediately.

In order to achieve high operational safety of the pump in the machine or plant we recommend checking the parameters mentioned above continuously and automatically and the automatic shut-down in case of changes exceeding the usual fluctuations in the designed operating range.

Plastic components of drive couplings should be replaced regularly, however, after 5 years at the latest. The corresponding information of the manufacturer is paramount.

For preventive maintenance of the pump we recommend having the seals replaced after an operating period of 5 years at the most by an authorized Bosch Rexroth service company.

### 5. Accessories

#### 5.1 SAE connection flanges

We recommend selecting the SAE flanges for suction and pressure port according to AB 22-15 (with welded connection) or AB 22-13 (with threaded connection).

#### 5.2 Other accessories

To install the Rexroth PGZ.-1X gerotor pump on electric motors we recommend selecting the pump mounting brackets according to AB 41-20 and torsionally flexible couplings according to AB 33-22.

### Note!

Please observe the following documentation in addition:

- **Data sheet RE 07008** General information on hydraulic products
- **Data sheet RE 07900** General information on installation, commissioning, and maintenance of hydraulic systems
- **Data sheet RE 90220** General information on hydraulic fluids on mineral oil basis