

Bosch Rexroth PGH4-3X/040RE11VU2 internal gear pump

Manufacturer: Bosch Rexroth
Manufacturer part number / published order designation: R901147103
Published model: PGH4-3X/040RE11VU2

About this compilation

Prepared by Hydmaster from selected manufacturer documentation. Original technical pages follow without cropped drawings, rewritten data or altered units. This cover and index are Hydmaster editorial material, not a manufacturer-issued exact-execution datasheet.

Coverage: selected pages relevant to the identified size and configuration. Other options or neighbouring models retained on an original page apply only where explicitly identified.

Execution notes and conditions

Individual delivery pressure/flow settings are not proven; series adjustment ranges are not presets.

Source-page index

Source page numbers below are physical pages of each complete original PDF. The original printed page labels and technical content remain unchanged. Compiled page numbers count this cover/index.

Source A: Rexroth Pgh Re10227 2025 Original

Original pages	Compiled pages	Relevant content
1-3	2-4	Manufacturer family overview and publication edition; Exact execution type key; Published exact material-number ordering list
6-8	5-7	Gap-compensated pump construction and material identification; Axial and radial compensation function; Frame size 4, nominal size 40: qualified operating pressure, speed, flow and fluid conditions
10-12	8-10	Hydraulic-fluid compatibility and operating conditions; Applicable viscosity/speed envelope and characteristic curves; Exact printed R901147103 row and clockwise keyed-shaft U2 installation drawing
21-22	11-12	Exact nominal-size suction and pressure flange dimensions; inch sizes denote flanges, not BSP threads; Measuring port and transport-thread details
38-41	13-16	Intended use, hydraulic and drive planning requirements; Hydraulic project planning and suction requirements; Mechanical installation and drive requirements; Maintenance and operating-safety information; combination panels are contextual only

Internal gear pump

Type PGH



- ▶ Component series 3X
- ▶ Frame size 4 and 5
- ▶ Size 20 ... 250
- ▶ Maximum operating pressure 315 bar
- ▶ Displacement 20 ... 250 cm³
- ▶ Fixed displacement
- ▶ Pump combinations
- ▶ Double pump in short version "PGH55"

Features

- ▶ Low operating noise
- ▶ Low flow pulsation
- ▶ High efficiency also at low speed and viscosity due to sealing gap compensation
- ▶ Suitable for wide viscosity and speed ranges
- ▶ All frame sizes and sizes can be arbitrarily combined
- ▶ Can be combined with internal gear pumps, vane pumps and axial piston pumps
- ▶ Application:
Durable drives with a high power and pressure range at very high numbers of load cycles (e.g. plastic machines, automated presses, foundry machines and other applications with storage charging operation).

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Ordering code	2 ... 5
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Ordering code: Single pumps

01	02	03	04	05	06	07	08	09	10	11
PG	H		-	3X	/					

01	Internal gear pump	PG
02	High-pressure pump	H
03	Frame size 4	4
	Frame size 5	5
04	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	3X
05	Frame size 4	
	Size 20 (displacement 20.10 cm ³)	020
	Size 25 (displacement 25.30 cm ³)	025
	Size 32 (displacement 32.70 cm ³)	032
	Size 40 (displacement 40.10 cm ³)	040
	Size 50 (displacement 50.70 cm ³)	050
	Frame size 5	
	Size 63 (displacement 64.70 cm ³)	063
	Size 80 (displacement 81.40 cm ³)	080
	Size 100 (displacement 100.20 cm ³)	100
	Size 125 (displacement 125.30 cm ³)	125
	Size 160 (displacement 162.80 cm ³)	160
	Size 200 (displacement 200.40 cm ³)	200
	Size 250 (displacement 250.50 cm ³)	250

Direction of rotation

06	When looking at the shaft end, right	R
	When looking at shaft end, left	L

Shaft end

07	Cylindrical with fitting key according to ISO 3019-2	E
	Geared according to ISO 3019-1	R

Line connections

08	ISO 6162-2 pressure connection (high-pressure series; size 20 ... 160)	11
	Pressure connection according to ISO 6162-1 (standard pressure series; sizes 200 and 250)	07

Seal material

09	FKM shaft seal ring and FKM seals	V
	NBR shaft seal ring and FKM seals	W ¹⁾

Mounting

10	4-hole mounting flange according to ISO 3019-2	E4
	2-hole mounting flange according to ISO 3019-1	U2
11	Further details in the plain text	*

¹⁾ Special applications (e.g. HFC fluids)**Notice:**

- Not every combination of ordering codes is possible. Please select the desired pump using the selection tables (page 12 ... 19) or after consultation.
- Suction port for all sizes to ISO 6162-1 (standard pressure series; for dimensions, see page 21).

Ordering code: Single pumps**Preferred types PGH4**

Type	Material number
PGH4-3X/020RE11VU2	R901147100
PGH4-3X/025RE11VU2	R901147101
PGH4-3X/032RE11VU2	R901147102
PGH4-3X/040RE11VU2	R901147103
PGH4-3X/050RE11VU2	R901147104

Preferred types PGH5

Type	Material number
PGH5-3X/063RE11VU2	R901147115
PGH5-3X/080RE11VU2	R901147116
PGH5-3X/100RE11VU2	R901147117
PGH5-3X/125RE11VU2	R901147118
PGH5-3X/160RE11VU2	R901147119
PGH5-3X/200RE07VU2	R901147120
PGH5-3X/250RE07VU2	R901147121

Function, section, symbol

Set-up

PGH type hydraulic pumps are gap-compensated internal gear pumps with a constant displacement. They essentially consist of a mounting flange (1), housing (2), cover with through-drive (3), pinion shaft (4), internal gear (5), plain bearings (6), axial washers (7) and stop pin (8), as well as the radial compensation, consisting of segment (9), segment support (10) and the sheet seal (11).

Suction and displacement procedure

The hydrodynamically mounted pinion shaft (4) drives the internally geared internal gear (5) in the direction of rotation shown.

The tooth clearances opening in the suction range suck in the hydraulic fluid. The hydraulic fluid is transported in the interdental spaces of the pinion and internal gear from the suction range (S) to the pressure range (P). There, the hydraulic fluid is displaced from the closing gaps between the gears and pumped into the pressure connection (P).

The separation of suction and pressure range is achieved by the elements of radial compensation (9...11) and the tooth engagement between the internal gear and the pinion shaft.

Hydrodynamic and hydrostatic storage

The pinion shaft (4) is accepted by hydrodynamically lubricated radial plain bearings (6).

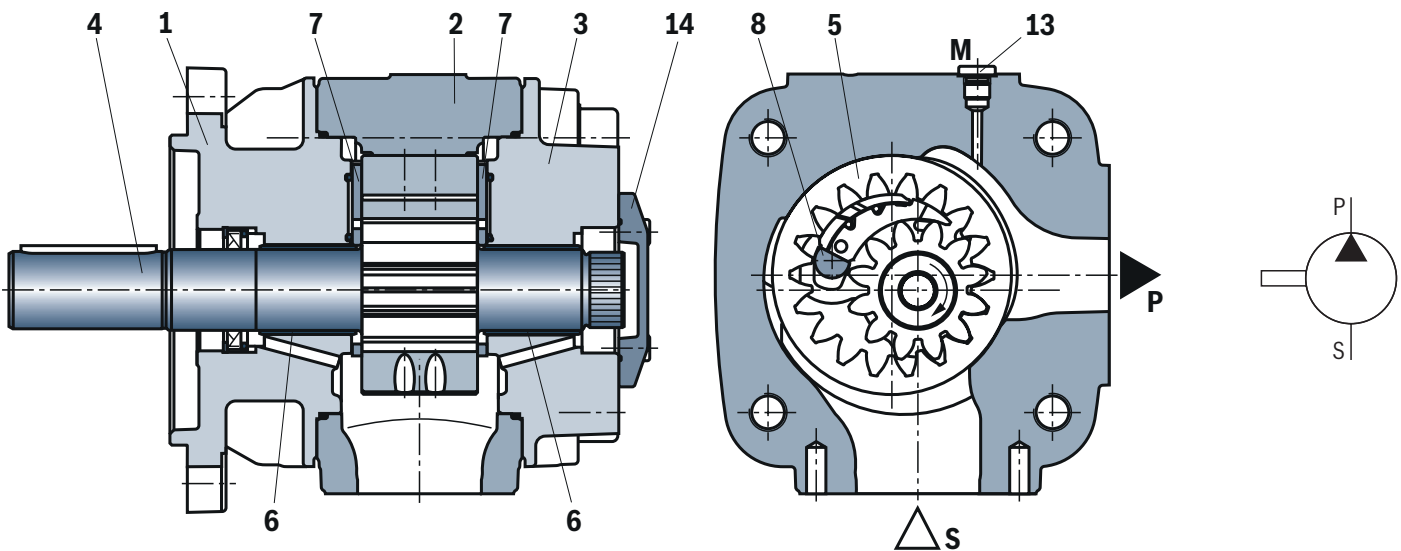
The internal gear (5) is mounted hydrostatically in the housing.

Gear tooth system

The gear tooth system with involute edges has a large meshing length for little flow and pressure pulsation and thus guarantees low-noise running.

Materials used

- Mounting flange (1), housing (2) and cover (3): Cast iron
- End cover (14): Aluminum
- Pinion shaft (4), internal gear (5) and stop pin (8): hardened steel
- Plain bearings (6): Steel bronze
- Axial washers (7): Bronze-coated steel plate
- Segment (9) and segment support (10): Brass
- Sheet seals (11): Plastic



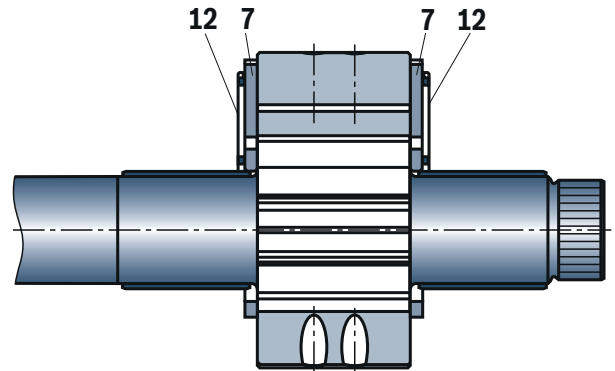
13 Measuring port

Function, section

Axial compensation

The displacement area in the pressure range is axially sealed by axial washers (7).

To the sides of the axial washers facing away from the displacement area a pressure field (12) is applied. These fields balance the axial washers vis-à-vis the displacement area, which results in a perfect sealing with low mechanical losses.



Radial compensation

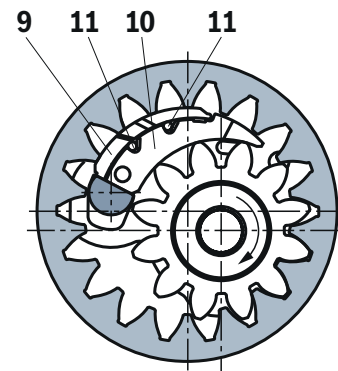
The radial compensation elements consist of segment (9), segment support (10) and sheet seals (11).

Segment (9) and segment support (10) are arranged in the pressure field so that the resulting compressive force is basically accepted by the stop pin.

A small compressive force component presses segment and segment support onto the tooth tips of pinion shaft and internal gear and in this way provides for the sealing of the pressure range to the suction range with automatic clearance adjustment.

This is the prerequisite for constantly high volumetric efficiency during the entire operating time.

The clearance adjustment of segment and segment support is made possible by the sheet seals located inbetween.



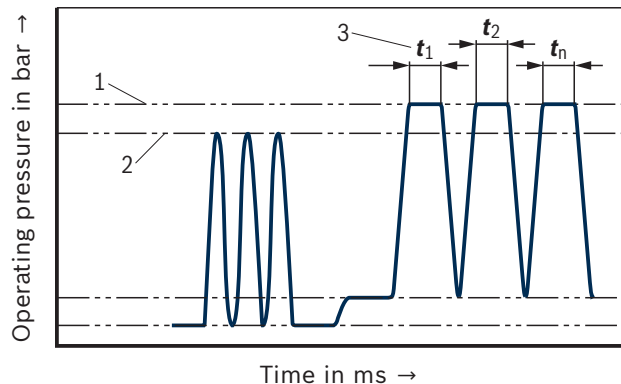
Technical data: Frame size 4
(For applications outside these values, please consult us!)

General						
Size	NG	20	25	32	40	50
Pump design	Internal gear pump, gap-compensated					
Type of mounting	Mounting flange					
Type of connection	Flange connection					
Mass	kg	14	14.5	15	16	17
Installation position	Preferably horizontal (suction port bottom)					
Shaft load	Radial and axial forces (e.g. belt pulley) ¹⁾					
Direction of rotation	Right or left					
Minimum speed ²⁾	rpm	400				
Maximum speed ²⁾	rpm	3000	3000	3000	3000	3000
Minimum drive power ³⁾	kW	1.1	1.1	1.1	1.1	1.5
Maximum drive power	kW	35	44	56	61	66
Moment of inertia	kgm ²	0.00037	0.00045	0.00055	0.00066	0.00081
Ambient temperature range	°C	-20 ... +60				

Hydraulic						
Minimum suction pressure (load-free)	bar	0.8				
Maximum suction pressure (load-free)	bar	2				
Maximum operating pressure	bar	315	315	315	315	280
Pressure peak ⁴⁾	bar	350	350	350	350	315
Hydraulic fluid		See table, page 10				
Hydraulic fluid temperature range		°C −10 ... +80				
Viscosity range (hydraulic fluid temperature ≤ +80 °C)	► Continuous operation					
	– up to speed 1800 rpm	mm²/s	300 ... 10			
	– up to speed 3000 rpm	mm²/s	100 ... 10			
	► Optimal operating range					
	– up to speed 3000 rpm	mm²/s	36 ... 16			
Admissible start viscosity		mm²/s	2000 ⁵⁾			
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)		Class 20/18/15 ⁶⁾				
Displacement (geometrical)	cm³	20.1	25.3	32.7	40.1	50.7
Maximum flow rate (at 10 bar and 1450 ^{rpm})	l/min	28.9	36.3	46.9	57.6	72.8

- 1) Only after consultation
- 2) Speed at permanent operating pressure or maximum drive power and absolute pressure 1 bar at the suction port (see characteristic curve on page 11).
- 3) At maximum suction pressure ≈ 1 bar
- 4) Maximum individual duration $t = 10$ ms and maximum total duration of action 300 hours (see characteristic curve "Pressure definition" on the right).
- 5) Speed range 400 to 1800 rpm; hydraulic fluid temperature ≥ -10 °C; duration ≤ 3 min; without load (operating pressure ≤ 30 bar).
- 6) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

Pressure definition



- 1 Pressure peak
- 2 Maximum operating pressure
- 3 Individual duration of action (Total duration of action = $t_1 + t_2 + \dots + t_n$)



Notice:

The stated technical data were measured with HLP46,
 $\vartheta_{oil} = 50$ °C and viscosity approx. 30 mm²/s.

Technical data

(For applications outside these values, please consult us!)

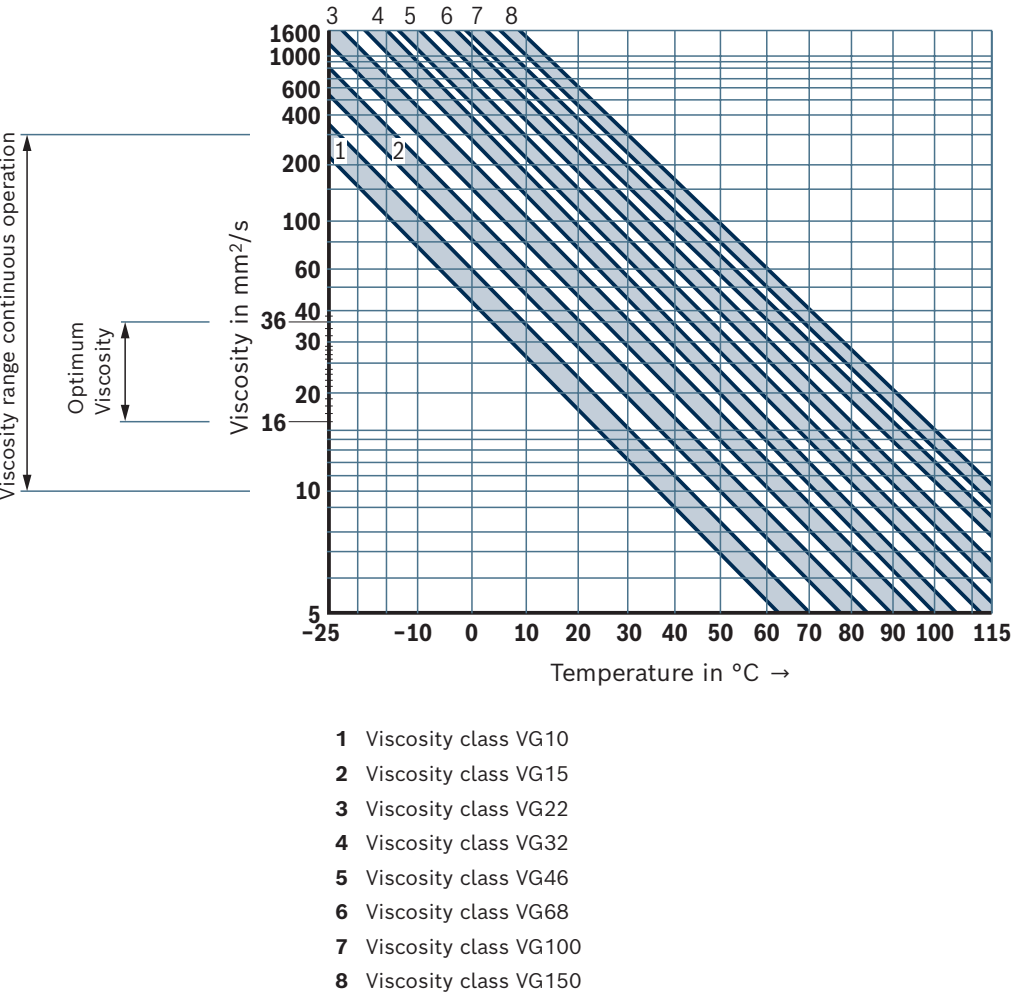
Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HLP	NBR, FKM	DIN 51524	90220

- Important information on hydraulic fluids:

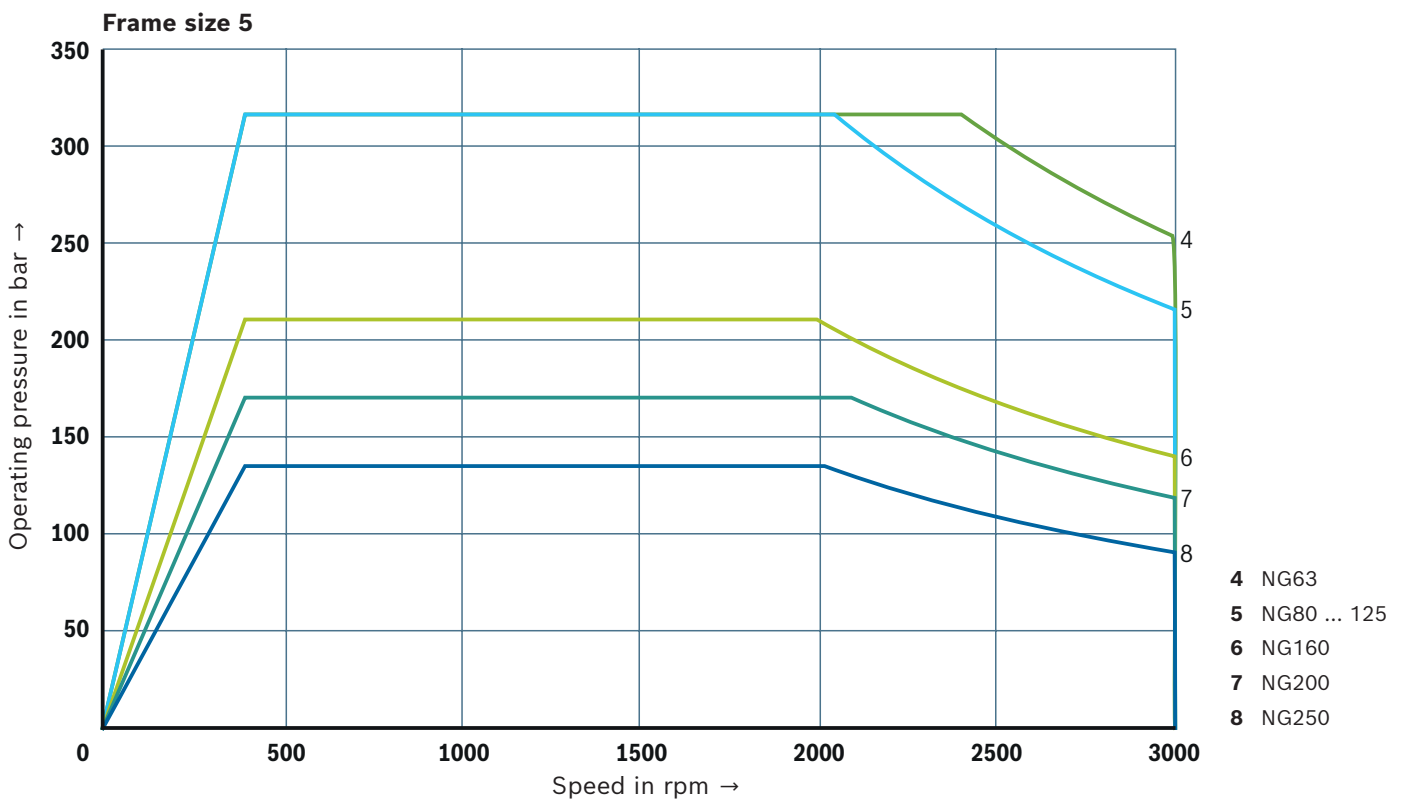
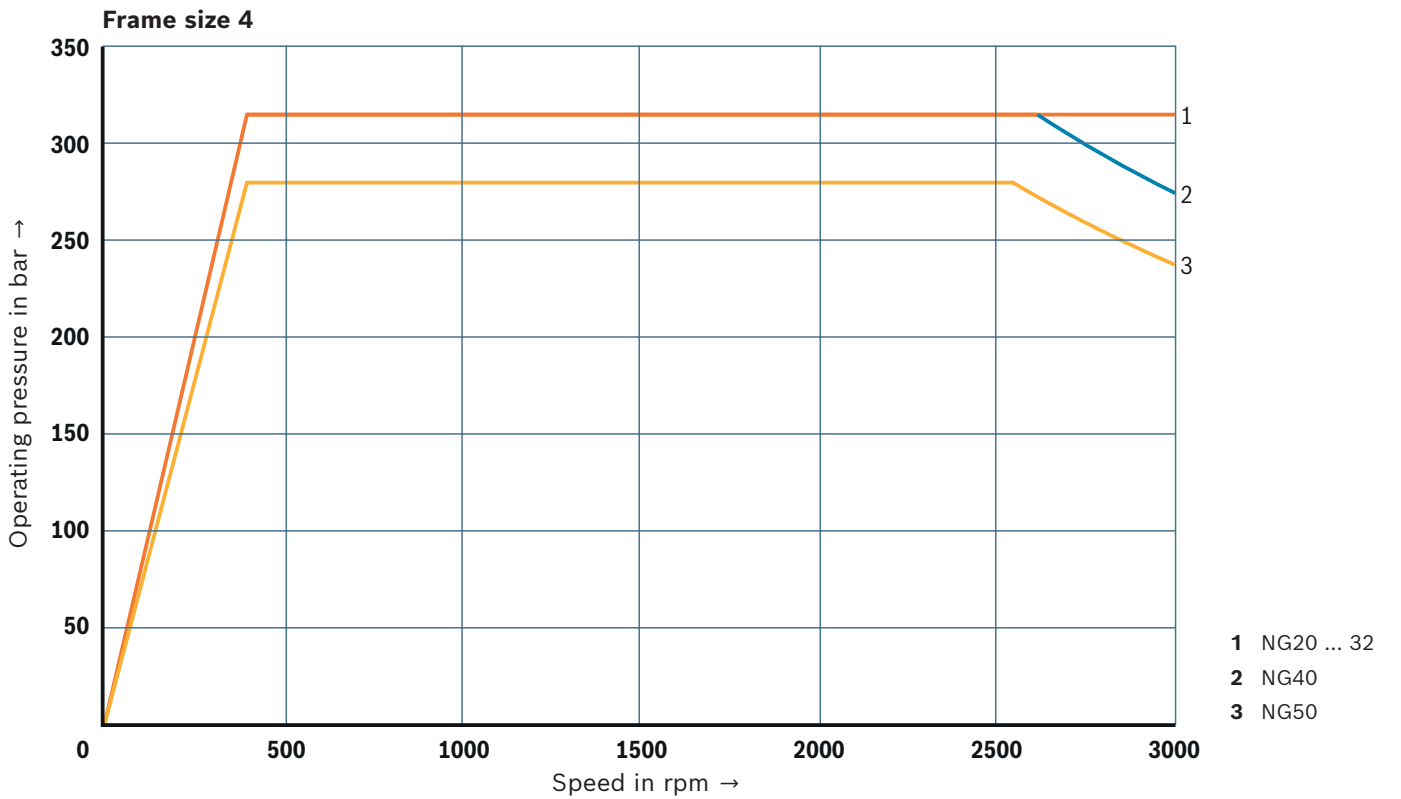
►

For further information and application notes and application requirements for selecting hydraulic fluids, operational behavior, and disposal and environmental protection, see the data sheets above or on request.
- The hydraulic fluid should be selected so that the operating viscosity is in the optimum range in the operating temperature range (see viscosity-temperature diagram).
- Additional hydraulic fluids upon request

Viscosity as a function of temperature for HLP (viscosity index VI 100, double logarithmic representation)



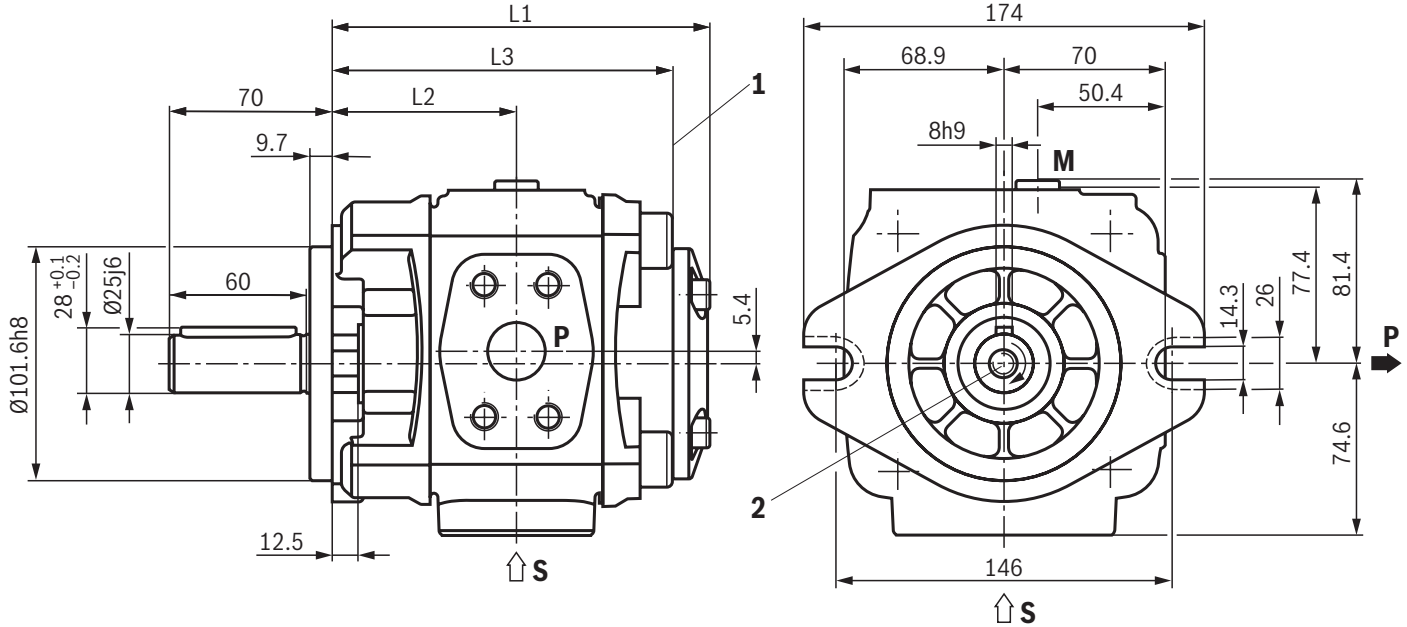
Characteristic curves



Dimensions: Frame size 4 – version "RE11.U2" (clockwise)
(dimensions in mm)

Shaft end "E" – cylindrical with fitting key and through-drive according to ISO 3019-2, E25M

Attachment "U2" – 2-hole mounting flange to ISO 3019-1, 101-2 (SAE A)



NG	L1	L2	L3	S	P	Material number	Type
20	145	70.5	129	1" S	3/4" H	R901147100	PGH4-3X/020RE11VU2
25	150	73	134	1 1/4" S	3/4" H	R901147101	PGH4-3X/025RE11VU2
32	157	76.5	141	1 1/2" S	1" H	R901147102	PGH4-3X/032RE11VU2
40	164	80	148	1 1/2" S	1" H	R901147103	PGH4-3X/040RE11VU2
50	174	85	158	2" S	1" H	R901147104	PGH4-3X/050RE11VU2

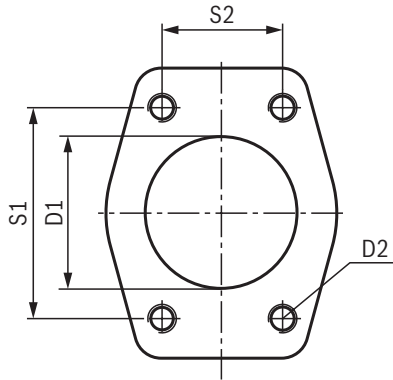
- 1 Start of combi part for multiple pumps
- 2 DIN 332-DS M8

 Notice:

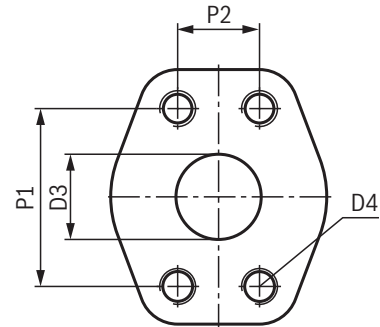
- ▶ S = ISO 6162-1 standard pressure series
- H = high-pressure series according to ISO 6162-2
(see table on page 21 for dimensions)
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Connections: Suction port and pressure port
(dimensions in mm)

Suction port S



Pressure port P



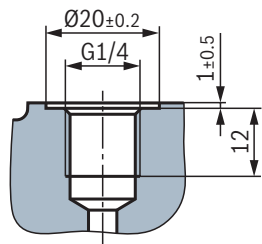
BG	NG	Port size, suction port S	D1	D2	S1	S2	Pressure port size P	D3	D4	P1	P2
4	020	DN25 ¹⁾ (SAE 1")	Ø25	M10; 18	52.4	26.2	DN19 ²⁾ (SAE 3/4")	Ø19	M10; 18	50.8	23.8
	025	DN32 ¹⁾ (SAE 1 1/4")	Ø32	M10; 18	58.7	30.2	DN19 ²⁾ (SAE 3/4")	Ø19	M10; 18	50.8	23.8
	032	DN38 ¹⁾ (SAE 1 1/2")	Ø38	M12; 21	69.9	35.7	DN25 ²⁾ (SAE 1")	Ø25.4	M12; 23	57.2	27.8
	040	DN38 ¹⁾ (SAE 1 1/2")	Ø38	M12; 21	69.9	35.7	DN25 ²⁾ (SAE 1")	Ø25.4	M12; 23	57.2	27.8
	050	DN51 ¹⁾ (SAE 2")	Ø51	M12; 21	77.8	42.9	DN25 ²⁾ (SAE 1")	Ø25.4	M12; 23	57.2	27.8
5	063	DN51 ¹⁾ (SAE 2")	Ø51	M12; 21	77.8	42.9	DN32 ²⁾ (SAE 1 1/4")	Ø32	M12; 21	66.6	31.8
	080	DN51 ¹⁾ (SAE 2")	Ø51	M12; 21	77.8	42.9	DN32 ²⁾ (SAE 1 1/4")	Ø32	M12; 21	66.6	31.8
	100	DN64 ¹⁾ (SAE 2 1/2")	Ø64	M12; 23	88.9	50.8	DN38 ²⁾ (SAE 1 1/2")	Ø38	M16; 30	79.3	36.5
	125	DN64 ¹⁾ (SAE 2 1/2")	Ø64	M12; 23	88.9	50.8	DN38 ²⁾ (SAE 1 1/2")	Ø38	M16; 30	79.3	36.5
	160	DN76 ¹⁾ (SAE 3")	Ø76	M16; 30	106.4	61.9	DN51 ²⁾ (SAE 2")	Ø51	M20; 35	96.8	44.5
	200	DN89 ¹⁾ (SAE 3 1/2")	Ø89	M16; 30	120.7	69.9	DN51 ¹⁾ (SAE 2")	Ø51	M12; 23	77.8	42.9
	250	DN89 ¹⁾ (SAE 3 1/2")	Ø89	M16; 30	120.7	69.9	DN64 ¹⁾ (SAE 2 1/2")	Ø64	M12; 23	88.9	50.8

¹⁾ Standard pressure series according to ISO 6162-1

²⁾ High-pressure series after ISO 6162-2

Connections: Measuring port and transport thread
(dimensions in mm)

Measuring port M



Transport thread

"PGH4"	"PGH5"
A diagram of the PGH4 pump housing. It shows a circular port labeled 'M' with an arrow pointing left. A screw connection is labeled 'M8; 14'.	A diagram of the PGH5 pump housing. It shows a circular port labeled 'M' with an arrow pointing left. A screw connection is labeled 'M10; 18'.

Project planning information: general

This project planning information refers to the specific properties of the internal gear pump Type PGH.-3X. You will find extensive general information and suggestions in the Hydraulics Trainer, Volume 3 "Project planning information and design of hydraulic systems", 00281.

Intended use

Rexroth internal gear pumps are intended for the set-up of hydraulic drive systems in mechanical engineering and plant construction. During project planning, the basic principles of the EU Machinery Directive or comparable national regulations outside the EU must be observed.

Technical data

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

All specified technical performance features are average values and apply with the specified boundary conditions. In case of modifications to the basic conditions (e.g. viscosity), the technical data may change as well. Distribution corresponding to the relevant state-of-the-art is possible.

Operation of the pump outside the admissible technical data (pages 8 and 9) is possible to a certain extent, but requires explicit written release from Bosch Rexroth.

Project planning information: Hydraulic project planning

Suction line

The line cross-sections must be rated for the intended volume flows in such a way that an optimum suction speed of 0.6 ... 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 on the pump itself are dimensioned for the maximum volume flow and therefore only represent an indication. In the case of continuous operation at speeds lower than the admissible maximum speed, the suction tube diameter should also be dimensioned smaller than the suction port of the pump according to the actual suction speed.

The suction line as a whole must be designed in such a way that the admissible inlet operating pressure is maintained (0.8...2 bar absolute).

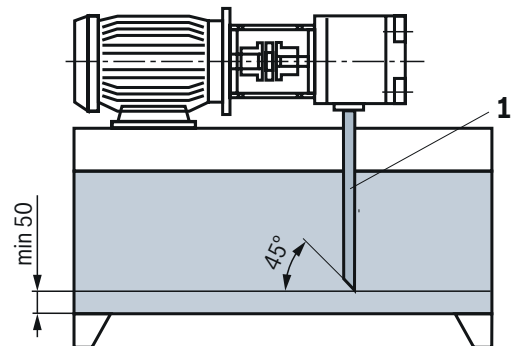
It is on the system side to ensure that the pressure at the suction port S is never higher than at the pressure connection P.

Bends and the combination of the suction pipes of several pumps are to be avoided. If suction filters must be used, make sure that the lowest admissible inlet operating pressure is not exceeded on the system side, even if the filter is contaminated.

Please ensure air tightness of the transitions and dimensional stability of the suction tube to the external air pressure.

The immersion depth of the suction pipe should be as large as possible. Dependent on the internal pressure of the container, the viscosity of the hydraulic fluid and the flow ratio in the container, no vortex may form even at maximum volume flow. Otherwise, there is the risk that air is sucked in.

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



1 Suction line

Project planning information: Hydraulic project planning

Pressure line

For pressure lines, make sure that sufficient bursting protection of the pipes, hoses and connection elements is provided. The cross-sections should be based on the maximum flow in order to avoid additional excessive load of the pump due to back pressure. Here, you must also consider the pipe losses over the entire pressure line length and other line resistances (e.g. bends, pressure filters). It is on the system side to ensure that the pressure at the suction port S is never higher than at the pressure connection P. Ensure an absolute pressure of 1 bar in the pressure line. 10 bar absolute in regular operation is recommended.

Pressure limitation

The internal gear pump type PGH does not contain any devices to maintain the maximum operating pressure. Setting and limiting the admissible operating pressure has to be ensured on the system side. The pressure relief valves necessary for that purpose are to be designed considering the maximum flow and the existing pressure increase speed so that the admissible intermittent operating pressure is not exceeded.

Pressure holding function

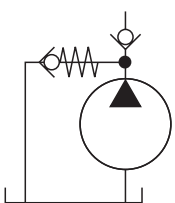
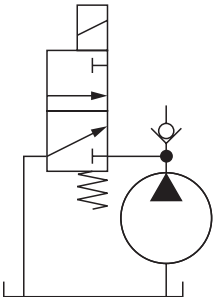
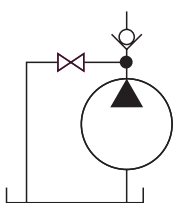
In the variable-speed drive, the pump can temporarily also be operated below the specified minimum speed, in the pressure holding function. The holding time and the speed necessary for that purpose results dependent on the operating viscosity and the pressure level. For the design, please contact Bosch Rexroth's technical sales department.

When switched off (speed = 0), a leakage flow streams through the pump back into the container dependent on the load pressure. Use a check valve to prevent this. When using a check valve, please observe the information for bleeding.

Bleeding option for commissioning

For internal gear pumps type PGH.-3X, a manual, switchable or automatic bleeding option must be provided for initial commissioning or re-commissioning after maintenance and repair work. You can use the measuring port (M) located at the pump as bleeding point. Otherwise, the bleeding point has to be put into the pressure line in front of the first valve or check valve.

Examples of bleeding circuits

Automatic bleeding via self-acting bleed valve	Switchable bleeding	Manually operated bleeding
		

Project planning information: Mechanical project planning

Removal and installation option

For disassembling and mounting the pump on the drive, provide guaranteed access on the system side by means of suitable lifting gear. Please pay particular attention to the weight of the frame size PGH5 (see "Technical data", page 9).

Provide screws of property class 8.8 or 10.9 for mounting purposes.

Mounting

The screws must be accessible on the machine-side so that the required tightening torque can be applied. The tightening torque of the screws is based on the operating conditions and the involved elements of the screw connection, and must be specified by the manufacturer in the power unit, machine or system project planning.

Tank

In the tank construction or the selection of suitable standard tanks, the following requirements are to be observed:

- ▶ Selection of the largest tank volume possible, dependent on the permanent or average flow, in order to allow for the separation of air bubbles by means of sufficient duration time of the medium in the tank. The air release capacity of the fluid used is also of importance.
- ▶ Provision of settling zones for the hydraulic fluid in the tank in order to allow for air release.
- ▶ Provision of guiding plates in order to allowing for the deposit of contamination at the tank bottom outside the pump suction area.
- ▶ Generous dimensioning of the tank surfaces depending on the heat output to be dissipated via the tank walls.

Required power unit functions

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

- ▶ Tanks, where internal pressure corresponds to the ambient pressure in accordance with the design, must be equipped with breathing filters for pressure compensation purposes.
- ▶ The hydraulic fluid should only be filled via filling connections that exclude filling with unfiltered hydraulic fluid.

- ▶ The ingress of contamination or humidity must be avoided. When used in highly contaminated environments, the container should be pre-tensioned using air pressure. If cleansing of the external tank side is intended or to be expected during the period of use, select tank fittings for pipes, lines, or hoses, which ensure safe sealing against external pressurization with water jet.

Place of installation and environmental conditions

For a place of installation at a geodetic altitude of more than 1000 m, the pump must be installed in or below the container to ensure the minimum inlet pressure is maintained.

A short suction line with large cross-section has to be selected, bends should not to be used.

If the pump is located more than 10 m below the container, additional measures must be taken to ensure that the inlet pressure is reduced to the maximum admissible value.

When operating the pump in salt-containing or corrosive environments, or when pressure loading with strongly abrasive substances is possible, make sure on the system side that the shaft seal ring and the sealing area of the shaft do not make direct contact with the environment.

Installation position

- ▶ Horizontal, suction port facing downwards preferred
- ▶ Vertical, upwards shaft when installed in tank

Pump combination

- ▶ For pump combinations, make sure that the admissible operating data for the relevant pump type are complied with in every stage.
- ▶ The combined pumps must all have the same direction of rotation.
- ▶ The pump with the highest torque, variable displacement pumps or pumps with intermittent load should be provided as the first stage in the pump combination.
- ▶ Torque (input shaft) formula

$$T = \frac{\Delta p \times V \times 0.0159}{\eta_{\text{hydr.-mech.}}}$$

- T** Torque in Nm
Δp Operating pressure in bar
V Displacement in cm³
η Hydraulic mechanical efficiency

- ▶ Joint aspiration is not possible.
- ▶ For reasons of strength and stability, we recommend the 4-hole mounting flange according to ISO 3019-2 "E4" for combinations of three or more pumps.
- ▶ Before operating pump combinations with different hydraulic fluids, please consult us.
- ▶ PGF combinations are mounted without combination parts and are not sealed towards each other.

Maintenance schedule and operational safety

For safe operation and a long life cycle of the pump, a maintenance schedule has to be developed for the power unit, the machine, or the system. The maintenance schedule must ensure that the intended or admissible operating conditions of the pump are complied with over the entire period of use.

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

- ▶ Maximum admissible degree of contamination of the hydraulic fluid
- ▶ Hydraulic fluid temperature range
- ▶ Filling level of the hydraulic fluid

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

- ▶ Vibrations
- ▶ Noise
- ▶ Temperature difference pump – hydraulic fluid in the tank
- ▶ Foam formation in the tank
- ▶ Leak-tightness

Modifications of these parameters indicate wear of components (e.g. drive motor, coupling, pump, etc.). The cause must be identified and remedied immediately.

In order to achieve high operational safety of the pump in the machine or system, we recommend checking the parameters mentioned above permanently and automatically and shutting the system off automatically in case of modifications exceeding the usual fluctuations in the intended operating range.

Plastic components of drive couplings should be replaced regularly, however, after 5 years at the latest. The relevant manufacturer's specifications must be considered and be given priority.

For preventive maintenance of the pump, we recommend replacing the seals after a maximum operating time of 5 years by an approved Rexroth service company.