

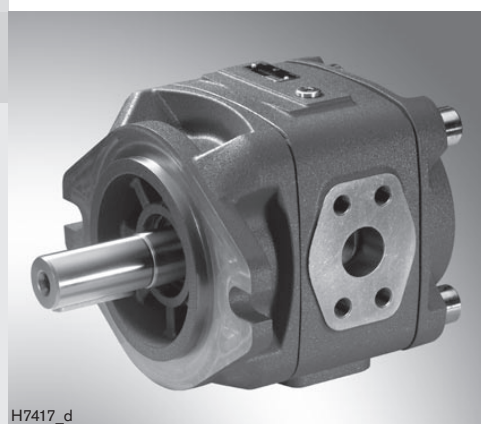
Internal gear pump, fixed displacement

RE 10227/04.07

1/24

Type PGH

Frame sizes 4 and 5
 Component series: 3X
 Maximum operating pressure 350 bar
 Maximum displacement 250 cm³



H7417_d

Table of contents

Contents	Page
Features	1
Ordering code, single pump	2
Function, section, symbol	3
Technical data	4 and 5
Characteristic curves	on request
Unit dimensions, single pumps	6 to 11
Ports	12
Pump combinations	13
Unit dimensions, pump combinations	14 to 18
Engineering notes	19 to 22
Commissioning notes	23

Features

- Fixed displacement
- Low operating noise
- Low pulsation of the flow
- High efficiency also at low speed and viscosity through sealing gap compensation
- Suitable for a wide viscosity and speed range
- All frame sizes and sizes can be optionally combined with each other
- Can be combined with internal gear pumps PGF, vane pumps and axial piston pumps
- Suitable for operation with HFC fluid (seal variant "W")
- Application:
 For endurant drives with high outputs and high pressures and a very large number of load cycles, e.g. plastics processing machines, automated presses, foundry machines and other applications that involve accumulator charging operation.

Information on available spare parts:
www.boschrexroth.com/spc

Ordering code: Single pumps

PG

H

-3X/

*

Series

High-pressure pump

= H

Frame size

BG4

= 4

BG5

= 5

Component series:

Component series 30 to 39

(30 to 39: unchanged installation and connection dimensions)

= 3X

Size

Size

Displacement/revolution

BG4

20

20.10 cm³

= 020

25

25.30 cm³

= 025

32

32.70 cm³

= 032

40

40.10 cm³

= 040

50

50.70 cm³

= 050

BG5

63

64.70 cm³

= 063

80

81.40 cm³

= 080

100

100.20 cm³

= 100

125

125.30 cm³

= 125

160

162.80 cm³

= 160

200

200.40 cm³

= 200

250

250.50 cm³

= 250

Further details in clear text

Type of connection

U2 =

SAE 2-hole mounting flange

E4 = ¹⁾

ISO 4-hole mounting flange to ISO 3019-2 and VDMA 24560

Seal material

V =

FKM seals

W = ²⁾

Shaft seal ring made of NBR (other seals made of FKM)

Pipe connection ³⁾

07 =

SAE flange of standard pressure series

11 =

SAE flange of high pressure series

Shaft variant

E =

Cylindrical

R =

SAE involute toothing

Direction of rotation (viewed to shaft end)

R =

Clockwise

L =

Anti-clockwise (on request)

Not all variants according to the type code are possible! Please select the required pump on the basis of the selection tables (pages 6 to 11) or after consultation of Bosch Rexroth.

- 1) Only in conjunction with cylindrical shaft (according to VDMA), only clockwise rotation
- 2) For operation with HFC fluid
- 3) For each size, a type of connection **07** or **11** is determined:
07: PGH5-3X/200/250...
11: PGH4-3X/020/025/032/040/050...
PGH5-3X/063/080/100/125/160...

The suction ports are all designed in the standard pressure series (for dimensions, see page 12).

Standard types PGH4-3X	
Type	Material no.
PGH4-3X/020RE11VU2	R901147100
PGH4-3X/025RE11VU2	R901147101
PGH4-3X/032RE11VU2	R901147102
PGH4-3X/040RE11VU2	R901147103
PGH4-3X/050RE11VU2	on request

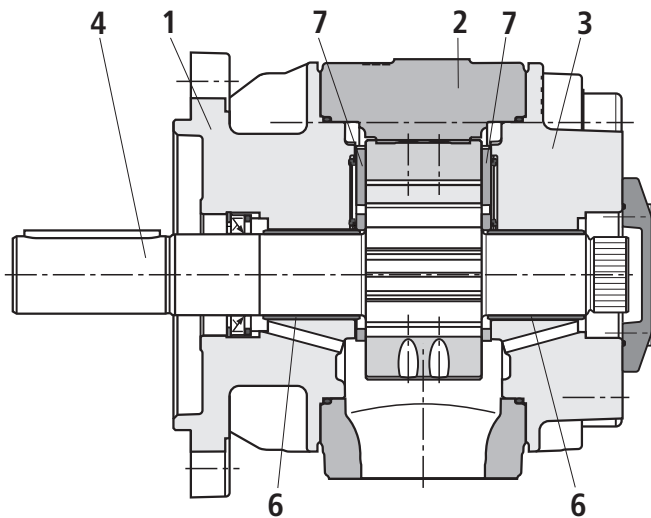
Standard types PGH5-3X	
Type	Material no.
PGH5-3X/063RE11VU2	R901147115
PGH5-3X/080RE11VU2	R901147116
PGH5-3X/100RE11VU2	R901147117
PGH5-3X/125RE11VU2	R901147118
PGH5-3X/160RE11VU2	R901147119
PGH5-3X/200RE07VU2	R901147120
PGH5-3X/250RE07VU2	R901147121

Function, section, symbol

Structure

Hydraulic pumps of type PGH.-3X are gap-compensated internal gear pumps with fixed displacement.

They basically consist of: Mounting flange (1), housing (2), cov-



Suction and displacement process

The hydrodynamically supported pinion shaft (4) drives the internal gear wheel (5) in the direction of rotation shown.

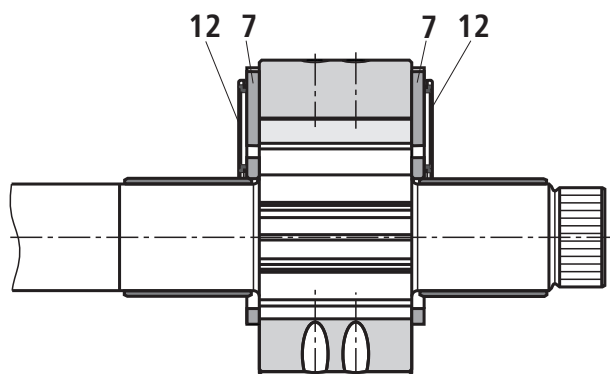
The spaces between the teeth, which are enlarged in the suction area, aspire the fluid. The fluid is transported in the spaces between the teeth of the pinion and the internal gear from the suction area (S) to the pressure area (P).

There, the fluid is then displaced from the narrowing spaces between the teeth and transported to pressure port (P).

The suction and pressure areas are separated by the elements of the radial compensation (9 to 11) and meshing of the internal gear and pinion shaft.

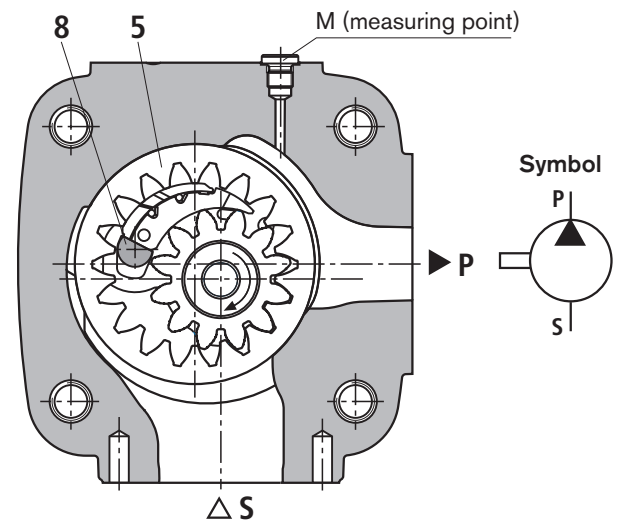
Axial compensation

Axial sealing of the displacement space in the pressure area is accomplished by axial plates (7).



The sides of the axial plates facing away from the displacement chamber are subject to a pressure field (12). They balance the axial plates vis-à-vis the displacement chamber, thus providing optimum sealing with low mechanical losses.

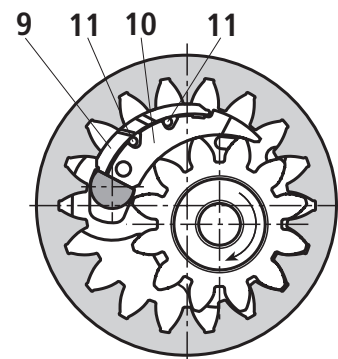
er with through-drive (3), pinion shaft (4), internal gear (5), plain bearings (6), axial plates (7) and abutment pin (8), as well as the radial compensation feature consisting of segment (9), segment carrier (10) and sealing rolls (11).



Radial compensation

The elements of radial compensation comprise segment (9), segment carrier (10) and sealing rolls (11).

Segment (9) and segment carrier (10) are arranged in the pressure field in a way that the resulting pressure force is largely supported on the abutment pin.



A small component of the pressure force pushes the segment and the segment carrier onto the tooth tips of the pinion shaft and the internal gear, thus ensuring automatically clearance-adjusting sealing of the pressure area against the suction area.

This is a precondition for uniformly high volumetric efficiency during the entire operating time.

The clearance adjustment of the segment and the segment carrier is made possible by the sealing rolls arranged in between.

Hydrodynamic and hydrostatic bearing

Pinion shaft (4) is supported on hydrodynamically lubricated radial plain bearings (6).

Internal gear (5) is hydrostatically supported in the housing.

Tooththing

The toothing with involute flanks features a long meshing length for low flow and pressure pulsation and therefore ensures low-noise operation.

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

Design	Internal gear pump, gap-compensated
Type of connection	SAE 2-hole flange to ISO 3019-1 or 4-hole flange to VDMA 24560 and ISO 3019-2
Pipe connection	Flanged connection
Shaft loading	Radial and axial forces (e.g. on pulley) only after consultation
Direction of rotation (viewed to shaft end)	Clockwise or anti-clockwise (on request) – not reversing!

Hydraulic

Hydraulic fluid	HLP – mineral oil to DIN 51524 Part 2 HFC – watery polymer solutions to DIN EN ISO 12922 ¹⁾ : Shaft variant W HEES – fluids to DIN ISO 15380 ¹⁾ HFD-U – fluids to VDMA 24317 ¹⁾ , DIN EN ISO 12922 ¹⁾ Please observe our specification according to data sheet RE 07075 Other fluids on request!		
Hydraulic fluid	HLP fluid	°C	–10 to +80; for other temperatures, please consult us!
temperature range	Special fluid	°C	–10 to +50; for other temperatures, please consult us!
Ambient temperature range		°C	–20 to +60
Viscosity range		mm ² /s	10 to 300; permissible starting viscosity 2000
Permissible max. degree of contamination of the hydraulic fluid			
Cleanliness class to ISO 4406 (c)	Class 20/18/15 ²⁾		

¹⁾ **Attention!**

For these media, the restrictions for special fluids are applicable

²⁾ The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

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

Frame size			BG4				
Size	Size		20	25	32	40	50
Weight	m	kg	14	14.5	15	16	17
Speed range	$n_{\min}$	min^{-1}	200	200	200	200	200
	$n_{\max}$	min^{-1}	3000	3000	3000	3000	3000
Displacement	V	cm^3	20.1	25.3	32.7	40.1	50.7
Flow ³⁾	q_V	l/min	28.9	36.3	46.9	57.6	72.8
Mass moment of inertia (around driving axis)	J	kgm^2	0.00037	0.00045	0.00055	0.00066	0.00081
Operating pressure, absolute – Inlet	p	bar	0.8 to 2 (briefly 0.6 bar during start-up)				
Nominal pressure	p_N	bar	315				
– Outlet, continuous	HLP fluid						
	Special fluid ¹⁾		220				
intermittent ⁴⁾	$p_{\max}$	bar	350				
	HLP fluid						
	Special fluid ¹⁾		245				

Frame size			BG5							
Size	Size		63	80	100	125	160	200	250	
Weight	m	kg	42	43.5	45.5	48	52	55.5	60.5	
Speed range	$n_{\min}$	min ⁻¹	200	200	200	200	200	200	200	
	$n_{\max}$	min ⁻¹	3000	3000	3000	3000	3000	3000	3000	
Displacement	V	cm ³	64.7	81.4	100.2	125.3	162.8	200.4	250.5	
Flow ³⁾	q_V	l/min	92.8	116.9	143.8	179.8	233.7	287.7	359.6	
Mass moment of inertia (around driving axis)	J	kgm ²	0.00237	0.00289	0.00329	0.00407	0.00506	0.00623	0.00760	
Operating pressure, absolute – Inlet			0.8 to 2 (briefly upon start-up 0.6 bar)							
Nominal pressure			p_N bar							
– Outlet, continuous			HLP fluid				315	210	170	135
			Special fluid ¹⁾				220	145	115	90
intermittent ⁴⁾			$p_{\max}$ bar							
			HLP fluid				350	260	210	170
			Special fluid ¹⁾				245	180	145	115

¹⁾ **Attention!**

For these media, the restrictions for special fluids are applicable

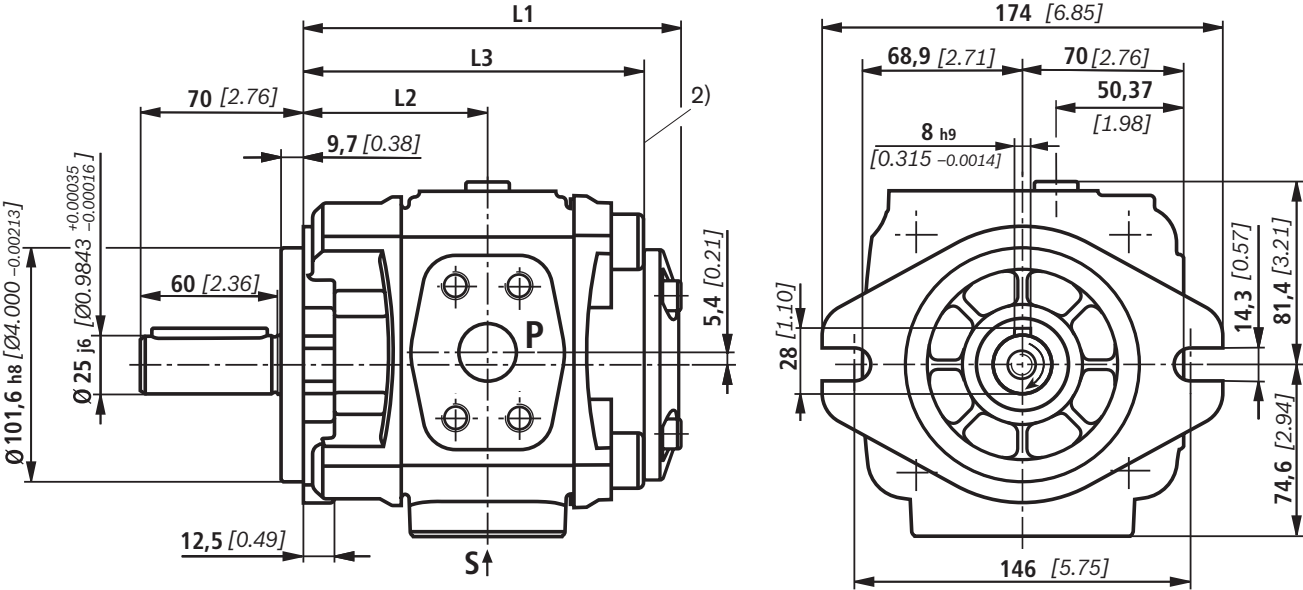
³⁾ Measured at $n = 1450 \text{ min}^{-1}$, $p = 10 \text{ bar}$ and $v = 30 \text{ mm}^2/\text{s}$ ⁴⁾ Max, 10 s, not exceeding 50 % of the duty cycle

Unit dimensions of frame size 4 (dimensions in mm [inch])

PGH4-3X/...^R_LE...VU2

Drive shaft cylindrical,
SAE 2-hole mounting flange

Type	Size	Material no. "R" clockwise	"L" anti-clockwise	L1	L2	L3	S ¹⁾	P ¹⁾
PGH4-3X/020..E11VU2		R901147100	on request	145 [5.71]	70.5 [2.78]	129 [5.08]	1" S	3/4" H
PGH4-3X/025..E11VU2		R901147101	on request	150 [5.91]	73 [2.87]	134 [5.28]	1 1/4" S	3/4" H
PGH4-3X/032..E11VU2		R901147102	on request	157 [6.18]	76.5 [3.01]	141 [5.55]	1 1/2" S	1" H
PGH4-3X/040..E11VU2		R901147103	on request	164 [6.46]	80 [3.15]	148 [5.83]	1 1/2" S	1" H
PGH4-3X/050..E11VU2		on request	on request	174 [6.85]	85 [3.35]	158 [6.22]	2" S	1" H



¹⁾ S = standard pressure series,
H = high pressure series;
for exact dimensions, see table on page 12
²⁾ Here starts the combination part of multiple pumps

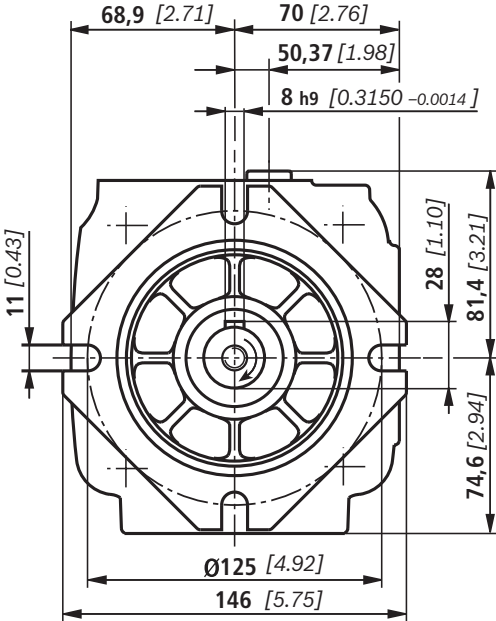
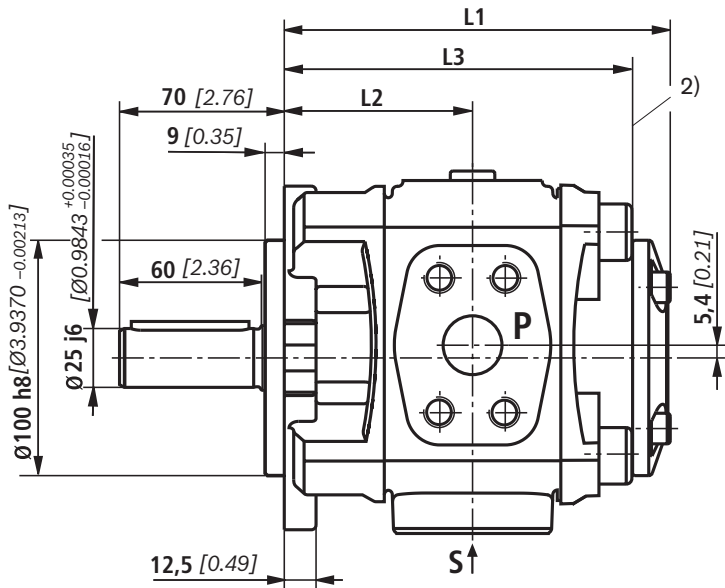
The figure shows a clockwise rotating pump; on an anti-clockwise rotating pump, the pressure port is located on the opposite side!

Unit dimensions of frame size 4 (dimensions in mm [inch])

PGH4-3X/... RE...VE4

Drive shaft cylindrical,
4-hole mounting flange to ISO 3019-2 and
VDMA 24560

Type	Size	Material no. "R" clockwise	L1	L2	L3	S ¹⁾	P ¹⁾
PGH4-3X/020RE11VE4		R901147105	145 [5.71]	70.5 [2.78]	129 [5.08]	1" S	3/4" H
PGH4-3X/025RE11VE4		R901147106	150 [5.91]	73.0 [2.87]	134 [5.28]	1 1/4" S	3/4" H
PGH4-3X/032RE11VE4		R901147107	157 [6.18]	76.5 [3.01]	141 [5.55]	1 1/2" S	1" H
PGH4-3X/040RE11VE4		R901147108	164 [6.46]	80 [3.15]	148 [5.83]	1 1/2" S	1" H
PGH4-3X/050RE11VE4		on request	174 [6.85]	85 [3.35]	158 [6.22]	2" S	1" H



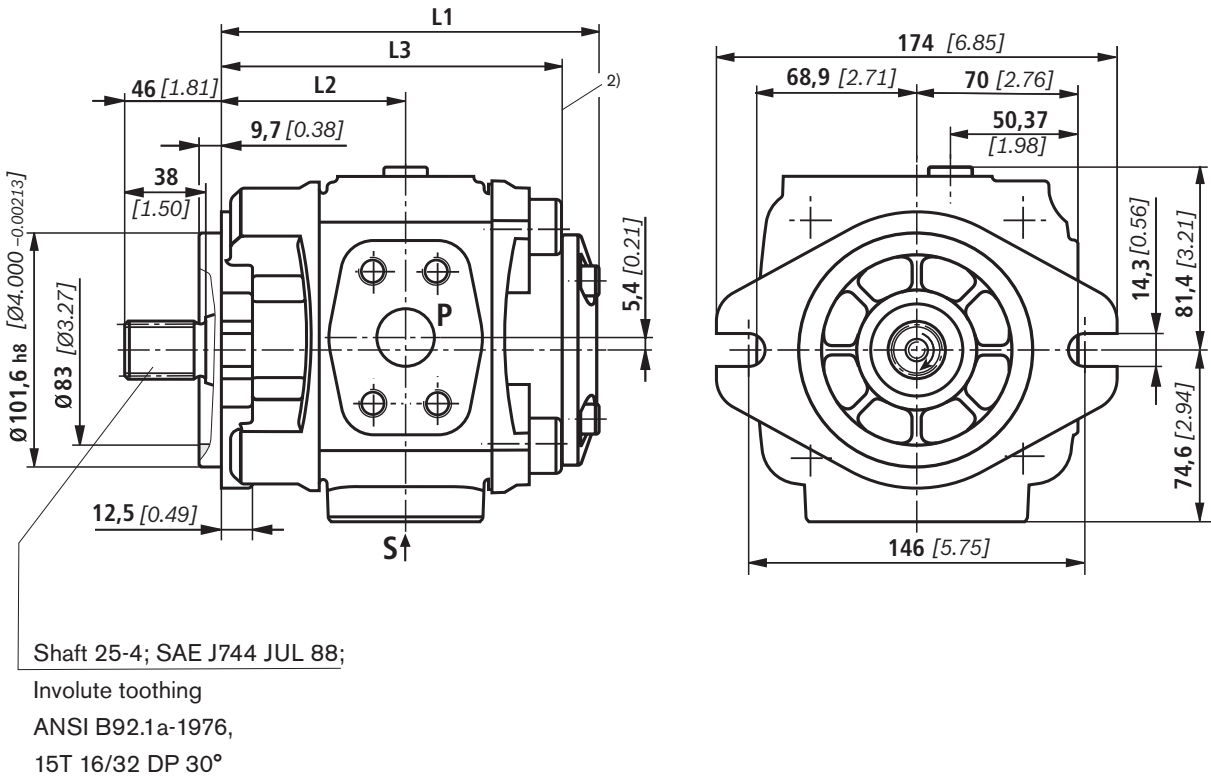
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for exact dimensions, see table on page 12
²⁾ Here starts the combination part for multiple pumps

Unit dimensions of frame size 4 (dimensions in mm [inch])

PGH4-3X/...^R_LR...VU2

Drive shaft splined, SAE 2-hole mounting flange
(middle and rear pump of pump combinations)

Type	Size	Material no.		L1	L2	L3	S ¹⁾	P ¹⁾
		"R" clockwise	"L" anti-clockwise					
PGH4-3X/020..R11VU2		R901147110	on request	145 [5.71]	70.5 [2.78]	129 [5.08]	1" S	3/4" H
PGH4-3X/025..R11VU2		R901147111	on request	150 [5.91]	73 [2.87]	134 [5.28]	1 1/4" S	3/4" H
PGH4-3X/032..R11VU2		R901147112	on request	157 [6.18]	76.5 [3.01]	141 [5.55]	1 1/2" S	1" H
PGH4-3X/040..R11VU2		R901147113	on request	164 [6.46]	80 [3.15]	148 [5.83]	1 1/2" S	1" H
PGH4-3X/050..R11VU2		on request	on request	174 [6.85]	85 [3.35]	158 [6.22]	2" S	1" H



¹⁾ S = standard pressure series, H = high pressure series;
for exact dimensions, see table on page 12
²⁾ Here starts the combination part of pump combinations

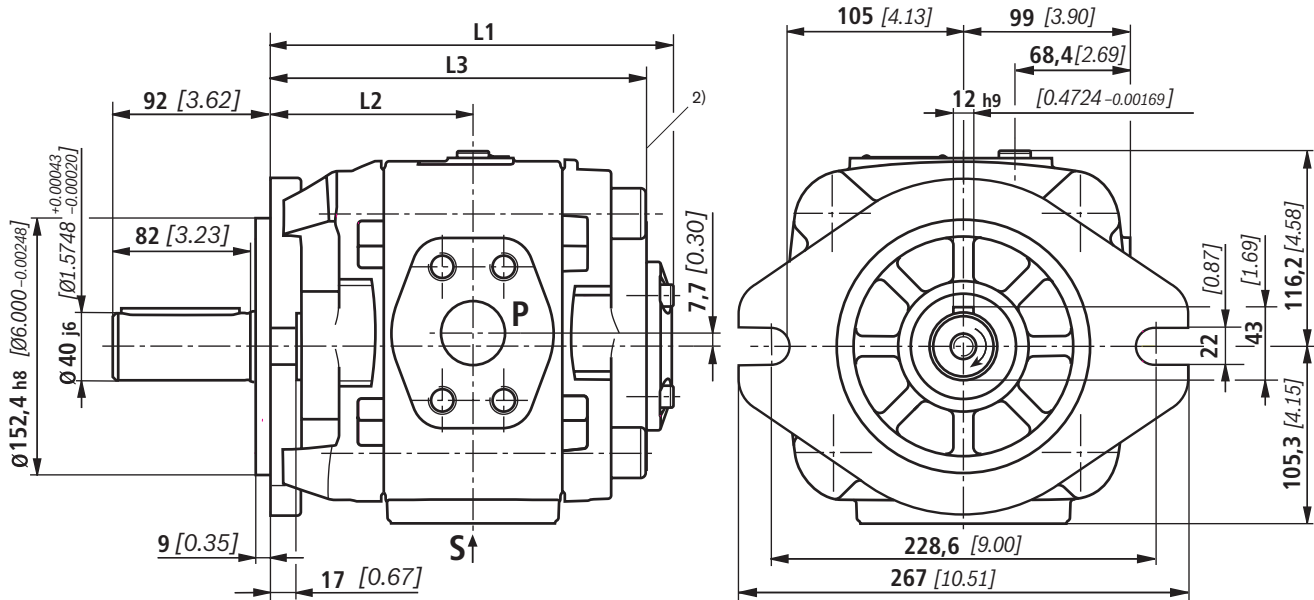
The figure shows a clockwise rotating pump; on an anti-clockwise rotating pump, the pressure port is located on the opposite side!

Unit dimensions of frame size 5 (dimensions in mm [inch])

PGH5-3X/...^R_L E...VU2

Drive shaft cylindrical, SAE 2-hole mounting flange

Type	Size	Material no.		L1	L2	L3	S ¹⁾	P ¹⁾
		"R" clockwise	"L" anti-clock-wise					
PGH5-3X/063..E11VU2		R901147115	on request	210 [8.27]	105.5 [4.15]	194 [7.64]	2" S	1 1/4" H
PGH5-3X/080..E11VU2		R901147116	on request	218 [8.58]	109.5 [4.31]	202 [7.95]	2" S	1 1/4" H
PGH5-3X/100..E11VU2		R901147117	on request	227 [8.94]	114 [4.49]	211 [8.31]	2 1/2" S	1 1/2" H
PGH5-3X/125..E11VU2		R901147118	on request	239 [9.41]	120 [4.72]	223 [8.78]	2 1/2" S	1 1/2" H
PGH5-3X/160..E11VU2		R901147119	on request	257 [10.12]	129 [5.08]	241 [9.49]	3" S	2" H
PGH5-3X/200..E07VU2		R901147120	on request	275 [10.83]	138 [5.43]	259 [10.20]	3 1/2" S	2" S
PGH5-3X/250..E07VU2		R901147121	on request	299 [11.77]	150 [5.91]	283 [11.14]	3 1/2" S	2 1/2" S



1) S = standard pressure series, H = high pressure series;
for exact dimensions, see table on page 12

2) Here starts the combination part for multiple pumps

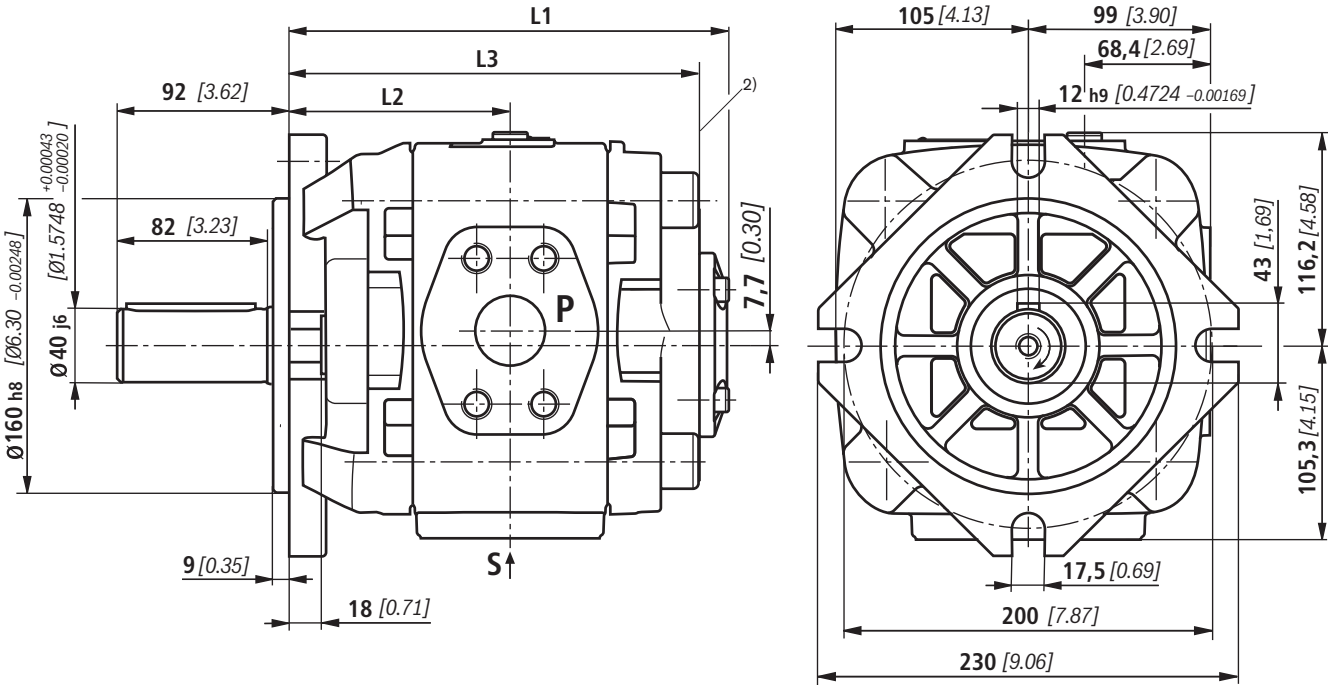
The figure shows a clockwise rotating pump; on an anti-clockwise rotating pump, the pressure port is located on the opposite side!

Unit dimensions of frame size 5 (dimensions in mm [inch])

PGH5-3X/...RE...VE4

Drive shaft cylindrical,
4-hole mounting flange to ISO 3019-2 and
VDMA 24560

Type	Size	Material no. "R" clockwise	L1	L2	L3	S ¹⁾	P ¹⁾
PGH5-3X/063RE11VE4		R901147122	210 [8.27]	105.5 [4.15]	194 [7.64]	2" S	1 1/4" H
PGH5-3X/080RE11VE4		R901147123	218 [8.58]	109.5 [4.31]	202 [7.95]	2" S	1 1/4" H
PGH5-3X/100RE11VE4		R901147124	227 [8.94]	114 [4.49]	211 [8.31]	2 1/2" S	1 1/2" H
PGH5-3X/125RE11VE4		R901147125	239 [9.41]	120 [4.72]	223 [8.78]	2 1/2" S	1 1/2" H
PGH5-3X/160RE11VE4		R901147126	257 [10.12]	129 [5.08]	241 [9.49]	3" S	2" H
PGH5-3X/200RE07VE4		R901147127	275 [10.83]	138 [5.43]	259 [10.20]	3 1/2" S	2" S
PGH5-3X/250RE07VE4		R901147128	299 [11.77]	150 [5.91]	283 [11.14]	3 1/2" S	2 1/2" S



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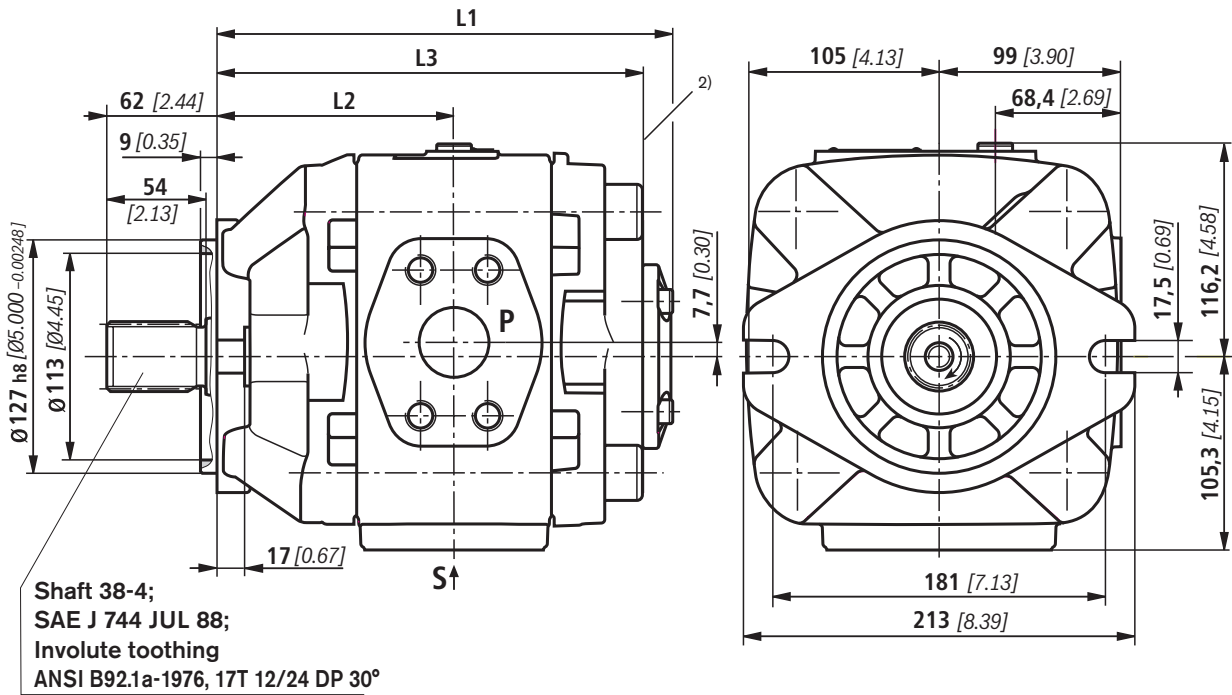
²⁾ Here starts the combination part for multiple pumps

Unit dimensions of frame size 5 (dimensions in mm [inch])

PGH5-3X/...^R_LR...VU2

Drive shaft splined, SAE 2-hole mounting flange
(middle and rear pump for pump combinations)

Type	Size	Material no.		L1	L2	L3	S ¹⁾	P ¹⁾
		"R" clockwise	"L" anti-clockwise					
PGH5-3X/063..R11VU2		R901147129	on request	219 [8.62]	114.5 [4.51]	203 [7.99]	2" S	1 1/4" H
PGH5-3X/080..R11VU2		R901147130	on request	227 [8.94]	118.5 [4.67]	211 [8.31]	2" S	1 1/4" H
PGH5-3X/100..R11VU2		R901147131	on request	236 [9.29]	123 [4.84]	220 [8.66]	2 1/2" S	1 1/2" H
PGH5-3X/125..R11VU2		R901147132	on request	248 [9.76]	129 [5.08]	232 [9.13]	2 1/2" S	1 1/2" H
PGH5-3X/160..R11VU2		R901147133	on request	266 [10.47]	138 [5.43]	250 [9.84]	3" S	2" H
PGH5-3X/200..R07VU2		R901147134	on request	284 [11.18]	147 [5.79]	268 [10.55]	3 1/2" S	2" S
PGH5-3X/250..R07VU2		R901147135	on request	308 [12.13]	159 [6.26]	292 [11.50]	3 1/2" S	2 1/2" S

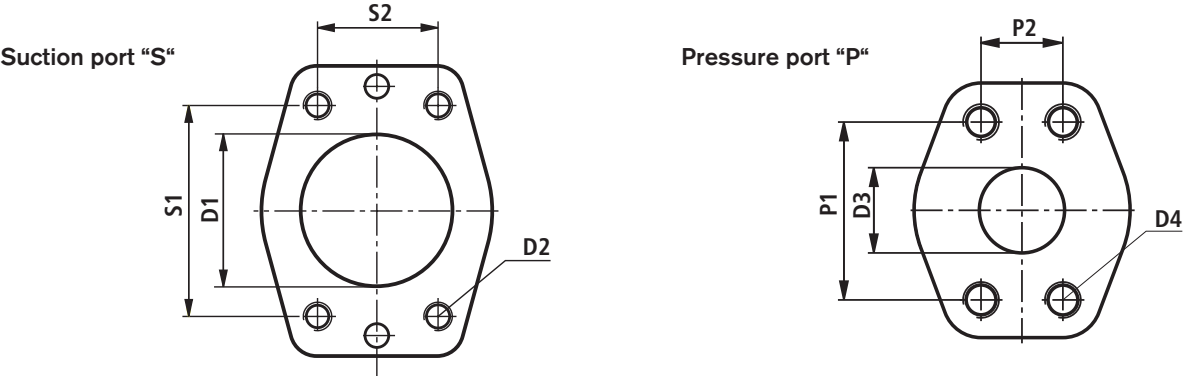


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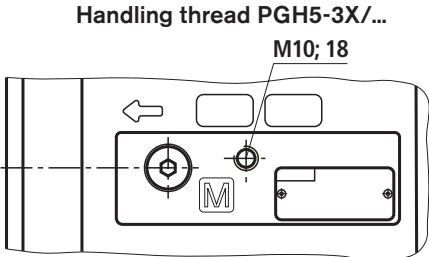
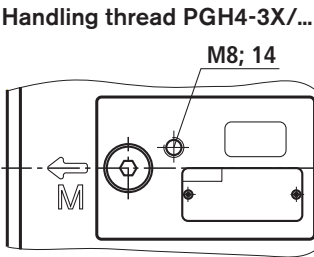
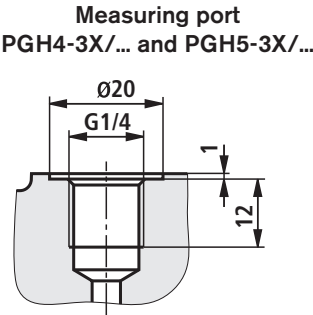
²⁾ Here starts the combination part for multiple pumps

The figure shows a clockwise rotating pump; on an anti-clockwise rotating pump, the pressure port is located on the opposite side!

Ports (dimensions in mm [inch])



BG	Size	Porting pattern / suction port S	D1	D2	S1	S2	Porting pattern / pressure port P	D3	D4	P1	P2
4	020	1" 5000 PSI	Ø25 [Ø0.984]	M10; 18	52.4 [2.063]	26.2 [1.032]	3/4" 6000 PSI	Ø19 [Ø0.748]	M10; 18	50.8 [2.000]	23.8 [0.937]
	025	1 1/4" 4000 PSI	Ø32 [Ø1.260]	M10; 18	58.7 [2.311]	30.2 [1.189]	3/4" 6000 PSI	Ø19 [Ø0.748]	M10; 18	50.8 [2.000]	23.8 [0.937]
	032	1 1/2" 3000 PSI	Ø38 [Ø1.496]	M12; 21	69.9 [2.752]	35.7 [1.406]	1" 6000 PSI	Ø25.4 [Ø1.000]	M12; 23	57.2 [2.252]	27.8 [1.094]
	040	1 1/2" 3000 PSI	Ø38 [Ø1.496]	M12; 21	69.9 [2.752]	35.7 [1.406]	1" 6000 PSI	Ø25.4 [Ø1.000]	M12; 23	57.2 [2.252]	27.8 [1.094]
	050	2" 3000 PSI	Ø51 [Ø2.008]	M12; 21	77.8 [3.063]	42.9 [1.689]	1" 6000 PSI	Ø25.4 [Ø1.000]	M12; 23	57.2 [2.252]	27.8 [1.094]
5	063	2" 3000 PSI	Ø51 [Ø2.008]	M12; 21	77.8 [3.063]	42.9 [1.689]	1 1/4" 6000 PSI	Ø32 [Ø1.260]	M12; 21	66.6 [2.622]	31.8 [1.252]
	080	2" 3000 PSI	Ø51 [Ø2.008]	M12; 21	77.8 [3.063]	42.9 [1.689]	1 1/4" 6000 PSI	Ø32 [Ø1.260]	M12; 21	66.6 [2.622]	31.8 [1.252]
	100	2 1/2" 2500 PSI	Ø64 [2.520]	M12; 23	88.9 [3.500]	50.8 [2.000]	1 1/2" 6000 PSI	Ø38 [Ø1.496]	M16; 30	79.3 [3.122]	36.5 [1.437]
	125	2 1/2" 2500 PSI	Ø64 [2.520]	M12; 23	88.9 [3.500]	50.8 [2.000]	1 1/2" 6000 PSI	Ø38 [Ø1.496]	M16; 30	79.3 [3.122]	36.5 [1.437]
	160	3" 2000 PSI	Ø76 [Ø2.992]	M16; 30	106.4 [4.189]	61.9 [2.437]	2" 6000 PSI	Ø51 [Ø2.008]	M20; 35	96.8 [3.811]	44.5 [1.752]
	200	3 1/2" 500 PSI	Ø89 [Ø3.504]	M16; 30	120.7 [4.752]	69.9 [2.752]	2" 3000 PSI	Ø51 [Ø2.008]	M12; 23	77.8 [3.063]	42.9 [1.689]
	250	3 1/2" 500 PSI	Ø89 [Ø3.504]	M16; 30	120.7 [4.752]	69.9 [2.752]	2 1/2" 2500 PSI	Ø64 [Ø2.520]	M12; 23	88.9 [3.500]	50.8 [2.000]



Pump combinations

All internal gear pumps of type PGH-3X can be combined; each pump is provided with output shaft toothing. The combination options and material numbers of the required combination parts are given in the following table.

Please observe the engineering notes on pump combinations on page 21.

Rear pump \ Front pump	Material no.	
	PGH4-3X	PGH5-3X
PGH2-2X/...R...U2 (RD10223)	R901155288	R901155283
PGH3-2X/...R...U2 (RD10223)	R901155288	R901155283
PGH4-3X/...R...U2	R901155289	R901155284
PGH5-3X/...R...U2	–	R901155285
PGF2-2X/...J...U2 (RD10213)	R901155288	R901155283
PGP2-2X/...J...U2 (RD10231)	R901155288	R901155283
PGF3-3X/...J...U2 (RD10213)	R901155287	R901155282
PGP3-3X/...J...U2 (RD10231)	R901155287	R901155282
PVV/Q1-1X/...J...B (RD10335)	R901155287	R901155282
PVV/Q2-1X/...J...B (RD10335)	R901155287	R901155282
PVV/Q4-1X/...J...C (RD10335)	–	R901155286
PVV/Q5-1X/...J...C (RD10335)	–	R901155286
AZPF-1X/...RR...B (RD10089)	R901155288	R901155283

Ordering code

Double = P2
3-fold = P3

Series of 1st pump ¹⁾

Component series of 1st pump ¹⁾

Size of 1st pump ¹⁾

Series of 2nd pump ¹⁾

Component series of 2nd pump ¹⁾

Size of 2nd pump ¹⁾

Series of 3rd pump ¹⁾

Component series of 3rd pump ¹⁾

Size of 3rd pump ¹⁾

Type of connection of 1st pump

U2 = ²⁾ SAE 2-hole mounting flange

E4 = ³⁾ ISO 4-hole mounting flange to ISO 3019-2 and VDMA 24560

Seal material

V = FKM seals

W = Shaft seal ring NBR (other seals made of FKM)

Shaft version of 1st pump

E = Cylindrical

R = SAE involute toothing

Direction of rotation (viewed to shaft end)

R = Clockwise

L = Anti-clockwise (on request)

Order example:

P3GH5-3X/160+GH5-3X/100+GH4-3X/050REVE4

¹⁾ For details, see Ordering code on page 2

²⁾ In conjunction with cylindrical and splined shaft

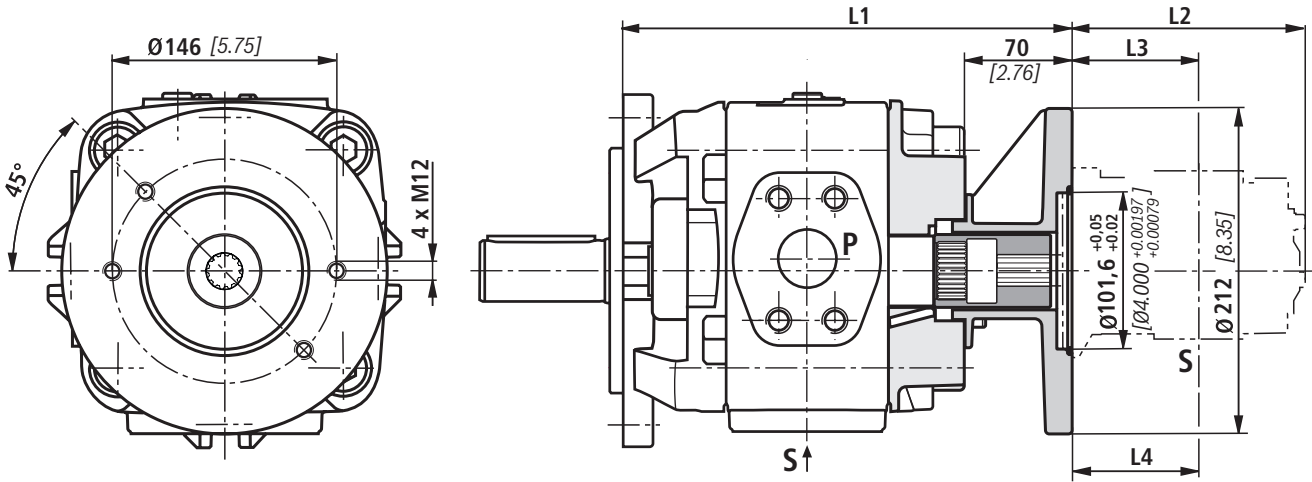
³⁾ Only in conjunction with cylindrical shaft (to VDMA); only clockwise rotation

Unit dimensions, pump combinations (dimensions in mm [inch])

The dimensional drawings show the front pump and the combination part.

Combination part PGH5-3X+GF3-3X/VV1-1X/VV2-1X/K02

Material no.: R901155282



PGH5-3X.. Size	PGH5-3X/..RE..U2 PGH5-3X/..RE..E4 L1	PGH5-3X/..RR..U2 L1
63	264 [10.39]	273 [10.75]
80	272 [10.71]	281 [11.06]
100	281 [11.06]	290 [11.42]
125	293 [11.54]	302 [11.89]
160	311 [12.24]	320 [12.60]
200	329 [12.95]	338 [13.31]
250	353 [13.90]	362 [14.25]

PGF3/PGP2 Size	L2	L3
20	144.5 [5.69]	79.5 [3.13]
22	146.5 [5.77]	80.5 [3.17]
25	150.5 [5.93]	82.5 [3.25]
32	159.5 [6.28]	87 [3.43]
40	169.5 [6.67]	92 [3.62]

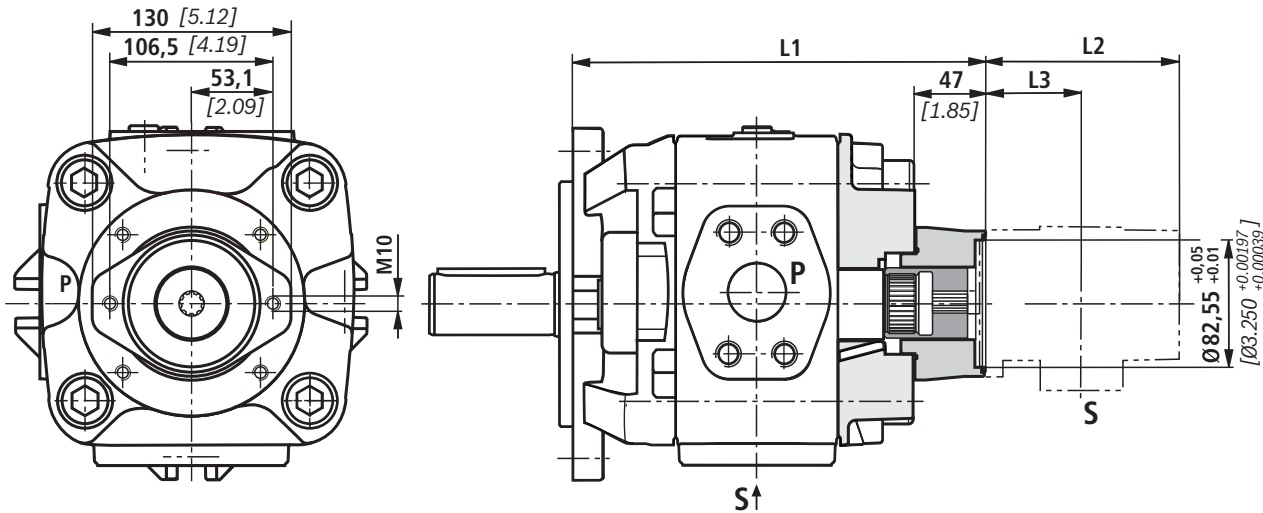
PVV..UMB Frame size	L2	L3 (P)	L4 (S)
1	156 [6.14]	133 [5.24]	63.5 [2.50]
2	163 [6.42]	38 [1.50]	120.5 [4.75]

Unit dimensions, pump combinations (dimensions in mm [inch])

The dimensional drawings show the front pump and the combination part.

Combination part PGH5-3X+GH2/3-2X/GF2-2X/AZPF-1X/K01

Material no. : R901155283



PGH5-3X.. Size	PGH5-3X/..RE..U2 PGH5-3X/..RE..E4 L1	PGH5-3X/..RR..U2 L1
63	241 [9.49]	250 [9.84]
80	249 [9.80]	258 [10.16]
100	258 [10.16]	267 [10.51]
125	270 [10.63]	279 [10.98]
160	288 [11.34]	297 [11.69]
200	306 [12.05]	315 [12.40]
250	330 [12.99]	339 [13.35]

PGH2 Size	L2	L3
005	110 [4.33]	54 [2.13]
006	112.5 [4.43]	55.5 [2.19]
008	116 [4.57]	57 [2.24]

PGH3 Size	L2	L3
011	121.5 [4.78]	60 [2.36]
013	126.5 [4.98]	62.5 [2.46]
016	131.5 [5.18]	65 [2.56]

PGF2/PGP2 Size	L2	L3
006	116 [4.567]	65 [2.559]
008	119.5 [4.705]	67 [2.638]
011	125 [4.921]	69.5 [2.736]
013	130 [5.118]	72 [2.835]
016	135 [5.315]	74.5 [2.933]
019	141 [5.551]	77.5 [3.051]
022	147 [5.787]	80.5 [3.169]

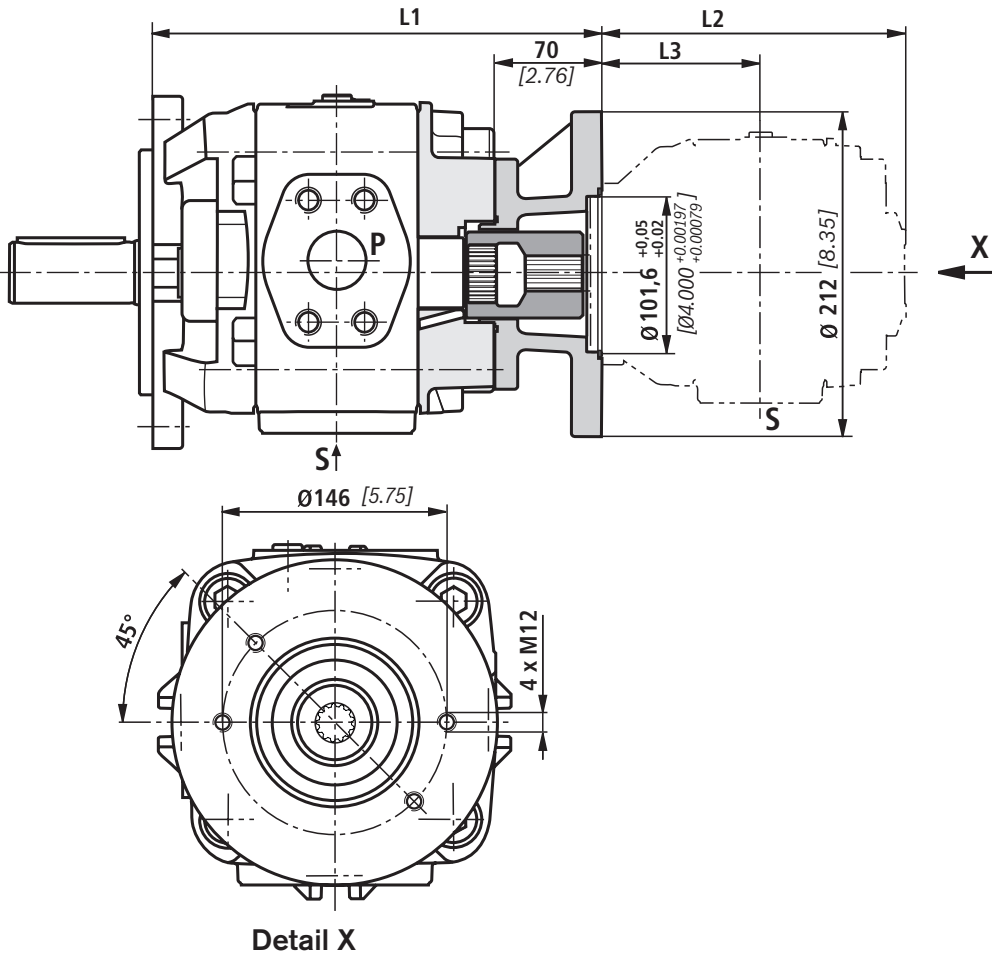
AZPF Size	L2	L3
004	85 [3.346]	40 [1.575]
005	87.5 [3.445]	41 [1.614]
008	91.5 [3.602]	43 [1.692]
011	96.5 [3.799]	47 [1.850]
014	101.5 [3.996]	47.5 [1.870]
016	105 [4.134]	47.5 [1.870]
019	110 [4.331]	47.5 [1.870]
022	115.5 [4.547]	55 [2.165]

Unit dimensions, pump combinations (dimensions in mm [inch])

The dimensional drawings show the front pump and the combination part.

Combination part PGH5-3X+GH4-3X..R

Material no.: R901155284



PGH5-3X.. Size	PGH5-3X/..RE..U2 PGH5-3X/..RE..E4 L1	PGH5-3X/..RR..U2 L1
63	264 [10.39]	273 [10.75]
80	272 [10.71]	281 [11.06]
100	281 [11.06]	290 [11.42]
125	293 [11.54]	302 [11.89]
160	311 [12.24]	320 [12.60]
200	329 [12.95]	338 [13.31]
250	353 [13.90]	362 [14.25]

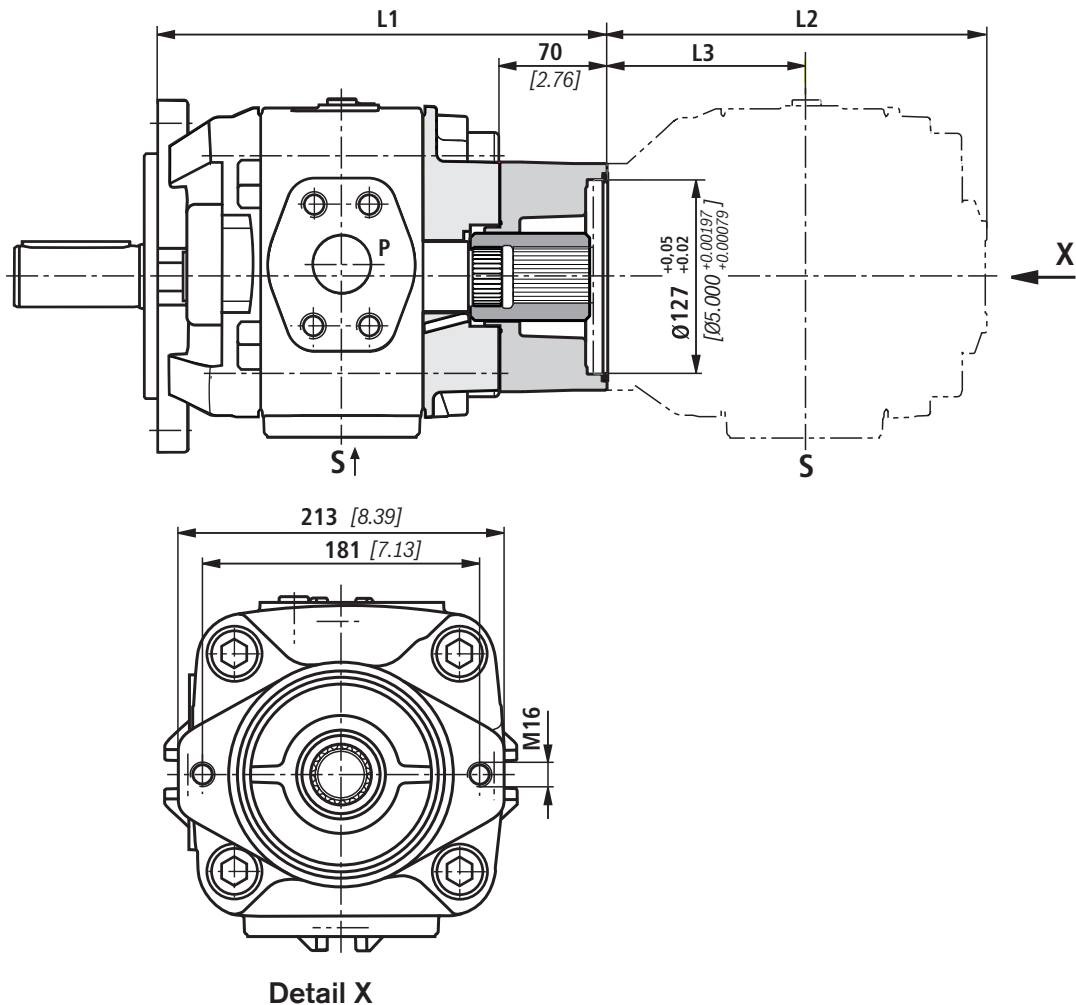
PGH4-3X...R..U2 Size	L2	L3
20	145 [5.71]	70.5 [2.78]
25	150 [5.91]	73 [2.87]
32	157 [6.18]	76.5 [3.01]
40	164 [6.46]	80 [3.15]
50	174 [6.85]	85 [3.35]

Unit dimensions, pump combinations (dimensions in mm [inch])

The dimensional drawings show the front pump and the combination part.

Combination part PGH5-3X+GH5-3X..R

Material no.: R901155285



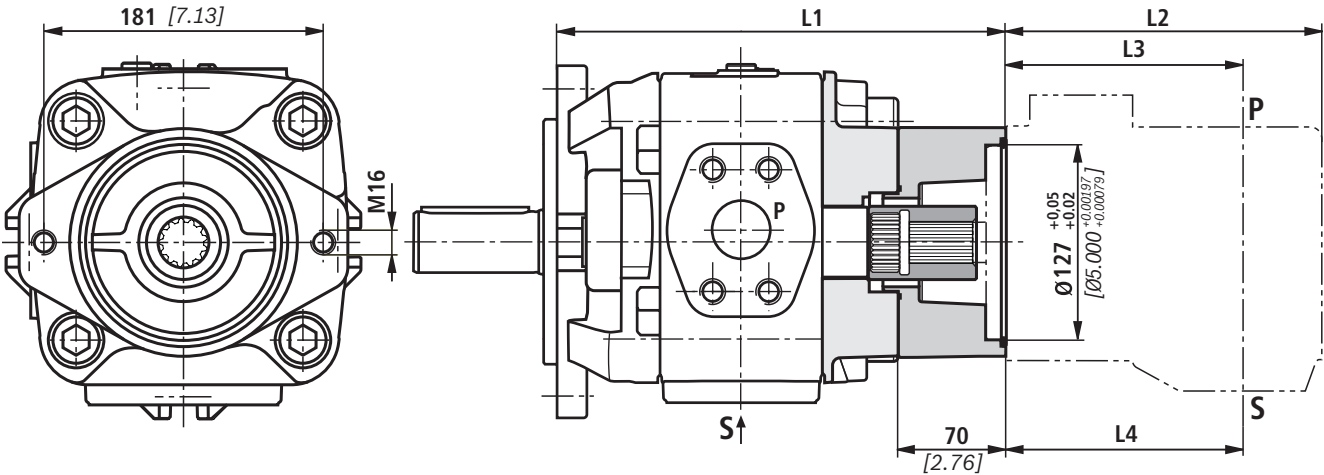
PGH5-3X.. Size	PGH5-3X/..RE..U2 PGH5-3X/..RE..E4 L1	PGH5-3X/..RR..U2 L1
63	264 [10.39]	273 [10.75]
80	272 [10.71]	281 [11.06]
100	281 [11.06]	290 [11.42]
125	293 [11.54]	302 [11.89]
160	311 [12.24]	320 [12.60]
200	329 [12.95]	338 [13.31]
250	353 [13.90]	362 [14.25]

PGH5-3X...R..U2 Size	L2	L3
63	219 [8.62]	114.5 [4.51]
80	227 [8.94]	118.5 [4.67]
100	236 [9.29]	123 [4.84]
125	248 [9.76]	129 [5.08]
160	266 [10.47]	138 [5.43]
200	284 [11.18]	147 [5.79]
250	308 [12.13]	159 [6.26]

Unit dimensions, pump combinations (dimensions in mm [inch])

The dimensional drawings show the front pump and the combination part.

Combination part: PGH5-3X+VV4/5-1X..J
Material no. R901155286



PGH5-3X.. Size	PGH5-3X/..RE..U2 PGH5-3X/..RE..E4 L1	PGH5-3X/..RR..U2 L1
63	264 [10.39]	273 [10.75]
80	272 [10.71]	281 [11.06]
100	281 [11.06]	290 [11.42]
125	293 [11.54]	302 [11.89]
160	311 [12.24]	320 [12.60]
200	329 [12.95]	338 [13.31]
250	353 [13.90]	362 [14.25]

PVV..UMB Frame size	L2	L3 (P)	L4 (S)
4	186 [7.32]	38 [1.50]	126 [4.96]
5	216 [8.50]	43 [1.69]	153 [6.02]

Engineering notes

1. General notes

These engineering notes refer to the specific properties of Rexroth PGH.-3X internal gear pumps.

Comprehensive, general notes and suggestions can be found in The Hydraulic Trainer, Volume 3, "Engineering notes and design of hydraulic systems", RE 00281.

1.1 Use according to the intended purpose

Rexroth internal gear pumps are intended for setting up hydraulic drive systems for the construction of plant and machinery. For engineering, the general principles of the EU Machinery Directive or comparable national regulations outside the EU must be observed.

These pumps must not be used in potentially explosive atmospheres according to Directive 94/9/EC (ATEX).

1.2 Technical data

The manufacturer of plant or machinery must ensure that permissible data and operating conditions are adhered to. The pump itself does not include any features to prevent its operation outside the permissible data.

All of the technical performance features stated are based on average values, which are valid under the specified boundary conditions. If the operating conditions change (e.g. viscosity), the technical data may change as well. Variances according to the relevant state of the art are possible.

The pump may to a certain extent be operated outside the permissible technical data (pages 4, 5), which is, however, subject to Bosch Rexroth's explicit, written approval.

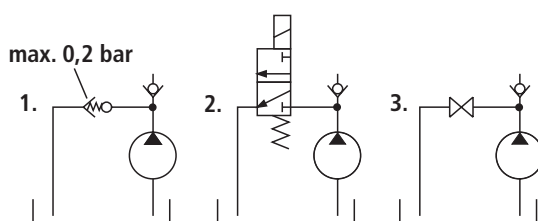
2. Hydraulic engineering

2.1 Bleeding for commissioning

For Rexroth internal gear pumps of type PGH.-3X a manual, switchable or automatic bleeding feature must be provided for initial commissioning or re-commissioning after repairs or servicing. Measuring point (M) located on the pump can be used as bleed point. Otherwise, the bleed point must be provided in the pressure line upstream of the first valve or check valve. Bleeding may be carried out at a maximum counterpressure of 0.2 bar.

Examples of bleeding circuits:

1. Automatic bleeding via automatic bleed valve
2. Switchable bleeding
3. Manual bleeding



2.2 Suction line

The line cross-sections must be rated for the provided flows so that an optimum suction velocity of 0.6 to 1.2 m/s is achieved on average. The suction velocity should not exceed a maximum value of 2 m/s.

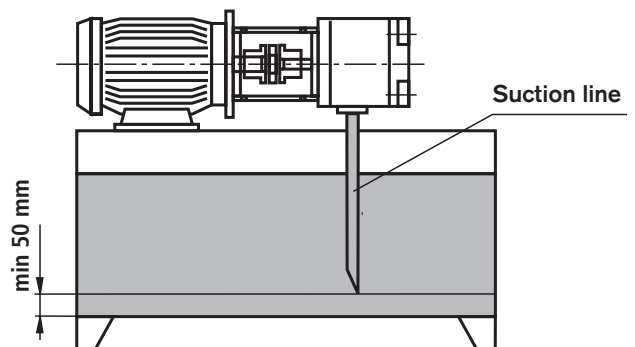
The suction cross-sections on the pump itself are dimensioned for the maximum flow rate and can therefore only be regarded as a guideline. In the case of continuous operation at speeds below the permissible maximum speed, the suction pipe diameter should be dimensioned smaller than the suction port of the pump according to the actual suction velocity.

In general, the suction line should be designed so that the permissible inlet operating pressure is adhered to (0.8 to 2 bar abs.)! Bends and grouping of suction pipes of several pumps should be avoided. If the use of suction filters cannot be avoided, it must be ensured on the system side that the inlet operating pressure does not fall below the permissible value even when the filter is clogged.

Make sure that the transitions are air-tight and the shape of a suction hose is stable towards the external atmospheric pressure.

The immersion depth of the suction pipe should be selected as deep as possible. Taking account of the internal tank pressure, viscosity of the operating medium and the flow situation in the tank, no vortex may form, even at maximum flow. Otherwise, there is a risk of air being aspirated.

We recommend the selection of suction pipes according to AB 23-03.



Engineering notes

2.3 Pressure line

With regard to pressure lines, see to it that pressure pipes, hoses and connection elements feature a sufficient burst strength. The cross-sections should be selected to suit the maximum flow in order that excessive stress on the pump due to backpressure is prevented. In addition, losses over the entire length of the pressure line and other line resistances (e.g. bends, pressure filters) must be taken into account.

2.4 Pressure relief function

PGH internal gear pumps are not provided with devices, which ensure that the maximum pressure is not exceeded. The setting and safeguarding of the permissible operating pressure must be ensured on the system side.

The pressure relief valves required for this should be rated taking into account the maximum flow and the pressure increase rate so that the permissible intermittent operating pressure is not exceeded.

2.5 Pressure holding function

In conjunction with a variable-speed drive, the pump can also be operated temporarily below the specified minimum speed in the pressure holding mode. The holding time and the speed required for this depend on the operating viscosity and the pressure level. For the rating, please contact the technical sales departments of Bosch Rexroth.

When the pump is switched off (speed = 0) a leakage flow, which depends on the load pressure, flows through the pump back to the tank. If this is to be reliably prevented, a check valve must be installed.

When using a check valve, please observe the notes on bleeding in chapter 2.1.

3. Mechanical engineering

3.1 Installation and removal

For the installation of the pump in and its removal from the drive, accessibility with suitable lifting gear must be ensured by the customer. Here, particular attention must be paid to the own weight of frame size PGH5 (see "Technical data" on page 5).

For mounting, use screws of strength class 8.8 or 10.9.

3.2 Mounting

Screws must be accessible from the machine side to ensure that the required tightening torque can be applied. The screw tightening torque depends on the elements involved in the screwed connection and must be determined by the manufacturer when the power unit, machine or system is engineered.

3.3 Tank

For the design of the tank or the selection of suitable standard tanks, the following requirements must be taken into account:

- Select a tank capacity as large as possible in relation to the continuous or medium flow in order to ensure a sufficient dwell time of the fluid in the tank, which allows air bubbles to separate. The air separation capacity of the fluid used is also relevant here.
- Provide settling zones for the fluid in the tank to allow the separation of air.
- Provide baffle plates to allow contamination to settle at the bottom of the tank outside the aspiration zone of the pump.
- Dimension the tank surface generously in dependence upon the heat to be dissipated via the tank walls.

3.4 Required power unit functions

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

- Tanks, the design of which provides that the internal pressure corresponds to the atmospheric pressure, should be fitted with breather filters for the purpose of pressure compensation.
- The fluid should only be filled in through a filling connection, which rules out filling in of unfiltered fluid.
- The ingress of contamination or humidity must be prevented. When installed in a highly contaminated environment, the tank should be pre-loaded using air pressure. If the tank is to be cleaned externally during the operating period, the tank openings for pipes, lines or hoses must be selected so that they guarantee reliable sealing against the application of water jets.

3.5 Place of installation and ambient conditions

At places of installation above a geodetic height of more than 1000 m, the pump must be arranged in or below the tank, or the tank must be pre-loaded with air pressure to ensure compliance with the permissible minimum inlet pressure. The length of the suction line should be as short as possible and the cross-section as large as possible; the use of bends should be avoided.

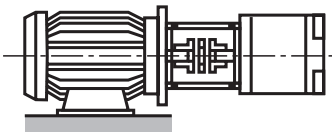
If the pump is arranged more than 10 m below the tank, additional measures must be taken to ensure that the inlet pressure is reduced to the permissible maximum value.

If the pump is to be operated in a salty or corrosive environment or if it is possible that the pump is exposed to strongly abrasive substances, it must be ensured by the customer that the shaft seal ring and the sealing area of the shaft cannot get in direct contact with the surroundings.

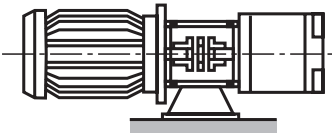
Engineering notes

3.6 Installation position

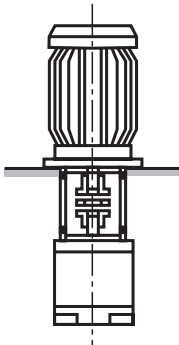
IM B3



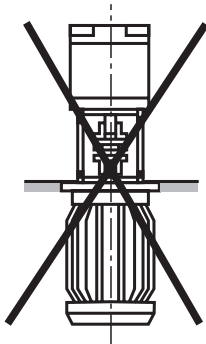
IM B5



IM V1



IM V2



⚠ Attention!
Installation position motor below and pump above (e.g. IM V2) is not permitted!

4. Pump combinations

- In the case of pump combinations, care must be taken that the operating data permitted for the relevant pump type are adhered to at every stage.
- Combined pumps must all rotate in the same direction.
- The pump with the highest torque, variable displacement pumps or pumps subjected to intermittent loads should be provided as first stage in the pump combination.
- The maximum through-drive torque must be verified by the engineer for every application. This is also valid for pump combinations already available (coded).

- The drive torque of a pump stage can be calculated as follows:

$$T = \frac{\Delta p \cdot V \cdot 0,0159}{\eta_{\text{hydr.-mech.}}}$$

- T : torque in Nm
- Δp : operating pressure in bar
- V : displacement in cm³
- η : hydraulic-mechanical efficiency

Permissible max. torque in Nm:

Type	Input torque		Output torque
	Cylindrical shaft ..E	Splined shaft ..R	
PGH4	450	450	280
PGH5	1100	1400	700

- The sum of torques of a pump combination must not exceed the max. drive torque.
- Common aspiration is impossible.
- For strength and stability reasons, we recommend the use of ISO 4-hole mounting flanges to VDMA "E4" for combinations comprising three or more pumps.
- Before operating pump combinations with different media, please contact Bosch Rexroth.
- The medium and rear pumps must have shaft variant "R" (splined).

Engineering notes

5. Maintenance schedule and operational reliability

To guarantee the reliable operation and a long service life of the pump, a maintenance schedule must be prepared for the power unit, machine or system. The maintenance schedule must make sure that the provided or permissible operating conditions of the pump are adhered to over the period of use.

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

- The required oil cleanliness
- The operating temperature range
- The fluid level

Moreover, the pump and the system must be inspected at regular intervals for changes in the following parameters:

- Vibration
- Noise
- Differential temperature of pump – fluid in the tank
- Foaming in the tank
- Freedom from leakage

Changes in these parameters indicate wear of components (e.g. drive motor, coupling, pump, etc.). The cause must be immediately pinpointed and eliminated.

To provide high operational reliability of the pump in the machine or system, we recommend continuous, automatic checks of the above parameters and an automatic shutdown in the case of changes that exceed the usual fluctuations within the provided operating range.

Plastic components of drive couplings should be replaced at regular intervals, but not later than after 5 years. The relevant manufacturer's data must be observed with priority.

For preventive maintenance of the pump we recommend to have seals replaced by an authorized Bosch Rexroth Service Company after a maximum operating time of 5 years.

6. Accessories

6.1 SAE connection flanges

We recommend the selection of SAE flanges for the suction and the pressure port in accordance with AB 22-15 (with welded connection) or AB 22-13 (with threaded connection).

6.2 Pump safety block

To limit the operating pressure and allow pressureless circulation of the pump we recommend the use of our pump safety blocks of type DBA... according to RE 25890.

Automatic bleeding for commissioning is, however, not possible with the DBA blocks. For this, we recommend a separate, manual or automatic bleeding feature, e.g. at the measuring port of the pump (see page 19)!

6.3 Other accessories

For mounting the Rexroth PGH.-3X internal gear pump to electric motors, we recommend to select pump mounting brackets according to AB 41-20 and torsionally flexible couplings according to AB 33-22.

Commissioning notes

Preparation

- Check that the system is properly and faultlessly assembled.
- Fill the hydraulic fluid only in through filters having the required minimum retention rate.
- Fill the pump completely with hydraulic fluid via the suction or pressure pipe.
- Check the direction of rotation of the motor for compliance with the direction of rotation according to the relevant pump type.

Bleeding

- Open the bleed point on the system manually or change over to pressureless circulation according to the operating instructions of the system. During bleeding, it must be ensured that entrapped air can be removed from the system at no pressure.
- To bleed the pump, switch the motor briefly on and immediately off again (jog mode). Repeat this process until the pump is definitely bled completely.
- Re-close bleed ports that were opened manually.

Commissioning

- When complete bleeding of the pump is ensured, switch the motor on. Let the pump run at zero pressure until the system is bled completely. For bleeding the system, observe the operating instructions for the system.
- Commission the system according to the operating instructions and let the pump run on load.
- After a certain operating time, check the hydraulic fluid in the tank for bubbles or the formation of foam on the surface.

Operation

- During operation, take note of changes in the noise characteristic. A slight increase in the noise level is normal due to warming up of the operating medium. A significant increase in the noise level or brief, stochastic noise anomalies can indicate the aspiration of air. If the suction pipes are too short or the fill level of the operating medium is too low, air can also be aspirated via a vortex.
- Changes in operating speeds, temperatures, increases in the noise level or power consumption indicate wear or damage to the system or pump.

Re-commissioning

- Check the pump and system for leakage. Leakage indicates leaky spots below the hydraulic fluid level. An increased hydraulic fluid level in the tank indicates leakage above the hydraulic fluid level.
- If the pump is arranged above the hydraulic fluid level, the pump can drain due to leakages, for example due to a worn out shaft seal ring. In this case, bleeding is required during re-commissioning. Initiate a repair.
- Bleeding is also necessary after repair and maintenance work.
- When the system is intact, switch the motor on.

General

- Pumps delivered by us were tested for function and performance. No changes of whatever nature must be made to the pump, otherwise, the warranty becomes void!
- Repairs may only be carried out by the manufacturer or his authorized dealers and subsidiaries. Repairs carried out by the customer are not covered by any warranty.

Important notes

- Installation, maintenance and repair of the pump may only be carried out by authorized, trained and instructed personnel!
- The pump may only be operated at the permissible data (see pages 4 and 5)!
- The pump may only be operated when in perfect condition!
- When carrying out any work on the pump, depressurize the system!
- Unauthorized conversions or changes, which affect safety and function, are not permitted!
- Provide protective guards (e.g. coupling guard) and do not remove any existing protective guards and equipment!
- Always ensure the proper fit of all mounting screws! (Observe prescribed tightening torque!)
- Generally valid safety and accident prevention regulations must be observed!

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