

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: 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

Ordering code: Pump combination

01	02	03	04	05	06	07	08	09	10	11	12	13	14						
		-	3X	/		+	-		/		+	-		/					

Combination

01	2-fold	P2
	3-fold	P3

Pump 1 ¹⁾

02	Frame size 4	GH4
	Frame size 5	GH5

Pump 1 ¹⁾

03	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	3X
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Pump 1 ¹⁾

04	Size 020 ... 250	e.g. 040
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Pump 2 ²⁾

05	Frame size e.g. GH3	e.g. GH3
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Pump 2 ²⁾

06	Component series e.g. 2X	e.g. 2X
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Pump 2 ²⁾

07	Size e.g. 016	e.g. 016
----	---------------	-----------------

Pump 3 ²⁾

08	Frame size e.g. GH3	e.g. GH3
----	---------------------	-----------------

Pump 3 ²⁾

09	Component series e.g. 2X	e.g. 2X
----	--------------------------	----------------

Pump 3 ²⁾

10	Size e.g. 016	e.g. 016
----	---------------	-----------------

Direction of rotation

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

Shaft end

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

Seal material

13	FKM shaft seal ring and FKM seals	V
	NBR shaft seal ring and FKM seals	W ³⁾

Mounting

14	4-hole mounting flange according to ISO 3019-2	E4
	2-hole mounting flange according to ISO 3019-1	U2

¹⁾ Details see page 2.²⁾ For details, see the data sheet of the pump used, e.g. PGH3-2X (data sheet 10223).³⁾ For special applications (e.g. HFC fluids)**Order example:**

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

**Notice:**

- For further information, see configuration possibilities and dimensions page 23... 33.
- Further configuration possibilities according to consultation.

Ordering code: Double pump in short version "PGH55"

01	02	03	04	05	06	07	08	09	10	11	12
PG	H	55	-	3X	/			-			

01	Internal gear pump	PG
02	High-pressure pump	H
03	Frame size 55	55
04	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	3X

Size (front pump)

05	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 (front pump)

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

Size (rear pump)

07	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
08	Direction of rotation rear pump	R

Shaft end

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

Seal material

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

Mounting

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

¹⁾ For special applications (e.g. HFC fluids)

Order example:

PGH55-3X / 080R-080REVE4

**Notice:**

For further information, see dimensions page 34... 36.

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).

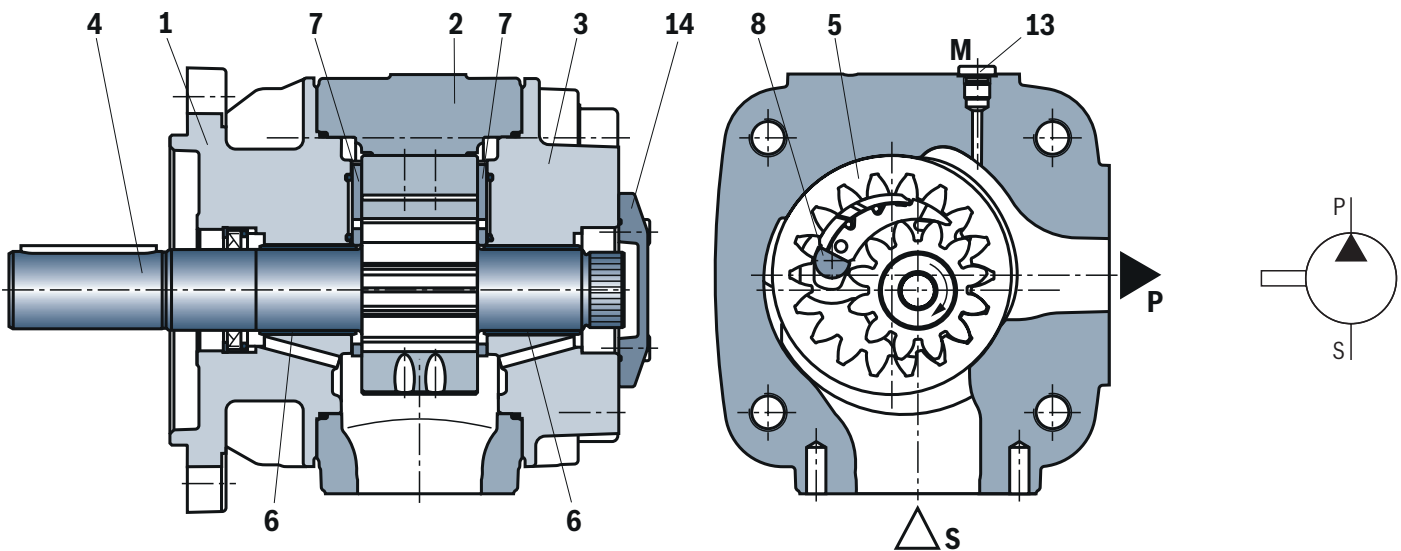
The internal gear (5) is mounted hydrostatically in the housing.

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

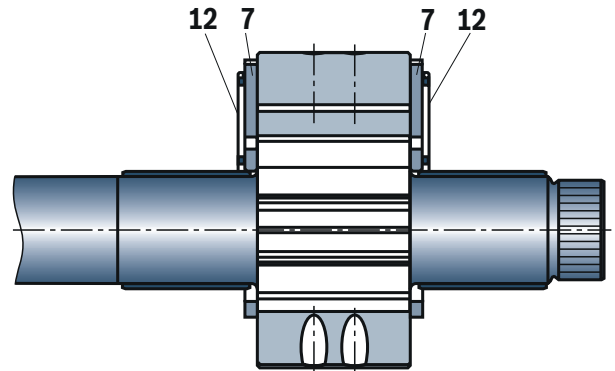
Function, section

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

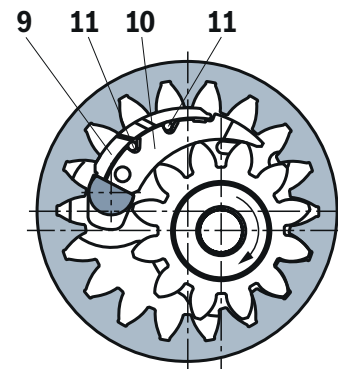
The radial compensation elements consist of segment (9), segment support (10) and sheet seals (11).

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.



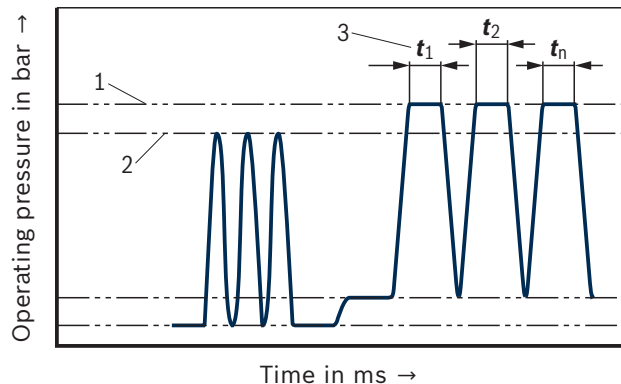
Technical data: Frame size 4
(For applications outside these values, please consult us!)

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.

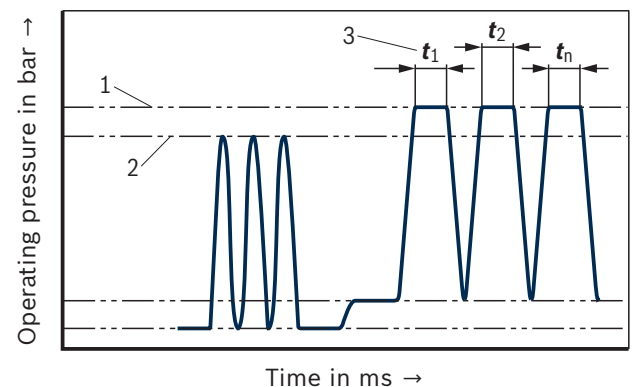
Technical data: Frame size 5
(For applications outside these values, please consult us!)

General								
Size	NG	63	80	100	125	160	200	250
Pump design	Internal gear pump, gap-compensated							
Type of mounting	Mounting flange							
Type of connection	Flange connection							
Mass	kg	42	43.5	45.5	48	52	55.5	60.5
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						
Minimum drive power ³⁾	kW	1.8	2.2	3	4	5.5	7.5	7.5
Maximum drive power	kW	96	103	129	161	134	140	134
Moment of inertia	kgm ²	0.00237	0.00289	0.00329	0.00407	0.00506	0.00623	0.00760
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	210	170	135
Pressure peak ⁴⁾	bar	350	350	350	350	260	210	170
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	64.7	81.4	100.2	125.3	162.8	200.4	250.5
Maximum flow rate (at 10 bar and 1450 rpm)	l/min	92.8	116.9	143.8	179.8	233.7	287.7	359.6

- 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 min^{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!)

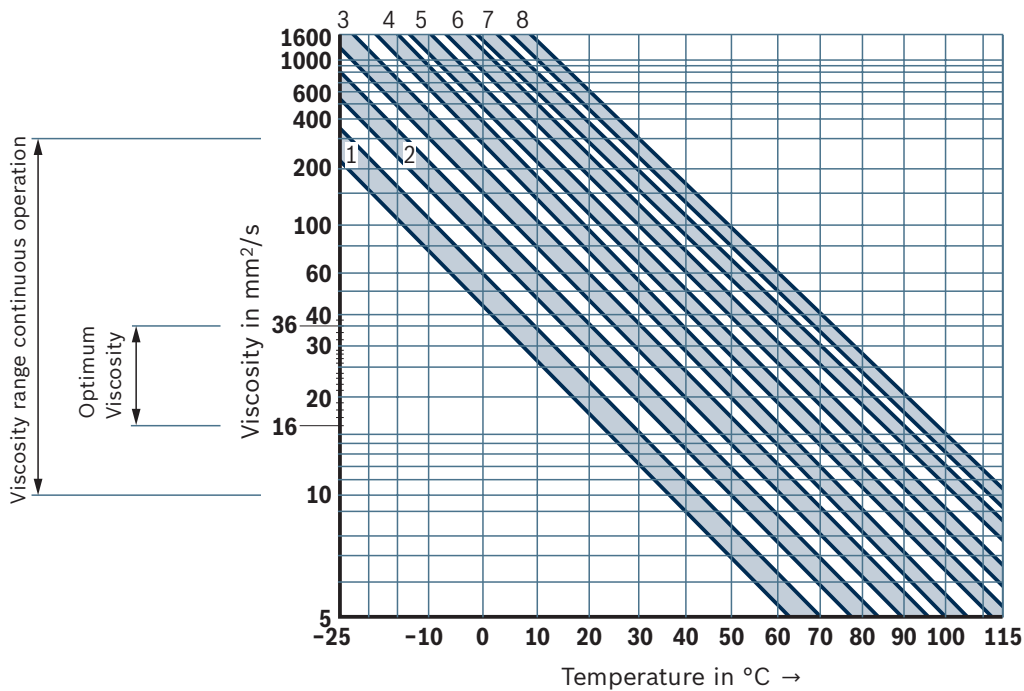
Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HLP	NBR, FKM	DIN 51524	90220

 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.

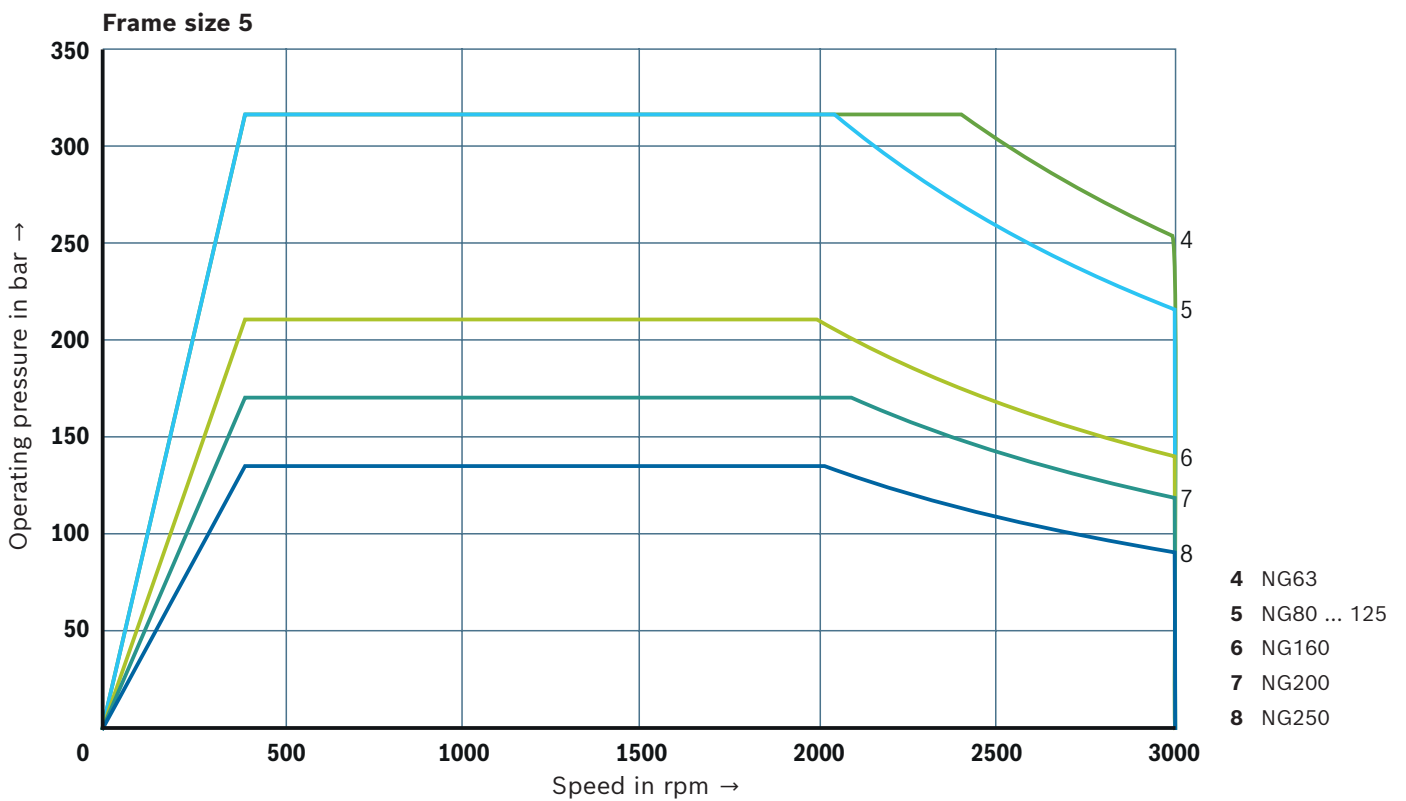
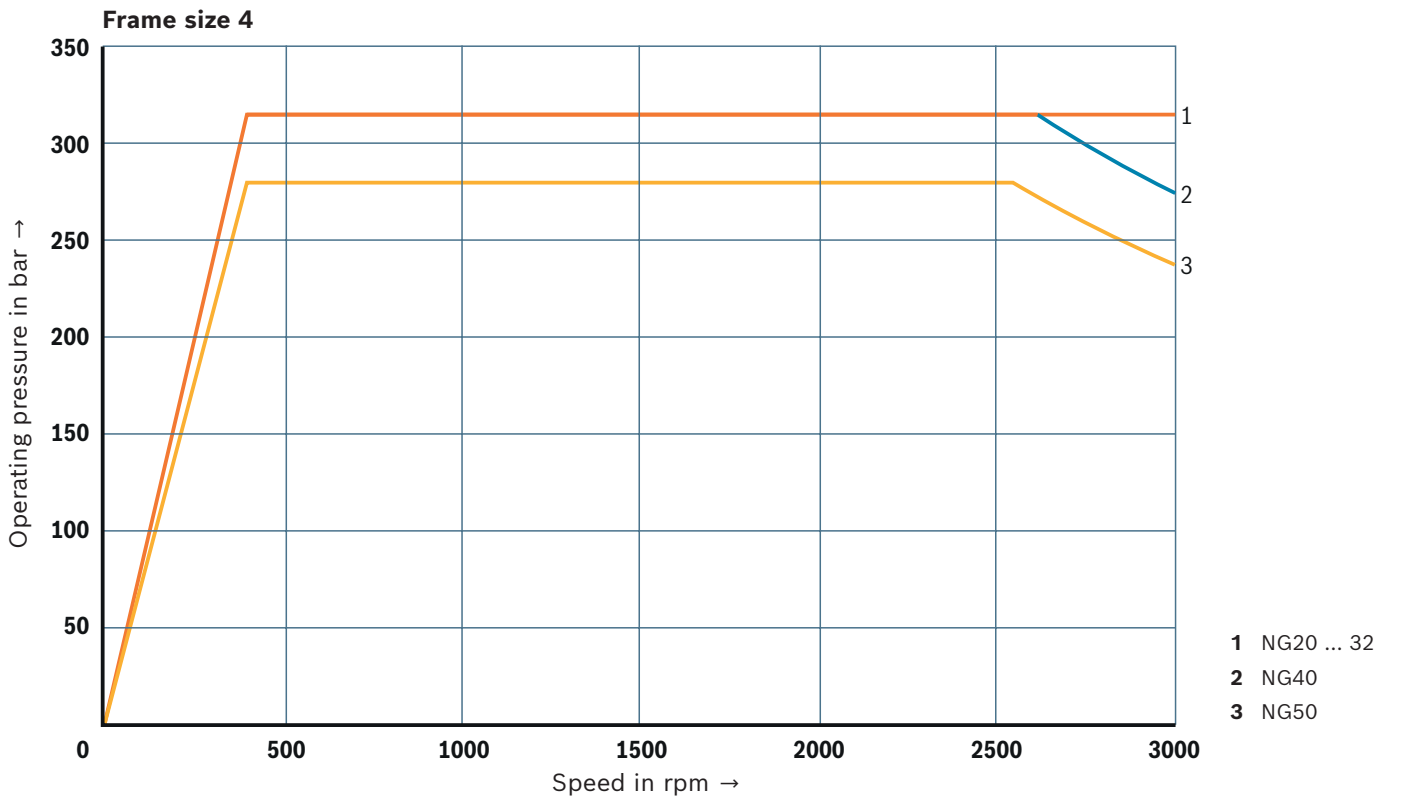
- ▶ The hydraulic fluid should be selected so that the operating viscosity is in the optimum range in the operating temperature range (see viscosity-temperature diagram).
- ▶ **Additional hydraulic fluids upon request**

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



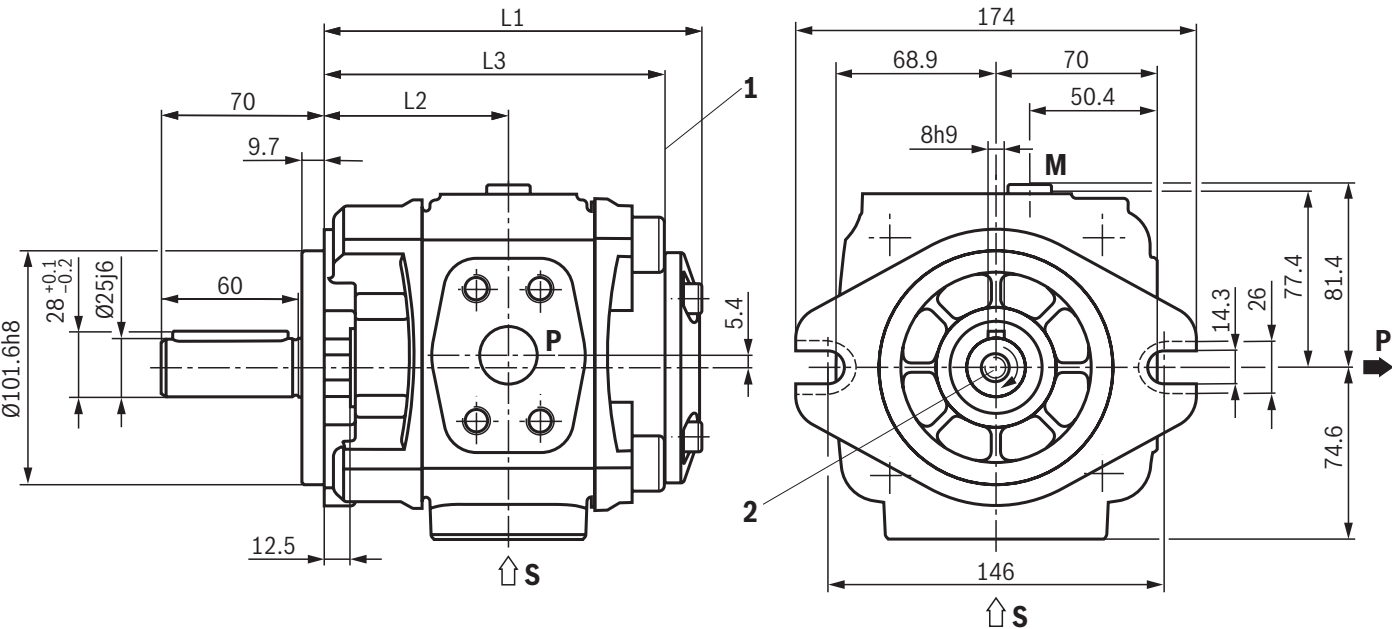
- 1 Viscosity class VG10
- 2 Viscosity class VG15
- 3 Viscosity class VG22
- 4 Viscosity class VG32
- 5 Viscosity class VG46
- 6 Viscosity class VG68
- 7 Viscosity class VG100
- 8 Viscosity class VG150

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

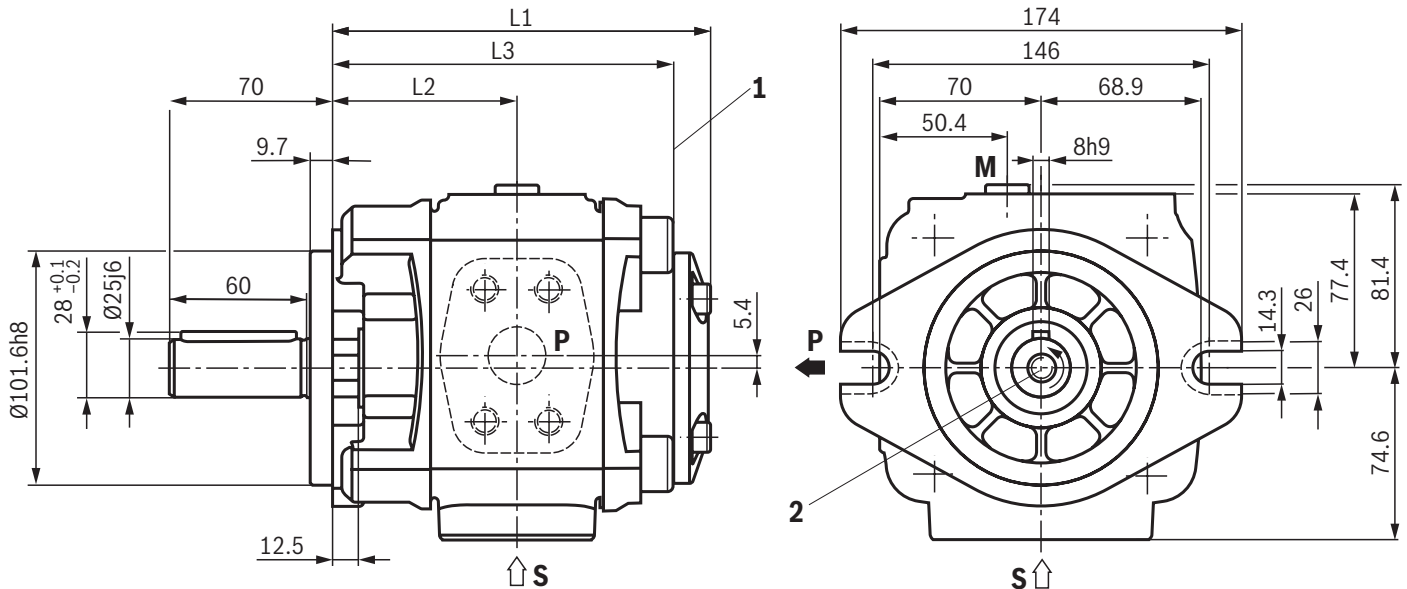
Notice:

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

Dimensions: Frame size 4 – version "LE11.U2" (left-handed)
(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	R901283006	PGH4-3X/020LE11VU2
25	150	73	134	1 1/4" S	3/4" H	R901283008	PGH4-3X/025LE11VU2
32	157	76.5	141	1 1/2" S	1" H	R901283009	PGH4-3X/032LE11VU2
40	164	80	148	1 1/2" S	1" H	R901283010	PGH4-3X/040LE11VU2
50	174	85	158	2" S	1" H	R901283011	PGH4-3X/050LE11VU2

1 Start of combi part for multiple pumps

2 DIN 332-DS M8

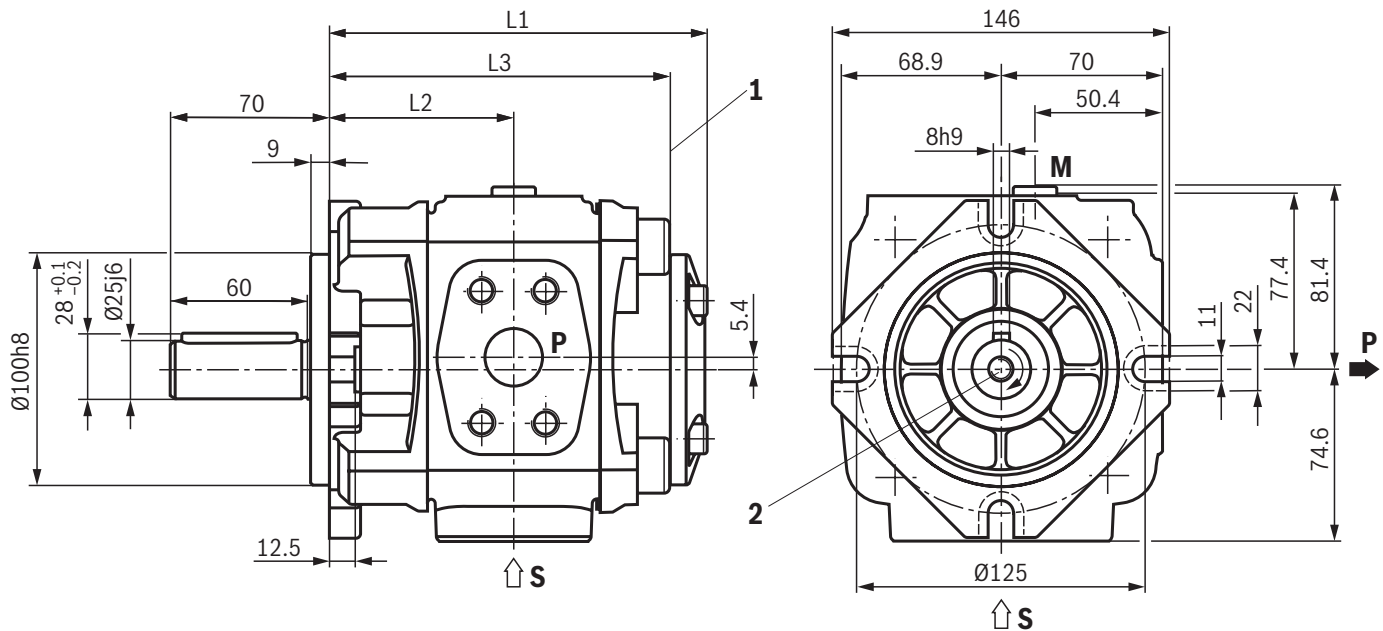


Notice:

- ▶ 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.

Dimensions: Frame size 4 – version "RE11.E4" (clockwise)
(dimensions in mm)

Shaft end "E" – cylindrical with fitting key and through-drive according to ISO 3019-2, E25M
Attachment "E4" – 4-hole mounting flange after ISO 3019-2, 100B4SW



NG	L1	L2	L3	S	P	Material number	Type
20	145	70.5	129	1" S	3/4" H	R901147105	PGH4-3X/020RE11VE4
25	150	73.0	134	1 1/4" S	3/4" H	R901147106	PGH4-3X/025RE11VE4
32	157	76.5	141	1 1/2" S	1" H	R901147107	PGH4-3X/032RE11VE4
40	164	80	148	1 1/2" S	1" H	R901147108	PGH4-3X/040RE11VE4
50	174	85	158	2" S	1" H	R901147109	PGH4-3X/050RE11VE4

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

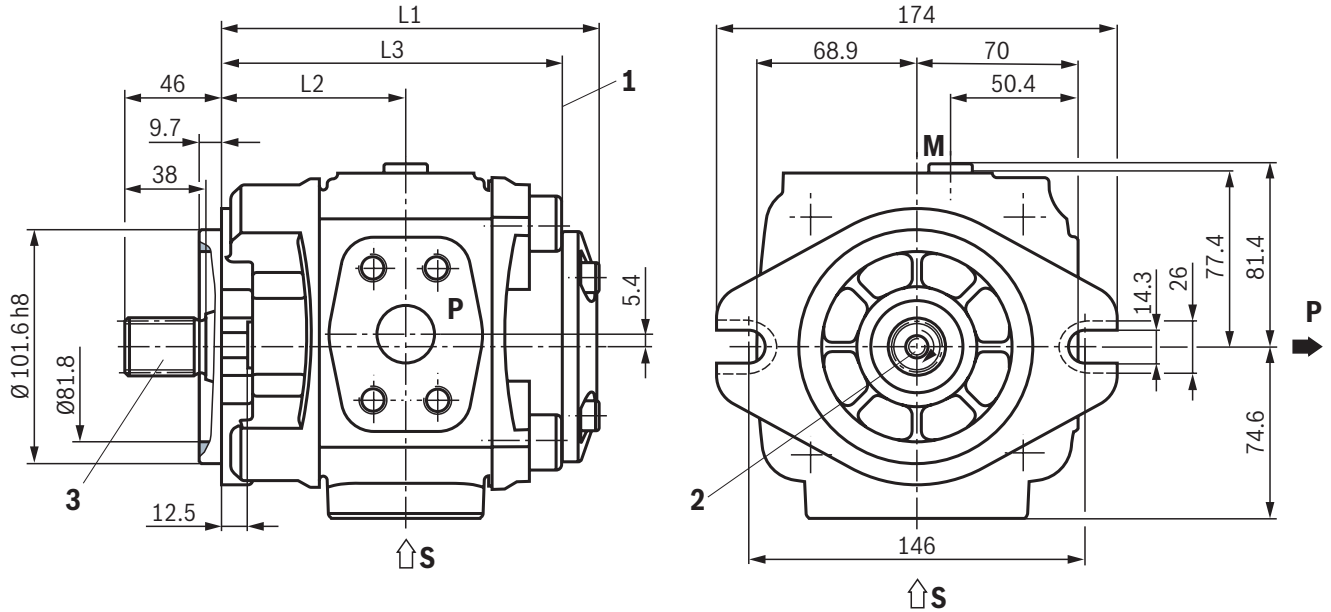
Notice:

- 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.

Dimensions: Frame size 4 – version "RR11.U2" (clockwise)
(dimensions in mm)

Shaft end "R" – geared with through-drive according to ISO 3019-1, 25-4

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	R901147110	PGH4-3X/020RR11VU2
25	150	73	134	1 1/4" S	3/4" H	R901147111	PGH4-3X/025RR11VU2
32	157	76.5	141	1 1/2" S	1" H	R901147112	PGH4-3X/032RR11VU2
40	164	80	148	1 1/2" S	1" H	R901147113	PGH4-3X/040RR11VU2
50	174	85	158	2" S	1" H	R901147114	PGH4-3X/050RR11VU2

- 1 Start of combi part for multiple pumps
- 2 DIN 332-DS M8
- 3 Involute toothing 15T – 16/32DP

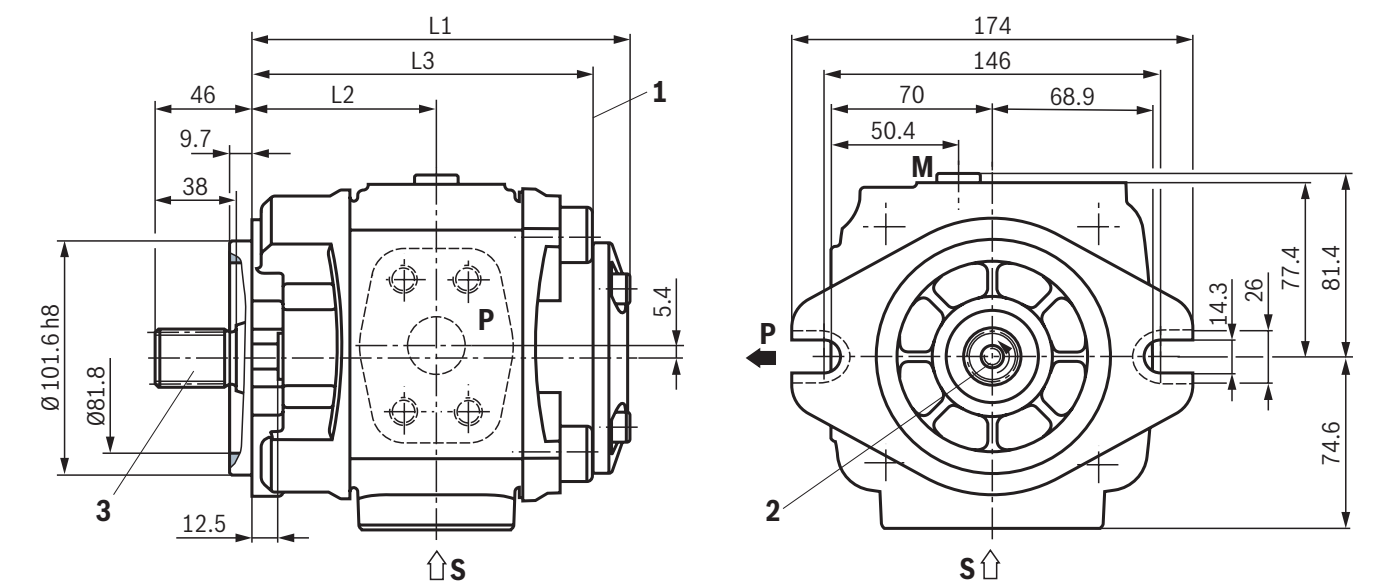


Notice:

- Central and back pump in pump combinations
- 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.

Dimensions: Frame size 4 – version "LR11.U2" (left-handed)
(dimensions in mm)

Shaft end "R" – geared with through-drive according to ISO 3019-1, 25-4
Attachment "U2" – 2-hole mounting flange after 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	R901282905	PGH4-3X/020LR11VU2
25	150	73	134	1 1/4" S	3/4" H	R901282906	PGH4-3X/025LR11VU2
32	157	76.5	141	1 1/2" S	1" H	R901282907	PGH4-3X/032LR11VU2
40	164	80	148	1 1/2" S	1" H	R901282908	PGH4-3X/040LR11VU2
50	174	85	158	2" S	1" H	R901282909	PGH4-3X/050LR11VU2

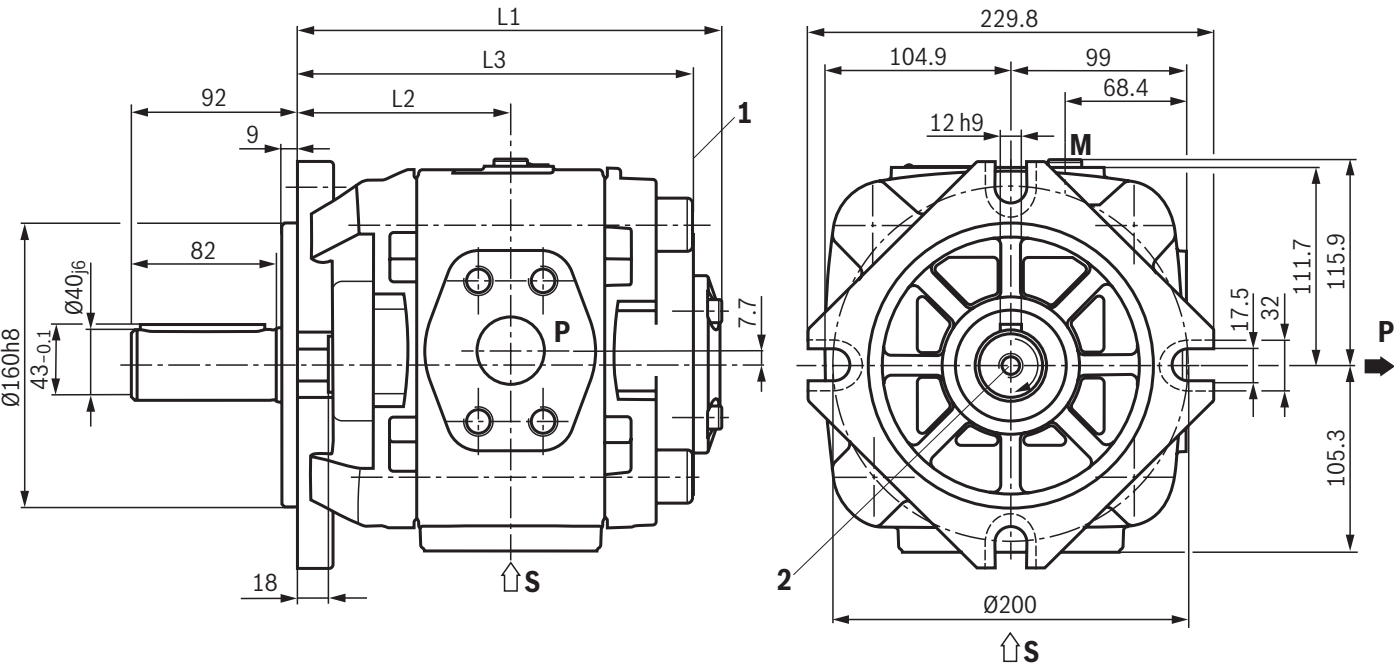
- 1 Start of combi part for multiple pumps
- 2 DIN 332-DS M8
- 3 Involute toothing 15T – 16/32DP

Notice:

- ▶ Central and back pump in pump combinations
- ▶ 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.

Dimensions: Frame size 5 – version "RE..E4" (clockwise)
(dimensions in mm)

Shaft end "E" – cylindrical with fitting key and through-drive according to ISO 3019-2, E40N
Attachment "E4" – 4-hole mounting flange according to ISO 3019-2, 160B4SW



NG	L1	L2	L3	S	P	Material number	Type
63	210	105.5	194	2" S	1 1/4" H	R901147122	PGH5-3X/063RE11VE4
80	218	109.5	202	2" S	1 1/4" H	R901147123	PGH5-3X/080RE11VE4
100	227	114	211	2 1/2" S	1 1/2" H	R901147124	PGH5-3X/100RE11VE4
125	239	120	223	2 1/2" S	1 1/2" H	R901147125	PGH5-3X/125RE11VE4
160	257	129	241	3" S	2" H	R901147126	PGH5-3X/160RE11VE4
200	275	138	259	3 1/2" S	2" S	R901147127	PGH5-3X/200RE07VE4
250	299	150	283	3 1/2" S	2 1/2" S	R901147128	PGH5-3X/250RE07VE4

- 1 Start of combi part for multiple pumps
- 2 DIN 332-DS M12

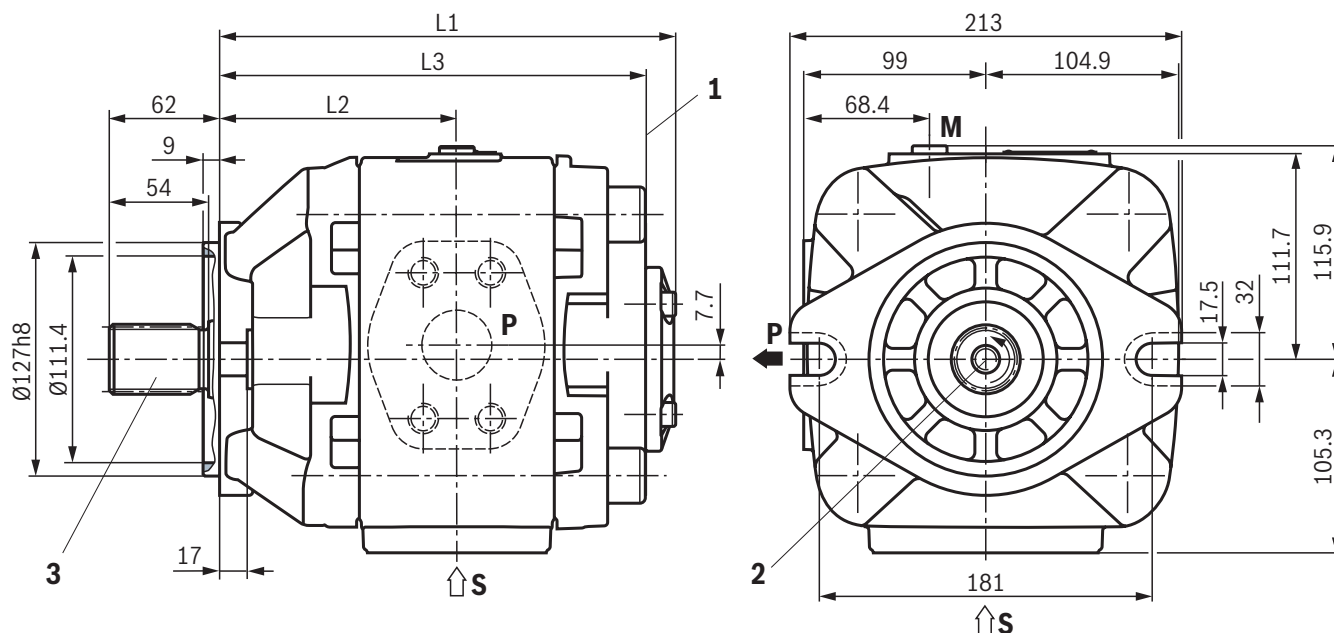
Notice:

- 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.

Dimensions: Frame size 5 – version "LR..U2" (counterclockwise rotation)
(dimensions in mm)

Shaft end "R" – geared with through-drive according to ISO 3019-1, 38-4

Attachment "U2" – 2-hole mounting flange after ISO 3019-1, 127-2 (SAE C)



NG	L1	L2	L3	S	P	Material number	Type
63	219	114.5	203	2" S	1 1/4" H	R901260687	PGH5-3X/063LR11VU2
80	227	118.5	211	2" S	1 1/4" H	R901260688	PGH5-3X/080LR11VU2
100	236	123	220	2 1/2" S	1 1/2" H	R901260689	PGH5-3X/100LR11VU2
125	248	129	232	2 1/2" S	1 1/2" H	R901260690	PGH5-3X/125LR11VU2
160	266	138	250	3" S	2" H	R901260691	PGH5-3X/160LR11VU2
200	284	147	268	3 1/2" S	2" S	R901260692	PGH5-3X/200LR07VU2
250	308	159	292	3 1/2" S	2 1/2" S	R901260693	PGH5-3X/250LR07VU2

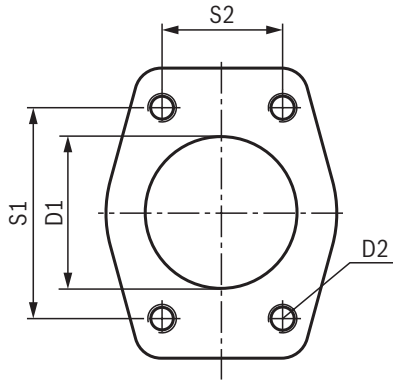
- 1 Start of combi part for multiple pumps
2 DIN 332-DS M12
3 Involute toothing 17T – 12/24DP

 Notice:

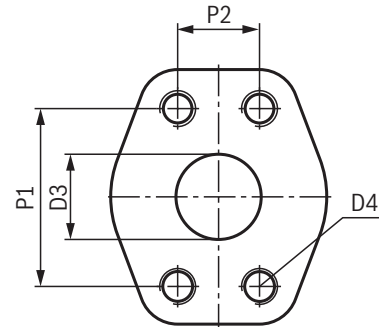
- Central and back pump in pump combinations
- S = ISO 6162-1 standard pressure series
H = high-pressure series according to ISO 6162-2
(see table on page 21 for dimensions)
- The dimensions are nominal dimensions which are subject to tolerances.

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

Suction port S



Pressure port P



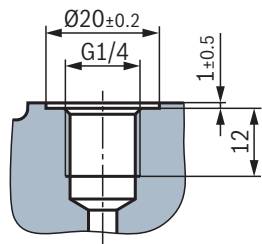
BG	NG	Port size, suction port S	D1	D2	S1	S2	Pressure port size P	D3	D4	P1	P2
4	020	DN25 ¹⁾ (SAE 1")	Ø25	M10; 18	52.4	26.2	DN19 ²⁾ (SAE 3/4")	Ø19	M10; 18	50.8	23.8
	025	DN32 ¹⁾ (SAE 1 1/4")	Ø32	M10; 18	58.7	30.2	DN19 ²⁾ (SAE 3/4")	Ø19	M10; 18	50.8	23.8
	032	DN38 ¹⁾ (SAE 1 1/2")	Ø38	M12; 21	69.9	35.7	DN25 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"
<p>Diagram of the PGH4 transport thread. It shows a side view of the pump housing with a measuring port labeled 'M' and a transport thread connection point labeled 'M8; 14'.</p>	<p>Diagram of the PGH5 transport thread. It shows a side view of the pump housing with a measuring port labeled 'M' and a transport thread connection point labeled 'M10; 18'.</p>

Configuration possibilities: Pump combination

PGH internal gear pumps can be combined with the shaft designs "E" and "R", these pumps have output shaft teeth. The possible combinations and die material numbers of the required combination parts are available in the following table.

Upstream pump	Downstream pump	Material number	Data sheet
"PGH4"	PGH2-2X/..R..U2	R901155288	10223
	PGH3-2X/..R..U2	R901155288	10223
	PGH4-3X/..R..U2	R901155289	10227
	PGF2-2X/..J..U2	R901155288	10213
	PGF3-3X/..J..U2	R901155287	10213
	PVV1-1X/..Y...B	R901155287	10335
	PVV2-1X/..Y...B	R901155287	10335
	AZPF-1X/...RR...	R901155288	10089
	PGZ4-1X/.RT..U2	R901253382	10545
	PGZ5-1X/.RT..U2	R901253382	10545
"PGH5"	PGH2-2X/..R..U2	R901155283	10223
	PGH3-2X/..R..U2	R901155283	10223
	PGH4-3X/..R..U2	R901155284	10227
	PGH5-3X/..R..U2	R901155285	10227
	PGF2-2X/..J..U2	R901155283	10213
	PGF3-3X/..J..U2	R901155282	10213
	PVV1-1X/..J15...B	R901155282	10335
	PVV2-1X/..J15...B	R901155282	10335
	PVV4-1X/..J15...C	R901155286	10335
	PVV5-1X/..J15...C	R901155286	10335
	AZPF-1X/...RR...	R901155283	10089
	PGZ4-1X/.RT..U2	R901238497	10545
	PGZ5-1X/.RT..U2	R901238497	10545

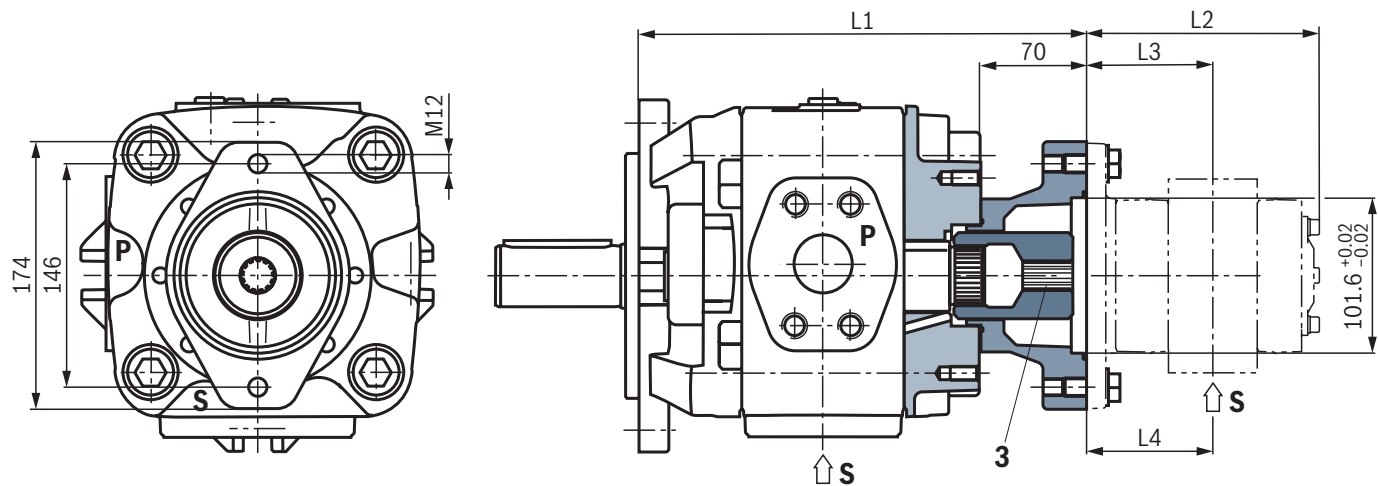


Notice:

- Please note the project planning information for pump combinations on page 41.
- For further information, see "ordering codes Pump Combination" page 4.

Dimensions: Pump combination – design "P2GH5-3X...+GF3-3X...";
"P2GH5-3X...+VV1-1X..."; "P2GH5-3X...+VV2-1X..."
(dimensions in mm)

Material number combi part: **R901155282**
– Pump 2 with shaft end (22-4) and 2-hole mounting flange (101-2) according to ISO 3019-1



3 Drivers with involute toothing shaft (22-4) according to ISO 3019-1 – 13T – 16/32DP

Notice:

- ▶ The dimensional drawings show the front pump and the combination part.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH5-3X..."

Size	"E..U2"; "E..E4"	"R..U2"
	L1	L1
063	264	273
080	272	281
100	281	290
125	293	302
160	311	320
200	329	338
250	353	362

Pump 2: "PGF3-3X...J...U2" ¹⁾

Size	L2	L3
020	144.5	79.5
022	146.5	80.5
025	150.5	82.5
032	159.5	87
040	169.5	92

Pump 2: "PVV.-1X...J15..B" ²⁾

Frame size	L2	L3 (P)	L4 (S)
1	156	133	63.5
2	163	38	20.5

¹⁾ For further information refer to data sheet 10223
²⁾ For further information refer to data sheet 10335

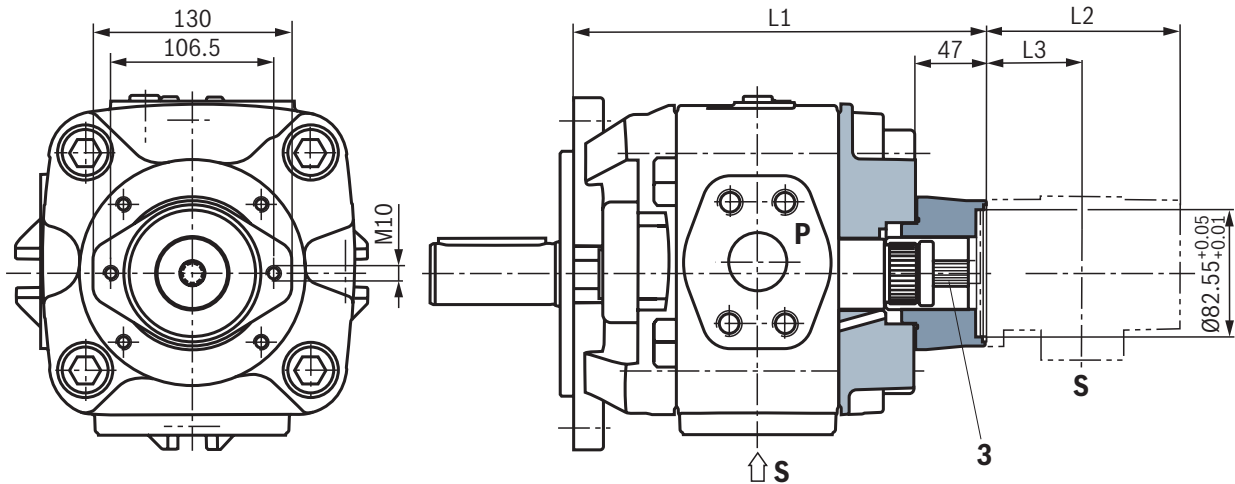
Order examples:

- ▶ P2GH5-3X/125+GF3-3X/020REVE4
- ▶ P2GH5-3X/125+VV2-1X/027REVE4

Dimensions: Pump combination – design "P2GH5-3X...+GF2-2X...";
 "P2GH5-3X...+GH2-2X..."; "P2GH5-3X...+GH3-2X"; "P2GH5-3X...+AZPF-1X..."
 (dimensions in mm)

Material number combi part: **R901155283**

– Pump 2 with shaft end (16-4) and 2-hole mounting flange (82-2) according to ISO 3019-1



- 3 Drive with involute toothing shaft (16-4) according to ISO 3019-1 – 9T – 16/32DP



Notice:

- ▶ The dimensional drawings show the front pump and the combination part.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH5-3X..."

Size	"E..U2"; "E..E4"	"R..U2"
	L1	L1
063	241	250
080	249	258
100	258	267
125	270	279
160	288	297
200	306	315
250	330	339

Pump 2: "PGH2-2X...R...U2" ²⁾

Size	L2	L3
005	110	54
006	112.5	55.5
008	116	57

Pump 2: "PGH3-2X...R...U2" ²⁾

Size	L2	L3
011	121.5	60
013	126.5	62.5
016	131.5	65

Pump 2: "PGF2-2X...J...U2" ¹⁾

Size	L2	L3
006	116	65
008	119.5	67
011	125	69.5
013	130	72
016	135	74.5
019	141	77.5
022	147	80.5

Pump 2: "AZPF-1X...RR..." ³⁾

Size	L2	L3
004	85	40
005	87.5	41
008	91.5	43
011	96.5	47
014	101.5	47.5
016	105	47.5
019	110	47.5
022	115.5	55

¹⁾ For further information refer to data sheet 10213

²⁾ For further information refer to data sheet 10223

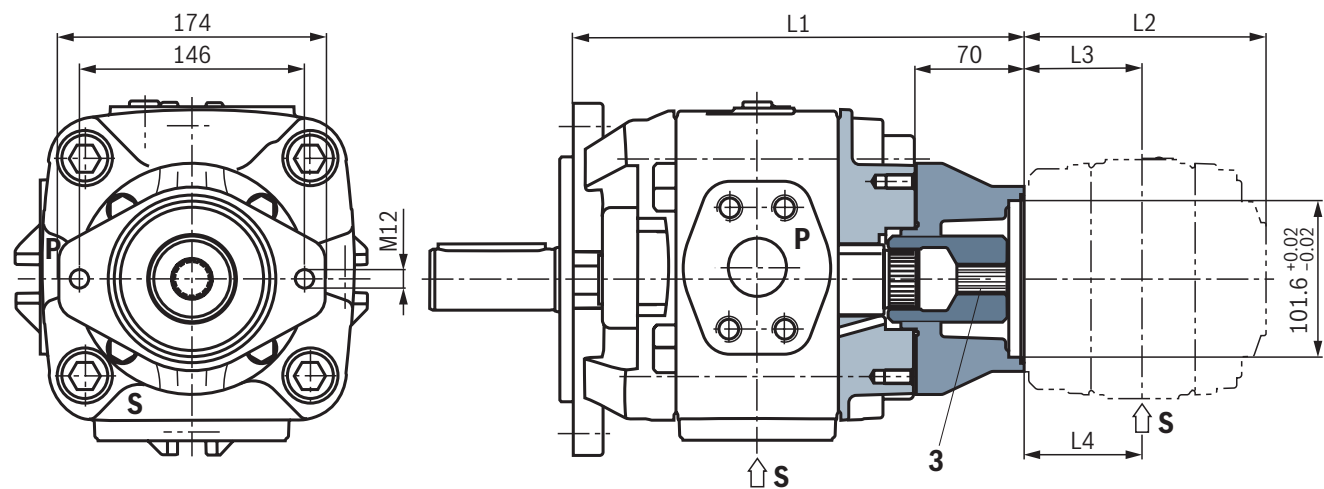
³⁾ For further information refer to data sheet 10089

Order examples:

- ▶ P2GH5-3X/080+GF2-2X/016RRVU2
- ▶ P2GH5-3X/080+GH2-2X/006REVU2
- ▶ P2GH5-3X/080+GH3-2X/016REVE4
- ▶ P2GH5-3X/100+AZPF-12/016RRVU2

Dimensions: Pump combination – version "P2GH5-3X...+GH4-3X..."
(dimensions in mm)

Material number combi part: **R901155284**
– Pump 2 with shaft end (25-4) and 2-hole mounting flange (101-2) according to ISO 3019-1



- 3 Drivers with involute toothing shaft (16-4) according to ISO 3019-1 – 15T – 16/32DP

Notice:

- ▶ The dimensional drawings show the front pump and the combination part.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH5-3X..."

Size	"E..U2"; "E..E4"	"R..U2"
	L1	L1
063	264	273
100	281	290
125	293	302
160	311	320
200	329	338
250	353	362

Pump 2: "PGH4-3X...R...U2"

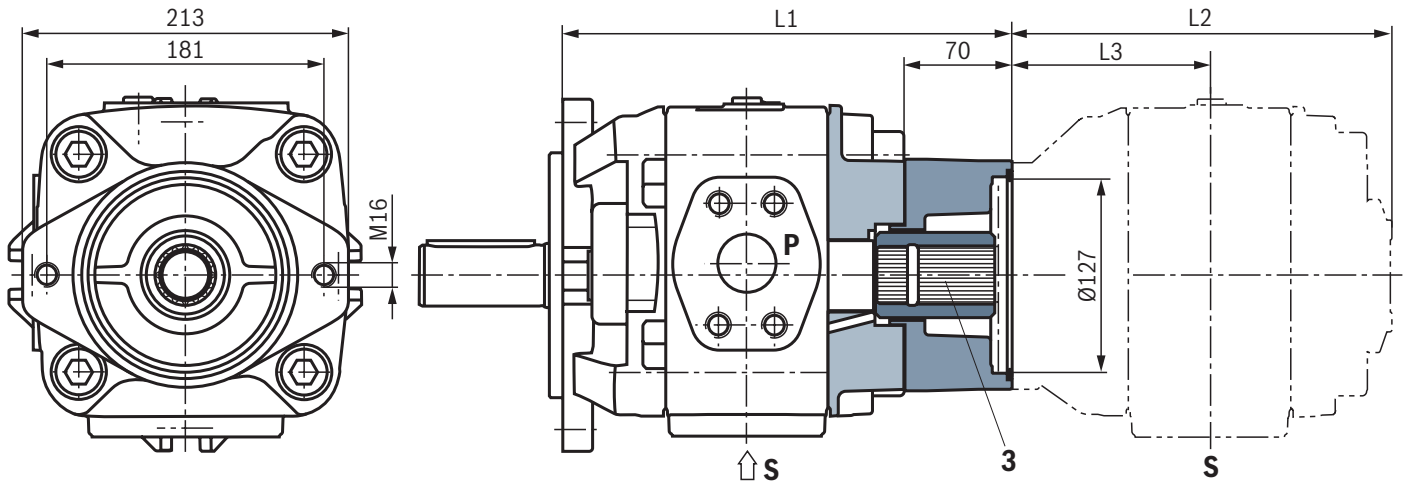
Size	L2	L3
020	145	70.5
025	150	73
032	157	76.5
040	164	80
050	174	85

- Order examples:**
- ▶ P2GH5-3X/125+GH4-3X/040REVE4
 - ▶ P2GH5-3X/100+GH4-3X/032REVU2

Dimensions: Pump combination – version "P2GH5-3X...+GH5-3X..."
(dimensions in mm)

Material number combi part: **R901155285**

– Pump 2 with shaft end (38-4) and 2-hole mounting flange (127-2) according to ISO 3019-1



- 3** Drivers with involute toothing shaft (38-4) according to ISO 3019-1 – 17T – 12/24DP



Notice:

- The dimensional drawings show the front pump and the combination part.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH5-3X..."

Size	"E..U2"; "E..E4"	"R..U2"
	L1	L1
063	264	273
080	272	281
100	281	290
125	293	302
160	311	320
200	329	338
250	353	362

Pump 2: "PGH5-3X...R...U2"

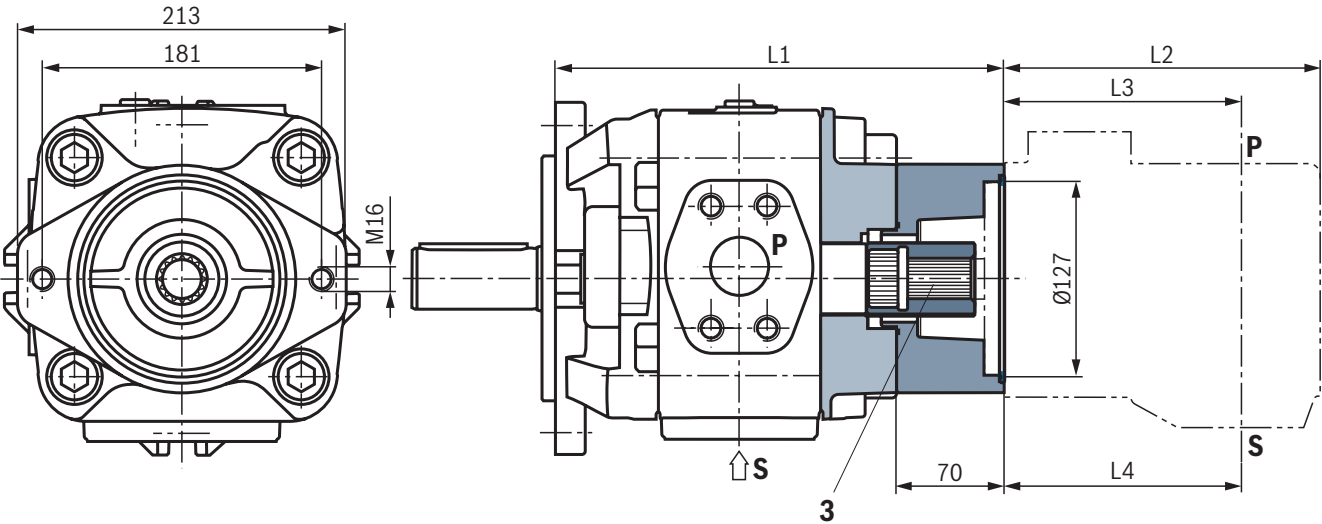
Size	L2	L3
063	219	114.5
080	227	118.5
100	236	123
125	248	129
160	266	138
200	284	147
250	308	159

Order examples:

- P2GH5-3X/200+GH5-3X/160REVE4
- P2GH5-3X/160+GH5-3X/125REVU2

Dimensions: Pump combination – design "P2GH5-3X...+VV4-1X...";
"P2GH5-3X...+VV5-1X..."
(dimensions in mm)

Material number combi part: **R901155286**
– Pump 2 with shaft end (32-4) and 2-hole mounting flange (127-2) according to ISO 3019-1



3 Drivers with involute toothing shaft (32-4) according to ISO 3019-1 – 14T – 12/24DP

Notice:

- The dimensional drawings show the front pump and the combination part.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH5-3X..."

Size	"E..U2"; "E..E4"	"R..U2"
	L1	L1
063	264	273
080	272	281
100	281	290
125	293	302
160	311	320
200	329	338
250	353	362

Pump 2: "PVV.-1X/...J15..C" 1)

Frame size	L2	L3 (P)	L4 (S)
4	186	38	126
5	216	43	153

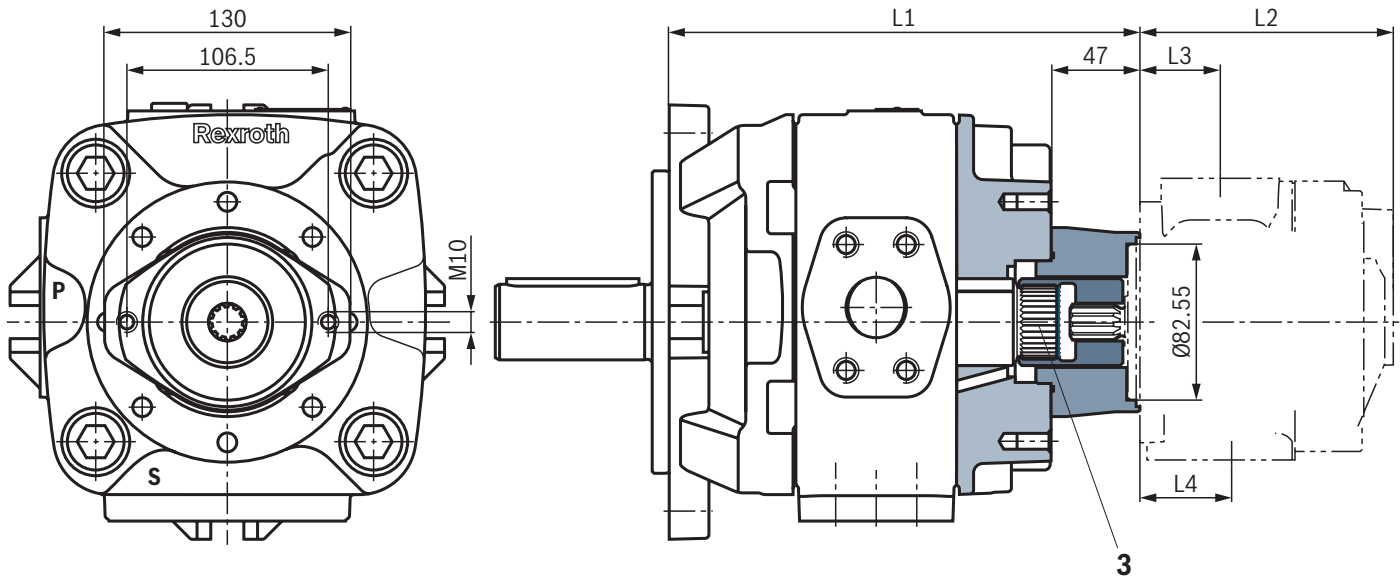
1) For further information refer to data sheet 10335

Order example:
► P2GH5-3X/160+VV4-1X/122RE11+J15U2

Dimensions: Pump combination – design "P2GH5-3X...+GZ4-1X...";
 "P2GH5-3X...+GZ5-1X..."
 (dimensions in mm)

Material number combi part: **R901238497**

– Pump 2 with shaft end (19-4) and 2-hole mounting flange (82-2) according to ISO 3019-1



3 Drivers with involute toothing shaft (19-4) according to ISO 3019-1 – 11T – 16/32DP



Notice:

- The dimensional drawings show the front pump and the combination part.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH5-3X..."

Size	"RE..U2"; "RE..E4"	"R..U2"
	L1	L1
063	241	250
080	249	258
100	452	267
125	270	279
160	288	297
200	306	315
250	330	339

Pump 2: "PGZ4-1X/...RT..VU2" ¹⁾

Size	L2	L3 (P)	L4 (S)
020	116.5	42.5	42.5
032	121.5	42.5	42.5
040	125	42.5	42.5
050	129	42.5	42.5
063	134	42.5	42.5
080	142	42.5	42.5

Pump 2: "PGZ5-1X/...RT..VU2" ¹⁾

Size	L2	L3 (P)	L4 (S)
063	134	42.5	48.5
080	142	42.5	48.5
100	150.5	42.5	48.5
140	163	42.5	48.5

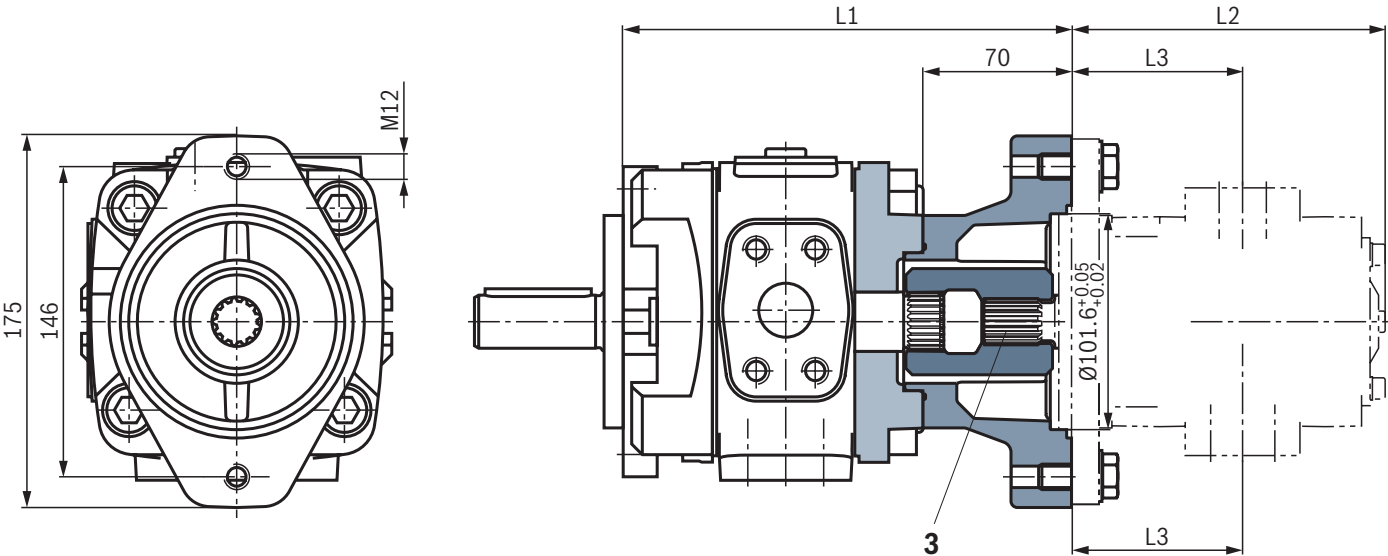
¹⁾ For further information refer to data sheet 10545

Order examples:

- P2GH5-3X/080+GZ4-1X/050REVE4
- P2GH5-3X/160+GZ5-1X/080REVE4

Dimensions: Pump combination – design "P2GH4-3X...+GF3-3X...";
"P2GH4-3X...+VV1-1X"; "P2GH4-3X...+V2-1X..."
(dimensions in mm)

Material number combi part: **R901155287**
– Pump 2 with shaft end (22-4) and 2-hole mounting flange (101-2) according to ISO 3019-1



3 Drivers with involute toothing shaft (22-4) according to ISO 3019-1 – 13T –16/32DP

Notice:

- ▶ The dimensional drawings show the front pump and the combination part.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH4-3X..."

Size	L1
020	199
025	204
032	211
040	218
050	228

Pump 2: "PGF3-3X/...J...U2" ¹⁾

Size	L2	L3 (P)	L4 (S)
020	144.5	79.5	79.5
025	150.5	82.5	82.5
032	159.5	87	87
040	169.5	92	92

Pump 2: "PVV.-1X/...J15..B" ²⁾

Frame size	L2	L3 (P)	L4 (S)
1	156	133	63.5
2	163	38	120.5

¹⁾ For further information refer to data sheet 10213
²⁾ For further information refer to data sheet 10335

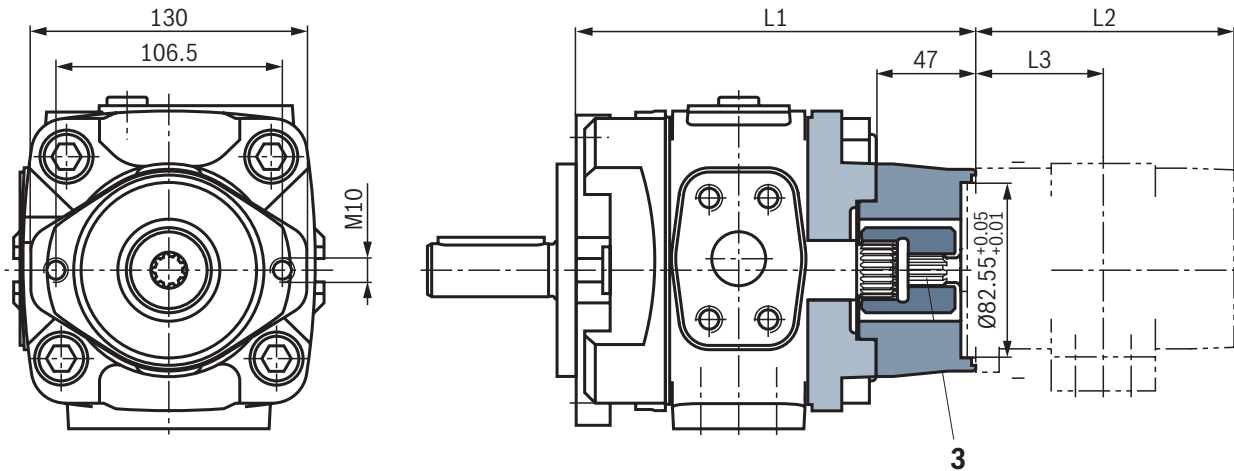
▶ **Order examples:**

- ▶ P2GH4-3X/050+GF3-3X/020REVE4
- ▶ P2GH4-3X/050+VV1-1X/027REVE4

Dimensions: Pump combination – design "P2GH4-3X...+GH2-2X...";
 "P2GH4-3X...+GH3-2X..."; "P2GH4-3X...+GF2-2X..."; "P2GH4-3X...+AZPF-1X..."
 (dimensions in mm)

Material number combi part: **R901155288**

– Pump 2 with shaft end (16-4) and 2-hole mounting flange (82-2) according to ISO 3019-1



- 3 Drive with involute toothing shaft (16-4) according to ISO 3019-1 – 9T – 16/32DP



Notice:

- The dimensional drawings show the front pump and the combination part.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH4-3X..."

Size	L1
020	176
025	181
032	188
040	195
050	205

Pump 2: "PGH2-2X/...R...U2" ¹⁾

Frame size	L2	L3
005	110	54
006	112.5	55.5
008	116	57

Pump 2: "PGH3-2X/...R...U2" ¹⁾

Frame size	L2	L3
011	121.5	60
013	126.5	62.5
016	131.5	65

¹⁾ For further information refer to data sheet 10223

²⁾ For further information refer to data sheet 10213

³⁾ For further information refer to data sheet 10089

Pump 2: "PGF2-2X/...J...U2" ²⁾

Size	L2	L3
006	116	65
008	119.5	67
011	125	69.5
013	130	72
016	135	74.5
019	141	77.5
022	147	80.5

Pump 2: "AZPF-1X/...RR..." ³⁾

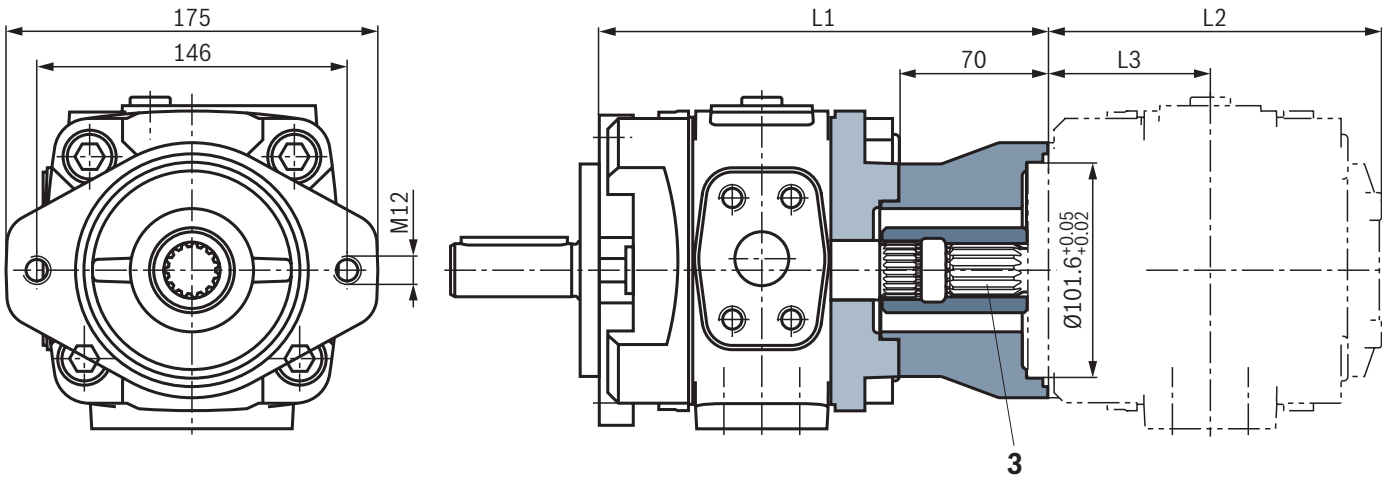
Size	L2	L3
004	85	40
005	87.5	41
008	91.5	43
011	96.5	47
014	101.5	47.5
016	105	47.5
019	110	47.5
022	115.5	55

Order examples:

- P2GH4-3X/040+GF2-2X/016RRVU2
- P2GH4-3X/050+GH2-2X/006REVU2
- P2GH4-3X/040+GH3-2X/016REVE4
- P2GH4-3X/063+AZPF-12/016REVE4

Dimensions: Pump combination – version "P2GH4-3X...+GH4-3X..."
(dimensions in mm)

(Material number combi part: **R901155289**)
– Pump 2 with shaft end (25-4) and 2-hole mounting flange (101-2) according to ISO 3019-1



3 Drivers with involute toothing shaft (25-4) according to ISO 3019-1 – 15T – 16/32DP



Notice:

- The dimensional drawings show the front pump and the combination part.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH4-3X..."

Size	L1
020	199
025	204
032	211
040	218
050	228

Pump 2: "PGH4-3X/...R...U2"

Size	L2	L3
020	145	70.5
025	150	73
032	157	76.5
040	164	80
050	174	85

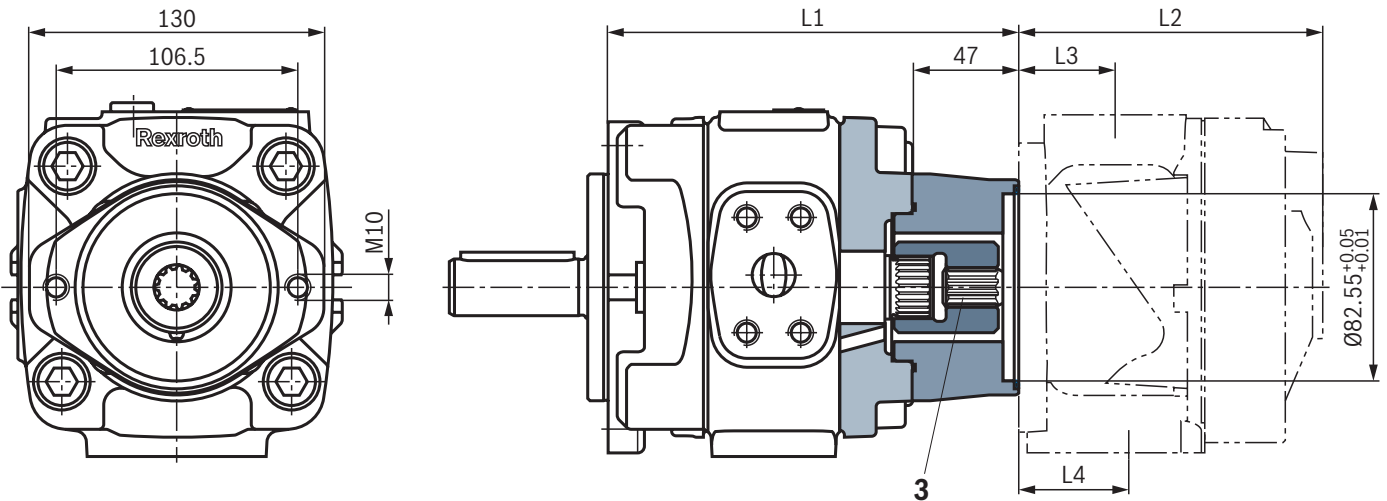
Order examples:

- P2GH4-3X/050+GH4-3X/040REVE4
- P2GH4-3X/050+GH4-3X/025REVU2

Dimensions: Pump combination – design "P2GH4-3X...+GZ4-1X...";
 "P2GH4-3X...+GZ5-1X..."
 (dimensions in mm)

Material number combi part: **R901253382**

– Pump 2 with shaft end (19-4) and 2-hole mounting flange (82-2) according to ISO 3019-1



3 Drivers with involute toothing shaft (19-4) according to ISO 3019-1 – 11T – 16/32DP



Notice:

- The dimensional drawings show the front pump and the combination part.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH4-3X..."

Size	L1
020	176
025	181
032	188
040	195
050	205

Pump 2: "PGZ5-1X/...RT..VU2" ¹⁾

Size	L2	L3 (P)	L4 (S)
063	134	42.5	48.5
080	142	42.5	48.5
100	150.5	42.5	48.5
140	163	42.5	48.5

¹⁾ For further information refer to data sheet 10545

Pump 2: "PGZ4-1X/...RT..VU2" ¹⁾

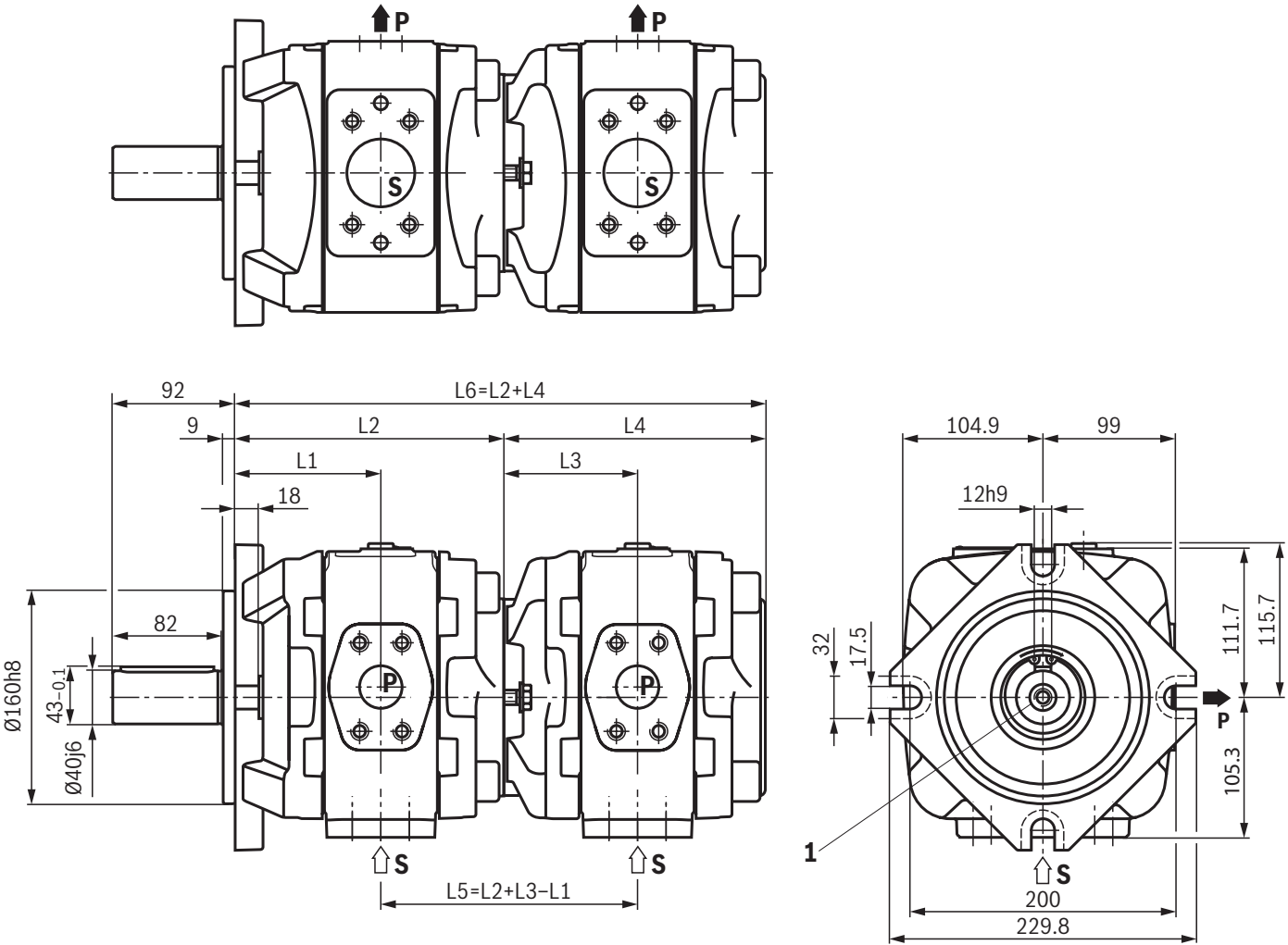
Size	L2	L3 (P)	L4 (S)
020	116.5	42.5	42.5
032	121.5	42.5	42.5
040	125	42.5	42.5
050	129	42.5	42.5
063	134	42.5	42.5
080	142	42.5	42.5

Order examples:

- P2GH4-3X/050+GZ4-1X/050REVE4
- P2GH5-3X/063+GZ5-1X/063REVE4

Dimensions: Double pump – version "PGH55-3X/.R-.RE.E4" (clockwise)
(dimensions in mm)

Shaft end "E" – cylindrical with fitting key according to ISO 3019-2, E40N
Attachment "E4" – 4-hole mounting flange according to ISO 3019-2, 160B4SW



1 DIN 332-DS M12

Notice:

- Compact design; shortened length of an assembly compared to the standard combination.
- For further information, see "Ordering codes double pump PGH55" page 5.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH55-3X/.R-.REVE4"

Size	L1	L2
063	105.5	194
080	109.5	202
100	114	211
125	120	223
160	129	241
200	138	259
250	150	283

Pump 2: "PGH55-3X/.R-.REVE4"

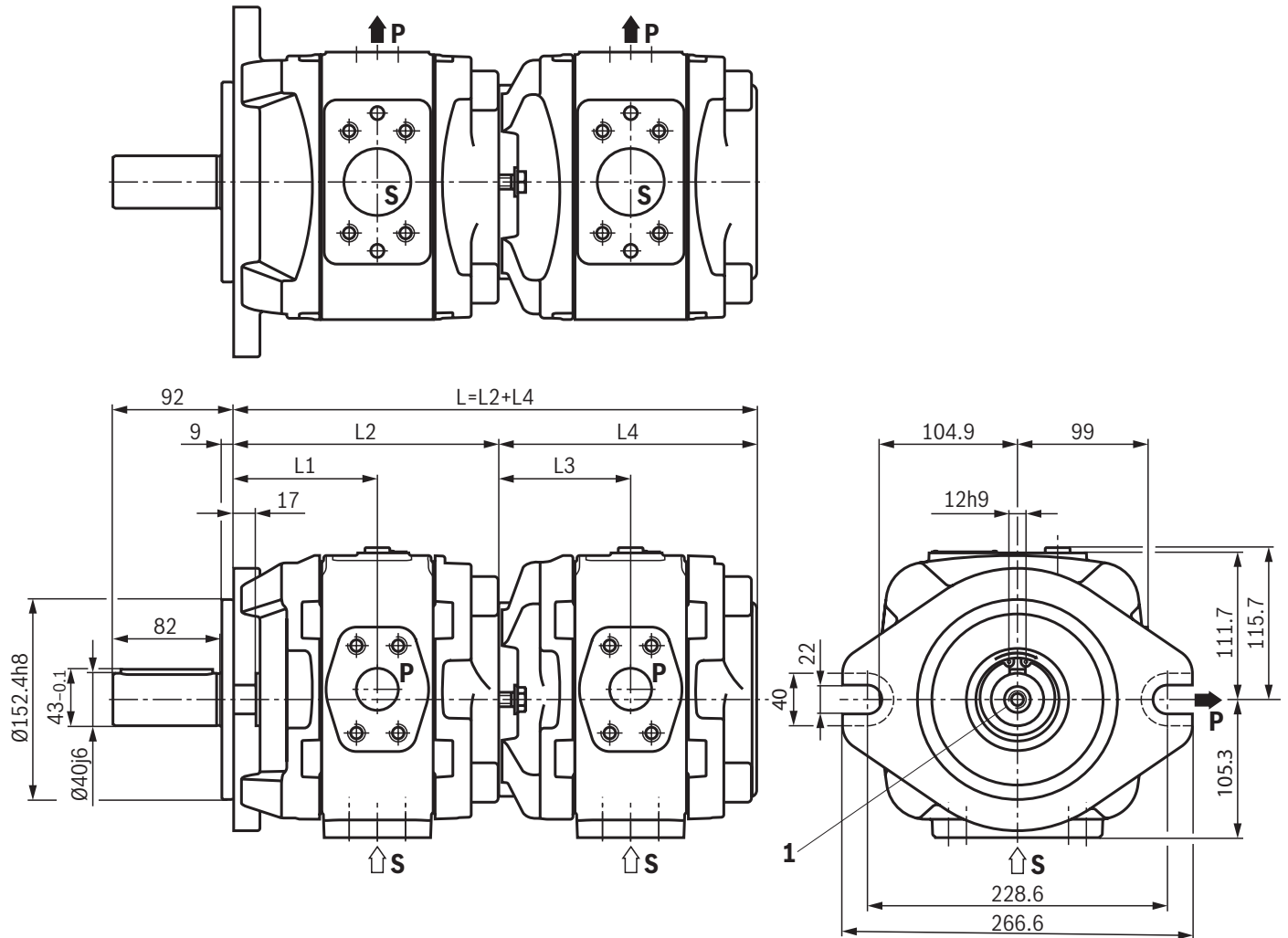
Size	L3	L4
063	96.5	188.5
080	100.5	196.5
100	105	205.5
125	111	217.5

Order example:
► PGH55-3X / 080R-080REVE4

Dimensions: Double pump – version "PGH55-3X/.R-.RE.U2" (clockwise)
(dimensions in mm)

Shaft end "E" – cylindrical with fitting key according to ISO 3019-2, E40N

Attachment "U2" – 2-hole mounting flange according to ISO 3019-1, 152-2 (SAE D)



1 DIN 332-DS M12



Notice:

- For further information, see "Ordering codes double pump PGH55" page 5.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH55-3X/.R-.REVU2"

Size	L1	L2
063	105.5	194
080	109.5	202
100	114	211
125	120	223
160	129	241
200	138	259
250	150	283

Pump 2: "PGH55-3X/.R-.REVU2"

Size	L3	L4
063	96.5	188.5
080	100.5	196.5
100	105	205.5
125	111	217.5

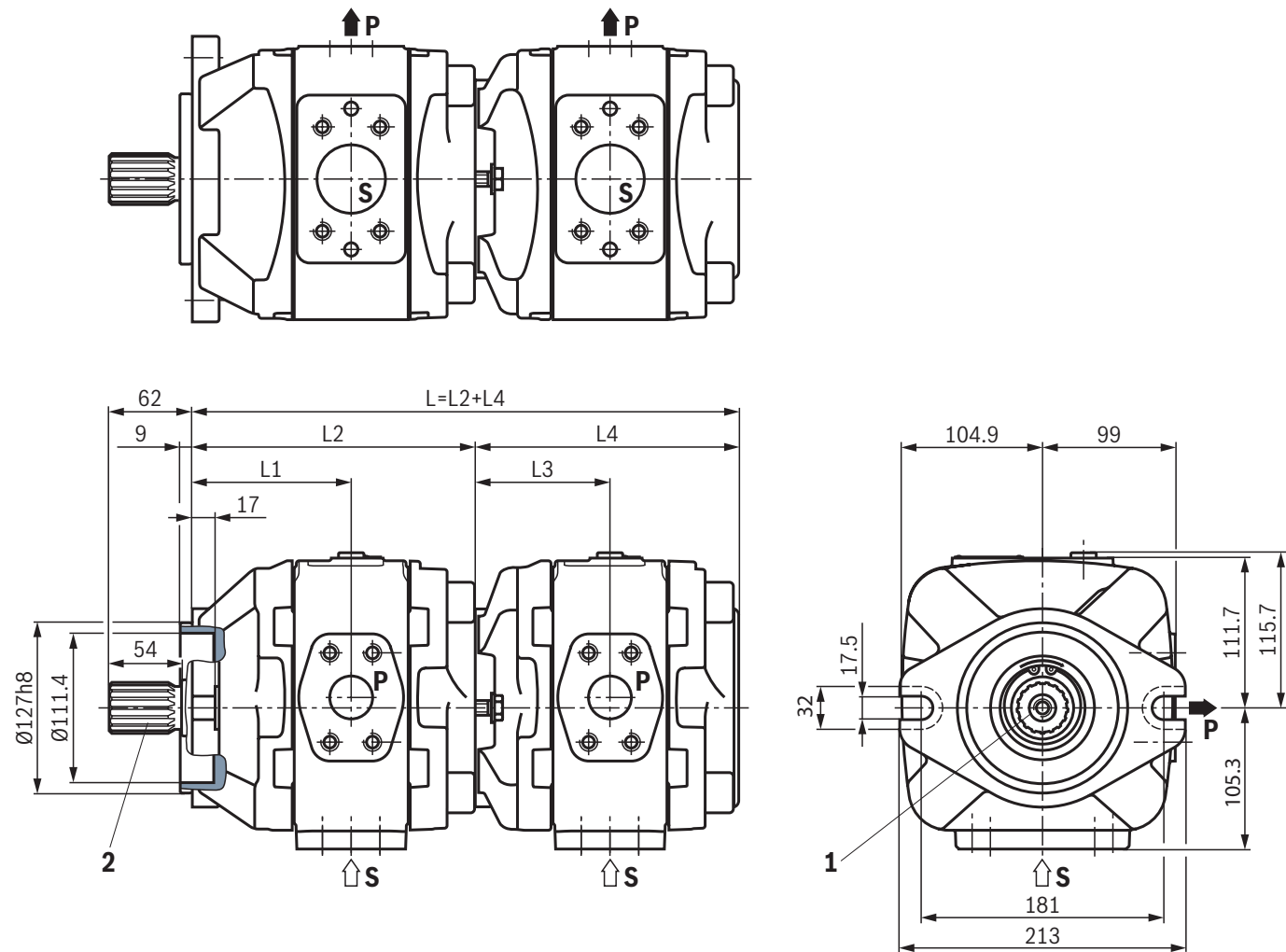
Order example

- PGH55-3X / 080R-080REVU2

Dimensions: Double pump – version "PGH55-3X/.R-.RR.U2" (clockwise)
(dimensions in mm)

Shaft end "R" – geared according to ISO 3019-1, 38-4

Attachment "U2" – 2-hole mounting flange according to ISO 3019-1, 127-2 (SAE C)



- 1 DIN 332-DS M12
- 2 Involute toothing 17T – 12/24DP

Notice:

- For further information, see "Ordering codes double pump PGH55" page 5.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH55-3X/.R-.RRVU2"

Size	L1	L2
063	114.5	203
080	118.5	211
100	123	220
125	129	232
160	138	250
200	147	268
250	159	292

Pump 2: "PGH55-3X/.R-.RRVU2"

Size	L3	L4
063	96.5	188.5
080	100.5	196.5
100	105	205.5
125	111	217.5

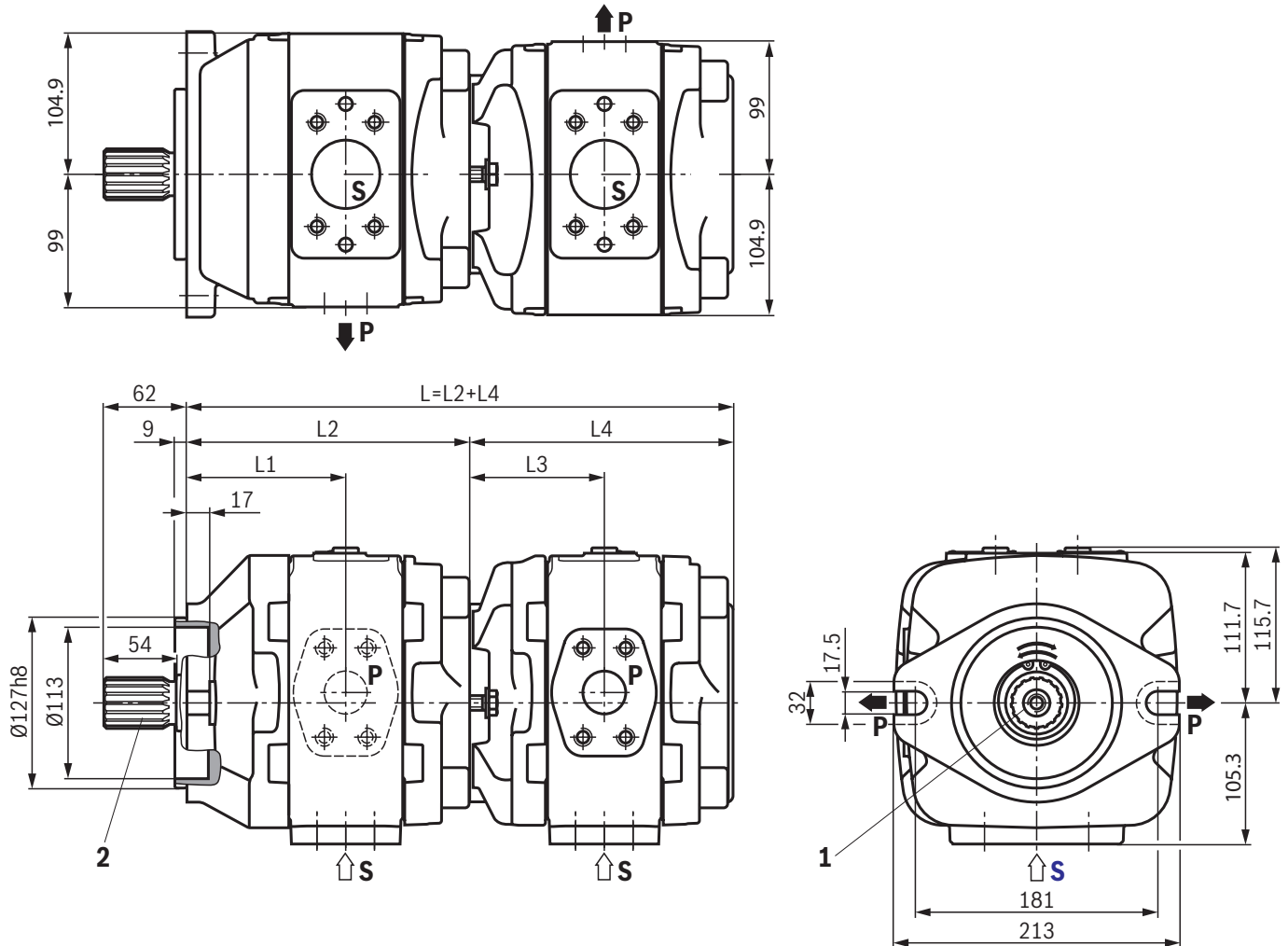
Order example:

- PGH55-3X / 080R-080RRVU2

Dimensions: Double pump – version "PGH55-3X/.L.RRVU2" (alternating mode)
(dimensions in mm)

Shaft end "R" – geared according to ISO 3019-1, 38-4

Attachment "U2" – 2-hole mounting flange according to ISO 3019-1, 127-2 (SAE C)



1 DIN 332-DS M12

2 Involute toothing 17T – 12/24DP

Notice:

- Alternating mode; in left-right combination, e.g. for driving synchronous cylinders.
- For further information, see "Ordering codes double pump PGH55" page 5.
- The dimensions are nominal dimensions which are subject to tolerances.

Pump 1: "PGH55-3X/.L.RRVU2"

Size	L1	L2
063	114.5	203
080	118.5	211
100	123	220
125	129	232
160	138	250
200	147	268
250	159	292

Pump 2: "PGH55-3X/.L.RRVU2"

Size	L3	L4
063	96.5	188.5
080	100.5	196.5
100	105	205.5
125	111	217.5

Order example:

- PGH55-3X/080L-080RRVU2

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).

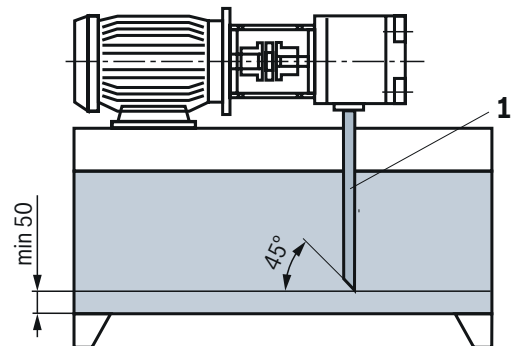
It is on the system side to ensure that the pressure at the suction port S is never higher than at the pressure connection P.

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

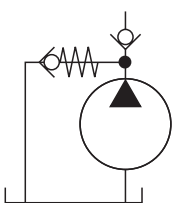
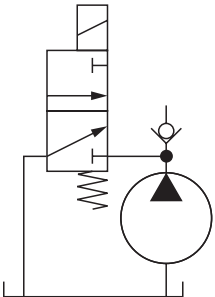
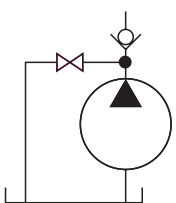
In the variable-speed drive, the pump can temporarily also be operated below the specified minimum speed, in the pressure holding function. The holding time and the speed necessary for that purpose results dependent on the operating viscosity and the pressure level. For the design, please contact Bosch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

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

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

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.

Accessories

Pump safety block

To limit the operating pressure and to ensure depressurized circulation of the pump, we recommend our pump safety blocks type DBA according to data sheet 25891.

However, automatic bleeding during commissioning is not possible using pump safety blocks of type DBA. For this purpose, we recommend separate manual bleeding, e.g. via the pump's measuring port (see page 22).

SAE connection flanges

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

Miscellaneous accessories

To set-up the internal gear pump type PGH.-3X on electric motors, we recommend selecting the pump carriers according to AB 41-20 and the torsionally flexible couplings according to AB 33-22.

Further information

- ▶ Hydraulic fluids on mineral oil basis
- ▶ Environmentally compatible hydraulic fluids
- ▶ Pump safety block
- ▶ Information on available spare parts

Data sheet 90220

Data sheet 90221

Data sheet 25891

www.boschrexroth.com/spc

Notes

Notes

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