RE 10 223/07.99

Replaces: 01.98

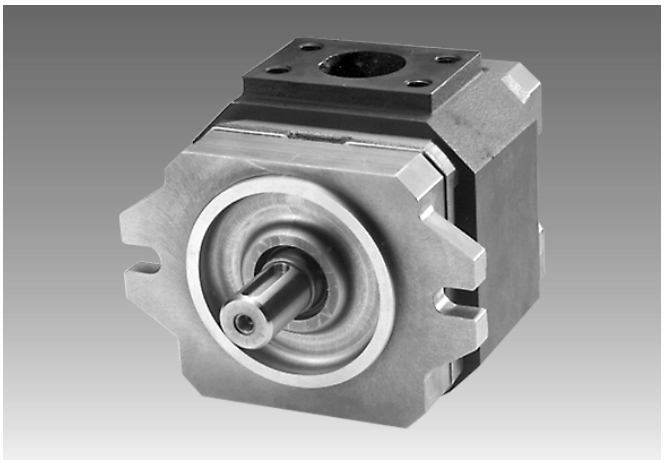
Internal gear pump
Type PGH
Fixed displacement

Frame sizes 2, 3, 4 and 5

Series 2X

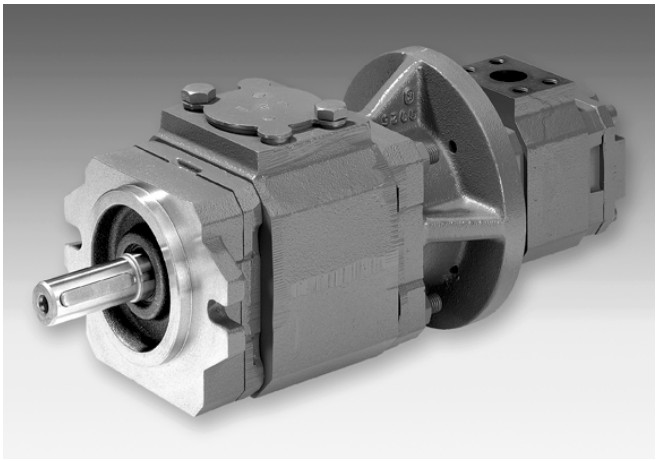
Maximum operating pressure 350 bar

Maximum displacement 6 to 250 cm^3



DR 67180-3/94

Internal gear pump type PGH with SAE 2-hole mounting flange



H/A/D 6194/99

Double pump PGH4 + PGH3

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Features

- Fixed displacement
- Low operating noise
- Low pulsation of the oil flow
- High efficiency even at low speed and viscosity due to sealing gap compensation
- Suitable for a wide range of viscosities and speeds
- All frame and nominal sizes can be freely combined
- Can be combined with PGF internal gear pumps, axial piston pumps and vane pumps
- Suitable for operation with HFC fluids

Ordering details

PG	H	–2X/				V		*

Series
High pressure pump **= H**

Frame size
FS 2 **= 2**
FS 3 **= 3**
FS 4 **= 4**
FS 5 **= 5**

Series: Series 20 to 29 **= 2X**
(20 to 29: Unchanged installation and connection dimensions)

Frame size	Size	Displacement per revolution	
FS 2	6.3	6.5 cm³	**= 006**
	8.0	8.2 cm³	**= 008**
FS 3	11	11.0 cm³	**= 011**
	13	13.3 cm³	**= 013**
	16	16.0 cm³	**= 016**
FS 4	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**
	63	65.50 cm³	**= 063**
	80	80.30 cm³	**= 080**
	100	101.40 cm³	**= 100**
FS 5	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 plain text

Mounting flange – centring
U2 [1] **=** SAE 2-hole mounting flange
E4 [2] **=** ISO 4-hole mounting flange
to ISO 3019/2 and VDMA 24 560 part 1

V = **FKM seals**

Suction and pressure ports to SAE
07 = Pressure port 3000 PSI standard pressure series
11 = Pressure port 6000 PSI high pressure series

Shaft version
E = Cylindrical
R = SAE involute splined shaft

Direction of rotation (viewed on shaft end)
R = Clockwise
L = Anti-clockwise

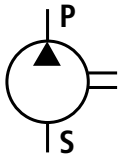
[1] in conjunction with cylindrical and splined shafts

[2] only in conjunction with cylindrical shaft (to VDMA), only frame sizes 4 and 5, only clockwise direction of rotation

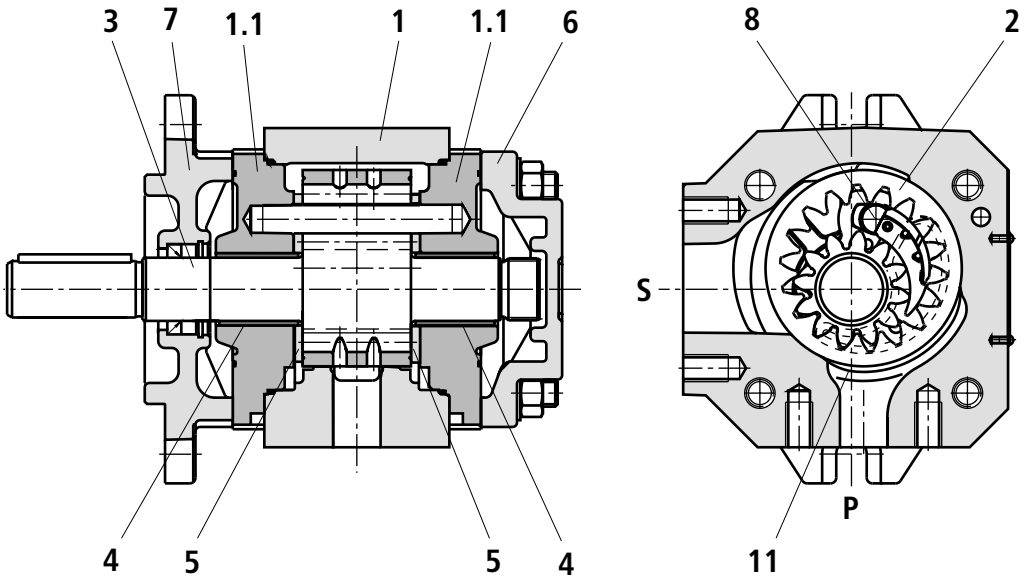
Order example: **PGH4-2X/032RE11VU2**
Material number: **00932141**

⚠ **Attention!** Not all variants according to the type code are possible! Please choose the required pump on the basis of the selection table (pages 12 to 17) or after consultation of Mannesmann Rexroth.

Symbol



Function, section



Design

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

They basically consist of housing (1), bearing cover (1.1), hollow gear (2), pinion shaft (3), plain bearings (4), axial plates (5), blanking plate (6), mounting flange (7) and stop pin (8) as well as segment assembly (9), which comprises segment (9.1), segment carrier (9.2) and sealing rolls (9.3).

Suction and displacement process

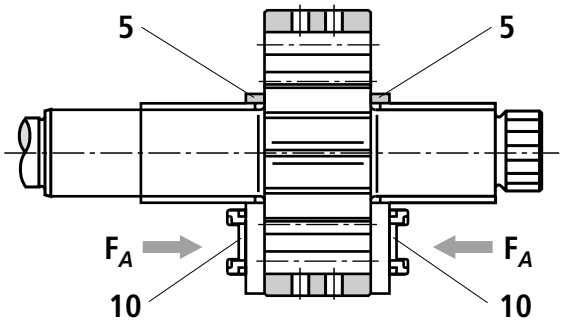
The pinion shaft (3) which is carried in hydrodynamic bearings drives the internally geared hollow gear (2) in the direction of rotation indicated.

During rotation, the volume increases in the suction area at an angle of approx. 90 °. A vacuum pressure develops and fluid flows into the chambers.

The sickle-shaped segment assembly (9) separates the suction chamber from the pressure chamber. Within the pressure chamber, the teeth of pinion shaft (3) mesh with the teeth of hollow gear (2). The fluid is displaced via pressure channel (P).

Axial compensation

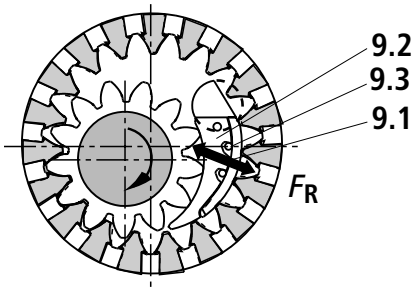
Axial compensation force F_A acts within the pressure chamber and is generated by the pressure field (10) in the axial plates (5).



The axial longitudinal gaps between rotating and fixed parts are therefore extremely small, which ensures optimum axial sealing of the pressure chamber.

Radial compensation

Radial compensation force F_R acts on segment (9.1) and segment carrier (9.2).



Depending on the operating pressure, the two segment elements (9.1) and (9.2) are pressed against the crowns of the teeth on pinion shaft (3) and hollow gear (2).

The area ratios and position of the sealing rolls (9.3) between the segment and segment carrier are designed so that a largely leakage-gap-free sealing is achieved between the internal gear (2), segment (9) and pinion shaft (3).

Spring elements under sealing rolls (9.3) ensure adequate contact pressure, even at very low pressures.

Hydrodynamic and hydrostatic bearings

The forces acting on pinion shaft (3) are absorbed by hydro-dynamically lubricated radial plain bearings (4); those acting on hollow gear (2) are absorbed by hydrostatic bearings (11).

Toothing

Toothing is of the involute type. Its greater meshing length results in lower displacement and pressure pulsations; this lower pulsation rate contributes significantly to low-noise operation.

Technical data

General									
Design			Internal gear pump, gap-compensated						
Type			PGH						
Mounting type			SAE 2-hole flange to ISO 3019/1 or 4-hole flange to VDMA 24 560 part 1 and ISO 3019/2						
Type of connection, pipe connection			Flange connection						
Installation position			Optional						
Shaft loading			Radial and axial forces (e.g. belt pulley) **only** after consultation						
Direction of rotation (viewed to shaft end)			Clockwise or anti-clockwise – **not** alternating!						
Frame size			**FS 2**		**FS 3**				
Nominal size	Size		6.3	8.0	11	13	16		
Weight	m	kg	4.4	4.6	4.8	5	5.3		
Speed range	n_{min}	min^{-1}	600						
	n_{max}	min^{-1}	3000						
Displacement	V	cm^3	6.5	8.2	11.0	13.3	16.0		
Flow [1]	q_V	L/min	9.4	11.9	16	19.3	23.2		
Operating pressure, absolute									
Inlet	p	bar	0.8 to 2 (briefly on start-up 0.6 bar)						
Outlet, continuous	p_{max}	bar							
HLP fluid			315						
HFC fluid			210						
intermittent [2]	p_{max}	bar							
HLP fluid [4]			350						
HFC fluid [4]			230						
Frame size			**FS 4**						
Nominal size	Size		20	25	32	40	50	63	80	100
Weight	m	kg	13.5	14	14.5	15	16	17	18,5	20
Speed range	n_{min}	min^{-1}	500	500	500	500	500	400	400	400
	n_{max}	min^{-1}	3000	3000	3000	2600	2600	2600	2200	2200
Displacement	V	cm^3	20.1	25.3	32.7	40.1	50.7	65.5	80.3	101.4
Flow [1]	q_V	L/min	28.9	36.4	46.9	57.6	73.5	94.4	115.8	146.3
Operating pressure, absolute										
Inlet	p	bar	0.8 to 2 (briefly on start-up 0.6 bar)							
Outlet, continuous	p_{max}	bar								
HLP fluid			250					210	210	160
HFC fluid			175					140	140	100
intermittent [2]	p_{max}	bar								
HLP fluid			315					250	250	210
HFC fluid [4]			210					175	175	140
Frame size			**FS 5**							
Nominal size	Size		63	80	100	125	160	200	250	
Weight	m	kg	39	40.5	42.5	45	49	52.5	57.5	
Speed range	n_{min}	min^{-1}	400	400	400	400	300	300	300	
	n_{max}	min^{-1}	2600	2200	2200	2200	1800	1800	1800	
Displacement	V	cm^3	64.7	81.4	100.2	125.3	162.8	200.4	250.5	
Flow [1]	q_V	L/min	92.6	116.9	143.8	180.7	234.9	289.1	361.4	
Operating pressure, absolute										
Inlet	p	bar	0.8 to 2 (shortly on start-up 0.6 bar)							
Outlet, continous	p_{max}	bar								
HLP fluid			250				210	160	125	
HFC fluid			175				140	100	70	
intermittent [2]	p_{max}	bar								
HLP fluid			315				250	210	160	
HFC fluid [4]			210				175	175	100	

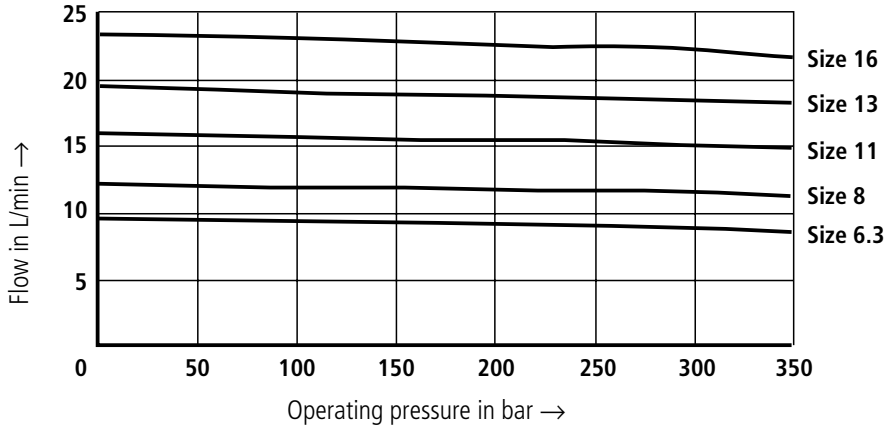
Technical data

Hydraulic fluid			HLP mineral oil to DIN 51 524 part 2 HFC watery polymer solutions to VDMA 24 317 **Please note our specifications according to data sheet RE 07 075.** **Environmentally compatible fluids on enquiry!**
Hydraulic fluid	HLP fluid	°C	– 10 to + 80; for other temperatures, please consult us
temperature range	HFC fluid	°C	– 10 to + 50; for other temperatures, please consult us
Ambient temperature range		°C	– 20 to + 60
Viscosity range [3]		mm^2/s	10 to 300; permissible start-up viscosity 2000
Degree of contamination			Max. permissible degree of hydraulic fluid contamination according to NAS 1638 class 10. We recommend a filter with a minimum retention rate of $\beta_{20} \geq 75$. To ensure a long service life, we recommend a max. permissible degree of contamination to NAS 1638 class 9. For this, we recommend a filter with a minimum retention rate of $\beta_{10} \geq 100$.

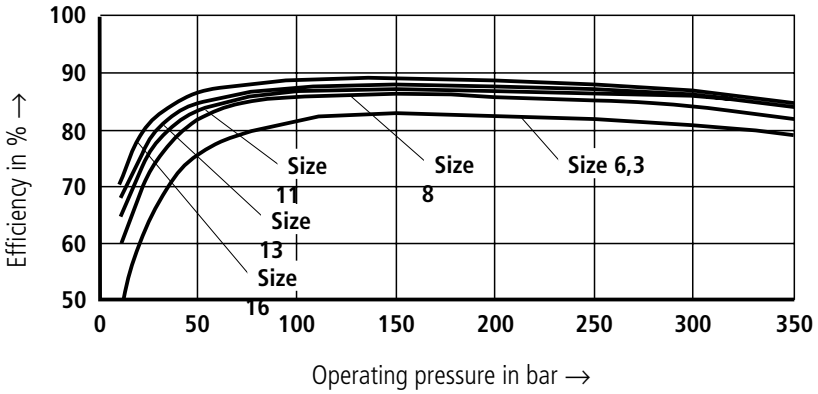
[1] measured at $n = 1450\ min^{-1}$ and $p = 10$ bar
[2] max 10 s, not exceeding 50 % of the duty cycle
[3] viscosity range for optimum working range of the pumps $\nu = 25$ to 100 mm^2/s
[4] **Attention!** This value must also **not** be exceeded by pressure peaks!

Characteristic curves – average values for frame sizes 2 and 3 (measured at n = 1450 min^{-1}; ν = 46 mm^2/s and ϑ = 50 °C)

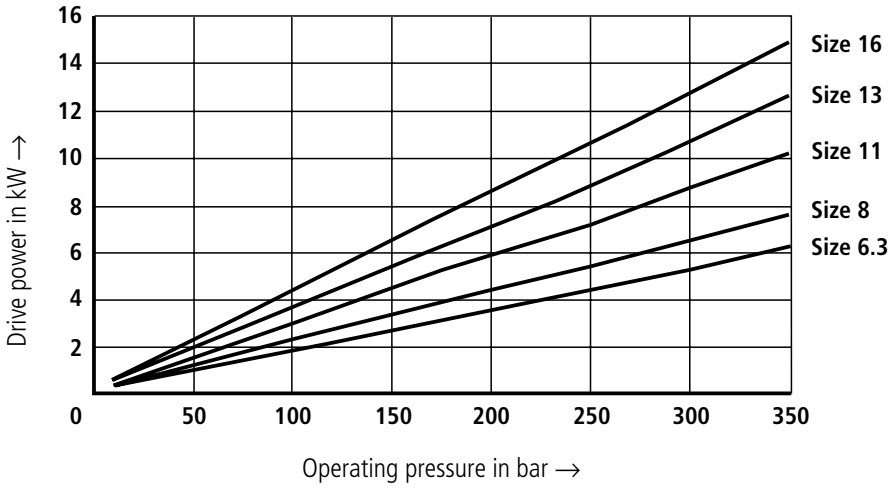
Flow



Efficiency

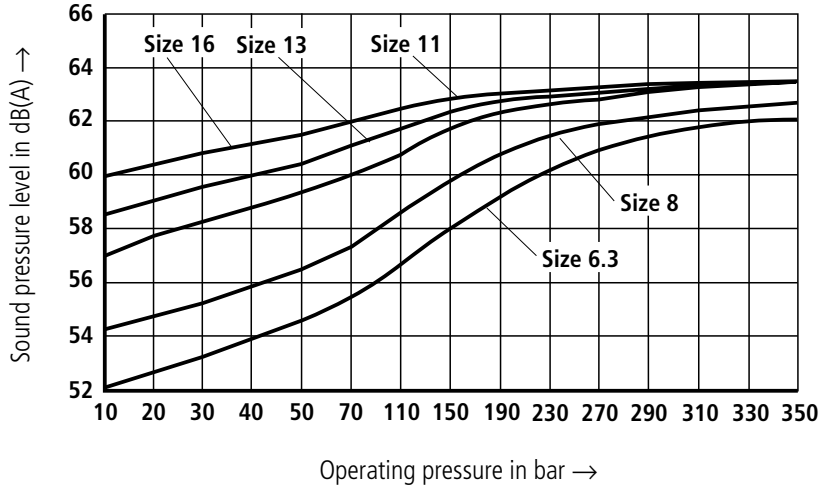


Drive power



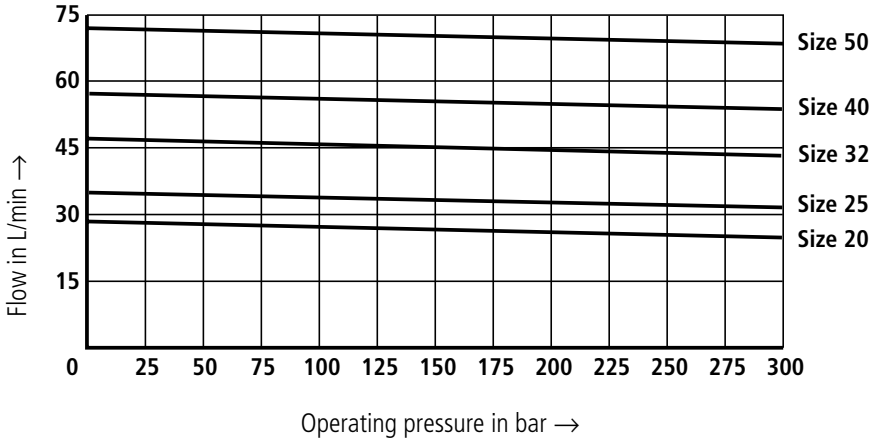
Characteristic curves – average values for frame sizes 2 and 3 (measured at $n = 1450\ min^{-1}$; $\nu = 46\ mm^2/s$ and $\vartheta = 50\ °C$)

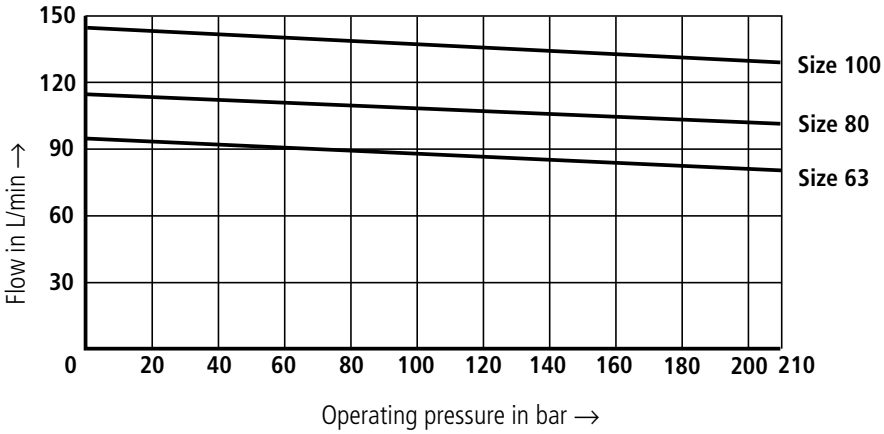
Sound pressure level



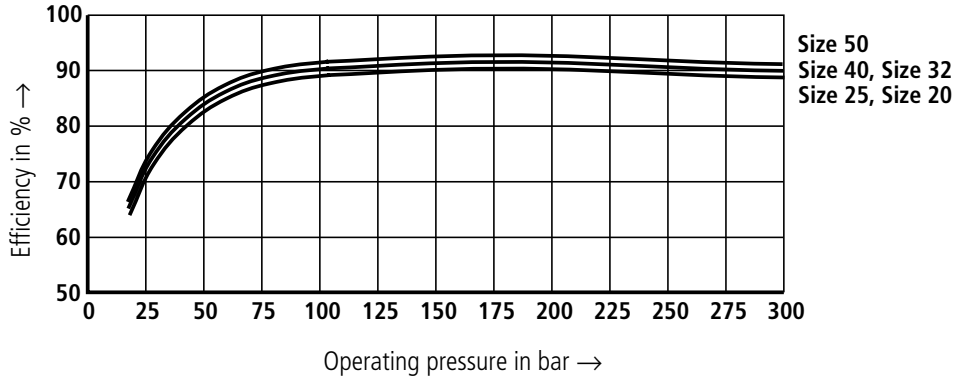
Characteristic curves – average values for frame size 4 (measured at n = 1450 min^{-1}; ν = 46 mm^2/s and ϑ = 40 °C)

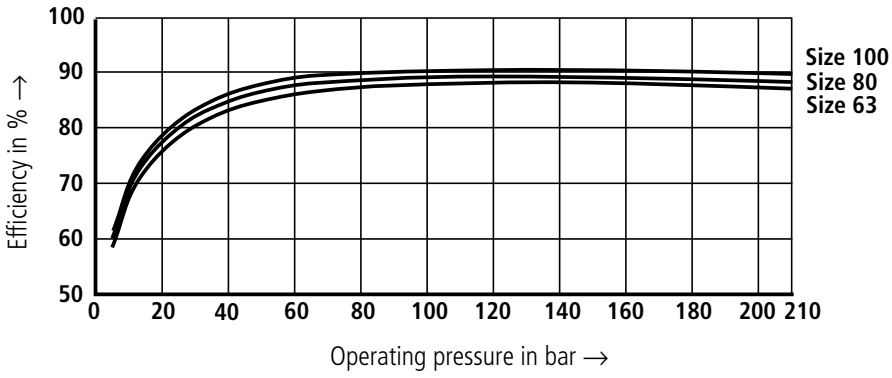
Flow





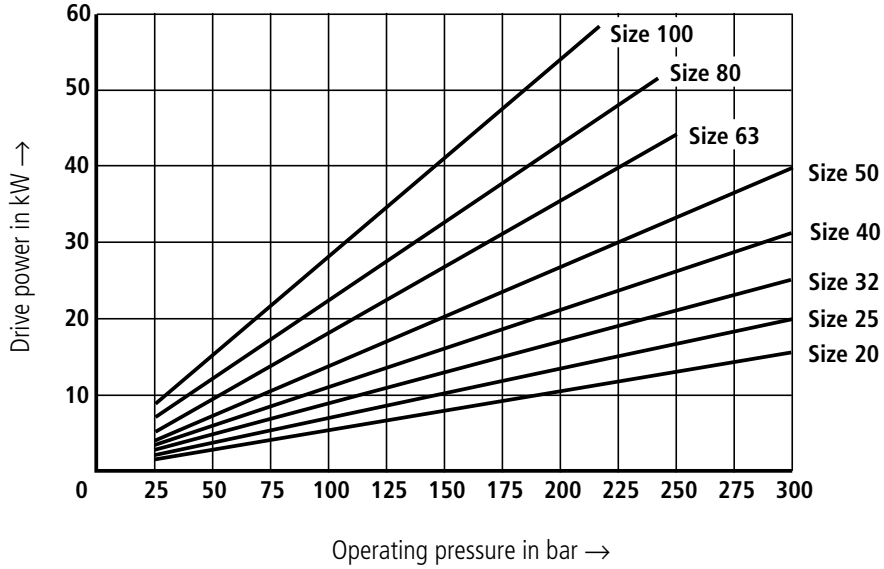
Efficiency





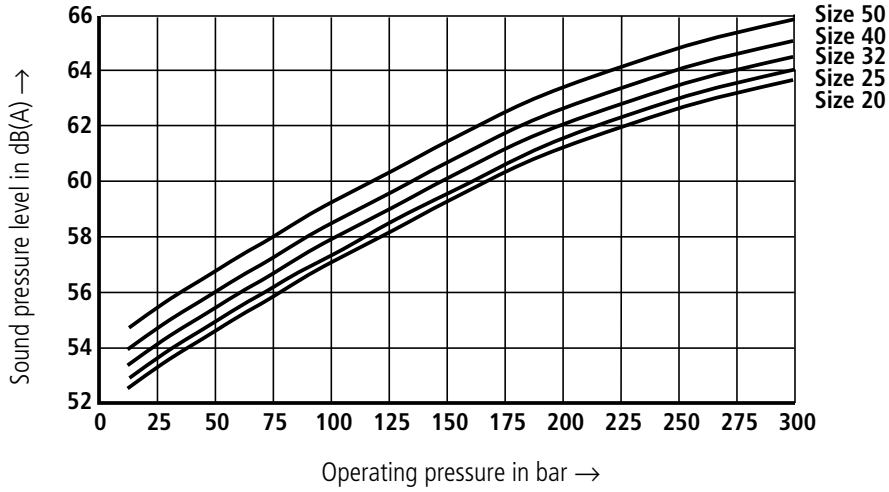
Characteristic curves – average values for frame size 4 (measured at n = 1450 min^{-1}; ν = 46 mm^2/s and ϑ = 40 °C)

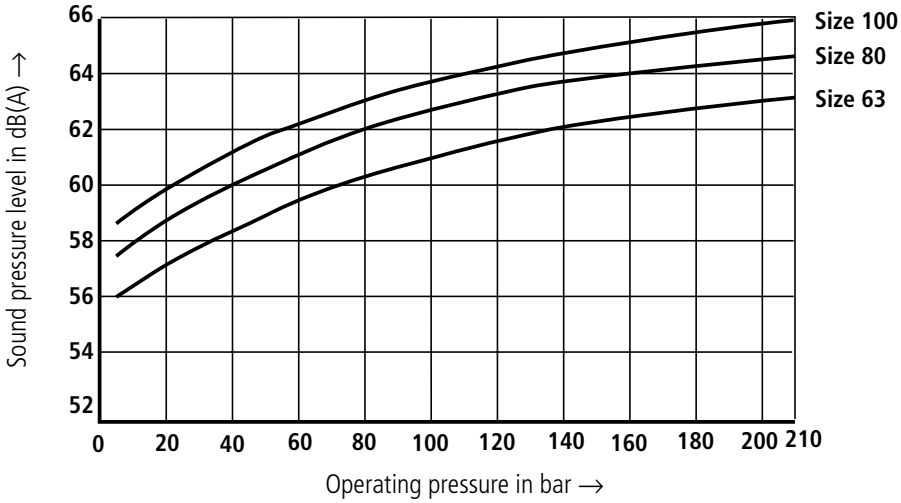
Drive power



Sound pressure level

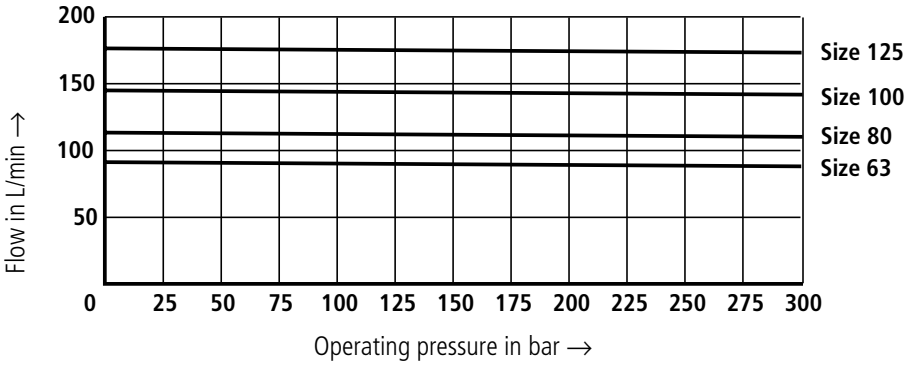
Measured in a dead anechoic room in line with DIN 45 635, page 26
Distance microphone – pumps = 1 m

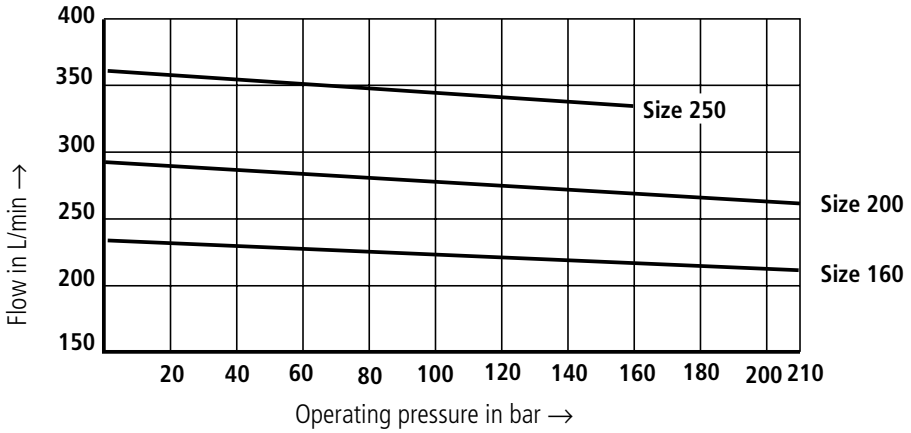




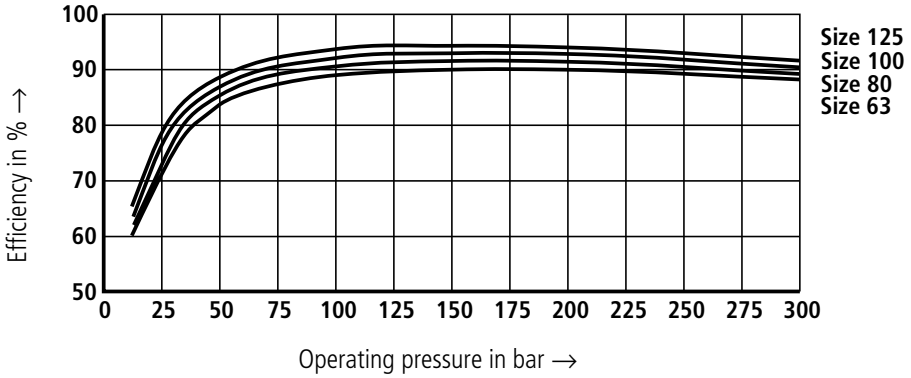
Characteristic curves – average values for frame size 5 (measured at n = 1450 min^{-1}; ν = 46 mm^2/s and ϑ = 40 °C)

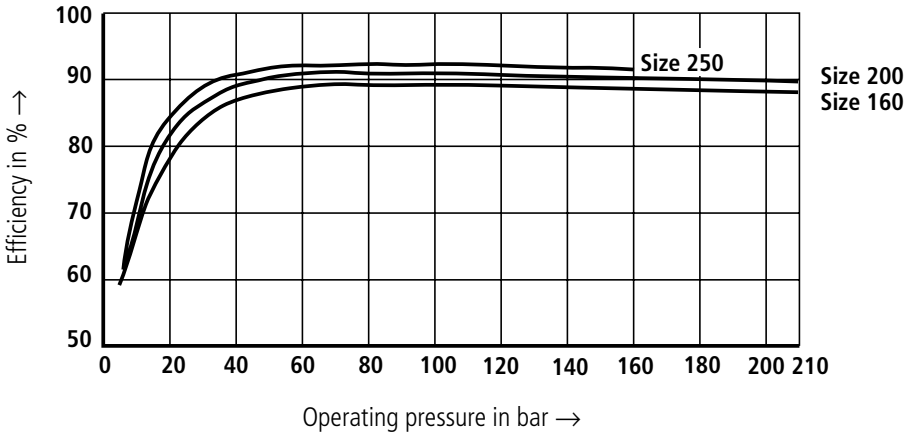
Flow





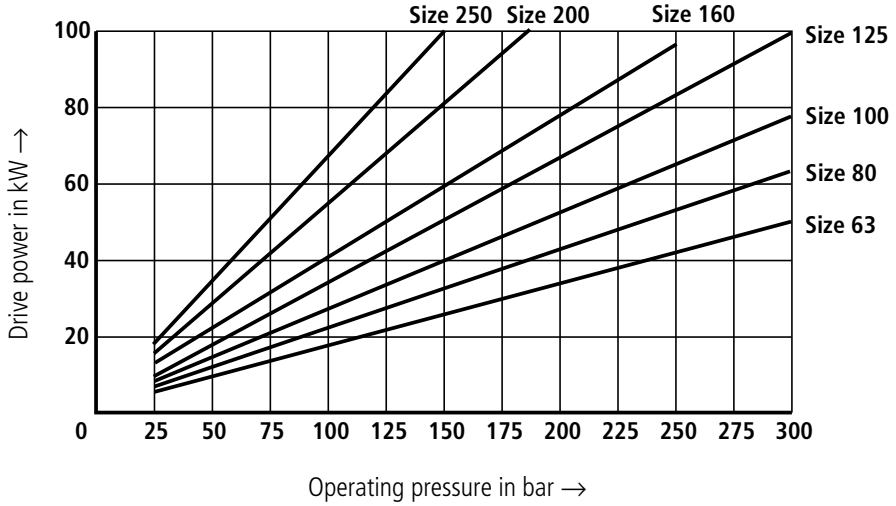
Efficiency





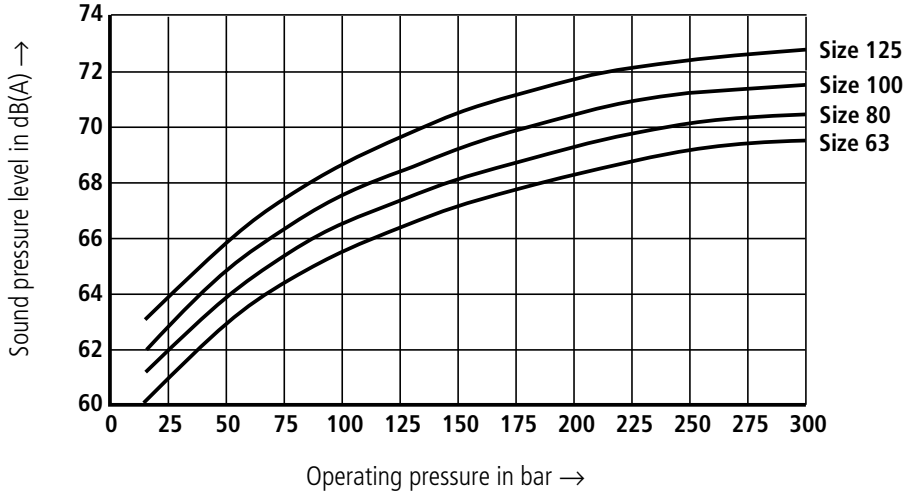
Characteristic curves – average values for frame size 5 (measured at n = 1450 min^{-1}; ν = 46 mm^2/s and ϑ = 40 °C)

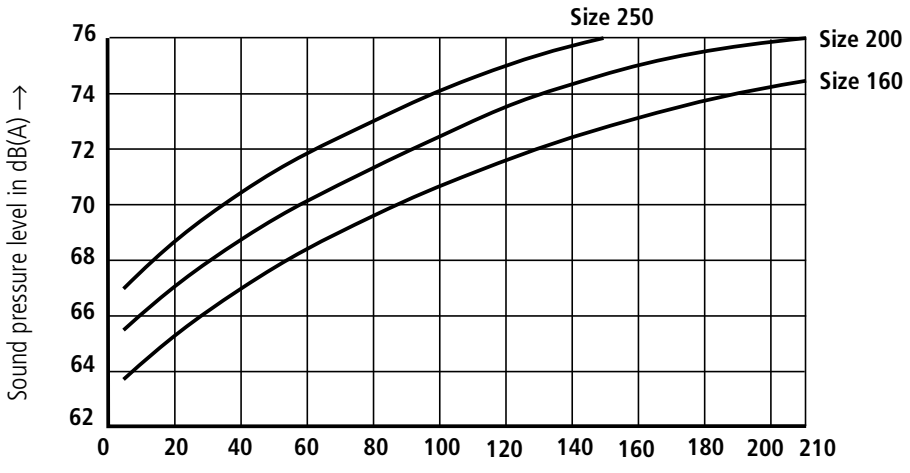
Drive power



Sound pressure level

Measured in a dead anechoic room in line with DIN 45 635, page 26
Distance microphone – pumps = 1 m





Unit dimensions of frame size 2

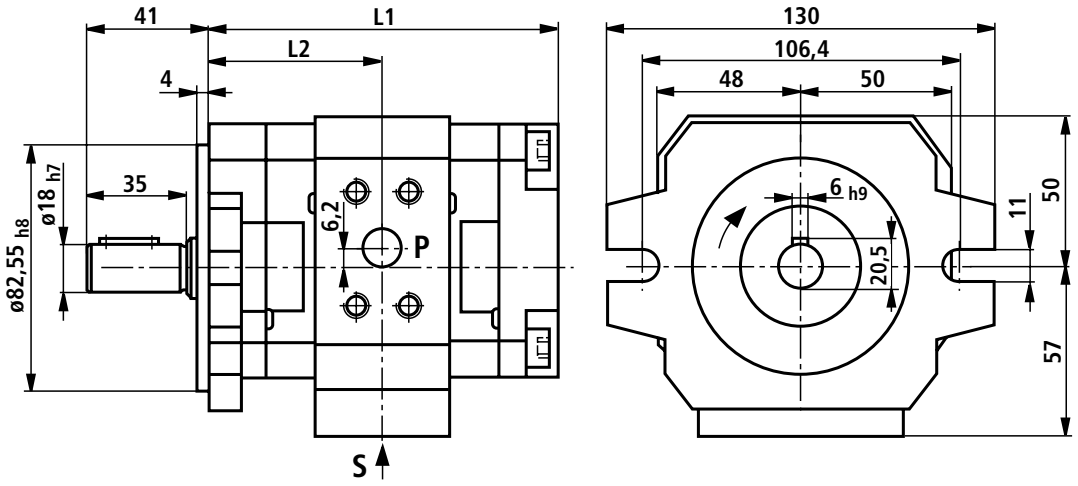
(Dimensions in mm, Δ preferred version)

PGH2-2X/...$^{R}_{L}$ E07VU2

Drive shaft cylindrical,
SAE 2-hole mounting flange

Type Size	Material no. R=clockwise rot.	L=anti-clockwise rot.	L1	L2	S	P
PGH2-2X/006..E07VU2	00951301 Δ	00961547	112.5	55.5	1/2"S[1)]	1/2"S[1)]
PGH2-2X/008..E07VU2	00951302 Δ	00961548	116	57.3	1/2"S[1)]	1/2"S[1)]

[1)] S = standard pressure series; for exact dimensions, refer to table on page 17

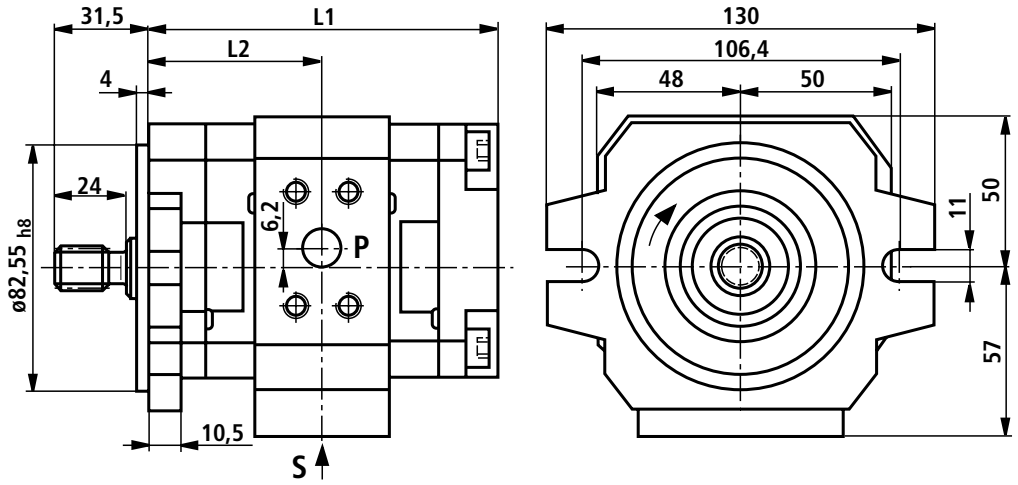


PGH2-2X/...$^{R}_{L}$ R07VU2

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

Type Size	Material no. R=clockwise rot.	L=anti-clockwise rot.	L1	L2	S	P
PGH2-2X/006..R07VU2	00961549 Δ	00961550	112.5	55.5	1/2"S[1)]	1/2"S[1)]
PGH2-2X/008..R07VU2	00961551 Δ	00961552	116	57.3	1/2"S[1)]	1/2"S[1)]

[1)] S = standard pressure series; for exact dimensions, refer to table on page 17



Unit dimensions of frame size 3

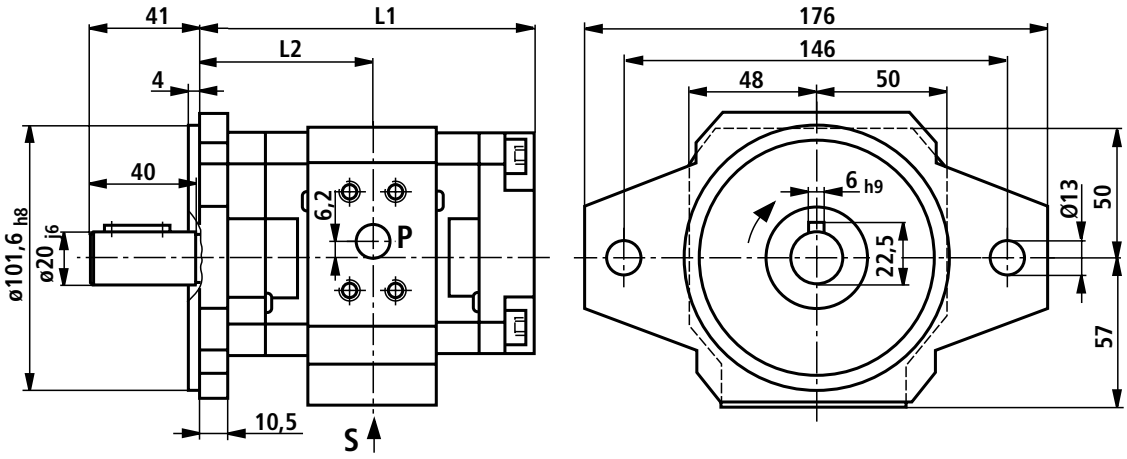
(Dimensions in mm, Δ preferred version)

PGH3-2X/...$^{R}_{L}$E07VU2

Drive shaft cylindrical,
SAE 2-hole mounting flange

Type Size	Material no. R=clockwise rot.	L=anti clockwise rot.	L1	L2	S	P
PGH3-2X/011..E07VU2	00951303 Δ	00961553	128	66.5	1"S[1)]	1/2"S[1)]
PGH3-2X/013..E07VU2	00951304 Δ	00961554	133	69	1"S[1)]	1/2"S[1)]
PGH3-2X/016..E07VU2	00951305 Δ	00961555	138	71.5	1"S[1)]	1/2"S[1)]

[1)] S = standard pressure series; for exact dimensions, refer to table on page 17

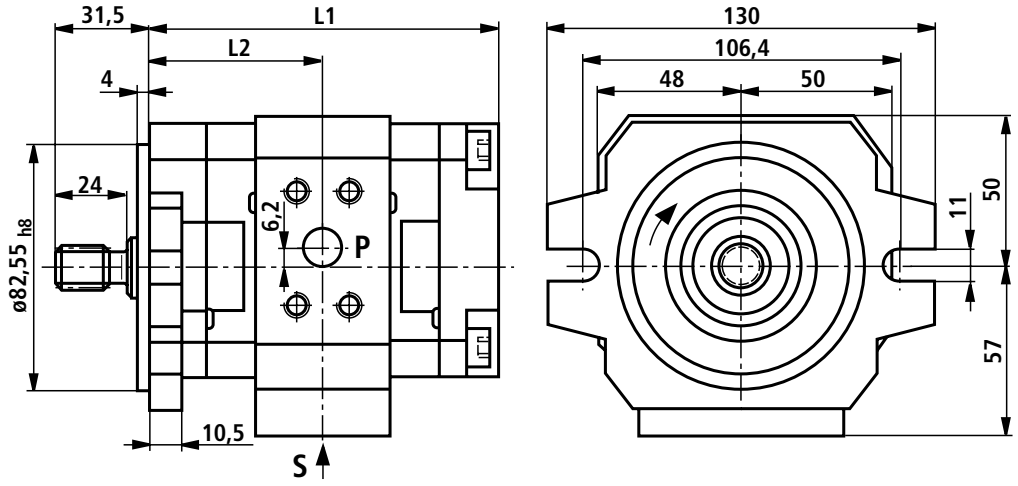


PGH3-2X/...$^{R}_{L}$R07VU2

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

Type Size	Material no. R=clockwise rot.	L=anti-clockwise rot.	L1	L2	S	P
PGH3-2X/011..R07VU2	00961556 Δ	00961559	121.5	60	1"S[1)]	1/2"S[1)]
PGH3-2X/013..R07VU2	00951557 Δ	00961560	126.5	62.5	1"S[1)]	1/2"S[1)]
PGH3-2X/016..R07VU2	00961558 Δ	00961561	131.5	65	1"S[1)]	1/2"S[1)]

[1)] S = standard pressure series; for exact dimensions, refer to table on page 17



Unit dimensions of frame size 4

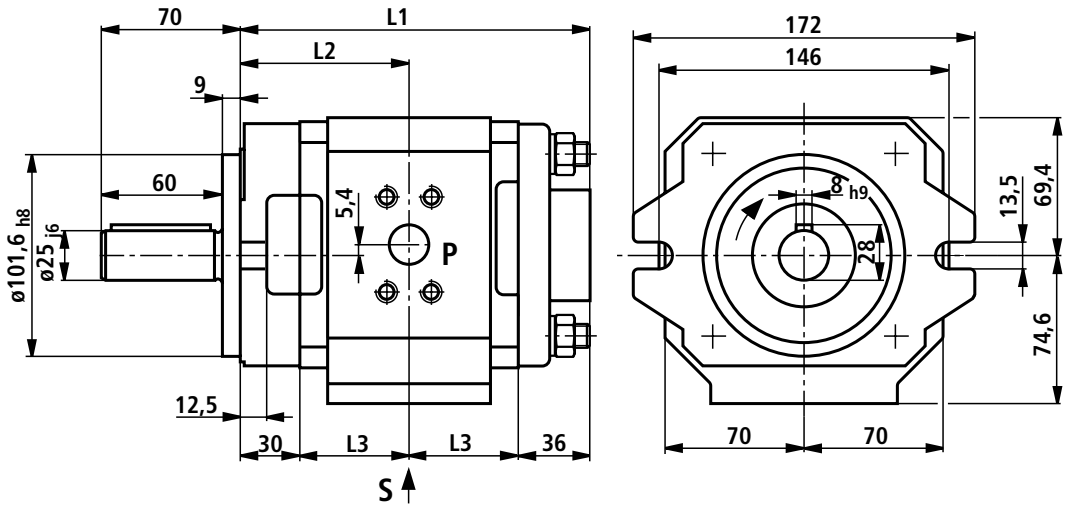
(Dimensions in mm, Δ preferred version)

PGH4-2X/...$^{R}_{L}$E...VU2

Drive shaft cylindrical,
SAE 2-hole mounting flange

Type Size	Material no. R=clockwise rot.	Material no. L=anti-clockwise rot.	L1	L2	L3	S	P
PGH4-2X/020..E11VU2	00932139 Δ	00086338	147	70.5	40.5	1 1/4"S[1)]	3/4"H[1)]
PGH4-2X/025..E11VU2	00932140 Δ	00086339	152	73	43	1 1/4"S[1)]	3/4"H[1)]
PGH4-2X/032..E11VU2	00932141 Δ	00086340	159	76.5	46.5	1 1/2"S[1)]	3/4"H[1)]
PGH4-2X/040..E11VU2	00086321 Δ	00086341	166	80	50	1 1/2"S[1)]	3/4"H[1)]
PGH4-2X/050..E11VU2	00932159 Δ	00086342	176	85	55	1 1/2"S[1)]	1"H[1)]
PGH4-2X/063..E07VU2	00086325 Δ	00086344	190	92	62	2"S[1)]	1 1/4"S[1)]
PGH4-2X/080..E07VU2	00086326 Δ	00086345	204	99	69	2"S[1)]	1 1/2"S[1)]
PGH4-2X/100..E07VU2	00932160 Δ	00086346	224	109	79	2"S[1)]	1 1/2"S[1)]

[1)] S = standard pressure series, H = high pressure series; for exact dimensions, refer to table on page 17

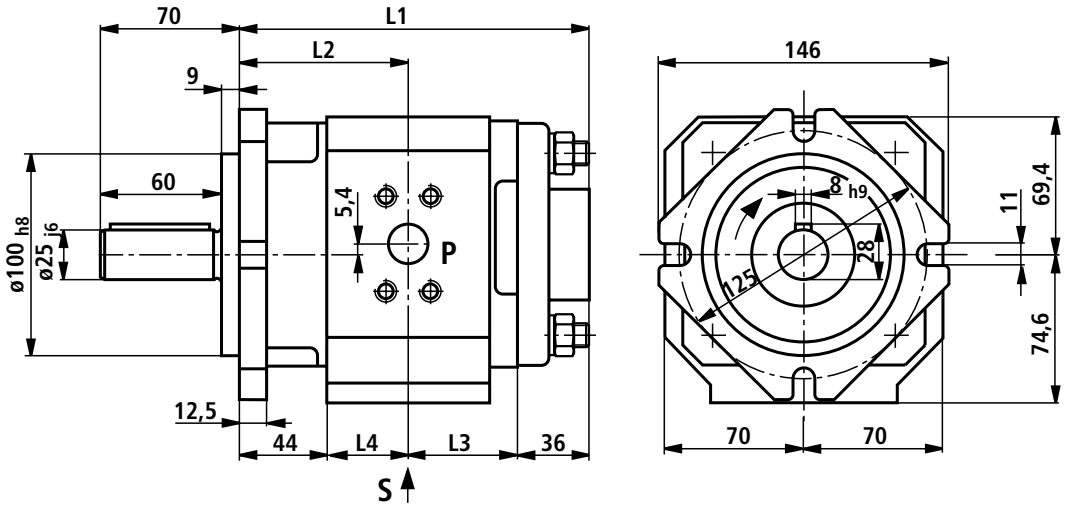


PGH4-2X/...RE...VE4

Drive shaft cylindrical,
with 4-hole mounting flange to
ISO 3019/2 and VDMA 24 560 part 1

Type Size	Material no. R=clockwise rot.	L1	L2	L3	L4	S	P
PGH4-2X/020RE11VE4	00086397	147	70.5	40.5	26.5	1 1/4"S[1)]	3/4"H[1)]
PGH4-2X/025RE11VE4	00086398	152	73	43	29	1 1/4"S[1)]	3/4"H[1)]
PGH4-2X/032RE11VE4	00932161	159	76.5	46.5	32.5	1 1/2"S[1)]	3/4"H[1)]
PGH4-2X/040RE11VE4	00932162	166	80	50	36	1 1/2"S[1)]	3/4"H[1)]
PGH4-2X/050RE11VE4	00932163	176	85	55	41	1 1/2"S[1)]	1"H[1)]
PGH4-2X/063RE07VE4	00932165	190	92	62	48	2"S[1)]	1 1/4"S[1)]
PGH4-2X/080RE07VE4	00932166	204	99	69	55	2"S[1)]	1 1/2"S[1)]
PGH4-2X/100RE07VE4	00086405	224	109	79	6	2"S[1)]	1 1/2"S[1)]

[1)] S = standard pressure series, H = high pressure series; for exact dimensions, refer to table on page 17



Unit dimensions of frame size 4

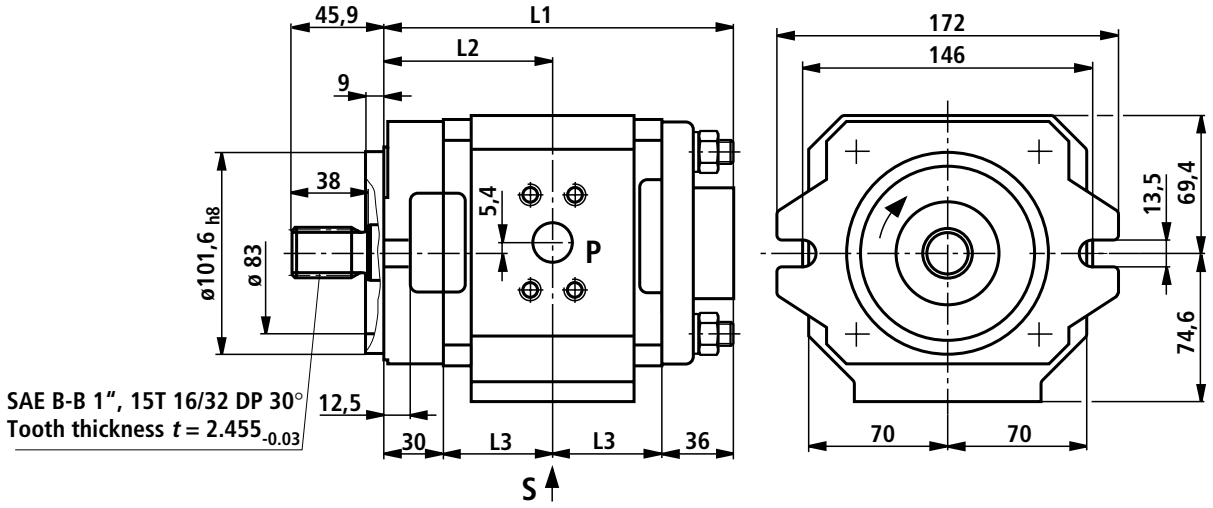
(Dimensions in mm, Δ preferred version)

PGH4-2X/...$^{R}_{L}$R...VU2

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

Type Size	Material no. R=clockwise rot.	L=anti-clockwise rot.	L1	L2	L3	S	P
PGH4-2X/020..R11VU2	00086356 Δ	00086379	147	70.5	40.5	1 1/4"S[1)]	3/4"H[1)]
PGH4-2X/025..R11VU2	00086357 Δ	00086380	152	73	43	1 1/4"S[1)]	3/4"H[1)]
PGH4-2X/032..R11VU2	00086358 Δ	00086381	159	76.5	46.5	1 1/2"S[1)]	3/4"H[1)]
PGH4-2X/040..R11VU2	00086359 Δ	00086382	166	80	50	1 1/2"S[1)]	3/4"H[1)]
PGH4-2X/050..R11VU2	00086360 Δ	00086383	176	85	55	1 1/2"S[1)]	1"H[1)]
PGH4-2X/063..R07VU2	00086362 Δ	00086385	190	92	62	2"S[1)]	1 1/4"S[1)]
PGH4-2X/080..R07VU2	00086363 Δ	00086386	204	99	69	2"S[1)]	1 1/2"S[1)]
PGH4-2X/100..R07VU2	00086364 Δ	00086387	224	109	79	2"S[1)]	1 1/2"S[1)]

[1)] S = standard pressure series, H = high pressure series; for exact dimensions, refer to table on page 17



Unit dimensions of frame size 5

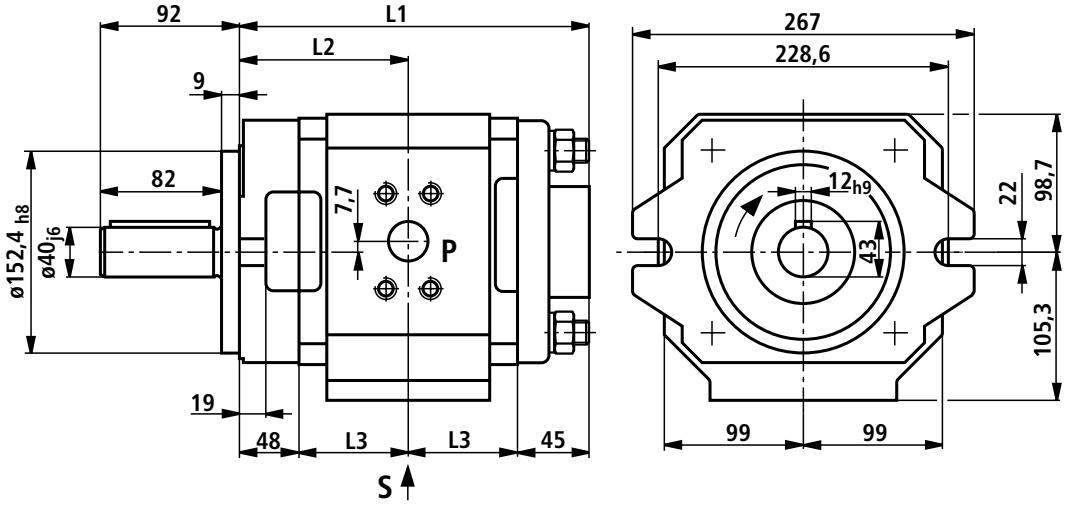
(Dimensions in mm, Δ preferred version)

PGH5-2X/...$^{R}_{L}$E...VU2

Drive shaft cylindrical,
SAE 2-hole mounting flange

Type Size	Material no. R=clockwise rot.	L=anti-clockwise rot.	L1	L2	L3	S	P
PGH5-2X/063..E11VU2	00932168 Δ	00086496	208	105.5	57.5	1 1/2"S[1)]	1"H[1)]
PGH5-2X/080..E11VU2	00086460 Δ	00086497	216	109.5	61.5	2"S[1)]	1 1/4"H[1)]
PGH5-2X/100..E11VU2	00086461 Δ	00086498	225	114	66	2"S[1)]	1 1/4"H[1)]
PGH5-2X/125..E11VU2	00932169 Δ	00086499	237	120	72	2"S[1)]	1 1/4"H[1)]
PGH5-2X/160..E07VU2	00932171 Δ	00086501	255	129	81	3"S[1)]	2"S[1)]
PGH5-2X/200..E07VU2	00086465 Δ	00086502	273	138	90	3"S[1)]	2"S[1)]
PGH5-2X/250..E07VU2	00086466 Δ	00086503	297	150	102	3"S[1)]	2"S[1)]

[1)] S = standard pressure series, H = high pressure series; for exact dimensions, refer to table on page 17

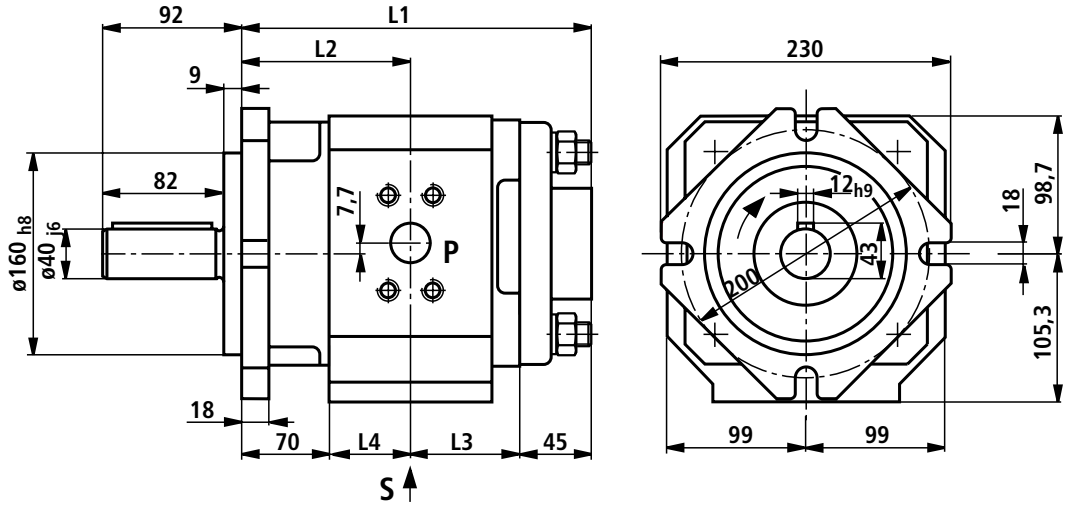


PGH5-2X/...RE...VE4

Drive shaft cylindrical,
with 4-hole mounting flange to
ISO 3019/2 and VDMA 24 560 part 1

Type Size	Material no. R=clockwise rot.	L1	L2	L3	L4	S	P
PGH5-2X/063RE11VE4	00086551	208	105.5	57.5	35.5	1 1/2"S[1)]	1"H[1)]
PGH5-2X/080RE11VE4	00932173	216	109.5	61.5	39.5	2"S[1)]	1 1/4"H[1)]
PGH5-2X/100RE11VE4	00932174	225	114	66	44	2"S[1)]	1 1/4"H[1)]
PGH5-2X/125RE11VE4	00932175	237	120	72	50	2"S[1)]	1 1/4"H[1)]
PGH5-2X/160RE07VE4	00086556	255	129	81	59	3"S[1)]	2"S[1)]
PGH5-2X/200RE07VE4	00086557	273	138	90	68	3"S[1)]	2"S[1)]
PGH5-2X/250RE07VE4	00932176	297	150	102	80	3"S[1)]	2"S[1)]

[1)] S = standard pressure series, H = high pressure series; for exact dimensions, refer to table on page 17



Unit dimensions of frame size 5

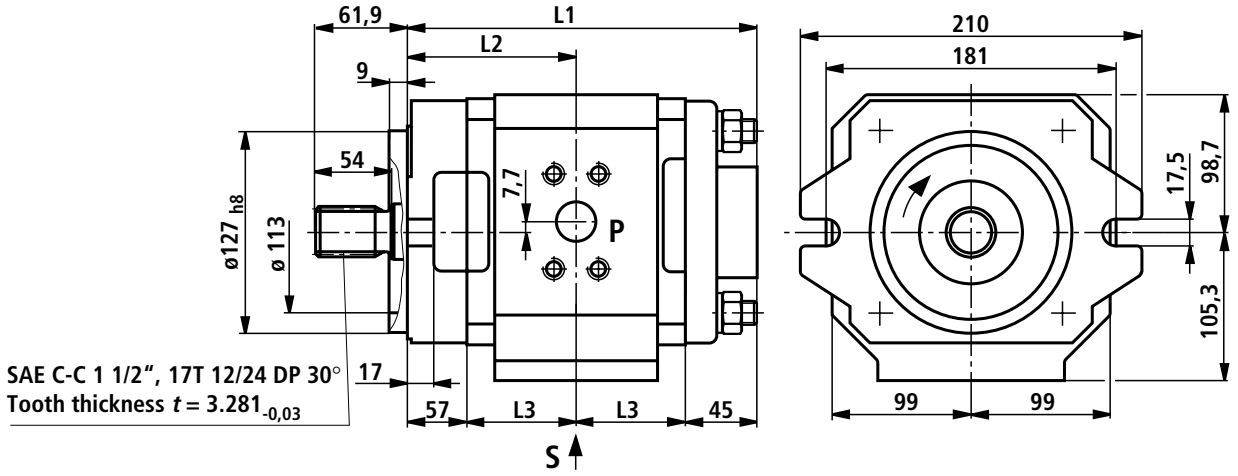
(Dimensions in mm, Δ preferred series)

PGH5-2X/...$^{R}_{L}$R...VU2

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

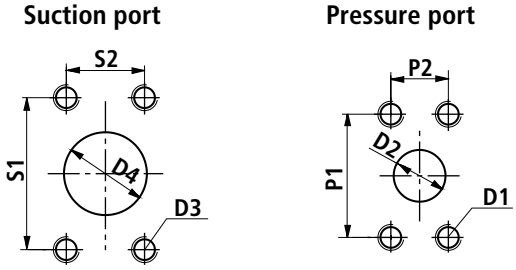
Type Size	Material no. R=clockwise rot.	L=anti-clockwise rot.	L1	L2	L3	S	P
PGH5-2X/063..R11VU2	00932172 Δ	00086533	217	114.5	57.5	1 1/2"S[1)]	1"H[1)]
PGH5-2X/080..R11VU2	00086516 Δ	00086534	225	118.5	61.5	2"S[1)]	1 1/4"H[1)]
PGH5-2X/100..R11VU2	00086517 Δ	00086535	234	123	66	2"S[1)]	1 1/4"H[1)]
PGH5-2X/125..R11VU2	00086518 Δ	00086536	246	129	72	2"S[1)]	1 1/4"H[1)]
PGH5-2X/160..R07VU2	00086520 Δ	00086538	264	138	81	3"S[1)]	2"S[1)]
PGH5-2X/200..R07VU2	00086521 Δ	00086539	282	147	90	3"S[1)]	2"S[1)]
PGH5-2X/250..R07VU2	00086522 Δ	00086540	306	159	102	3"S[1)]	2"S[1)]

[1)] S = standard pressure series, H = high pressure series; for exact dimensions, refer to table on page 17



Suction and pressure ports

(Dimensions in mm)



FS	Size	Porting pattern/ suction S	Porting pattern/ pressure P	D1	D2	D3	D4	P1	P2	S1	S2
2	**006**	1/2" 3000 PSI	1/2" 3000 PSI	M8x15	13	M8x15	13	38.1	17.5	38.1	17.5
	008	1/2" 3000 PSI	1/2" 3000 PSI	M8x15	13	M8x15	13	38.1	17.5	38.1	17.5
3	**011**	1" 3000 PSI	1/2" 3000 PSI	M8x15	13	M10x17	25	38.1	17.5	52.4	26.2
	013	1" 3000 PSI	1/2" 3000 PSI	M8x15	13	M10x17	25	38.1	17.5	52.4	26.2
	016	1" 3000 PSI	1/2" 3000 PSI	M8x15	13	M10x17	25	38.1	17.5	52.4	26.2
4	**020**	1 1/4" 3000 PSI	3/4" 6000 PSI	M10x18	19	M10x18	30	50.8	23.8	58.7	30.2
	025	1 1/4" 3000 PSI	3/4" 6000 PSI	M10x18	19	M10x18	32	50.8	23.8	58.7	30.2
	032	1 1/2" 3000 PSI	3/4" 6000 PSI	M10x18	19	M12x20	35	50.8	23.8	69.9	35.7
	040	1 1/2" 3000 PSI	3/4" 6000 PSI	M10x18	19	M12x20	38	50.8	23.8	69.9	35.7
	050	1 1/2" 3000 PSI	1" 6000 PSI	M12x22	21	M12x20	40	57.2	27.8	69.9	35.7
	063	2" 3000 PSI	1 1/4" 3000 PSI	M10x18	32	M12x20	51	58.7	30.2	77.8	42.9
	080	2" 3000 PSI	1 1/2" 3000 PSI	M12x20	38	M12x20	51	69.9	35.7	77.8	42.9
	100	2" 3000 PSI	1 1/2" 3000 PSI	M12x20	38	M12x20	51	69.9	35.7	77.8	42.9
5	**063**	1 1/2" 3000 PSI	1" 6000 PSI	M12x22	25	M12x20	40	57.2	27.8	69.9	35.7
	080	2" 3000 PSI	1 1/4" 6000 PSI	M14x24	32	M12x20	51	66.7	31.8	77.8	42.9
	100	2" 3000 PSI	1 1/4" 6000 PSI	M14x24	32	M12x20	51	66.7	31.8	77.8	42.9
	125	2" 3000 PSI	1 1/4" 6000 PSI	M14x24	32	M12x20	51	66.7	31.8	77.8	42.9
	160	3" 3000 PSI	2" 3000 PSI	M12x20	34	M16x24	76	42.9	77.8	61.9	106.4
	200	3" 3000 PSI	2" 3000 PSI	M12x20	43	M16x24	76	42.9	77.8	61.9	106.4
	250	3" 3000 PSI	2" 3000 PSI	M12x20	51	M16x24	76	42.9	77.8	61.9	106.4

Multiple pumps

All of the internal gear pumps of type PGH can be combined, each pump is provided with output toothing. The possible combinations and the related material numbers of the required combination parts are listed in the following table.

Front pump / Rear pump	PGH2-2X	PGH3-2X	PGH4-2X	PGH5-2X
PGH2-2X/..R	00886137	00886137	00984745	00984739
PGH3-2X/..R	00886137	00886137	00984745	00984739
PGH4-2X/..R	–	–	00984748	00088542
PGH5-2X/..R	–	–	–	00088544
PGP2-2X/..J	00886137	00886137	00984745	00984739
PGP3-3X/..J	–	–	00088547	00088541
PGF2-2X/..J	00886137	00886137	00984745	00984739
PGF3-3X/..J	–	–	00088547	00088541
PVV/Q1-1X/..J	–	–	00088547	00088541
PVV/Q2-1X/..J	–	–	00088547	00088541
PVV/Q4-1X/..J	–	–	–	00088543
PVV/Q5-1X/..J	–	–	–	00088543
G2-4X/..R	00886137	00886137	00984745	00984739
A10VSO10..U	00886137	00886137	00984745	00984739
A10VSO18..U	00886137	00886137	00984745	00984739
A10VO28..S	–	–	00088547	00088541
A10VO45..S	–	–	00984748	00088542
A10VO71..S	–	–	–	00088543
A10VO100..S	–	–	–	00088544

Ordering details

[ ] / + [ ] / + [ ] / [ ] [ ] + R + R [ ] [ ]

Double = **P2**
Triple = **P3**

Series of 1st pump [1]

Nominal size of 1st pump [1]

Series of 2nd pump [1]

Nominal size of 2nd pump [1]

Series of 3rd pump [1]

Nominal size of 3rd pump [1]

Direction of rotation (viewed to shaft end)
Clockwise = **R**
Anti-clockwise = **L**

Shaft version of 1st pump
Cylindrical = **E**
SAE involute splining = **R**

Line connection of 1st pump
Pressure port 3000 PSI standard pressure series = **07**
Pressure port 6000 PSI high pressure series = **11**

Mounting flange of 1st pump
U2 [2] = SAE 2-hole mounting flange
E4 [3] = ISO 4-hole mounting flange to ISO 3019/2 and VDMA 24560 part 1

Line connection of 3rd pump
07 = Pressure port 3000 PSI standard pressure series
11 = Pressure port 6000 PSI high pressure series

Shaft version of 3rd pump
R = SAE involute splining

Line connection of 2nd pump
07 = Pressure port 3000 PSI standard pressure series
11 = Pressure port 6000 PSI high pressure series

Shaft version of 2nd pump
R = SAE involute splining

[1] for details, see ordering details on page 2
[2] in conjunction with cylindrical and splined shaft
[3] only in conjunction with cylindrical shaft (to VDMA); only FS 4 and FS 5, only clockwise direction of rotation

Order example

P3GH5/160+GH3/016+GH2/008RE07+R07+R07U2

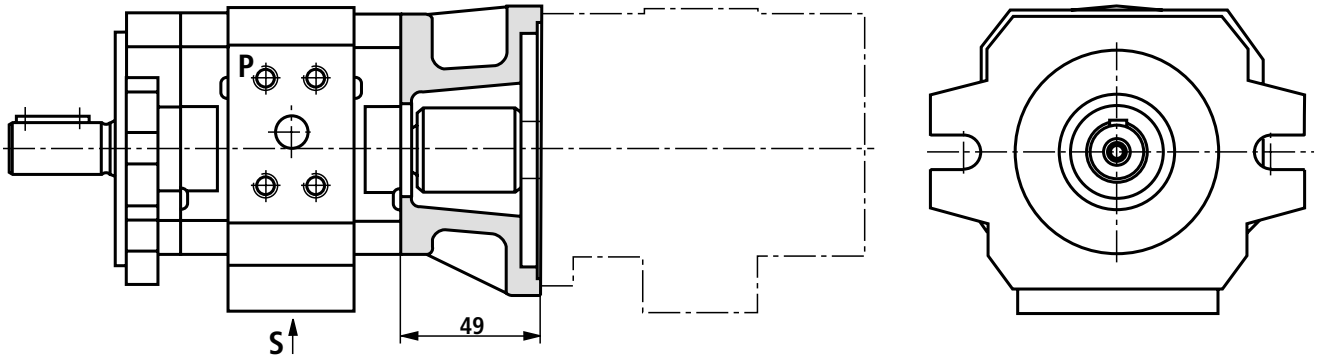
Multiple pumps

Unit dimensions

The dimensional drawings show the front pump and the combination part [1)]

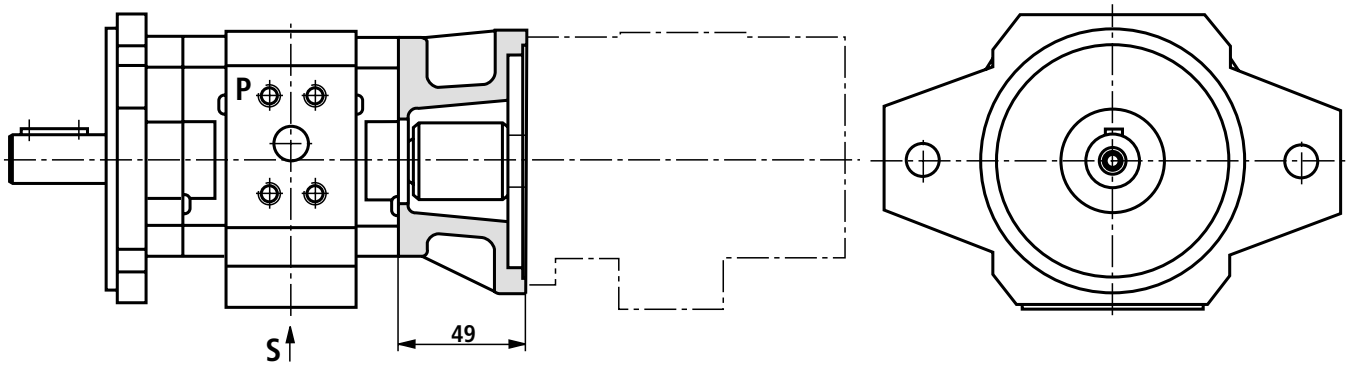
PGH2

PGH2 with combinatin part PGH2, PGH3, PGF2, PGP2, G2-4X, A10VSO10/18 (SAE-A flange, shaft 9T 16/32 DP)



PGH3

PGH3 with combination part for PGH2, PGH3, PGF2, PGP2, G2-4X, A10VSO10/18 (SAE-A flange, shaft 9T 16/32 DP)



[1)] For weights of the individual pumps, see pages 12 to 17 and the relevant RE data sheets for the rear pump.

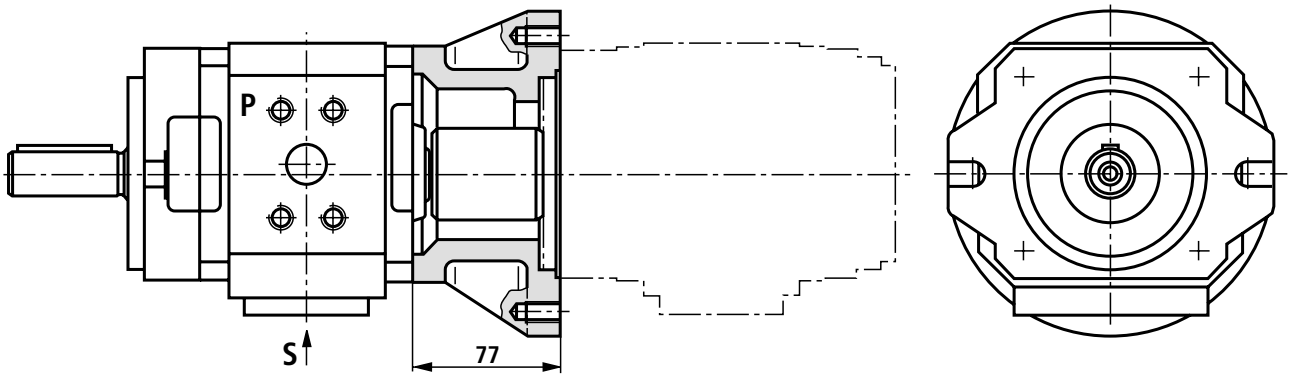
Multiple pumps

Unit dimensions

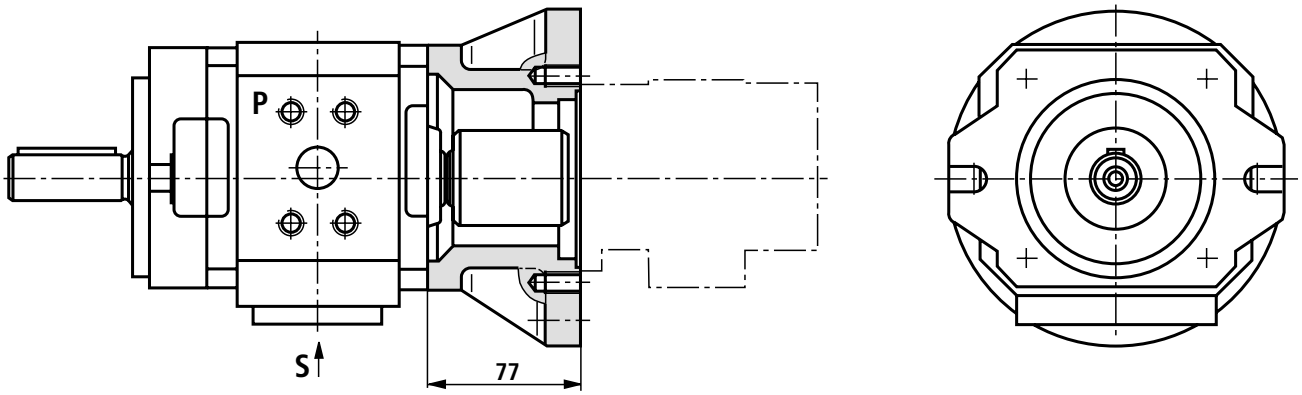
The dimensional drawings show the front pump and the combination part. [1)]

PGH4

PGH4 with combination part for PGH4, A10VO45 (SAE-B flange, shaft 15T 16/32 DP)
PGP3, PGF3, PVV/Q1, PVV/Q2, A10VO28 (SAE-B flange, shaft 13T 16/32 DP)



PGH4 with combination part for PGH2, PGH3, PGF2, PGP2, G2-4X, A10VSO10/18 (SAE-A flange, shaft 9T 16/32 DP)



[1)] For the weights of the individual pumps, see pages 12 to 17 and the relevant RE data sheets for the rear pumps.

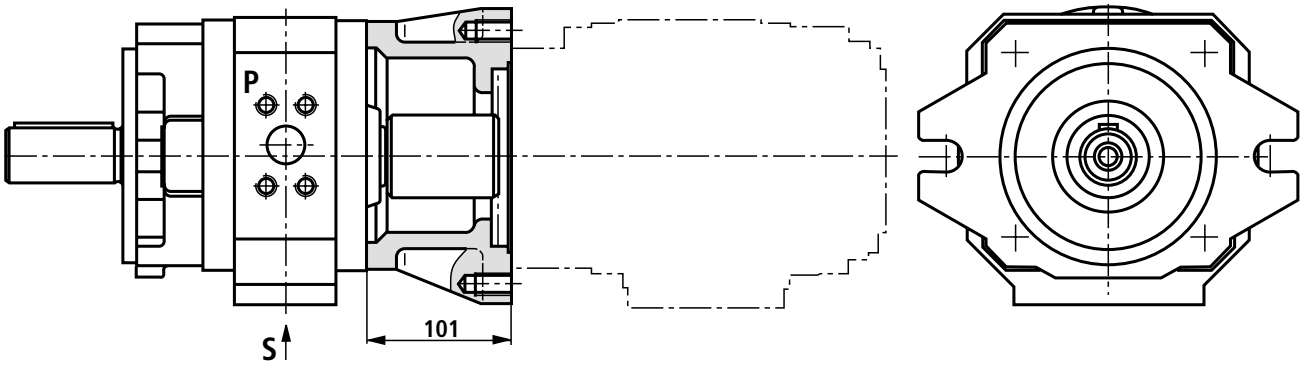
Multiple pumps

Unit dimensions

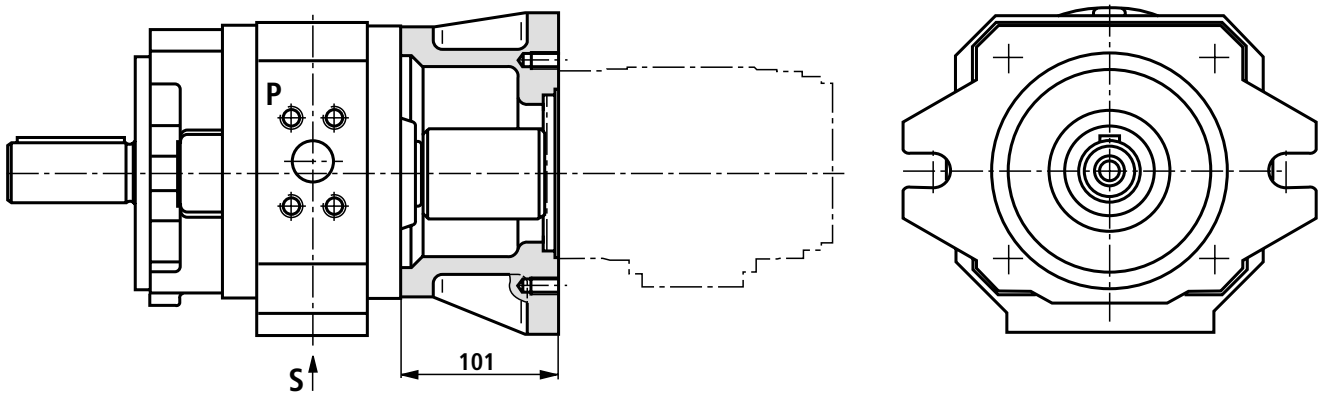
The dimensional drawings show the front pump and the combination part. [1)]

PGH5

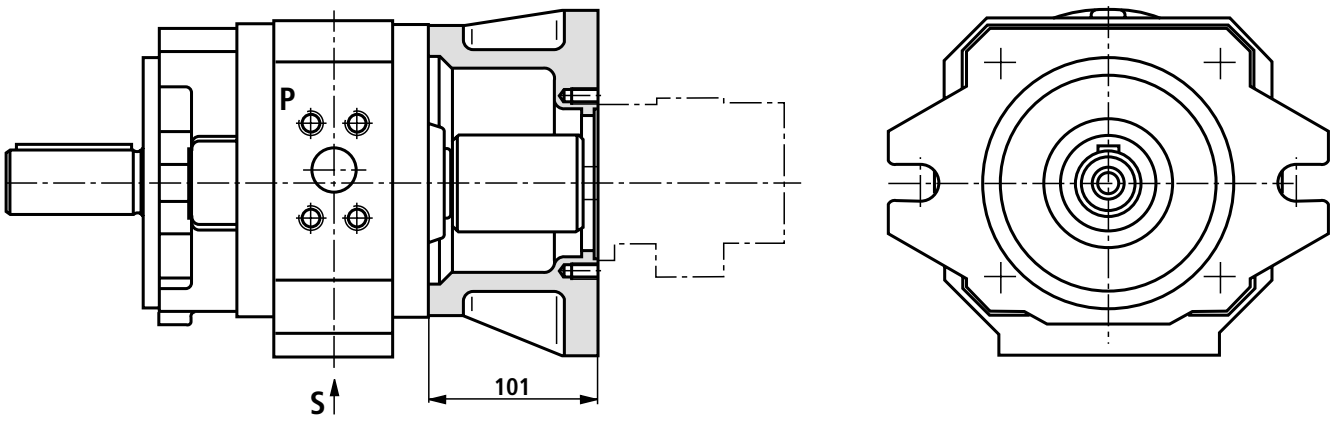
PGH5 with combination part for PGH5, A10VO100 (SAE-C flange, shaft 17T 12/24 DP)
PVV/Q4, PVV/Q5 (SAE-C flange, shaft 14T 12/24 DP)



PGH5 with combination part for PGH4, A10VO45 (SAE-B flange, shaft 15T 16/32 DP)
PGP3, PGF3, PVV/Q1, PVV/Q2, A10VO28 (SAE-B flange, shaft 13T 16/32 DP)



PGH5 with combination part for PGH2, PGH3, PGF2, PGP2, G2-4X, A10VSO10/18 (SAE-A flange, shaft 9T 16/32 DP)



[1)] Weight of individual pumps, see pages 12 to 17 and the relevant RE data sheets for the rear pumps.

Multiple pumps

Engineering guidelines

- The general technical data are the same as for the individual single pumps (see page 4).
- Combined pumps must all have the same direction of rotation.
- The pump that is subjected to the greatest loads should be provided as first pump.
- The engineer must verify the max. through-drive torque for each application. This is also valid for existing (coded) multiple pumps.
- The drive torque of a pump stage can be calculated as follows:

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

T : Torque in Nm
Δp : Operating pressure in bar
V : Displacement in cm^3
η : Hydraulic-mechanical efficiency

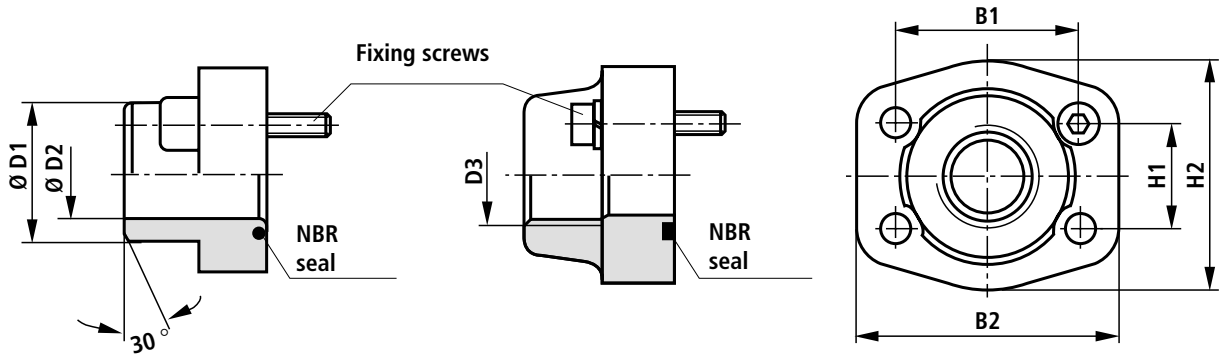
Max. permissible torques in Nm:

	Input side		Output side
	Cylindrical shaft ..E	Splined shaft ..R	
PGH2	100	120	75
PGH3	110	120	75
PGH4	450	450	280
PGH5	1100	1400	700

- Common suction is impossible.
- For combinations consisting of three or more pumps we recommend ISO 4-hole mounting flanges to VDMA "E4" for reasons of rigidity and stability, .
- Before operating pump combinations with different fluids, please consult Rexroth Hydraulics.
- The middle and rear pumps must be provided with shaft version "R" (splined).

SAE connecting flanges

(Dimensions in mm)



With welded connection to AB 22-15

With threaded connection to AB 22-13

Suction flange for PGH.../...	Pressure flange for PGH.../...	Flange size, pressure	Material number for flange with welded connection	Material number for flange with threaded connection	**B1**	**B2**	**H1**	**H2**	**Ø D1**	**Ø D2**	**D3**	Fixing screws
–	PGH4/020/025/032/040	3/4", 6000 PSI	00012344	00031447	50.8	71	23.8	60	25	17	G 3/4	M10x35
–	PGH4/050; PGH5/063	1", 6000 PSI	00026315	00035817	57.2	81	27.8	70	25	17	G 1	M12x45
–	PGH5/080/100/125	1 1/4", 6000 PSI	00012346	00211976	66.7	95	31.8	78	38	26	G 1 1/4	M14x45
PGH2/006/008	PGH2/006/008 PGH3/011/013/016	1/2", 3000 PSI	00026298	00024200	38.1	54	17.5	46	20	14	G 1/2	M8x30
PGH3/011/013/016	–	1", 3000 PSI	00012937	00014154	52.4	70	26.2	59	35	27	G 1	M10x35
PGH4/020/025	PGH4/063	1 1/4", 3000 PSI	00026324	00014153	58.7	79	30.2	73	38	30	G 1 1/4	M10x35
PGH4/032/040/050; PGH5/063	PGH4/080/100	1 1/2", 3000 PSI	00013500	00014827	69.9	93	35.7	83	38	30	G 1 1/2	M12x45
PGH4/063/080/100 PGH5/080/100/125	PGH5/160/200/250	2", 3000 PSI	00049861	00014829	77.8	102	42.9	97	60	44	G 2	M12x45
PGH5/160/200/250	–	3", 3000 PSI	00012940	–	106.4	135	61.9	131	89	82	–	M16x45

The material numbers include the flange, O-ring (NBR) and fixing screws.

BSP threads "G" to ISO 228/1

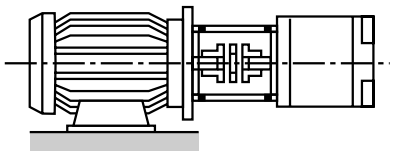
Pump safety block

For limiting the operating pressure or (and) solenoid operated unloading of the operating pressure we recommend pump safety blocks to RE 25 880 and RE 25 890.

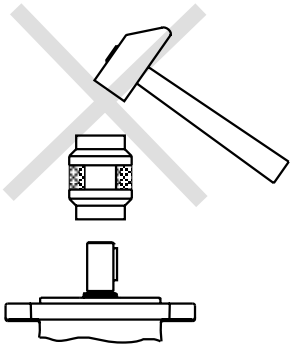
Installation guidelines

Drive

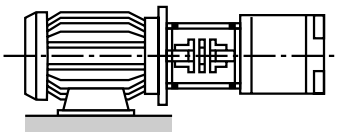
Electric motor + pump mounting bracket + coupling + pump



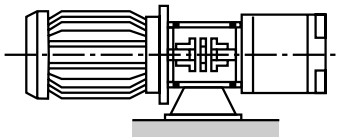
– No radial and axial forces on the pump drive shaft permitted!
– Motor and pump must be exactly aligned!
– Always use a coupling that is suitable for compensating for shaft misalignment!
– When fitting the coupling avoid axial forces, i.e. **do not hammer or press the coupling onto the shaft!** Use the internal thread of the drive shaft!



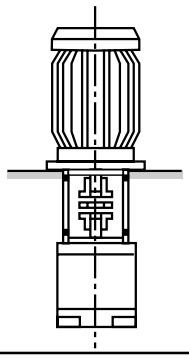
B3



B5



V1



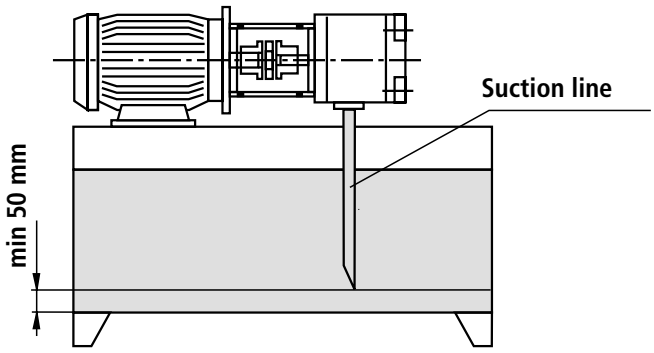
Fluid reservoir

– Match the capacity of the reservoir to the operating conditions
– The permissible fluid temperature must not be exceeded; if required, provide a cooler

Lines and connections

– Remove the protective plugs from the pump
– We recommend the use of seamless precision steel pipes to DIN 2391 and removable pipe connections
– Select the internal diameter of the pipes according to the ports (suction velocity 1 to 1.5 m/s)
– For inlet pressures, see page 4
– Thoroughly clean pipes and fittings before assembly

Piping recommendations



– **Under no circumstances** may the return oil be directly sucked back into the pump, i.e. maintain the greatest possible distance between the suction and the return pipe.
– Suction pipe and return outlet must always be clearly below the oil level.
– Always ensure that the pipes are assembled leak-proof.

Filters

– Whenever possible, use return line or pressure filters. (Only use suction filters in combination with vacuum switches/ clogging indicators)

Hydraulic fluid

– Observe our specifications according to data sheet RE 07 075
– We recommend brand name hydraulic oils
– Do not mix hydraulic oils of different types, since this can lead to decomposition and deterioration of the lubricating quality.
– The fluid must be replaced at regular intervals according to the operating conditions. In connection with this, the fluid reservoir must be cleaned of residues.

Commissioning guidelines

Commissioning

– Check to ensure that the installation is correctly and properly assembled.
– Only fill the system with fluid via a filter with the required minimum retention rate.
– Observe the arrow for the direction of rotation.
– Start the pump without load and allow it to run for a few seconds without load to ensure sufficient lubrication.
– Never let the pump run without oil.
– Should the pump not run clear of bubbles after about 20 seconds, the installation must be re-checked.
  After having reached the operating values, check all pipe connections for leaks. Check the operating temperature.

Bleeding

– Before first commissioning, we recommend that the pump housing is filled with oil. This increases operational reliability and reduces wear under unfavourable installation conditions.
– **On the first start-up, allow foamed oil to escape by careful opening the pressure flange or the pressure pipe (if required, provide splash protection) while the pump is circulating oil at zero pressure. Only when bubble-free oil is flowing, retighten the flange at the specified tightening torque.**

General

– All pumps supplied by us are subjected to functional and performance tests. If alterations of any nature are made to the pump, the warranty immediately becomes void.
– Repairs may only be carried out by the manufacturer, its authorized dealers or subsidiaries. Repairs and servicing carried out by third parties are not covered by the warranty.

⚠ Important notes

– The pump may only be installed, serviced and repaired by authorized, trained and instructed personnel!
– Operate the pump only within the permissible parameters (see page 4)!
– The pump may only be operated when in perfect condition!
– When working on the pump, make sure that the system pressure is zero!
– Unauthorized conversions and changes that affect the safety and function of the pump are not permitted!
– Fit protective devices (e.g. coupling guard) and do not remove existing protective devices !
– Always make sure that all fixing screws are properly tightened! (Observe the prescribed tightening torque).
– Generally valid safety rules and regulations for the prevention of accidents must strictly be adhered to at all times!

Engineering guidelines

Comprehensive notes and guidelines can be found in The Hydraulic Trainer, Volume 3, RE 00 281, "Planning and design of hydraulic systems".
When using internal gear pumps, we recommend that the following notes are observed in particular.

Technical data

All the technical data mentioned here depend on manufacturing tolerances and are valid with certain operating conditions.
Please take into account that minor variations are possible and technical data can vary under certain boundary conditions (e.g. viscosity).

Characteristic curves

When selecting the size of the drive motor, please note the max. permissible application data in the characteristic curves shown on pages 6 to 11.

Start-up against pressure

With a bubble-free fluid in the suction line and in the pump, the pump can start up against a maximum pressure of 30 bar!

Sound pressure level

The sound pressure level values given on pages 7, 9 and 11 were measured in line with DIN 45 635, page 26. This means that only the noise emission by the pump was considered. Environmental influences (place of installation, piping, etc.) were not taken into account.
The values given refer to only one pump.

With internal gear pumps, the pulsations passed on to valves, pipes and machine components, etc. are very small due to the low displacement pulsation (approx. 2 to 3 %).

Nevertheless, the sound pressure level of the power unit can be 5 to 10 dB(A) higher than that of the pump due to unfavourable influences at the place of installation.

Notes

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