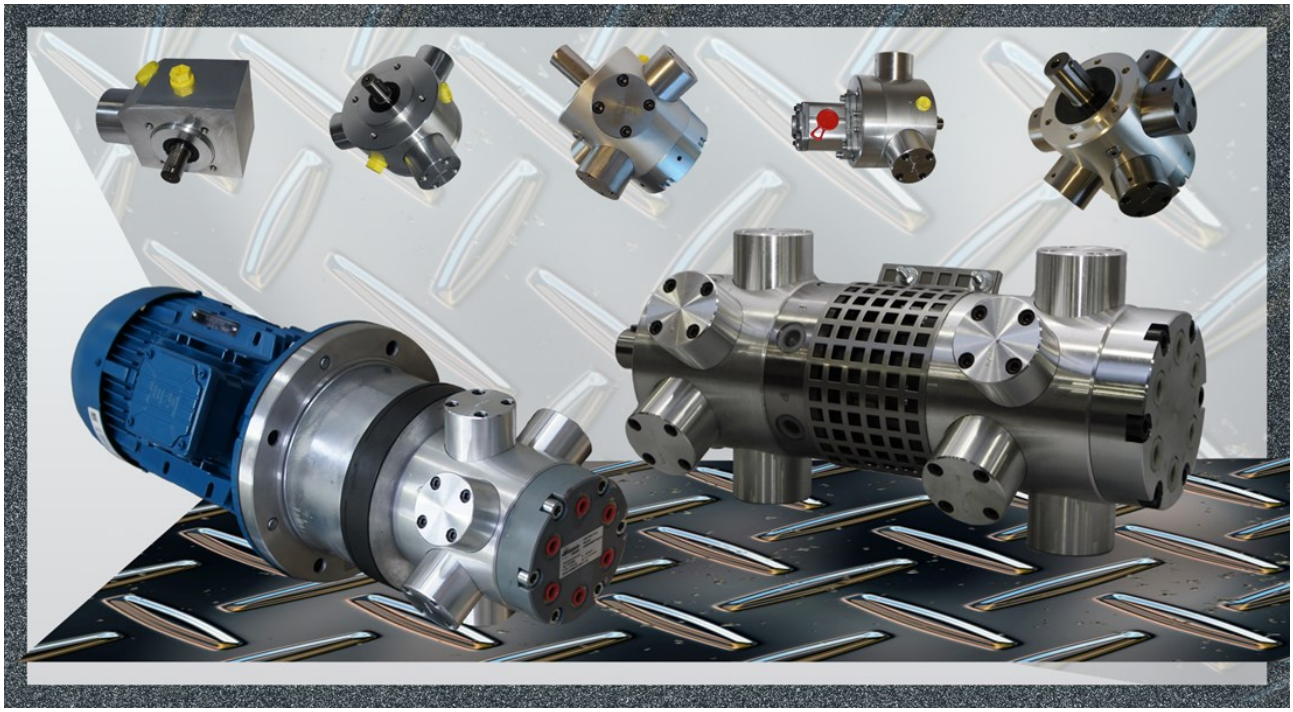
High-Pressure Hydraulics

Wimmer-Pumps

- Radial Piston Pumps
- Twin-, Multiple-, Multiple Circulation and HP/LP-Pumps
- Motor Pumps
- Hydraulic Aggregates
- Customized Solutions



RADIAL PISTON PUMPS: CONSTANT PUMPS

valve controlled on pressure and suction side

Standard pumps from:

◊ 0.3 to 5,4 l/min @ 1500 RPM (10,8 l/min @ 3000 RPM) up to 1000 Bar
◊ 0.3 to 9,7 l/min @ 1500 RPM (19,4 l/min @ 3000 RPM) up to 700 Bar
◊ 0.3 to 48,1 l/min @ 1500 RPM (96,2 l/min @ 3000 RPM) up to 500 Bar

(values in brackets for twin pumps)

- 3 sizes (groups)
- Up to 6 pistons per single pump or up to 12 pistons per twin pump;
- Possible piston diameters 6, 8, 9, 10, 12, 16, 19 und 22 mm
- Within one size (group) the pump elements can be replaced and mixed optionally
- Self-priming and under most operating conditions self-ventilating (manual ventilation and filling is possible with the integrated air discharge port)
- Above-average service life
- Friendly design – pump elements can be replaced without having to dismantle the pump
- Can also be used for biological degradable hydraulic oils or hydraulic liquids which are virtually non-flammable

Twin-, Multiple-, Multiple Circulation- and HP/LP-Pumps:

- HP/LP combination pumps
  (Almost all pumps are deliverable with a flange mounted gear pump)
- Twin- or multiple pumps
- Multiple circulation pumps (several pressure connections per pump possible)
- Attachment of pumps of other makes possible

Motor pumps:

- With pumping support and coupling for separate installation from oil container or for “conventional” container design
- With sub-oil motor for installation of pump and motor inside an oil container
- Radial piston pumps which fit partly for high revolution speed (e.g. diesel engine, 2-pole electric motor etc.)

Hydraulic aggregates:

- Ready to connect
- With / without electric motor
- With / without accessories

Customized solutions:

- We check all customers requests carefully and work out tailor-made solutions (3D-CAD-system Pro/Engineer is available)
- On account of the know-how of our production and assembly departments and the existing production equipment, we can provide everything from individual components to complete systems

Table of contents

1. GENERAL INFORMATION

WIMMER radial piston pumps are hydraulic pumps with a constant volumetric output. The pumps are usually used to supply hydraulic systems with pressure oil. **WIMMER** 's range of pumps includes simple pumps with one to six pistons and twin pumps with up to 12 pistons. All pumps are available with flange mounted gear pumps (HP/LP - pumps). In the case of pumps with multiple pistons, it is possible to have two to six pressure outlets from one pump depending on the number of pump pistons.

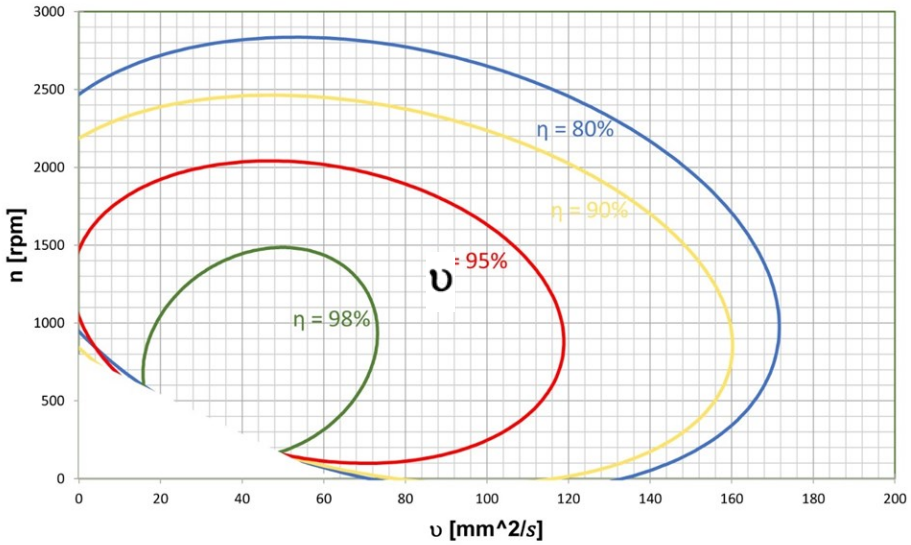
For the installation of a motor pump unit into a oil container the **WIMMER** pumps can be delivered with a completely mounted sub-oil motor.

The radial piston pumps are controlled by valves and the pistons are arranged to be either opposite the housing or arranged in a star shape (180° to 60° depending on the number of pistons). Depending on the model, one to six pistons are driven by an eccentric bearing. The eccentric bearing rolls off the piston floor if the pressure stroke is under a high load, if there is no load on the intake stroke, it glides. The pistons are returned by springs.

The delivery flows of the individual pump elements are brought together in the pump housing and join up in one or more axial or radial pressure connections as required. Oil is ingested through the pump housing which guarantees permanent lubrication and cooling of all moving parts.

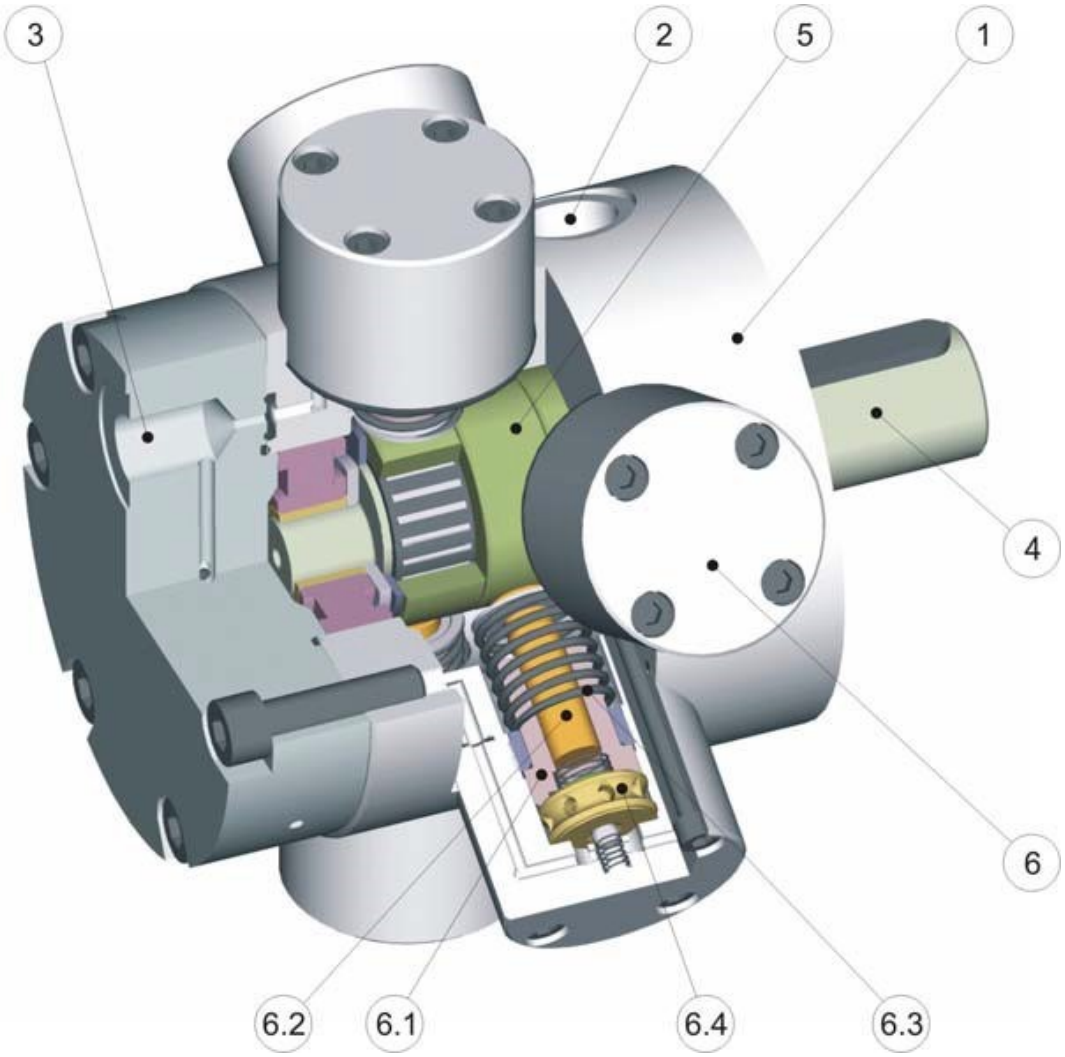
Due to the optimised weight of the design the pump housing is made of high-strength light metal. To ensure that maintenance is kept to a minimum and that the service life of WIMMER radial piston pumps is well above average, the bearings are generously dimensioned and all wearing parts such as eccentric shaft, pistons and valve unit, are specially hardened and polished.

Kinematic viscosities υ - Speed n



Speed - kinematic viscosity - volumetric flow rate

1.1 Design



Sectional model of a 6-cylinder pump

1. housing
2. intake connection
3. pressure connection
4. eccentric shaft (with rolling bearings and sliding bearings respectively, depending on the type of pump)
5. support roller with eccentric bearing for pressure stroke (with rolling bearings and sliding bearings respectively, depending on the type of pump)
6. pump element (can be replaced easily by loosening the four hexagon socket head screws) consists mainly of:
   - 6.1 piston guide
   - 6.2 piston
   - 6.3 piston spring for the intake stroke
   - 6.4 valve assembly with intake pressure valve

1.2 OPERATING DATA

Design:	radial piston pump with constant output
Type designation:	type identification see sect. 2.1
Attachment:	standard: at the front side
Drive:	via elastic coupling; direction of rotation as required (for HP/LP – combination pumps it must be the same as the direction of rotation of the gear pump)
Speed range:	100 - 2900 rpm , depending on the type ***(All pumps are tested and run-in up to 1500 rpm, higher speeds on request or according to run-in procedure.)***
Operating Pressure:	up to 1000 bar; see overview sect. 2.1
Delivery volume:	0.3 – 60 l/min (96.2 l/min); see overview sect. 2.1 calculating guide value of delivery volume: **Q_{th}= Vg * n * ηVol** Q_{th} : Delivery flow theorecically [l/min] Vg: displacement [cm3/rev] n: revolution speed [rpm] ηVol: volumetric efficiency up to ≈ 0.98
Installation position:	any; equipment dimensions see sect. 6
Suction height:	all pumps are under normal operating conditions self-priming (also see the operating regulations). during operation, the level of oil can be lowered up to 1000 mm depending on the type of pump.
Oils to be used:	hydraulic oils with a kinematic viscosity [cSt] of 10 – 220 mm2/s (HP/LP – combination pumps of 20 - 200 mm2/s); pay attention to the start viscosities; in addition biologically reducible hydraulic oils, virtually non-flammable hydraulic liquids and diesel fuel can be pumped (further information upon request).
Temperature range:	oil and surroundings (-40°) -20° / +80°C (pay attention to the start viscosities!)
Power requirement:	calculation: $PkW = \frac{p * Q_{th} * k}{612 * \eta}$ p: operating pressure [bar] Q_{th}: delivery volume theorecically[l/min] k: factor, depends on the number of pistons k ≈ 2.9 (1 piston), k ≈ 1.4 (2 piston), otherwise k=1 η: Ø overall efficiency ≈ 0.8 ... 0.88

2. OVERVIEW

2.1 STANDARD RADIAL PISTON PUMPS

Maximum pressures and displacements of the standard program

Size	Hou-sing	Nb of Pistons	Pressure (bar) / displacement (cm³) by piston diameter							
			Ø 6 mm	Ø 8 mm	Ø 9 mm	Ø 10 mm	Ø 12 mm	Ø 16 mm	Ø 19 mm	Ø 22 mm
1	PPZ	1	700/0,21	700/0,38		500/0,59				
		2	700/0,42	700/0,76		500/1,18				
		3	700/0,63	700/1,14		500/1,77				
2	PD	1	700/0,22	700/0,40	700/0,51	700/0,63	700/0,90	500/1,61		
		2	700/0,44	700/0,80	700/1,02	700/1,26	700/1,80	500/3,22		
	PDS	1	1000/0,22	1000/0,40	1000/0,51					
		2	1000/0,44	1000/0,80	1000/1,02					
	PZ	3	700/0,84	700/1,50	700/1,92	500/2,37	500/3,39	250/6,03		
		5	700/1,41	700/2,51	700/3,18	500/3,93	500/5,65	250/10,05		
	PM/P	2	700/0,565	700/1,05	700/1,28	700/1,58	700/2,26	500/4,02		
		3	*700/0,847*	*700/1,57*	*700/1,92*	*700/2,37*	*700/3,39*	*500/6,03*	**<< Only PM**	
		4	700/1,13	700/2,10	700/2,54	700/3,14	700/4,52	500/8,04		
		6	700/1,70	700/3,02	700/3,82	700/4,71	700/6,79	500/12,06		
	PS	2	1000/0,565	1000/1,00	1000/1,27					
		4	1000/1,13	1000/2,01	1000/2,54					
		6	1000/1,70	1000/3,02	1000/3,82					
3	PW	4							500/16,50	500/22,15
		6							500/24,75	500/33,19

Examples of assemblies:

PPZ/02-700-0,76 = 2 Plungers / 700 Bar / Ø 8mm

PPZ/02-500-0,97 = 2 Plungers / 500 Bar / Ø 8mm + Ø10mm

PZ/05-700-3,18/GP2 = 5 Plungers / 700 Bar / Ø 9mm / for assembly with gear pump size G2

PS/04-1000-7,34/G1 = 4 Plungers / 1000 Bar / 2x Ø6mm + 2x Ø9mm / for assembly with gear pump size G1

PW/06-500-22,15 = 6 Plungers / 500 Bar / Ø22mm

Type number

1	2	3	4	5	6	7	8
PZ/	**05**	**-700**	**-3,1**	**GP2**	**XXX**	**F**	**Sxxx**

Building Group		Nb of Pistons	Plunger Size	Pressure**
PPZ	Size 1	1,2 or 3	Ø 6, 8, 10	700
PD	Size 2	1 or 2	Ø 6, 8, 9, 10, 12, 16	700
PDS	Size 2 (1000 Bar)	1 or 2	Ø 6, 8, 9	1000
PZ	Size 2	3 or 5	Ø 6, 8, 9, 10, 12, 16	700
PM	Size 2	2, 3, 4 or 6	Ø 6, 8, 9, 10, 12, 16	700
P	Size 2	2, 4 or 6	Ø 6, 8, 9, 10, 12, 16	700
PS	Size 2 (1000 Bar)	2, 4 or 6	Ø 6, 8, 9	1000
PW	Size 3	4 or 6	Ø 19 & 22	500

Number of Plungers

max. Pressure **(** Tabel off max presures and displacements)**

250 Bar
500 Bar
700 Bar
1000 Bar

Flow ccm / Rev

for one pressure connection: flow rate of the pump
for more connections: V1 + V2.....+Vn

Drive option (second pump)

I	for second Radial Piston Pump
GP1	for Gear Pump Size1
GP2	for Gear Pump Size2
GP3	for Gear Pump Size3

Gearpump

Ref. of the gearpump for combination pumps

FPM (seals)

Sxxx = Special concept

Examples of assemblies:

PZ05-700-3,1 = PZ with 5 plungers, 700 Bar, 3,1ccm/rev

P/04-700-1,57 + 1,57 = P with 4 plungers, 700Bar, 2x 1.57 ccm/rev

P/06-500-12,06/GP2 = P with 6 plungers, 500 Bar, 12,06 ccm/rev, Second drive to gear pump BG2, without gear pump

PW/04-500-16.5/ALP2BK7-S-16 = PW with 4 plungers, 500 Bar, 16.5 ccm/rev and second pump ALP2BK7-S-16

Note:

- All pumps are also deliverable with different delivery flows.
- All pumps are also deliverable with several pressure connections as well as with different delivery flows (exception: 1-piston pump and type 'PPZ/02').
- Continuous shafts to connect additional pumps are available.
- Further information upon request.

2.2 Type Designation

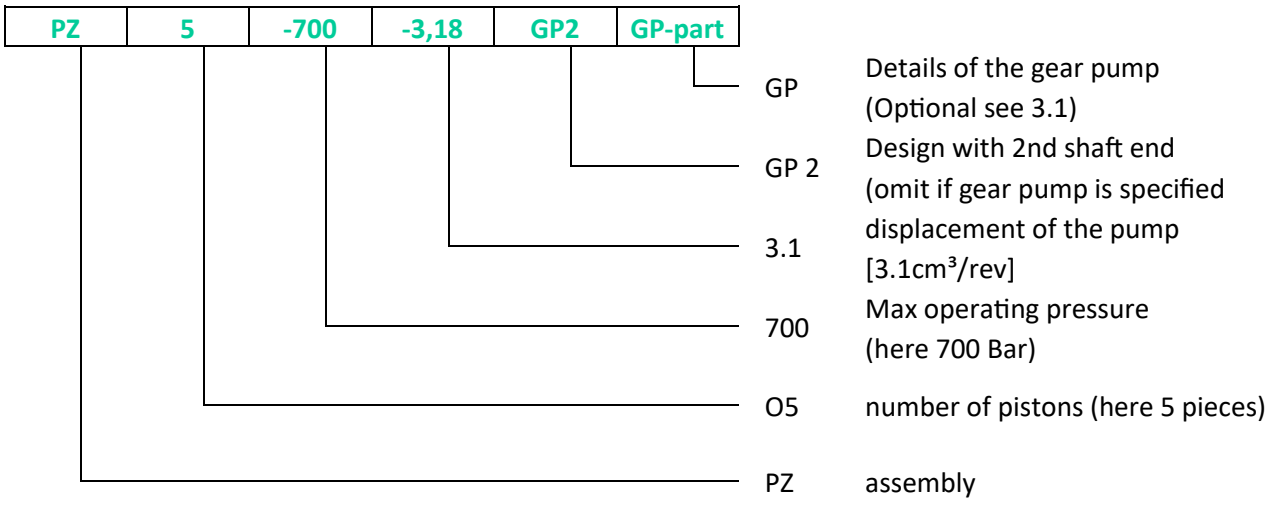
SYNTAX: ASSEMBLY / number of pistons - operating pressure - displacement (1) [- displacement (2)...] [/ 2. shaft end] [/ special stroke] [- GP-part]

ASSEMBLY/:	- can be seen in tables in sect. 2.1
Number of pistons:	- number of pistons used (tables sect. 2.1)
Operating pressure:	- max. operating pressure [bar] (tables sect. 2.1)
Displacement (1):	- displacement [cm³/rev] with one pressure connection (tables sect. 2.1).

The following values are optional for twin pumps, multiple circulation pumps and special outputs:

[- Displacement (2)]:	- displacement [cm³/rev] of the second pressure connection, optional (see sect. 3.2).
[/ 2. Shaft end]:	- I cylindric shaft end
	- GP2 shaft end to directly connect to a gear pump (GP) of size „ALP2BK7“
	- GP1 shaft end to directly connect to a GP „GP1P…G“
/ Special stroke]:	- height of stroke [mm] see information in sect. 3.2 (not Standard)
[/ GP - part]:	- high-pressure/low-pressure pumps (HP/LP pumps) LP-syntax to be specified (see sect. 4.1)

Example1:



3. COMBINATION PUMPS

3.1 GEAR PUMPS (FOR HP/LP-PUMPS)

All radial piston pumps (HP – high-pressure part) of the assemblies PD, PM/P, PPZ und PZ are available connected directly with a gear pump (LP – low-pressure part). The available gear pumps are external gear pumps made by the company MARZOCCHI or CASAPPA

Also gear pumps from other producers with the appropriate flange can be connected to the pumps.

The type designation of the combination HP/LP-pump is made up of the type designation of the high-pressure part (see sect. 2.2) and an analogous type designation of the low-pressure part (see example).

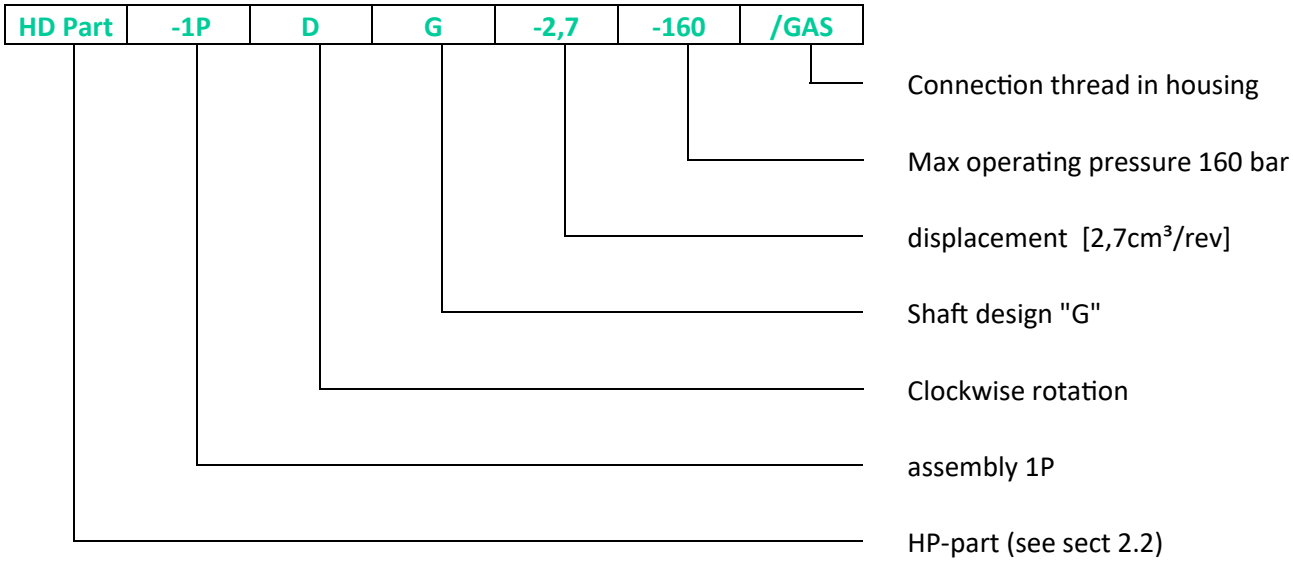
Type designation HP/LP-pump:

SYNTAX: HP-part – assembly, direction of rotation, possibly shaft type, possibly connection type, displacement - max. operating pressure

- Assembly: 1P, ALP2BK7 or ALP3
- Direction of rotation: direction of rotation (when looking at shaft end) clockwise rotation: D, counter-clockwise rotation: S
- Shaft type: e.g. „G“ with GP1P, without designation standard make
- Connections: suction and pressure connection
  - GAS – design with integrated threads measured in inches in housing
  - without designation standard angled flanges, straight flanges upon request
- Displacement: in cm³/rev

* Operating pressure: max. operating pressure (depends on the radial piston pump)

Example:



The gear pumps are directly connected to the second shaft end (type GP1 respectively) of the radial piston pumps of assemblies PD, PPZ and PZ.

p_{max} [bar] is equivalent to the max. operating pressure of the gear pump if the gear pump is used separately (manufacturer information). The max. operating pressure of the gear pump in a HP/LP-combination pump depends on the used radial piston pump. Further information upon request

3.1.1. Delivery volume 1.1 – 8.0 cm³/rev

Assembly	**GP1PD(S) G**										
Output [cm³/rev]	1.1	1.3	1.6	2.1	2.7	3.2	3.7	4.2	4.8	5.8	8.0
p_{max} [bar]	230	230	230	230	230	210	210	210	190	190	160

Suction and pressure connections

Size 1P: a) integrated screw-in thread, intake and pressure side 3/8", design /GAS

b) Angle flange available as 3/8"x30 and 1/2"x30,
order name WF 3/8"x30, WF 1/2"x30

3.1.2. Delivery volume 4.5 – 28.2 cm³/rev

The gear pumps are directly flange connected with the second shaft end (type GP2) of the radial piston pumps of assemblies PPZ, PZ and PM/P.

Assembly	**GPALP2BK7D (S)**												
Output [cm³/rev]	4.5	6.4	7.0	8.3	9.6	11.5	14.1	16.0	17.9	21.1	23.7	25.5	28.2
p_{max} [bar]	250	250	250	250	250	230	230	210	210	180	180	170	170

Angle connections are available in the following sizes:

Intake connection	WF 3/8"x35 2BK	WF1/2"x35 2BK	WF M18x15 2BK
Pressure connection	WF 3/8"x35 2BK	WF 1/2"x35 2BK	WF M18x15 2BK

Fixing materials included. Straight connections available upon request

3.1.3 Delivery volume 20 – 87 cm³/rev (HP-Assemblies P, PM/P und PW)

The gear pumps are flange connected to the second shaft end type I of the radial piston pumps of assemblies P, PM/P and PW.

Assembly	GPALP3D (S)										
Output [cm³/rev]	20	22	26	33	39	44	52	61	71	78	87
p_{max} [bar]	230	230	230	230	220	210	200	190	170	160	140

Angle connections are available in the following sizes:

Suction connection	WF 1"x56	WF 1 1/4"x62	WF 1 1/2"x62	WF 2 1/2"x62
Pressure connection	WF 3/4"x56	WF 1"X51		

Fixing materials included. Straight connections available upon request

3.2 Multiple circulation pumps, twin pumps and special capacities

Multiple circulation pumps:

The different output circuits make it possible to control overlapping movements of the consumers in hydraulic systems at any load without influencing one another and only low additional expense of the design. In addition, it is also possible to use a pressure connection to remove controlling oil.

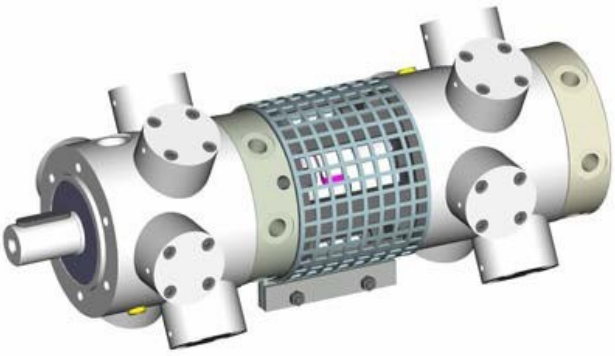
All **WIMMER** radial piston pumps, with the exception of the one cylinder pumps, are available with several pressure connections.

The maximum number of pressure connections depends on the number of pistons. It is also possible to divert one output from every piston or to group a number of pistons together from which the output is derived.

For the appropriate type designation see example 2 in sect. 2.2. A table to define the different combinations of delivery volumes is available upon request.

Twin and multiple pumps:

WIMMER radial piston pumps can be combined to create twin and multiple pumps using an intermediate flange and coupling unit. This enables the maximum output to be increased. Twin and multiple pumps can be made as multiple circulation pumps with several pressure connections per pump. Further information upon request.



Special designs:

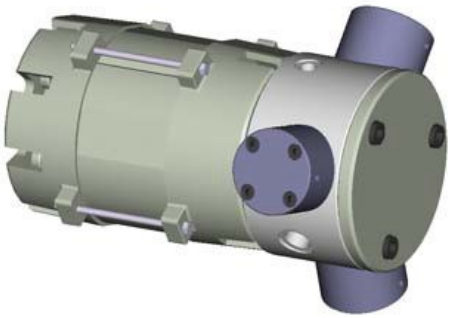
Outputs: By altering the height of stroke, a capacity deviation from that stated in the tables by up to 25% can be achieved.

Designs: Due to the modular system of the pumps, we have placed the emphasis of our customer orientation on being able to produce a variety of special designs (e.g. special casings, materials). As a flexible and innovative partner, we will gladly put our know-how at your disposal to fulfil your individual requirements.

Further information upon request.

4. SUB-OIL MOTOR PUMPS

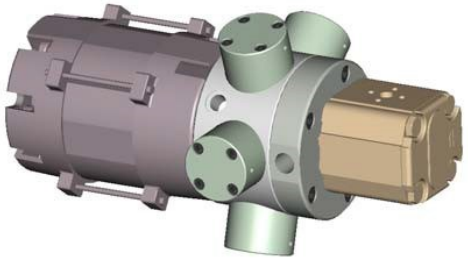
WIMMER radial piston pumps can be supplied with a sub-oil motor flanged to the pump as well. These motor pumps type 'MU' are designated for installation inside of the oil tank, i.e. pump and motor run in oil. The assembly of the motor pump unit can functionally be mounted to the tank lid or directly to the oil tank with simple brackets, preferably with damping elements.



In comparison to the arrangement of a conventional tank design there are several advantages. As pump and motor are directly mounted to each other this compact assembly needs less space. This results in more space being available for mounting components on the lid like valves, control boxes etc. Furthermore the acceptable exploitation of the motor capacity is higher due to the acute cooling effect of the oil scavenging around it. A further advantage is a lower noise level as the noises of the running motor and the cooling fan are not radiated directly like it is the case with a motor standing free.

The sub-oil motor pumps preferably run in intermittent duty S3 (interrupting duty). In case of an oil tank of sufficient capacity (temperature control!), idling duty (running though duty with interrupting stress) is possible as well.

This pump type is also applicable for two-stage- or double-circuit- installations due to the option to combine radial piston pumps with gear pumps (HP/LP pumps).



4.2 Overview radial piston pumps

appropriate to mount a sub-oil motor:

Size	Assem-bly	Number of pis-tons	Piston diameter [mm]				
			8	9	10	12	16
2	UPD	2	1.1	1.4	1.8	2.5	4.5
			0.80	*1.02*	*1.26*	*1.8*	*3.22*
			700	700	700	700	500
	UPZ	3	2.1	2.7	3.3	4.8	
			1.50	*1.92*	*2.37*	*3.39*	
			700	700	500	500	
		5	3.5	4.5	5.5	8.0	
			2.51	*3.18*	*3.93*	*5.65*	
			700	700	500	500	

8.0	= guide value of the delivery volume Qth [l/min] at 1450 rpm
5.65	= geometric displacement Vg[cm³/rev]
500	= max. allowable operating pressure pmax [bar]

All radial piston pumps are available with a second shaft end (type GP2) to mount a gear pump type 2BK7 (see sect. 3.1) as well (HP/LP pumps).

A volume flow differing from the actual values in the charts can be realized by using different piston diameters or special strokes.

Type designation:

SYNTAX (only HP-pump):

ASSEMBLY / number of pistons – operating pressure – displacement

SYNTAX (HP/LP-pump):

ASSEMBLY / number of pistons – operating pressure – displacement / 2nd shaft end – GP-part

UPZ/	O5	-700	-3,18	GP2	GP-part

GP	Details of the gear pump (Optional see 2.1 and 6.3)
GP 2	Design with 2nd shaft end (omit if gear pump is specified
3.18	displacement of the pump [3.18cm³/rev]
700	Max operating pressure (here 700 Bar)
O5	number of pistons (here 5 pieces)
UPZ	assembly UPZ

4.3 OVERVIEW SUB-OIL MOTORS:

General information:

Three-phase asynchronous motor 230/400 V and 400/690 V respectively

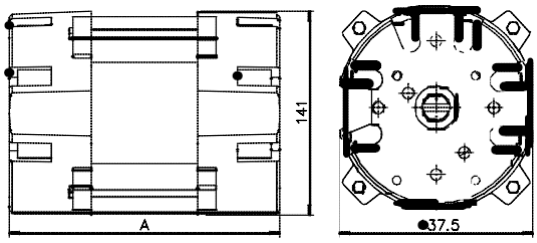
One-phase alternating current motor 230 V / 50 Hz

Isolation category H

Protection category IP 10

Voltage tolerance ± 5%

Operating mode S3-30%



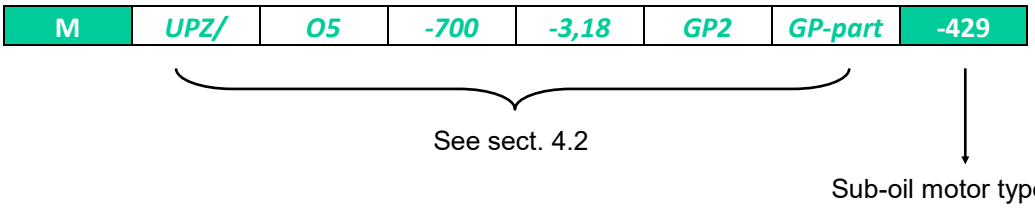
Three-phase asynchronous motor								
Type	P_N [kW]	Number of poles	n_N [rpm]	I_N [A] 230V	I_N [A] 400V	M_A/M_N	m [kg]	Measure 'A'
624	0.55	6	920	3.6	2.1	1.8	7.5	168
425	0.75	4	1400	4.1	2.4	2.8	5.8	163
426	1.10	4	1400	4.6	2.7	2.3	9.5	168
427	1.50	4	1400	7.1	4.1	2.3	10.0	183
428	2.20	4	1380	9.6	5.6	2.1	12.0	198
429	3.00	4	1380	12.8	7.4	2.0	13.2	218
430	4.00	4	1390	17.0	9.8	1.8	15.0	243
431	5.20	4	1380	22.2	12.8	1.8	18.0	268
270	2.20	2	2790	10.0	5.8	2.3		183
240	3.00	2	2810	12.1	7.1	2.5		228

One-phase alternating current motor								
Type	P_N [kW]	Number of poles	n_N [rpm]	I_N [A]	condenser [µF]	M_A/M_N	m [kg]	Measure 'A'
446	1.10	4	1380	11.2	40	0.78	8.0	198
447	1.50	4	1380	12.5	60	0.80	9.5	218
448	2.20	4	1390	14.1	80	0.71		243
221	1.50	2	2780	10.8	60	0.65		198
222	1.80	2	2770	14.5	60	0.58		218

Type designation of the motor pump:

SYNTAX *(sub-oil motor with HP-pump and HP/LP-pump respectively):*

M *HP-pump and HP/LP-pump respectively* – type of sub-oil motor



5. HYDRAULIC AGGREGATES

All **WIMMER** radial piston pumps can be delivered together with drive motor, pump support, valves and hydraulic oil tank as well as with a number of different attachments as complete hydraulic aggregates. Customer requests (e.g. design of tank lid) can be taken into consideration to work out a tailor-made solution.

WIMMER hydraulic aggregates can be delivered as tank aggregates up to 1000 bar. Usually a flanged motor which is mounted vertically on the container lid, is used for tank aggregates. Therefore the pumps are operating in the oil. Pumps mounted with an sub-oil motor are also available.

Tank: The following tank sizes are available as standard: 7 - 12 - 20 - 30 - 40 liters effective volume.

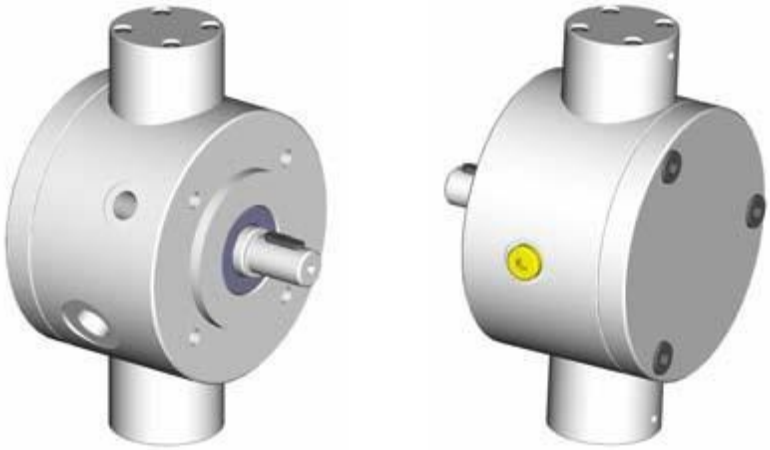
Container: lid and pump support are usually made of light alloy.

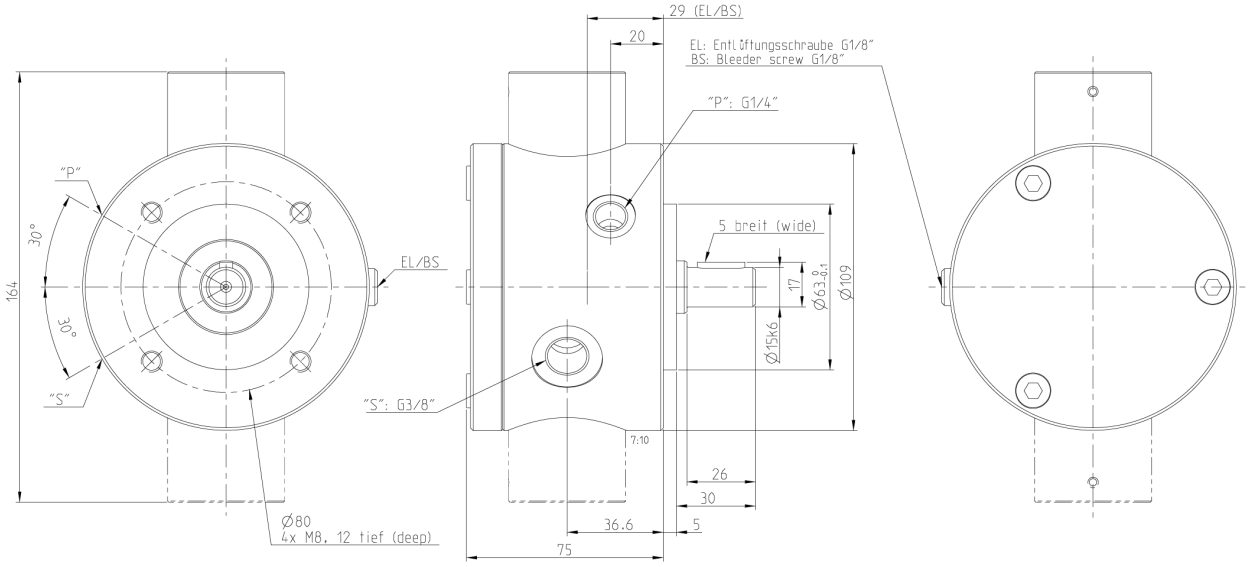
Larger containers up to 1250 liters oil volume and special dimensions are available upon request.

6. DATA SHEETS

6.1 Radial Piston Pumps (standard)

Assembly PPZ/01, PPZ/02

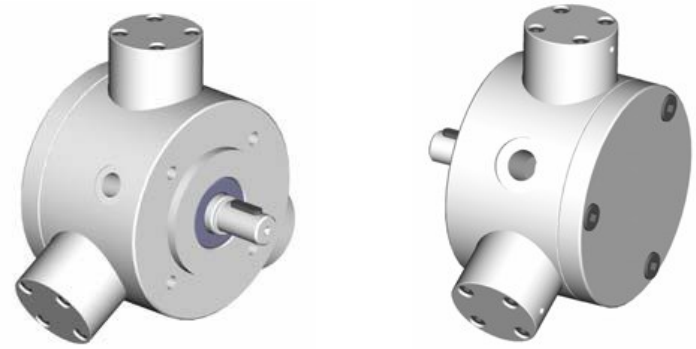


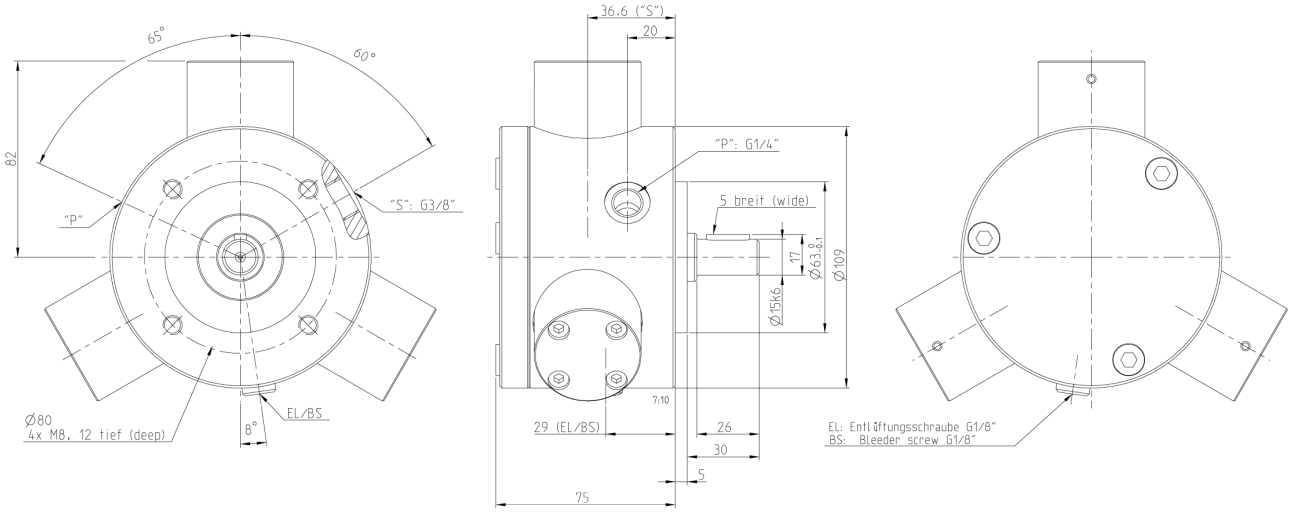


$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
0.3	0.21	700	2.2	PPZ/01-700-0.21
0.5	0.38	700	2.2	PPZ/01-700-0.38
0.8	0.59	500	2.2	PPZ/01-500-0.59
0.6	0.42	700	2.5	PPZ/02-700-0.42
1.0	0.76	700	2.5	PPZ/02-700-0.76
1.6	1.18	500	2.5	PPZ/02-500-1.18

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request.

Assembly PPZ/03

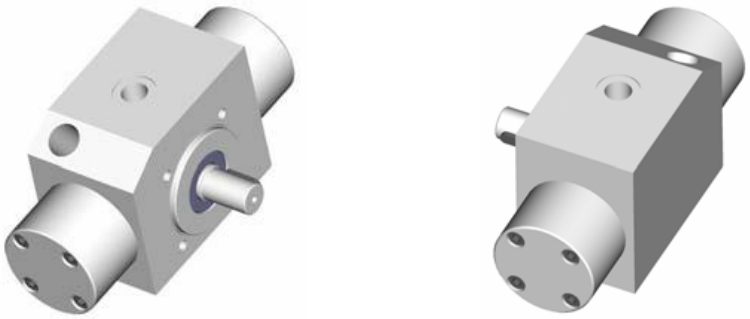


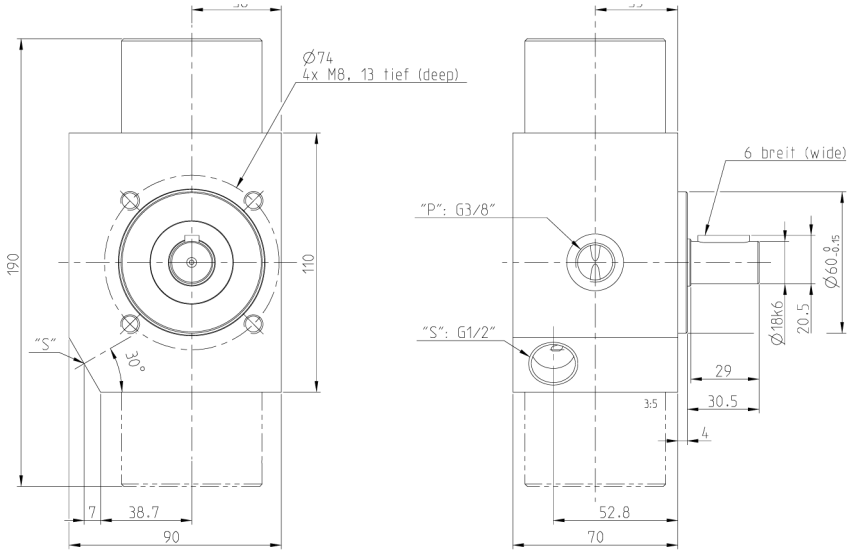


$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
0.9	0.63	700	2.8	PPZ/03-700-0.63
1.5	1.14	700	2.8	PPZ/03-700-1.14
1.8	1.30	500	2.8	PPZ/03-500-1.30
2.1	1.51	500	2.8	PPZ/03-500-1.51
2.4	1.77	500	2.8	PPZ/03-500-1.77

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PD/01, PD/02, PDS/01, PDS/02

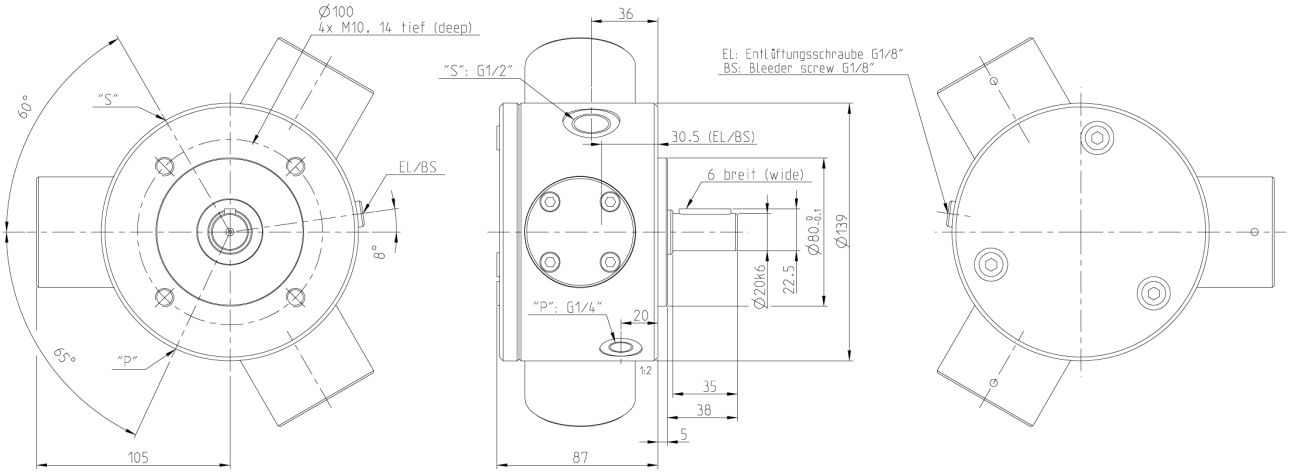




$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
0.3	0.22	700	2.5	PD(S)/01-700(1000)-0,22
0.5	0.40	700	2.5	PD(S)/01-700(1000)-0.40
0.64	0.44	700	2.8	PD(S)/02-700(1000)-0,44
0.7	0.51	700	2.5	PD(S)/01-700(1000)-0.51
0.9	0.63	700	2.5	PD/01-700-0.63
1.2	0.90	700	2.5	PD/01-700-0.90
2.2	1.61	500	2.5	PD/01-500-1.61
1.1	0.80	700 (1000)	2.8	PD(S)/02-700(1000)-0.80
1.4	1.02	700 (1000)	2.8	PD(S)/02-700(1000)-1.02
1.8	1.26	700	2.8	PD/02-700-1.26
2.5	1.80	700	2.8	PD/02-700-1.80
4.5	3.22	500	2.8	PD/02-700-3.22

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

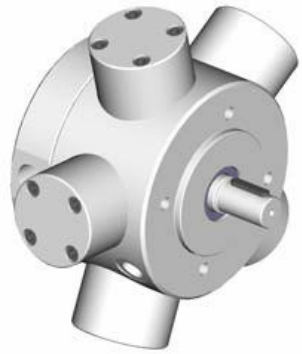
Assembly PZ/03

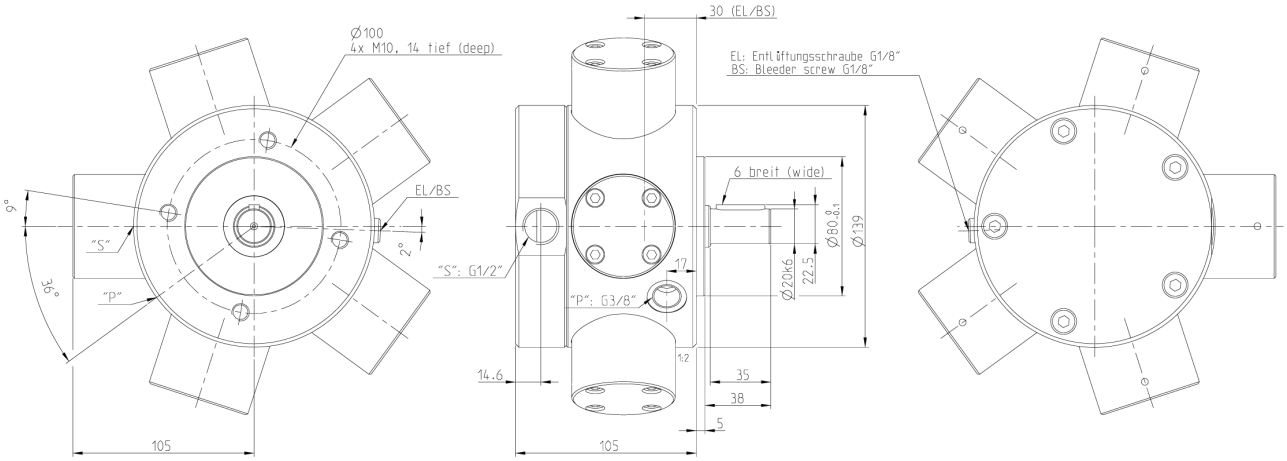


$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
1.2	0.84	700	5.4	PZ/03-700-0.84
2.1	1.50	700	5.4	PZ/03-700-1.50
2.7	1.92	700	5.4	PZ/03-700-1.92
3.3	2.37	500	5.4	PZ/03-500-2.37
4.8	3.39	500	5.4	PZ/03-500-3.39
8.7	6.03	250	5.4	PZ/03-250-6,03

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PZ/05

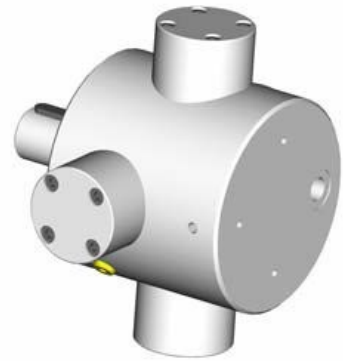


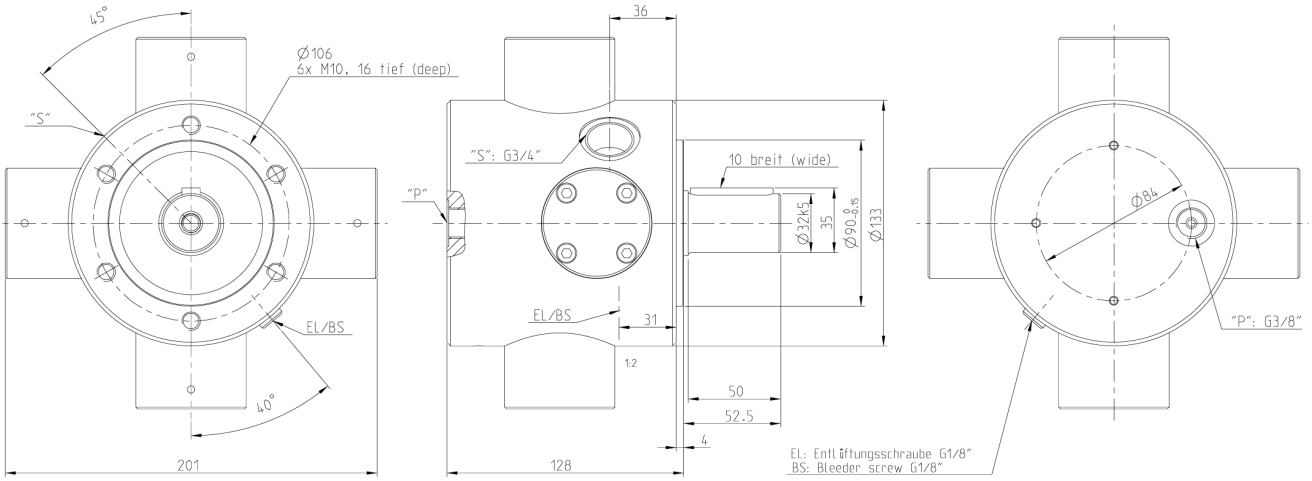


$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
2.0	1.41	700	6.7	PZ/05-700-1.41
3.5	2.51	700	6.7	PZ/05-700-2.51
4.5	3.18	700	6.7	PZ/05-700-3.18
4.8	3.37	500	6.7	PZ/05-700-3.37
5.1	3.52	500	6.7	PZ/05-700-3.52
5.5	3.93	500	6.7	PZ/05-700-3.93
6.5	4.48	500	6.7	PZ/05-700-4.48
7.0	4.81	500	6.7	PZ/05-700-4.81
8.0	5.65	500	6.7	PZ/05-700-5.65

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PM/04

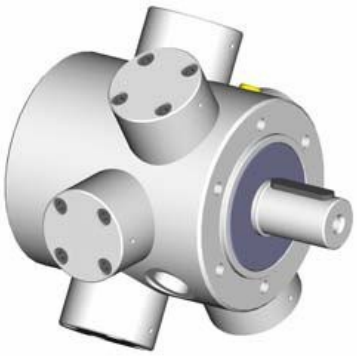


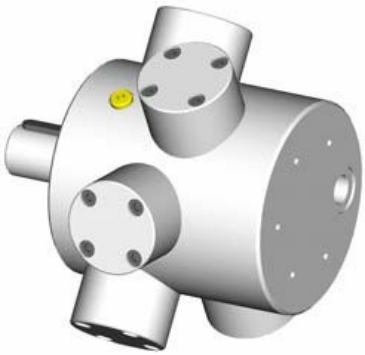


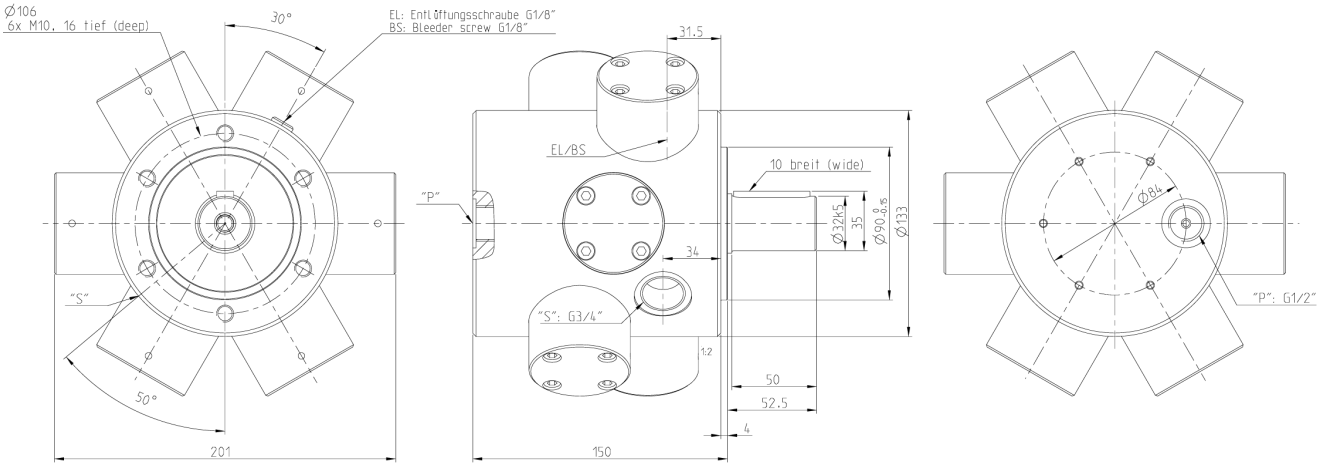
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
2.8	2.01	700	7.2	PM/04-700-2.01
3.2	2.21	700	7.2	PM/04-700-2.21
3.6	2.54	700	7.2	PM/04-700-2.54
4.0	2.76	700	7.2	PM/04-700-2.76
4.4	3.14	700	7.2	PM/04-700-3.14
5.3	3.72	700	7.2	PM/04-700-3.72
6.4	4.52	700	7.2	PM/04-700-4.52
11.4	8.04	500	7.2	PM/04-500-8.04

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PM/06



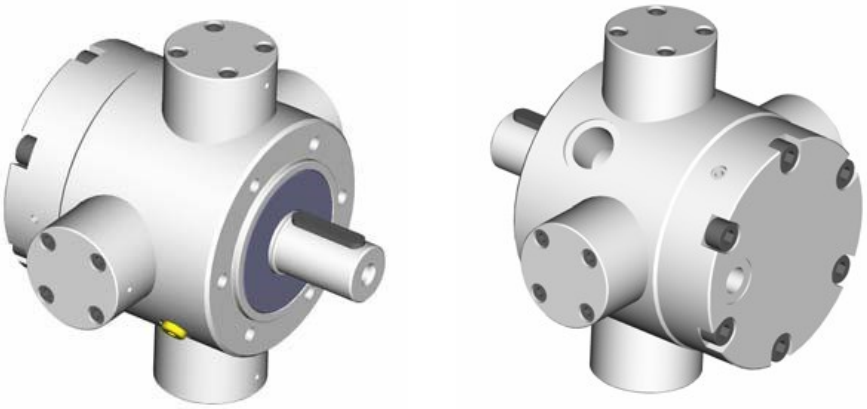


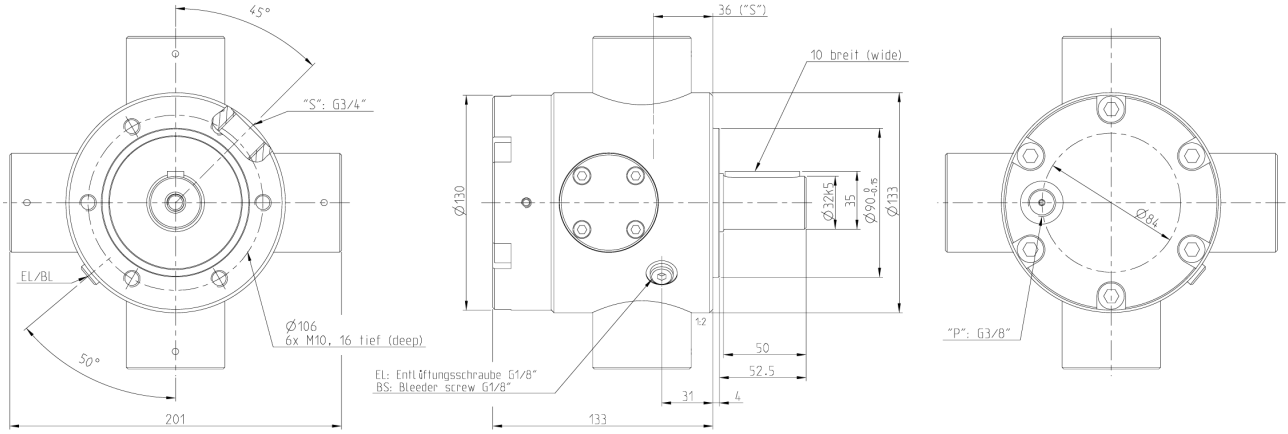


$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
4.2	3.02	700	8.9	PM/06-700-3.02
4.8	3.31	700	8.9	PM/06-700-3.31
5.4	3.82	700	8.9	PM/06-700-3.82
6.0	4.14	700	8.9	PM/06-700-4.14
6.6	4.71	700	8.9	PM/06-700-4.71
8.0	5.58	700	8.9	PM/06-700-5.58
9.6	6.79	700	8.9	PM/06-700-6.79
17.1	12.06	500	8.9	PM/06-500-12.06

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly P/04, PS/04



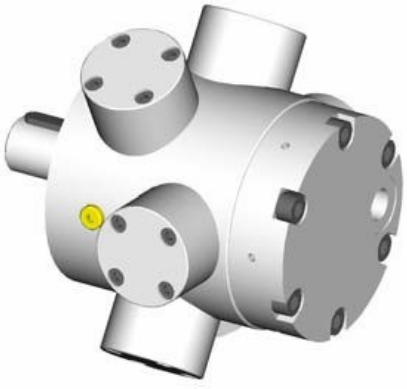


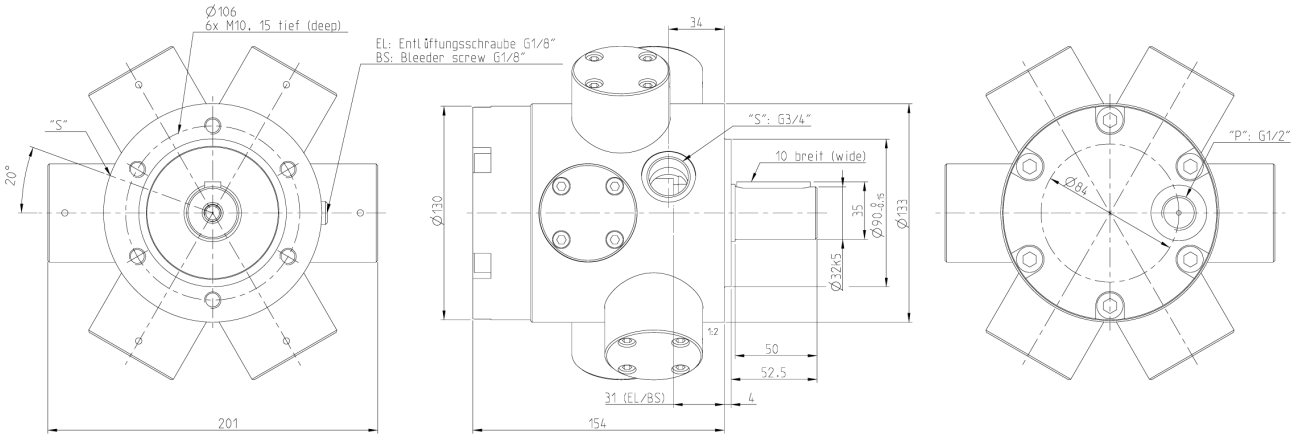
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
2.8	2.01	700 (1000)	9.0	P(S)/04-700(1000)-2.01
3.2	2.21	700 (1000)	9.0	P(S)/04-700(1000)-2.21
3.6	2.54	700 (1000)	9.0	P(S)/04-700(1000)-2.54
4.0	2.76	700	9.0	P/04-700-2.76
4.4	3.14	700	9.0	P/04-700-3.14
5.3	3.72	700	9.0	P/04-700-3.72
6.4	4.52	700	9.0	P/04-700-4.52
11.4	8.04	500	9.0	P/04-500-8.04

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request

Assembly P/06, PS/06



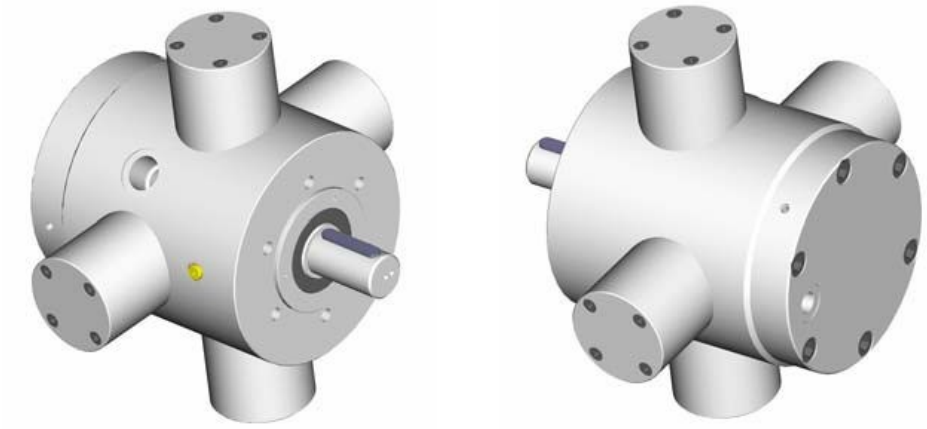


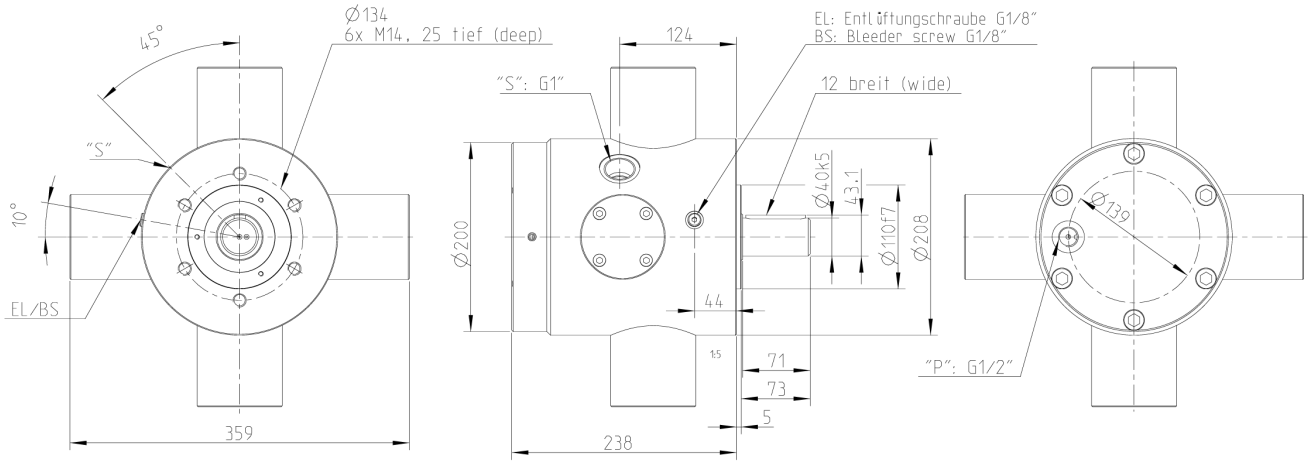
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
4.2	3.02	700 (1000)	11.6	P(S)/06-700(1000)-3.02
4.8	3.31	700 (1000)	11.6	P(S)/06-700(1000)-3.31
5.4	3.82	700 (1000)	11.6	P(S)/06-700(1000)-3.82
6.0	4.14	700	11.6	P/06-700-4.14
6.6	4.71	700	11.6	P/06-700-4.71
8.0	5.58	700	11.6	P/06-700-5.58
9.6	6.79	700	11.6	P/06-700-6.79
17.1	12.06	500	11.6	P/06-500-12.06

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

Assembly PW/04



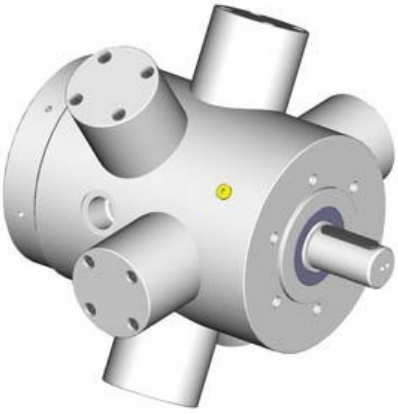


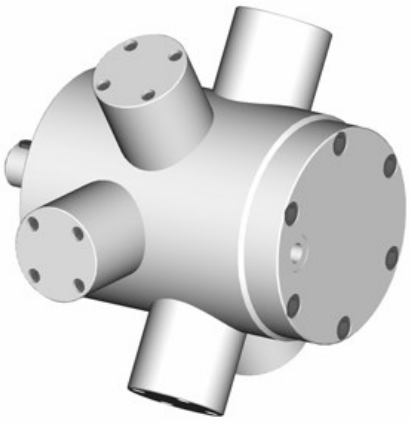
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
23.9	16.50	500	39	PW/04-500-16.50
28.0	19.31	500	39	PW/04-500-19.31
32.0	22.15	500	39	PW/04-500-22.15

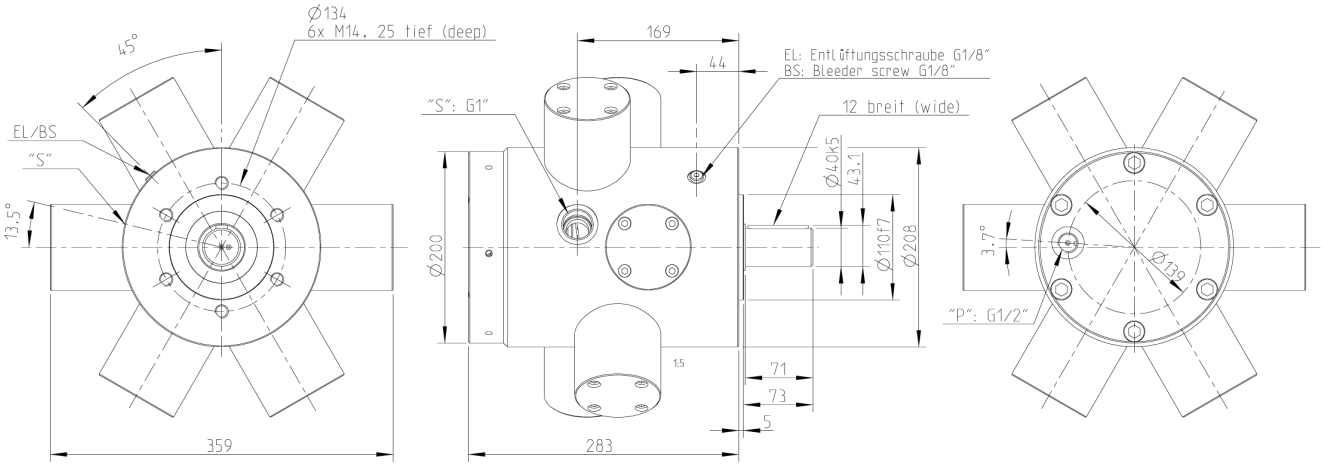
A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

Assembly PW/06







$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
35.9	24.75	500	48	PW/06-500-24.75
39.9	27.56	500	48	PW/06-500-27.56
42.0	28.97	500	48	PW/06-500-28.97
44.0	30.37	500	48	PW/06-500-30.37
48.1	33.19	500	48	PW/06-500-33.19

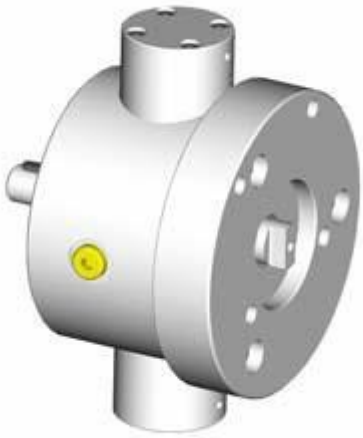
A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

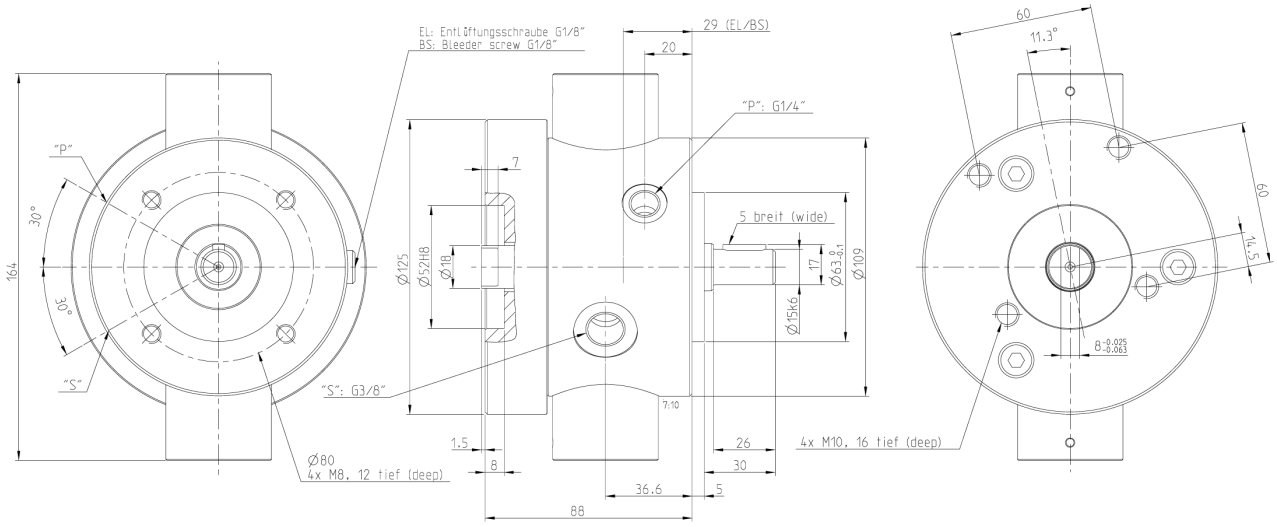
All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

6.2. Radial Piston Pump with second shaft end

Assembly PPZ/02…/GP2

for direct mounting a gear pump type ALP2BK7D(S)-… (see page 45)



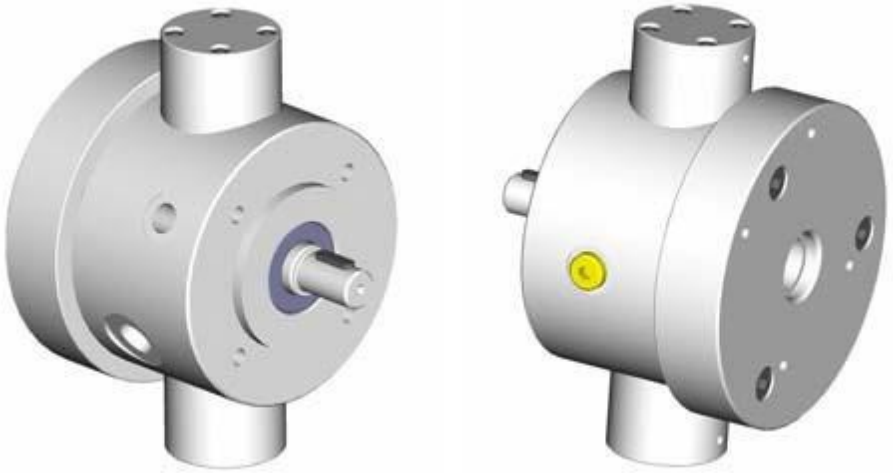


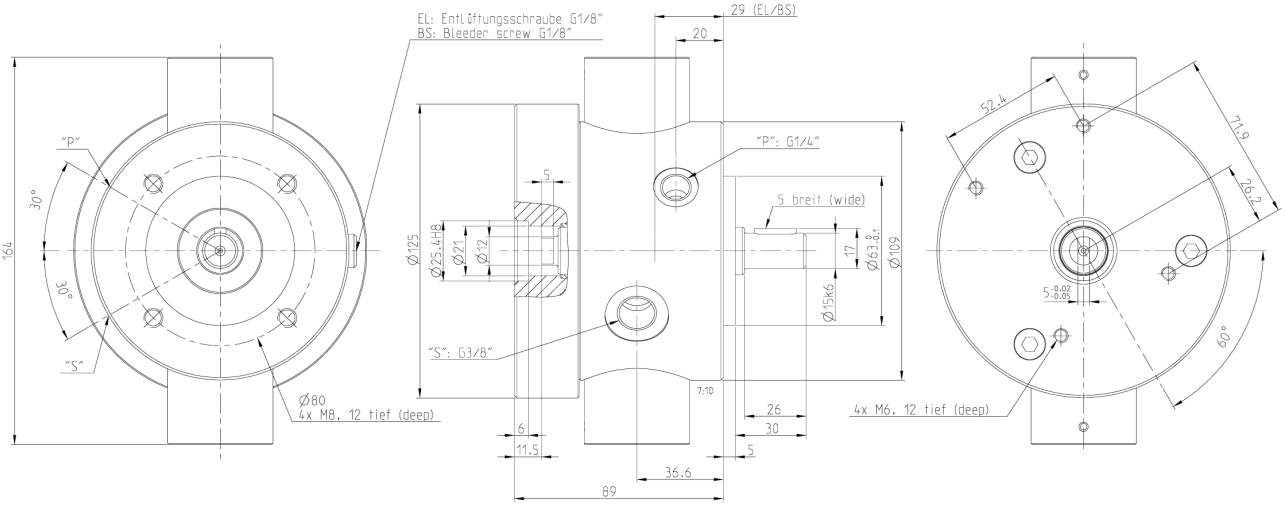
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
0.6	0.42	700	2.9	PPZ/02-700-0.42/GP2
1.0	0.76	700	2.9	PPZ/02-700-0.76/GP2
1.6	1.18	500	2.9	PPZ/02-500-1.18/GP2

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PPZ/02 … /GP1

for direct mounting a gear pump type 1PD(S)G-… (see page 44)



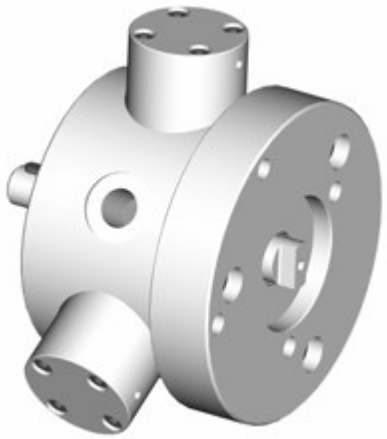


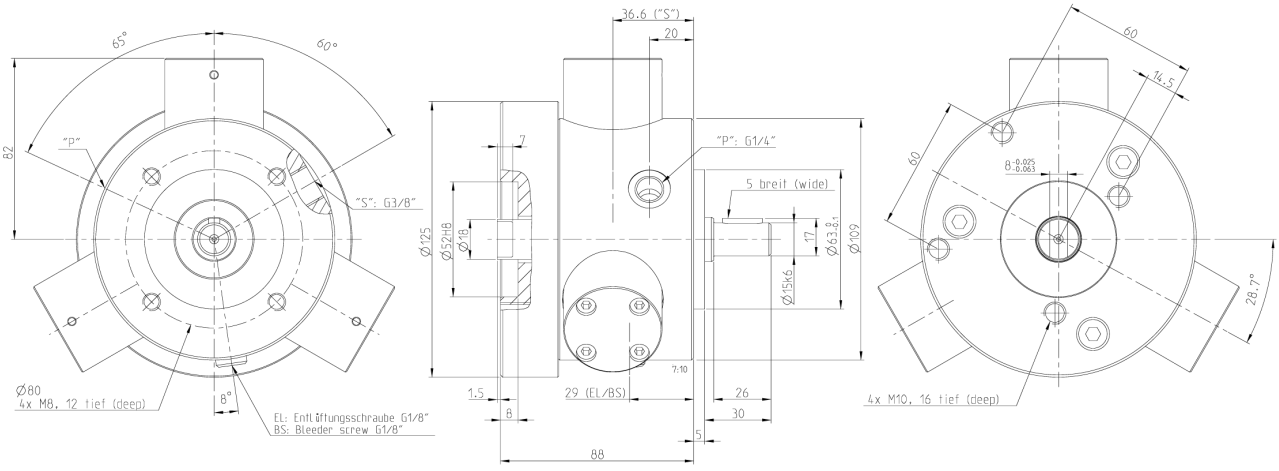
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
0.6	0.42	700	2.9	PPZ/02-700-0.42/GP1
1.0	0.76	700	2.9	PPZ/02-700-0.76/GP1
1.6	1.18	500	2.9	PPZ/02-500-1.18/GP1

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PPZ/03 … /G2

for direct mounting a gear pump type ALP2BK7D(S)-… (see page 45)



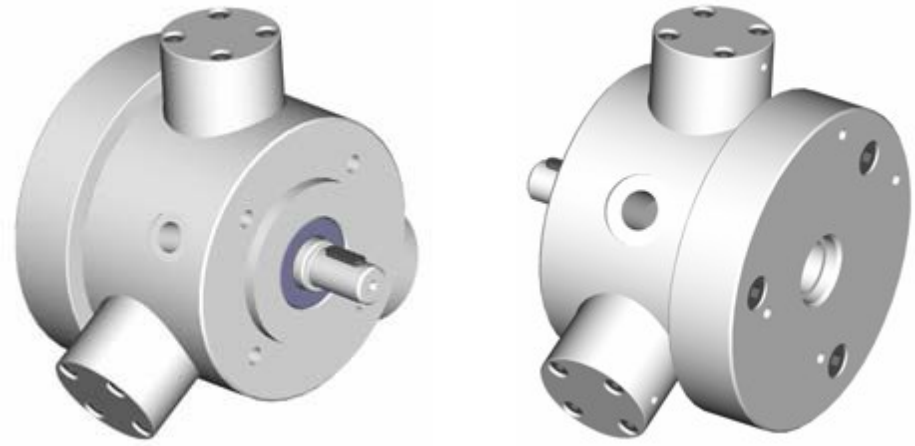


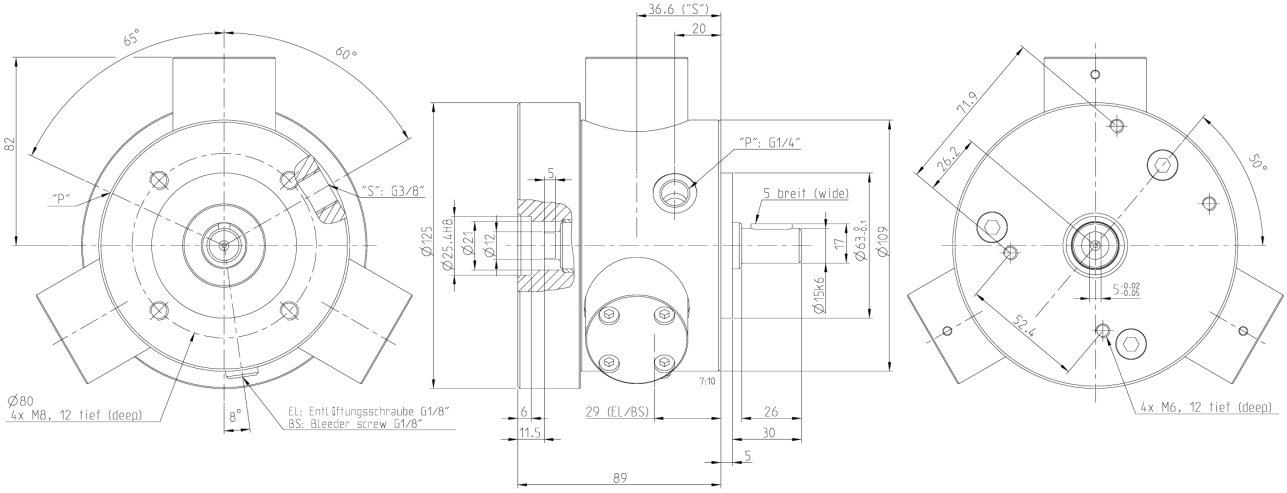
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
0.9	0.63	700	2.8	PPZ/03-700-0.63/GP2
1.5	1.14	700	2.8	PPZ/03-700-1.14/GP2
1.8	1.30	500	2.8	PPZ/03-500-1.30/GP2
2.1	1.51	500	2.8	PPZ/03-500-1.51/GP2
2.4	1.77	500	2.8	PPZ/03-500-1.77/GP2

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PPZ/03 … /GP1

for direct mounting a gear pump type 1PD(S)G-… (see page 44)



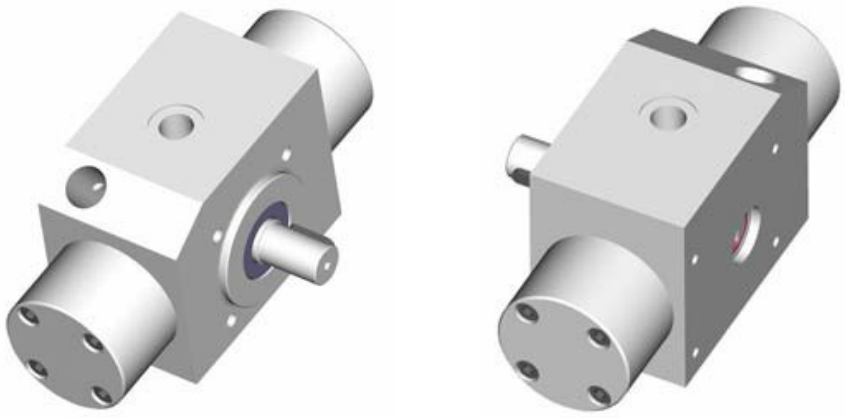


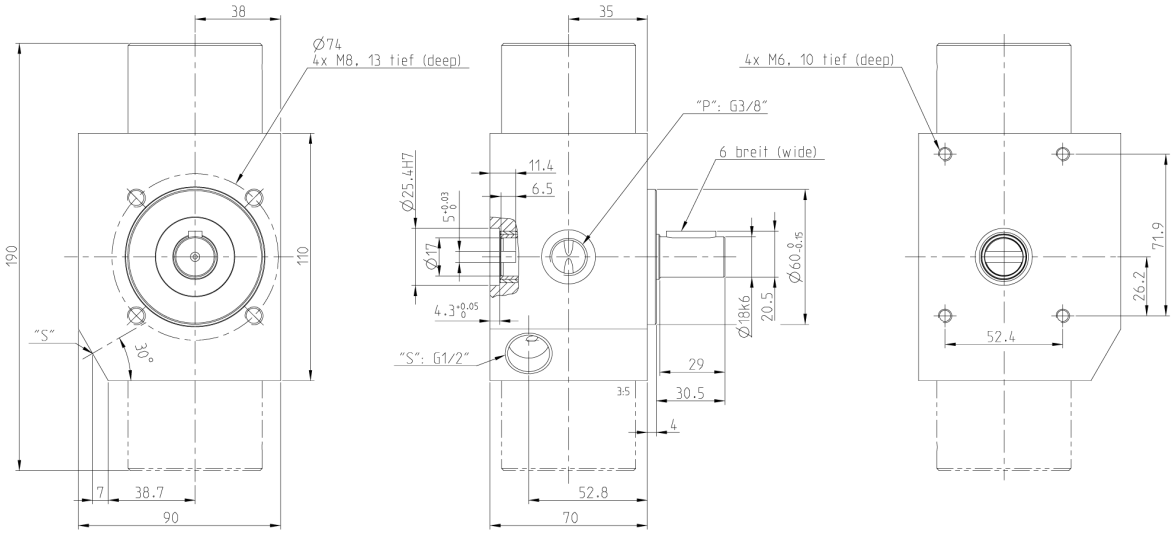
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
0.9	0.63	700	2.8	PPZ/03-700-0.63/GP1
1.5	1.14	700	2.8	PPZ/03-700-1.14/GP1
1.8	1.30	500	2.8	PPZ/03-500-1.30/GP1
2.1	1.51	500	2.8	PPZ/03-500-1.51/GP1
2.4	1.77	500	2.8	PPZ/03-500-1.77/GP1

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PD/02… /GP1

for direct mounting a gear pump type 1PD(S)G-… (see page 44)



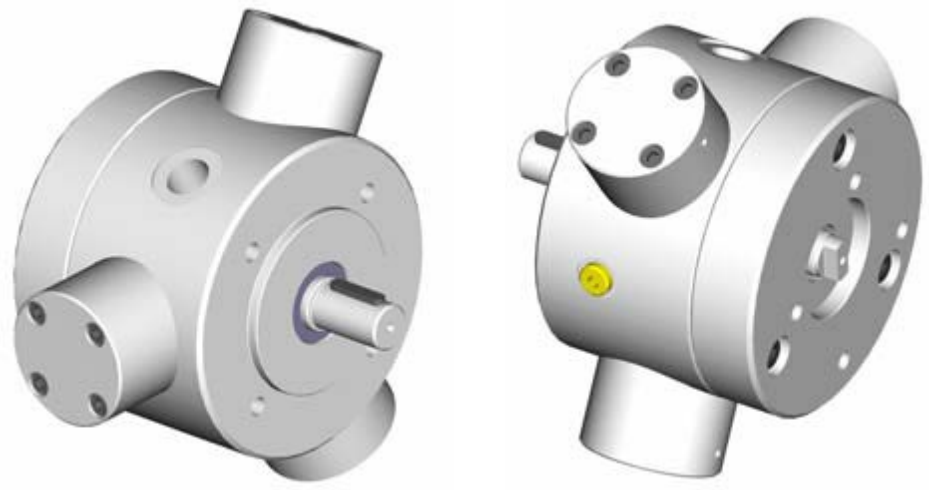


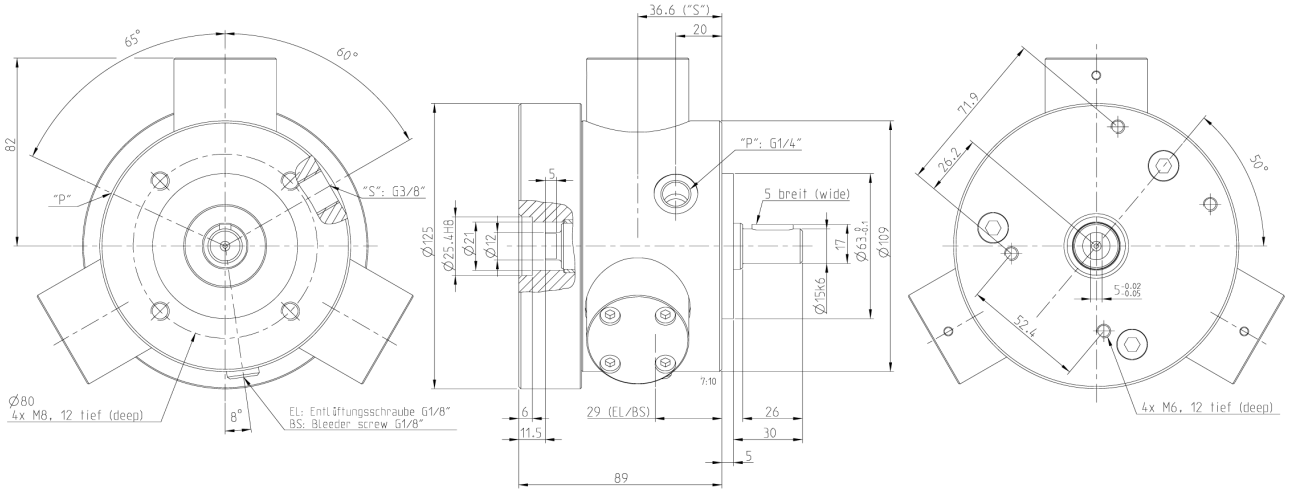
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
1.1	0.80	700	2.8	PD/02-700-0.80/GP1
1.4	1.02	700	2.8	PD/02-700-1.02/GP1
1.8	1.26	700	2.8	PD/02-700-1.26/GP1
2.5	1.80	700	2.8	PD/02-700-1.80/GP1
4.5	3.22	500	2.8	PD/02-700-3.22/GP1

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PZ/03… /GP2

for direct mounting a gear pump type ALP2BK7D(S)-… (see page 45)



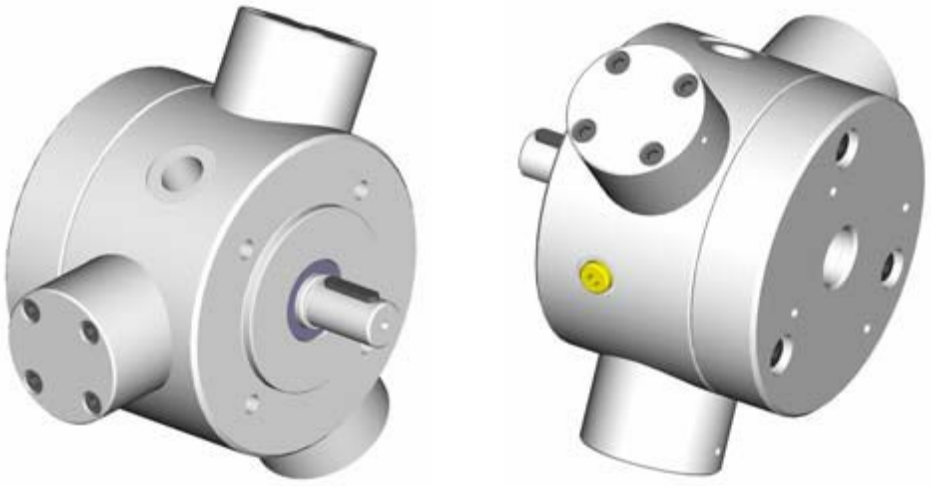


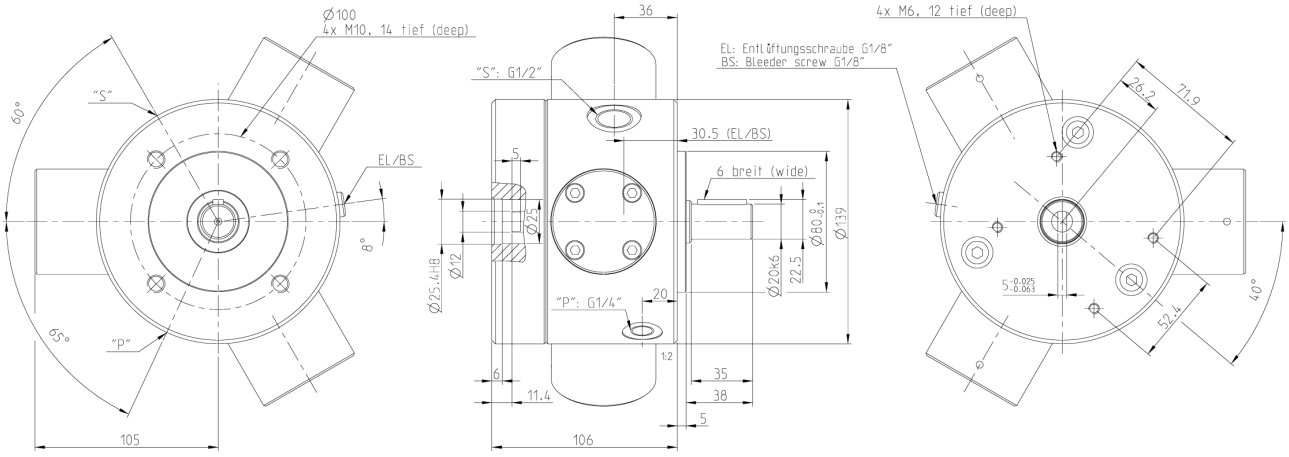
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	M [kg]	Pump designation
1.2	0.84	700	5.9	PZ/03-700-0.84/GP2
2.1	1.50	700	5.9	PZ/03-700-1.50/GP2
2.7	1.92	700	5.9	PZ/03-700-1.92/GP2
3.3	2.37	500	5.9	PZ/03-500-2.37/GP2
4.8	3.39	500	5.9	PZ/03-500-3.39/GP2

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PZ/03… /GP1

for direct mounting a gear pump type 1PD(S)G-… (see page 44)



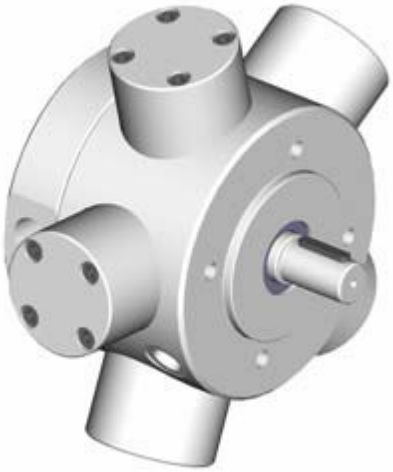


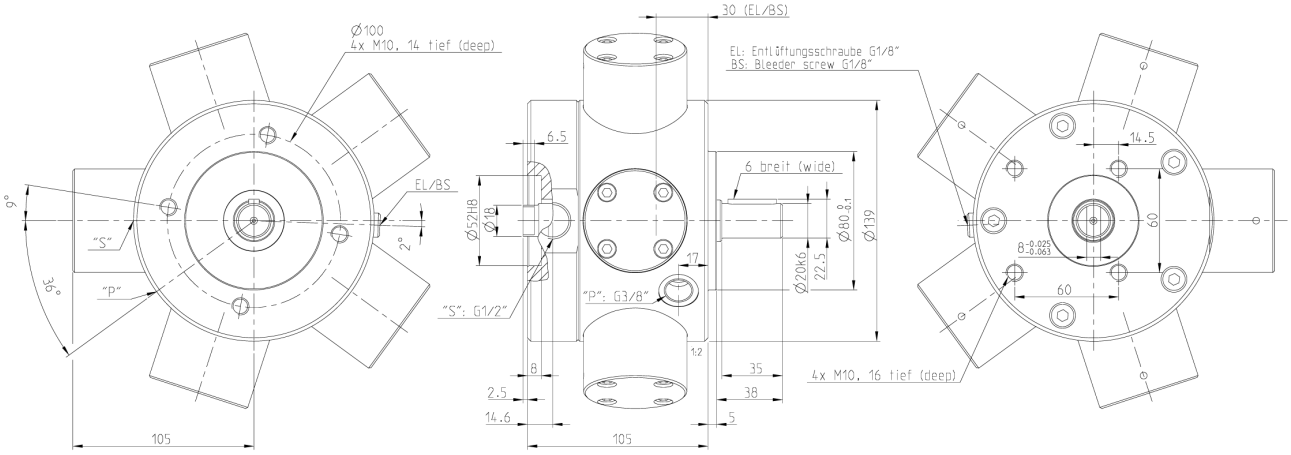
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
1.2	0.84	700	5.9	PZ/03-700-0.84/GP1
2.1	1.50	700	5.9	PZ/03-700-1.50/GP1
2.7	1.92	700	5.9	PZ/03-700-1.92/GP1
3.3	2.37	500	5.9	PZ/03-500-2.37/GP1
4.8	3.39	500	5.9	PZ/03-500-3.39/GP1

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PZ/05… /GP2

for direct mounting a gear pump type ALP2BK7D(S)-… (see page 45)



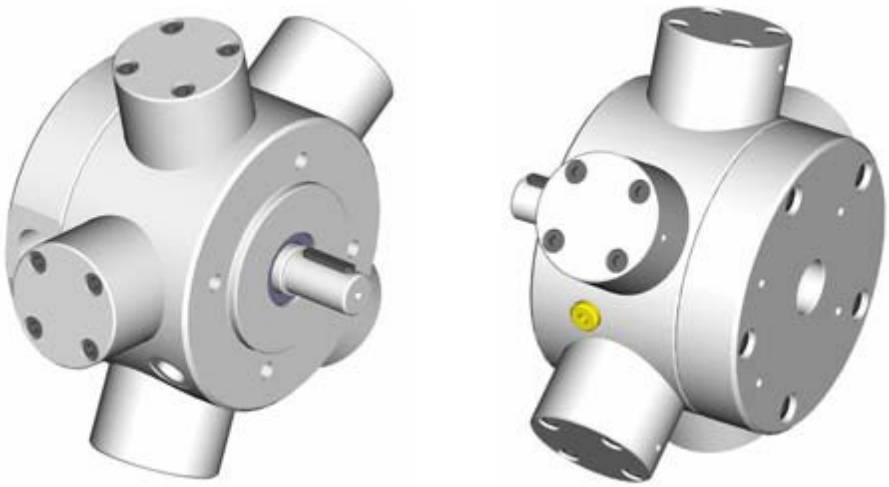


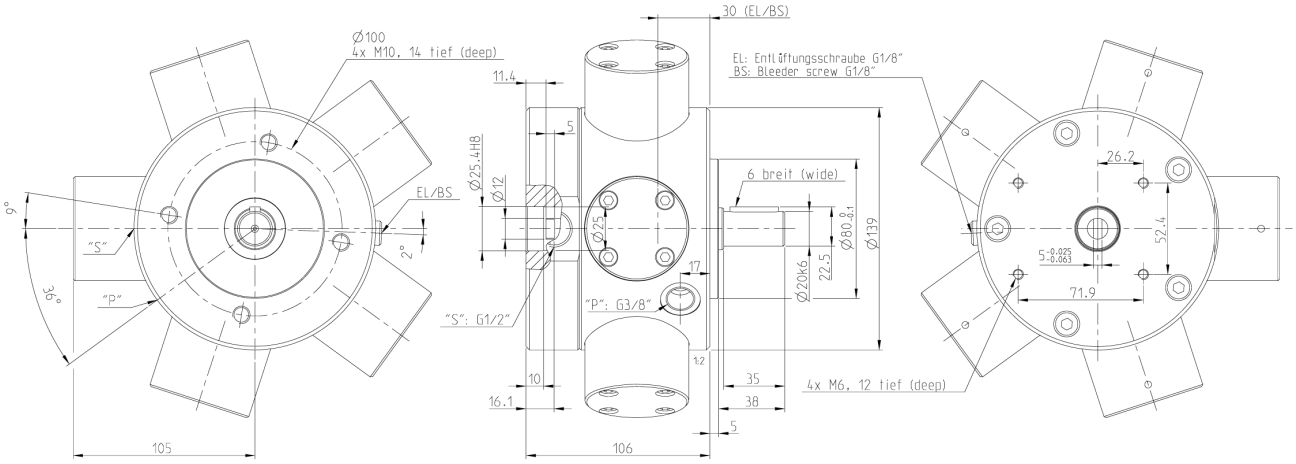
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
2.0	1.41	700	6.7	PZ/05-700-1.41/GP2
3.5	2.51	700	6.7	PZ/05-700-2.51/GP2
4.5	3.18	700	6.7	PZ/05-700-3.18/GP2
4.8	3.37	500	6.7	PZ/05-700-3.37/GP2
5.1	3.52	500	6.7	PZ/05-700-3.52/GP2
5.5	3.93	500	6.7	PZ/05-700-3.93/GP2
6.5	4.48	500	6.7	PZ/05-700-4.48/GP2
7.0	4.81	500	6.7	PZ/05-700-4.81/GP2
8.0	5.65	500	6.7	PZ/05-700-5.65/GP2

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly PZ/05… /GP1

for direct mounting a gear pump type 1PD(S)G-… (see page 44)

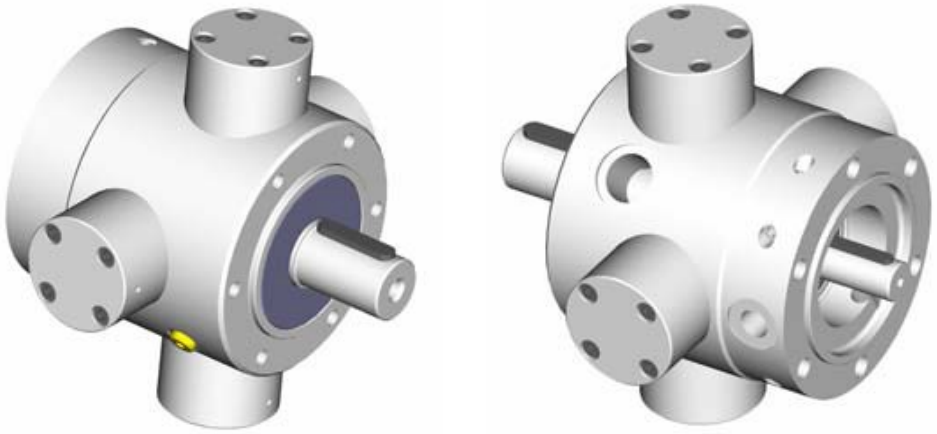


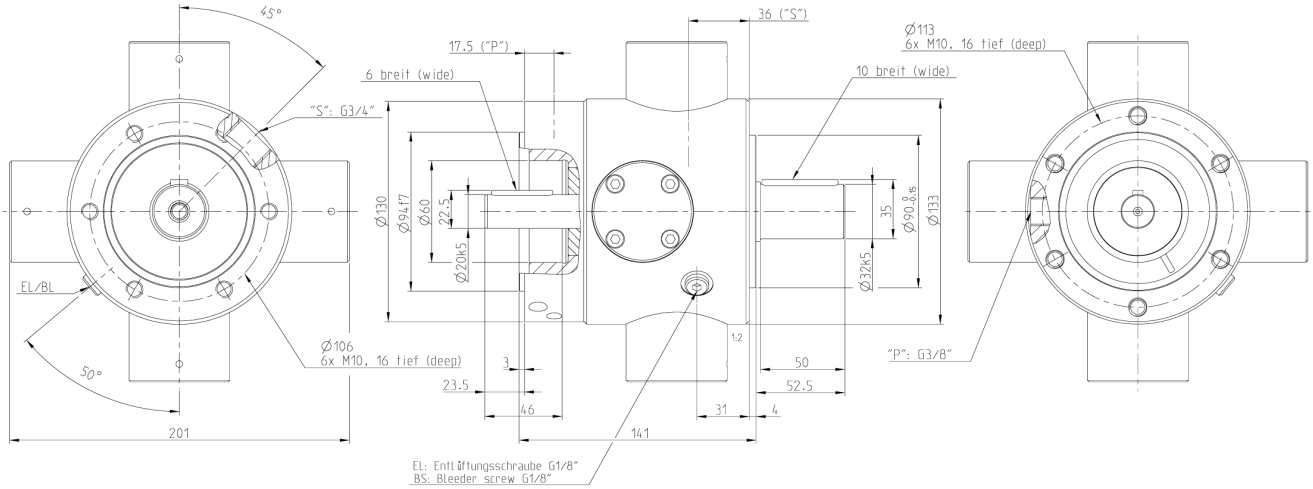


$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
2.0	1.41	700	6.7	PZ/05-700-1.41/GP1
3.5	2.51	700	6.7	PZ/05-700-2.51/GP1
4.5	3.18	700	6.7	PZ/05-700-3.18/GP1
4.8	3.37	500	6.7	PZ/05-700-3.37/GP1
5.1	3.52	500	6.7	PZ/05-700-3.52/GP1
5.5	3.93	500	6.7	PZ/05-700-3.93/GP1
6.5	4.48	500	6.7	PZ/05-700-4.48/GP1
7.0	4.81	500	6.7	PZ/05-700-4.81/GP1
8.0	5.65	500	6.7	PZ/05-700-5.65/GP1

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes. Further information upon request

Assembly P/04…/I, PS/04…/I





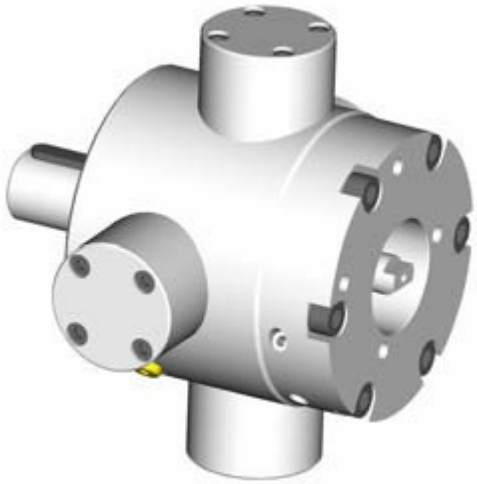
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
2.8	2.01	700 (1000)	9.0	P(S)/04-700(1000)-2.01/I
3.2	2.21	700 (1000)	9.0	P(S)/04-700(1000)-2.21/I
3.6	2.54	700 (1000)	9.0	P(S)/04-700(1000)-2.54/I
4.0	2.76	700	9.0	P/04-700-2.76/I
4.4	3.14	700	9.0	P/04-700-3.14/I
5.3	3.72	700	9.0	P/04-700-3.72/I
6.4	4.52	700	9.0	P/04-700-4.52/I
11.4	8.04	500	9.0	P/04-500-8.04/I

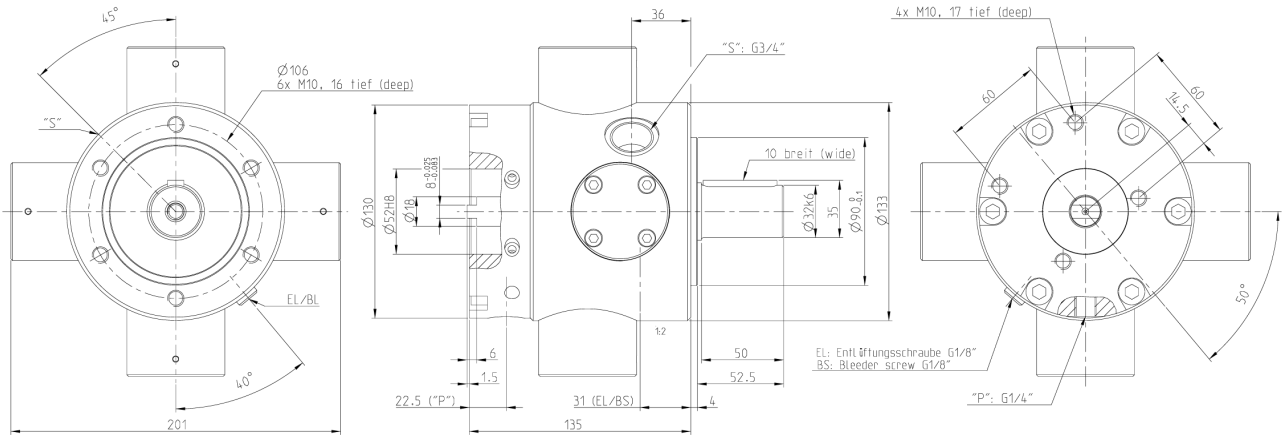
A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

Assembly P/04.../GP2, PS/04…/GP2

for direct mounting a gear pump type ALP2BK7D(S)-… (see page 45)



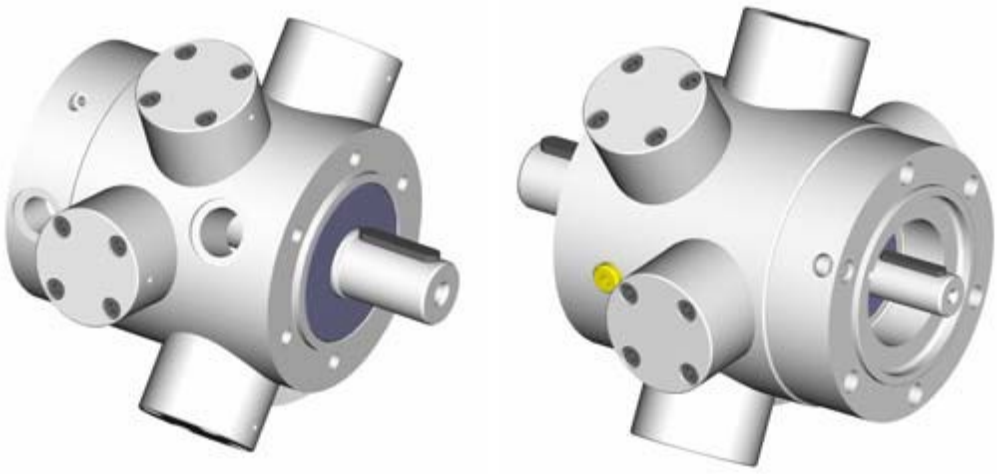


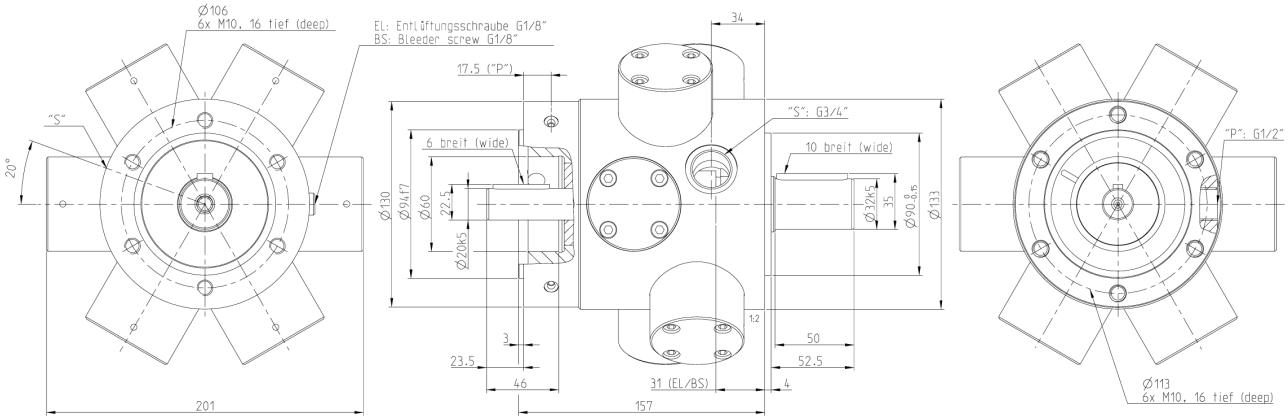
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/U]	$p_{max.}$ [bar]	m [kg]	Pump designation
2.8	2.01	700 (1000)	9.0	P(S)/04-700(1000)-2.01/GP2
3.2	2.21	700 (1000)	9.0	P(S)/04-700(1000)-2.21/GP2
3.6	2.54	700 (1000)	9.0	P(S)/04-700(1000)-2.54/GP2
4.0	2.76	700	9.0	P/04-700-2.76/GP2
4.4	3.14	700	9.0	P/04-700-3.14/GP2
5.3	3.72	700	9.0	P/04-700-3.72/GP2
6.4	4.52	700	9.0	P/04-700-4.52/GP2
11.4	8.04	500	9.0	P/04-500-8.04/GP2

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

Assembly P/06… /I, PS/06… /I





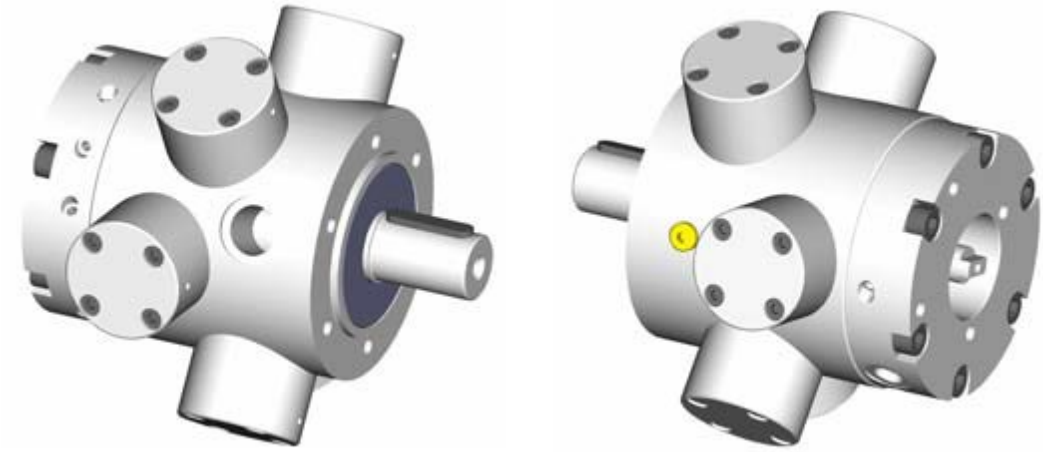
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
4.2	3.02	700 (1000)	11.6	P(S)/06-700(1000)-3.02/I
4.8	3.31	700 (1000)	11.6	P(S)/06-700(1000)-3.31/I
5.4	3.82	700 (1000)	11.6	P(S)/06-700(1000)-3.82/I
6.0	4.14	700	11.6	P/06-700-4.14/I
6.6	4.71	700	11.6	P/06-700-4.71/I
8.0	5.58	700	11.6	P/06-700-5.58/I
9.6	6.79	700	11.6	P/06-700-6.79/I
17.1	12.06	500	11.6	P/06-500-12.06/I

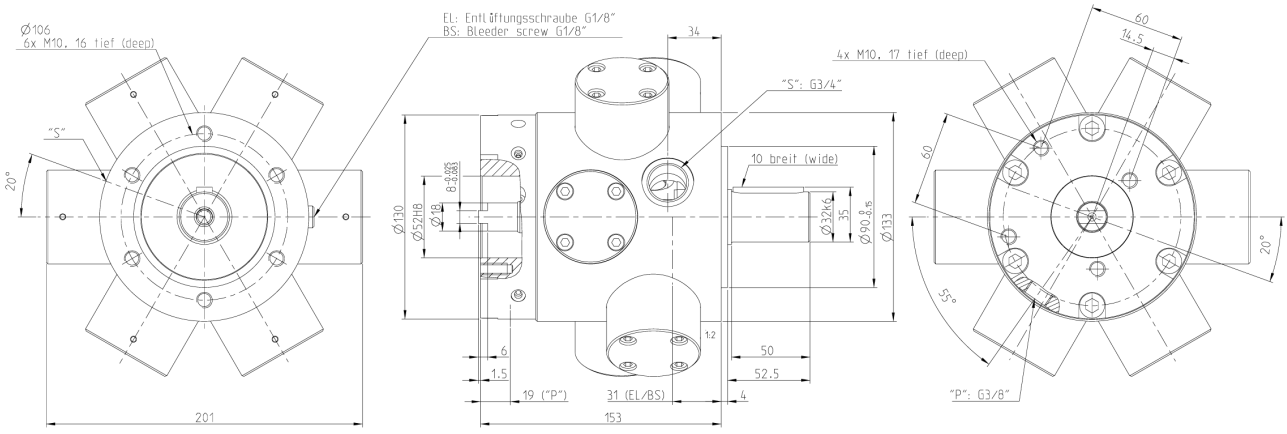
A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

Assembly P/06… /GP2, PS/06… /GP2

for direct mounting a gear pump type ALP2BK7D(S)-… (see page 45)



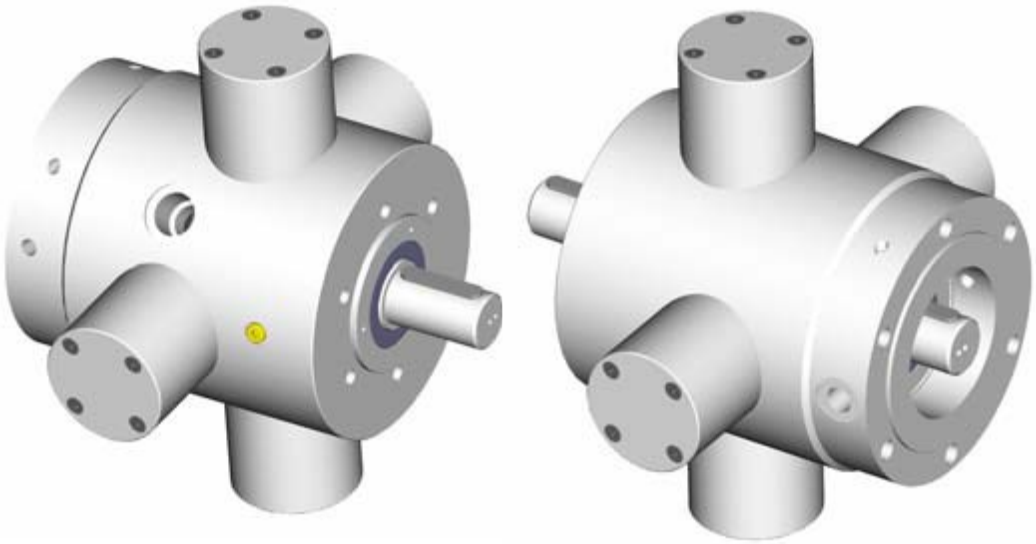


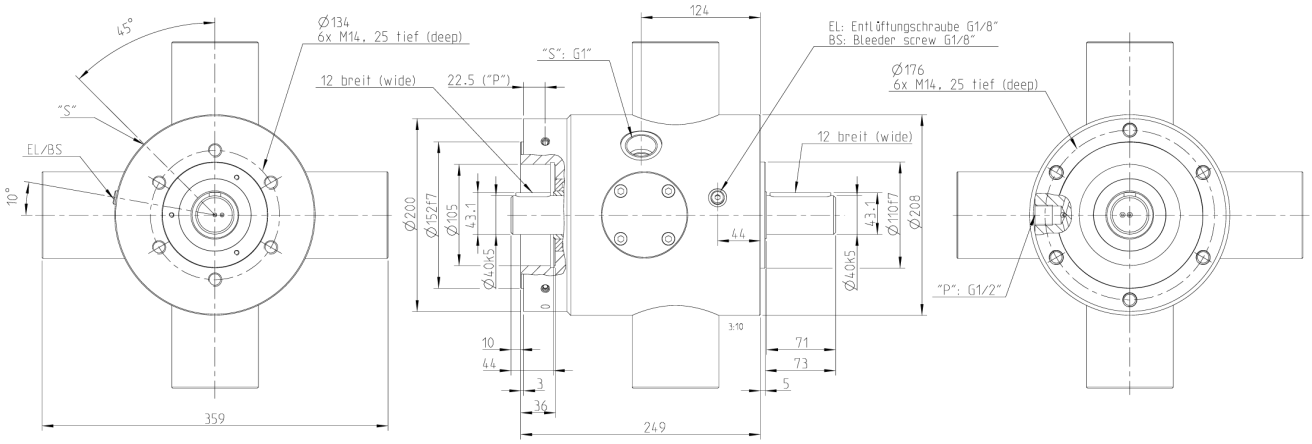
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/U]	$p_{max.}$ [bar]	m [kg]	Pump designation
4.2	3.02	700 (1000)	11.6	P(S)/06-700(1000)-3.02/GP2
4.8	3.31	700 (1000)	11.6	P(S)/06-700(1000)-3.31/GP2
5.4	3.82	700 (1000)	11.6	P(S)/06-700(1000)-3.82/GP2
6.0	4.14	700	11.6	P/06-700-4.14/GP2
6.6	4.71	700	11.6	P/06-700-4.71/GP2
8.0	5.58	700	11.6	P/06-700-5.58/GP2
9.6	6.79	700	11.6	P/06-700-6.79/GP2
17.1	12.06	500	11.6	P/06-500-12.06/GP2

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

Assembly PW/04… /I



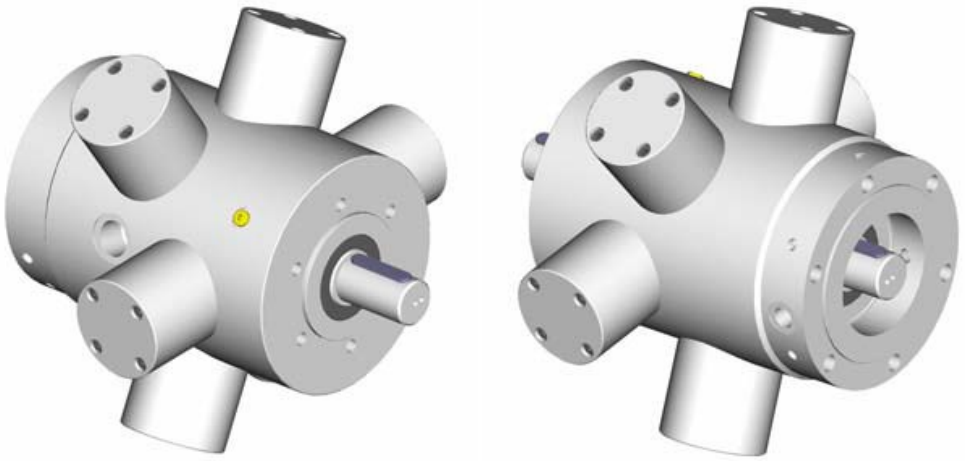


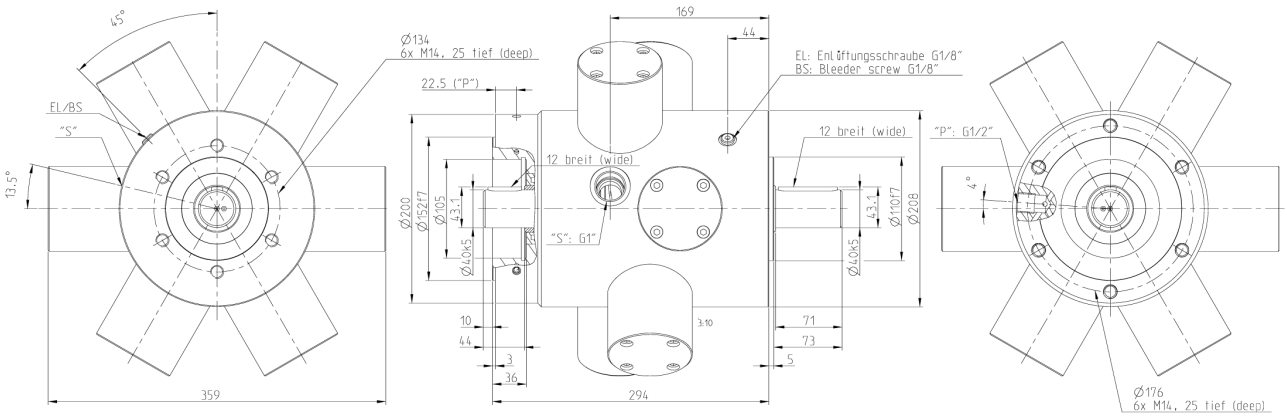
$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
23.9	16.50	500	39	PW/04-500-16.50/I
28.0	19.31	500	39	PW/04-500-19.31/I
32.0	22.15	500	39	PW/04-500-22.15/I

A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

Assembly PW/06… /I





$Q_{theor.}$ [l/min] (at 1450 rpm)	V_g [cm³/rev]	$p_{max.}$ [bar]	m [kg]	Pump designation
35.9	24.75	500	48	PW/06-500-24.75/I
39.9	27.56	500	48	PW/06-500-27.56/I
42.0	28.97	500	48	PW/06-500-28.97/I
44.0	30.37	500	48	PW/06-500-30.37/I
48.1	33.19	500	48	PW/06-500-33.19/I

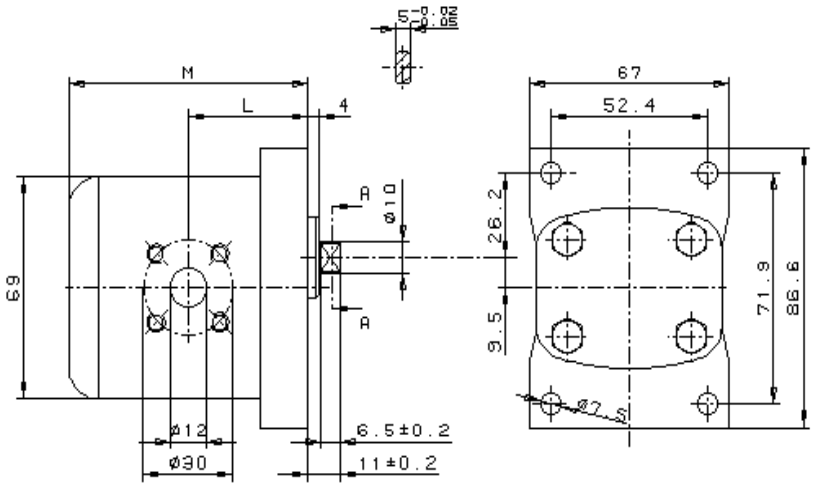
A volume flow differing from the actual values in the charts can be realized by using different piston diameters and/or special strokes.

All pumps are deliverable with several pressure connections as well as with different delivery flows per each pressure connection. Further information upon request.

6.3 GEAR PUMPS

Assembly 1PD(S)G-...

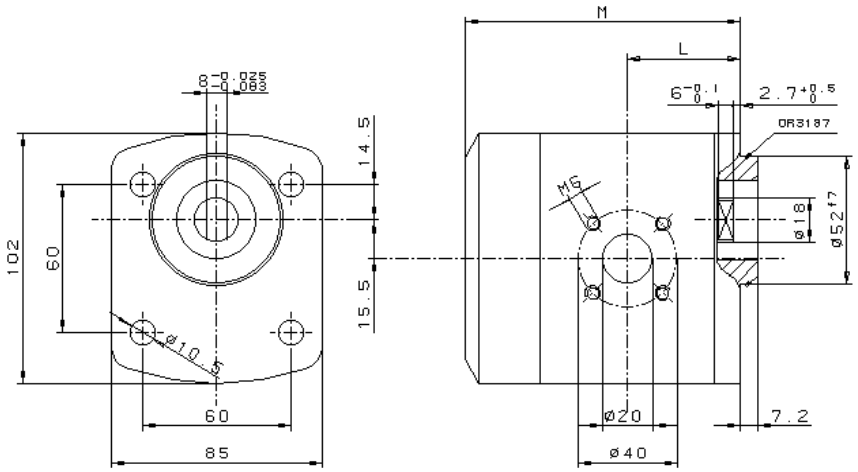
(second shaft end type GP1 of the radial piston pump is required)



displace-ment [cm³/rev]	M [mm]	L [mm]
1.1	75	34
1.3	76	34.5
1.6	77	35
2.1	79	36
2.7	81	37
3.2	83	38
3.7	85	39
4.2	87	40
4.8	89	41
5.8	93	43
8.0	101	47

Assembly ALP2BK7D(S)-…

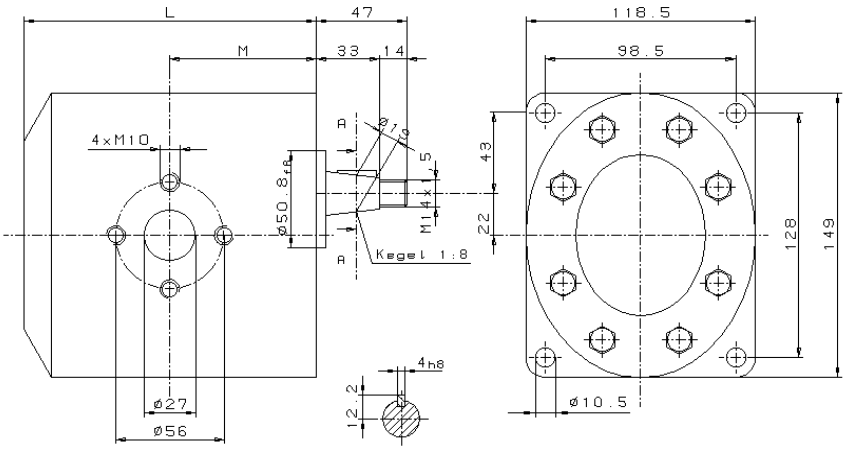
(second shaft end type GP2 of the radial piston pump is required)



displace-ment [cm³/rev]	M [mm]	L [mm]
4.5	91	37.3
6.4	94	38.5
7.0	95	44.8
8.3	97	45.8
9.6	99	40.6
11.5	102	45
14.1	106	45
16.0	109	45
17.9	112	53.3
21.1	117	45
23.7	121	52.5
25.5	124	59.3
28.2	128	61.3

Assembly ALP3D(S)-…

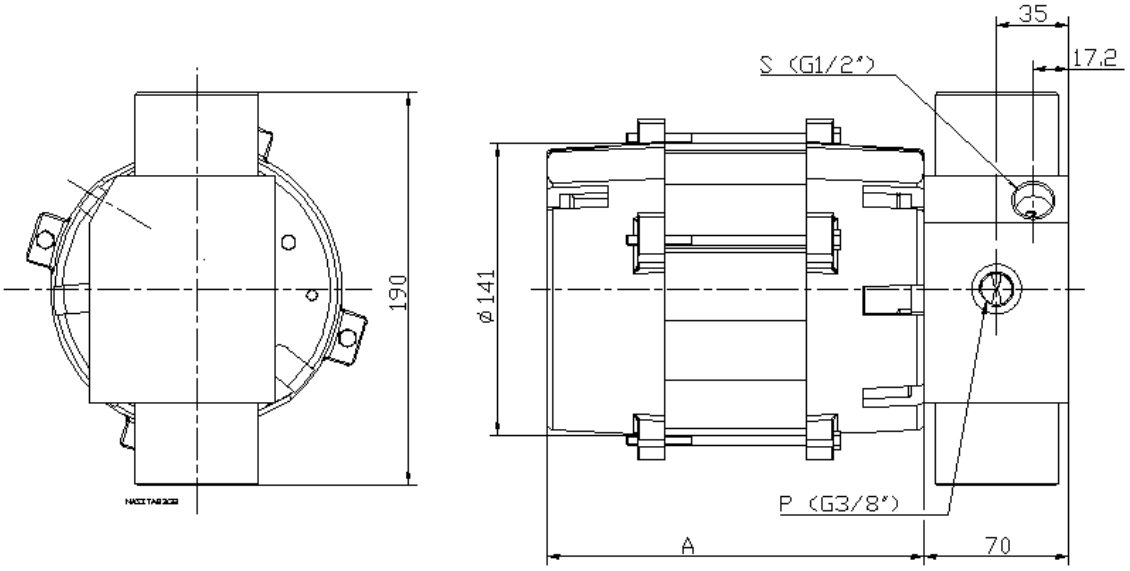
(second shaft end type I of the radial piston pump is required)



displace-ment [cm3/rev]	M [mm]	L [mm]
20	129.5	64
22	130.5	64.5
26	133.5	66
33	138.5	68.5
39	142.5	70.5
44	145.5	72
52	151.5	75
61	157.5	78
71	164.5	81.5
78	169.5	84
87	175.5	87

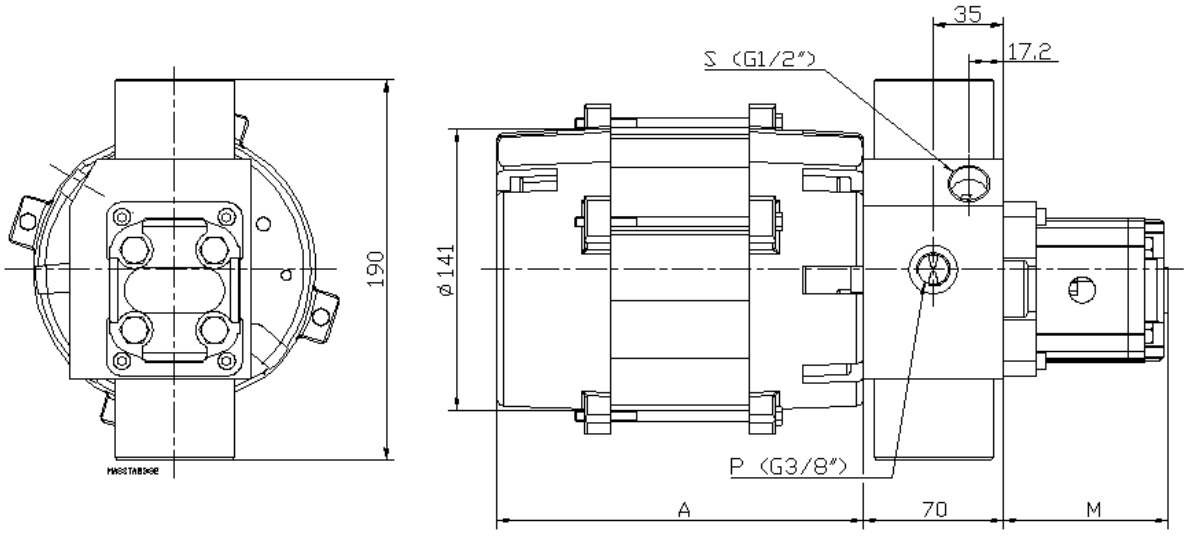
6.4. SUB-OIL MOTOR PUMPS

Assembly MUPD/02



(measure 'A' see page 16)

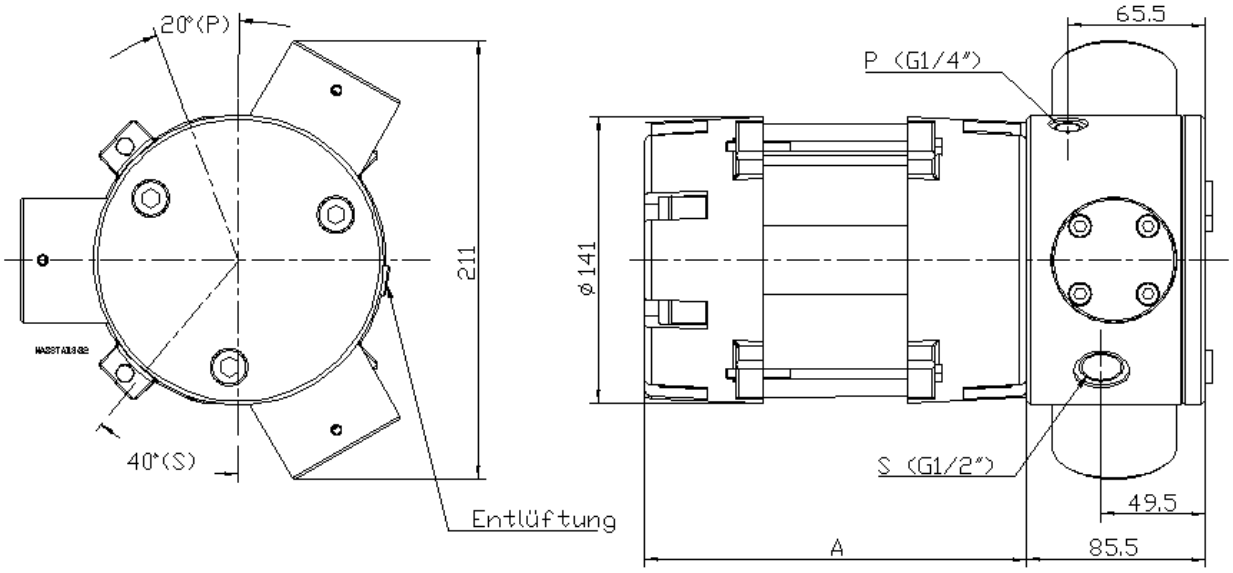
Assembly MUPD/02.../1PD(S)G-...



measure 'A' see page 16

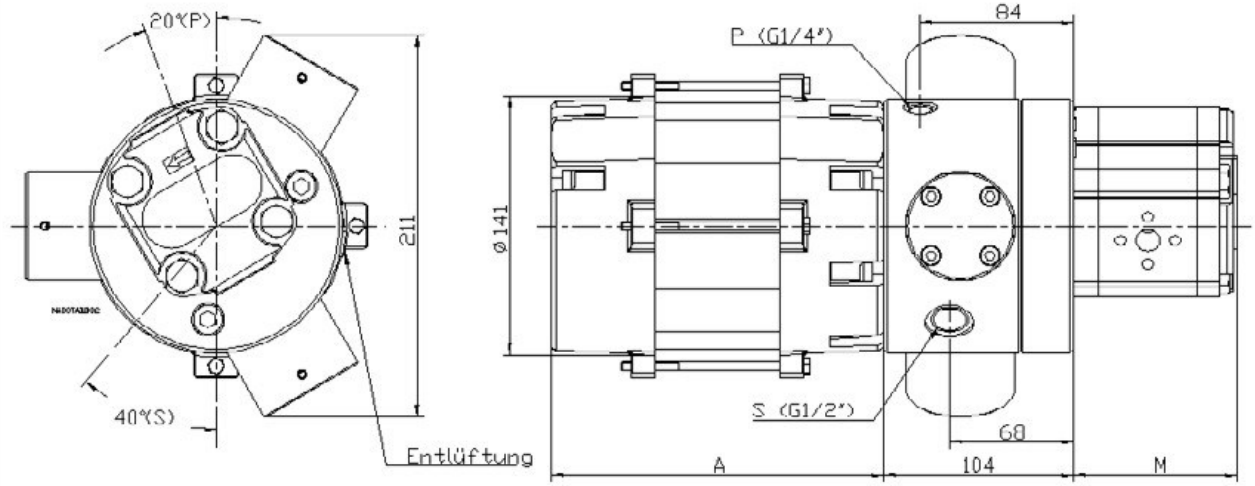
measure 'M'
see page 44,
assembly 1PD(S)G

Assembly MUPZ/03...



measure 'A' see page 16

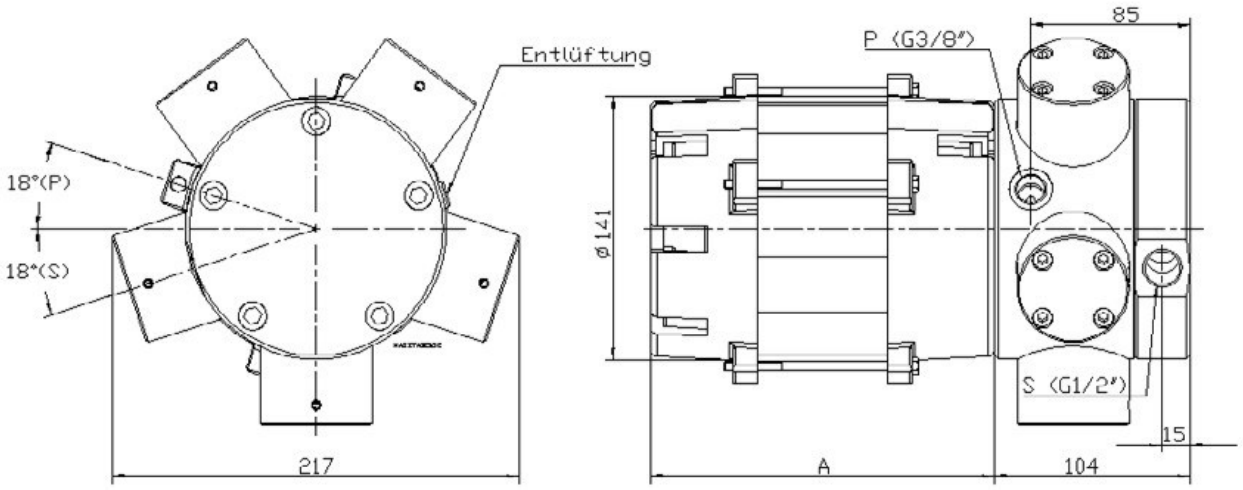
Assembly MUPZ/03.../ALP2BK7D(S)-...



measure 'A' see page 16

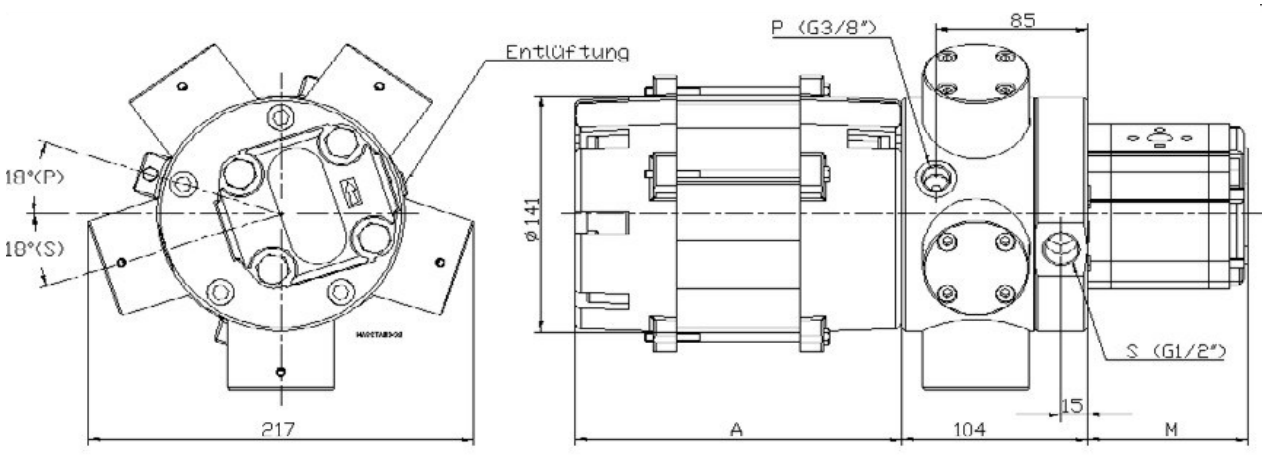
measure 'M' see page 44, assembly 1PD(S)G

Assembly MUPZ/05



measure 'A' see page 16

Assembly MUPZ/05.../ALP2BK7D(S)-...



measure 'A' see page 16

measure 'M'
see page 44,
assembly 1PD(S)G