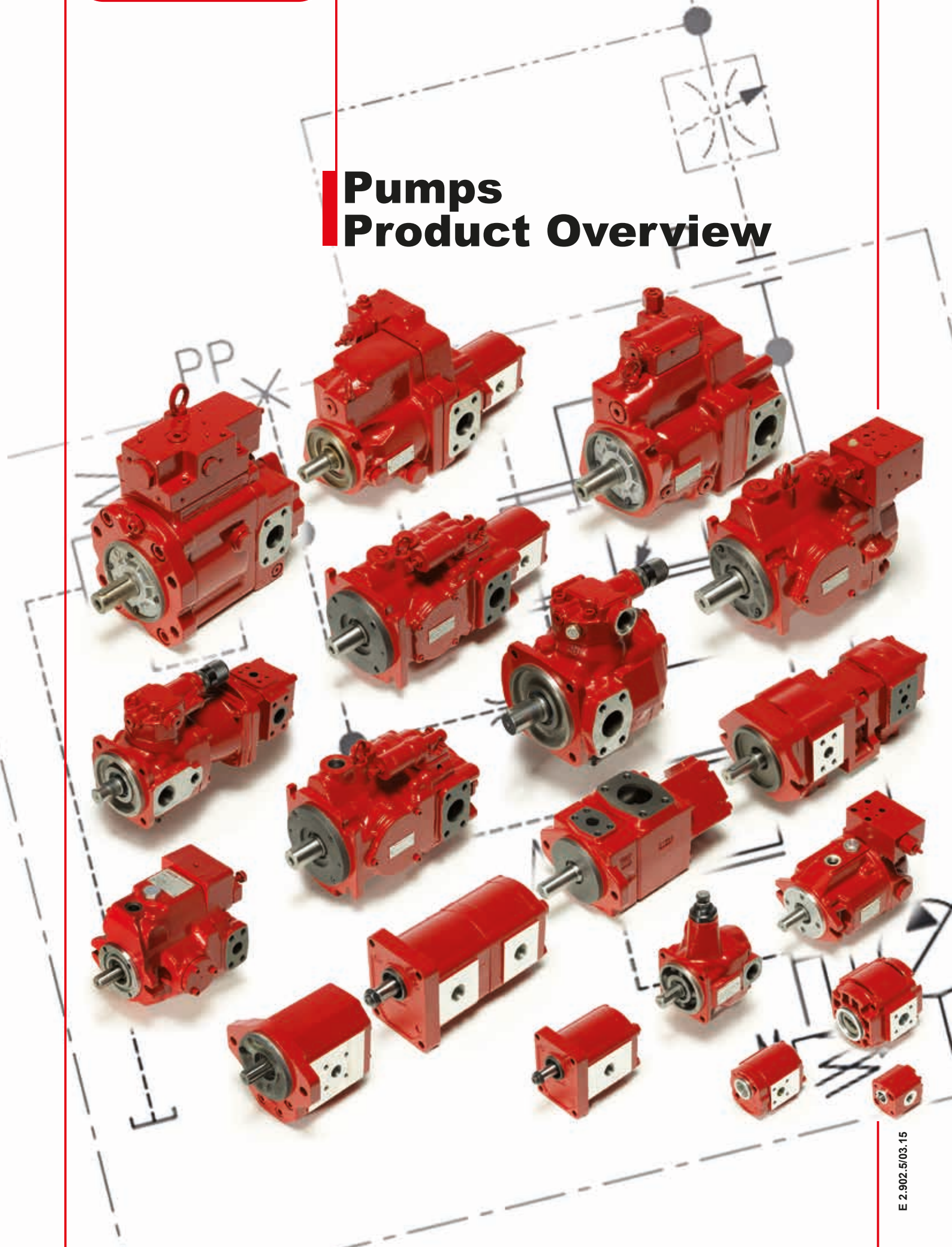
HYDAC INTERNATIONAL

Pumps
Product Overview



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1. GENERAL INFORMATION

1.1 HYDRAULIC FLUID

	Designation	Standard	Properties	Basic chemical composition	Recommended seal material
Standard hydraulic fluid	HL	DIN 51524 ISO 6743	Improved corrosion protection and anti-oxidation properties	Mineral oil (petroleum-based oil)	NBR FPM
	HLP (HM)		HL + wear protection additives		
	HV (HVLP)		HLP + improved viscosity properties		
	HLPD	–	HLP + detergent and dispersant additives		
Fire resistant fluid	HFA	ISO 6743	Fire resistant, corrosive, **reduced** pressure rating and component service life	Oil in water emulsion Water content > 80 %	NBR
	HFC		Improved viscosity properties, environmentally-friendly **reduced** pressure rating and component service life	Water-based solutions (water glycols) Water content > 35 %	NBR HNBR AU EU
	HFD		Standard pressure range, increased temperature range, potentially **toxic**	Water-free synthetic fluids - R: phosphate ester - U: polyolester POE	NBR FPM EPDM
Environ-mentally-friendly fluid	HETG		Small temperature range **Risk** of hydrolysis and gumming	Vegetable oil based (triglyceride, rapeseed oil)	NBR FPM AU EU
	HEES		Good temperature properties, good lubrication and anti-corrosion properties, dissolvable in mineral oil, good ageing resistance	Saturated or unsaturated synthetic fluid based on polyolester POE	NBR FPM AU
	HEPG		Good ageing resistance and lubrication properties, **incompatible** with mineral oil, polyurethane seals, standard paints and coatings and Plexiglas, problematic water and foaming properties	Polyglycol-based synthetic fluids	NBR FPM
	HEPR		Good ageing resistance and lubrication properties, wide temperature range	Based on polyalphaolefin	

1.2 SEAL MATERIAL

NBR	Nitrile butadiene rubber
HNBR	Hydrogenated nitrile butadiene rubber
FPM (ISO) **FKM (ASTM)**	Fluorinated propylene monomer rubber
EPDM	Ethylene propylene diene (monomer) rubber
AU	Polyester urethane rubber
EU	Polyester urethane rubber

1.3 FILTRATION

1.3.1 ISO 4406 (International Organisation for Standardisation)

ISO Code	Particles per 100 ml	
	from	to
24	8000000	16000000
23	4000000	8000000
22	2000000	4000000
21	1000000	2000000
20	500000	1000000
19	250000	500000
18	130000	250000
17	64000	130000
16	32000	64000
15	16000	32000
14	8000	16000
13	4000	8000
12	2000	4000
11	1000	2000
10	500	1000
9	250	500
8	130	250
7	64	130
6	32	64

1.3.2 Recommended cleanliness classes for systems and components

Type of system/Area of application/ Components	Recommended cleanliness class >4 µm(c) / >6 µm(c) / >14 µm(c)
Systems with servo hydraulics sensitive to fine contamination	15/13/10
Industrial hydraulics ● Proportional technology ● High pressure systems	17/15/12
Industrial and mobile hydraulics ● Solenoid control valve technology ● Medium pressure and low pressure systems	 18/15/12 19/16/14
Industrial and mobile hydraulics with low requirement for wear protection	20/18/15
Forced-feed circulatory lubrication on transmissions	18/16/13
New oil	21/19/16
Pumps/motors ● Axial piston pump ● Radial piston pump ● Gear pump ● Vane pump	 18/16/13 19/17/13 20/18/15 19/17/14
Valves ● Directional valves ● Pressure valves ● Flow control valves ● Check valves ● Proportional valves ● Servo valves	 20/18/15 19/17/14 19/17/14 20/18/15 18/16/13 16/14/11
Cylinders	20/18/15

1.4 FORMULAS

Pump displacement

$$Q = \frac{Vg * n * \eta_{vol}}{1000}$$

Q	[l/min]	Output flow
Vg	[cm³/rev]	Geometric displacement
n	[rpm]	Drive speed
η_{vol}		Volumetric efficiency

Drive torque

$$M = \frac{\Delta p * Vg}{20 * \pi * \eta_{mh}}$$

M	[Nm]	Moment (drive torque)
Δp	[bar]	Differential pressure
η_{mh}		Mech.-hydr. efficiency

Drive power

$$P = \frac{Q * \Delta p}{600 * \eta_{tot}}$$

P	[kW]	Power (drive energy)
η_{tot}		Total efficiency

INTRODUCTION

With over 7,500 employees worldwide, HYDAC is one of the leading suppliers of fluid technology, hydraulic and electronic equipment.

HYDAC is your expert partner for the supply of all major types of hydraulic pumps.

Designed with application-oriented engineering, developed and fabricated in product-oriented laboratories, testing and production facilities for use in mobile and stationary machines and systems.

With over 45 overseas companies, and more than 500 sales and service partners, HYDAC is your reliable partner worldwide.

Germany - Headquarters

HYDAC Drive Center

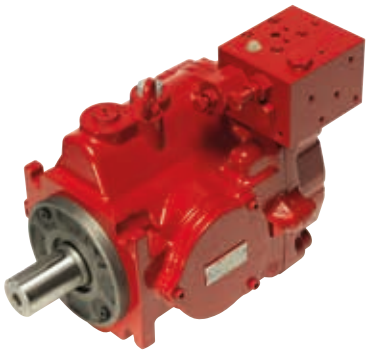
BIERI high pressure hydraulics - Switzerland

CONTENTS

Note:

In addition to our regional technical sales departments, HYDAC Drive Center is able to provide advice on all hydraulic pump and drive queries.

2. VARIABLE DISPLACEMENT AXIAL PISTON PUMP
for Open Loop Hydraulic Systems

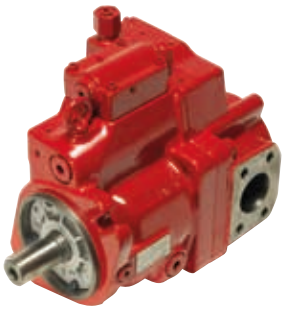


2.1 MEDIUM HEAVY DUTY SERIES — PPV100

Series	Geometric displacement [cm³/rev]	Operating pressure Nominal paressure [bar]	Operating pressure Peak [bar]	Maximum drive speed [rpm]
PPV100-16	16.3	315	350	3600
PPV100-37	37.1			2700
PPV100-56	56.3			2500
PPV100-71	70.7			2300
PPV100-100	100.5			2100
PPV100-145	145.2			1800
PPV100-180	180.7			1800

2.2 MEDIUM HEAVY DUTY SERIES — PPV100S

Series	Geometric displacement [cm³/rev]	Operating pressure Nominal pressure [bar]	Operating pressure Peak [bar]	Maximum drive speed [rpm]
PPV100S16	16.3	315	350	3600
PPV100S37	37.1			2700
PPV100S56	56.3			2500
PPV100S71	70.7			2300
PPV100S100	100.5			2100
PPV100S145	145.2			1800
PPV100S180	180.7			1800



2.3 MEDIUM HEAVY DUTY SERIES — PPV101

Series	Geometric displacement [cm³/rev]	Operating pressure Nominal pressure [bar]	Operating pressure Peak [bar]	Maximum drive speed [rpm]
PPV101-45	45.0	320	350	2700
PPV101-80	80.0			2400
PPV101-112	112.0			2200
PPV101-140	140.0			2100
PPV101-200	200.0			1900

2.4 HEAVY DUTY SERIES — PPV102

Series	Geometric displacement [cm³/rev]	Operating pressure Nominal pressure [bar]	Operating pressure Peak [bar]	Maximum drive speed [rpm]
PPV102-63	63.0	350	400	1800
PPV102-112	112.0			1800
PPV102-180	180.0			1800
PPV102-280	280.0			1500
PPV102-360	2 x 180.0			1800
PPV102-560	2 x 280.0			1500

2.5 LIGHT DUTY SERIES — PPV103

Series	Geometric displacement [cm³/rev]	Operating pressure		Maximum drive speed [rpm]
		Nominal pressure [bar]	Peak [bar]	
PPV103-10	10.0	160	210	1800
PPV103-16	15.8			1800
PPV103-22	22.2		160	1800
PPV103-37	36.9		210	1800
PPV103-56	56.2			1800
PPV103-70	70.0	250	250	1800
PPV103-90	91.0			1800
PPV103-145	145.0			1800

3. VARIABLE DISPLACEMENT VANE PUMPS

for Open Loop Hydraulic Systems

3.1 HYDRAULIC COMPENSATION — PVV100

Series	Geometric displacement [cm³/rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
PVV100-1-20	22.1	160	1800
PVV100-1-25	26.9		1800
PVV100-2-31	34.5		1800
PVV100-2-40	42.8		1800
PVV100-2-50	53.1		1800
PVV100-3-63	69.0	150	1800
PVV100-3-80	86.2		1800
PVV100-3-100	105.5		1800

3.2 HYDRAULIC COMPENSATION — PVV103

Series	Geometric displacement [cm³/rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
PVV103-05-16	17.9	250	1800
PVV103-1-32	34.5	250	1800

3.3 MECHANICAL COMPENSATION — PVV101

Series	Geometric displacement [cm³/rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
PVV101-1-20	22.1	100	1800
PVV101-1-25	26.9		1800
PVV101-2-31	34.5		1800
PVV101-2-40	42.8		1800
PVV101-2-50	53.1		1800
PVV101-3-63	69.0	80	1800
PVV101-3-80	86.2		1800
PVV101-3-100	105.5		1800

3.4 MECHANICAL COMPENSATION PVV102

Series	Geometric displacement [cm³/rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
PVV102-05-16	17.9	120	1800

4. FIXED DISPLACEMENT VANE PUMPS FOR OPEN LOOP HYDRAULIC SYSTEMS

4.1 FIXED DISPLACEMENT PVF100

Series	Geometric displacement [cm³/rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
PVF100-1-6	5.8	210	1800
PVF100-1-8	8.0		1800
PVF100-1-10	9.4		1800
PVF100-1-12	12.2		1800
PVF100-1-14	13.7		1800
PVF100-1-17	16.6		1800
PVF100-1-19	18.6		1800
PVF100-1-23	22.7		1800
PVF100-1-25	25.3		1800
PVF100-1-31	31.0	160	1800
PVF100-2-41	41.3	210	1800
PVF100-2-47	47.2		1800
PVF100-2-53	52.5		1800
PVF100-2-59	58.2		1800
PVF100-2-65	64.7		1800
PVF100-3-76	76.4		1800
PVF100-3-94	93.6		1800
PVF100-3-116	115.6	160	1800
PVF100-4-136	136.0	175	1800
PVF100-4-153	153.0		1800
PVF100-4-184	184.0		1800
PVF100-4-200	201.0		1800
PVF100-4-237	237.0		1800

Series	Geometric displacement		Operating pressure Rated [bar]	Maximum drive speed [rpm]
	2nd stage [ccm/rev]	1st stage [ccm/rev]		
PVF101-12-	6 8 10 12 14 17 19 23 25 31	26 33 41 47 53 59 65	210 (160)	1800
PVF101-13-	6 8 10 12 14 17 19 23 25 31	76 94 116	210 (160)	1800
PVF101-23-	41 47 53 59 65	52 60 66 76 94 116	210 (160)	1800
PVF101-33-	76 94 116	76 94 116	210 (160)	1800
PVF101-14-	6 8 10 12 14 17 19 23	136 153 184 200 237	175	1800
PVF101-24-	26 33 41 47			
PVF101-34-	52 60 66 76 94 116			

5. EXTERNAL GEAR PUMPS
for Open Loop Hydraulic Systems

5.1 SIZE 0 — PGE100

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGE100-25	0.25	170	200	200	3500
PGE100-30	0.30			210	
PGE100-50	0.50			230	
PGE100-75	0.75			230	
PGE100-100	1.00			210	
PGE100-125	1.25			210	3000
PGE100-150	1.50	145	175	200	2500
PGE100-175	1.75	130	160	180	
PGE100-200	2.00			170	2000

5.2 SIZE 1 — PGE101

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGE101-100	1	250	280	300	3500
PGE101-125	1.25				
PGE101-160	1.6				
PGE101-200	2				
PGE101-250	2.5				
PGE101-315	3.15				
PGE101-365	3.65				
PGE101-420	4.2				
PGE101-500	5				3000
PGE101-610	6.1	200	220	230	2500
PGE101-740	7.4	170	190	200	2500

5.3 SIZE 2 PGE102

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGE102-450	4.5	250	280	300	3500
PGE102-630	6.3				
PGE102-820	8.2				
PGE102-1000	10				
PGE102-1100	11.3				
PGE102-1200	12				
PGE102-1400	14		270	280	
PGE102-1500	15				3000
PGE102-1600	16				
PGE102-1730	17.3	220	250	270	
PGE102-1900	19	200	220	230	
PGE102-2200	22	180	200	210	2500
PGE102-2500	25	160	180	190	
PGE102-2800	28	120	140	150	

5.4 SIZE 3 PGE103

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGE103-2000	20	250	270	300	3000
PGE103-2250	22.5				
PGE103-2500	25				
PGE103-2800	28				
PGE103-3200	32				3000
PGE103-3600	36	240	260	280	2800
PGE103-4200	42	230	250	270	2500
PGE103-4600	46	210	230	250	2300
PGE103-5000	50	185	200	230	2100
PGE103-5500	55	165	180	200	1750
PGE103-6000	60	150	165	180	

Series	Sizes	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGE104-	1 + 1	max. 250	max. 280	max. 300	max. 3500
	2 + 2				
	2 + 1				
	3 + 3				max. 3000
	3 + 2				
	3 + 1				
	1 + 1 + 1				max. 3500
	2 + 2 + 2				
	2 + 2 + 1				
	2 + 1 + 1				
	3 + 3 + 3				max. 3000
	3 + 3 + 2				
	3 + 3 + 1				
	3 + 2 + 2				
	3 + 2 + 1				
	3 + 1 + 1				

6. Internal Gear Pumps
for Open Loop Hydraulic Systems

6.1 MEDIUM HEAVY DUTY SERIES SIZE 2 PGI100

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGI100-2-005	5.4	250	320	350	4200
PGI100-2-006	6.4				
PGI100-2-008	7.9				
PGI100-2-011	10.9				4000
PGI100-2-013	13.3				
PGI100-2-016	15.8				
PGI100-2-019	19.3		300	325	3600
PGI100-2-022	22.2				
PGI100-2-025	25.2		280	300	

6.2 MEDIUM HEAVY DUTY SERIES SIZE 3 PGI101

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGI101-3-020	20.0	250	320	350	3600
PGI101-3-025	24.8				3200
PGI101-3-032	32.1				3000
PGI101-3-040	40.1		300	325	2500
PGI101-3-050	50.3		280	300	1800
PGI101-3-064	64.4				

6.3 MEDIUM HEAVY DUTY SERIES SIZE 5 PGI103

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGI103-5-064	65.3	210	230	250	3000
PGI103-5-080	80.4				
PGI103-5-100	100.5				2500

6.4 MEDIUM HEAVY DUTY SERIES SIZE 6 PGI103

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGI103-6-125	125.7	250	280	300	2200
PGI103-6-160	160.1				2000
PGI103-6-200	200.9	160	170	180	2200
PGI103-6-250	249.9	140	150	160	

6.5 HEAVY DUTY SERIES SIZE 2/3/6 PGI102

Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGI102-2-004	3.8	330	350	400	4200
PGI102-2-005	5.4				
PGI102-2-006	6.4				
PGI102-2-008	7.9				4000
PGI102-2-011	10.9				
PGI102-2-013	13.3				
PGI102-2-016	15.8				
PGI102-2-019	19.3	300	300	325	3600
PGI102-2-022	22.2	250			
PGI102-2-025	25.2		280	300	
PGI102-3-014	14.6	330	350	400	4000
PGI102-3-016	16.0				
PGI102-3-020	20.0				
PGI102-3-025	24.8				3000
PGI102-3-032	32.1				
PGI102-3-040	40.1	280	300	325	2500
PGI102-3-050	50.3				1800
PGI102-3-064	64.6				
PGI102-6-040	40.8	330	340	350	2400
PGI102-6-050	50.6				
PGI102-6-064	65.3	315	330	340	
PGI102-6-080	80.0	300			2200
PGI102-6-100	101.2				
PGI102-6-125	125.7	280	300	320	
PGI102-6-160	160.1				2000
PGI102-6-200	200.9	150	150	165	
PGI102-6-250	249.9				

7. BIERI HIGH PRESSURE HYDRAULICS

Radial piston pump	Geometric volume [cm³/rev]
BRK series 11 to 700 bar	from 0.47 to 6.33
BRK series 11 to 1000 bar	from 0.47 to 2.71
BRK series 12 to 1000 bar	from 1.10 to 8.14

Special radial piston pump ATEX	
SRK Atex series 11 700 bar	from 0.47 to 6.33
SRK Atex series 12 700 bar	from 1.10 to 6.33

Special radial piston pump	
SRK series 11 to 500 bar	0.47 to 4.52
SRK series 12 to 700 bar	1.1 - 5.65

Multi-outlet pumps	Number of outlets	Geometric volume [cm³/rev]
MRK series 11 700 bar	2 to 8	from 0.16 to 1.88
MRK series 11 1000 bar	2 and 4	from 0.23 to 1.02
MRK series 12 1000 bar	2, 4, 7 and 9	from 0.40 to 5.43
MRK series 03 to 700 bar	2 to 5	from 0.16 to 0.23
MRK series 14 to 700 bar	2 to 6	from 0.16 to 0.51
MRK series 15 to 700 bar	3 to 6	from 0.40 to 0.90

Combination pump	High pressure (BRK pump) Geometric volume [cm³/rev]	High pressure [bar]
BKP combination pump	from 0.47 to 8.14	1000-500

Combination pump with hollow shaft	High pressure Geometric volume [cm³/rev]	High pressure [bar]
KKP series 01 700 bar	from 0.12 to 0.24	700
KKP series 02 700 bar	from 0.17 to 0.24	700
KKP series 03 700 bar	from 0.47 to 0.68	700
KKP series 04 700 bar	from 0.68 to 1.88	700
KKP series 05 700 bar	2.71	625
SKP series 03 700 bar	from 0.45 to 0.80	700
SKP series 04 700 bar	from 0.68 to 2.16	700
SKP series 05 700 bar	2.71	700

Hollow shaft pump	Geometric volume [cm³/rev]
HRK series 01 to 700 bar	from 0.12 to 0.34
HRK series 02 to 700 bar	from 0.12 to 0.34
HRK series 03 to 700 bar	from 0.47 to 0.79
HRK series 04 to 700 bar	from 1.13 to 2.01
HRK series 05 to 700 bar	from 2.54 to 4.52

Micropump	Geometric volume [cm³/rev]
AKP series 01	0.1
AKP series 02	0.3

Operating pressure Nominal pressure [bar]	High pressure [bar]	Drive speed [rpm]	Number of pistons	
700-350	700	2000	3, 5 and 7	
1000-850	1000	2000	3 and 5	
1000-500	1000	2000	7 and 9	

700-350	700	1800	3, 5 and 7	ATEX certified
700-650	700	1800	7	ATEX certified

500-350	500	2000	3,5, and 7	
700-550	700	2000	7 and 9	

Operating pressure Nominal pressure [bar]	High pressure [bar]	Drive speed [rpm]	Number of pistons	
700-300	700		3 to 8	
1000	1000		4	
1000-350	1000		6 to 9, 12	
700	700	2000	2 to 5	
700	700	2000	2 to 6	
640-700	700	2000	3 to 6	

Low pressure (gear pump) Geometric volume [cm³/rev]	High pressure [bar]	Speed [rpm]		
from 4 to 61.1	250-170	2000		

Low pressure Geometric volume [cm³/rev]	High pressure [bar]	Drive speed [rpm]	Number of pistons	
from 0.94 to 2.41	60	3600		
from 0.94 to 2.41	60-120	3600		
from 0.47 to 2.72	160	2000		
from 1.21 to 2.72	160	2000		
2.72	160	2000		
from 4 to 8	100-70	2000	2	
from 4 to 14	100	2000	2 and 3	
from 4 to 14	100	2000	3	

Operating pressure Nominal pressure [bar]	High pressure [bar]	Drive speed [rpm]	Number of pistons	
700	700	3600		
700	700	3600		
700	700	2000		
700	700	2000		
700-400	700	2000		

Operating pressure [bar] Nominal pressure [bar]	High pressure	Drive speed [rpm]	Number of pistons	
500	550	100-5000	3	
500	550	100-5000	5	

8. BELL HOUSING SET

Select the correct nominal size:

Motor size	Bell housing size	Motor power at 1500 rpm kW *	Bell housing version		
			PTS rigid	PT flexible	PTK flexible with oil-air cooler
71	160	0.25-0,37	x	not available	
80	2001	0.55-0,75	x	x	x
90S	200	1.1	x	x	x
90L	200	1.5	x	x	x
100L	250	2.2-3	x	x	x
112M	250	4	x	x	x
132S	300	5.5	x	x	x
132M	300	7.5	x	x	x
160M	350	11	x	x	x
160L	350	15	x	x	x
180M	3501	18.5	x	x	x
180L	3501	22	x	x	x
200L	400	30	x	x	Not available
225S	450	37	x	x	
225M	450	45	x	x	
250M	550	55	x	x	
280S	5501	75	x	x	
280M	5501	90	x	x	
315S	660	110	x	x	
315M	660	132	x	x	
315L	6601	160-200	x	x	

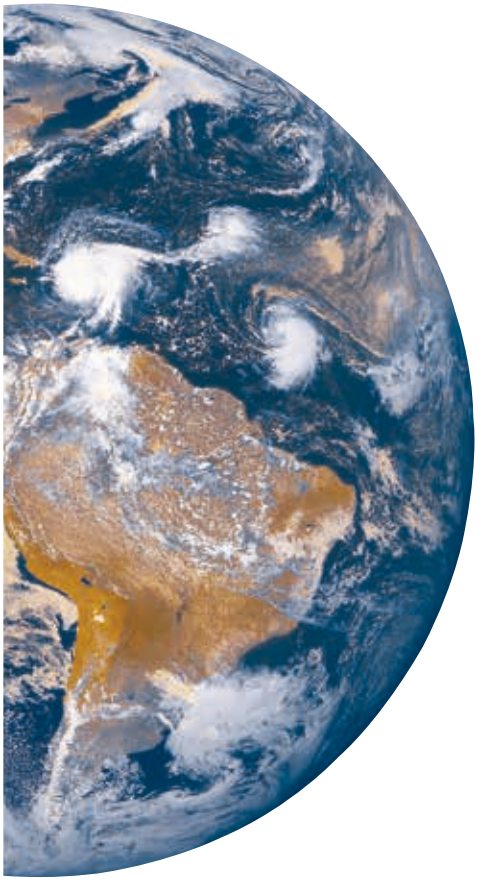
* For other motor speeds or sizes please contact HYDAC.

9. INDUSTRIES AND APPLICATIONS

HYDAC pumps are used in almost all industries worldwide.

The main sectors are industrial hydraulics, mobile technology and process technology.

Listed below is a selection of typical application examples for industrial hydraulics.



10.1. INDUSTRIAL HYDRAULICS

Machine tools, cutting
- Clamping of tool and workpiece
- Tool changer
- Axis clamping
- Hydraulic axes

Preferred drive concepts:
- External gear pumps,
  Pressure-controlled vane pumps

Machine tools, non-cutting
- Holding and clamping function
- Tool drives

Preferred drive concepts:
- Fixed displacement pumps with accumulator charging function
  External and internal gear pumps
  Controlled axial piston pumps
  Highly dynamic, speed-controlled fixed displacement pump drives

Plastics technology
- Closing cylinder drive incl. holding function.
- The competition between hydraulic drive technology and electrical drive technology decreases as the machine size increases.

Preferred drive concepts:
- Controlled axial piston pumps;
  Vane pumps for smaller machines and pressure ranges below 160 bar.
  Highly dynamic, speed-controlled fixed displacement pump drives

Die casting machines
- Closing cylinder drive incl. holding function.

Preferred drive concepts:
- Controlled axial piston pumps;
  Vane pumps for smaller machines and pressure ranges below 160 bar.
  Highly dynamic, speed-controlled fixed displacement pump drives

Steel industry
Preferred drive concepts:
- Controlled axial piston pumps;
  Accumulator charging function with fixed displacement pump drives

Power plants
Preferred drive concepts:
- Controlled axial piston pumps;
  Accumulator charging function with fixed displacement pump drives

Paper industry
Preferred drive concepts:
- Accumulator charging function with fixed displacement pump drives
  Controlled axial piston pumps

Wind Energy
Preferred drive concepts:
- Controlled axial piston pumps;
  Accumulator charging function with fixed displacement pump drives

NOTE

The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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