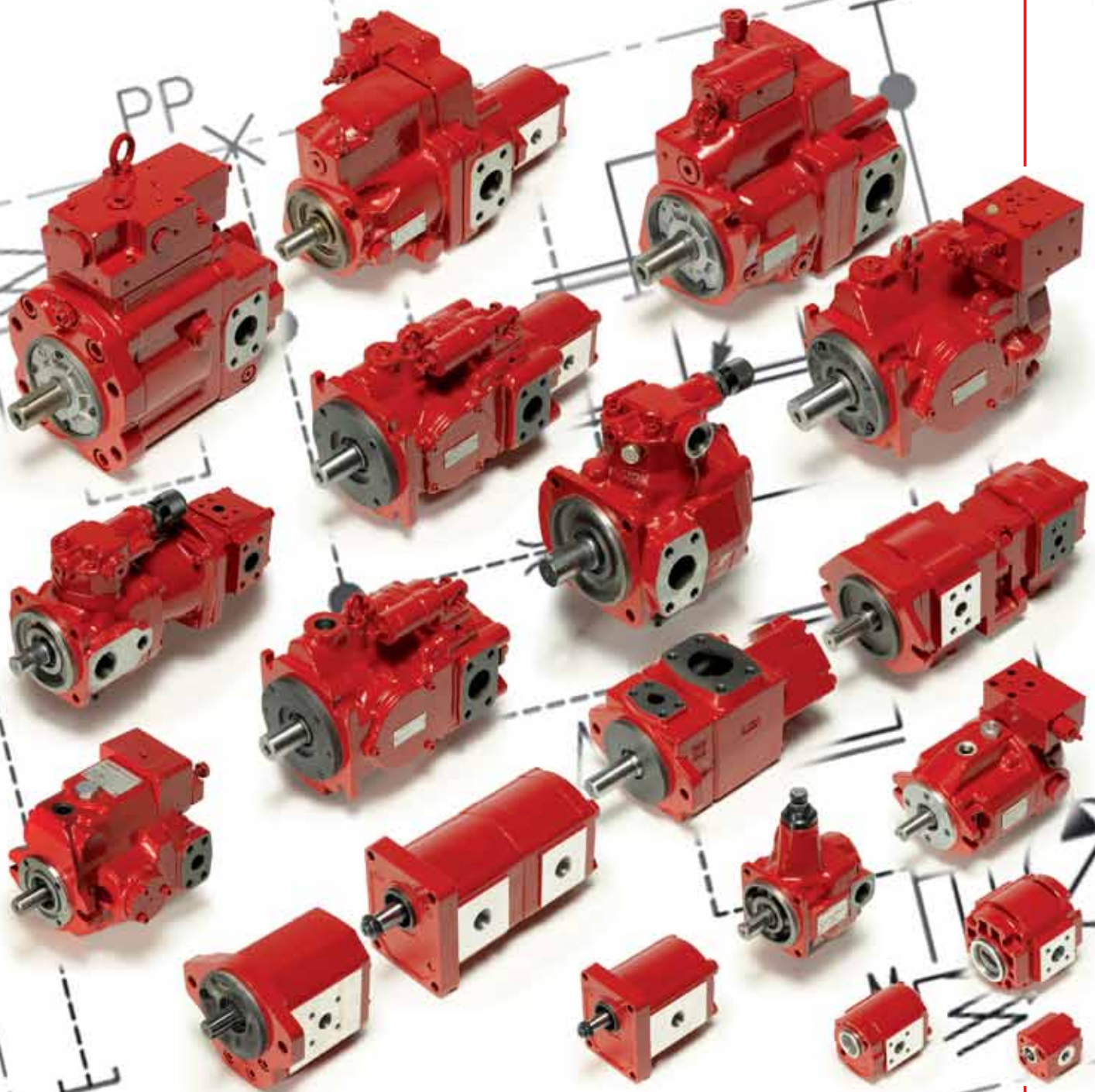


Pump Specifications



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.

Application-based engineering designs, developed and manufactured in product-orientated 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.



HYDAC in Sulzbach



HYDAC Drive Center

Pump Specifications

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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.

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

1. GENERAL INFORMATION

1.1 HYDRAULIC FLUID

	Description	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
Environmentally-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	8 000 000	16 000 000
23	4 000 000	8 000 000
22	2 000 000	4 000 000
21	1 000 000	2 000 000
20	500 000	1 000 000
19	250 000	500 000
18	130 000	250 000
17	64 000	130 000
16	32 000	64 000
15	16 000	32 000
14	8 000	16 000
13	4 000	8 000
12	2 000	4 000
11	1 000	2 000
10	500	1 000
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

Displacement

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

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

Drive torque

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

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

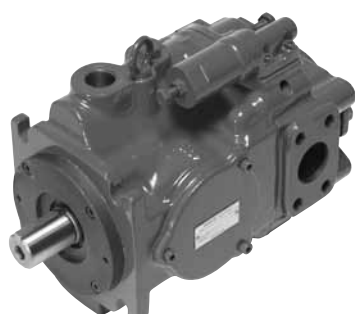
Variable Displacement Axial Piston Pump

for Open Loop Hydraulic Systems

2. AXIAL PISTON PUMPS

2.1 MEDIUM HEAVY DUTY SERIES

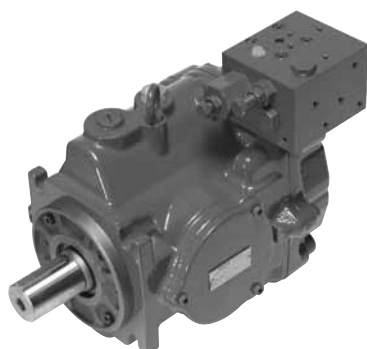
PPV100S



Series	Geometric displacement [cm³/rev]	Operating pressure		Maximum drive speed [rpm]
		Rated [bar]	Peak [bar]	
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

2.2 MEDIUM HEAVY DUTY SERIES

PPV100



Series	Geometric displacement [cm³/rev]	Operating pressure		Maximum drive speed [rpm]
		Rated [bar]	Peak [bar]	
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

2.3 MEDIUM HEAVY DUTY SERIES

PPV101



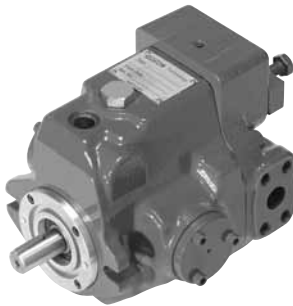
Series	Geometric displacement [cm³/rev]	Operating pressure		Maximum drive speed [rpm]
		Rated [bar]	Peak [bar]	
PPV101-45	45.0	320	350	2700
PPV101-80	80.0			2400
PPV101-112	112.0			2200
PPV101-140	140.0			2200
PPV101-200	200.0			1900



2.4 HEAVY DUTY SERIES

PPV102

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



2.5 LIGHT DUTY SERIES

PPV103

Series	Geometric displacement [cm³/rev]	Operating pressure		Maximum drive speed [rpm]
		Rated [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



2.1 MEDIUM HEAVY DUTY SERIES

CONTENTS

PPV100S

Ordering Code	2.1.1 Medium Heavy Duty Series
Technical Information	2.1.2 Specifications 2.1.3 Max. drive and through drive torque 2.1.4 Pump combinations for PPV100S 2.1.5 Specifications for special fluids 2.1.6 Seals 2.1.7 Filtration 2.1.8 Hydraulic fluids 2.1.9 Temperature range 2.1.10 Viscosity range 2.1.11 Adjustments 2.1.12 Installation notes
Control Options	2.1.13 Standard pressure control 2.1.14 Remote pressure control 2.1.15 Load sensing control 2.1.16 Availability of control type
Performance Data	2.1.17 PPV100-16 2.1.18 PPV100S37 2.1.19 PPV100S56 2.1.20 PPV100S71 2.1.21 PPV100S100 2.1.22 PPV100S145 2.1.23 PPV100S180
Dimensions	2.1.24 PPV100-16 2.1.25 PPV100S37 with 2-hole mounting flange 2.1.26 PPV100S37 with 4-hole mounting flange 2.1.27 PPV100S56 with 2-hole mounting flange 2.1.28 PPV100S56 with 4-hole mounting flange 2.1.29 PPV100S71 2.1.30 PPV100S100 2.1.31 PPV100S145 2.1.32 PPV100S180

ORDERING CODE

2.1.1 Medium Heavy Duty Series

PPV100S 16 - F R 01 K K1 E1 C - 10 - XXXX

Axial piston pump
Medium Heavy Duty Series
with lateral ports and
prepared for through drive

Size

16	16.3	cm ³ /rev
37	37.1	cm ³ /rev
56	56.3	cm ³ /rev
71	70.7	cm ³ /rev
100	100.5	cm ³ /rev
145	145.2	cm ³ /rev
180	180.7	cm ³ /rev

Mounting type
 F Flange mounting

Shaft rotation
 R Clockwise

Control type
 01 Pressure compensator
 07 Remote pressure compensator
 14 Load sensing control

Pressure setting range
 K 50 - 350 bar (standard, for control type 01 only)

Shaft Extension
 K1 Parallel keyed shaft to ISO
 K2 Parallel keyed shaft to SAE
 SP Splined shaft to SAE

Flange type
 E1 ISO 3019-2, metric thread
 U1 SAE version, UN thread
 U2 SAE version, BSPF-/ metric thread
 J1 SAE version, RC-/ metric thread

Mounting flange
 D 4-hole mounting flange (not for size 16)
 C 2-hole mounting flange (only for sizes 16/37/56)

Through drive versions
 - Single pump with steel case (standard)
 A SAE A through drive (sizes 16-180)
 AB SAE AB through drive (sizes 16-180)
 B SAE B through drive (sizes 37-180)
 BB SAE BB through drive (sizes 37-180 only)
 C SAE C through drive (sizes 37-180 only)
 CC SAE CC through drive (sizes 100-180 only)
 D SAE D through drive (sizes 145-180 only)

Design number
 10 Standard

Design standard
 - Standard (FPM seal)
 30 (see specifications for special fluids at point 2.1.5)
 450 (see specifications for special fluids at point 2.1.5)

Modification number
 XXXX Determined by manufacturer

TECHNICAL INFORMATION

2.1.2 Specifications

Pump size			16	37	56	71	100	145	180
Geometric displacement		[cm³/rev]	16.3	37.1	56.3	70.7	100.5	145.2	180.7
Pressure	Rated	[bar]	315						
	Peak		350						
Drive speed	Min.	[rpm]	600						
	Max. (at -0.2 bar inlet pressure)		3600	2700	2500	2300	2100	1800	1800
	Max. (at 0 bar inlet pressure)		3800	2700	2700	2400	2200	2000	1800
Power (1500 rpm, 315 bar)		[kW]	14	32	48	60	86	126	156
Pre-fill oil volume		[cm³]	400	700	900	1300	1700	2400	3200
Approx. weight (with pressure compensator 01)		[kg]	14.5	19.5	25.7	35	44.6	60	70.4
Approx. weight (with remote pressure compensator 07)			16.2	21.2	27.4	37.2	46.9	62.2	72.6
Approx. weight (with load sensing control 14)			17.5	22.5	28.7	38	47.6	63	73.4
Moment of inertia		[kgm²]	0.0009	0.0034	0.0069	0.0092	0.0163	0.0277	0.0362

2.1.3 Max. drive and through drive torques

Pump size		16	37	
Mounting flange		2-hole	2-hole	4-hole
Maximum torque on primary shaft [Nm]	ISO shaft, keyed	94	295	451
	SAE shaft, keyed	135	295	528
	SAE splined shaft	136	364	784
Max. through drive torque [Nm]	ISO shaft, keyed	76	295	295
	SAE shaft, keyed	76	295	295
	SAE splined shaft	76	295	295

Pump size		56	71	
Mounting flange		2-hole	4-hole	4-hole
Maximum torque on primary shaft [Nm]	ISO shaft, keyed	295	451	451
	SAE shaft, keyed	295	528	528
	SAE splined shaft	364	784	784
Max. through drive torque [Nm]	ISO shaft, keyed	295	295	297
	SAE shaft, keyed	295	295	297
	SAE splined shaft	295	295	297

Pump size		100	145	180
Mounting flange		4-hole	4-hole	4-hole
Maximum torque on primary shaft [Nm]	ISO shaft, keyed	789	1295	1295
	SAE shaft, keyed	852	1436	1436
	SAE splined shaft	1321	1965	1965
Max. through drive torque [Nm]	ISO shaft, keyed	609	609	609
	SAE shaft, keyed	609	609	609
	SAE splined shaft	609	609	609

2.1.4 Pump combinations PPV100S

Primary stage Secondary stage	PPV100S16	PPV100S37	PPV100S56	PPV100S71	PPV100S100	PPV100S145	PPV100S180
PPV100S16	•	•	•	•	•	•	•
PPV100S37		•	•	•	•	•	•
PPV100S56			•	•	•	•	•
PPV100S71				•	•	•	•
PPV100S100					•	•	•
PPV100S145						•	•
PPV100S180							•
PGE102	•	•	•	•	•	•	•
PGE103		•	•	•	•	•	•
PPV101-45		•	•	•	•	•	•
PPV101-80							
PPV101-112/140						•	•
PPV101-200							
PGI100-2		•	•	•			
PGI101		•	•	•			

* For other pump combinations, please contact HYDAC DRIVE CENTER.

2.1.5 Specifications for special fluids

Fluid type	Pressure [bar]		Drive speed [rpm]		Temperature range [°C]	Viscosity range [cSt]	Design standard*2
	Rated	Intermittent	Rated	Maximum			
Water glycol Water > 35 % Polymer solution (HFC)	210	210	1200	1800*1	0 - 50	20 - 200	30
Phosphate ester synthetic (HFD-R)	210	210	1200	1800*1	0 - 60		–
Polyolester synthetic (HFD-U)	280	320	1200	1800	0 - 60		450

*1 – If a drive speed of 1500 rpm or greater is used, an overhead reservoir is required.

*2 – Use "Design Standard" field in Ordering Code 2.1.1.

2.1.6 Seals

The pump series is equipped with fluorocarbon (FPM) seals as standard.

If special hydraulic fluids are used, the seal material must be changed if required.

2.1.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class to NAS 1638
Class 10 (21/19/16 ISO 4406:1999) or cleaner.

2.1.8 Hydraulic fluids

The pump series is designed for use with

HL	Hydraulic oil
HFC	Water glycol
HLP	Hydraulic oils of the R&O type
HFD-U	Polyolester
HFD-R	Phosphate ester

For use with other fluids, please contact HYDAC DRIVE CENTER.

2.1.9 Temperature range

-20 to + 95 °C oil temperature
-20 to + 50 °C ambient temperature

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

2.1.10 Viscosity range

Minimum viscosity:

10 cSt (mm²/s)*
Short-term (t ≤ 1 min) for a max. temperature at drain port of 95 °C

Normal operating viscosity:

10 - 200 cSt (mm²/s)*

Maximum viscosity:

1000 cSt (mm²/s)*
Short-term (t ≤ 1 min) for cold starts (p ≤ 30 bar, n ≤ 1000 rpm, tmin - 10 °C)

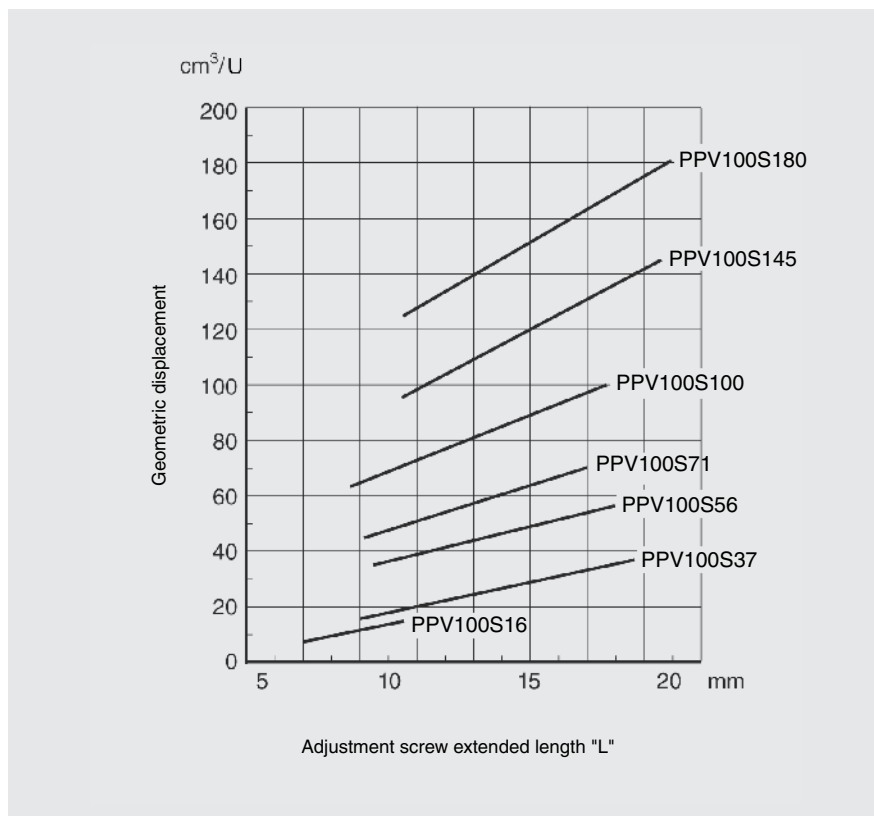
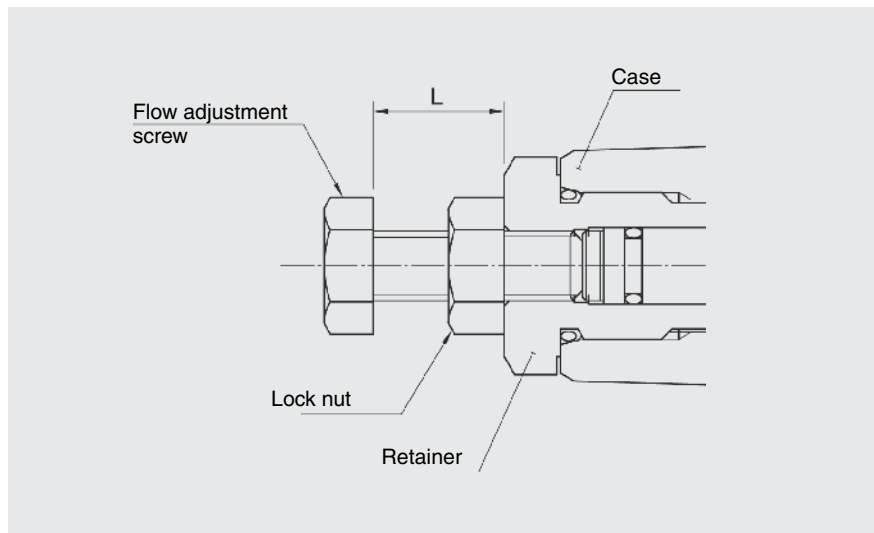
*measured at drain port

For low temperature applications, please contact HYDAC DRIVE CENTER

2.1.11 Adjustments

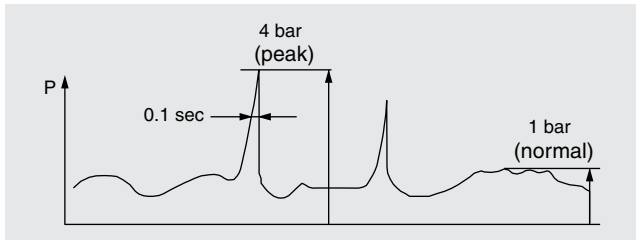
The pumps are supplied with a minimum discharge pressure and maximum flow rate setting. Pressure and flow rate can be adjusted using the adjustment screws to meet your system requirements.

Pump size	Volume		Pressure
	Volume adjustment screw rate	Min. adjustable displacement	Pressure adjustment screw rate
	[cm ³ per turn]	[cm ³ /rev]	[bar per turn]
PPV100S16	1.4	8	55
PPV100S37	3.3	16	
PPV100S56	4.2	35	
PPV100S71	4.9	45	63
PPV100S100	6.2	63	
PPV100S145	9.4	95	
PPV100S180	10.3	125	57



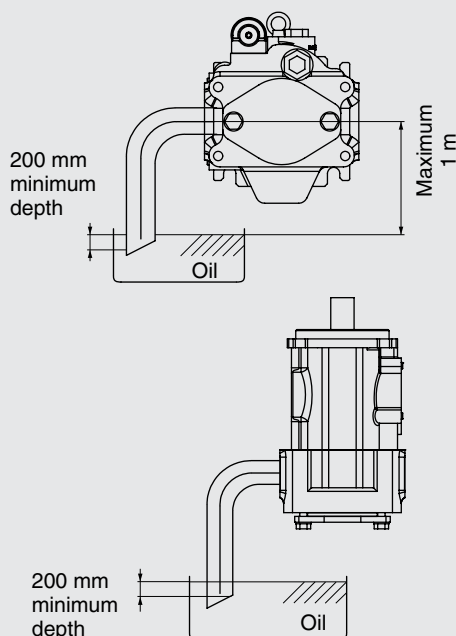
2.1.12 Installation notes

The pump should be installed horizontally with the case drain line initially rising above the level of the pump before continuing to the tank as shown in the diagram below. Do not connect the drain line to the suction line. The top drain port should always be used and the internal diameter of the drain line should be equal to or larger than the drain port to minimise pressure in the pump case. The pressure in the pump case should not exceed 1 bar as shown in the diagram below. Peak pressure should never exceed 4 bar.



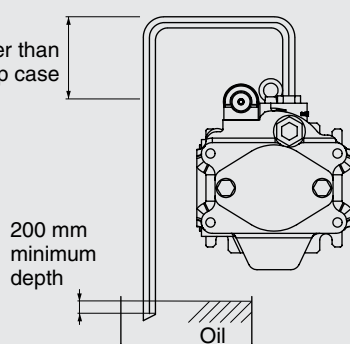
Installing the pump above the tank

Suction line



Drain pipe

Must be higher than top of pump case



Precautions:

- The distance between suction and drain pipes must be 200 mm minimum.
- Suction and drain pipes must be immersed at least 200 mm below the lowest oil level under operating conditions.
- The distance between the oil surface and the centre of the shaft must not exceed 1 m.
- The oil in the pump case must be refilled if the pump has not been operated for one month or longer.
- When installing a HYDAC pump always ensure that the fluid in the pump is prevented from draining away during stoppages.

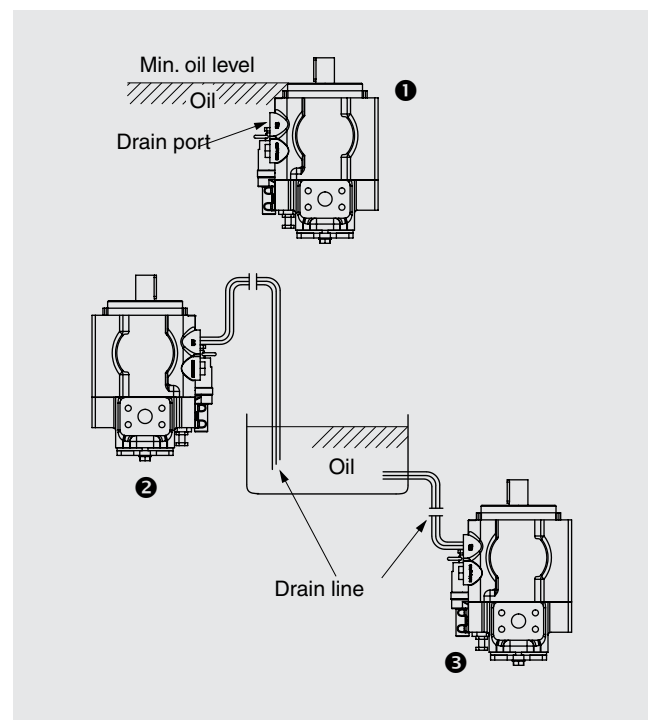
Installing the pump vertically

For applications requiring vertical installation (shaft at the top) please connect lines as shown in the diagram below.

The oil level in the tank should be higher than the pump mounting flange (see diagram ❶). If the oil level in the tank is lower than the pump mounting flange then the drain line should be installed as shown in diagram ❷.

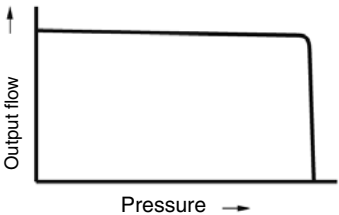
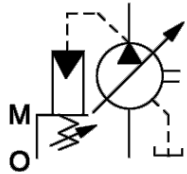
Once the pump is installed in the tank and immersed in the oil, the drain ports must be open to provide adequate lubrication to the internal components.

If the pump is installed outside the tank, there must be a separate drain line to the tank (diagram ❸). If the drain line is higher than the oil level, fill the line with oil before commissioning.

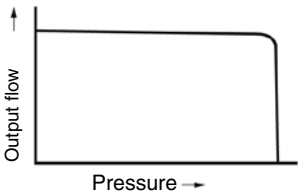
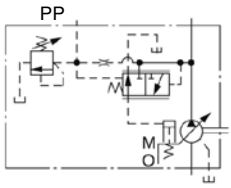


CONTROL OPTIONS

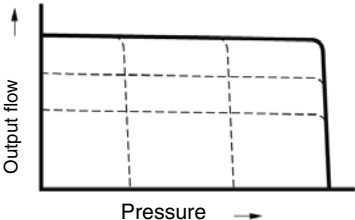
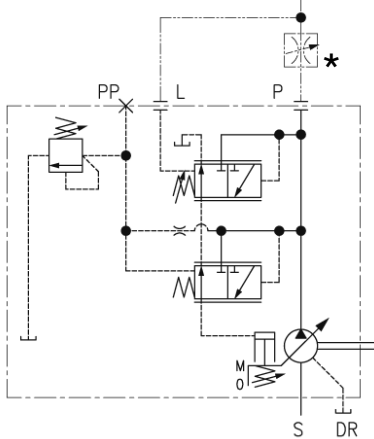
2.1.13 Standard pressure control

Description	Performance characteristics	Hydraulic circuit
When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically and the set pressure is maintained.		

2.1.14 Remote pressure control

Description	Performance characteristics	Hydraulic circuit
The pump is used in combination with the pressure relief valve or multistage pressure relief valve. By controlling the pilot pressure, the full cut-off pressure can be controlled remotely to meet system requirements.		

2.1.15 Load sensing control

Description	Performance characteristics	Hydraulic circuit
- This is an energy-saving type of control which maintains the pump flow and load pressure at the absolute minimum level necessary to operate the actuator. - This type of control automatically regulates the displacement so that the differential pressure via the throttle valve remains constant. To do so, the load pressure must be introduced to the load sensing port "L" of the pump through an external line. - Remote control of the pressure compensator is provided via the pilot port "PP". - The standard differential pressure setting is 15 bar. The differential pressure adjustment range is 10 to 30 bar.		

*A throttle valve is not included with the pump.

Recommended valve for use with remote pressure control

Type:	Part no.:
DB3E-02X-350V	397405

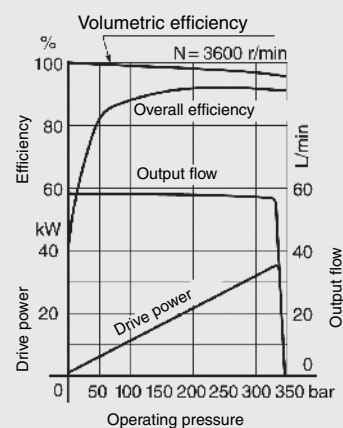
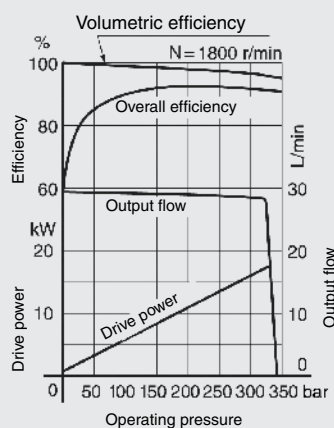
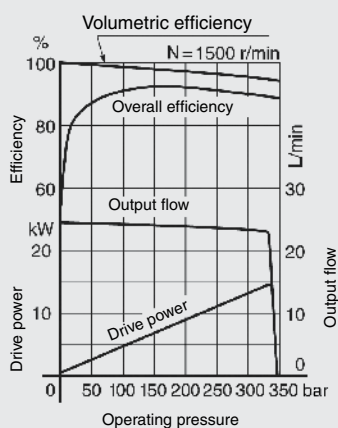
2.1.16 Availability of control type

Pump size	Geometric displacement cm ³ /rev	01 Pressure compensator type	07 Remote pressure compensator type	14 Load sensing type
PPV100S16	16.3	●	●	●
PPV100S37	37.1	●	●	●
PPV100S56	56.3	●	●	●
PPV100S71	70.7	●	●	●
PPV100S100	100.5	●	●	●
PPV100S145	145.2	●	●	●
PPV100S180	180.7	●	●	●

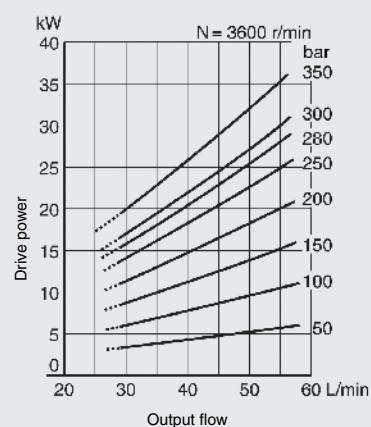
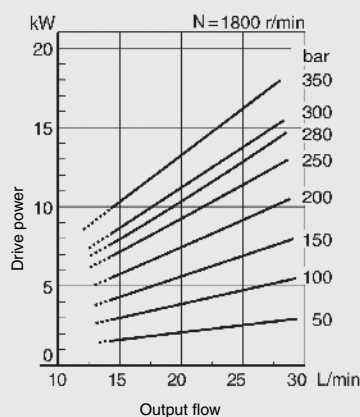
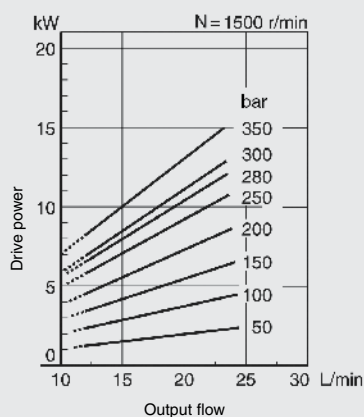
PERFORMANCE DATA

2.1.17 PPV100S16

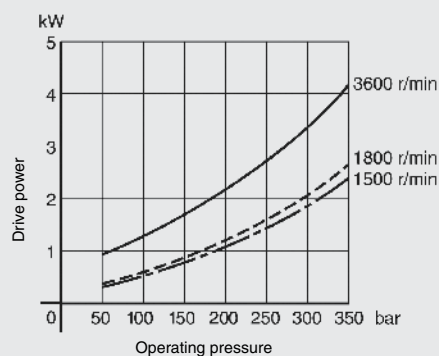
● Performance characteristic curve



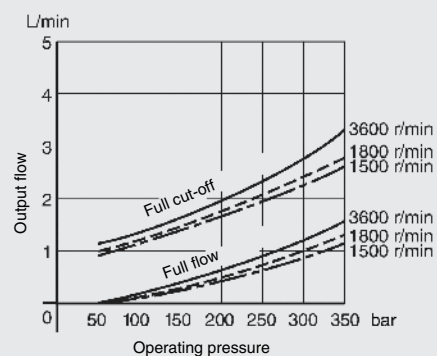
● Drive power



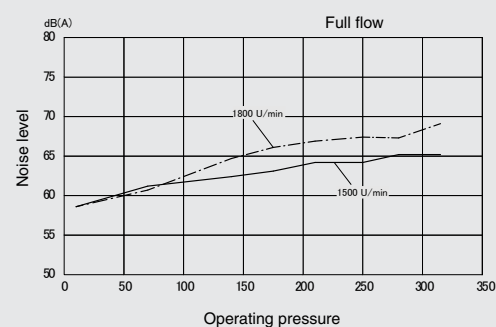
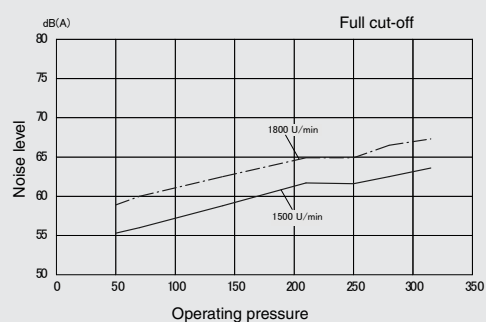
● Full cut-off power



● Drain

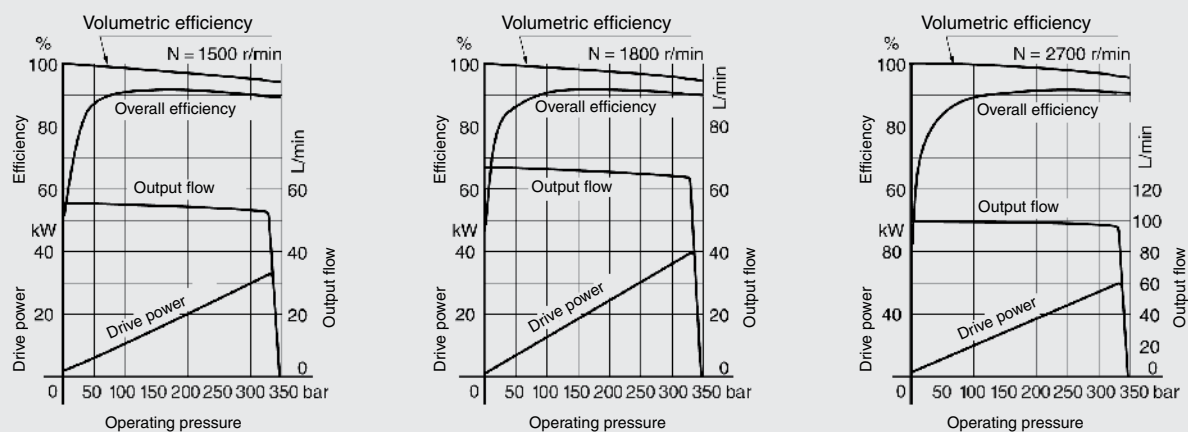


● Noise level

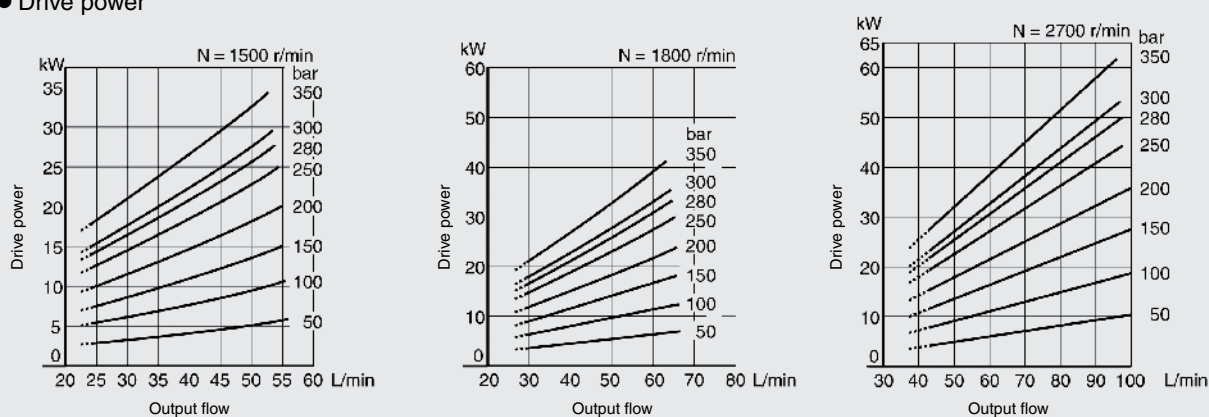


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

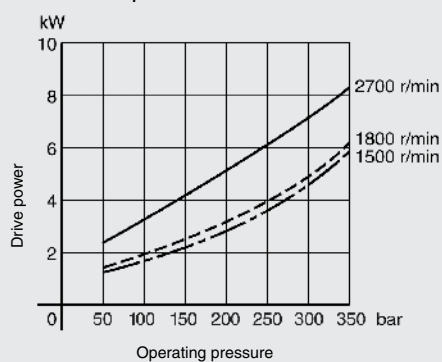


● Drive power

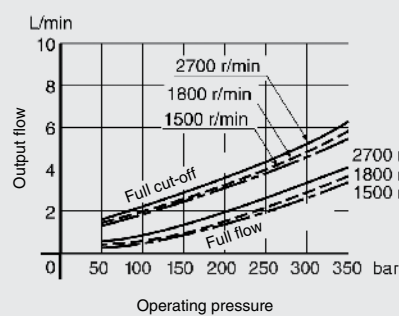


Note: The dotted lines in the graph are below the minimum adjustable flow

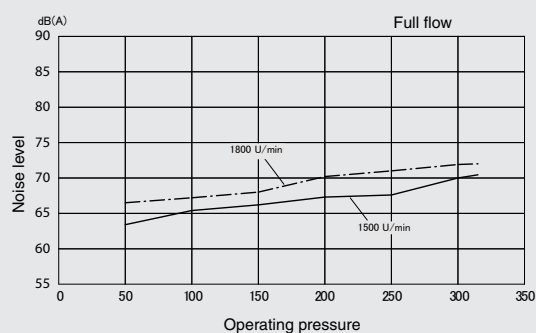
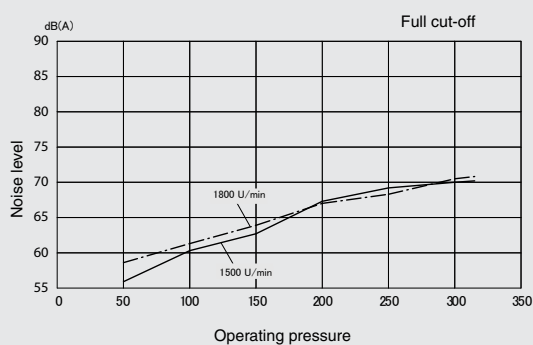
● Full cut-off power



● Drain

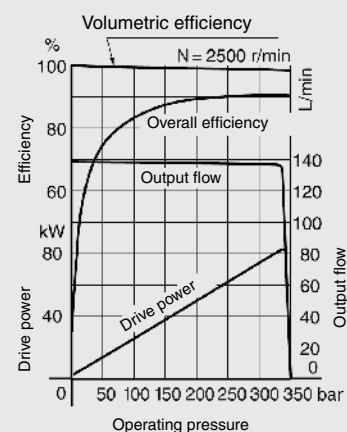
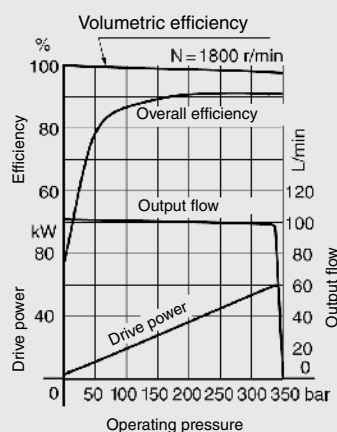
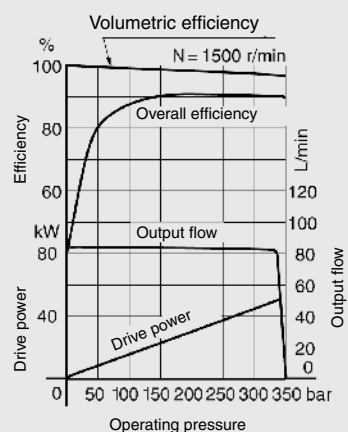


● Noise level

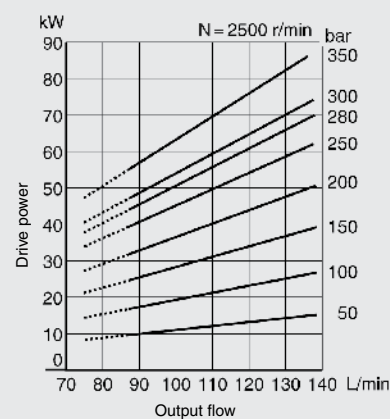
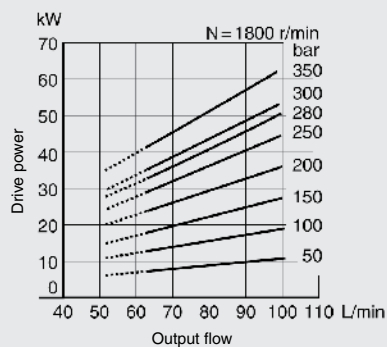
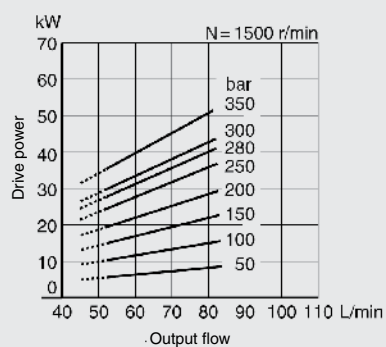


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

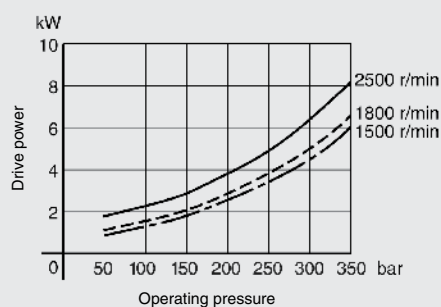


● Drive power

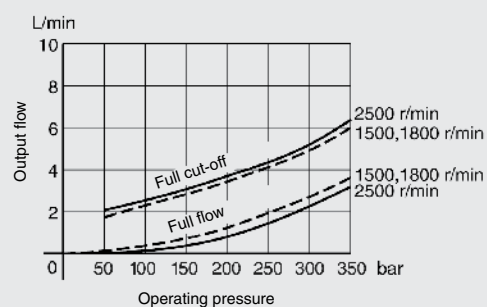


Note: The dotted lines in the graph are below the minimum adjustable flow

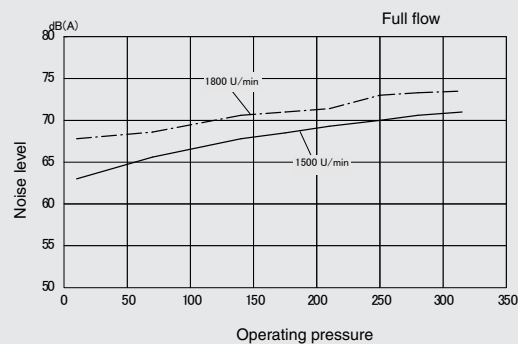
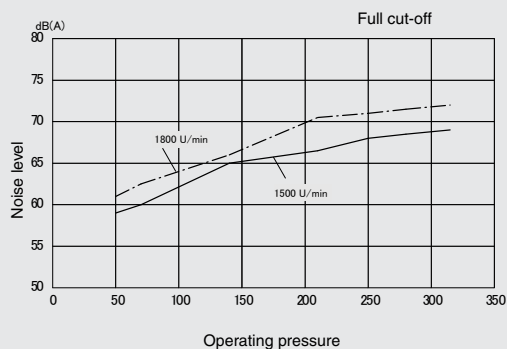
● Full cut-off power



● Drain

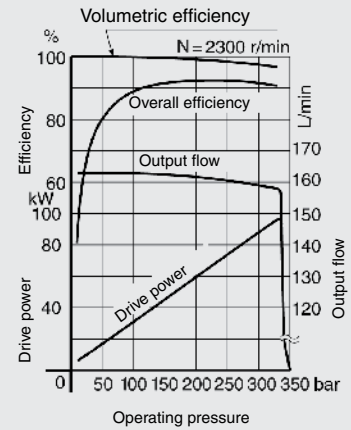
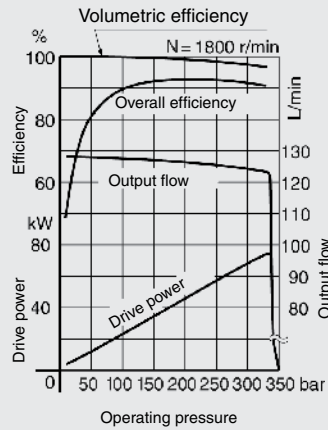
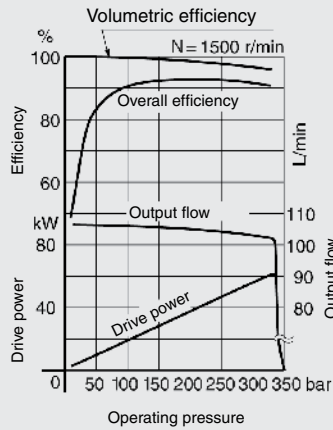


● Noise level

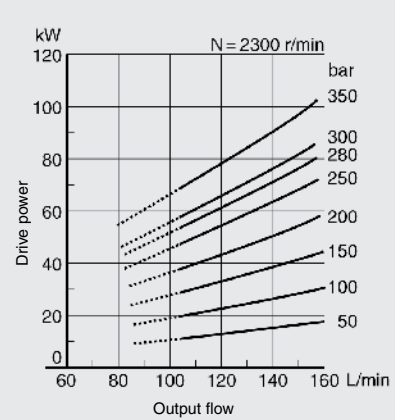
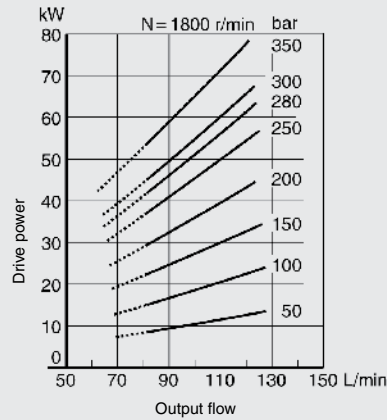
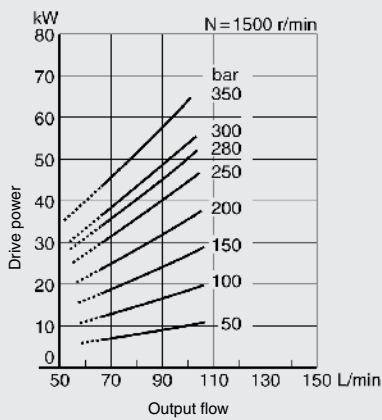


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

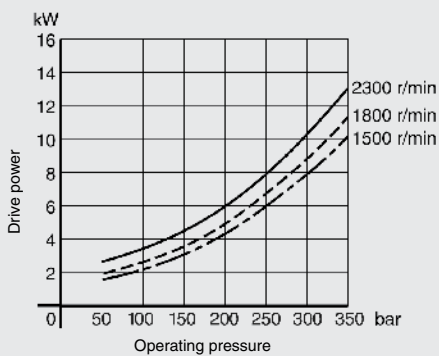


● Drive power

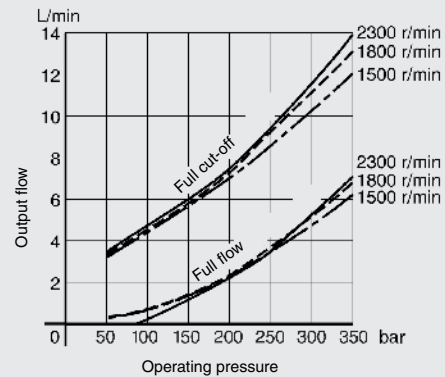


Note: The dotted lines in the graph are below the minimum adjustable flow

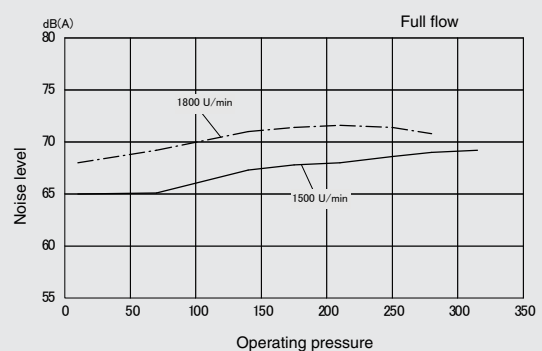
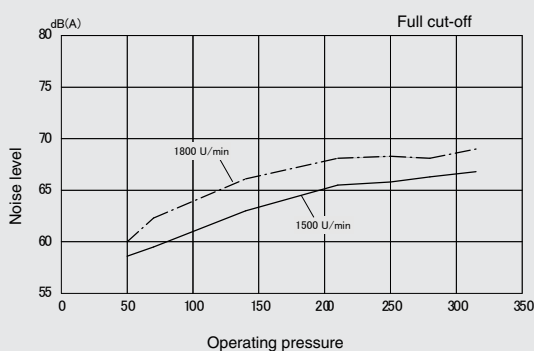
● Full cut-off power



● Drain

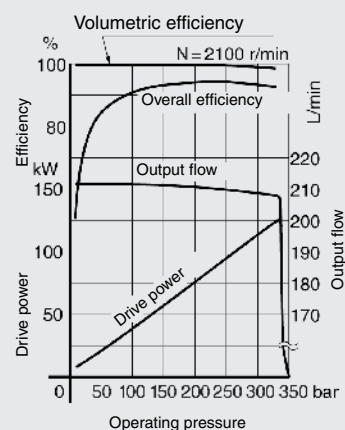
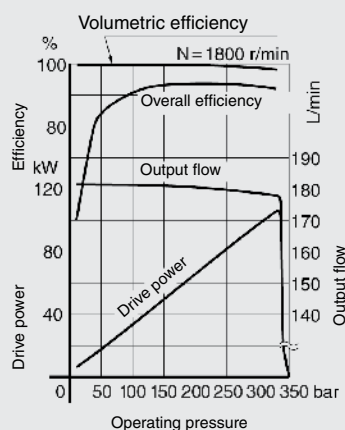
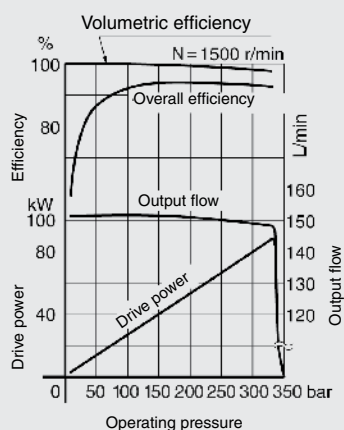


● Noise level

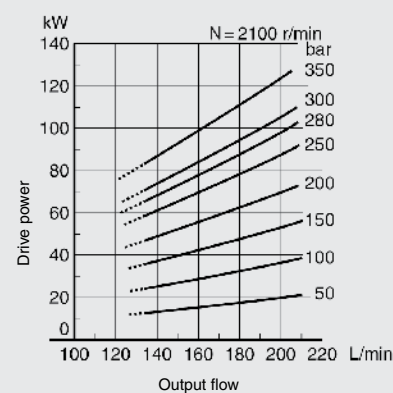
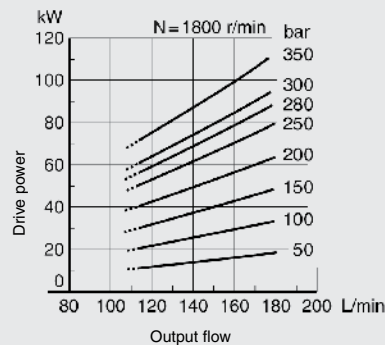
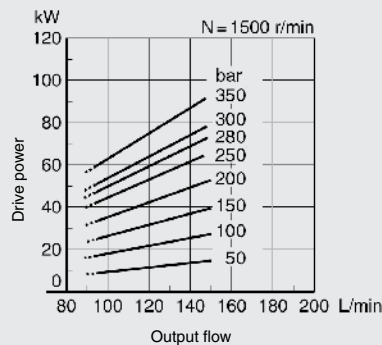


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

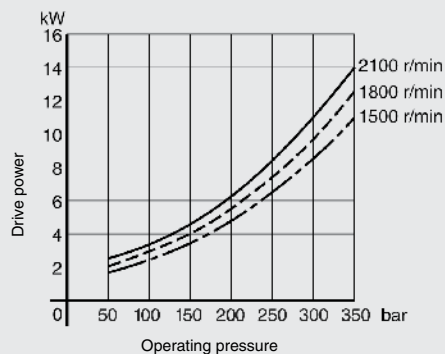


● Drive power

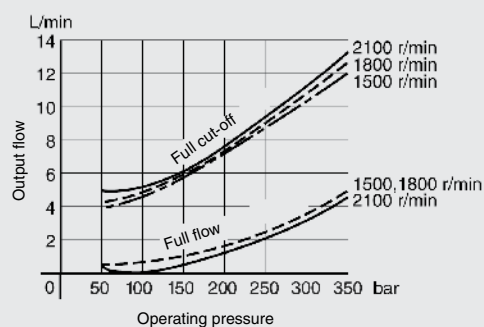


Note: The dotted lines in the graph are below the minimum adjustable flow

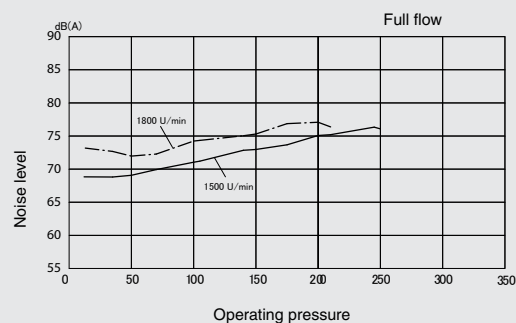
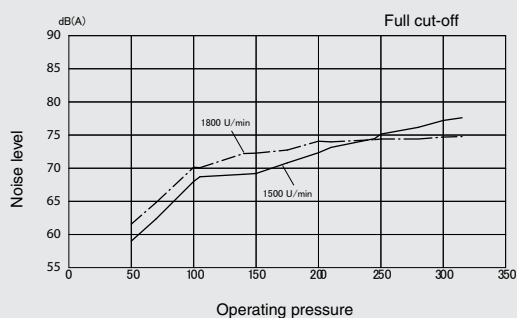
● Full cut-off power



● Drain



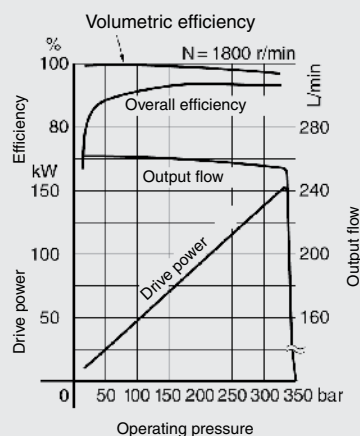
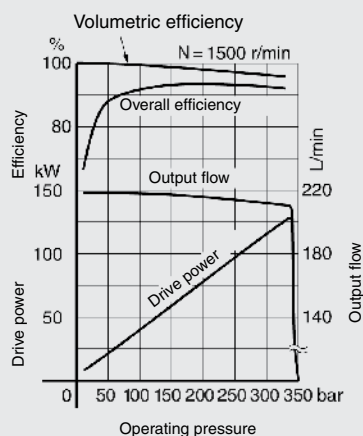
● Noise level



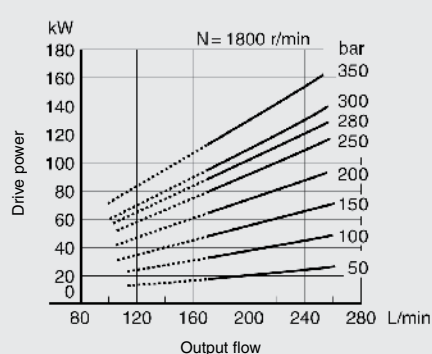
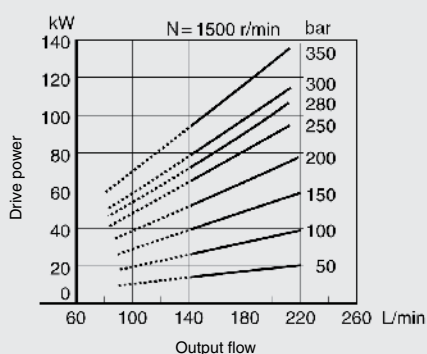
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

2.1.22 PPV100S145

● Performance characteristic curve

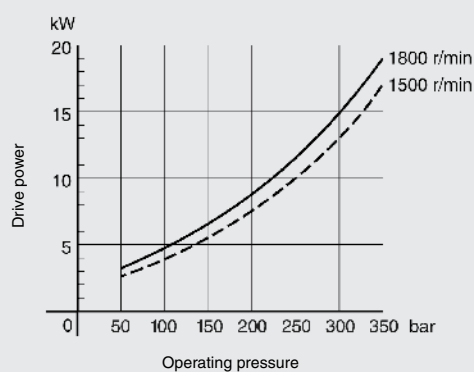


● Drive power

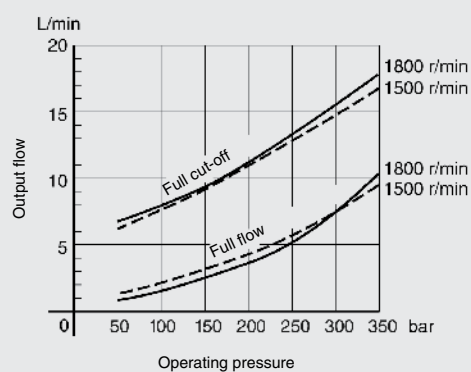


Note: The dotted lines in the graph are below the minimum adjustable flow

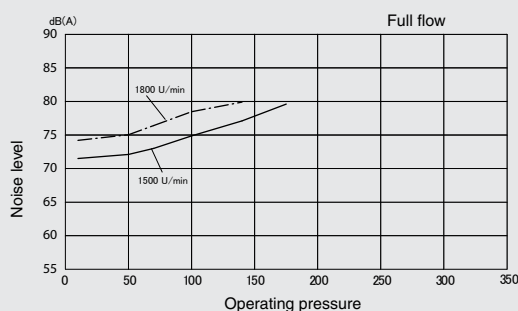
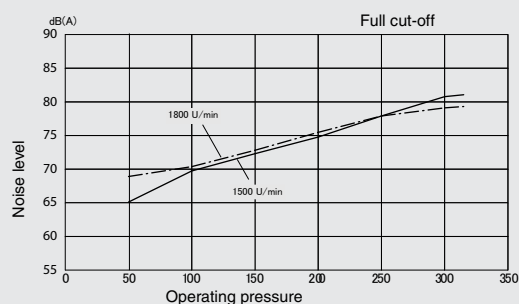
● Full cut-off power



● Drain

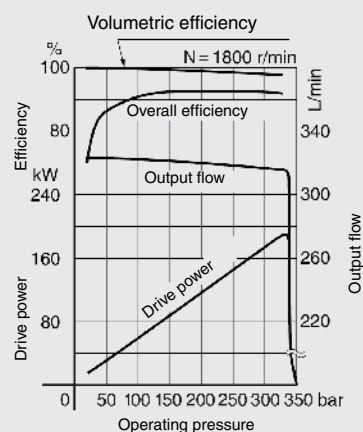
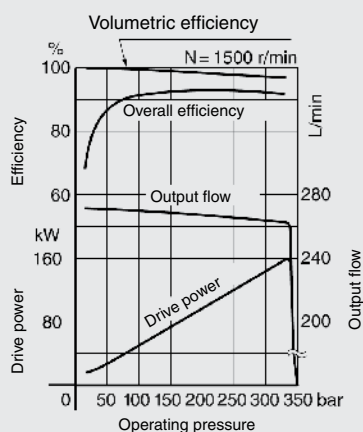


● Noise level

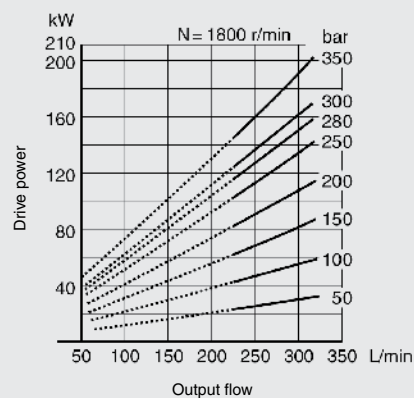
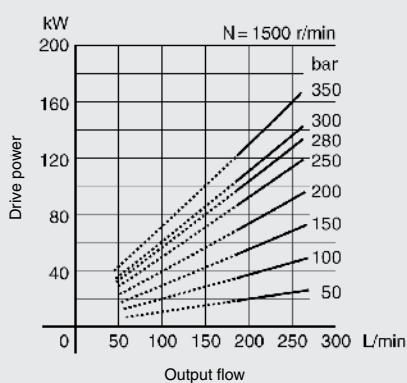


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

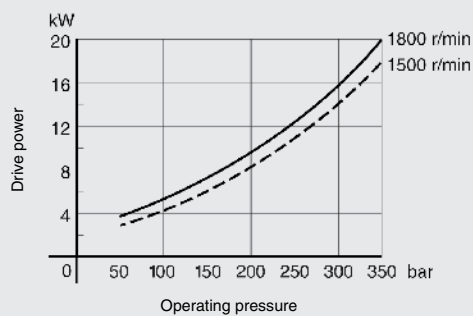


● Drive power

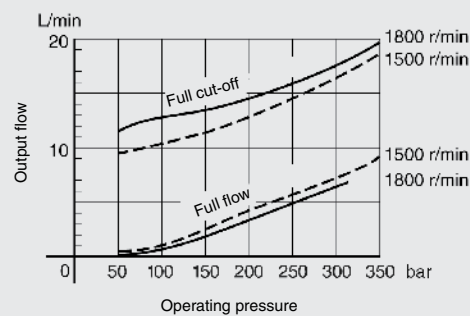


Note: The dotted lines in the graph are below the minimum adjustable flow

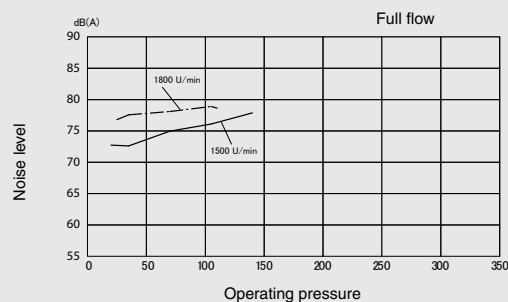
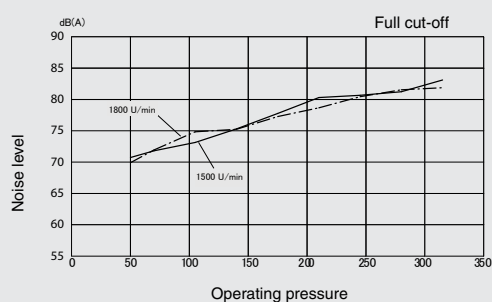
● Full cut-off power



● Drain



● Noise level

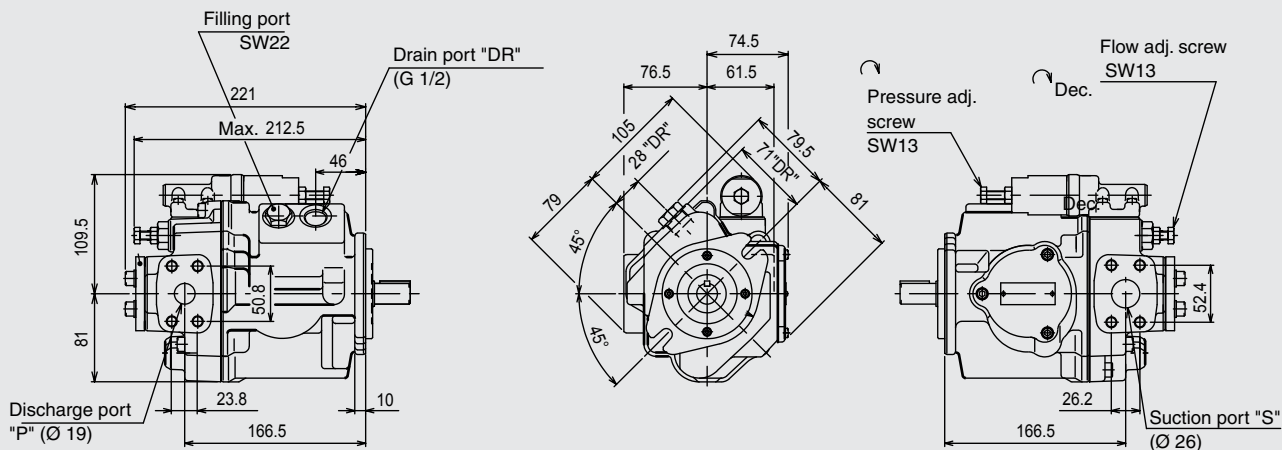


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

DIMENSIONS

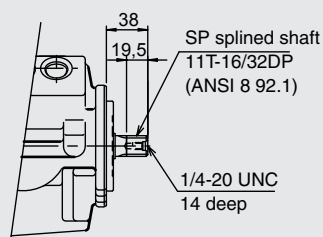
2.1.24 PPV100S16

PPV100S16 with pressure control 01

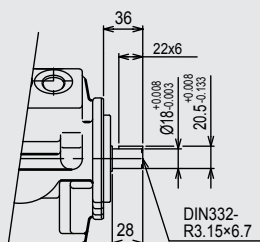


Mounting flange and shaft options

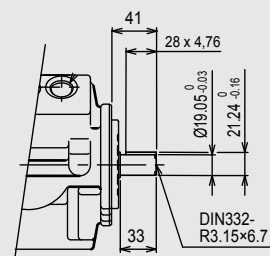
"SP" SAE AB Splined shaft



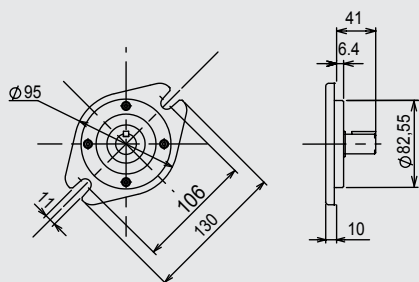
"K1" ISO Keyed shaft



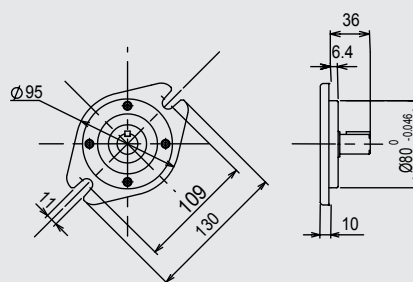
"K2" ISO Keyed shaft



"U1/U2/J1" SAE A Mounting flange



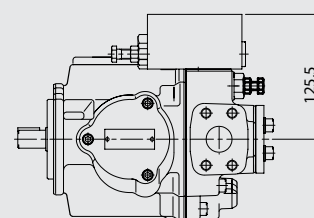
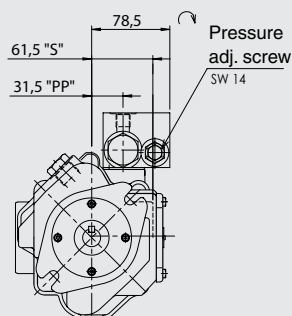
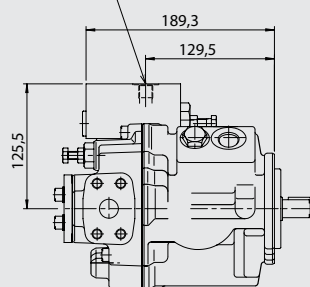
"E1" ISO Mounting flange



Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S16-FR__E1C-10	M10; 19 deep	M10; 19 deep	M22x1.5; 13 deep	M14x1.5 ; 13 deep	M14x1.5 ; 13 deep	3/4"	1"
PPV100S16-FR__U1C-10	3/8-16 UNC; 17 deep	3/8-16 UNC; 17 deep	7/8-14 UNF	1/2-20 UNF	1/2-20 UNF	3/4"	1"
PPV100S16-FR__U2C-10	M10; 19 deep	M10; 19 deep	G 1/2; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	3/4"	1"
PPV100S16-FR__J1C-10	M10; 19 deep	M10; 19 deep	Rc 1/2	Rc 1/4; 24 deep	Rc 1/4; 24 deep	3/4"	1"

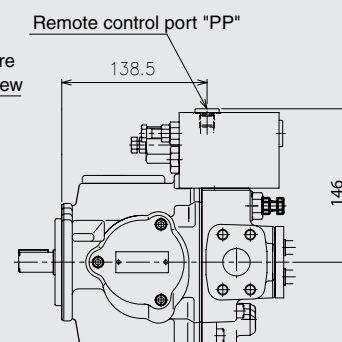
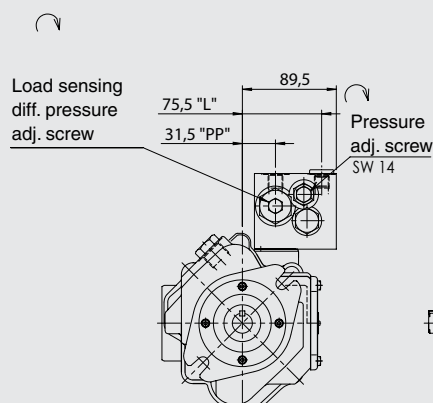
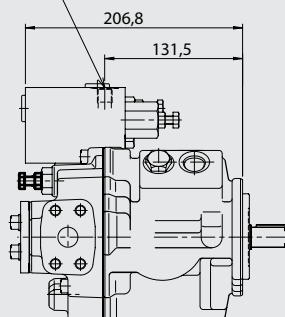
PPV100S16 with remote pressure control 07

Remote control port "PP"



PPV100S16 with load sensing control 14

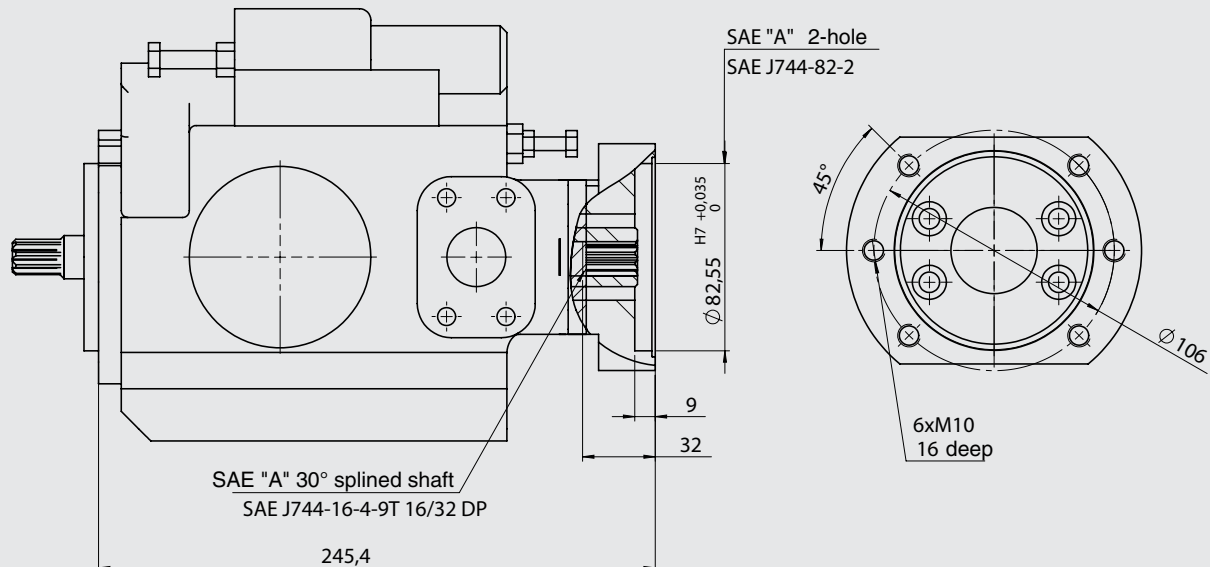
Load sensing port "L"



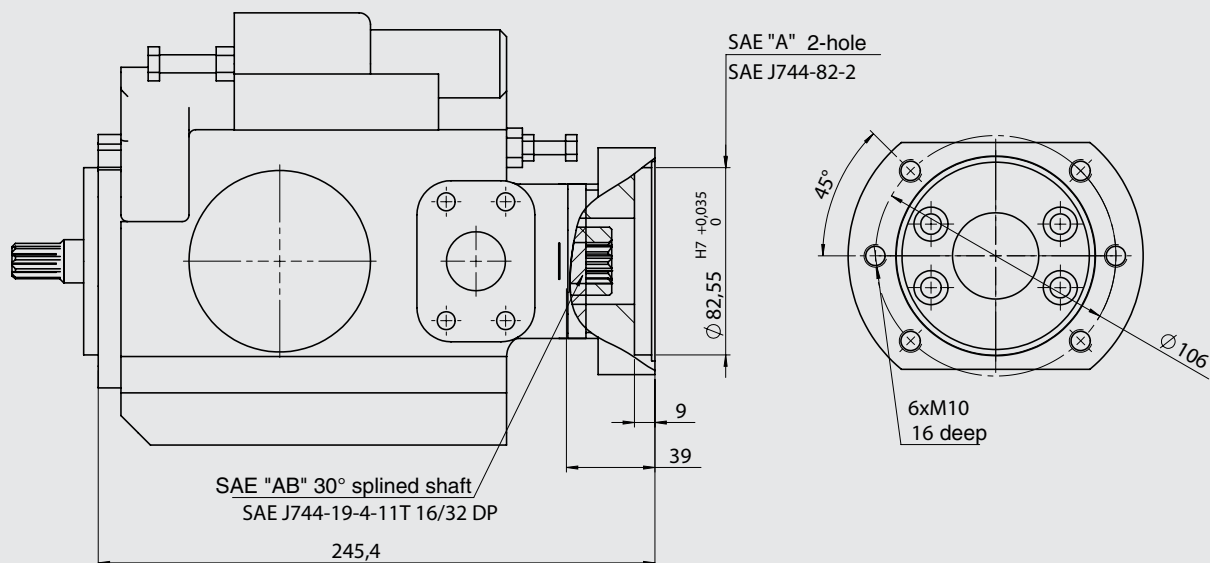
Pump type	Discharge port "P"	Suction port "S"	Thread size			Dimensions to SAE J 518 (full flange)	
			Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S16-FR__E1C-10	M10; 19 deep	M10; 19 deep	M22x1.5; 13 deep	M14x1.5 ; 13 deep	M14x1.5 ; 13 deep	3/4"	1"
PPV100S16-FR__U1C-10	3/8-16 UNC; 17 deep	3/8-16 UNC; 17 deep	7/8-14 UNF	1/2-20 UNF	1/2-20 UNF	3/4"	1"
PPV100S16-FR__U2C-10	M10; 19 deep	M10; 19 deep	G 1/2; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	3/4"	1"
PPV100S16-FR__J1C-10	M10; 19 deep	M10; 19 deep	Rc 1/2	Rc 1/4; 24 deep	Rc 1/4; 24 deep	3/4"	1"

PPV100S16 Through drive options

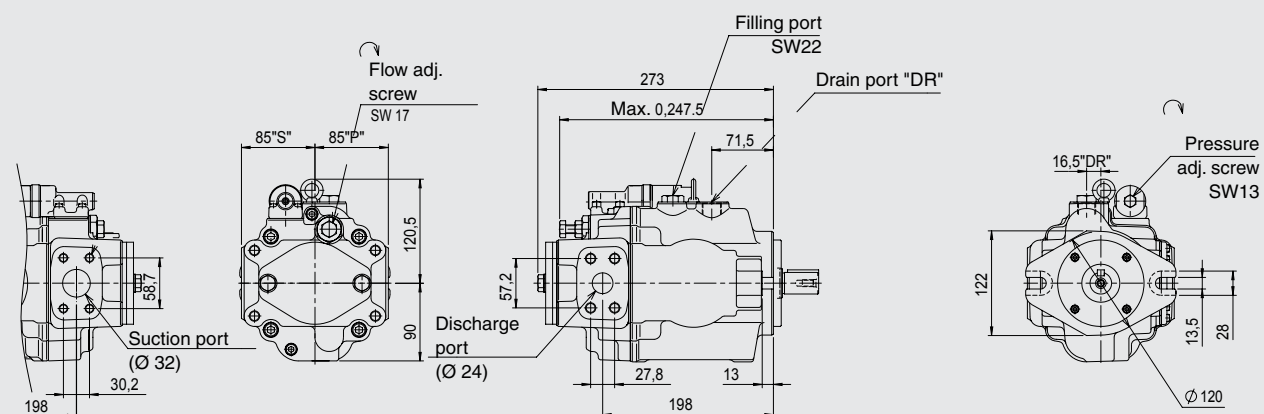
Through drive "SAE A"



Through drive "SAE AB"

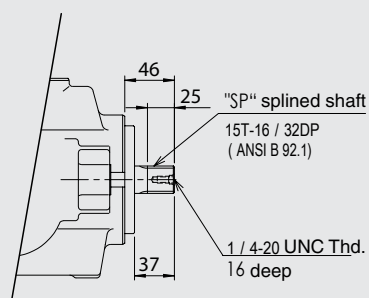


PPV100S37 with pressure control 01

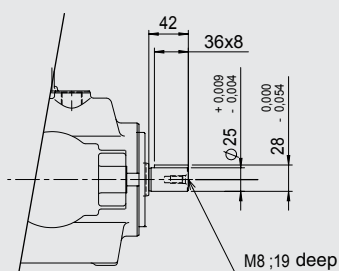


Mounting flange and shaft options

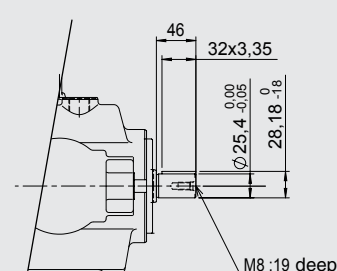
"SP" SAE BB Splined shaft



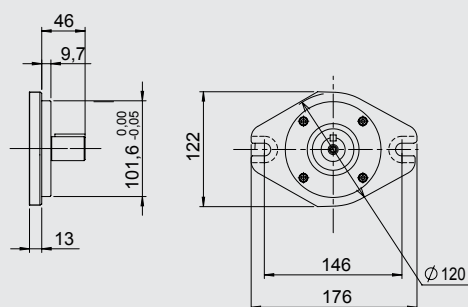
"K1" ISO Keyed shaft



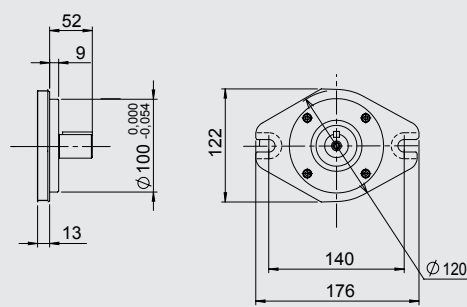
"K2" ISO Keyed shaft



"U1/U2/J1" SAE B Mounting flange



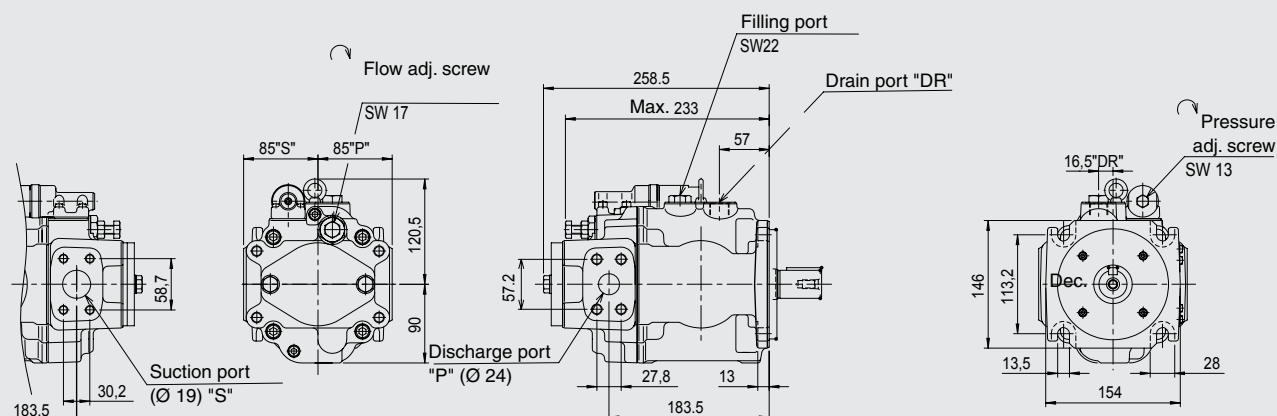
"E1" ISO Mounting flange



Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S37-FR___E1_-10	M12; 22 deep	M12; 22 deep	M22x1.5; 13 deep	M14x1.5 ; 13 deep	M14x1.5 ; 13 deep	1"	1 1/4"
PPV100S37-FR___U1C-10	7/16-14 UNC; 20 deep	7/16-14 UNC; 20 deep	7/8-14 UNF	1/2-20 UNF	1/2-20 UNF	1"	1 1/4"
PPV100S37-FR___U2C-10	M12; 22 deep	M10; 18 deep	G 1/2; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1"	1 1/4"
PPV100S37-FR___J1C-10	M12; 22 deep	M10; 18 deep	Rc 1/2	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1"	1 1/4"

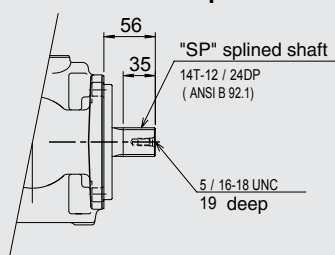
2.1.26 PPV100S37 with 4-hole mounting flange

PPV100S37 with pressure control 01

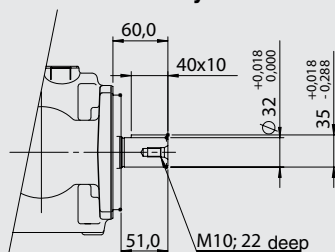


Mounting flange and shaft options

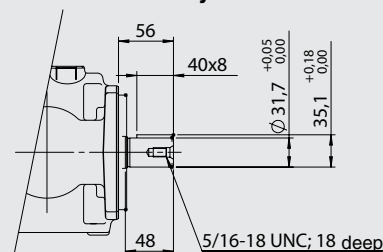
"SP" SAE C Splined shaft



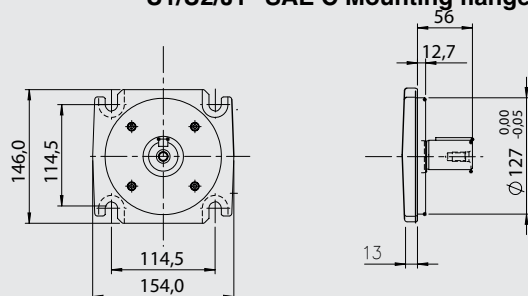
"K1" ISO Keyed shaft



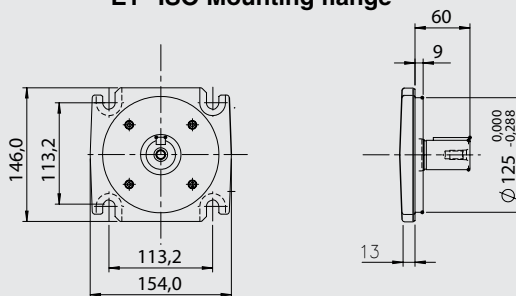
"K2" ISO Keyed shaft



"U1/U2/J1" SAE C Mounting flange

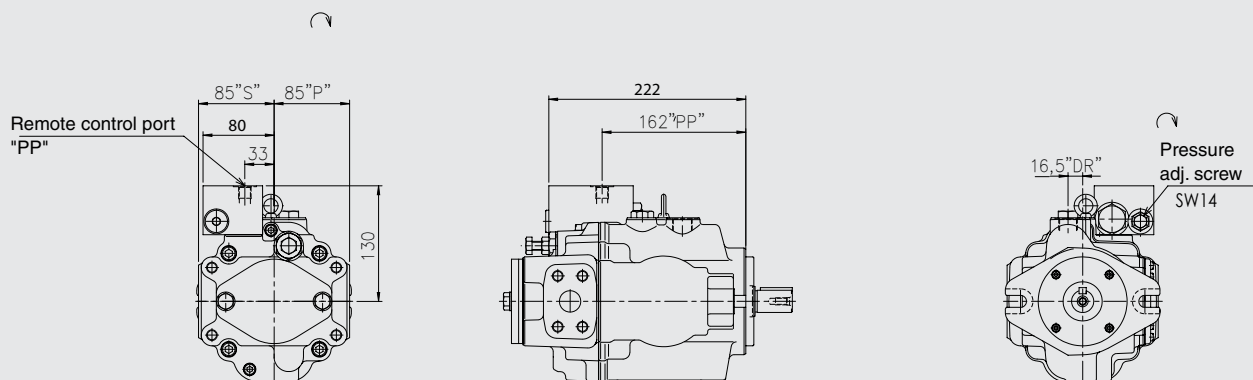


"E1" ISO Mounting flange

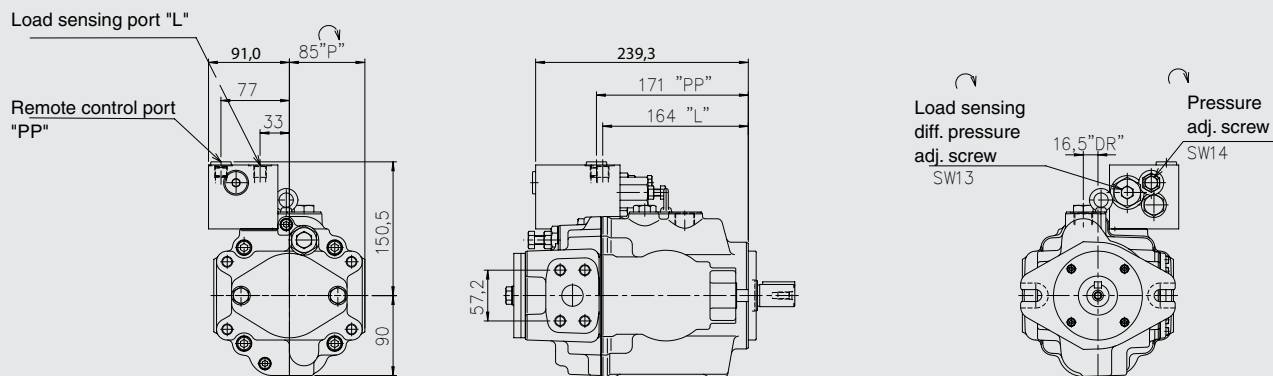


Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S37-FR__E1_-10	M12; 22 deep	M10; 18 deep	M22x1.5; 13 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1"	1 1/4"
PPV100S37-FR__U1_-10	7/16-14 UNC; 20 deep	7/16-14 UNC; 20 deep	7/8-14 UNF	1/2-20 UNF	1/2-20 UNF	1"	1 1/4"
PPV100S37-FR__U2_-10	M12; 22 deep	M10; 18 deep	G 1/2; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1"	1 1/4"
PPV100S37-FR__J1_-10	M12; 22 deep	M10; 18 deep	Rc 1/2	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1"	1 1/4"

PPV100S37 with remote pressure control 07



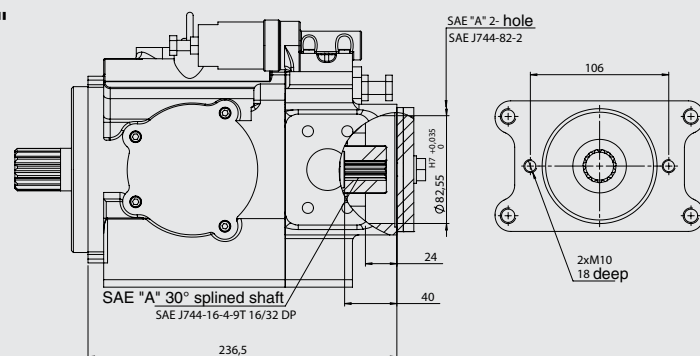
PPV100S37 with load sensing control 14



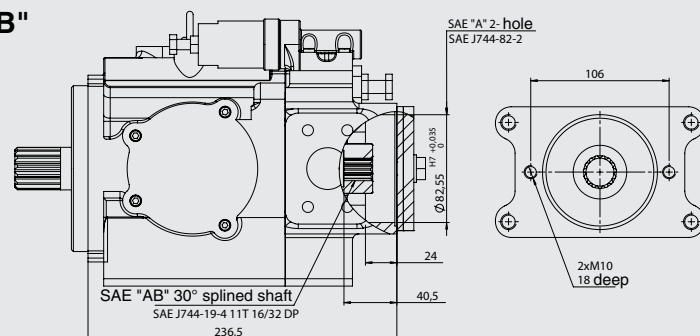
Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S37-FR___E1_-10	M12; 22 deep	M10; 18 deep	M22x1.5; 13 deep	M14x1.5; 13 deep	M14x1.5 ; 13 deep	1"	1 1/4"
PPV100S37-FR___U1_-10	7/16-14 UNC; 20 deep	7/16-14 UNC; 20 deep	7/8-14 UNF	1/2-20 UNF	1/2-20 UNF	1"	1 1/4"
PPV100S37-FR___U2_-10	M12; 22 deep	M10; 18 deep	G 1/2; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1"	1 1/4"
PPV100S37-FR___J1_-10	M12; 22 deep	M10; 18 deep	Rc 1/2	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1"	1 1/4"

PPV100S37 Through drive options

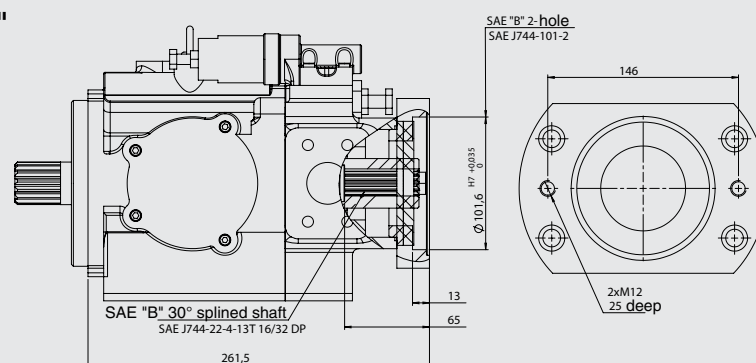
Through drive "SAE A"



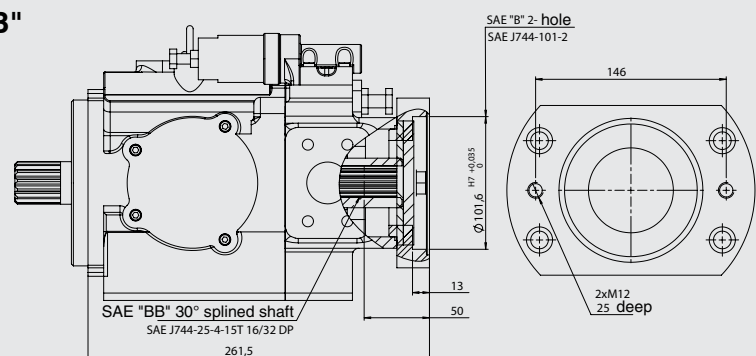
Through drive "SAE AB"



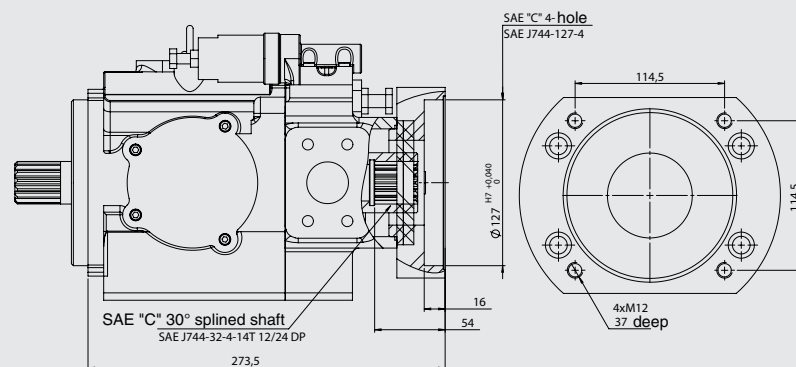
Through drive "SAE B"



Through drive "SAE BB"

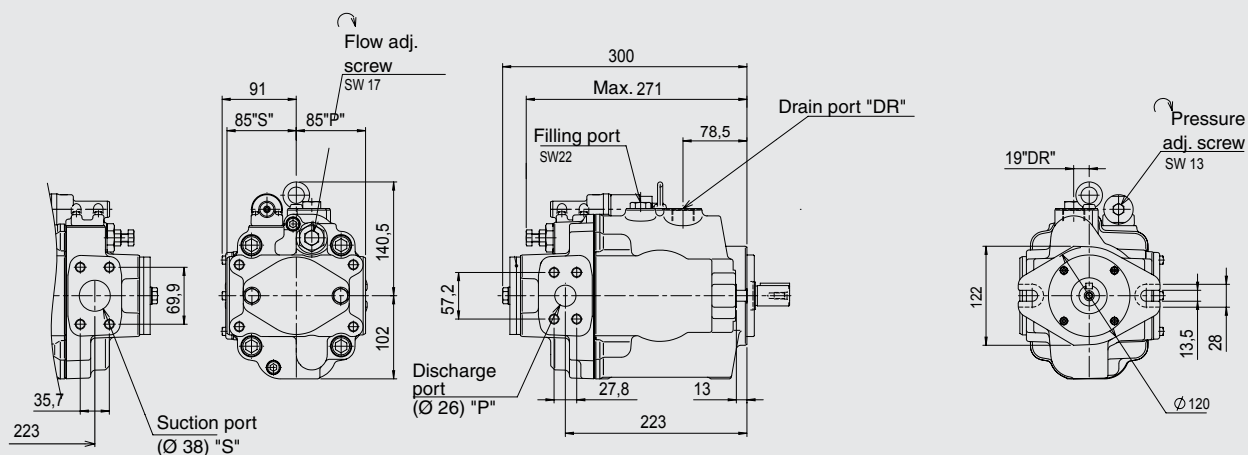


Through drive "SAE C"



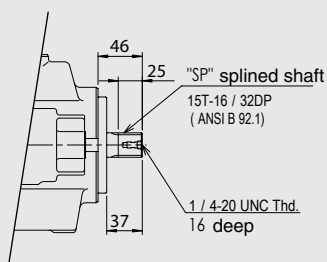
2.1.27 PPV100S56 with 2-hole mounting flange

PPV100S56 with pressure control 01

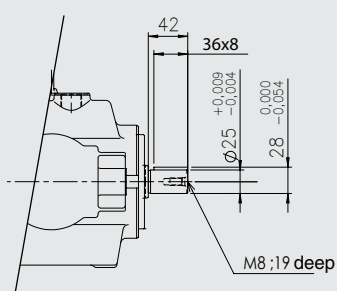


Mounting flange and shaft options

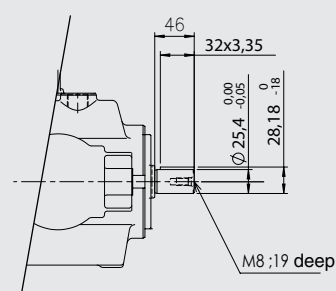
"SP" SAE BB Splined shaft



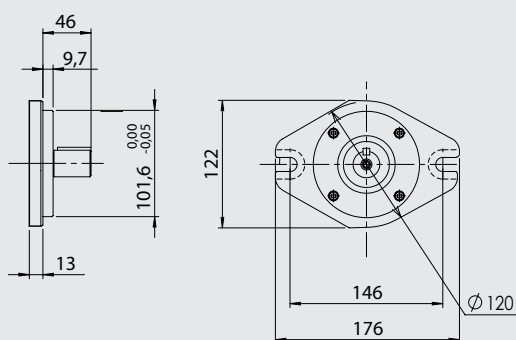
"K1" ISO Keyed shaft



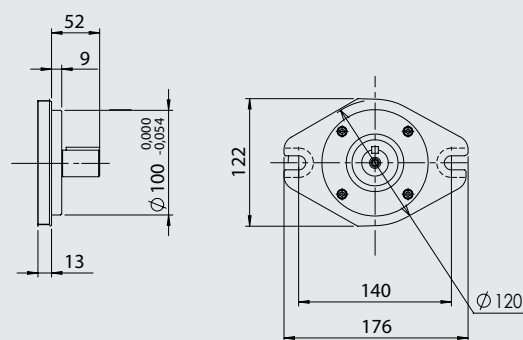
"K2" ISO Keyed shaft



"U1/U2/J1" SAE B Mounting flange



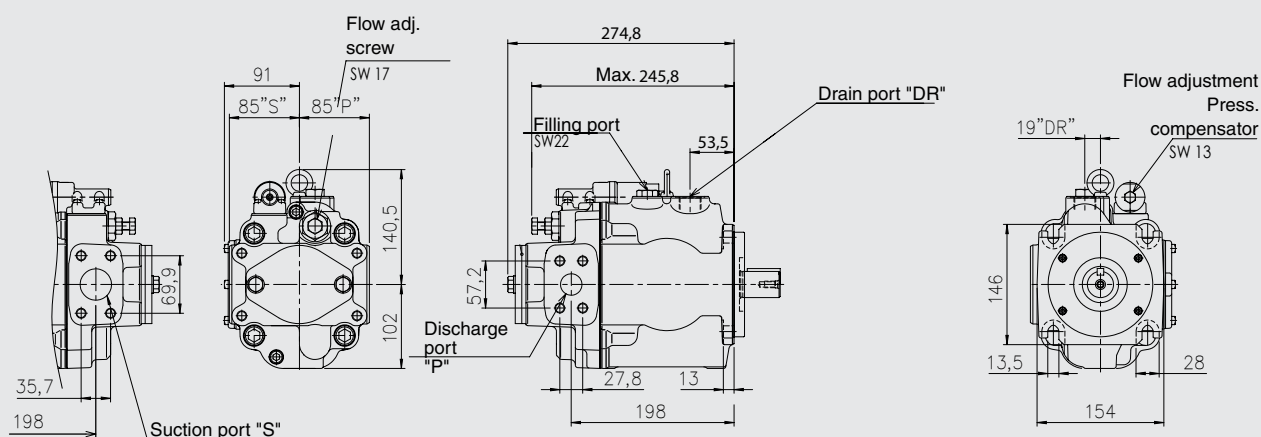
"E1" ISO Mounting flange



Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S56-FR__E1_-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1"	1 1/2"
PPV100S56-FR__U1_-10	7/16-14 UNC; 20 deep	1/2-13 UNC	7/8-14 UN	1 1/16-12 UNF	1/2-20 UNF	1"	1 1/2"
PPV100S56-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1"	1 1/2"
PPV100S56-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1"	1 1/2"

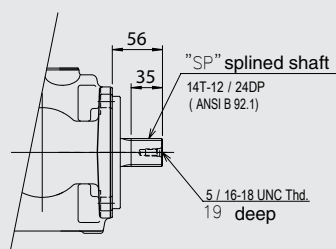
2.1.28 PPV100S56 with 4-hole mounting flange

PPV100S56 with pressure control 01

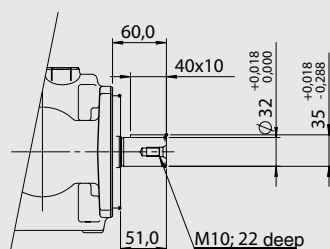


Mounting flange and shaft options

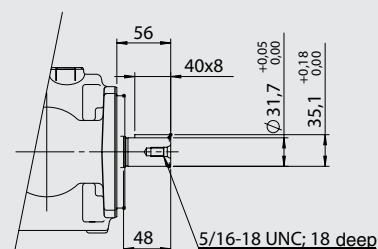
"SP" SAE C Splined shaft



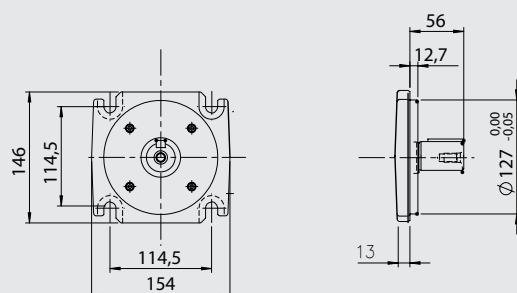
"K1" ISO Keyed shaft



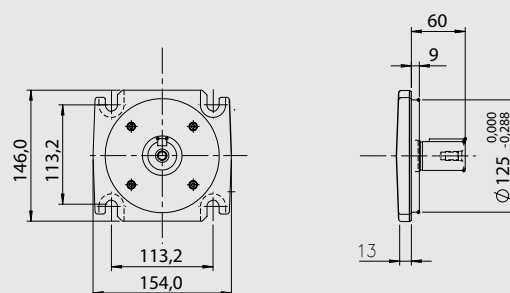
"K2" ISO Keyed shaft



"U1/U2/J1" SAE C Mounting flange

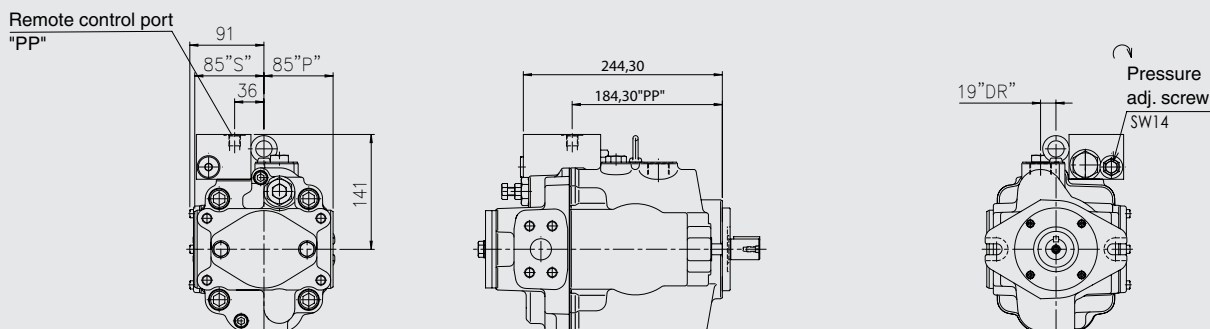


"E1" ISO Mounting flange

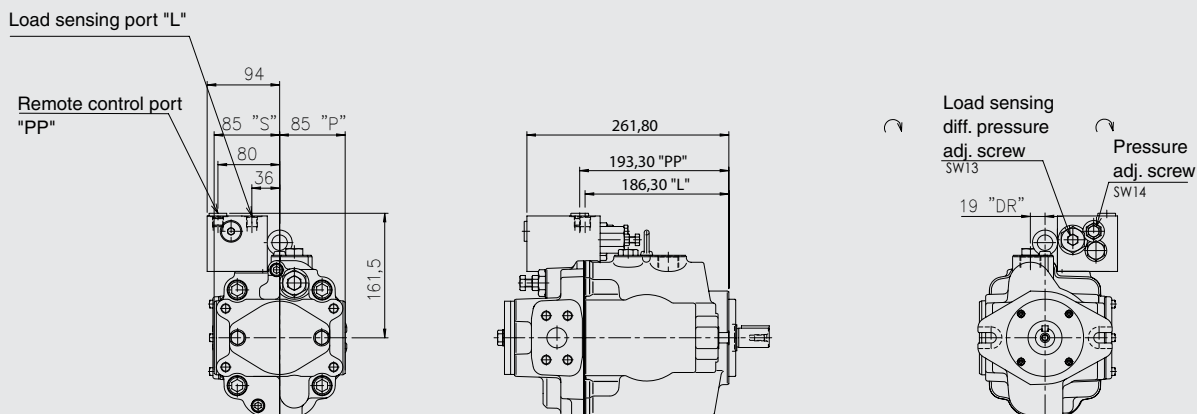


Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S56-FR__E1_-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1"	1 1/2"
PPV100S56-FR__U1_-10	7/16-14 UNC; 20 deep	1/2-13 UNC	7/8-14 UN	1 1/16-12 UNF	1/2-20 UNF	1"	1 1/2"
PPV100S56-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1"	1 1/2"
PPV100S56-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1"	1 1/2"

PPV100S56 with remote pressure control 07



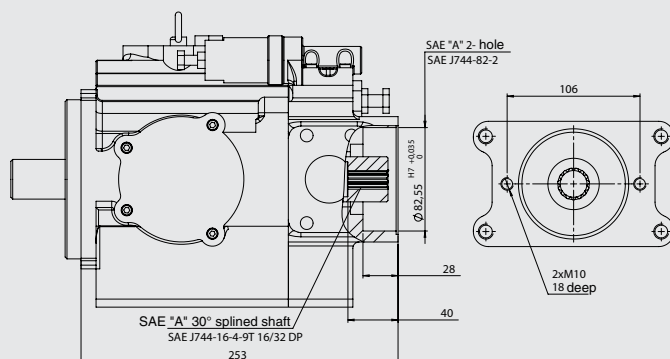
PPV100S56 with load sensing control 14



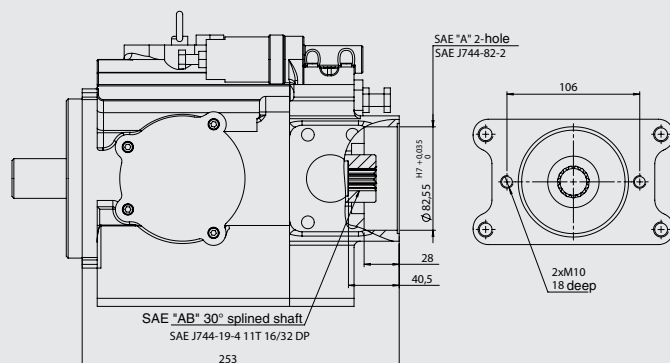
Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S56-FR__E1_-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1"	1 1/2"
PPV100S56-FR__U1_-10	7/16-14 UNC; 20 deep	1/2-13 UNC	7/8-14 UN	1 1/16-12 UNF	1/2-20 UNF	1"	1 1/2"
PPV100S56-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1"	1 1/2"
PPV100S56-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1"	1 1/2"

PPV100S56 Through drive options

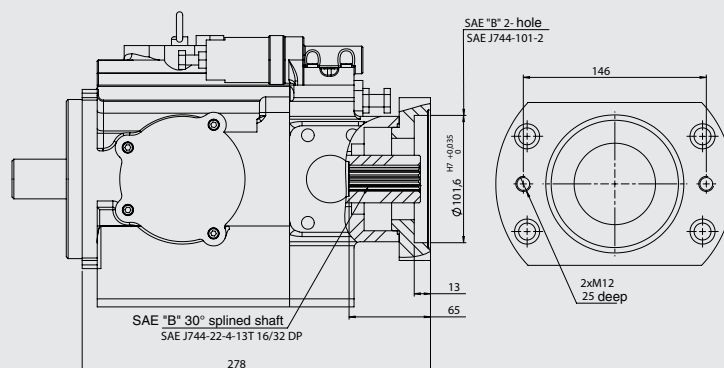
Through drive "SAE A"



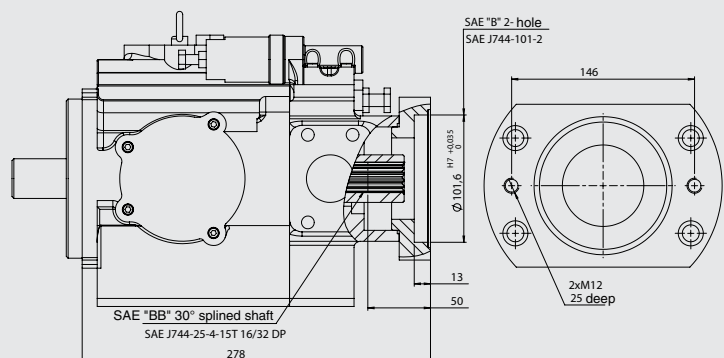
Through drive "SAE AB"



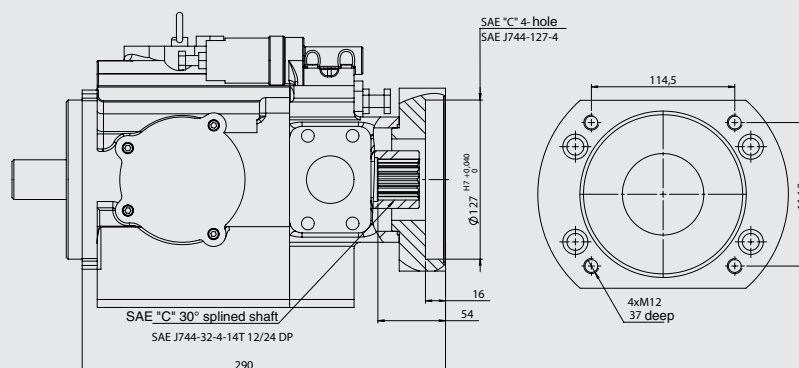
Through drive "SAE B"



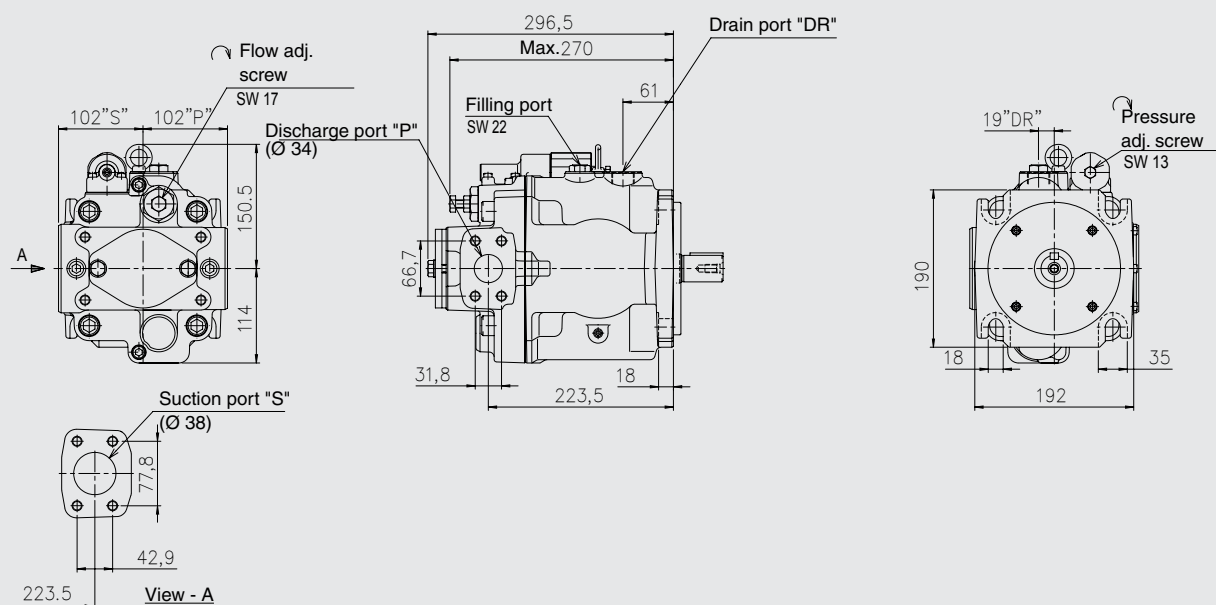
Through drive "SAE BB"



Through drive "SAE C"

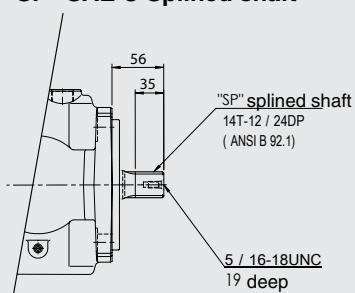


PPV100S71 with pressure control 01

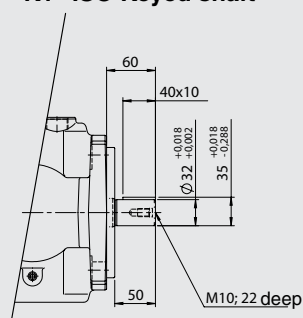


Mounting flange and shaft options

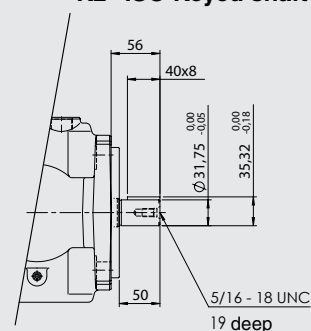
"SP" SAE C Splined shaft



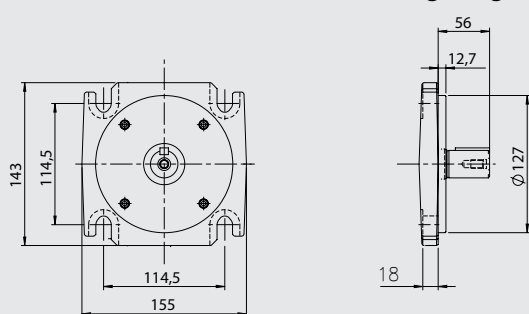
"K1" ISO Keyed shaft



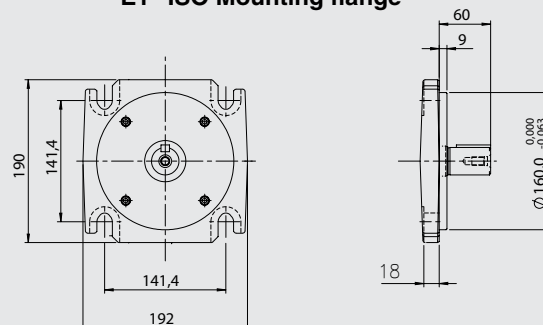
"K2" ISO Keyed shaft



"U1/U2/J1" SAE C Mounting flange

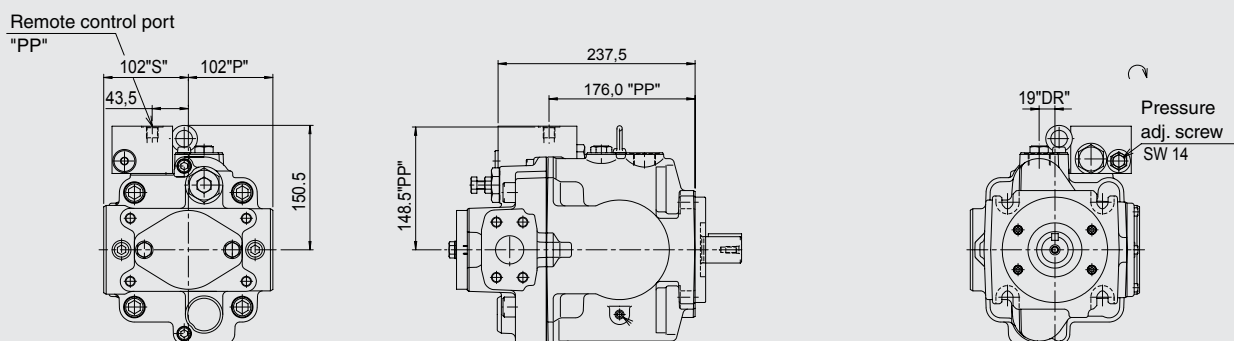


"E1" ISO Mounting flange

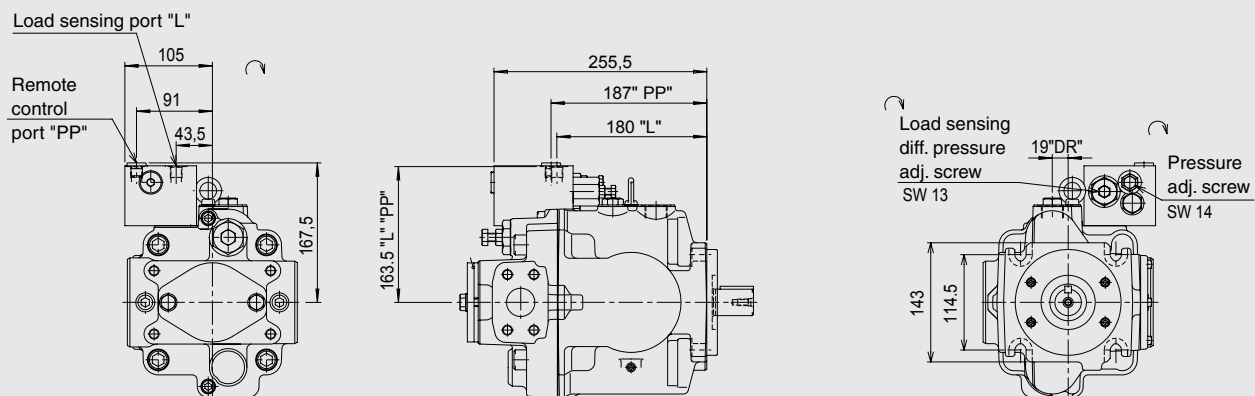


Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S71-FR__E1_-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/4"	2"
PPV100S71-FR__U1_-10	1/2-13 UNC; 21 deep	1/2-13 UNC; 21 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/4"	2"
PPV100S71-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/4"	2"
PPV100S71-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/4"	2"

PPV100S71 with remote pressure control 07



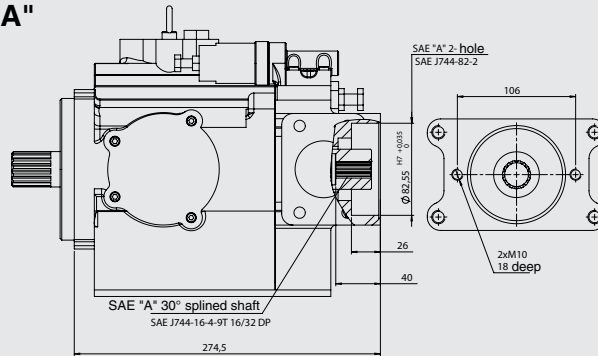
PPV100S71 with load sensing control 14



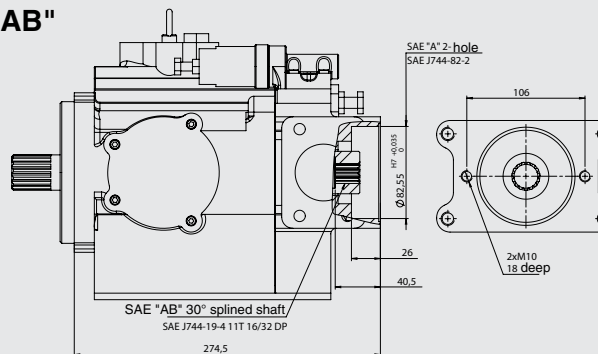
Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S71-FR__E1_-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/4"	2"
PPV100S71-FR__U1_-10	1/2-13 UNC; 21 deep	1/2-13 UNC; 21 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/4"	2"
PPV100S71-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/4"	2"
PPV100S71-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/4"	2"

PPV100S71 Through drive options

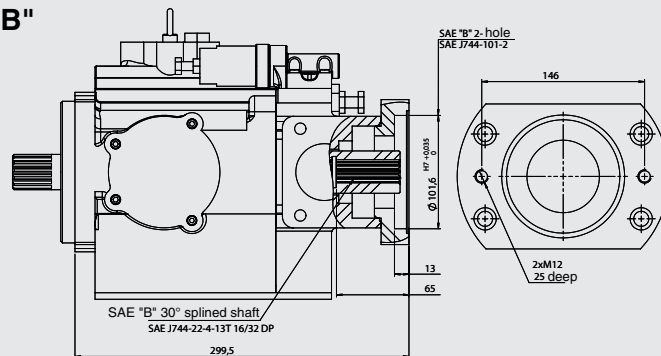
Through drive "SAE A"



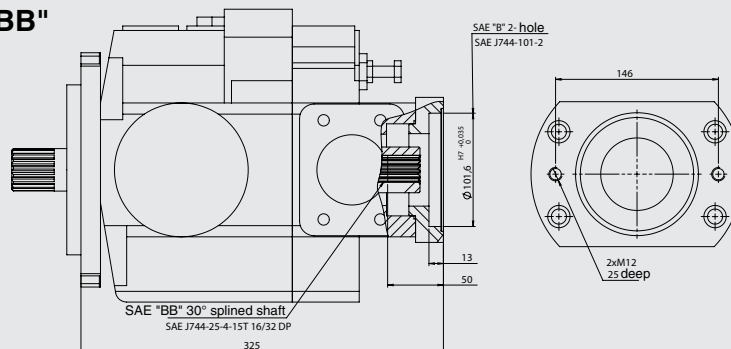
Through drive "SAE AB"



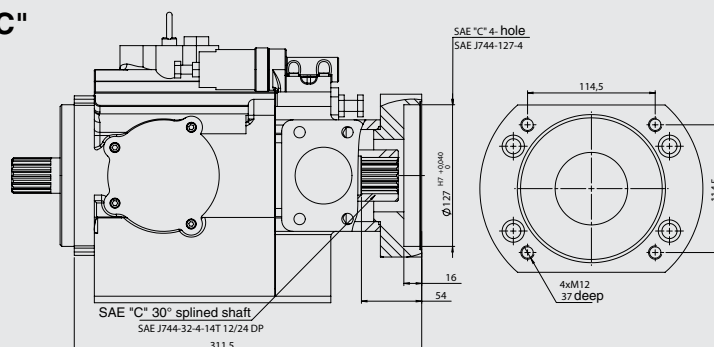
Through drive "SAE B"



Through drive "SAE BB"

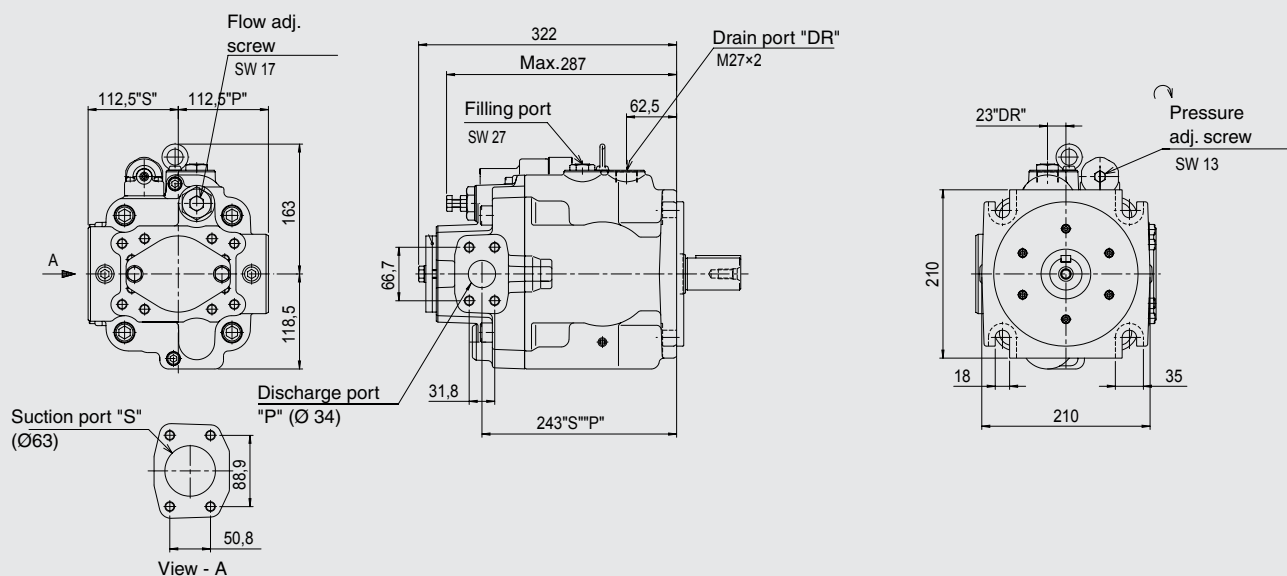


Through drive "SAE C"



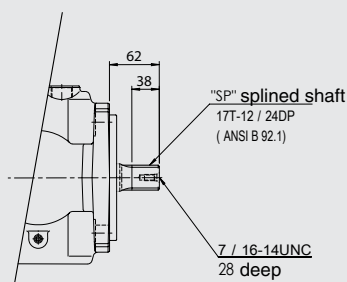
2.1.30 PPV100S100

PPV100S100 with pressure control 01

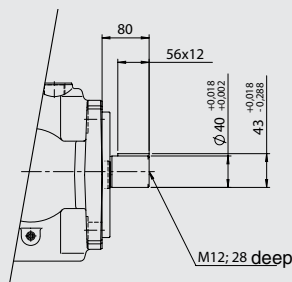


Mounting flange and shaft options

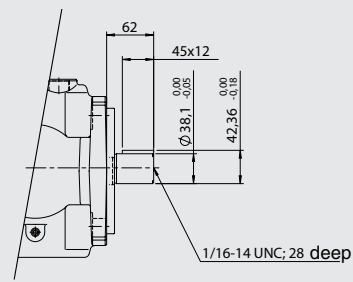
"SP" SAE CC Splined shaft



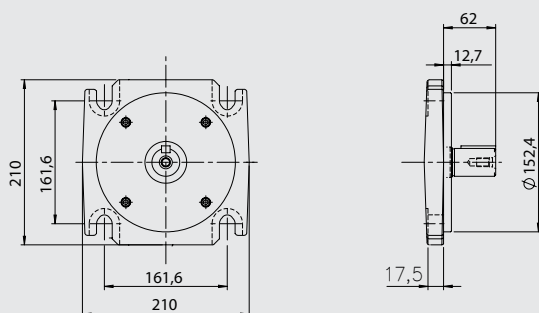
"K1" ISO Keyed shaft



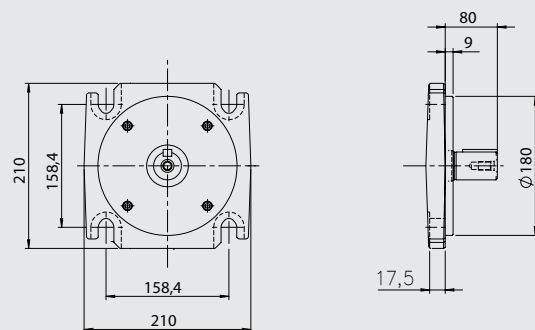
"K2" ISO Keyed shaft



"U1/U2/J1" SAE D Mounting flange

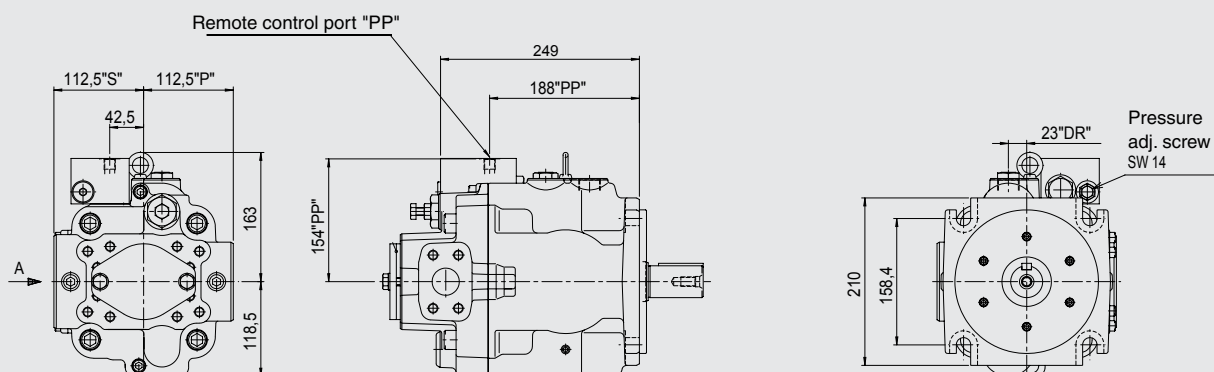


"E1" ISO Mounting flange

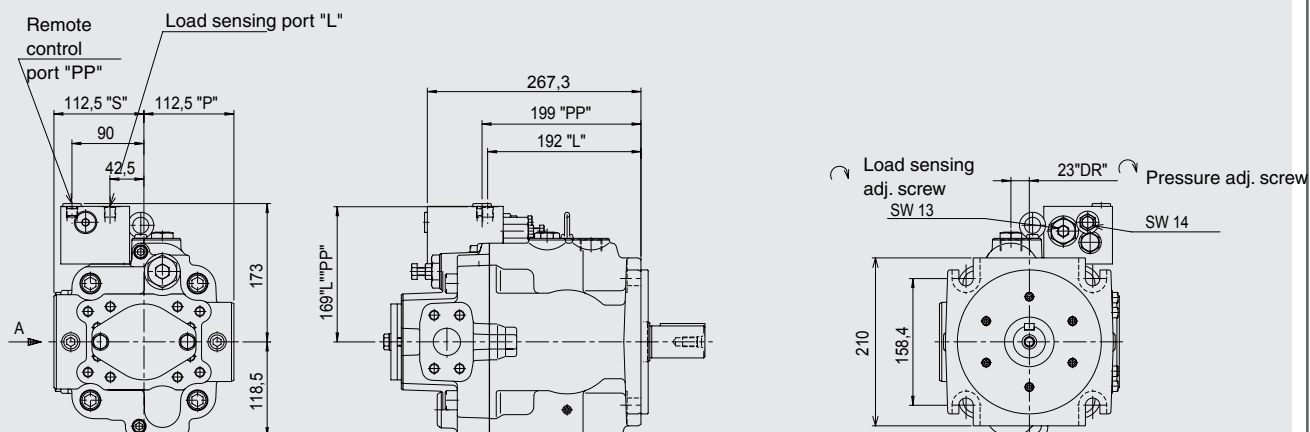


Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S100-FR__E1D-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/4"	2 1/2"
PPV100S100-FR__U1D-10	1/2-13 UNC; 21 deep	1/2-13 UNC; 21 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/4"	2 1/2"
PPV100S100-FR__U2D-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/4"	2 1/2"
PPV100S100-FR__J1D-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/4"	2 1/2"

PPV100S100 with remote pressure control 07



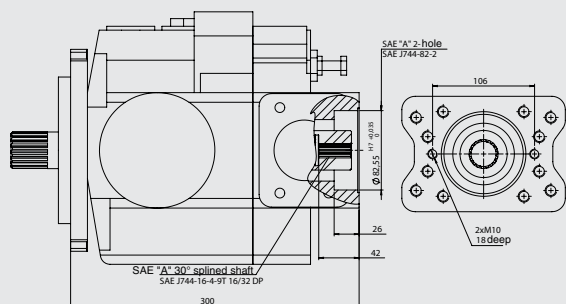
PPV100S100 with load sensing control 14



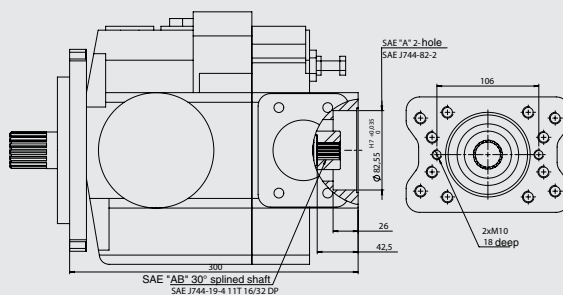
Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S100-FR__E1D-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/4"	2 1/2"
PPV100S100-FR__U1_-10	1/2-13 UNC; 21 deep	1/2-13 UNC; 21 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/4"	2 1/2"
PPV100S100-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/4"	2 1/2"
PPV100S100-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/4"	2 1/2"

PPV100S100 Through drive options

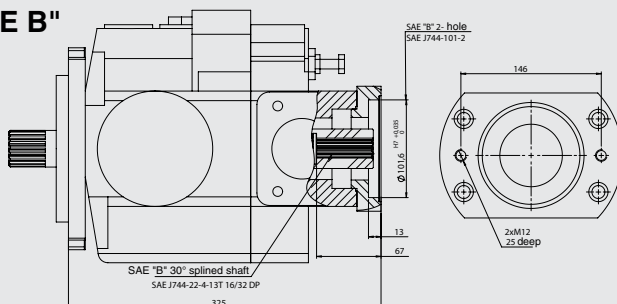
Through drive "SAE A"



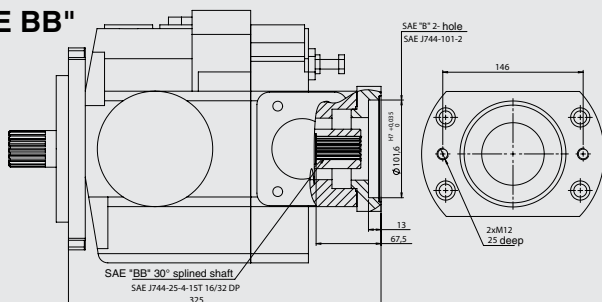
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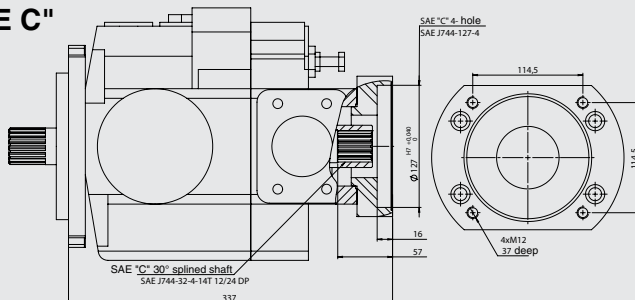
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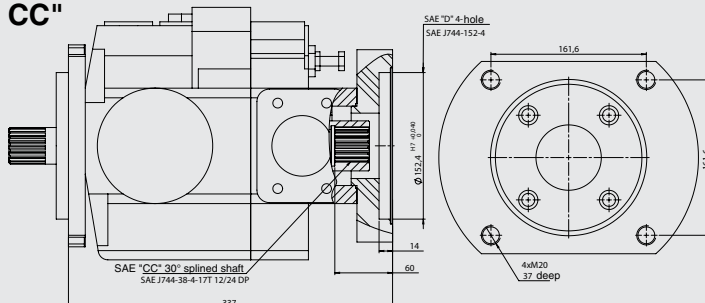
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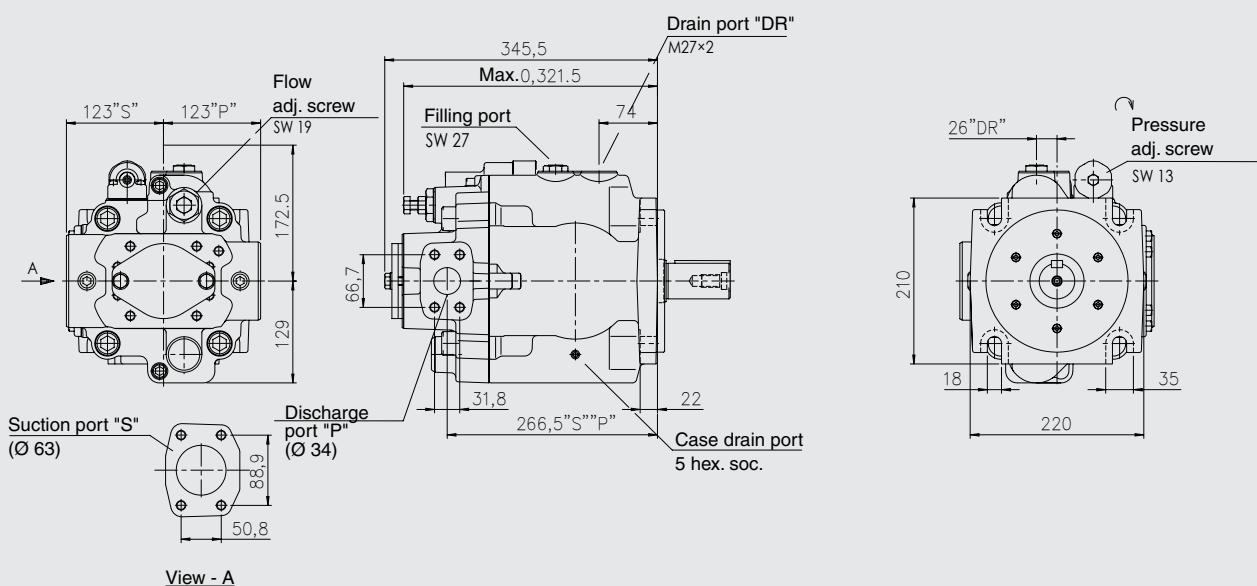
Through drive "SAE C"



Through drive "SAE D" Splined shaft "SAE CC"

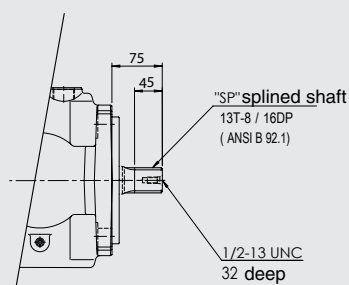


PPV100S145 with pressure control 01

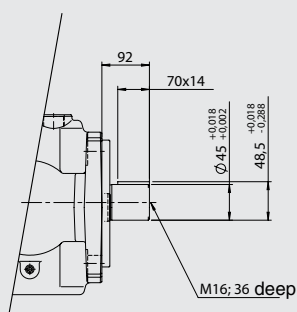


Mounting flange and shaft options

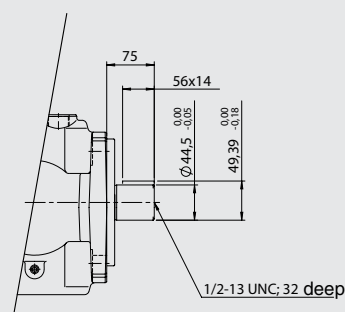
"SP" SAE D Splined shaft



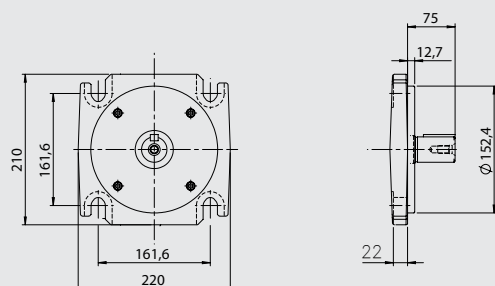
"K1" ISO Keyed shaft



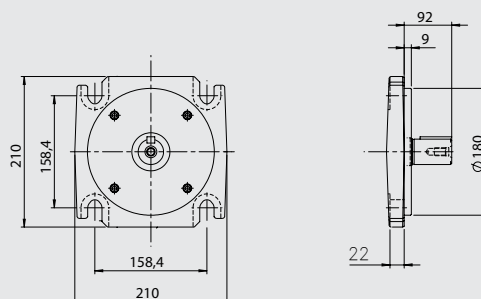
"K2" ISO Keyed shaft



"U1/U2/J1" SAE D Mounting flange

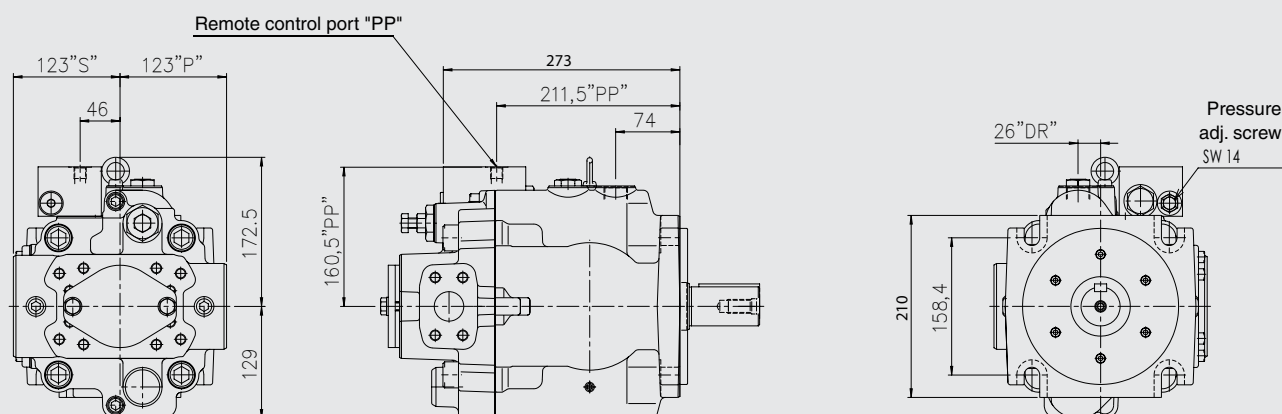


"E1" ISO Mounting flange

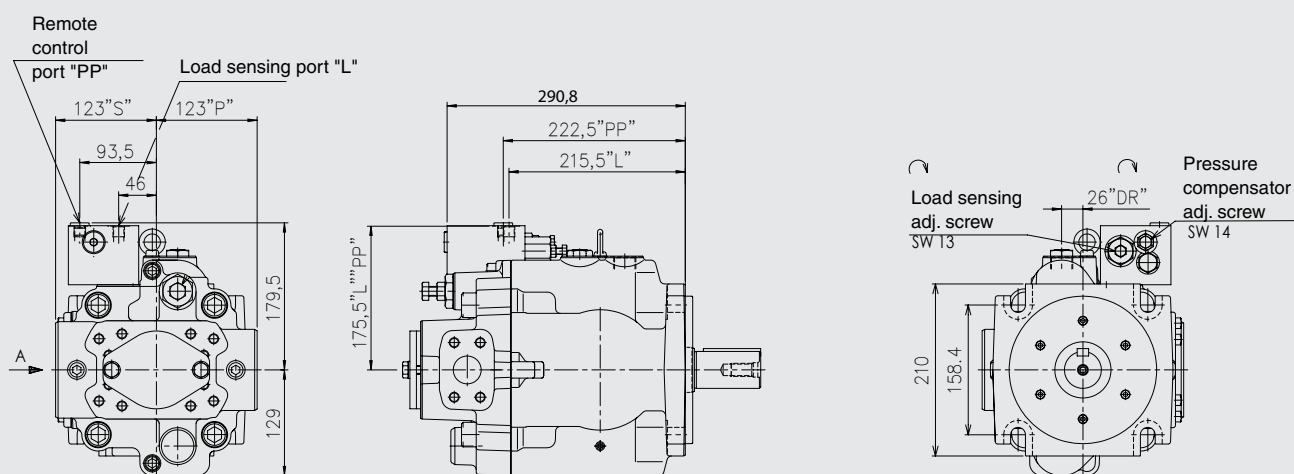


Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S145-FR__E1D-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/4"	2 1/2"
PPV100S145-FR__U1_-10	1/2-13 UNC; 21 deep	1/2-13 UNC; 21 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/4"	2 1/2"
PPV100S145-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/4"	2 1/2"
PPV100S145-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/4"	2 1/2"

PPV100S145 with remote pressure control 07



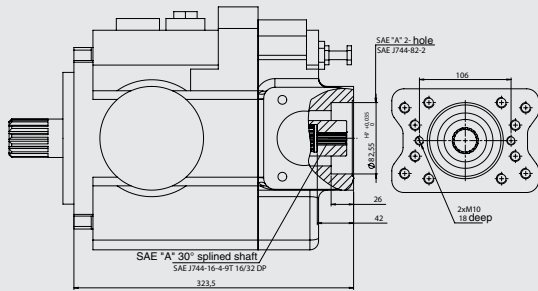
PPV100S145 with load sensing control 14



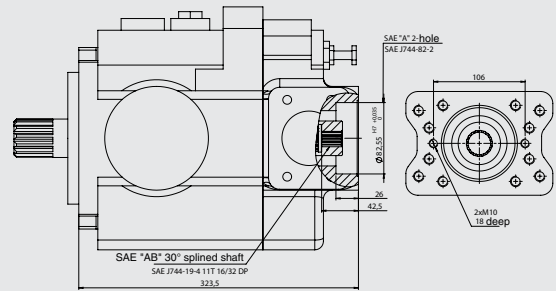
Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S145-FR__E1D-10	M12; 22 deep	M12; 22 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/4"	2 1/2"
PPV100S145-FR__U1_-10	1/2-13 UNC; 21 deep	1/2-13 UNC; 21 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/4"	2 1/2"
PPV100S145-FR__U2_-10	M12; 22 deep	M12; 22 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/4"	2 1/2"
PPV100S145-FR__J1_-10	M12; 22 deep	M12; 22 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/4"	2 1/2"

PPV100S145 Through drive options

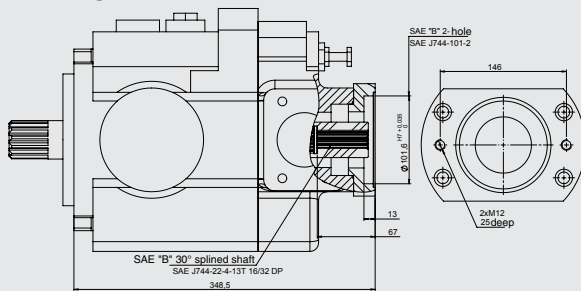
Through drive "SAE A"



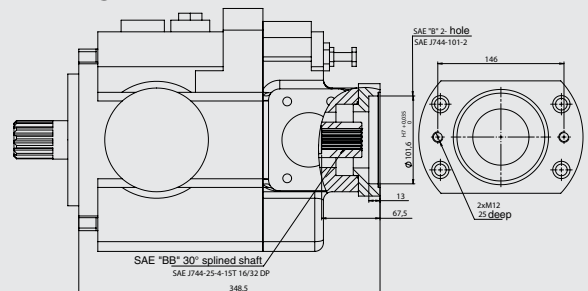
Through drive "SAE AB"



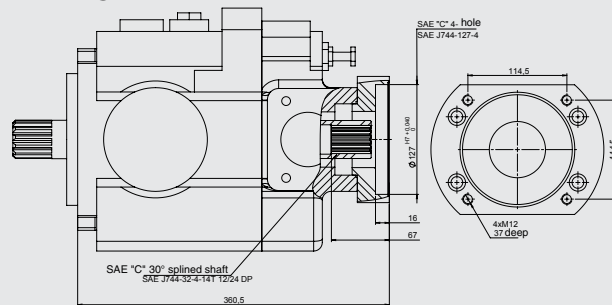
Through drive "SAE B"



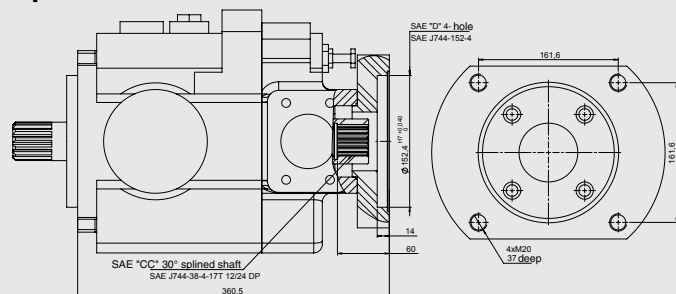
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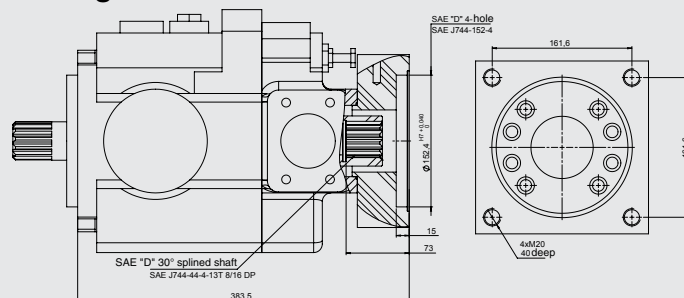
Through drive "SAE C"



Through drive "SAE D" Splined shaft "SAE CC"

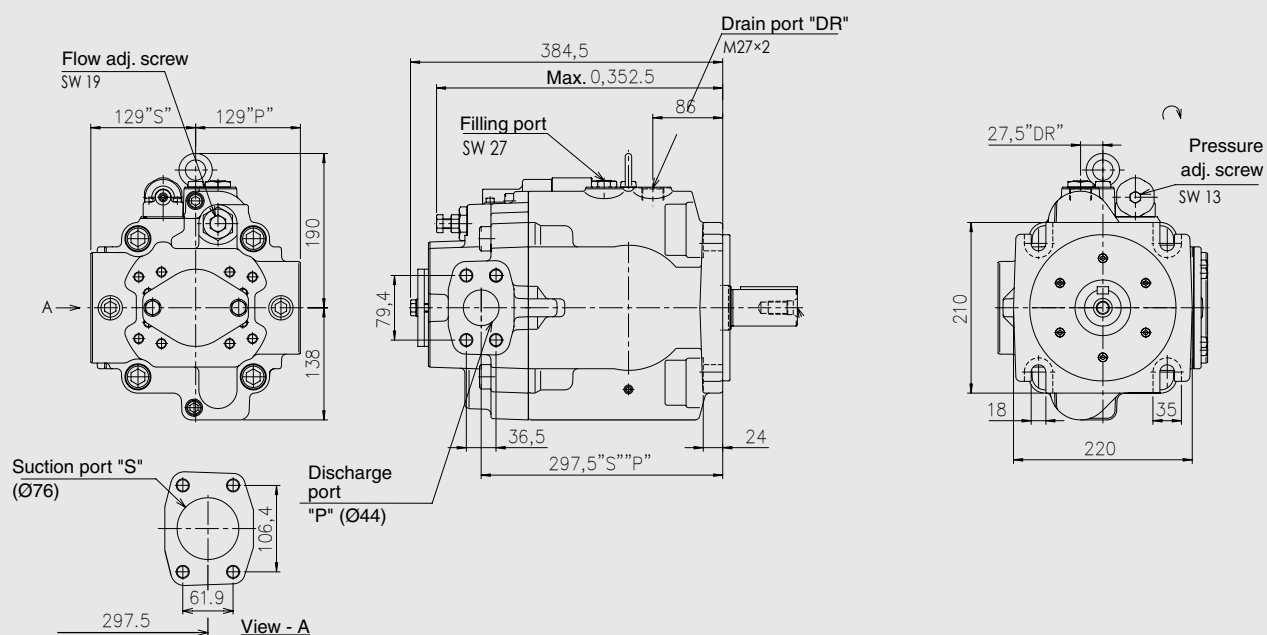


Through drive "SAE D"



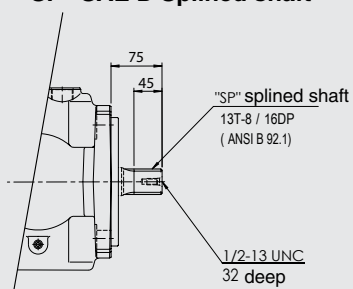
2.1.32 PPV100S180

PPV100S180 with pressure control 01

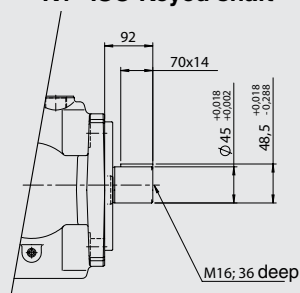


Mounting flange and shaft options

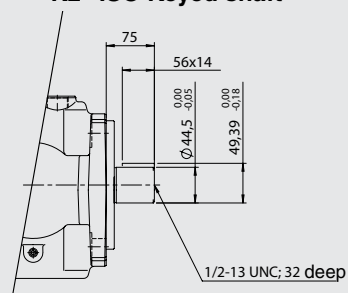
"SP" SAE D Splined shaft



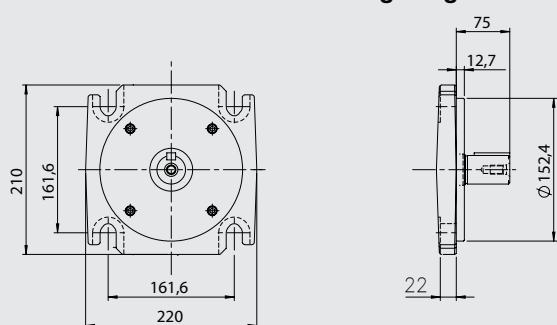
"K1" ISO Keyed shaft



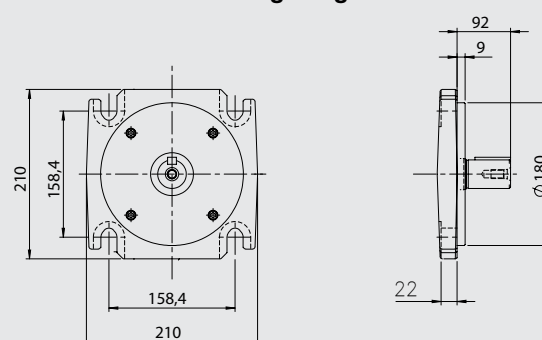
"K2" ISO Keyed shaft



"U1/U2/J1" SAE D Mounting flange

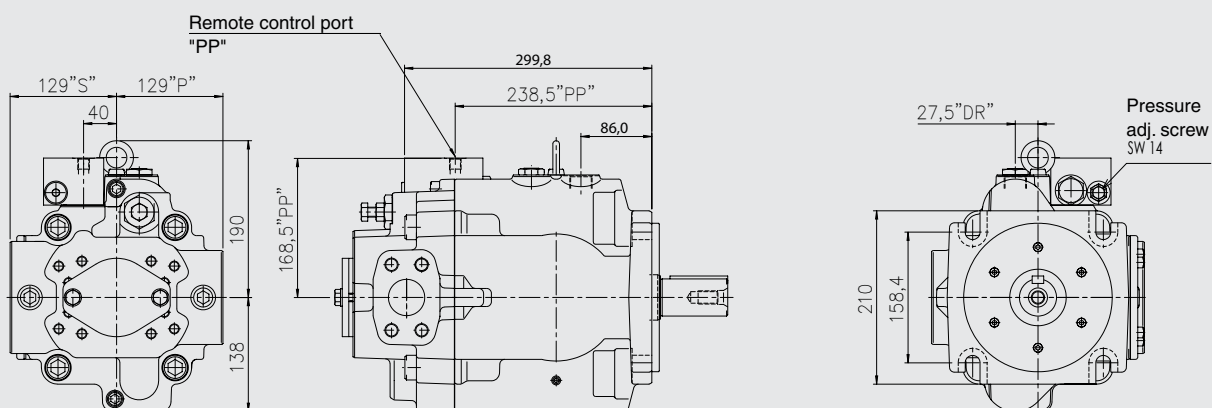


"E1" ISO Mounting flange

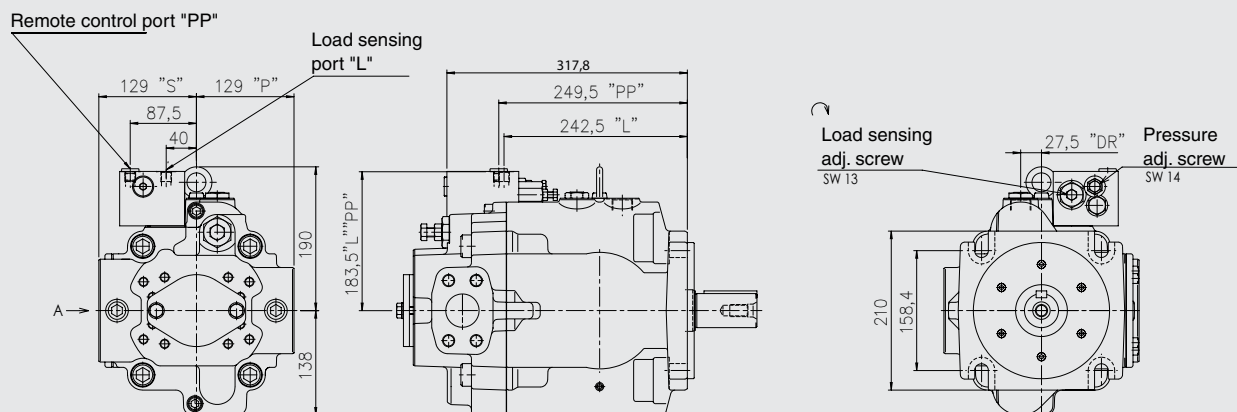


Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S180-FR__E1D-10	M16; 29 deep	M16; 29 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/2"	3"
PPV100S180-FR__U1_-10	5/8-11 UNC; 29 deep	5/8-11 UNC; 29 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/2"	3"
PPV100S180-FR__U2_-10	M16; 29 deep	M16; 29 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/2"	3"
PPV100S180-FR__J1_-10	M16; 29 deep	M16; 29 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/2"	3"

PPV100S180 with remote pressure control 07



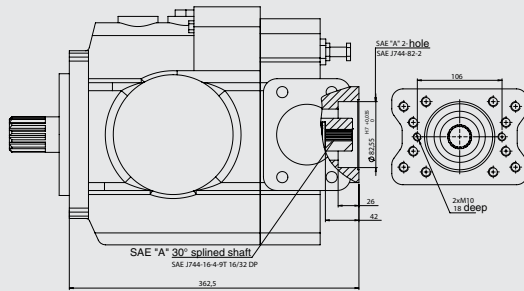
PPV100S180 with load sensing control 14



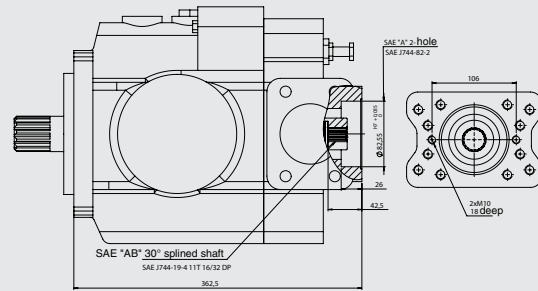
Pump type	Thread size					Dimensions to SAE J 518 (full flange)	
	Discharge port "P"	Suction port "S"	Drain port "DR"	Remote control port "PP"	Load sensing port "L"	"P"	"S"
PPV100S180-FR__E1_-10	M16; 29 deep	M16; 29 deep	M27x2; 15 deep	M14x1.5; 13 deep	M14x1.5; 13 deep	1 1/2"	3"
PPV100S180-FR__U1_-10	5/8-11 UNC; 29 deep	5/8-11 UNC; 29 deep	1 1/16-12 UN	1/2-20 UNF	1/2-20 UNF	1 1/2"	3"
PPV100S180-FR__U2_-10	M16; 29 deep	M16; 29 deep	G 3/4; 17 deep	G 1/4; 24 deep	G 1/4; 24 deep	1 1/2"	3"
PPV100S180-FR__J1_-10	M16; 29 deep	M16; 29 deep	Rc 3/4	Rc 1/4; 24 deep	Rc 1/4; 24 deep	1 1/2"	3"

PPV100S180 Through drive options

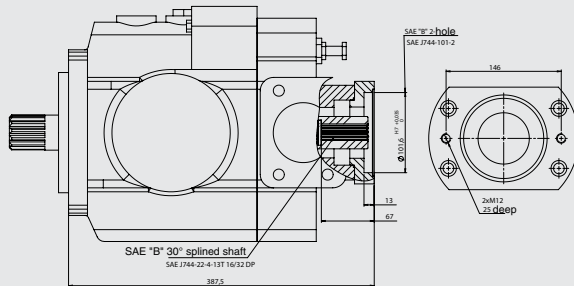
Through drive "SAE A"



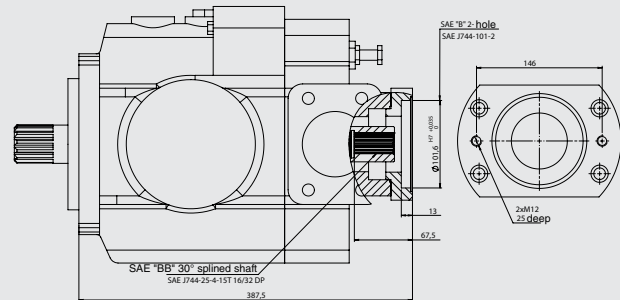
Through drive "SAE AB"



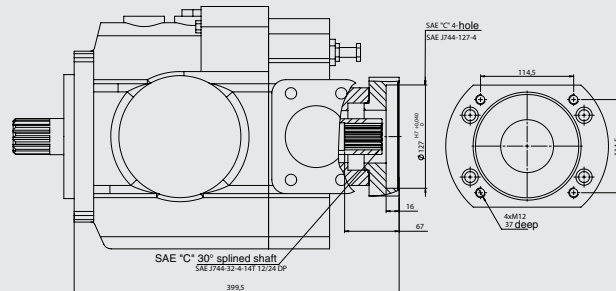
Through drive "SAE B"



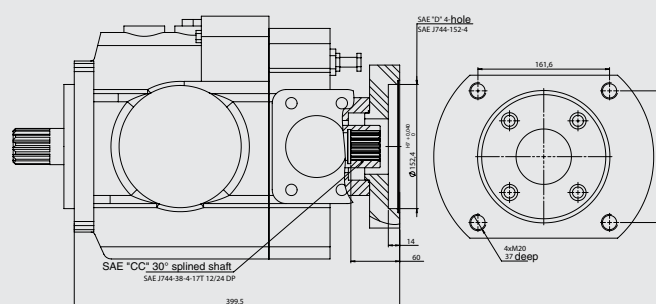
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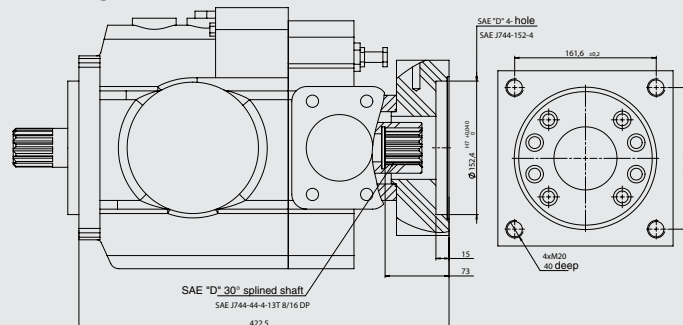
Through drive "SAE C"

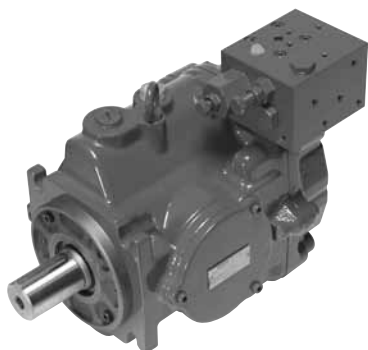


Through drive "SAE D" Splined shaft "SAE CC"



Through drive "SAE D"





2.2 MEDIUM HEAVY DUTY SERIES CONTENTS

PVV100

Ordering Code	2.2.1 Medium Heavy Duty Series
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Control Options	2.2.11 Standard pressure control 2.2.12 Remote pressure control 2.2.13 Power (torque) control 2.2.14 Load sensing control 2.2.15 Availability of control type
Performance Data	2.2.16 PPV100-16 2.2.17 PPV100-37 2.2.18 PPV100-56 2.2.19 PPV100-71 2.2.20 PPV100-100 2.2.21 PPV100-145 2.2.22 PPV100-180
Dimensions	2.2.23 PPV100-16 2.2.24 PPV100-37 2.2.25 PPV100-56 2.2.26 PPV100-71 2.2.27 PPV100-100 2.2.28 PPV100-145 2.2.29 PPV100-180

ORDERING CODE

2.2.1 Medium Heavy Duty Series

PPV100 - 16 - F R 01 K - - K - 10 80 - XXXX

Axial piston pump
Medium Heavy Duty Series

Size

16	16.3	cm ³ /rev (not with control type 09)
37	37.1	cm ³ /rev
56	56.3	cm ³ /rev
71	70.7	cm ³ /rev
100	100.5	cm ³ /rev
145	145.2	cm ³ /rev
180	180.7	cm ³ /rev

Mounting type
F Flange mounting

Shaft rotation
R Clockwise
(viewed from shaft end)

Control type
01 Pressure compensator
07 Remote pressure compensator (sizes 16/37/56 only)
09 Power (torque) compensator
14 Load sensing control

Setting range (for control type 01 only)
K 50 - 350 bar (standard)

Power setting (for control type 09 only)

5.5	5.5	kW
7.5	7.5	kW
11	11	kW
15	15	kW
18.5	18.5	kW
22	22	kW
30	30	kW
37	37	kW
45	45	kW
55	55	kW
75	75	kW
90	90	kW
110	110	kW

Power supply frequency (for control type 09 only)
A 50 Hz
B 60 Hz

Electric motor, number of poles (for control type 09 only)
4 4 poles
6 6 poles

Shaft extension
K Parallel keyed shaft

Design number
10 Design number

Design standard
80 European Design Standard
950 North American Standard (size 16 / 37 / 56 / 71 only)
954 North American Standard (size 100 / 145 / 180 only)

Modification number
XXXX Determined by manufacturer

TECHNICAL INFORMATION

2.2.2 Specifications

Pump size			16	37	56	71	100	145	180
Geometric displacement		[cm³/rev]	16.3	37.1	56.3	70.7	100.5	145.2	180.7
Pressure	Rated	[bar]	315						
	Peak		350						
Drive speed	Min.	[rpm]	600						
	Max.		3600	2700	2500	2300	2100	1800	1800
Power (1500 rpm, 280 bar)		[kW]	13	29	43	54	77	112	139
Drive torque (280 bar)		[Nm]	73	165	251	315	448	647	805
Pre-fill oil volume		[cm³]	400	700	900	1300	1700	2400	3200
Approx. weight (with pressure compensator)		[kg]	14.5	19.5	25.7	35.0	44.6	60.0	70.4
Approx. weight (with power control)			–	23.0	29.0	38.0	48.0	63.0	74.2
Approx. weight (with load sensing control)			17.5	22.5	28.7	38.0	47.6	63.0	73.4

2.2.3 Hydraulic fluids

The pump series is designed for use with

HL Hydraulic oil
(normal mineral oil)
and

HLP Hydraulic oils of the R&O type
(Rust and Oxidation inhibitor)

HFD-U Polyolester

For use with other fluids, please contact
HYDAC DRIVE CENTER.

2.2.4 Viscosity range

Minimum viscosity:

10 cSt (mm²/s)*

Short-term (t ≤ 1 min) for a max.
temperature at drain port of 95 °C

Normal operating viscosity:

10 - 200 cSt (mm²/s)*

Maximum viscosity:

1000 cSt (mm²/s)*

Short-term (t ≤ 1 min) for cold starts
(p ≤ 30 bar, n ≤ 1000 rpm,
tmin - 10 °C)

*measured at drain port

For low temperature applications,
please contact HYDAC DRIVE
CENTER

2.2.5 Temperature range

-20 to +95 °C

Note:

The highest fluid temperature will be at
the drain port of the pump,
up to 20 °C higher than in the reservoir.

2.2.6 Specifications for special fluids

Fluid type	Pressure [bar]		Drive speed [rpm]		Temperature range [°C]	Viscosity range [cSt]	Design standard*2
	Rated	Intermittent	Rated	Maximum			
Water glycol Water > 35 % Polymer solution (HFC)	210	210	1200	1800*1	0 - 50	20 - 200	30
Phosphate ester synthetic (HFD-R)	210	210	1200	1800*1	0 - 60		80
Polyolester synthetic (HFD-U)	280	320	1200	1800	0 - 60		80

*1 – If a drive speed of 1500 rpm or greater is used, an overhead reservoir is required.

*2 – Use "Design Standard" field in Ordering Code 2.2.1.

2.2.7 Seals

The pump series is equipped with fluorocarbon (FPM) seals as standard.

If special hydraulic fluids are used, the seal material must be changed if required.

2.2.8 Filtration

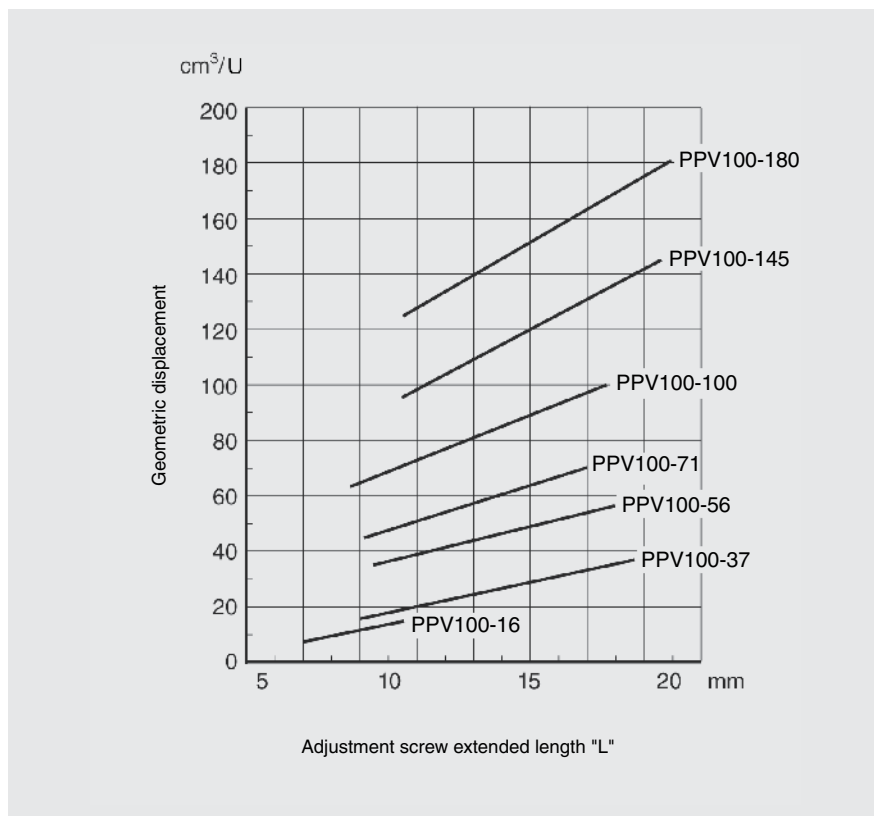
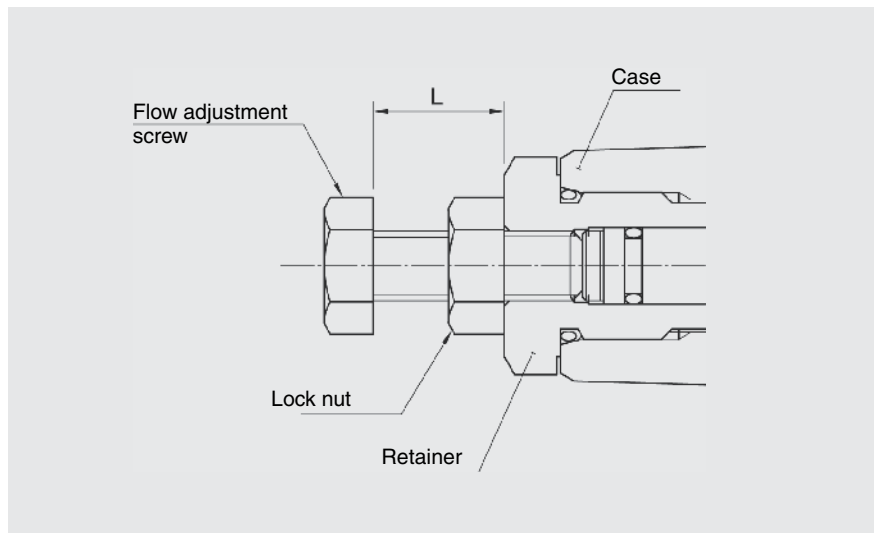
For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class to NAS 1638 Class 10 (21/19/16 ISO 4406:1999) or cleaner.

2.2.9 Adjustments

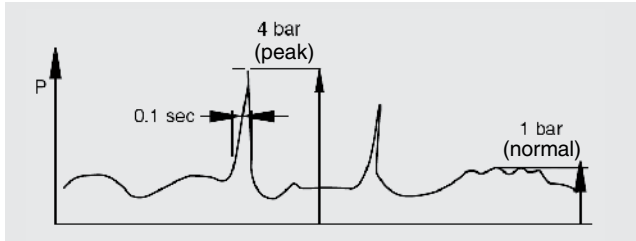
The pumps are supplied with a minimum discharge pressure and maximum flow rate setting. Pressure and flow rate can be adjusted using the adjustment screws to meet your system requirements.

Pump size	Volume		Pressure
	Volume adjustment screw rate	Min. adjustable displacement	Pressure adjustment screw rate
	[cm ³ per turn]	[cm ³ /rev]	[bar per turn]
PPV100-16	1.4	8	55
PPV100-37	3.3	16	
PPV100-56	4.2	35	
PPV100-71	4.9	45	63
PPV100-100	6.2	63	
PPV100-145	9.4	95	
PPV100-180	10.3	125	57



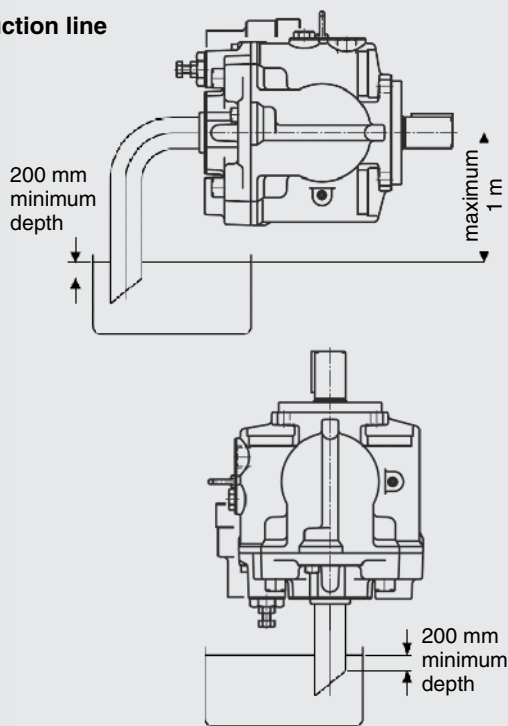
2.2.10 Installation notes

The pump should be installed horizontally with the case drain line initially rising above the level of the pump before continuing to the tank as shown in the diagram below. Do not connect the drain line to the suction line. The top drain port should always be used and the internal diameter of the drain line should be equal to or larger than the drain port to minimise pressure in the pump case. The pressure in the pump case should not exceed 1 bar as shown in the diagram below. Peak pressure should never exceed 4 bar.

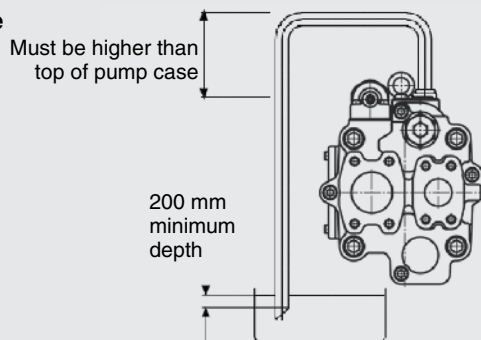


Installing the pump above the tank

Suction line



Drain line



Precautions:

- The distance between suction and drain pipes must be 200 mm minimum.
- Suction and drain pipes must be immersed at least 200 mm below the lowest oil level under operating conditions.
- The distance between the oil surface and the centre of the shaft must not exceed 1 m.
- The oil in the pump case must be refilled if the pump has not been operated for one month or longer.

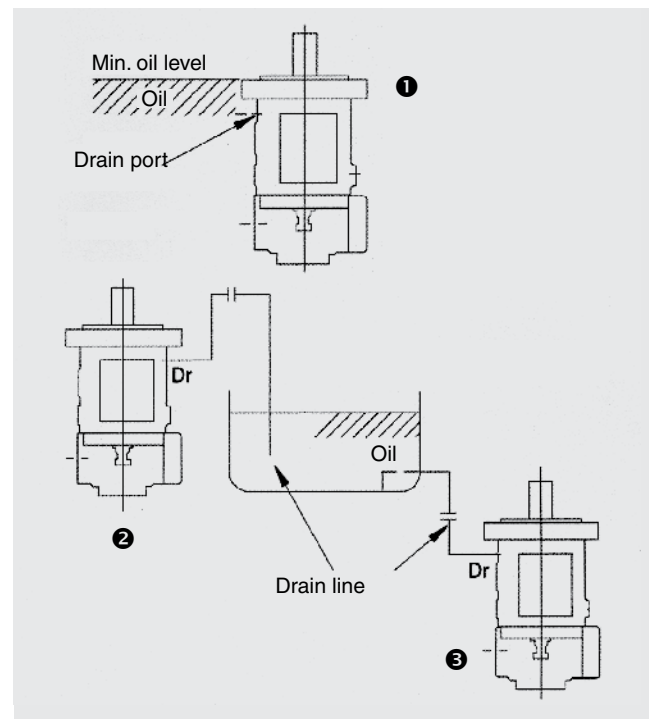
Installing the pump vertically

For applications requiring vertical installation (shaft at the top) please connect lines as shown in the diagram below.

The oil level in the tank should be higher than the pump mounting flange (see diagram ①). If the oil level in the tank is lower than the pump mounting flange, the drain line should be installed as shown in diagram ②.

Once the pump is installed in the tank and immersed in the oil, the drain ports must be open to provide adequate lubrication to the internal components.

If the pump is installed outside the tank, there must be a separate drain line to the tank (diagram ③). If the drain line is higher than the oil level, fill the line with oil before commissioning.



CONTROL OPTIONS

2.2.11 Standard pressure control

Description	Performance characteristics	Hydraulic circuit
When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically and the set pressure is maintained.		

2.2.12 Remote pressure control

Description	Performance characteristics	Hydraulic circuit
The pump is used in combination with the pilot relief valve or multistage pressure control valve. By controlling the pilot pressure, the full cut-off pressure can be remote-controlled according to your requirements.		

Recommended valve for use with remote pressure control

Type:	Part no.:
DB3E-02X-350V	397405

2.2.13 Power (torque) compensator

Description	Performance characteristics	Hydraulic circuit
- This type of control can control the pump drive power according to the motor output. - When the system pressure increases, the swash plate tilt angle (output flow) decreases, in line with the pre-set power values. - This type of control can enable one pump to act as two pumps (low-pressure and large-flow / high-pressure and small-flow). The motor capacity can therefore be reduced.		

2.2.14 Load sensing compensator

Description	Performance characteristics	Hydraulic circuit
- This is an energy-saving type of control which maintains the pump flow and load pressure at the absolute minimum level necessary to operate the actuator. - This type of control automatically regulates the displacement so that the differential pressure via the throttle valve remains constant. To do so, the load pressure must be introduced to the load sensing port "L" of the pump through an external line. - Remote control of the pressure compensator is provided via the pilot port "PP". - The standard differential pressure setting is 15 bar. The differential pressure adjustment range is 10 to 30 bar.		

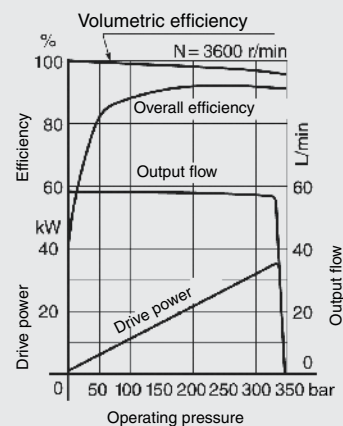
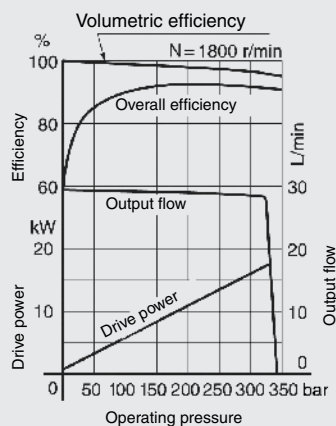
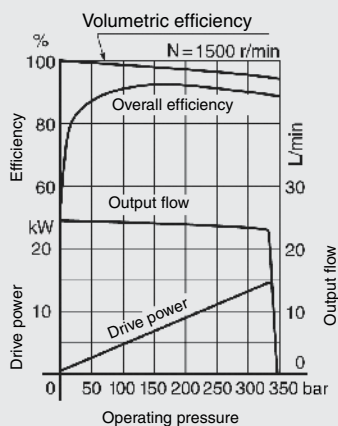
*A throttle valve is not included with the pump.

2.2.15 Availability of control type

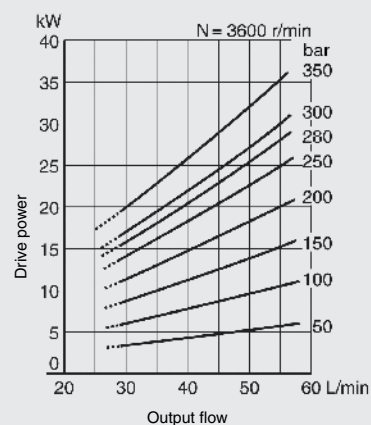
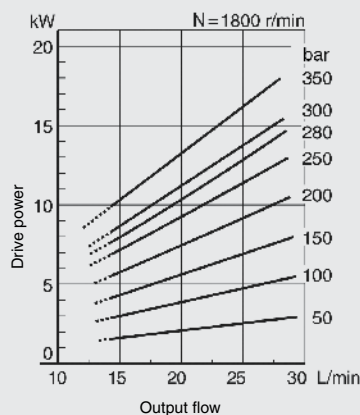
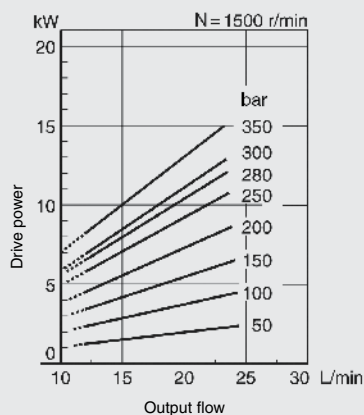
Pump size	Geometric displacement cm ³ /rev	01 Pressure compensator	07 Remote pressure compensator	09 Power control	14 Load sensing compensator
PPV100-16	16.3	●	●		●
PPV100-37	37.1	●	●	●	●
PPV100-56	56.3	●	●	●	●
PPV100-71	70.7	●		●	●
PPV100-100	100.5	●		●	●
PPV100-145	145.2	●		●	●
PPV100-180	180.7	●		●	●

Pump size	Drive power kW																						
	Electric motor 4-pole											Electric motor 6-pole											
		11	15	18.5	22	30	37	45	55	75	90	110	5.5	7.5	11	15	18.5	22	30	37	45	55	75
PPV100-37	50 Hz	●	●	●									●	●	●								
	60 Hz	●	●	●	●									●	●	●							
PPV100-56	50 Hz		●	●	●	●								●	●	●	●						
	60 Hz			●	●	●	●								●	●	●	●					
PPV100-71	50 Hz			●	●	●	●								●	●	●	●					
	60 Hz				●	●	●	●								●	●	●	●				
PPV100-100	50 Hz				●	●	●	●	●							●	●	●	●				
	60 Hz					●	●	●	●								●	●	●	●	●		
PPV100-145	50 Hz					●	●	●	●	●							●	●	●	●	●	●	
	60 Hz						●	●	●	●	●							●	●	●	●	●	
PPV100-180	50 Hz						●	●	●	●	●							●	●	●	●	●	
	60 Hz							●	●	●	●	●							●	●	●	●	●

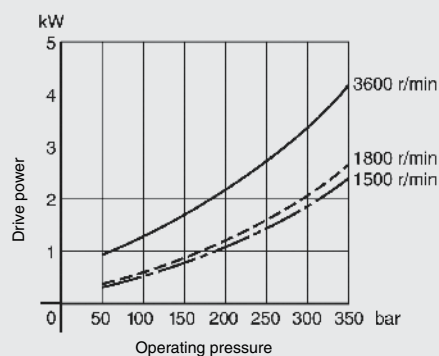
● Performance characteristic curve



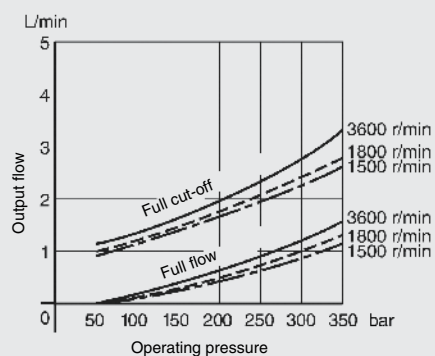
● Drive power



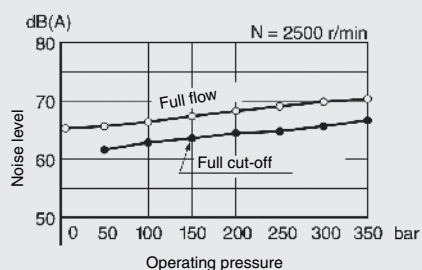
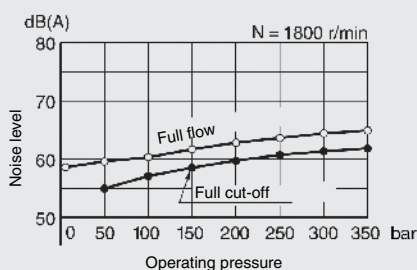
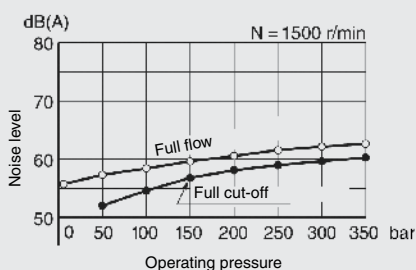
● Full cut-off power



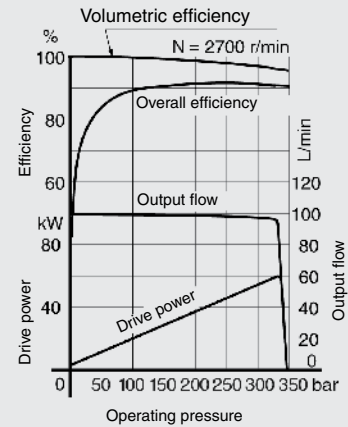
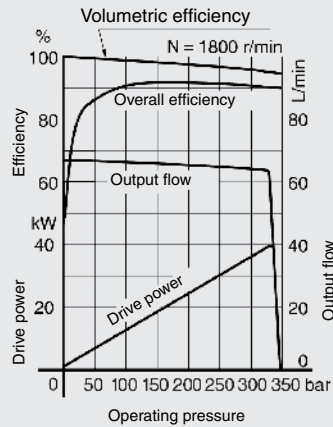
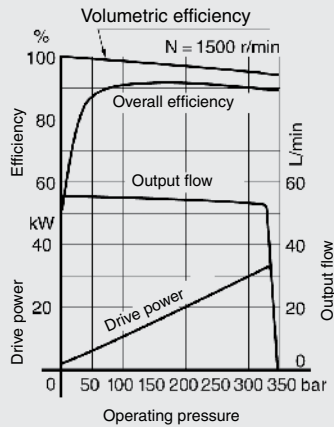
● Drain



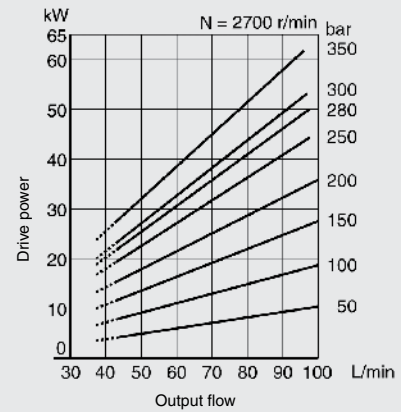
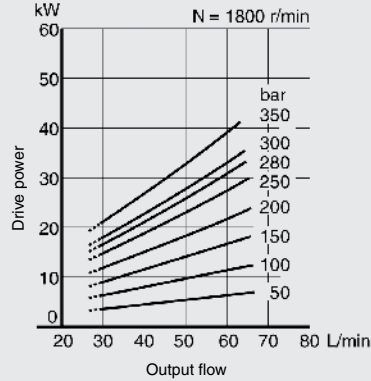
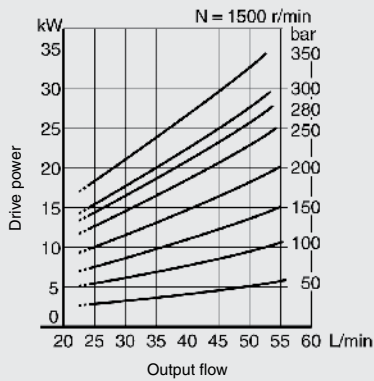
● Noise level (one metre horizontally away from pump head cover)



● Performance characteristic curve

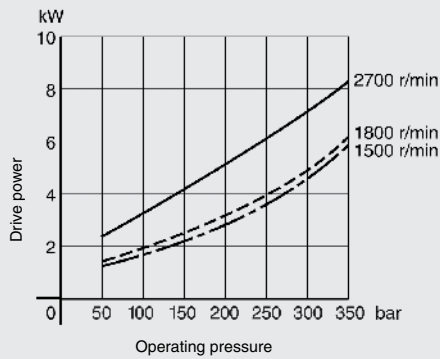


● Drive power

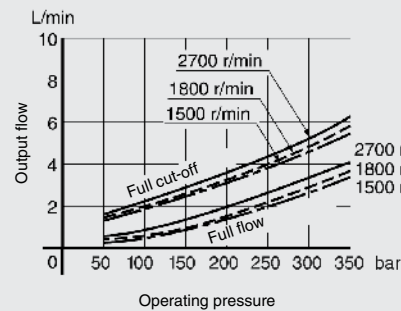


Note: The dotted lines in the graph are below the minimum adjustable flow

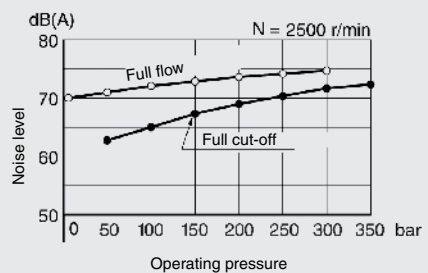
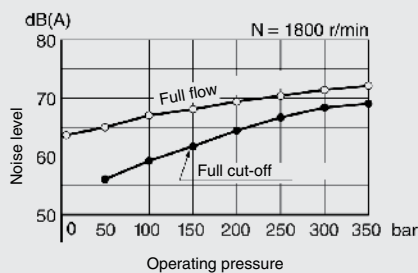
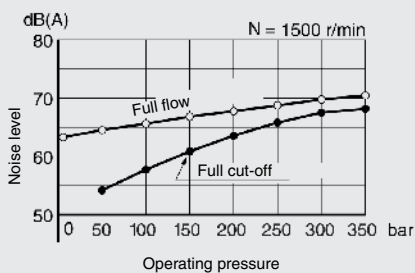
● Full cut-off power



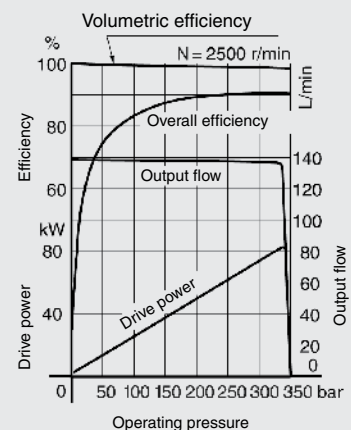
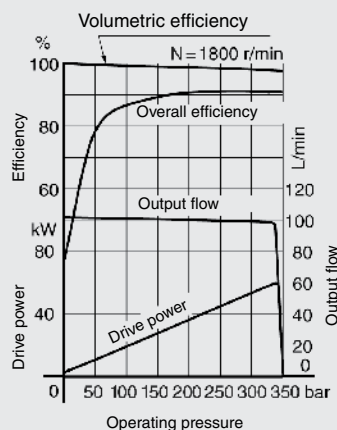
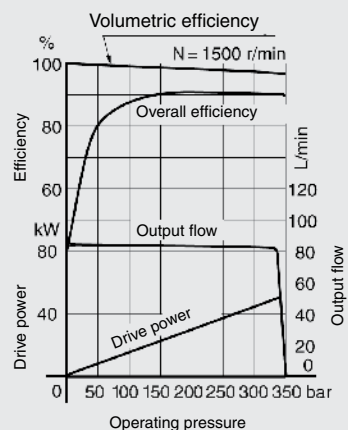
● Drain



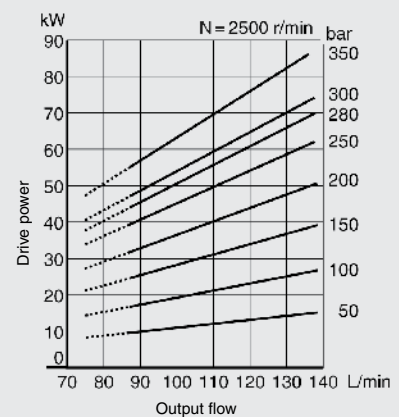
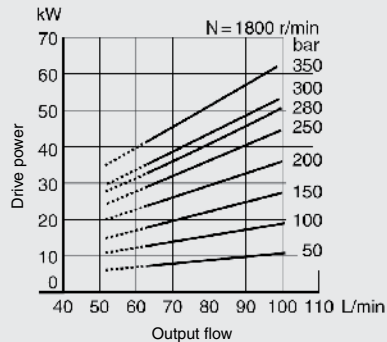
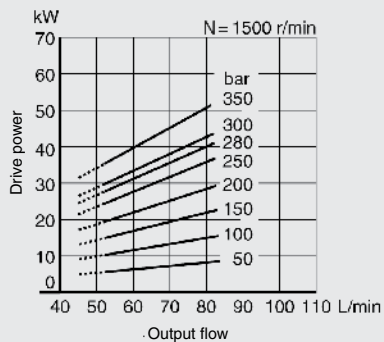
● Noise level (one metre horizontally away from pump head cover)



● Performance characteristic curve

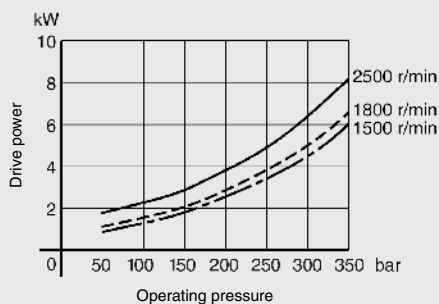


● Drive power

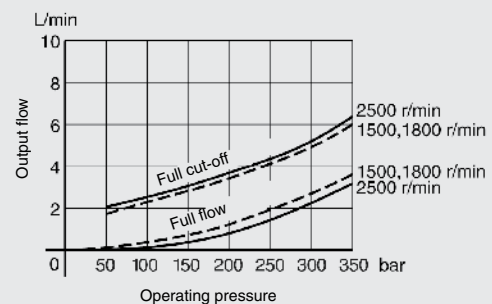


Note: The dotted lines in the graph are below the minimum adjustable flow

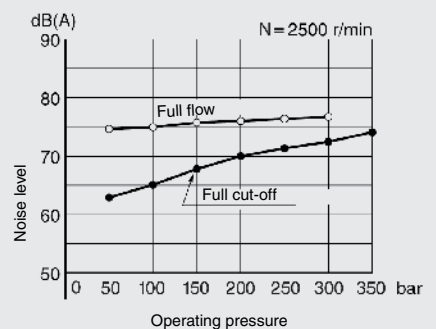
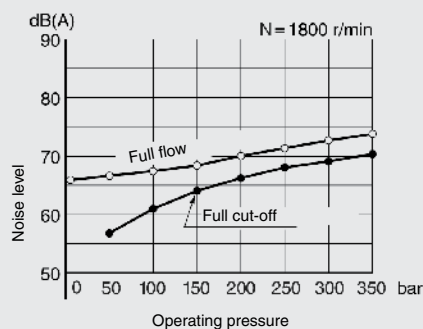
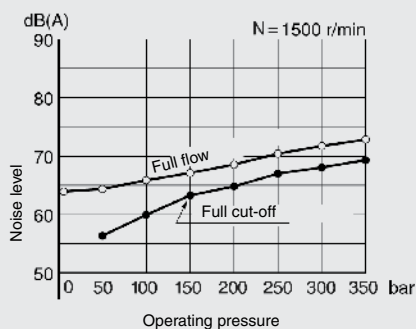
● Full cut-off power



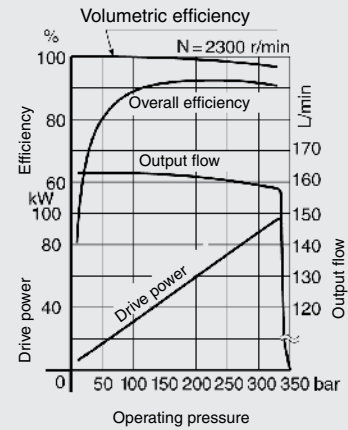
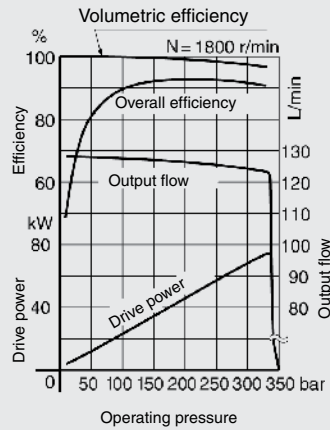
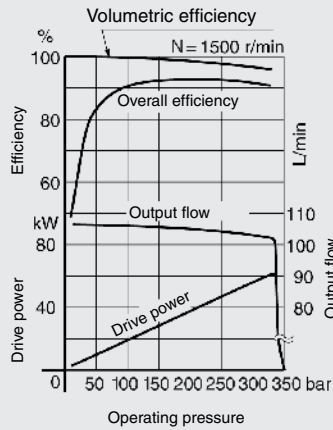
● Drain



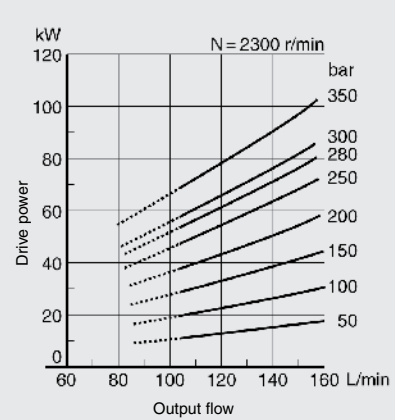
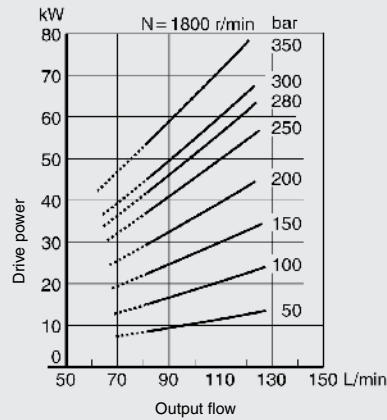
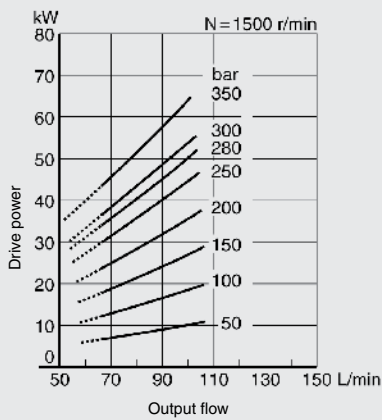
● Noise level (one metre horizontally away from pump head cover)



● Performance characteristic curve

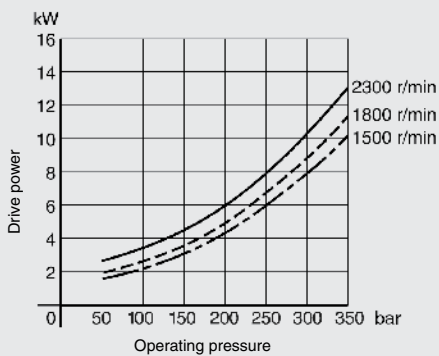


● Drive power

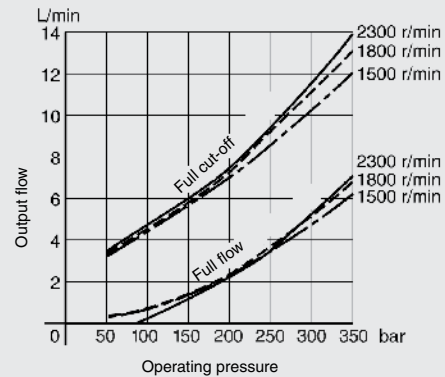


Note: The dotted lines in the graph are below the minimum adjustable flow

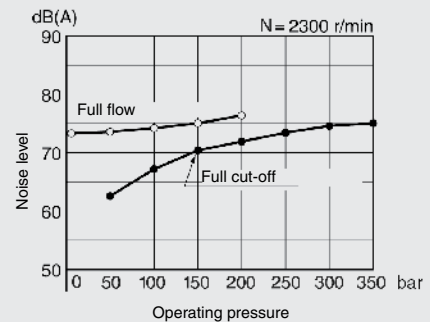
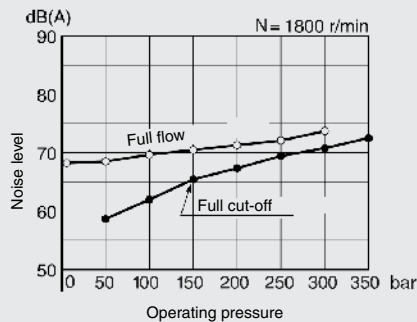
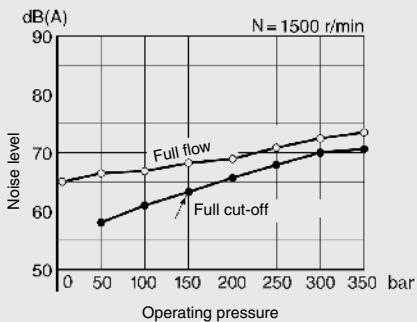
● Full cut-off power



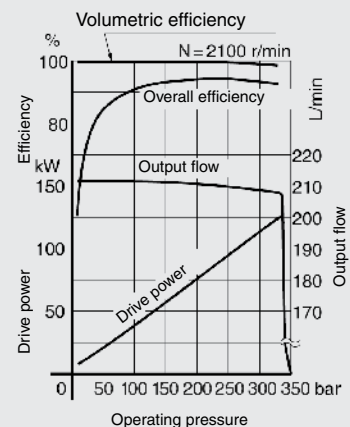
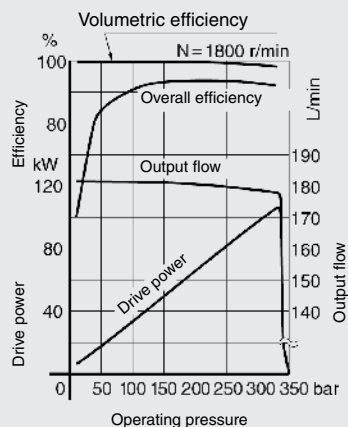
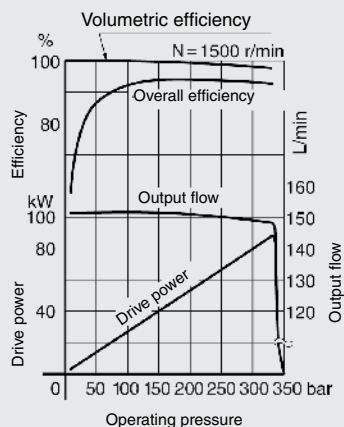
● Drain



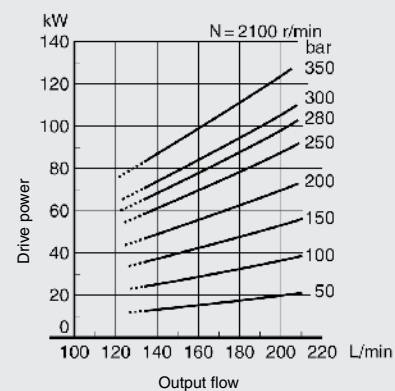
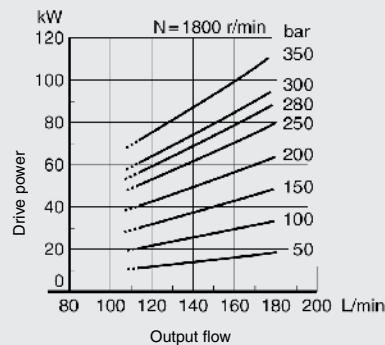
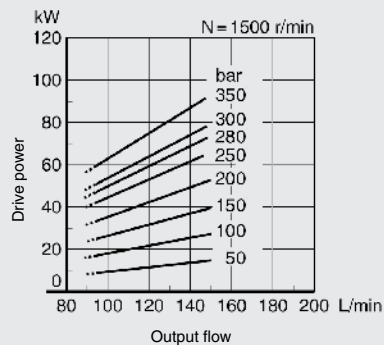
● Noise level (one metre horizontally away from pump head cover)



● Performance characteristic curve

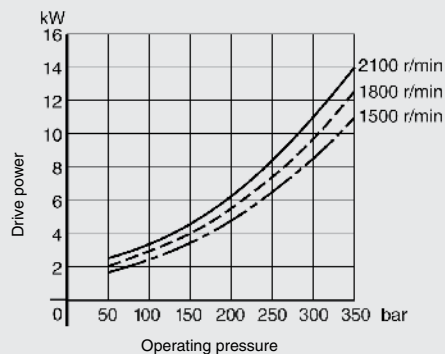


● Drive power

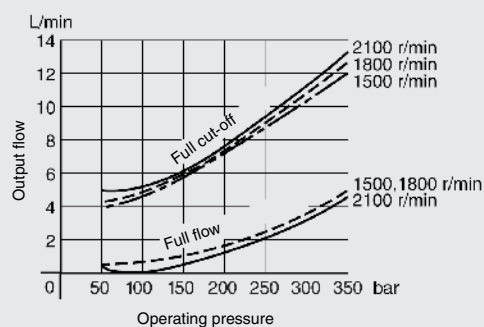


Note: The dotted lines in the graph are below the minimum adjustable flow

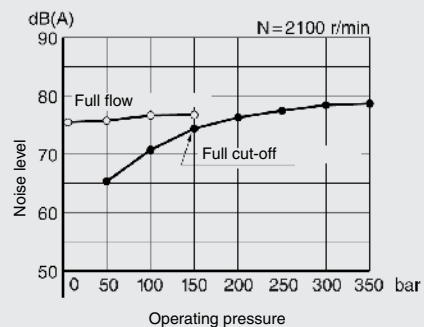
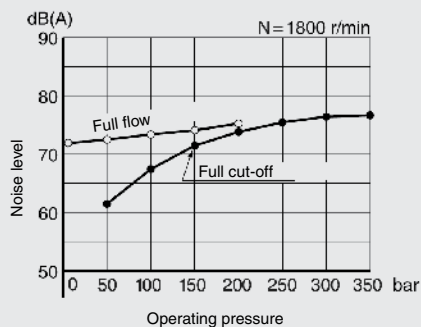
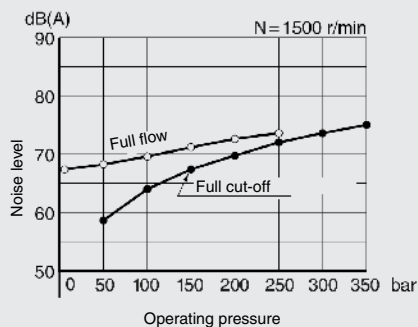
● Full cut-off power



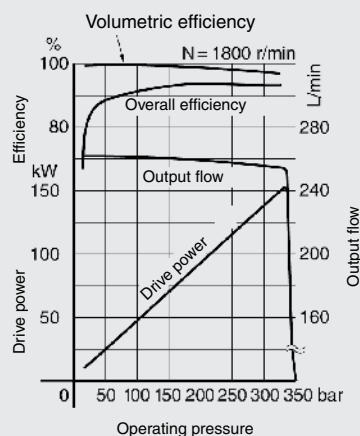
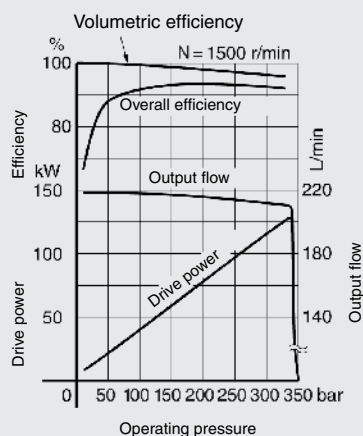
● Drain



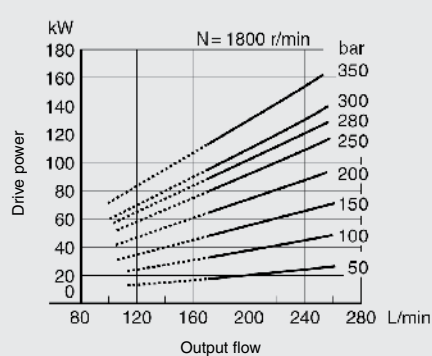
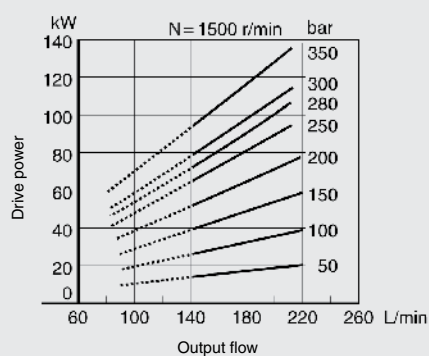
● Noise level (one metre horizontally away from pump head cover)



● Performance characteristic curve

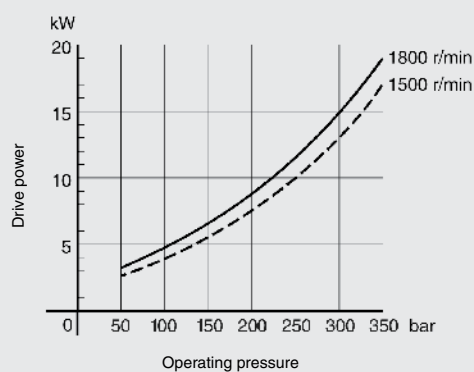


● Drive power

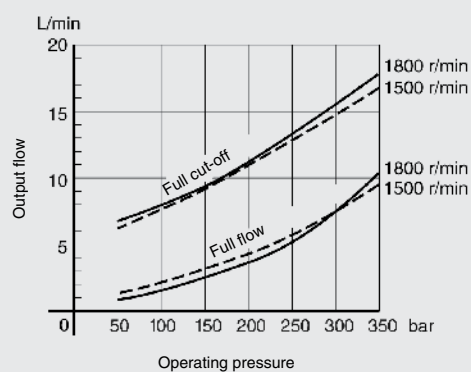


Note: The dotted lines in the graph are below the minimum adjustable flow

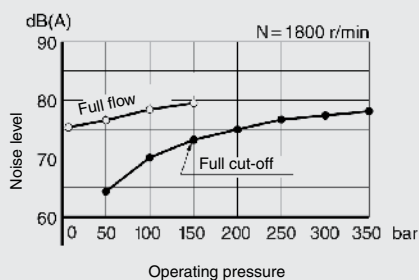
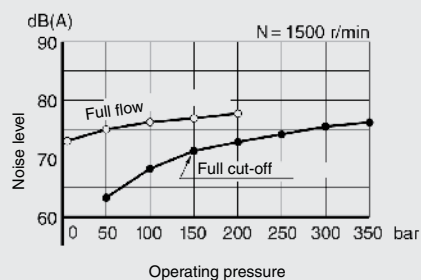
● Full cut-off power



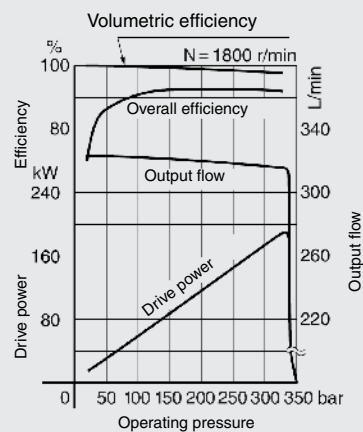
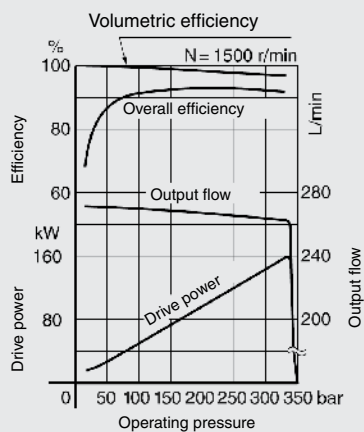
● Drain



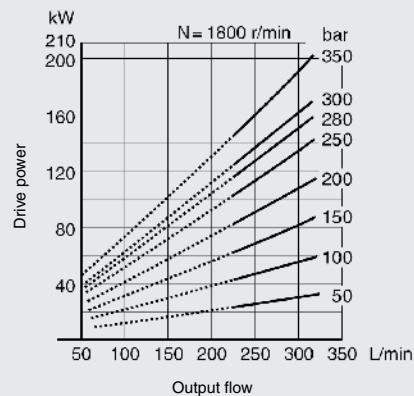
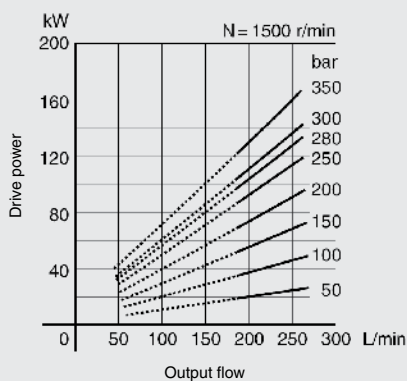
● Noise level (one metre horizontally away from pump head cover)



● Performance characteristic curve

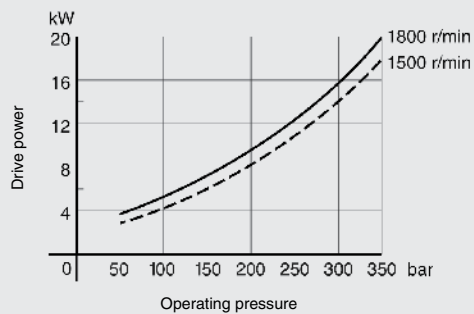


● Drive power

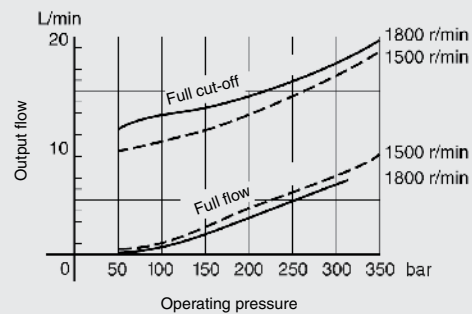


Note: The dotted lines in the graph are below the minimum adjustable flow

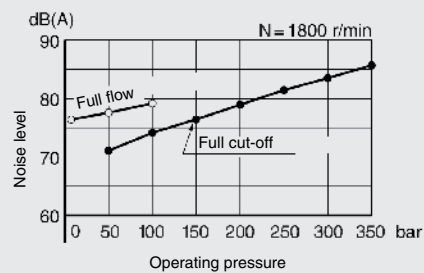
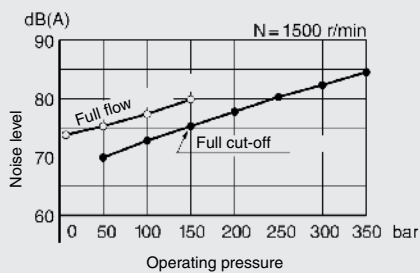
● Full cut-off power



● Drain



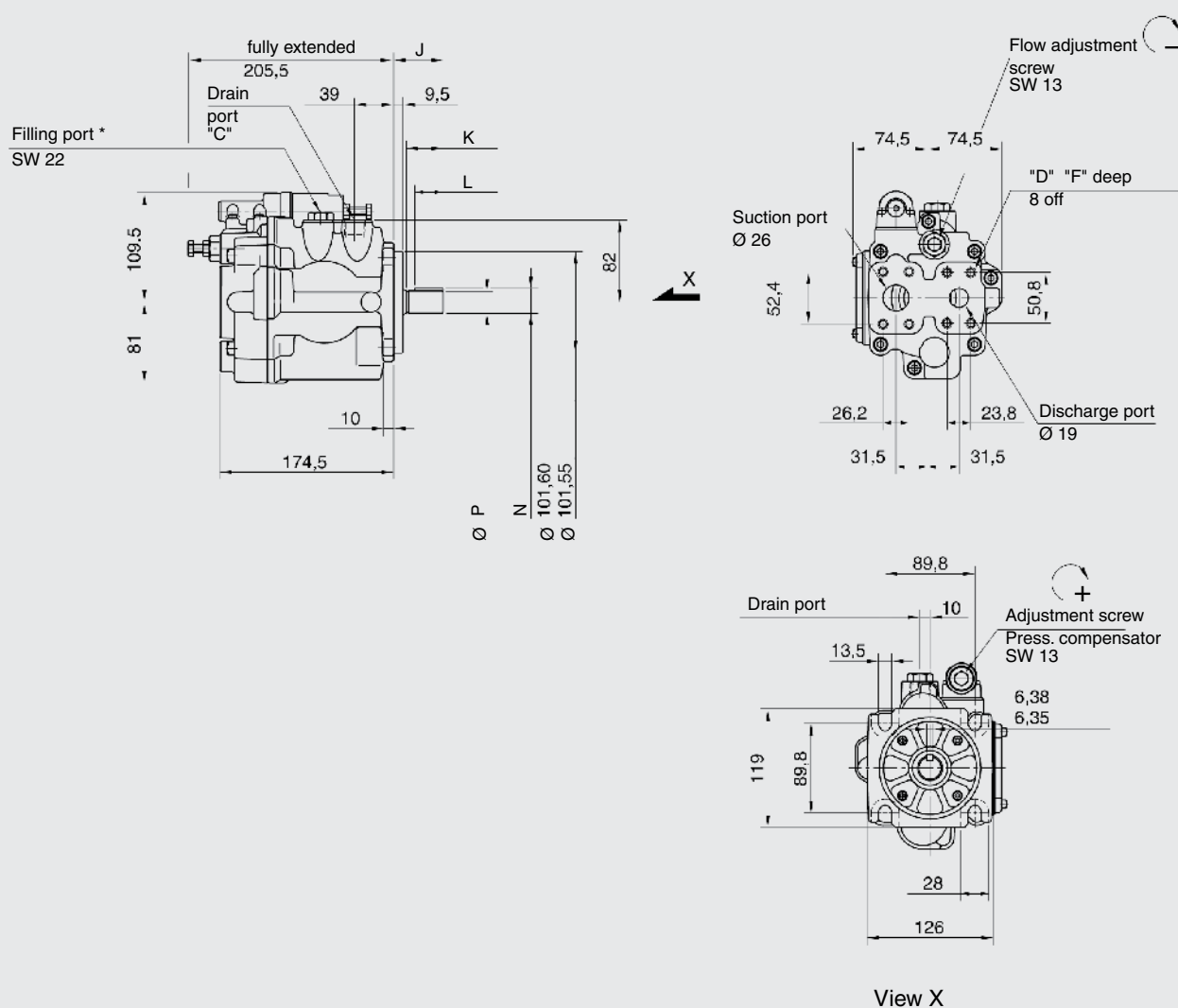
● Noise level (one metre horizontally away from pump head cover)



DIMENSIONS

2.2.23 PPV100-16

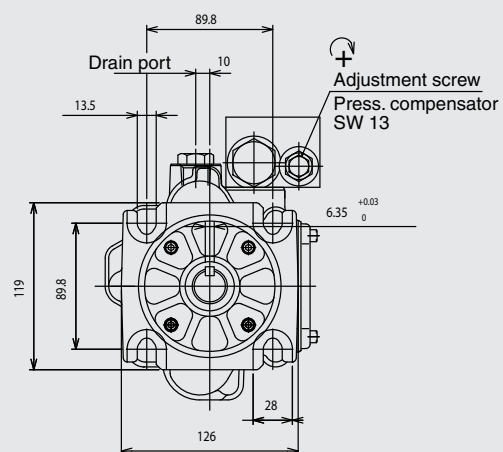
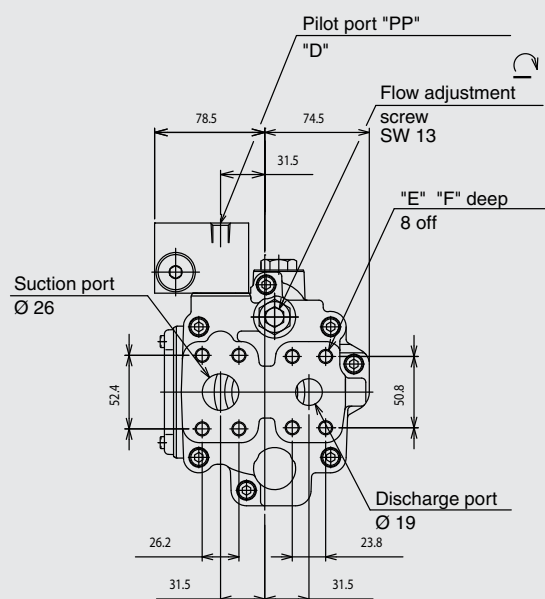
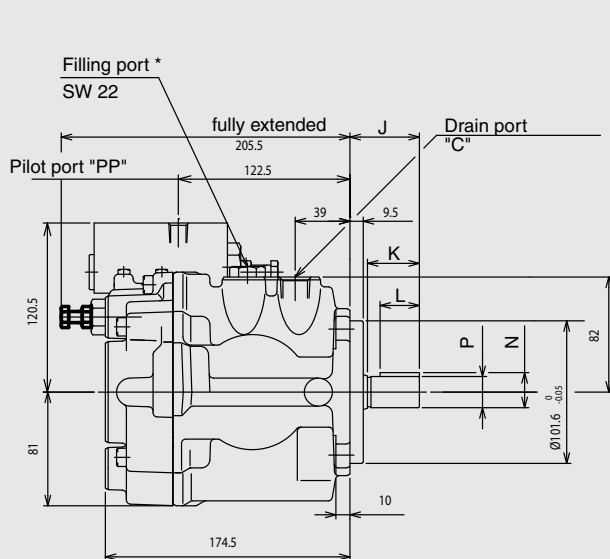
PPV100-16 with pressure control 01



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-16 ... 1080 European Standard	1/2 BSP.F	M10	–	19	–	49.5	37	28	25.01 24.85	22.23 22.20
PPV100-16 ... 10950 North American Standard	7/8-14 UNF	3/8-16 UNC	–	19	–	49.5	37	28	25.01 24.85	22.23 22.20

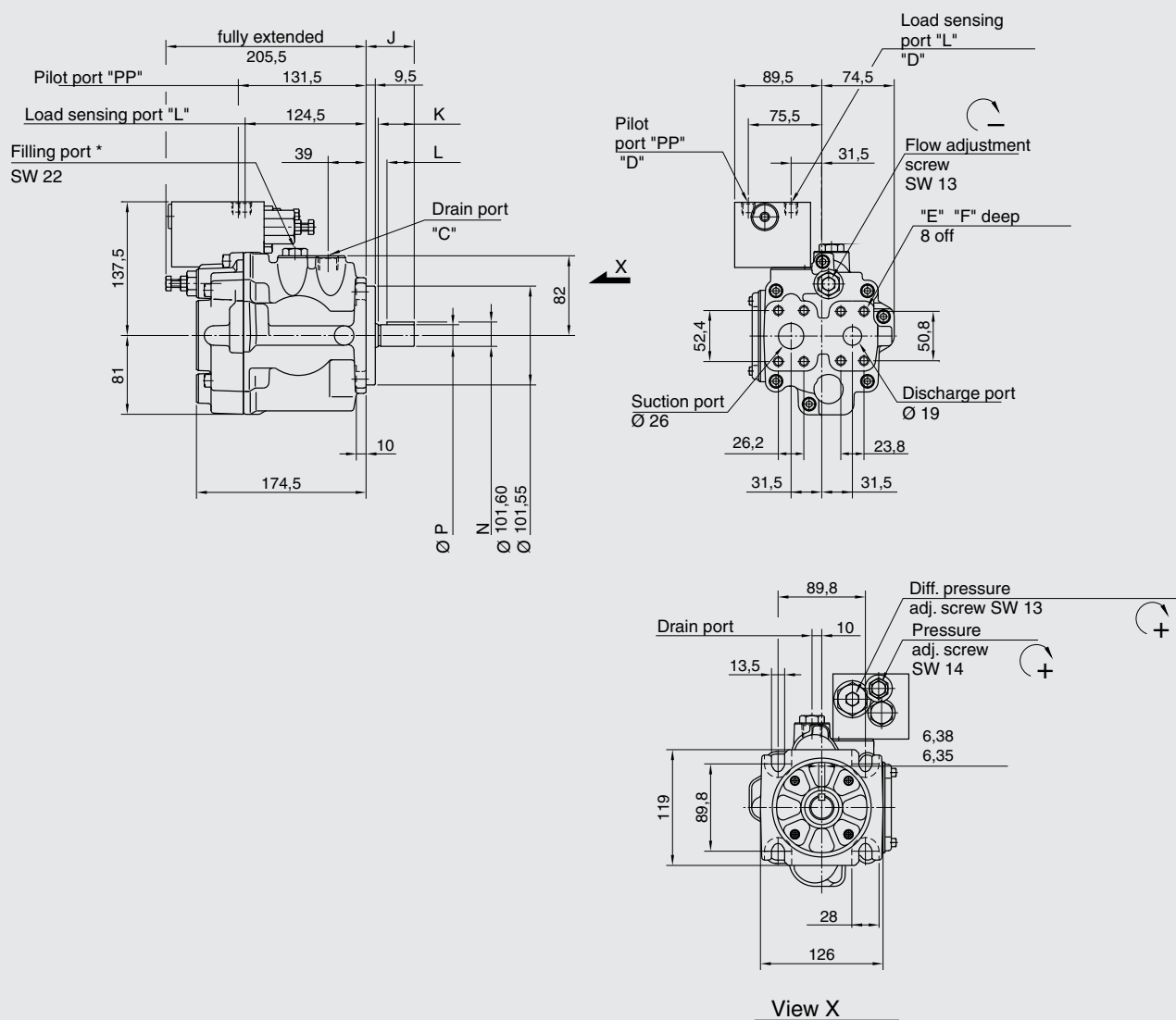
PPV100-16 with remote pressure control 07



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-16 ... 1080 European Standard	1/2 BSP.F	1/4 BSP.F	M10	19	—	49.5	37	28	25.01 24.85	22.23 22.20
PPV100-16 ... 10950 North American Standard	7/8-14 UNF	7/16-20 UNF	3/8-16 UNC	19	—	49.5	37	28	25.01 24.85	22.23 22.20

PPV100-16 with load sensing control 14



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-16 ... 1080 European Standard	1/2 BSP.F	1/4 BSP.F	M10	19	—	49.5	37	28	25.01 24.85	22.23 22.20
PPV100-16 ... 10950 North American Standard	7/8-14 UNF	7/16-20 UNF	3/8-16 UNC	19	—	49.5	37	28	25.01 24.85	22.23 22.20

Technical drawing of the 1000 series pump, showing three views: front, side, and top.

Front View:

- Drain port
- Adjustment screw
- Press. compensator SW 13
- Dimensions: 114,5, 16,5, 13,5, 6,38, 6,35, 28, 150, 143, 114,5

Side View:

- Filling port * SW 22
- Drain port "C"
- Dimensions: 223, 49, 12,5, 114, 90, 189,5, 12, 94, 127,00, 126,95

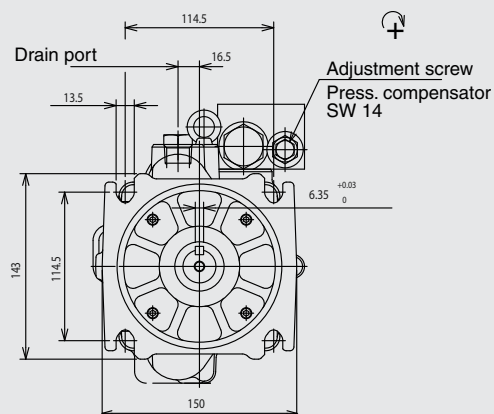
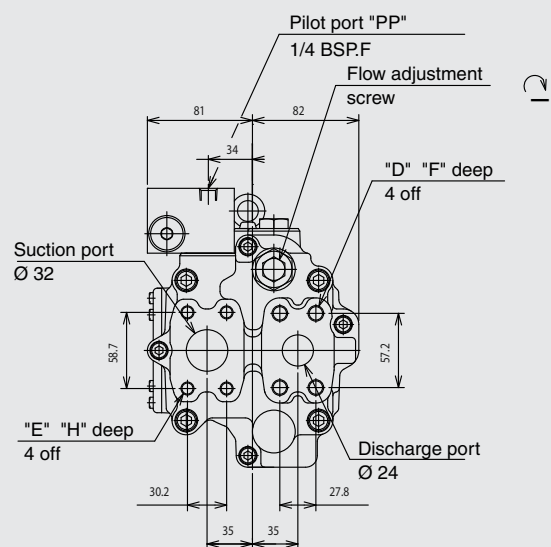
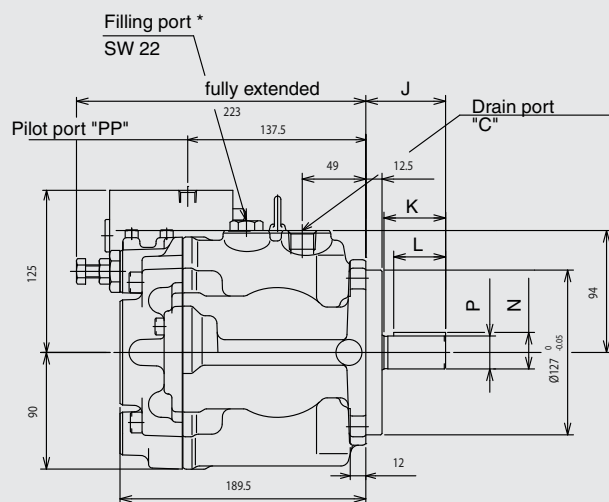
Top View:

- Flow adjustment screw
- SW 17
- "E" "H" deep 4 off
- Suction port Ø 32
- "D" "F" deep 4 off
- Discharge port Ø 24
- Dimensions: 81, 82, 58,7, 57,2, 30,2, 27,8, 35, 35

View X

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-37 ... 1080 European Standard	1/2 BSP.F	M12	M10	22	18	61.5	47.5	40	28.18 28.00	25.40 25.37
PPV100-37 ... 10950 North American Standard	7/8-14 UNF	1/2-13 UNC	7/16-14 UNC	21	20	61.5	47.5	40	28.18 28.00	25.40 25.37

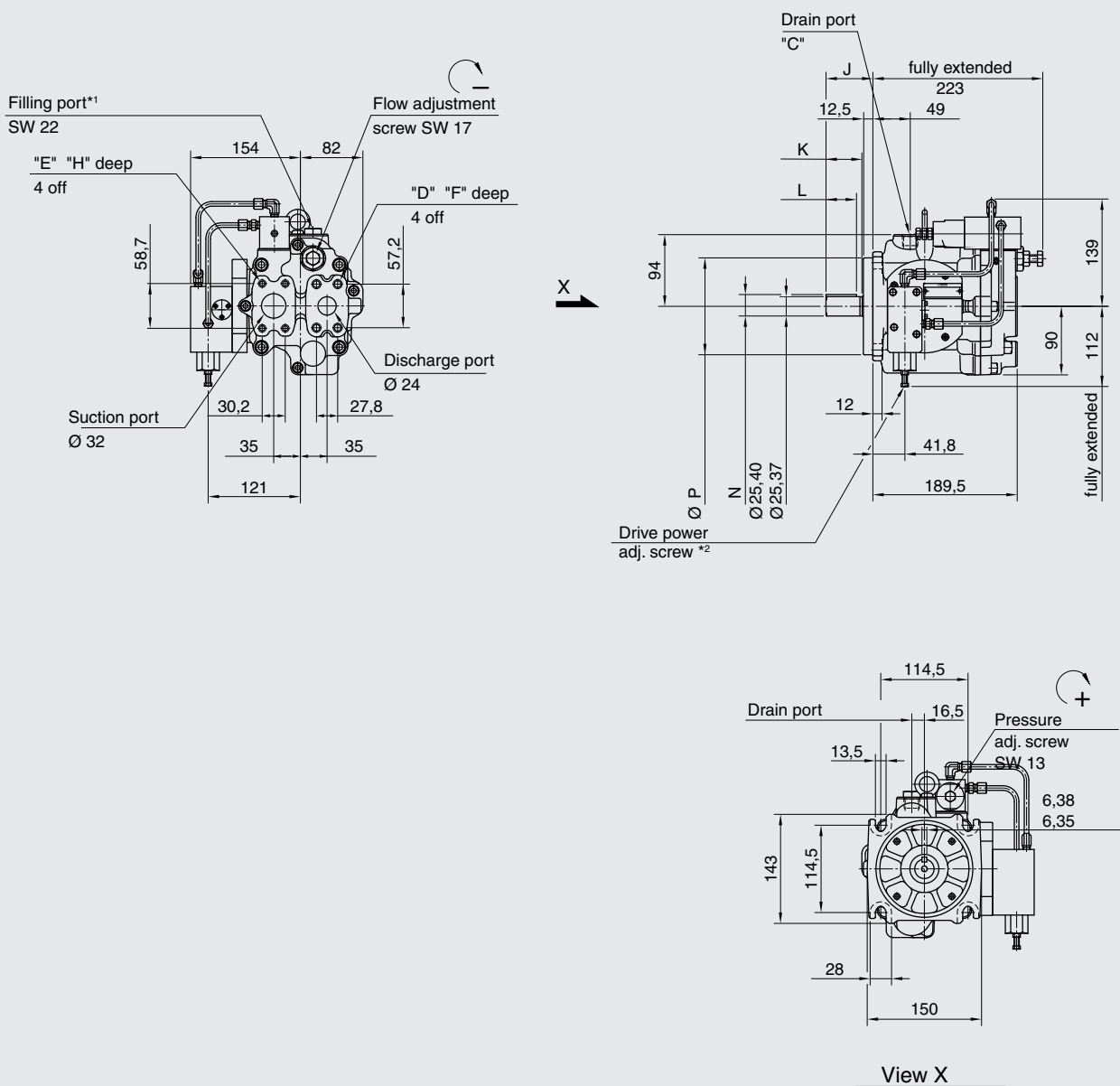
PPV100-37 with remote pressure control 07



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-37 ... 1080 European Standard	1/2 BSP.F	M12	M10	22	18	61.5	47.5	40	28.18 28.00	25.40 25.37
PPV100-37 ... 10950 North American Standard	7/8-14 UNF	1/2-13 UNC	7/16-14 UNC	21	20	61.5	47.5	40	28.18 28.00	25.40 25.37

PPV100-37 with power (torque) control 09

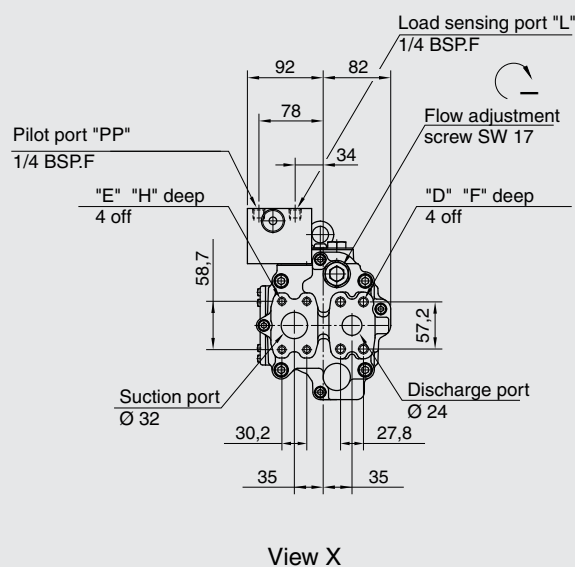
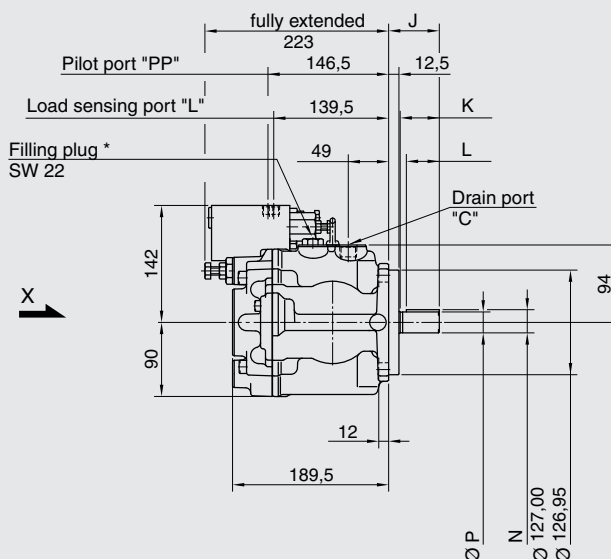
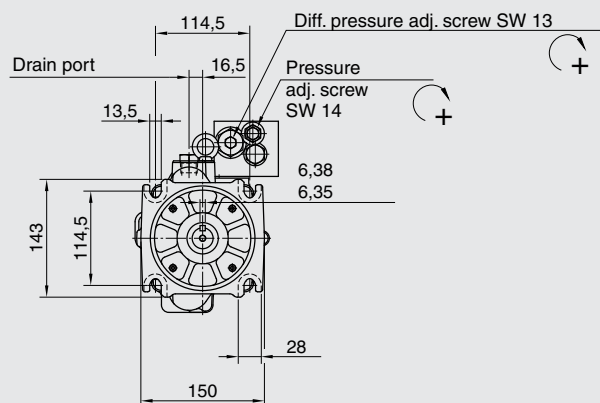


*¹ Install the pump so that the filling port is at the top.

*² Adjustment screw is factory-set

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-37 ... 1080 European Standard	1/2 BSP.F	M12	M10	22	18	61.5	47.5	40	28.18 28.00	25.40 25.37
PPV100-37 ... 10950 North American Standard	7/8-14 UNF	1/2-13 UNC	7/16-14 UNC	21	20	61.5	47.5	40	28.18 28.00	25.40 25.37

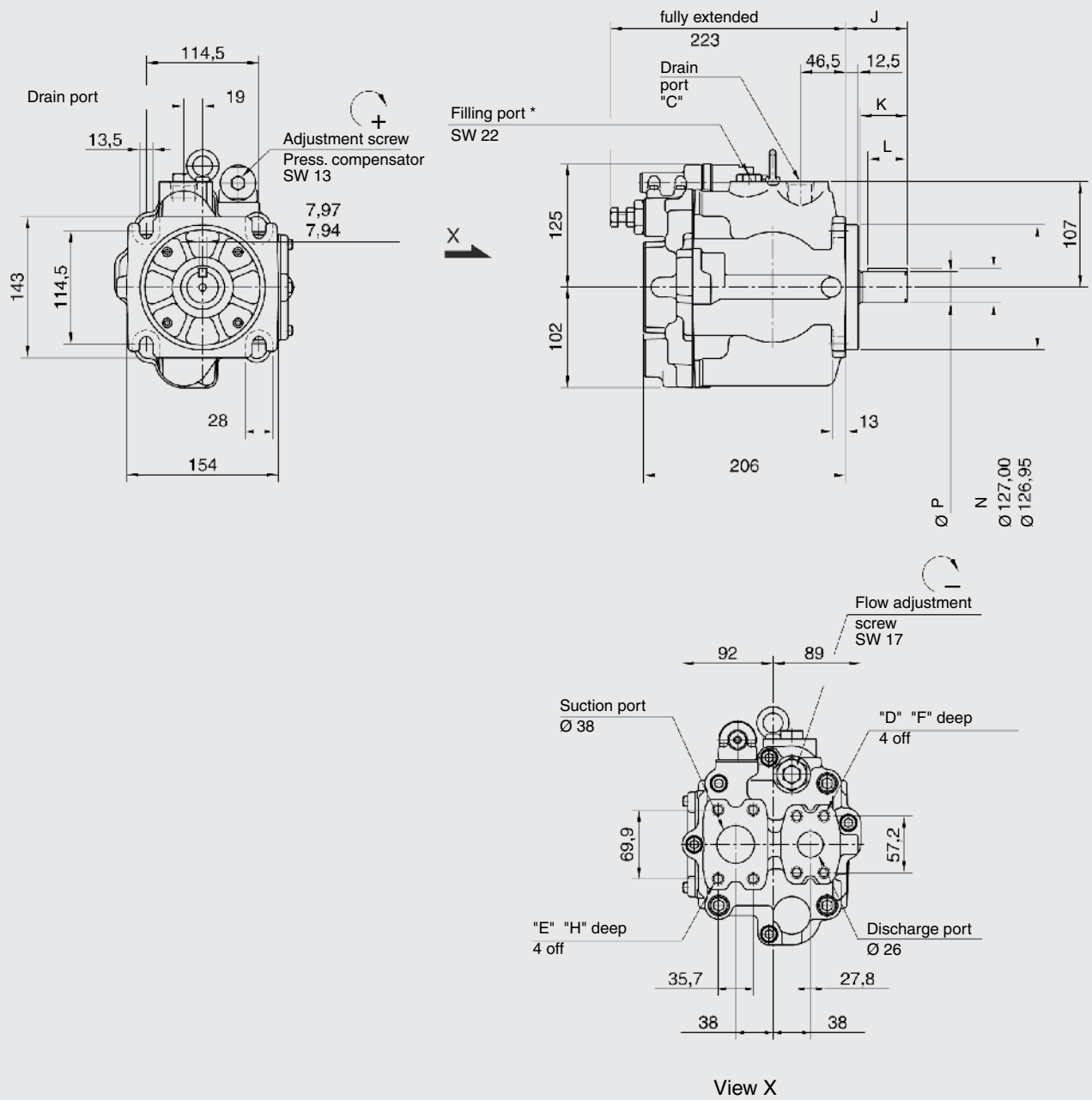
PPV100-37 with load sensing control 14



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-37 ... 1080 European Standard	1/2 BSP.F	M12	M10	22	18	61.5	47.5	40	28.18 28.00	25.40 25.37
PPV100-37 ... 10950 North American Standard	7/8-14 UNF	1/2-13 UNC	7/16-20 UNF	21	20	61.5	47.5	40	28.18 28.00	25.40 25.37

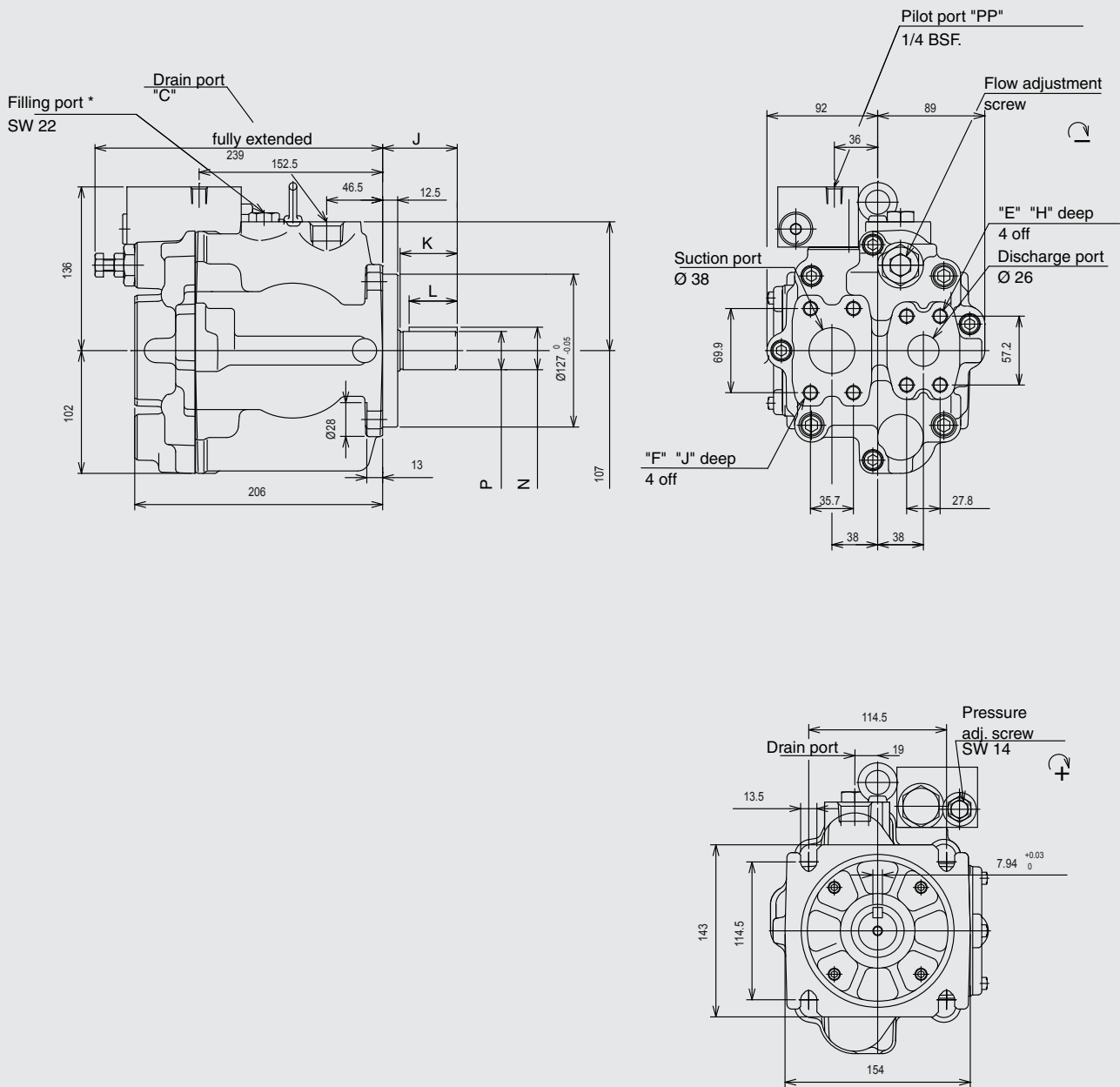
PPV100-56 with pressure control 01



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-56 ... 1080 European Standard	3/4 BSP.F	M12	M12	22	22	62	47.5	40	35.32 35.14	31.75 31.70
PPV100-56 ... 10950 North American Standard	1 1/16-12 UN	7/16-14 UNC	1/2-13 UNC	21	20	61.5	47.5	40	35.32 35.14	31.75 31.70

PPV100-56 with remote pressure control 07

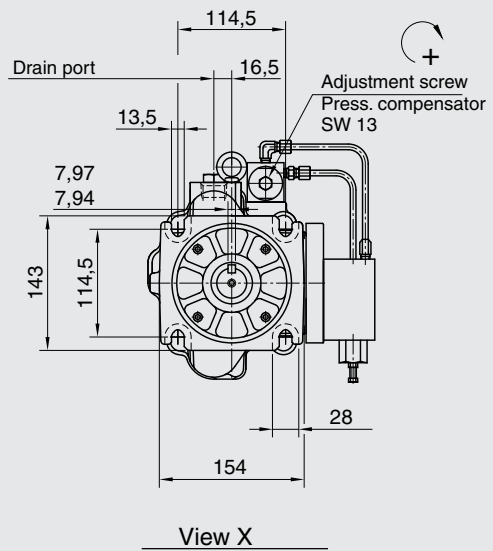
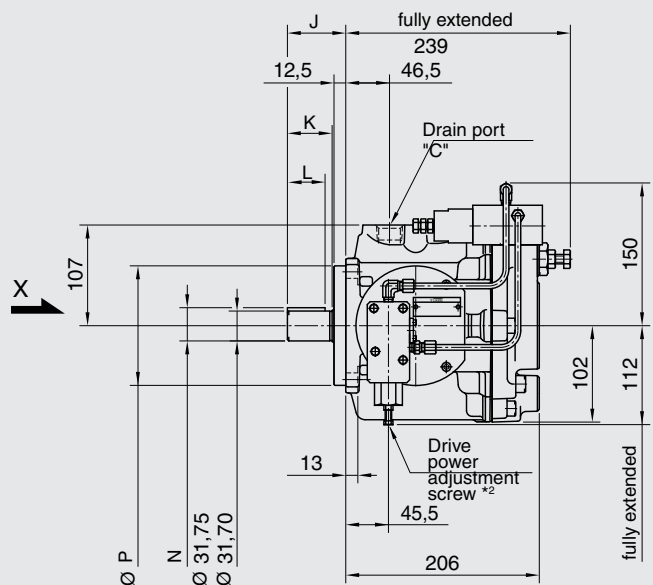
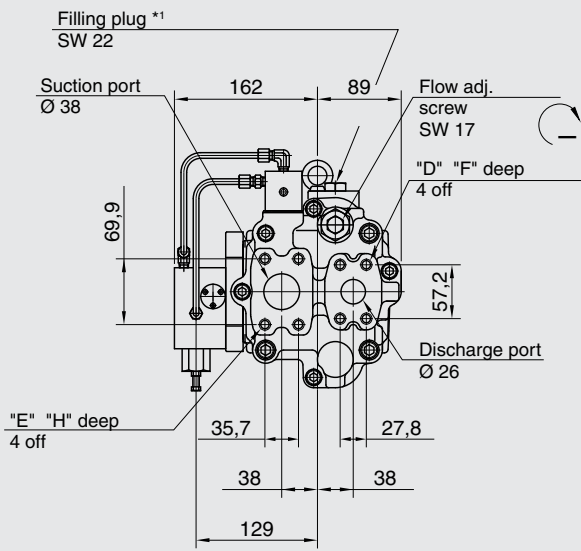


*1 Install the pump with the filling port at the top.

*2 Adjustment screw is pre-set at the factory

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-56 ... 1080 European Standard	3/4 BSP.F	M12	M12	22	22	62	47.5	40	35.32 35.14	31.75 31.70
PPV100-56 ... 10950 North American Standard	1 1/16-12 UN	7/16-16 UNC	1/2-13 UNC	20	21	62	47.5	40	35.32 35.14	31.75 31.70

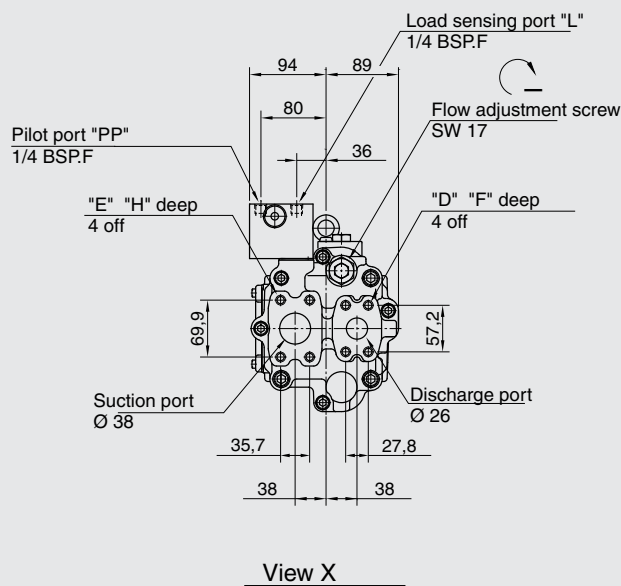
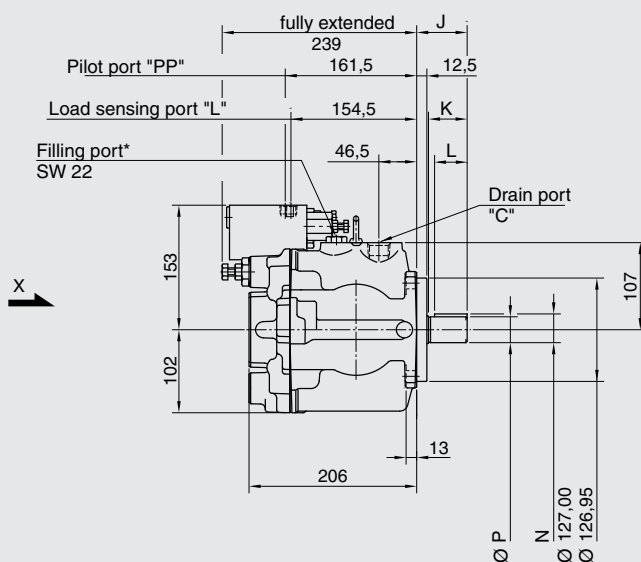
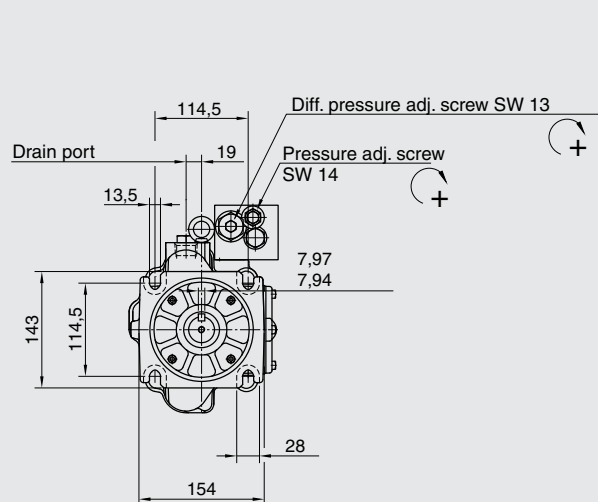
PPV100-56 with power (torque) control 09



*1 Install the pump with the filling port at the top.
*2 Adjustment screw is pre-set at the factory

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-56 ... 1080 European Standard	3/4 BSP.F	M12	M12	22	22	62	47.5	40	35.32 35.14	31.75 31.70
PPV100-56 ... 10950 North American Standard	1 1/16-12 UN	7/16-14 UNC	1/2-13 UNC	20	21	62	47.5	40	35.32 35.14	31.75 31.70

PPV100-56 with load sensing control 14

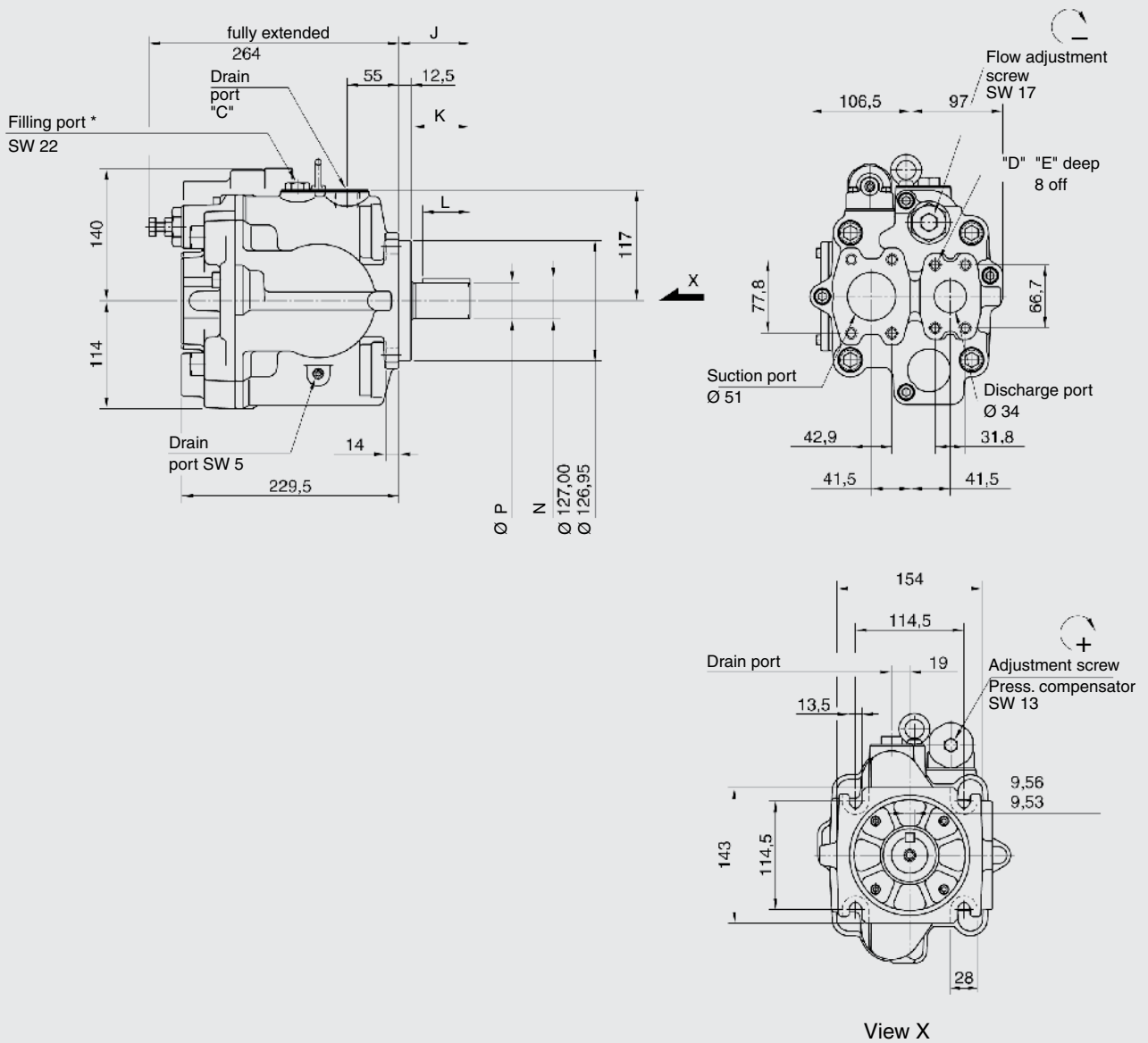


View X

* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-56 ... 1080 European Standard	3/4 BSP.F	M12	M12	22	22	62	47.5	40	35.32 35.17	31.75 31.70
PPV100-56 ... 10950 North American Standard	1 1/16-12 UN	7/16-14 UNC	1/2-13 UNC	20	21	62	47.5	40	35.32 35.17	31.75 31.70

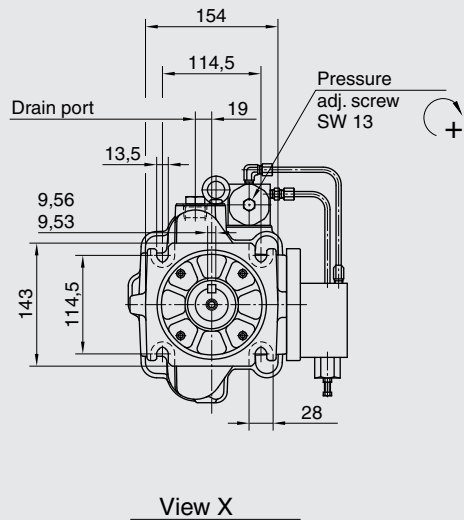
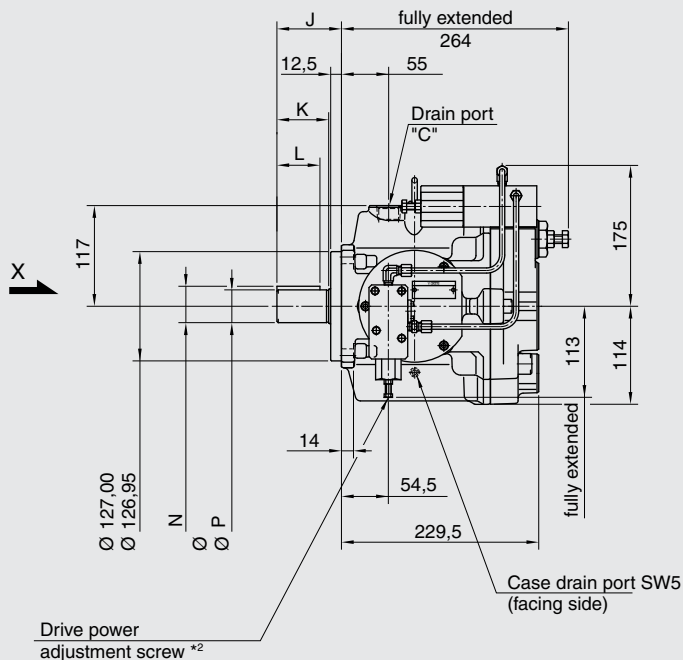
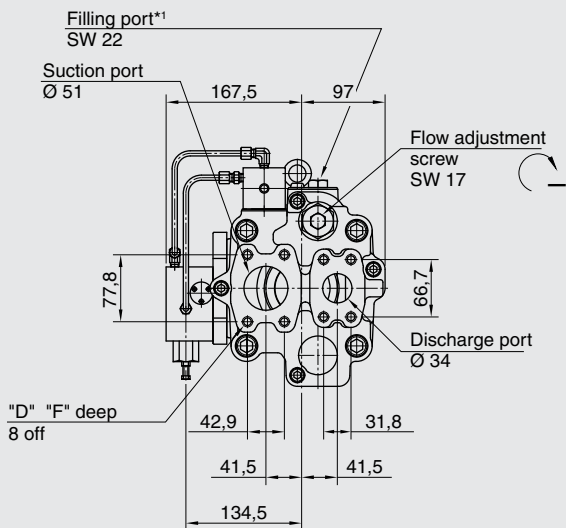
PPV100-71 with pressure control 01



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-71 ... 1080 European Standard	3/4 BSP.F	M12	—	19	—	75	60.5	50	42.36 42.18	38.10 38.05
PPV100-71 ... 10950 North American Standard	1 1/16-12 UN	1/2-13 UNC	—	21	—	75	60.5	50	42.36 42.18	38.10 38.05

PPV100-71 with power (torque) control 09

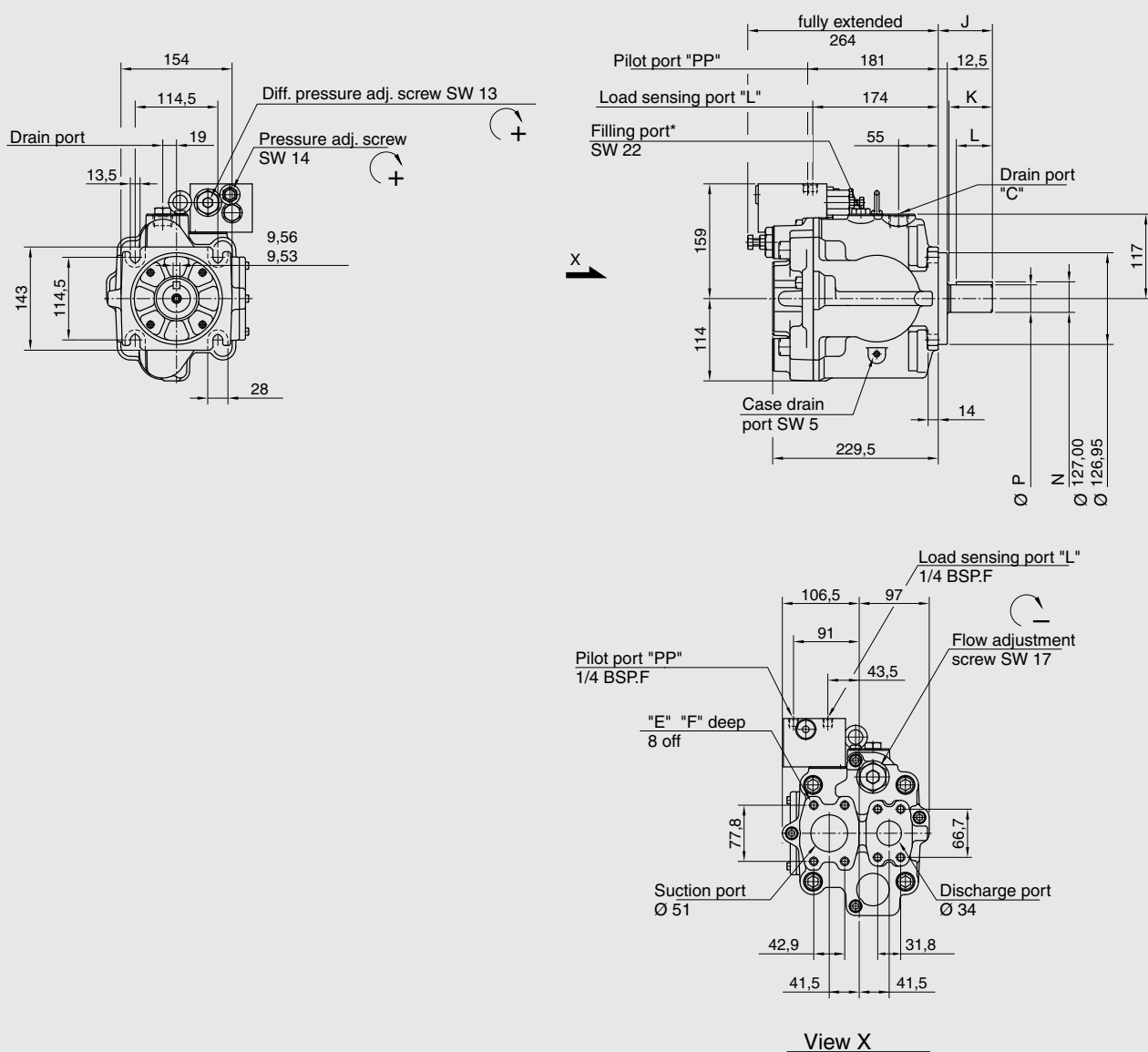


*1 Install the pump with the filling port at the top.

*2 Adjustment screw is factory-set

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-71 ... 1080 European Standard	3/4 BSPF	M12	–	19	–	75	60.5	50	42.36 42.18	38.10 38.05
PPV100-71 ... 10950 North American Standard	1 1/16-12 UN	1/2-13 UNC	–	21	–	75	60.5	50	42.36 42.18	38.10 38.05

PPV100-71 with load sensing control 14

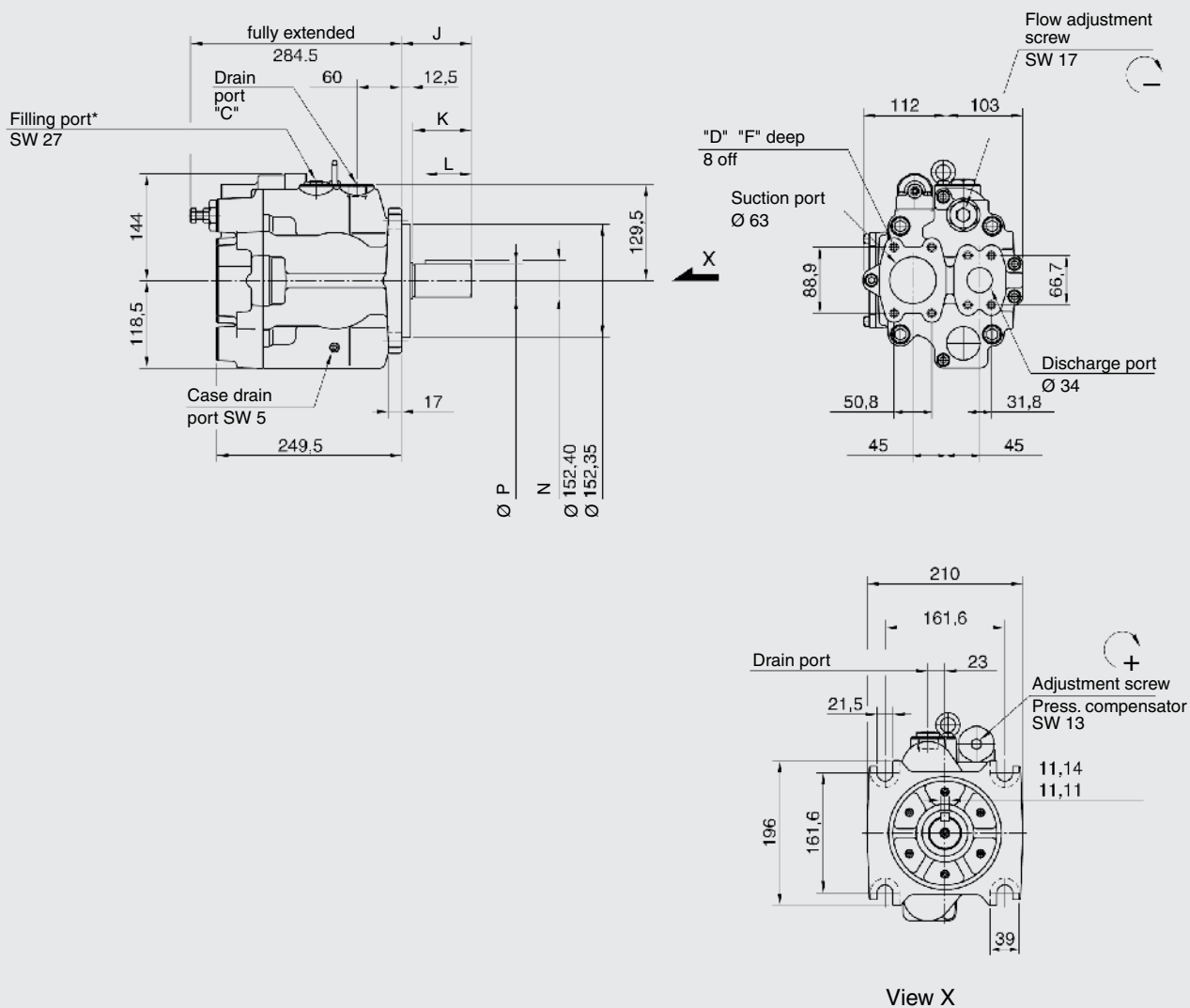


* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-71 ... 1080 European Standard	3/4 BSP.F	M12	–	19	–	75	60.5	50	42.36 42.18	38.10 38.05
PPV100-71 ... 10950 North American Standard	1 1/16-12 UN	1/2-13 UNC	–	21	–	75	60.5	50	42.36 42.18	38.10 38.05

2.2.27 PPV100-100

PPV100-100 with pressure control 01

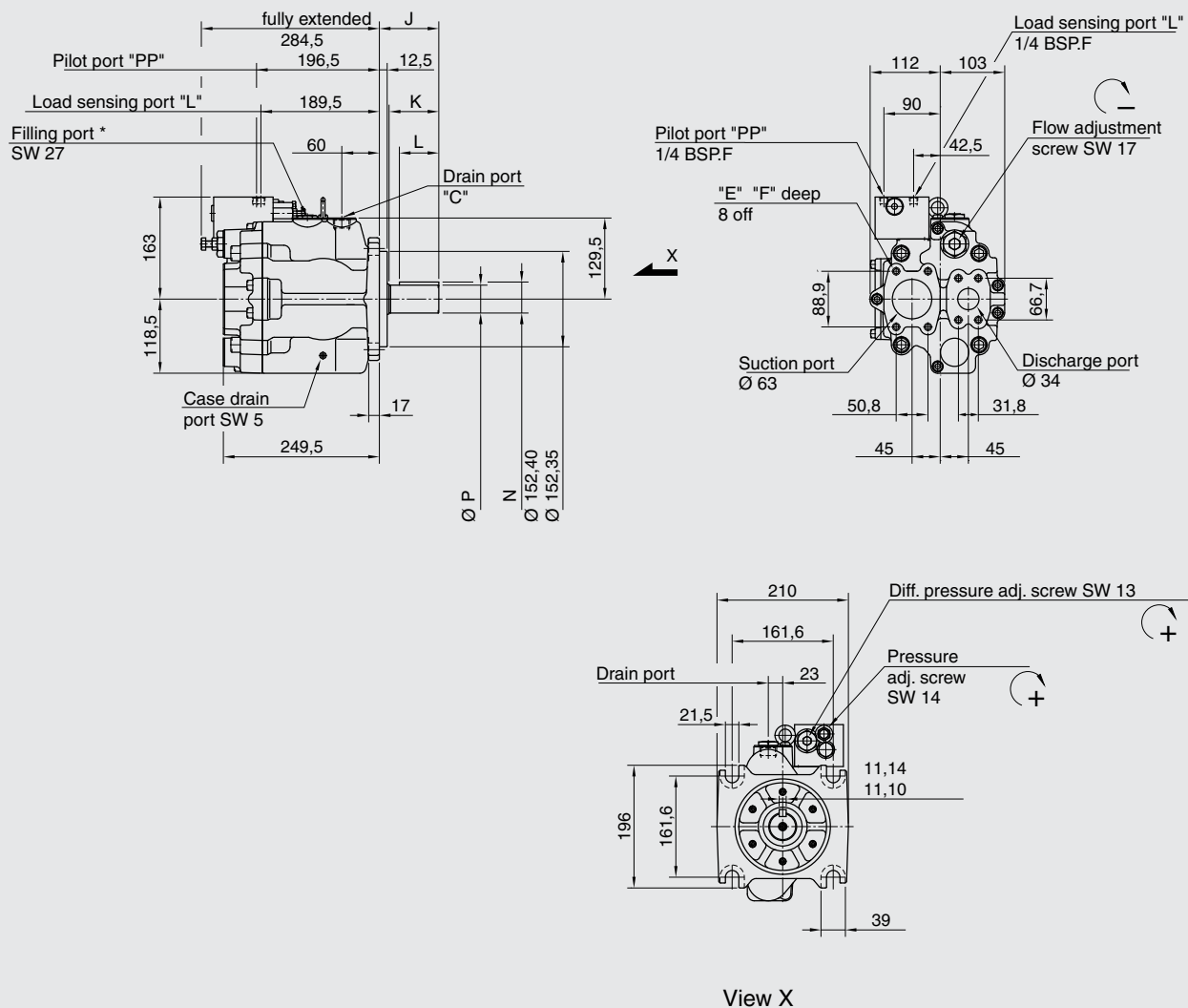


* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-100 ... 1080 European Standard	3/4 BSP.F	M12	–	22	–	95	81	63	49.39 49.21	44.45 44.40
PPV100-100 ... 10954 North American Standard	1 1/16-12 UN	1/2-13 UNC	–	21	–	74.6	60.6	50	49.39 49.21	44.45 44.40

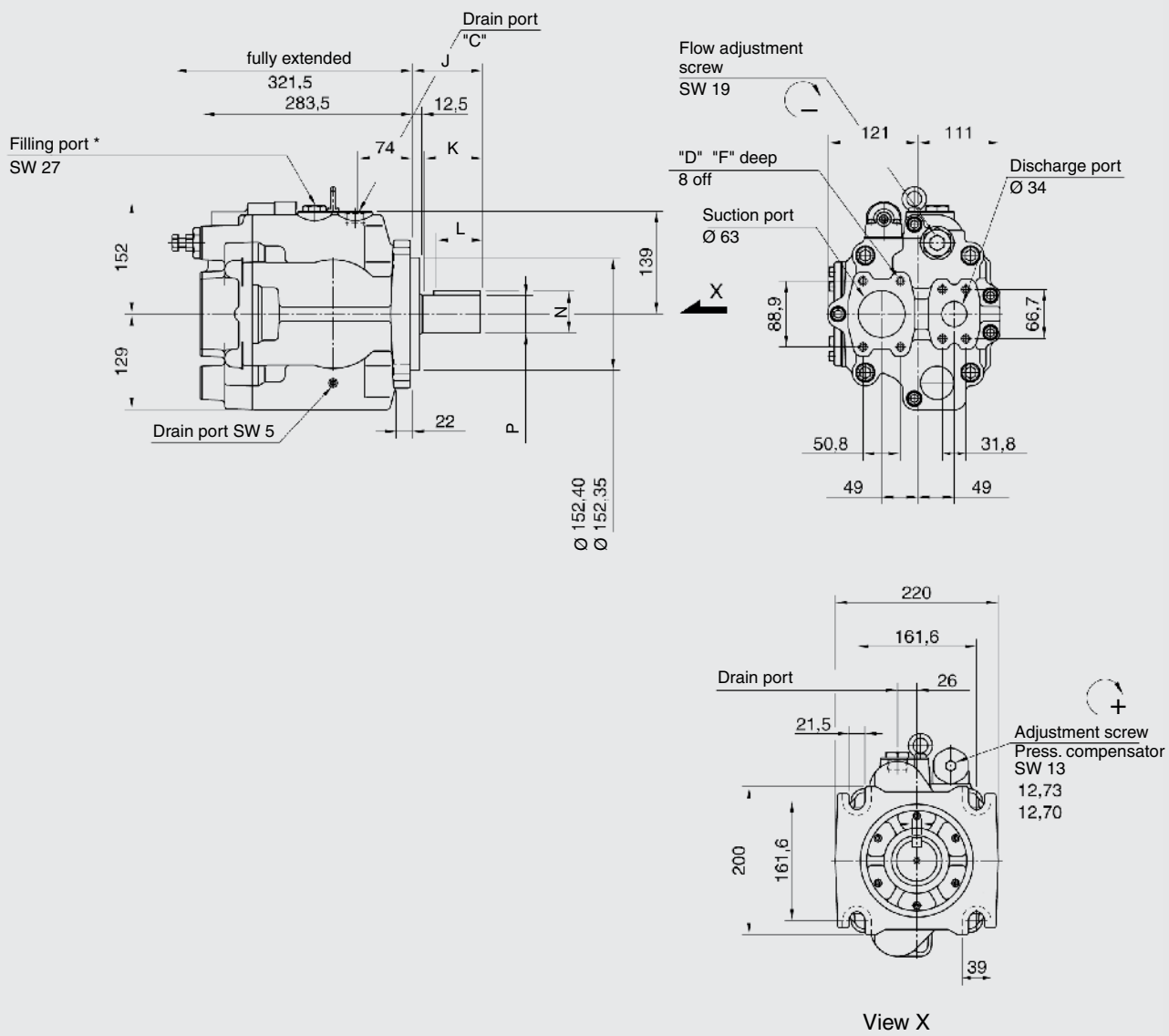
77

PPV100-100 with load sensing control 14



* Install the pump so that the filling port is at the top.

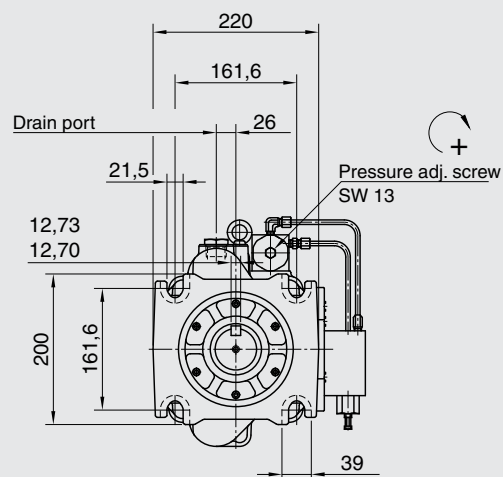
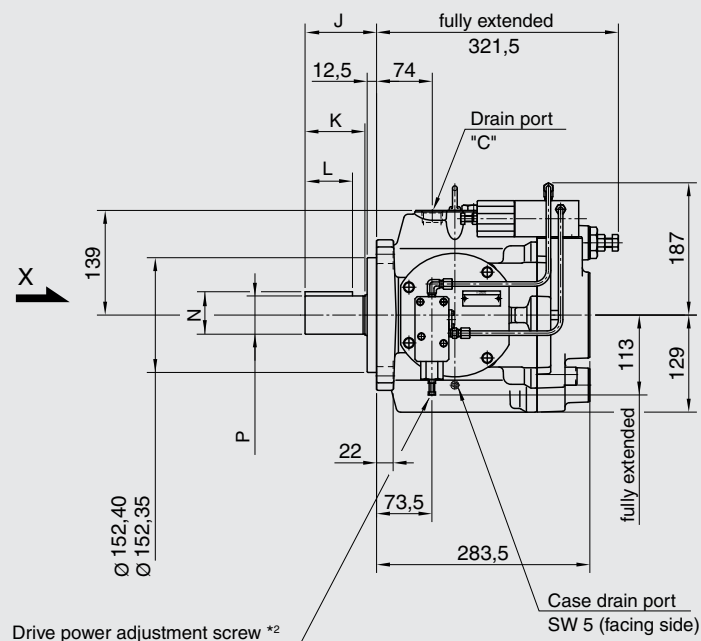
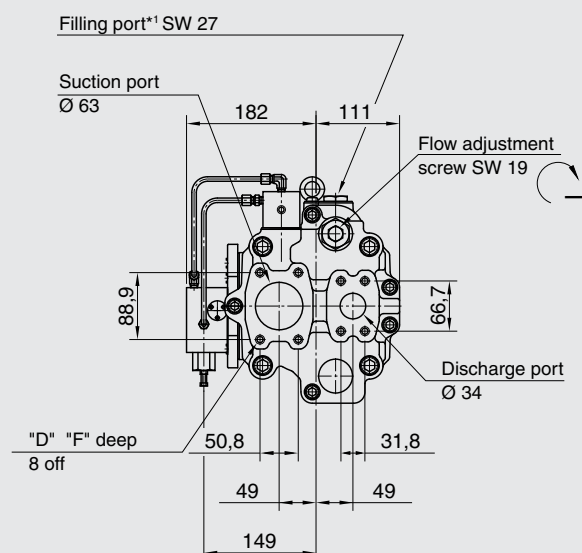
Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-100 ... 1080 European Standard	3/4 BSP.F	M12	–	22	–	95	81	63	49.39 49.21	44.45 44.40
PPV100-100 ... 10954 North American Standard	1 1/16-12 UN	1/2-13 UNC	–	21	–	74.6	60.6	50	49.39 49.21	44.45 44.40



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-145 ... 1080 European Standard	3/4 BSPF	M12	–	22	–	95	81	63	56.43 56.25	50.80 50.75
PPV100-145 ... 10954 North American Standard	1 1/16-12 UN	1/2-13 UNC	–	21	–	74.6	60.6	50	56.43 56.25	50.80 50.75

PPV100-145 with power (torque) control 09



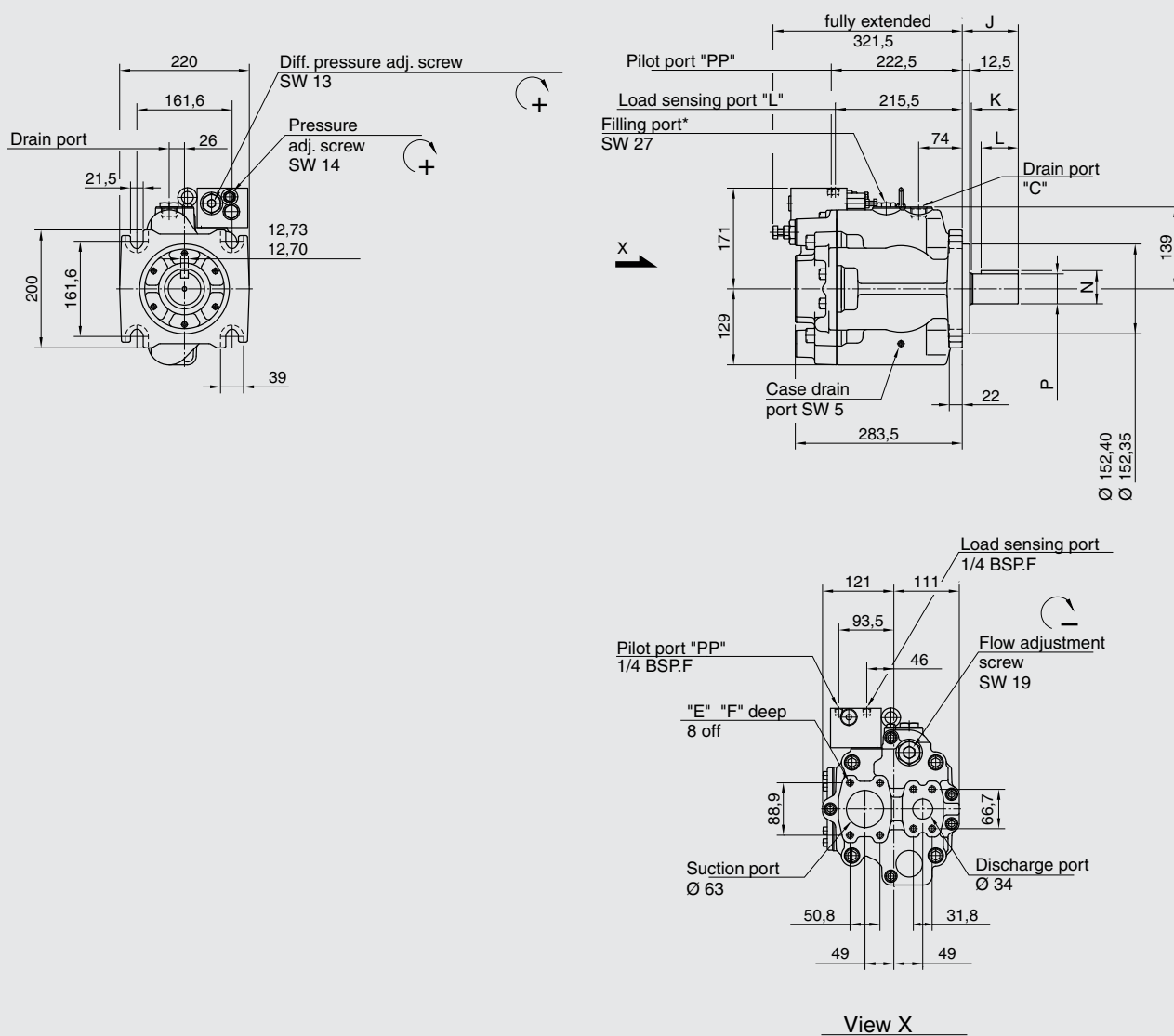
View X

*1 Install the pump so that the filling port is at the top.

*2 Adjustment screw is factory-set

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-145 ... 1080 European Standard	3/4 BSPF	M12	–	22	–	95	81	63	56.43 56.25	50.80 50.75
PPV100-145 ... 10954 North American Standard	1 1/16-12 UN	1/2-13 UNC	–	21	–	74.6	60.6	50	56.43 56.25	50.80 50.75

PPV100-145 with load sensing control 14

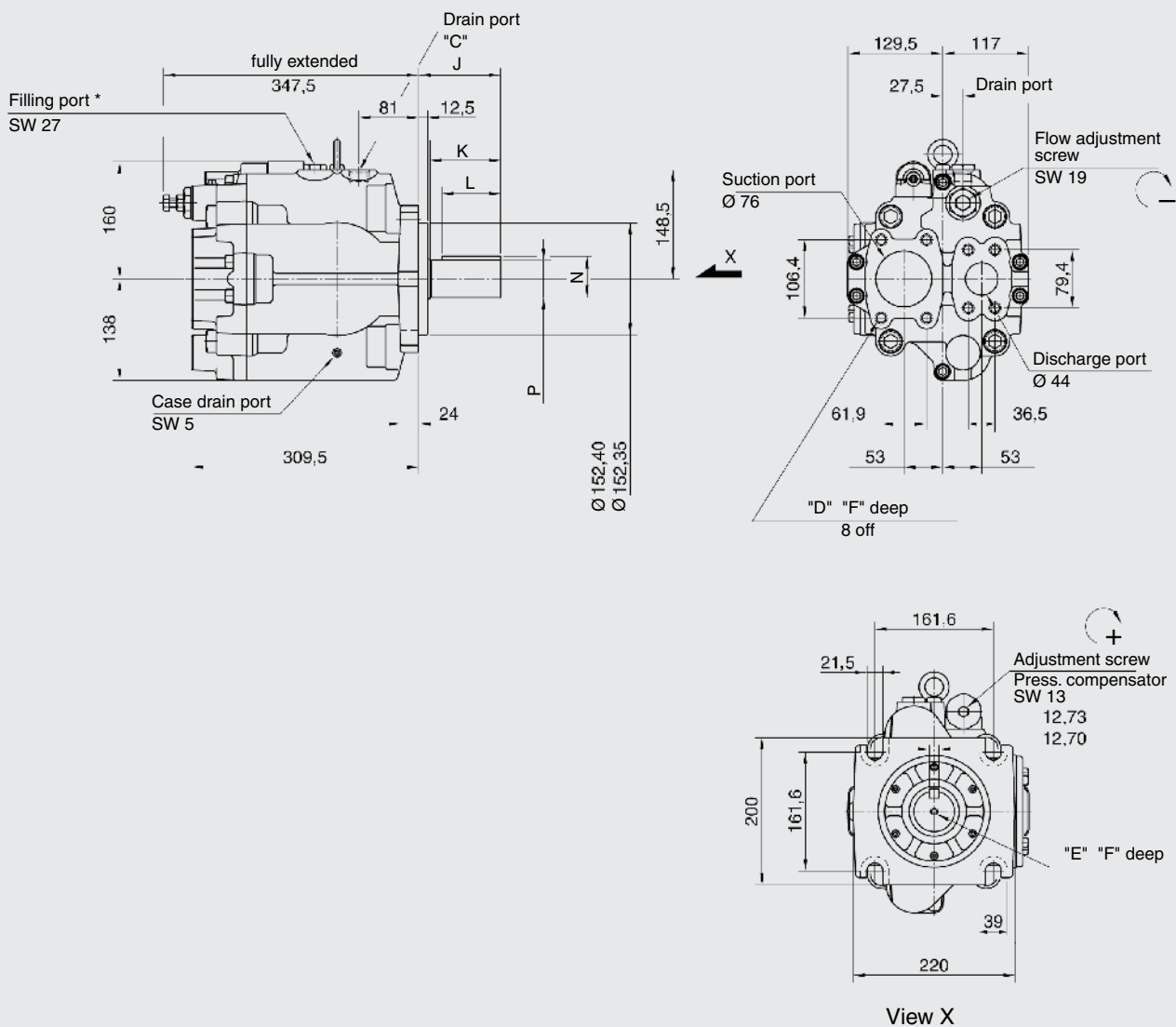


* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-145 ... 1080 European Standard	3/4 BSP.F	M12	–	22	–	95	81	63	56.43 56.25	50.80 50.75
PPV100-145 ... 10954 North American Standard	1 1/16-12 UN	1/2-13 UNC	–	21	–	74.6	60.6	50	56.43 56.25	50.80 50.75

2.2.29 PPV100-180

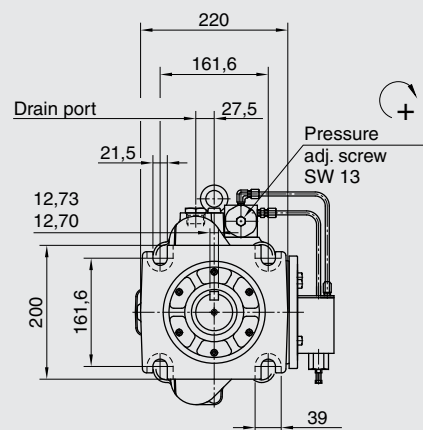
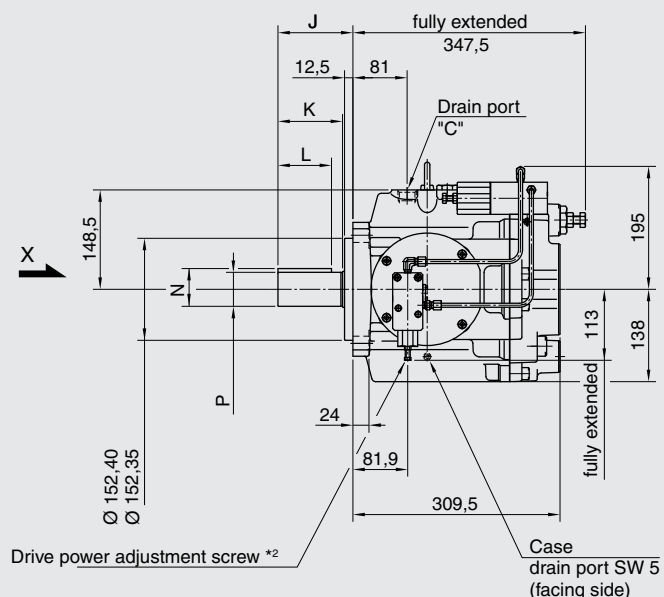
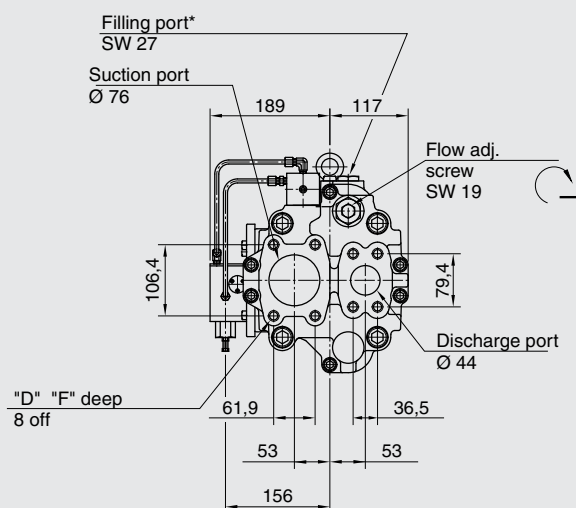
PPV100-180 with pressure control 01



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-180 ... 1080 European Standard	3/4 BSPF	M16	–	29	–	112	97.5	80	56.43 56.25	50.80 50.75
PPV100-180 ... 10954 North American Standard	1 1/16-12 UN	5/8-11 UNC	–	36	–	99.8	85.3	70	56.43 56.25	50.80 50.75

PPV100-180 with power (torque) control 09



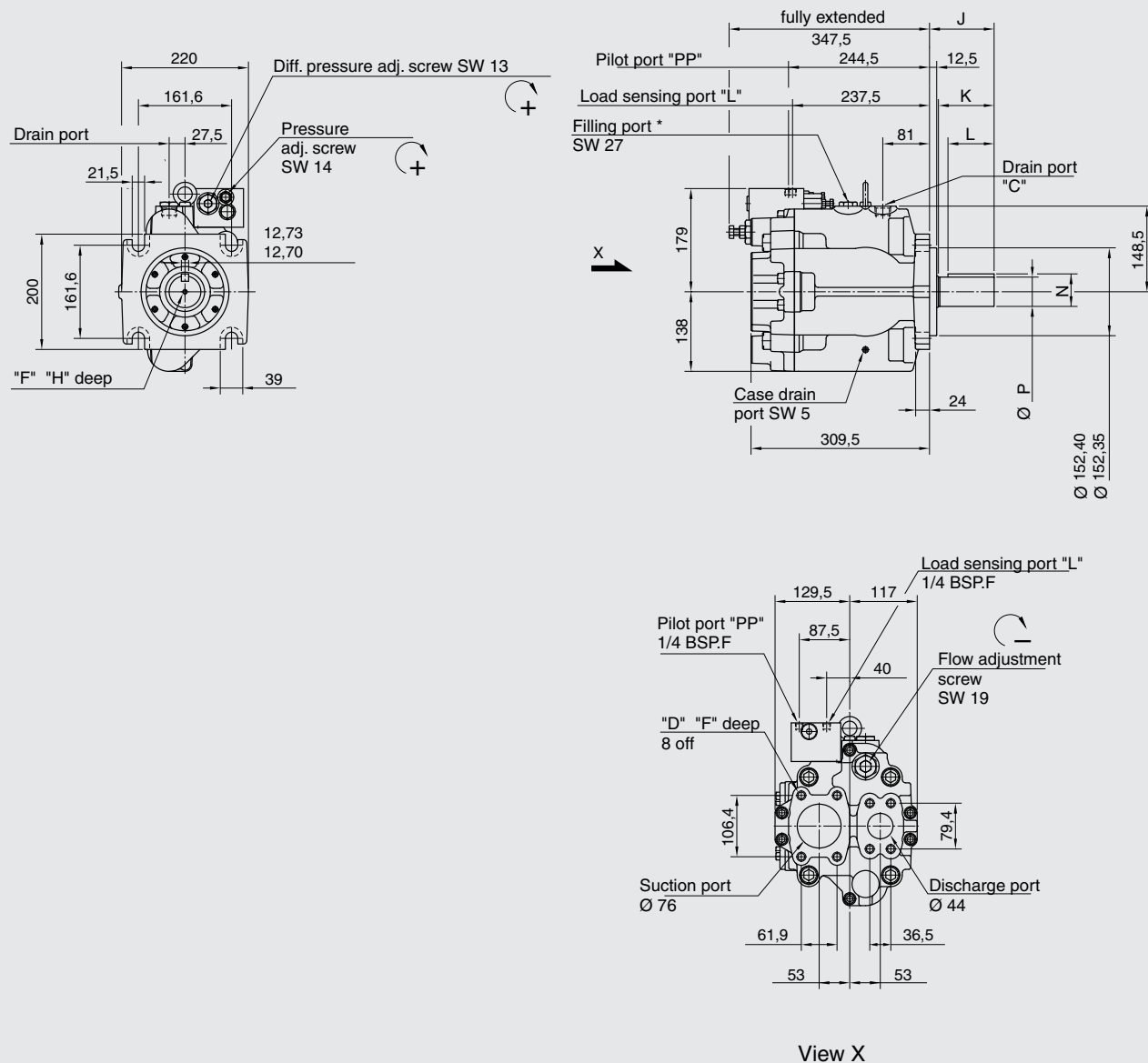
View X

*1 Install the pump with the filling port at the top.

*2 Adjustment screw is pre-set at the factory

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-180 ... 1080 European Standard	3/4 BSP.F	M16	—	29	—	112	97.5	80	56.43 56.25	50.80 50.75
PPV100-180 ... 10954 North American Standard	1 1/16-12 UN	5/8-11 UNC	—	36	—	99.8	85.3	70	56.43 56.25	50.80 50.75

PPV100-180 with load sensing control 14



* Install the pump so that the filling port is at the top.

Model numbers	Thread size			Dimensions in mm						
	C	D	E	F	H	J	K	L	N	P
PPV100-180 ... 1080 European Standard	3/4 BSP.F	M16	—	29	—	112	97.5	80	56.43 56.25	50.80 50.75
PPV100-180 ... 10954 North American Standard	1 1/16-12 UN	5/8-11 UNC	—	36	—	99.8	85.3	70	56.43 56.25	50.80 50.75



2.3 MEDIUM HEAVY DUTY SERIES

CONTENTS

PPV101

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Technical Information	2.3.3 Specifications 2.3.4 Hydraulic fluids 2.3.5 Viscosity range 2.3.6 Temperature range 2.3.7 Fire-resistant fluids 2.3.8 Seals 2.3.9 Filtration 2.3.10 Adjustments 2.3.11 Drive and through drive torques 2.3.12 Through drive limitations 2.3.13 Installation notes
Control Options	2.3.14 Load sensing (LS) and pressure cut-off (PC) 2.3.15 LS and PC with integrated unloading valve 2.3.16 LS and PC with integrated proportional relief valve 2.3.17 LS and PC with torque limiter 2.3.18 Pressure cut-off 2.3.19 PC with integrated unloading valve 2.3.20 PC with integrated proportional pressure relief valve 2.3.21 PC with torque limiter 2.3.22 Electrical displacement control 2.3.23 Pilot-operated displacement control
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Dimensions	2.3.29 PPV101-45 2.3.30 PPV101-80 2.3.31 PPV101-112 / -140 2.3.32 PPV101-200 2.3.33 Electrical displacement control 2.3.34 Unloading valve

ORDERING CODE

2.3.1 Medium Heavy Duty Series

PPV101 – 45 / B – 1 N R M M – P 0 – – XXXX

Axial piston pump

Medium Heavy Duty Series

Size	45	45 cm ³ /rev
	80	80 cm ³ /rev
	112	112 cm ³ /rev
	140	140 cm ³ /rev
	200	200 cm ³ /rev

Design series: B

Seals

–	NBR
V	FPM
W	NBR, Water glycol (not for size 200)

Open circuit: 1

Through drive and ports

N	Single pump with steel cover plate, side port (standard)
O	Single pump, side port
A	SAE A through drive, side port
B	SAE B through drive, side port
BB	SAE BB through drive, side port
C	SAE C through drive, side port
CC	SAE CC through drive, side port
C4	SAE C 4-hole through drive, side port
D	SAE D through drive, side port
E	SAE E through drive, side port
R	Single pump, rear port

Shaft rotation

R	Clockwise
L	Anti-clockwise (viewed from shaft end)

Mounting flange and shaft

S	SAE splined shaft & flange
M	ISO keyed shaft & flange (not for size 200)
F	SAE D flange with SAE F splined shaft
K	SAE keyed shaft & flange
T*	SAE B splined shaft & 2-hole flange (size 45 only)
	SAE CC splined shaft & SAE D 4-hole flange (size 112/140 only)
U*	SAE B keyed shaft & 2-hole flange (size 45 only)
C*	SAE C splined shaft & 2-hole flange (size 112/140 only)
R*	SAE C splined shaft & SAE D 4-hole flange (size 112/140 only)
X*	SAE C keyed shaft & 2-hole flange (size 112/140 only)
W*	SAE CC splined shaft & SAE C 2-hole flange (size 112/140 only)
Y*	SAE CC keyed shaft & SAE C 2-hole flange (size 112/140 only) * Standard models

Connection threads

M	Metric threads
S	UNC threads

Control type

P	Remote pressure compensator
L	Load sensing and pressure control

Additional pressure control

O	No additional control
N	With integrated unloading valve, normally closed
M	With integrated unloading valve, normally open
V	With integrated remote control valve
1	Load sensing control without pressure control

Solenoid voltage for integrated unloading valve (options N and M)

–	no unloading valve
115A	115 V AC 50 / 60 Hz
235A	230 V AC 50 / 60 Hz
12D	12 V DC
24D	24 V DC

Additional control options

–	No additional control
---	-----------------------

Torque limiter control

/1-L**	Low setting range
/1-M**	Medium setting range
/1-H**	High setting range

** For settings, see next page

Displacement control

/1-E0	Electrical displacement control (pilot pressure required)
/1-Q0	Pilot-operated displacement control

Modification number

XXXX	Determined by manufacturer
------	----------------------------

2.3.2 Torque limiter settings

Drive speed 1450 rpm (50 Hz, 4-pole electric motor)						
Power (kW)	Torque (Nm)	Pump size				
		45	80	112	140	200
3.7	24					
5.5	36	S3				
7.5	49	L4	S3			
11	72	L1	L6	S5		
15	99	M2	L3	S2	S3	
18.5	122	H4	L1	L4	S1	
22	145	H4	M4	L3	L6	
30	198		H4	M3	L2	L5
37	244		H2	M1	M3	L3
45	296		H1	H4	M2	L2
55	362			H2	H4	M3
75	494				H1	H6
90	593					H4
110	724					H2
132	869					

For other drive speeds or different power settings, please contact HYDAC Drive Center.

TECHNICAL INFORMATION

2.3.3 Specifications

Pump size			45	80	112	140	200
Geometric displacement		[cm³/rev]	45.0	80.0	112.0	140.0	200.0
Pressure	Rated	[bar]	320				
	Peak	[bar]	350				
Drive speed	Min.	[rpm]	600				
	Max.	[rpm]	2700	2400	2200	2100	1900
Power (1500 rpm, 280 bar)		[kW]	35*	62	86*	108*	154
Drive torque (280 bar)		[Nm]	201*	357	499*	624*	891
Pre-fill oil volume		[cm³]	600	800	1500	1500	2000
Approx. weight		[kg]	25.0	35.0	65.0	65.0	100.0

* Depending on the design of the drive shaft, the maximum torque or power can be lower - see point 2.3.11

2.3.4 Hydraulic fluids

H, HL	Mineral oil
HEES	Fatty acid esters (Polyolester), biodegradable
HFC	Water glycol
HLP, HLPD, HV, HVLP	High quality hydraulic fluids based on mineral oil and with additional anti-wear properties (at pressures above 200 bar)
HFD-U	Polyolester

For use with other fluids, please contact HYDAC.

2.3.5 Viscosity range

Minimum viscosity:	10 cSt (mm ² /s)
Normal operating viscosity:	10 - 200 cSt (mm ² /s)
Maximum viscosity (cold start):	1000 cSt (mm ² /s)

2.3.6 Temperature range

-20 to +95 °C

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

2.3.7 Fire-resistant fluids

Parameters:	Fluid:		
	Mineral oil	Polyolester	Water glycol
Max. continuous pressure (bar)	320	320	210
Recommended temp. range (°C)	20 ~ 60	30 ~ 60	10 ~ 50
Cavitation resistance	○	△	△
Expected life expectancy compared to mineral oil	100%	50% ~ 100%	20% ~ 80%

○ = Recommended

△ = Acceptable but with reduced pump life

2.3.8 Seals

Type of seal (see ordering code)	Fluid type	Material of shaft seal ring	Other seals (O-rings)
–	Mineral oil	FPM	NBR
V	HEES, HFD	FPM	FPM
W	Water glycol	NBR	NBR

2.3.9 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class to NAS 1638 Class 9 (20/18/15 ISO 4406:1999) or cleaner.

2.3.10 Adjustments

Pump size	Volumen		Pressure
	Volume adjustment screw rate	Min. adjustable displacement	Adjustment screw internal hex size
	[cm³/rev]	[cm³/rev]	[mm]
PPV101-45	4.9	16	8
PPV101-80	6.0	35	
PPV101-112	11.5	56	10
PPV101-140	12.0	70	
PPV101-200	15.3	100	

2.3.11 Max. drive and through drive torques

Pump size		45			80	
Maximum torque on primary shaft [Nm]		140	225		400	
Mounting flange	Standard	SAE B	SAE BB	ISO 100	SAE C	ISO 125
	Bolts	2	2	2	2	2
Drive shaft	Standard	SAE BB	SAE BB	ISO 25 mm	SAE C	ISO 32 mm
	Type	Splined shaft	Splined shaft / keyed shaft	Keyed shaft	Splined shaft / keyed shaft	Keyed shaft
Max. through drive torque	SAE A	123				
	SAE B	290			340	
	SAE BB	290			400	
	SAE C				400	
	SAE CC					
	SAE D					
	SAE E					

Pump size		112		140		200	
Maximum torque on primary shaft [Nm]		980*1		980*1		980	1800
Mounting flange	Standard	SAE C and D	ISO 180	SAE C and D	ISO 180	SAE E	SAE E
	Bolts	2 and 4	4	2 and 4	4	4	4
Drive shaft	Standard	SAE C, CC and D	ISO 45 mm	SAE C, CC and D	ISO 45 mm	SAE D	SAE F
	Type	Splined shaft / keyed shaft	Keyed shaft	Splined shaft / keyed shaft	Keyed shaft	Splined shaft / keyed shaft	Splined shaft
Max. through drive torque	SAE A	123					
	SAE B	340					
	SAE BB	550					
	SAE C	700				990	
	SAE CC	700				990	
	SAE D	700				990	
	SAE E					990	

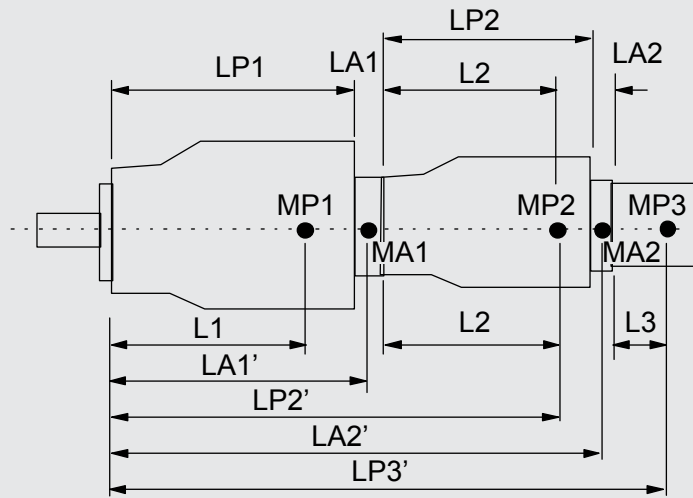
*1 Maximum drive torque for:
 SAE C: 400 Nm
 SAE CC: 765 Nm

Note:

The through drive option is only available when using mineral oil.

2.3.12 Through drive limitations

In addition to the maximum through drive torque, one must consider a possible excessive bending moment so that the maximum combined bending moment value as determined by the expression below is not exceeded.



MPX = weight of pump [kg]
 LPX = length of pump [mm]
 Lx = distance of C of G from mounting flange [mm]
 MAX = weight of adapter kit [kg]
 LAX = length of adapter kit [mm]

$$\begin{aligned} \text{Bending moment} = & ((L1.mP1) + (LA1'.mA1) + (LP2'.mP2) + (LA2'.mA2) + LP3'.mP3) + \dots / 102 [\text{Nm}] \\ & ((L1.mP1) \\ & + (LP1 + (LA1/2)).mA1 \\ & + (LP1 + LA1 + L2).mP2 \\ & + (LP1 + LA1 + LP2(LA2/2)).mA2 \\ & + (LP1 + LA1 + LP2 + LA2).mP3 \\ & + \dots) / 102 \end{aligned}$$

Pump overall length [mm] (Lp)

	Single pump	Through drive pump
Size	Type "0"	Type "S"
45	244	244
80	272	272
112 / 140	308	307.5
200	359	359

Distance of pump C of G from mounting flange [mm] (L)

	Single pump	Through drive pump
Size	Type "0"	Type "S"
45	120	120
80	130	130
112 / 140	150	150
200	190	190

Pump weight [kg] (MP)

Size	Standard pump		Pump with torque limiter	
	Single pump	Through drive pump	Single pump	Through drive pump
Size	Type "0"	Type "S"	Type "0"	Type "S"
45	25	28	27	30
80	35	38	37	40
112 / 140	65	69	67	71
200	95	103	97	105

Pump adapter weight (MA) & Length (LA)

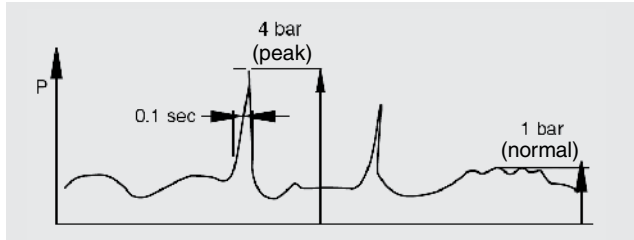
Size	Adapter kit	Weight (MAx)	Length (LAX)
45	SAE "A"	0	0
	SAE "B" & "BB"	2	20
	SAE "C" & "C4"	4	24.5
80	SAE "A"	0	0
	SAE "B" & "BB"	3	20
	SAE "C" & "C4"	4	24.5
	SAE "D"	10	43
112 / 140	SAE "A"	0	0
	SAE "B" & "BB"	3	25
	SAE "C" & "CC" & "C4"	5	30
	SAE "D"	10	43
200	SAE "A"	1	6
	SAE "B" & "BB"	8	25
	SAE "C" & "CC" & "C4"	8	30
	SAE "D"	10	38
	SAE "E"	15	38

Size	Maximum bending moment (Nm)
45	137
80	244
112 / 140	462
200	930

2.3.13 Installation notes

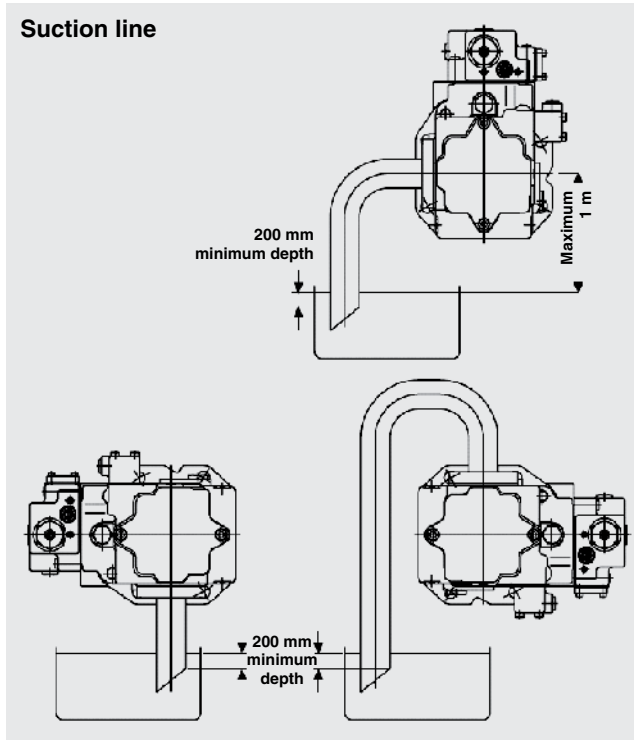
The pump should be installed horizontally with the case drain line initially rising above the level of the pump before continuing to the tank as shown in the diagram below. Do not connect the drain line to the suction line.

The top drain port should always be used and the internal diameter of the drain line should be equal to or larger than the drain port to minimise pressure in the pump case. The pressure in the pump case should not exceed 1 bar as shown in the diagram below. Peak pressure should never exceed 4 bar.



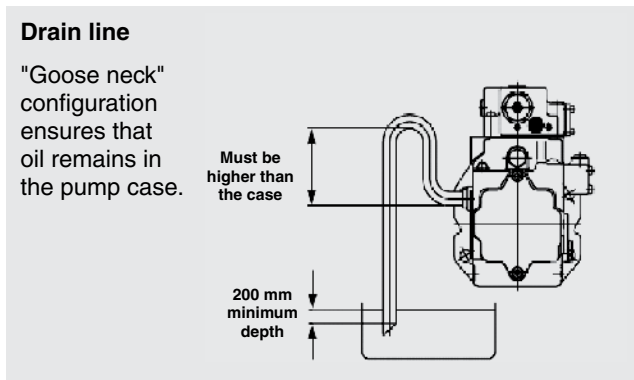
Installing the pump above the tank

Suction line



Drain line

"Goose neck" configuration ensures that oil remains in the pump case.



Precautions:

- Suction and drain lines must be immersed at least 200 mm below the lowest oil level under operating conditions.
- The distance between the oil surface and the centre of the shaft must not exceed 1 m.
- The oil in the pump case must be refilled if the pump has not been operated for one month or longer.
- When installing a HYDAC pump always ensure that the fluid in the pump is prevented from draining away during stoppages.

Vertical installation of the pump

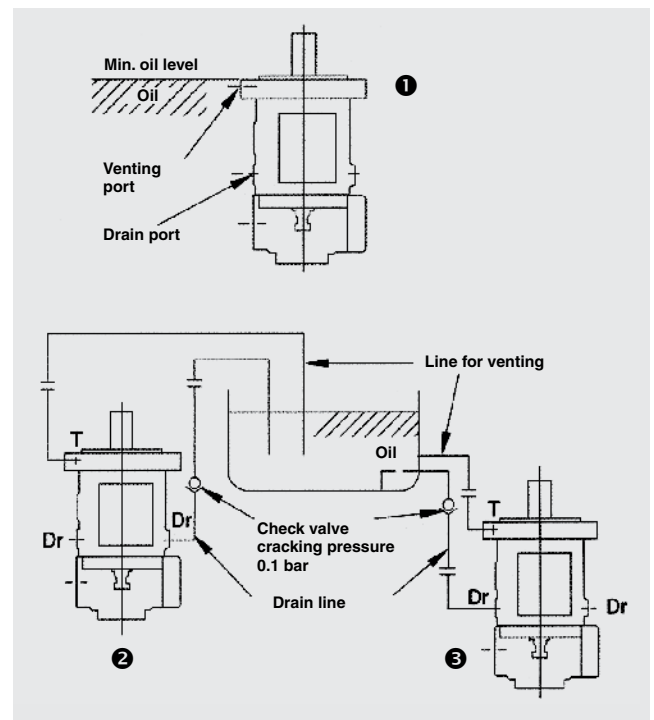
For applications requiring vertical installation (shaft at the top), remove the blanking plug at the venting port and connect the piping as shown in the diagram below.

The oil level in the tank should be higher than the pump mounting flange (see diagram ①).

If the oil level in the tank is lower than the mounting flange, forced lubrication is required through the venting port (1 - 2 l/min.)

When the pump is installed in the tank and submerged in the oil, open the drain and venting ports to provide adequate lubrication to the internal components.

If the pump is installed outside the tank, the drain and venting lines must be run to the tank (see diagram ③). If these lines are higher than the oil level (see diagram ②), they must be filled with oil before commissioning.



A check valve with a cracking pressure of 0.1 bar should be installed at the case drain port as shown.

Recommended check valves:

Size	Check valve	Part no.
PPV 101-45	RV-12-01.X/0-0.1bar	3474099
PPV 101-80 to PPV 101-200	RV-16-01.X/0-0.1bar	858636

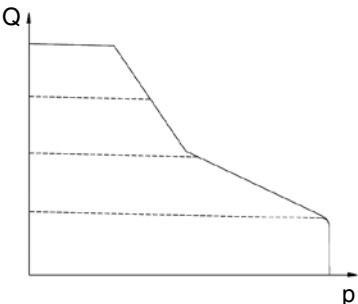
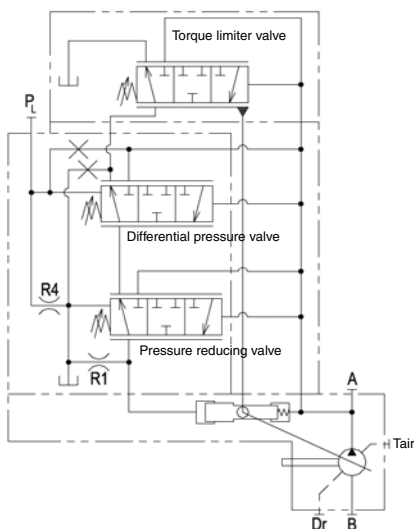
2.3.14 Load sensing and pressure cut-off- L0 / L1

2.3.15 Load sensing and pressure cut-off with integrated unloading valve – LN / LM

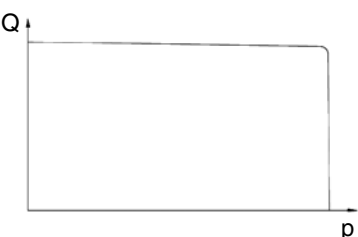
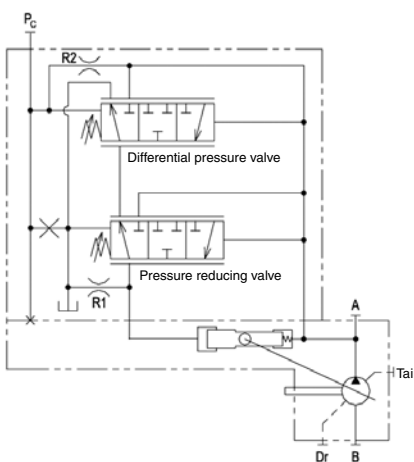
2.3.16 Load sensing and pressure cut-off with integrated proportional pressure relief valve – LV

2.907.3.0/02.14

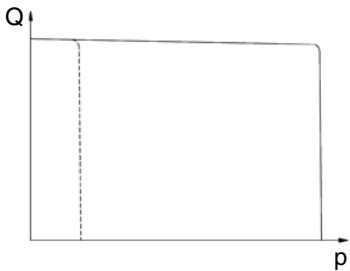
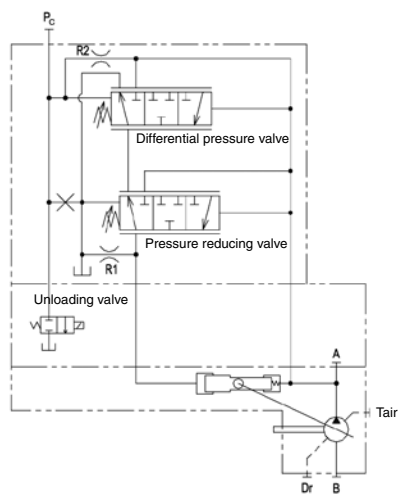
2.3.17 Load sensing and pressure cut-off with torque limiter – L0/1-xx

Description	Performance characteristics	Hydraulic circuit
L0 control functions as before. In response to a rise in operating pressure, the swash plate adjustment angle is reduced, limiting the input torque. This regulator prevents an overload of the drive motor. The torque limit control module consists of two springs that oppose the spool force generated by the system pressure. By turning an outer and inner spring adjustment screw, the required input torque limit can be set.		

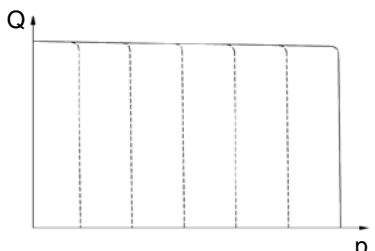
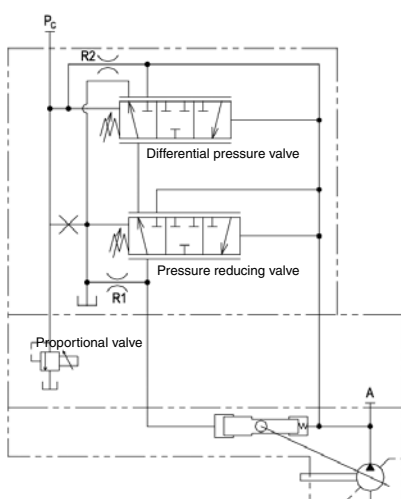
2.3.18 Pressure cut-off – P0

Description	Performance characteristics	Hydraulic circuit
As the system pressure rises to the pre-set value, the swash plate pivots back to prevent the system pressure from exceeding the compensator setting. A pressure relief valve must be built into the system. Note: An external pressure control can be connected to the Pc port. Factory set to 320 bar.		

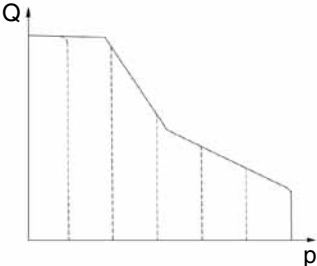
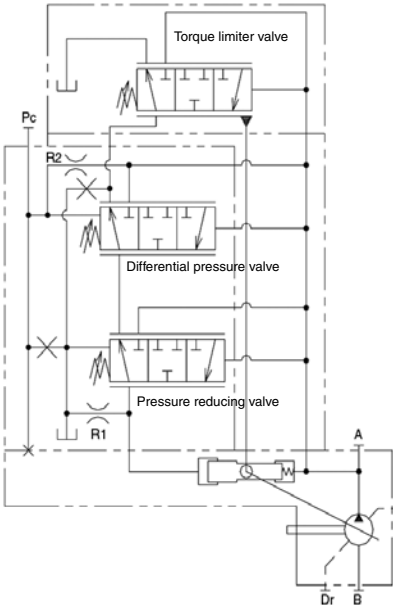
2.3.19 Pressure cut-off with integrated unloading valve - PN/ PM

Description	Performance characteristics	Hydraulic circuit
A solenoid unloading valve is installed between the pressure cut-off regulator and the pump which, when activated, de-strokes the swash plate. On the PM type, the solenoid valve must be energized for the pressure cut-off function to be activated.		

2.3.20 Pressure cut-off with integrated proportional pressure relief valve - PV

Description	Performance characteristics	Hydraulic circuit
A solenoid proportional pressure relief valve is fitted between the pressure cut-off regulator and the pump to control the maximum pressure. An electrical amplifier card is also required.		

2.3.21 Pressure cut-off with torque limiter - P0/1-xx

Description	Performance characteristics	Hydraulic circuit
P0 control functions as before. In response to a rise in operating pressure, the swash plate adjustment angle is reduced, limiting the input torque. This regulator prevents an overload of the drive motor. The torque limit control module consists of two springs that oppose the spool force generated by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set. Note: An external pressure control can be connected to the Pc port.	 The graph shows the relationship between flow rate Q (y-axis) and pressure p (x-axis). The curve starts at a constant flow rate for a range of pressures, then decreases linearly as pressure increases further. Vertical dashed lines indicate specific pressure points along the linear region.	 The hydraulic circuit diagram illustrates the torque limiting mechanism. It features a pump (P) connected to a system. The circuit includes a torque limiter valve, a differential pressure valve, and a pressure reducing valve. The torque limiter valve is controlled by an external pressure P_c and a pressure P_2. The differential pressure valve is controlled by a pressure P_1. The pressure reducing valve is controlled by a pressure P_1. The circuit also includes a motor (M) and a tank (T). The pressure P_c is connected to the Pc port of the torque limiter valve. The pressure P_2 is connected to the P2 port of the torque limiter valve. The pressure P_1 is connected to the P1 port of the differential pressure valve and the P1 port of the pressure reducing valve. The motor (M) is connected to the A port of the differential pressure valve. The tank (T) is connected to the B port of the differential pressure valve and the B port of the pressure reducing valve. The pressure P_c is also connected to the Pc port of the pressure reducing valve.

2

2.907.3.0/02.14

95

95

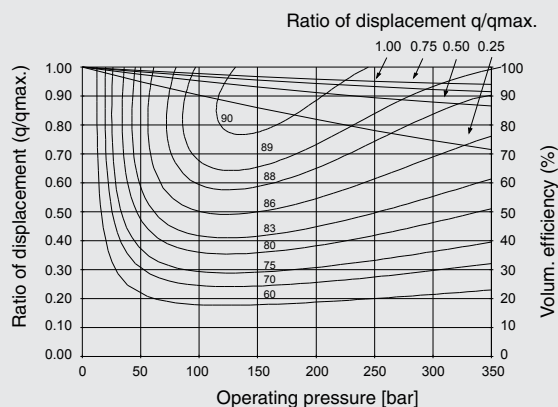
95

95

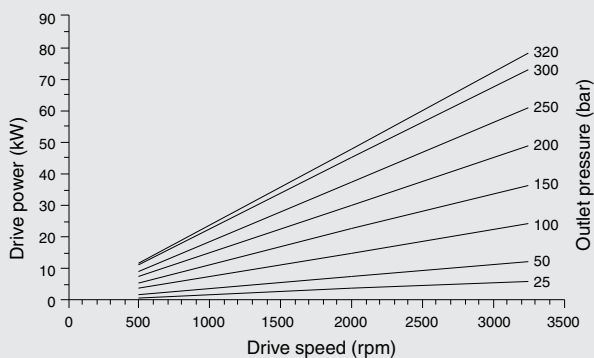
PERFORMANCE DATA

2.3.24 PPV101-45

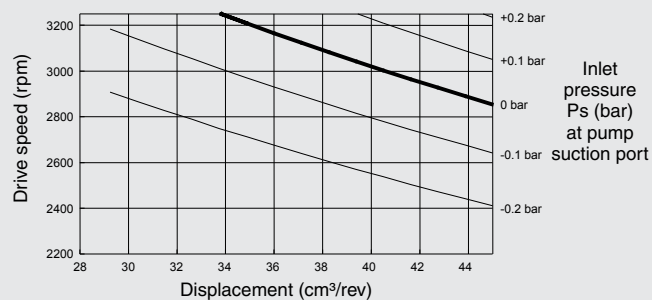
- **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs., test temperature 50 °C, viscosity 31 cSt (ISO VG 46))



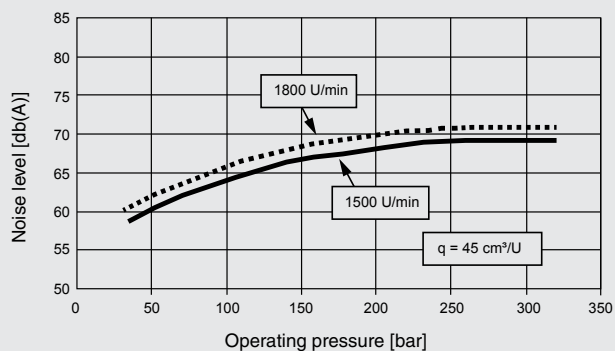
- **Power curve**
Note: Suction pressure 1 bar abs., max. displacement



- **Self-priming capability**



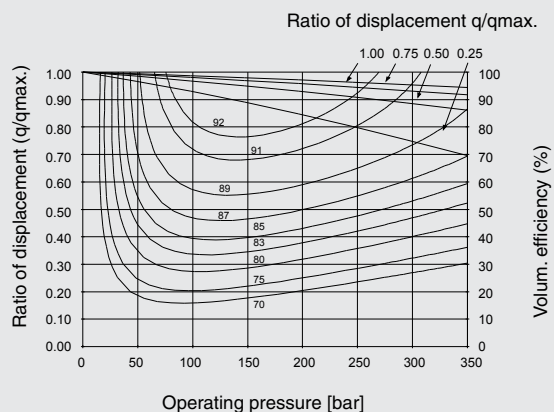
- **Noise level**



* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

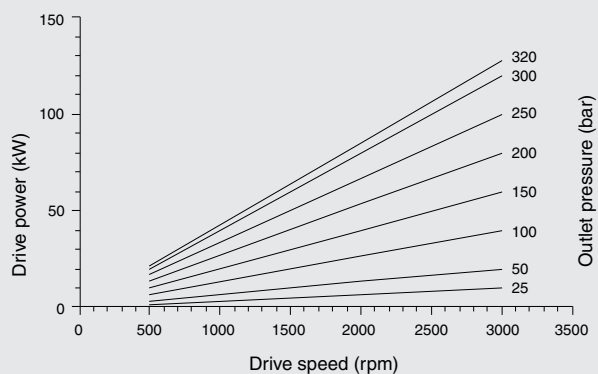
2.3.25 PPV101-80

- **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs.), test temperature 50 °C, viscosity 31 cSt (ISO VG 46)

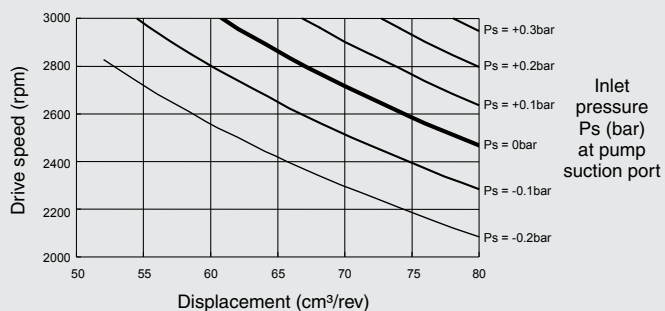


- **Power curve**

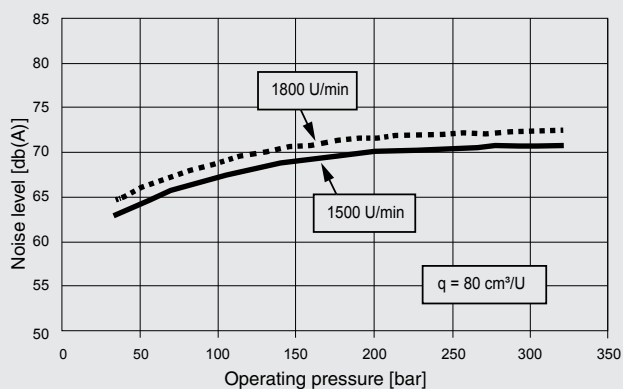
Note: Suction pressure 1 bar abs., max. displacement



- **Self-priming capability**



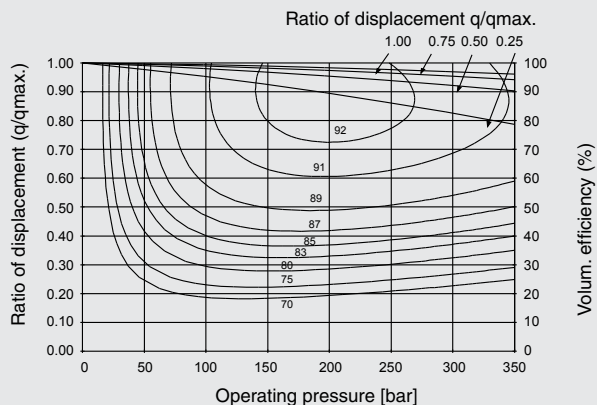
- **Noise level**



* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

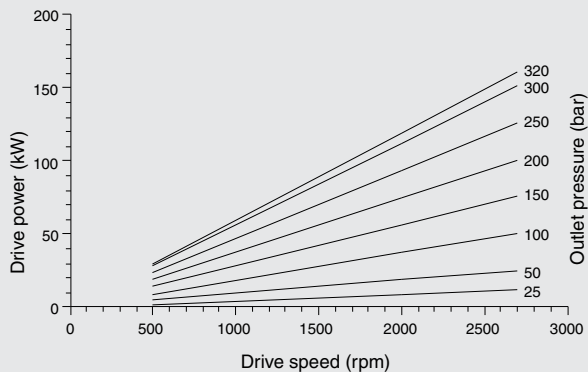
2.3.26 PPV101-112

- **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs., test temperature 50 °C, viscosity 31 cSt (ISO VG 46))

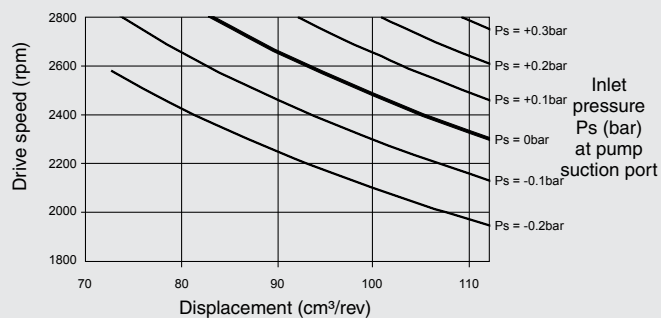


- **Power curve**

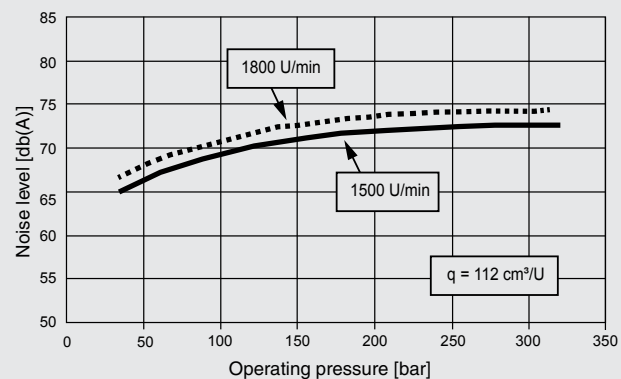
Note: Suction pressure 1 bar abs., max. displacement



- **Self-priming capability**

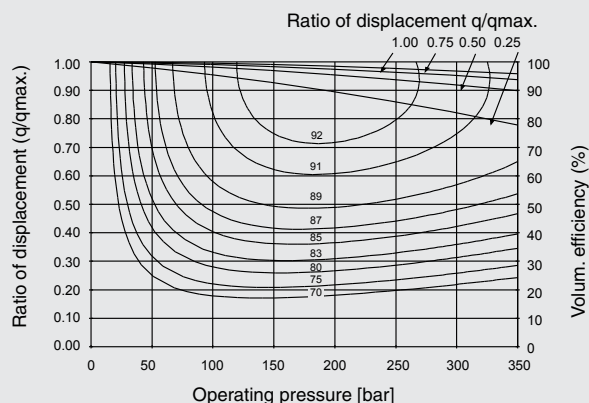


- **Noise level**



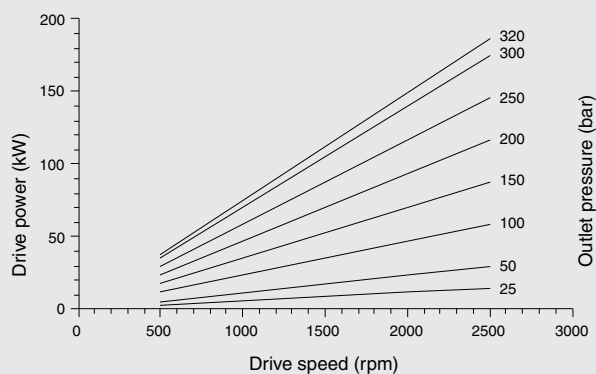
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

- **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs.), test temperature 50 °C, viscosity 31 cSt (ISO VG 46)

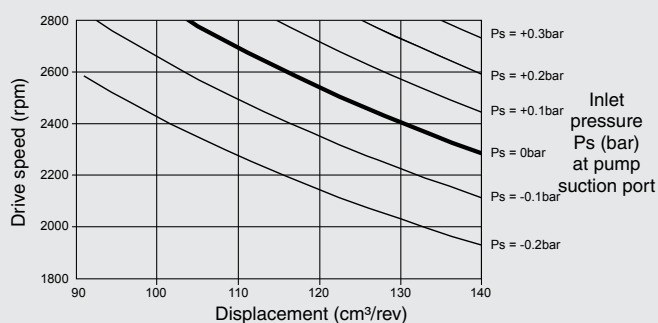


- **Power curve**

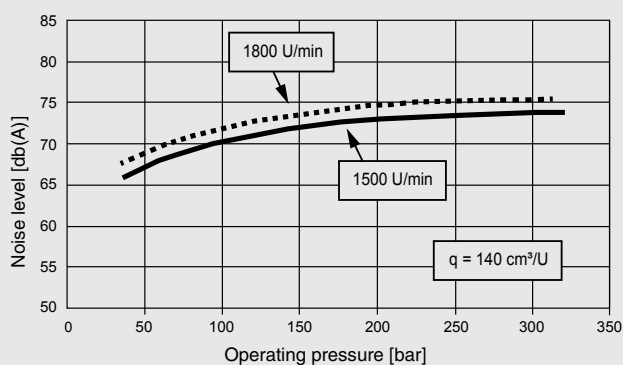
Note: Suction pressure 1 bar abs., max. displacement



- **Self-priming capability**



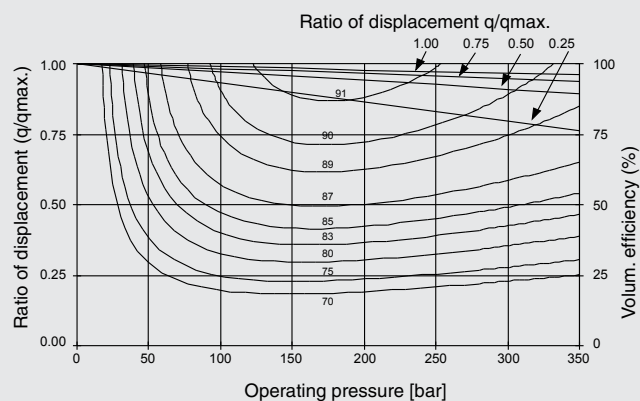
- **Noise level**



* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

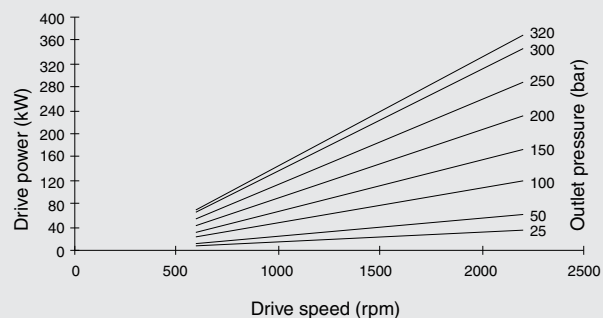
2.3.28 PPV101-200

- **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs., test temperature 50 °C, viscosity 31 cSt (ISO VG 46))

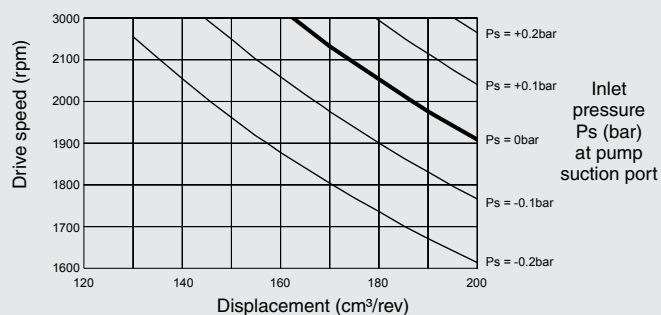


- **Power curve**

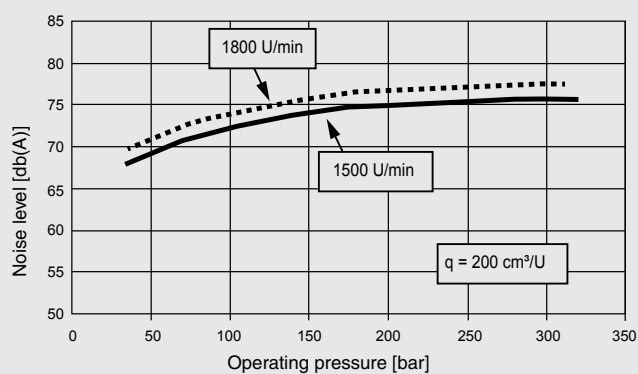
Note: Suction pressure 1 bar abs., max. displacement



- **Self-priming capability**



- **Noise level**



* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

2.3.29 PPV101-45

Note: for anti-clockwise rotation, suction port "B" and discharge port "A" are reversed

Max. flow adjustment screw

Drive power adj. screw

$P_L(P_C)$

$\phi 38$

$\phi 90$

T air

40

B

69.8 ± 0.2

Dr

13

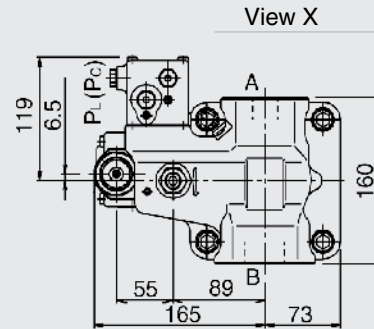
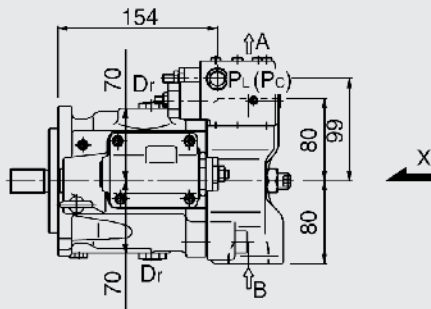
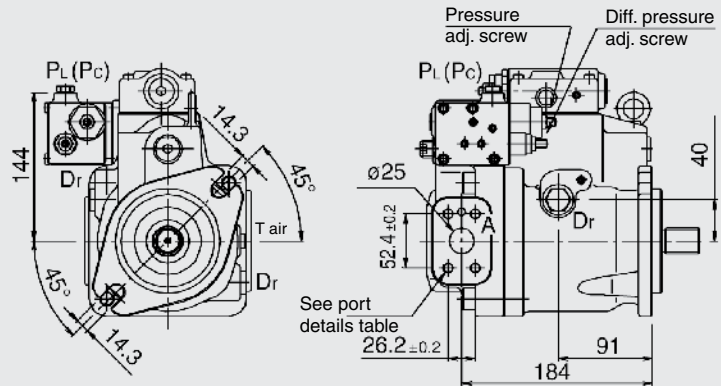
91

184

218

35.7 ± 0.2

See port details table



SAE type

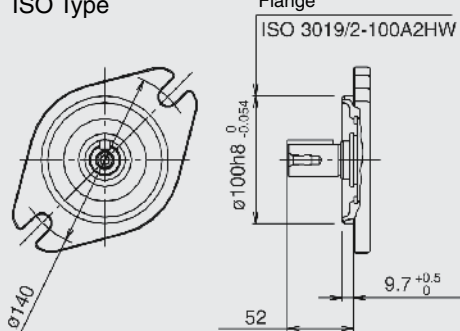
SAE "B" 2-hole
SAE J744-101-2

$\phi 146$

$\phi 101.6^{+0}_{-0.035}$

9.7

46



38
33
ø24.981
SAE "BB" 30° Splined shaft
SAE J744-25-4 15T 16/32 DP

28.1₀^{+0.13}

6.35₀^{+0.03}

32

38

M8

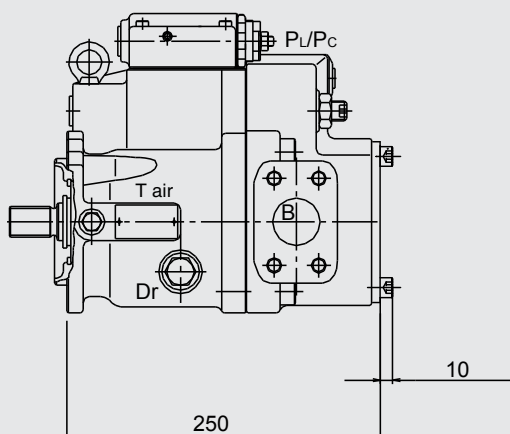
SAE "BB" parallel shaft

SAE J744-25-1

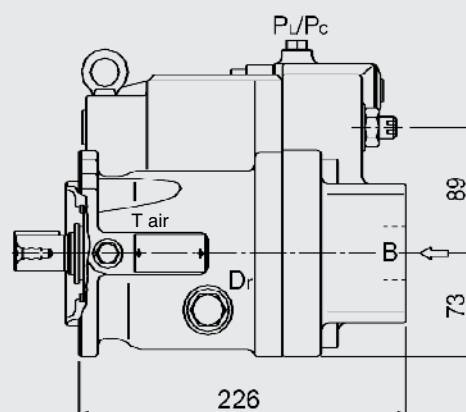
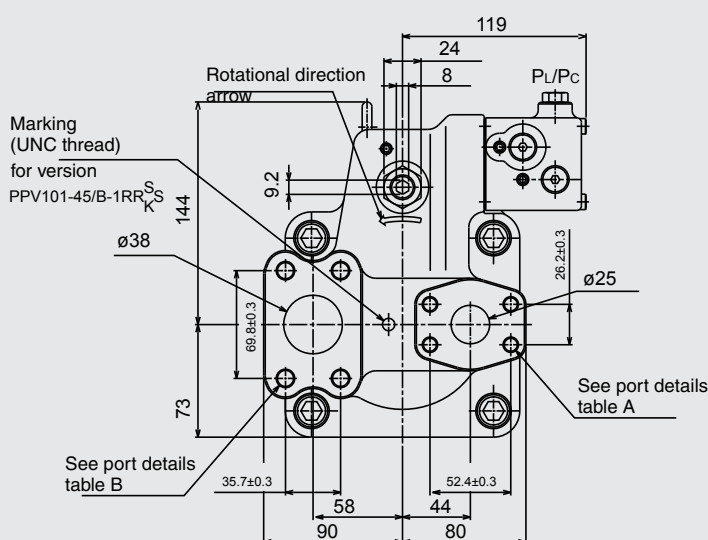
19

25

Single pump prepared for through drive "N"



Option for rear suction and discharge ports



Port details

SAE flange ports

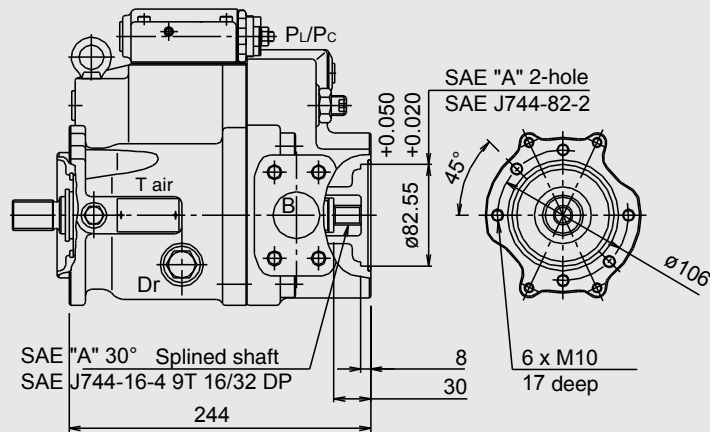
Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C std pressure (code 61) 1"	57	3/8-16UNC-2B x 18 mm
B	Suction port	SAE J518C std pressure (code 61) 1½"	98	1/2-13UNC-2B x 22 mm
Metric version ("M" in position 9 of model code):				
A	Discharge port	SAE J518C std pressure (code 61) 1"	57	M10 x 17
B	Suction port	SAE J518C std pressure (code 61) 1½"	98	M12 x 20

Auxiliary ports:

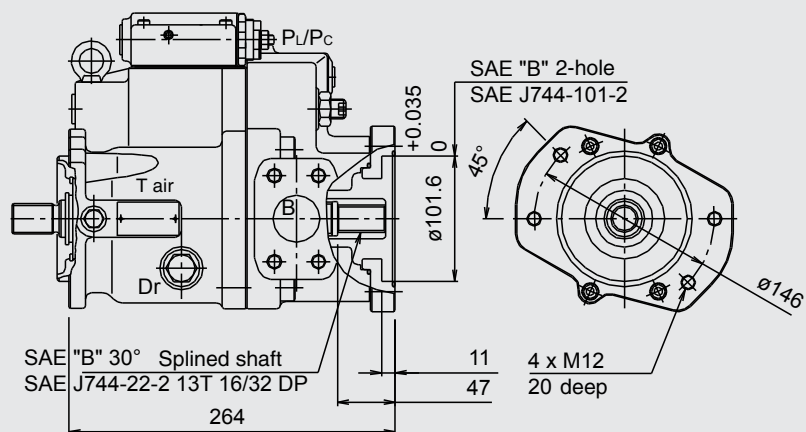
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K", "U" or "T" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926/1 parallel thread with O-ring, ½" OD tube 3/4-16UNF-2B	98
PL PC	Load sensing port Pressure control port	SAE J1926/1 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12
T air	Venting port	SAE J1926/1 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12
ISO version ("M" in position 8 of model code):			
Dr	Drain port (x2)	M22 x 1.5 DIN 3852	98
PL PC	Load sensing port Pressure control port	M14 x 1.5 DIN 3852	25
T air	Venting port	M14 x 1.5 DIN 3852	25

Through drive options

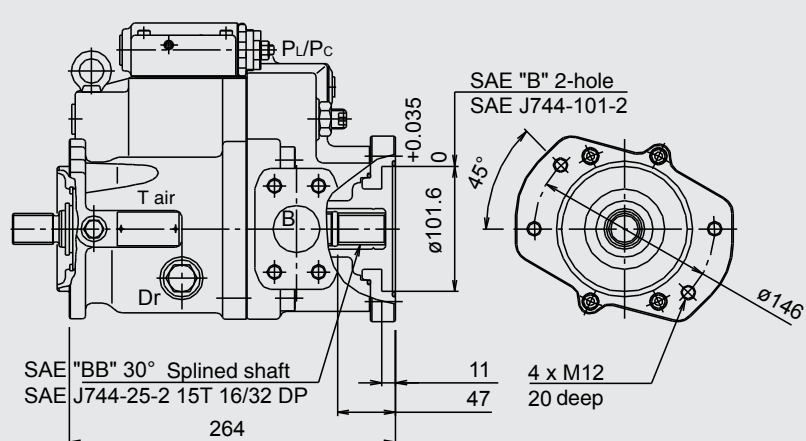
Through drive "A"



Through drive "B"



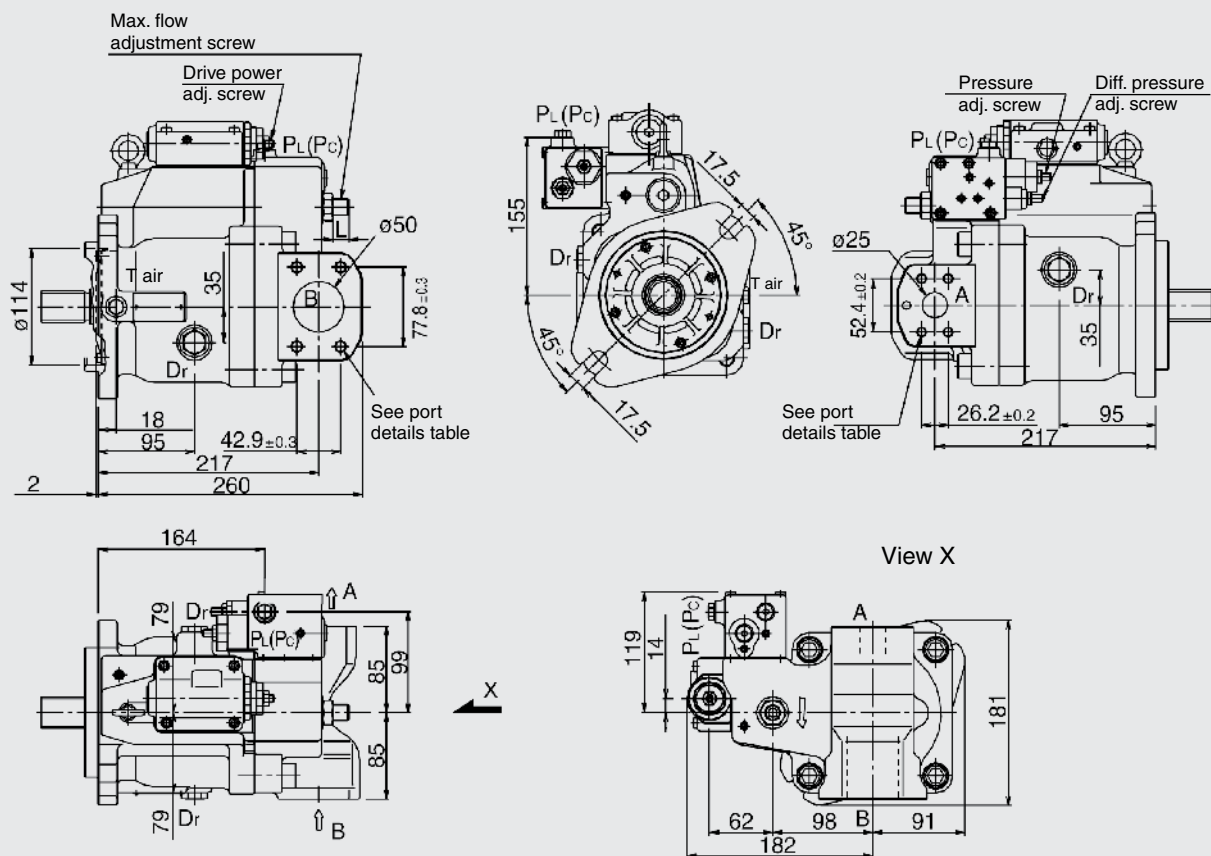
Through drive "BB"



PPV101-80 with cut-off / load sensing control and torque limiter module (clockwise rotation)

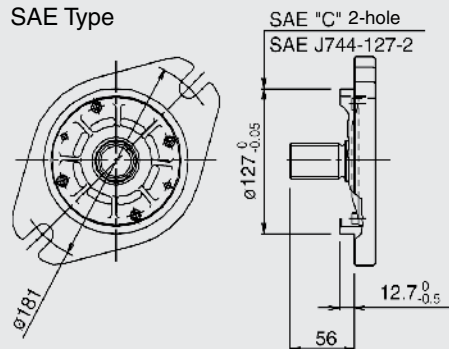
Note: for anti-clockwise rotation, suction port "B" and discharge port "A" are reversed

Single pump "0"

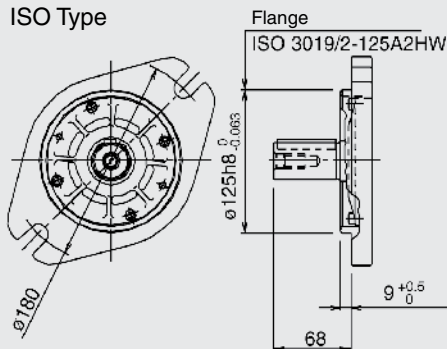


Mounting flange and shaft options

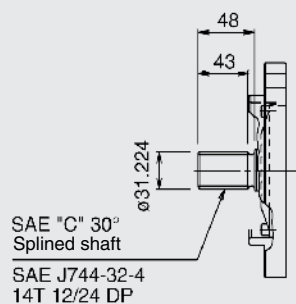
SAE Type



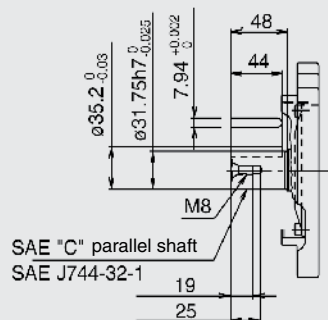
ISO Type



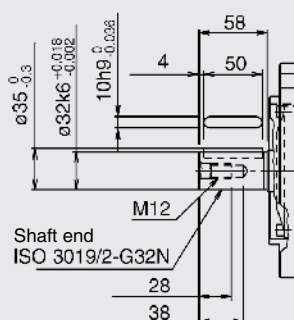
SAE Splined shaft



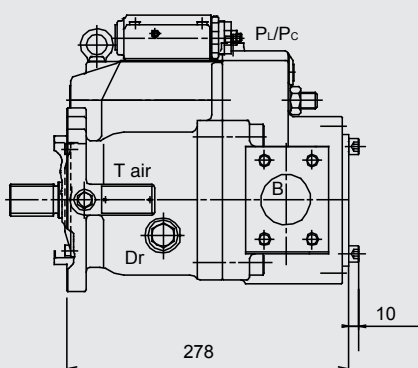
SAE parallel shaft



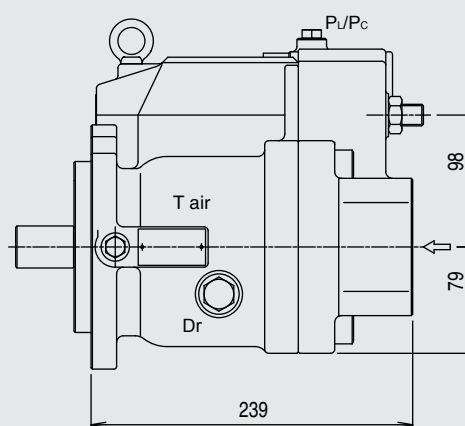
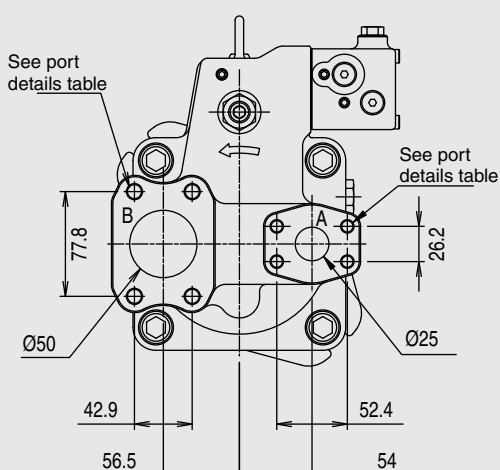
ISO parallel shaft



Single pump prepared for through drive "N"



Option for rear suction and discharge ports



Port details

SAE flange ports

Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C std pressure (code 61) 1"	57	3/8-16UNC-2B x 18 mm
B	Suction port	SAE J518C std pressure (code 61) 2"	98	1/2-13UNC-2B x 22 mm

Metric version ("M" in position 9 of model code):

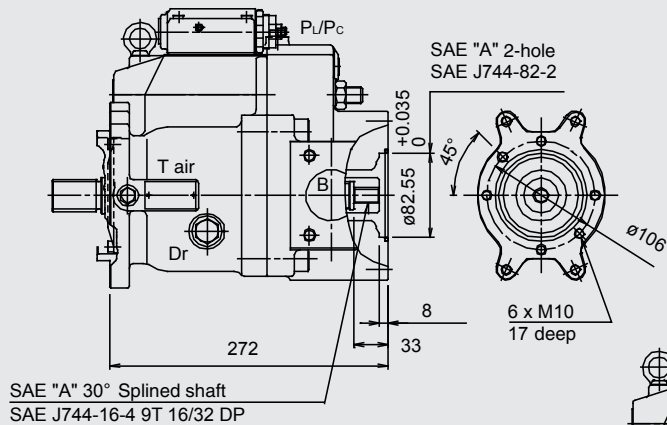
A	Discharge port	SAE J518C std pressure (code 61) 1"	57	M10 x 17
B	Suction port	SAE J518C std pressure (code 61) 2"	98	M12 x 20

Auxiliary ports:

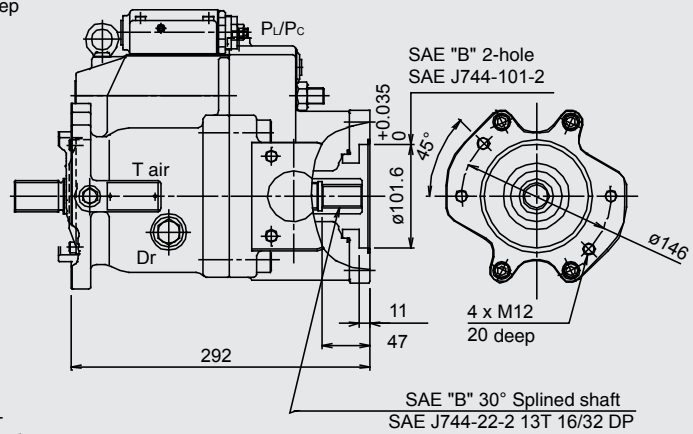
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926/1 parallel thread with O-ring, 1/2" OD tube 3/4-16UNF-2B	98
PL	Load sensing port	SAE J1926/1 parallel thread with O-ring, 1/4" OD tube 7/16-20UNF-2B	12
PC	Pressure control port	SAE J1926/1 parallel thread with O-ring, 1/4" OD tube 7/16-20UNF-2B	12
T air	Venting port	SAE J1926/1 parallel thread with O-ring, 1/4" OD tube 7/16-20UNF-2B	12
ISO version ("M" in position 8 of model code):			
Dr	Drain port (x2)	M22 x 1.5 DIN 3852	98
PL	Load sensing port	M14 x 1.5 DIN 3852	25
PC	Pressure control port	M14 x 1.5 DIN 3852	25
T air	Venting port	M14 x 1.5 DIN 3852	25

Through drive options

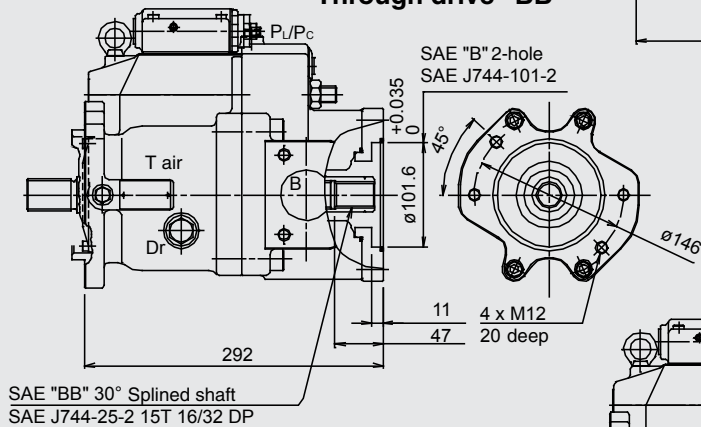
Through drive "A"



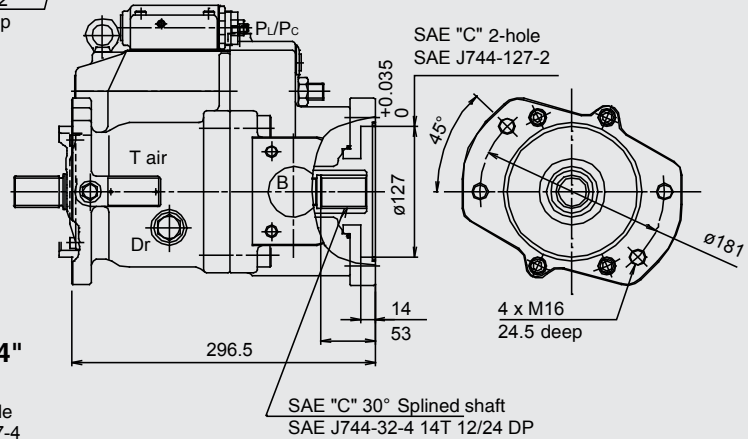
Through drive "B"



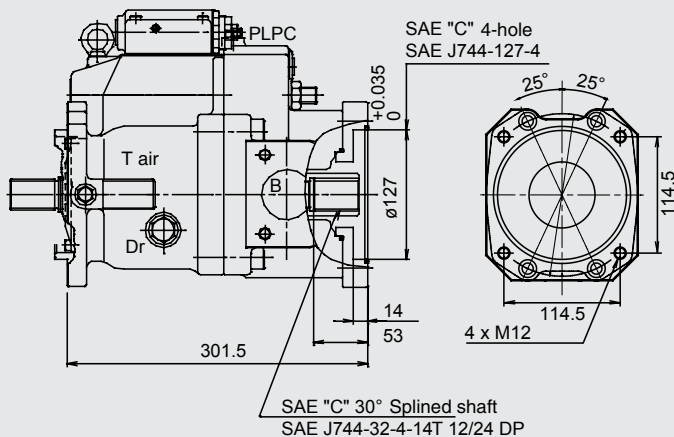
Through drive "BB"



Through drive "C"



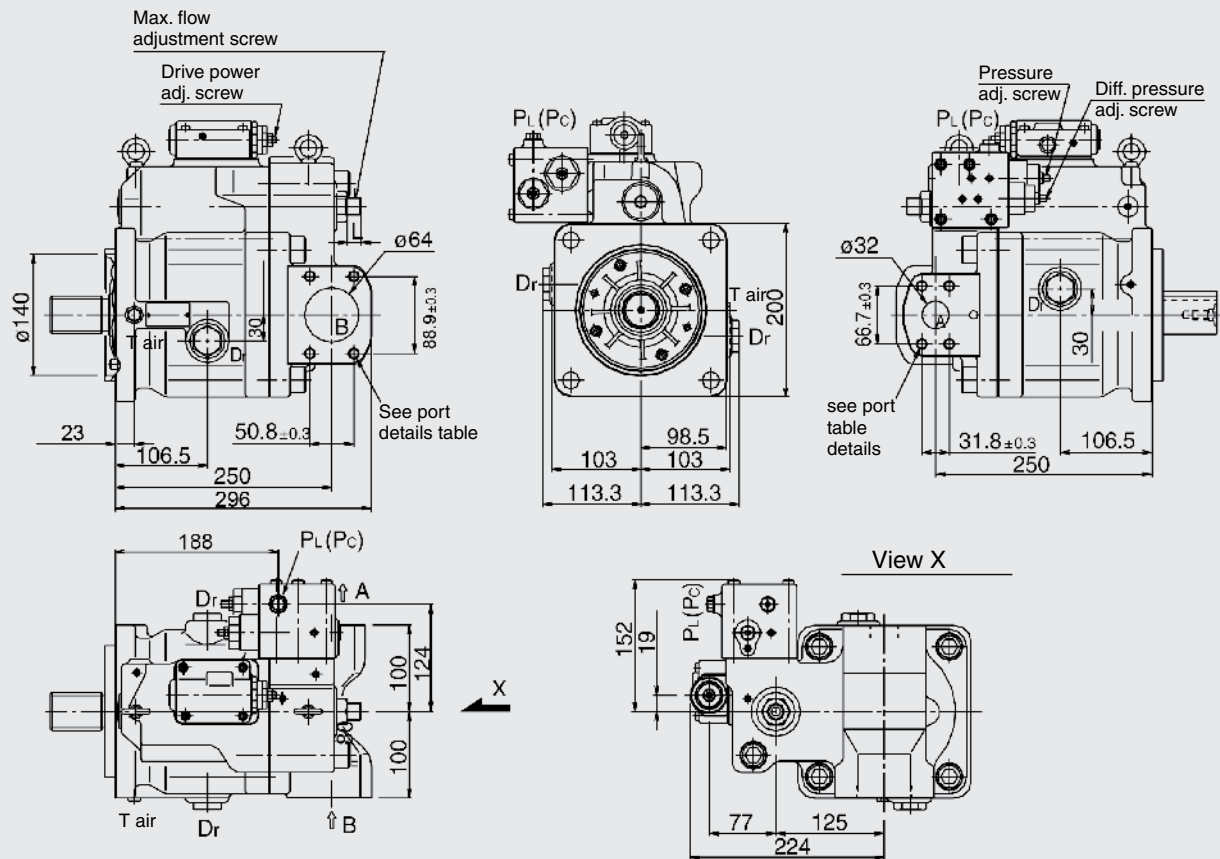
Through drive "C4"



PPV101-112 / -140 (4-hole flange) with cut-off / load sensing control and torque limiter module (clockwise rotation)

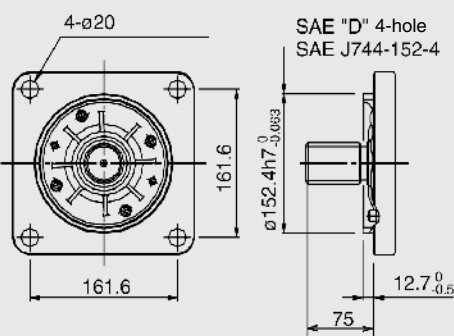
Note: for anti-clockwise rotation, suction port "B" and discharge port "A" are reversed

Single pump "0"

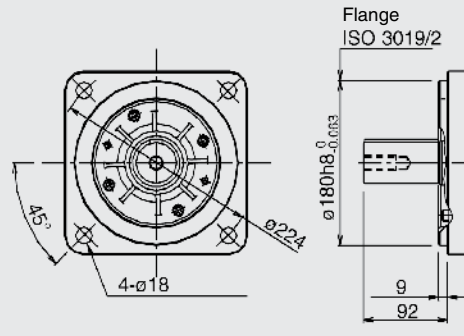


Standard mounting flange (SAE D 4-hole flange) and shaft options

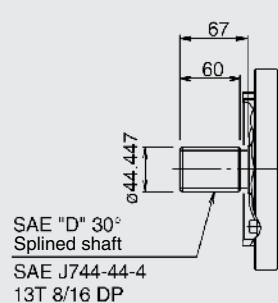
SAE Type



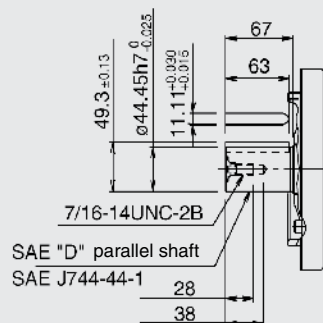
ISO Type



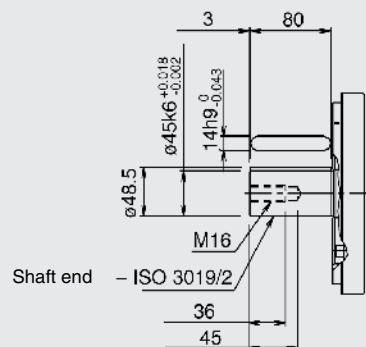
SAE Splined shaft



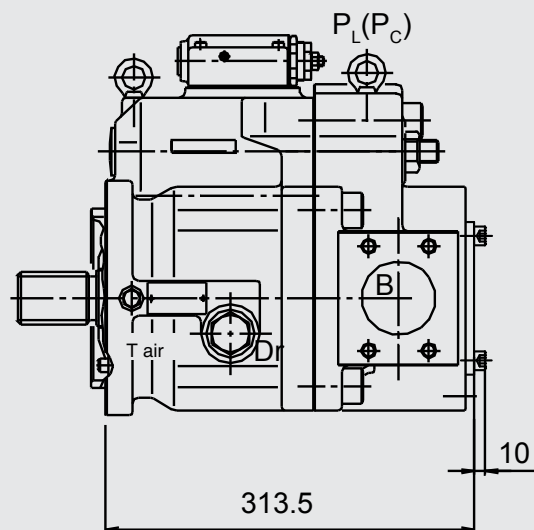
SAE parallel shaft



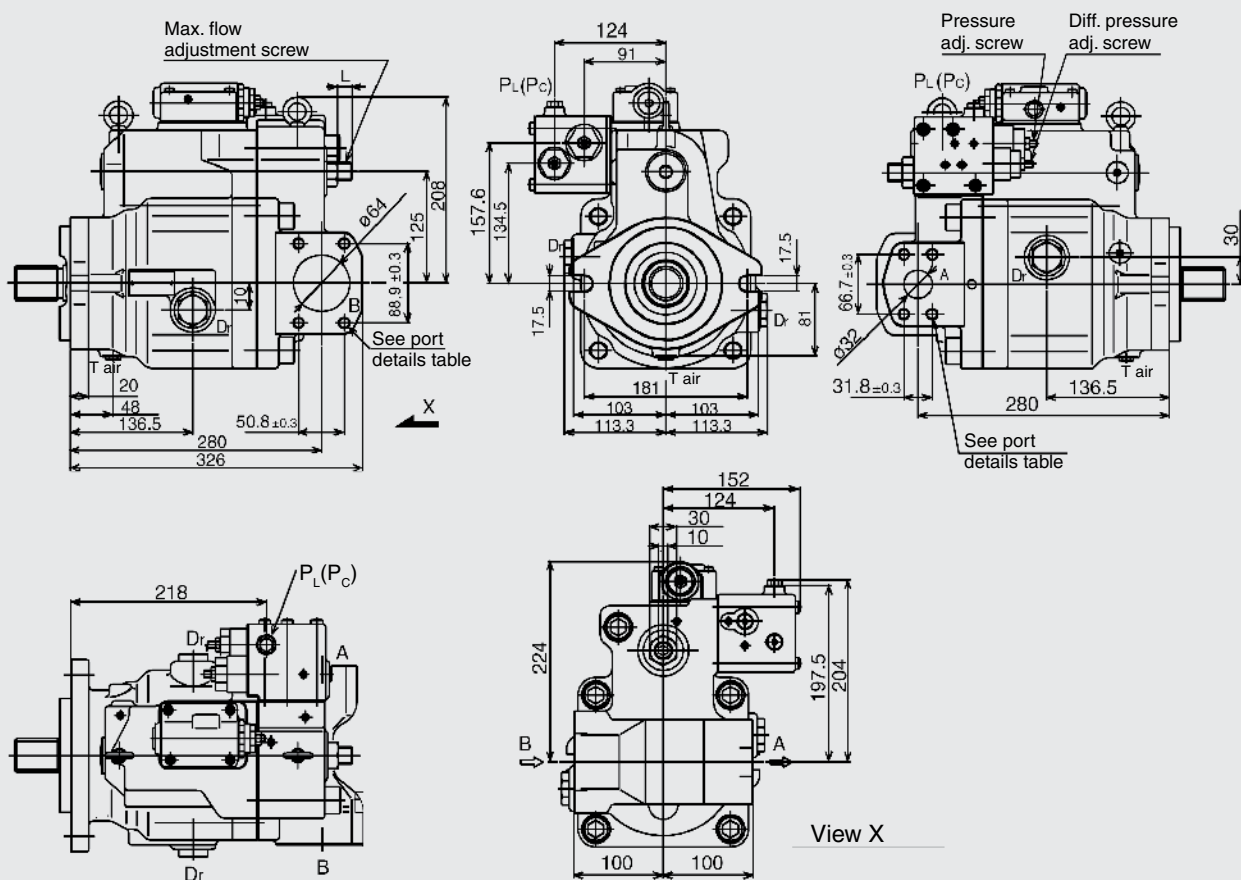
ISO parallel shaft



Single pump prepared for through drive "N"

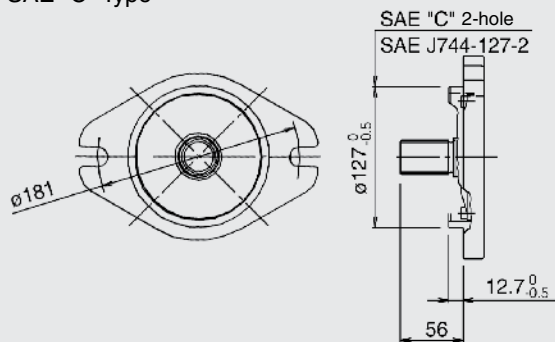


SAE 2-hole flange option

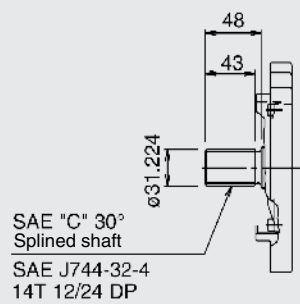


Mounting flange (2-hole) and shaft options

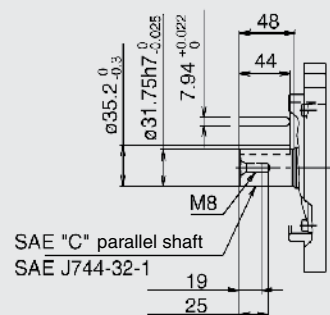
SAE "C" Type



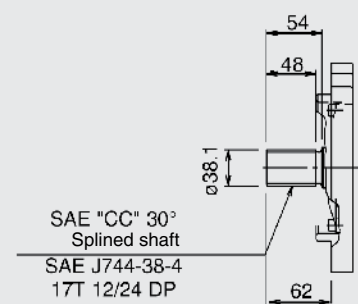
SAE "C" Splined shaft



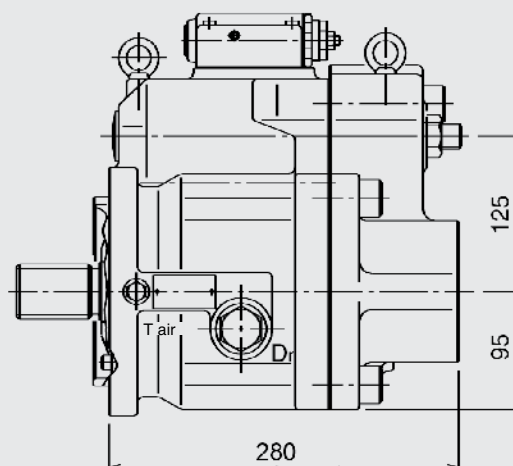
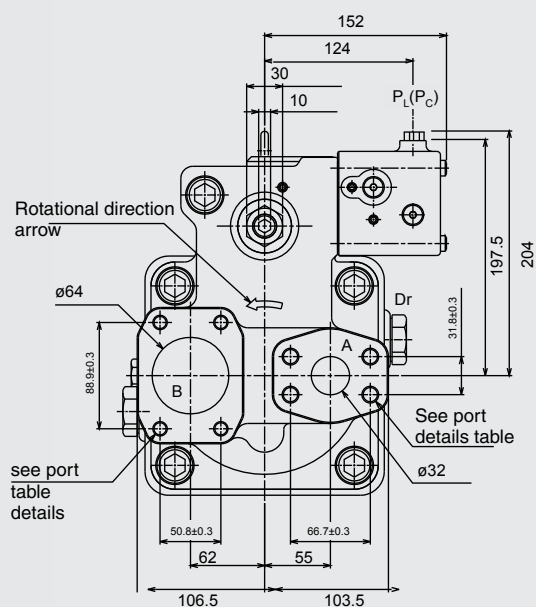
SAE "C" parallel shaft



SAE "CC" Splined shaft



Option for rear suction and discharge ports



Port details

SAE flange ports

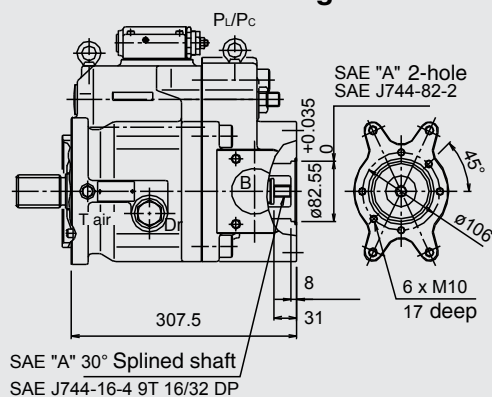
Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C high pressure (code 62) 1¼"	98	1/2-13UNC-2B x 22 mm
B	Suction port	SAE J518C std pressure (code 61) 2½"	98	1/2-13UNC-2B x 22 mm
Metric version ("M" in position 9 of model code):				
A	Discharge port	SAE J518C high pressure (code 62) 1¼"	157	M14 x 19
B	Suction port	SAE J518C std pressure (code 61) 2½"	98	M12 x 17

Auxiliary ports:

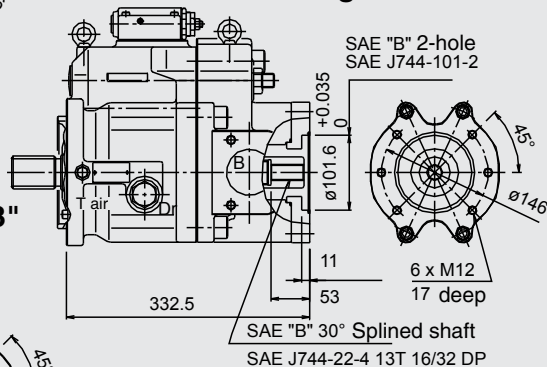
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K", "C", "R", "X", "U" or "T" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926/1 parallel thread with O-ring, ¾" OD tube 1 1/16-12UNF-2B	167
PL	Load sensing port	SAE J1926/1 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12
PC	Pressure control port	SAE J1926/1 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12
T air	Venting port	SAE J1926/1 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12
ISO version ("M" in position 8 of model code):			
Dr	Drain port (x2)	M27 x 2 DIN 3852	167
PL	Load sensing port	M14 x 1.5 DIN 3852	25
PC	Pressure control port	M14 x 1.5 DIN 3852	25
T air	Venting port	M14 x 1.5 DIN 3852	25

Through drive options

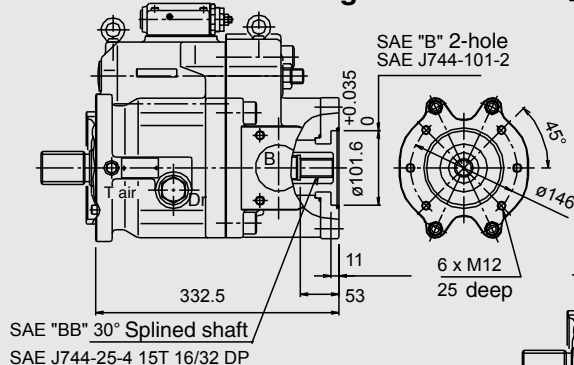
Through drive "A"



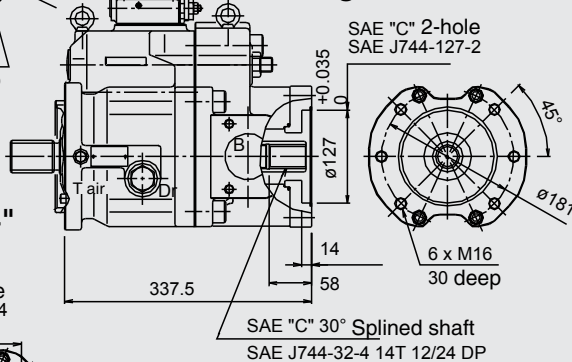
Through drive "B"



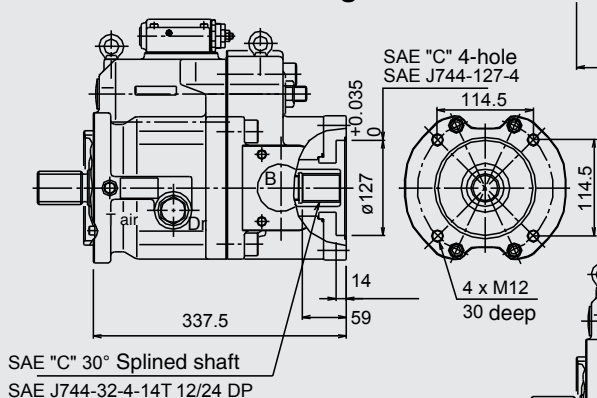
Through drive "BB"



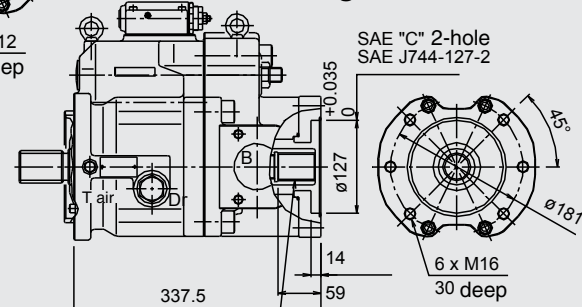
Through drive "C"



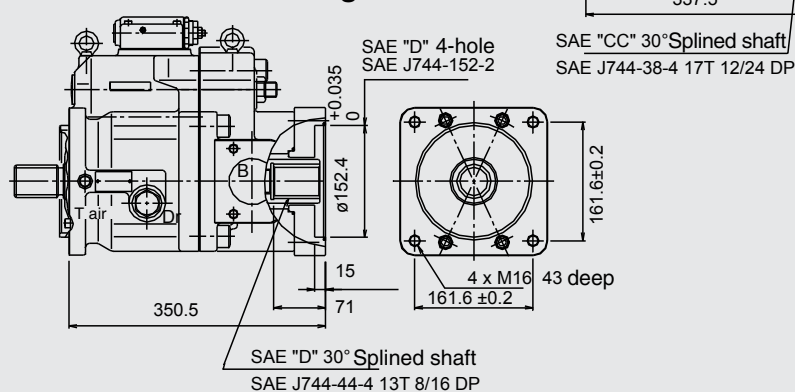
Through drive "C4"



Through drive "CC"



Through drive "D"

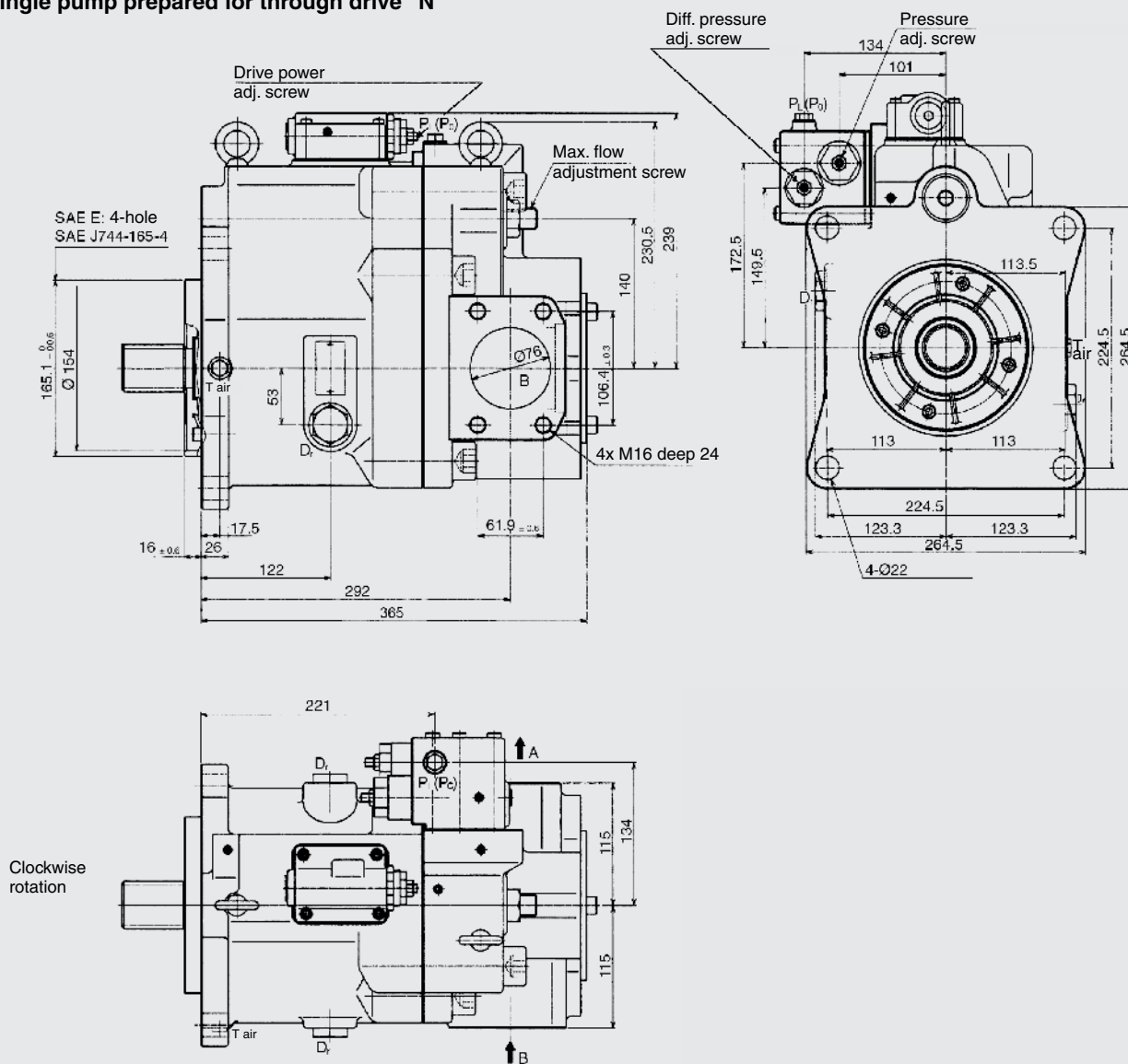


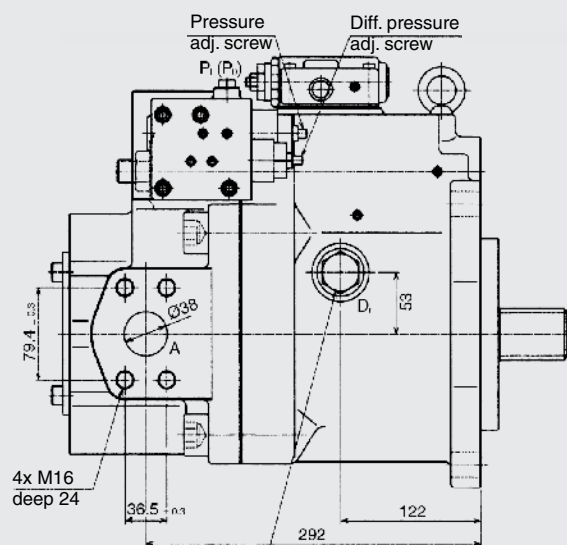
2.3.32 PPV101-200

PPV101-200 with cut-off / load sensing control and torque limiter module (clockwise rotation)

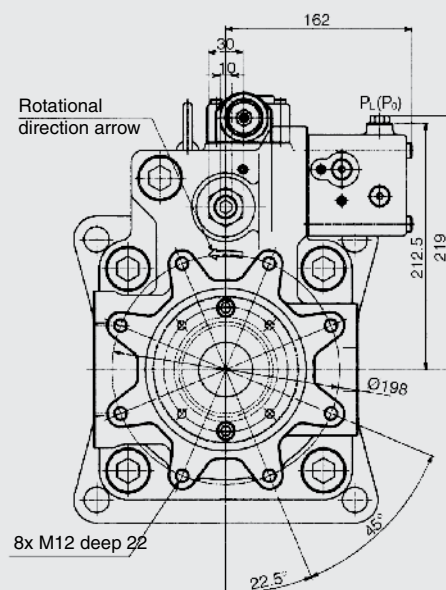
Note: for anti-clockwise rotation, suction port "B" and discharge port "A" are reversed

Single pump prepared for through drive "N"



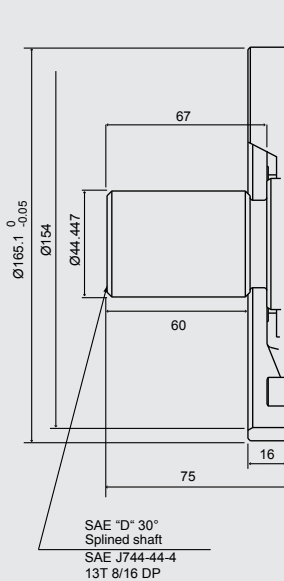


Fill the case with oil before
commissioning

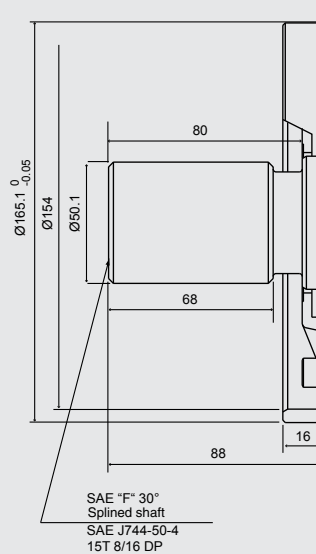


Mounting flange and shaft options

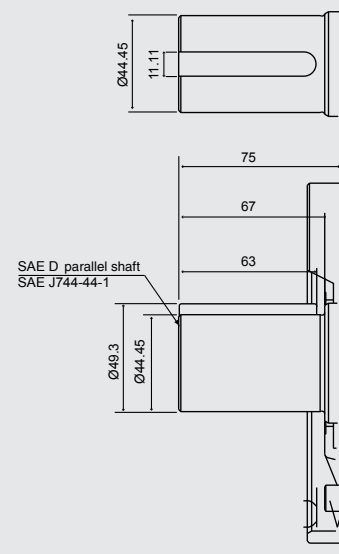
SAE "D" Splined shaft



SAE "F" Splined shaft



SAE parallel shaft



Port details

SAE flange ports

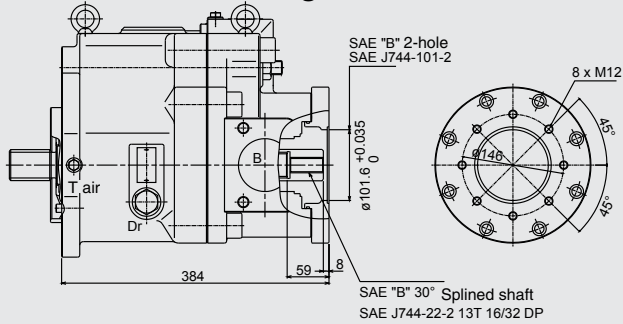
Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C high pressure (code 62) 1 1/4"	235	5/8-11UNC-2B
B	Suction port	SAE J518C std pressure (code 61) 3"	235	5/8-11UNC-2B
Metric version ("M" in position 9 of model code):				
A	Discharge port	SAE J518C high pressure (code 62) 1 1/4"	235	M16 x 24
B	Suction port	SAE J518C std pressure (code 61) 3"	235	M16 x 24

Auxiliary ports:

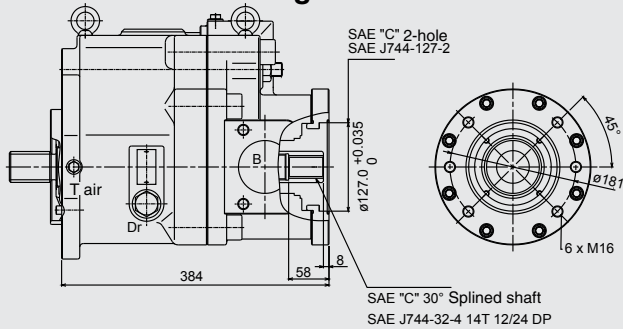
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926 parallel thread with O-ring, 3/4" OD tube 1.1/16-12UNF-2B	167
PL	Load sensing port	SAE J1926 parallel thread with O-ring, 1/4" OD tube 7/16-20UNF-2B	12
PC	Pressure control port		
T air	Venting port	SAE J1926 parallel thread with O-ring, 1/4" OD tube 7/16-20UNF-2B	12

Through drive options

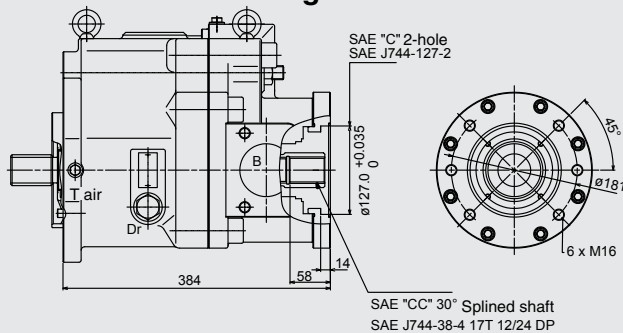
Through drive "B"



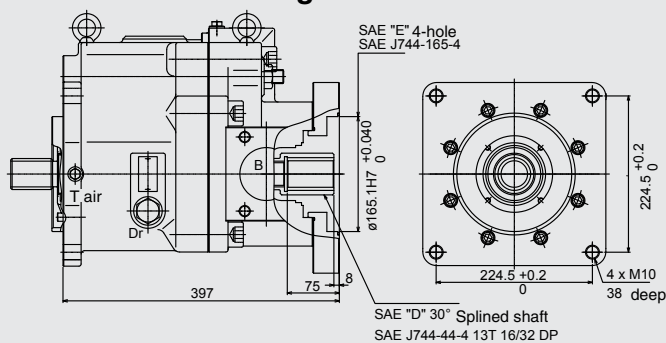
Through drive "C"



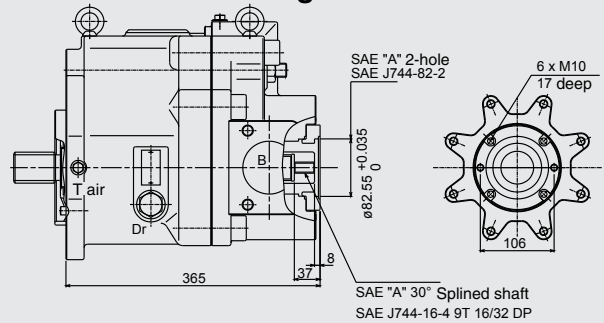
Through drive "CC"



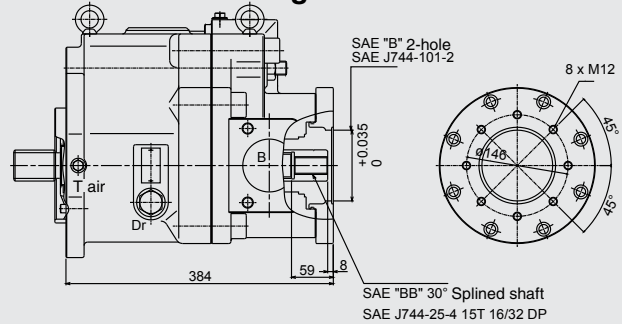
Through drive "E"



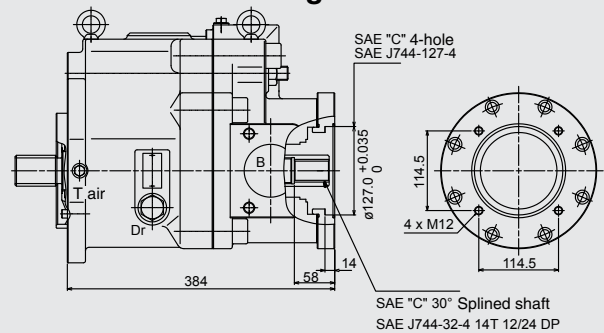
Through drive "A"



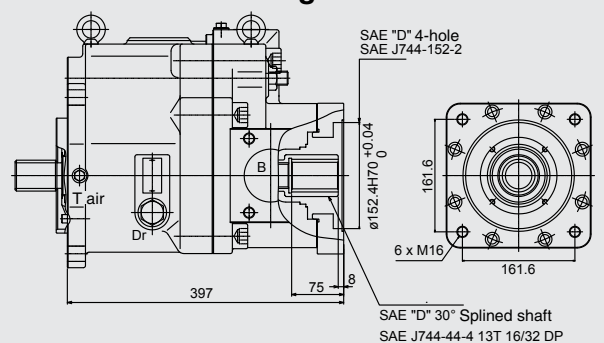
Through drive "BB"



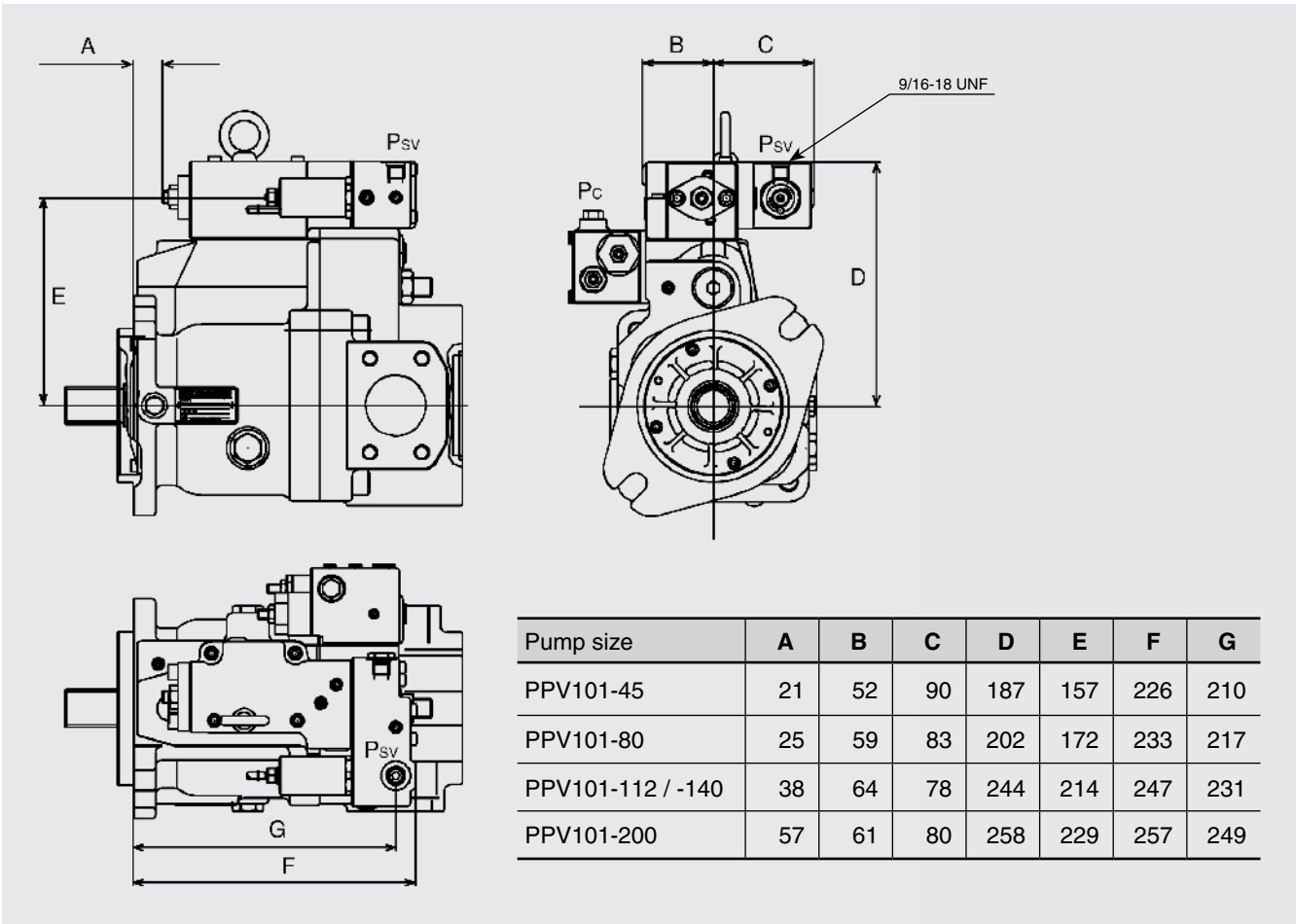
Through drive "C4"



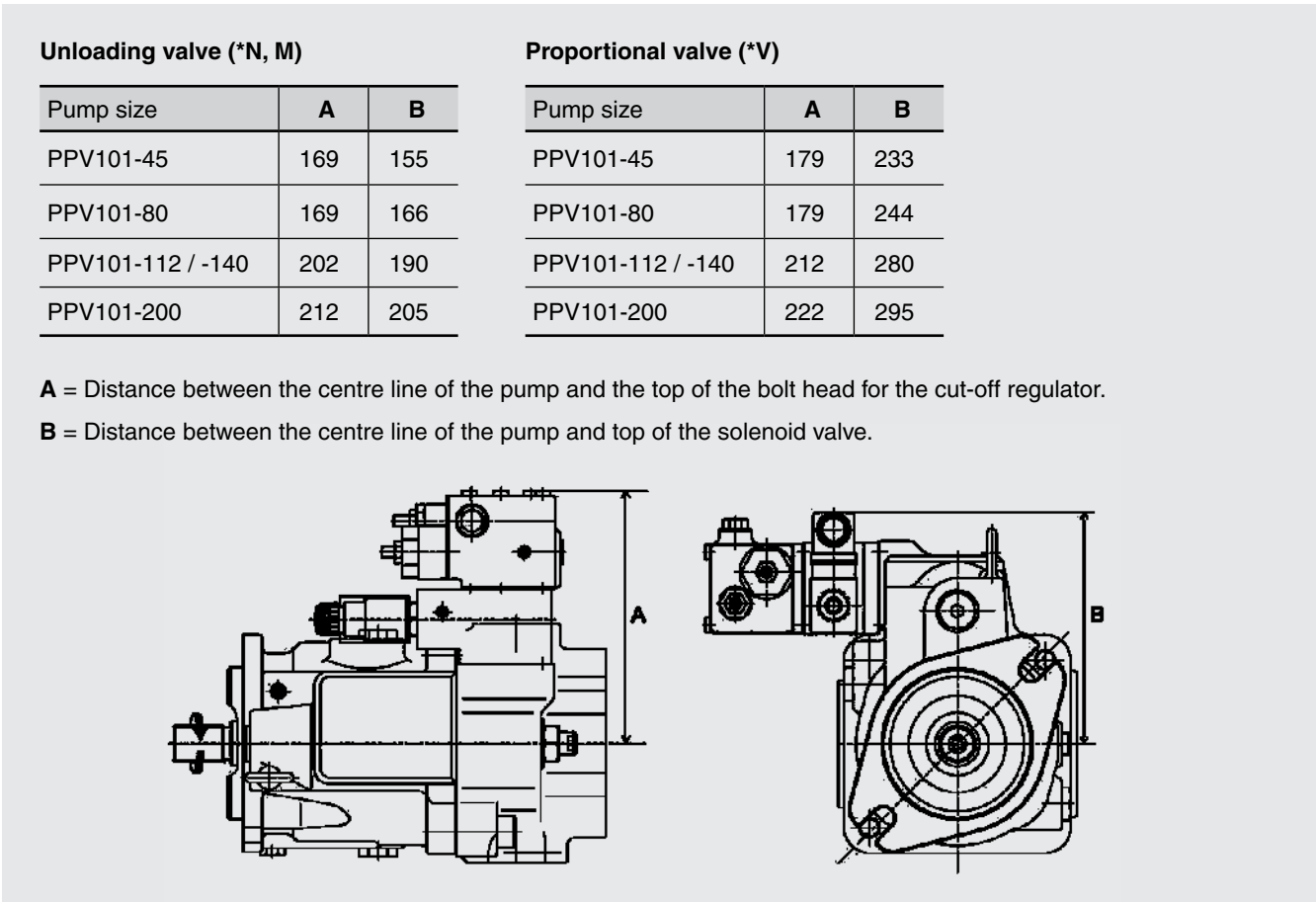
Through drive "D"

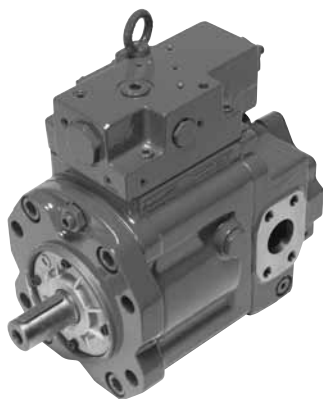


2.3.33 Electrical displacement control



2.3.34 Unloading valve





2.4 HEAVY DUTY SERIES

CONTENTS

PPV102

Ordering Code	2.4.1 Heavy Duty Series 2.4.2 Heavy Duty Series compensator 2.4.3 Standard gear pump models
Technical Information	2.4.4 Specifications 2.4.5 Hydraulic fluids 2.4.6 Viscosity range 2.4.7 Temperature range 2.4.8 Fire-resistant fluids 2.4.9 Seals 2.4.10 Filtration 2.4.11 Adjustments 2.4.12 Installation notes
Control Options	2.4.13 Variable delivery positive displacement control 2.4.14 Variable delivery electrical displacement control 2.4.15 Power control 2.4.16 Power and positive displacement control 2.4.17 Power and electrical displacement control 2.4.18 Pressure compensation control 2.4.19 Pressure compensation and load sensing control 2.4.20 Power and pressure compensation 2.4.21 Power / pressure compensation and positive displacement control 2.4.22 Power / pressure compensation and electrical displacement control 2.4.23 Power, pressure compensation and load sensing control
Performance Data	2.4.24 PPV102-63 2.4.25 PPV102-112 2.4.26 PPV102-180 / -360 2.4.27 PPV102-280 / -560
Dimensions	2.4.28 PPV102-63 / -112 / -180 / -280 2.4.29 PPV102-360 / -560 2.4.30 Regulators 2.4.31 Auxiliary ports 2.4.32 Suction and discharge ports 2.4.33 Through drive for optional gear pump

ORDERING CODE

2.4.1 Heavy Duty Series

PPV102 – 112 – 1 0 N R S – 4000 – – – XXXX

Axial piston pump Heavy Duty Series

Size

63	63 cm³/rev
112	112 cm³/rev
180	180 cm³/rev
280	280 cm³/rev
360	2 x 180 cm³/rev
560	2 x 280 cm³/rev

Fluid type

–	Mineral oil
W	Water glycol
P	Polyolester

Open circuit: 1

Gear pumps, through drive and pilot port options

0	No gear pump, no pilot port
1	10 cm³/rev with built-in safety valve, set to 40 bar (50 bar max), not for sizes 360 and 560
2	15 cm³/rev with built-in safety valve, set to 40 bar (50 bar max), not for sizes 360 and 560
3	No gear pump, with pilot ports
6	With pilot ports, SAE A through drive, 13 T splined shaft
H	With pilot ports, SAE A through drive, 9 T splined shaft
7	No pilot port, SAE A through drive, 13 T splined shaft
G	No pilot port, SAE A through drive, 9 T splined shaft
A	SAE B through drive for sizes 280, 360 and 560 only

Installation type

N	Flange mounting
---	-----------------

Shaft rotation (viewed from shaft end)

R	Clockwise
L	Anti-clockwise, sizes 360 and 560 only

Series

S	Low pressure pulsation (standard)
---	-----------------------------------

Installation position

–	Horizontal (standard)
V	Horizontal / vertical

Compensator ordering code (see next page)

Confluent block (sizes 360 and 560 only)

–	Single pump
0	Without confluent block
R	Rear outlet
S	Side outlet

Auxiliary gear pump (sizes 360 and 560 only)

–	No gear pump
1	With gear pump, see Standard Gear Pump Arrangements

Modification number

XXXX	Determined by manufacturer
------	----------------------------

2.4.2 Heavy Duty Series compensator

4 0 0 0

Power control / pressure compensation

- 0 No power control and no pressure compensation
- 1 Power control
- 4 Pressure compensation
- 7 Power control and pressure compensation

Displacement control

- 0 No displacement control
- P Positive displacement control
- N Negative displacement control
- E Electrical positive displacement control
- L Load sensing control

Power control mode

- 0 No power control
 - L Low setting range
 - M Medium setting range
 - H High setting range
- see table: Power Setting Code

Power setting code

- 0 No power control
- 1 - 4 Power setting code – see table: Power Setting Code

Power setting code

Standard compensator code at 1500 rpm drive speed,
pumps without auxiliary gear pump

Motor power [kW]	Nominal size [cm³]					
	63	112	180	280	360	560
11	L4					
15	L1					
18.5	M2					
22	M1	L3				
30	H2	M3	L3			
37		M1	L1			
45		H5	M4			
55		H3	M2	L2		
75			H4	M4	L2	
90			H2	M2	M4	
110				H4	M2	L3
132				H2	H4	L1
160					H2	M3
200						M1
250						H4
280						H2

For other drive speeds or different power settings, please contact HYDAC.

Power control adjustment range at 1500 rpm drive speed

Power control mode	Nominal size [cm³]					
	63	112	180	280	360	560
L Low setting range	10.6 - 18.9	19.1 - 30.7	29.9 - 45.6	46.8 - 75.0	59.9 - 91.1	93.5 - 160.0
M Medium setting range	15.6 - 22.4	27.1 - 45.6	43.9 - 75.0	67.3 - 113.5	87.9 - 134.5	137.2 - 239.2
H High setting range	22.0 - 33.8	37.0 - 62.1	55.0 - 96.5	90.0 - 150.1	109.4 - 192.9	197.3 - 300.3

2.4.3 Standard gear pump models

Pump size and ordering code												Gear pump displacement
PPV102-63	–	1	1	#	#	S	–	####	–	#		10 cm³/rev
PPV102-112	–	1	1	#	#	S	–	####	–	#		10 cm³/rev
PPV102-180	–	1	1	#	#	S	–	####	–	#		10 cm³/rev
PPV102-280	–	1	2	#	#	S	–	####	–	#		15 cm²/rev
PPV102-360	–	1	A	#	#	S	–	####	–	#	– 1	25.3 cm³/rev
PPV102-560	–	1	A	#	#	S	–	####	–	#	– 1	32.5 cm³/rev

Note: The "#" denotes all available models for the pump. See point 2.4.1 Ordering code for the pump.

TECHNICAL INFORMATION

2.4.4 Specifications

Pump size			63	112	180	280	360	560
Geometric displacement		[cm³/rev]	63	112	180	280	360	560
Pressure	Rated	[bar]	350					
	Peak	[bar]	400					
Drive speed	Min.	[rpm]	600					
	Max.self-priming	[rpm]	1800	1800	1800	1500	1800	1500
	Max. *	[rpm]	3250	2700	2300	2000	2300	2000
Power (1500 rpm, 350 bar)		[kW]	61	108	173	270	347	539
Drive torque (350 bar)		[Nm]	388	688	1101	1720	2210	3430
Pre-fill oil volume		[cm³]	1000	1200	2900	3200	6000	6500
Approx. weight		[kg]	48	68	86	160	160	300

* required supply pressure p = 1 bar (2 bar abs.)

2.4.5 Hydraulic fluids

H, HL	Mineral Oil
HEES	Fatty acid esters (Polyolester), biodegradable
HFC	Water glycol
HLP, HLPD, HV, HVLP	High quality hydraulic fluids based on mineral oil and with additional anti-wear properties (at pressures above 200 bar)
HFD-U	Polyolester
For use with other fluids, please contact HYDAC.	

2.4.6 Viscosity range

Minimum viscosity:	10 cSt (mm²/s)
Normal operating viscosity:	10 - 200 cSt (mm²/s)
Maximum viscosity (during cold start):	1000 cSt (mm²/s)

2.4.7 Temperature range

-20 to +80 °C

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

2.4.8 Fire-resistant fluids

	Fluid type		
	Mineral oil	Polyolester	Water glycol*
Maximum continuous pressure (bar)	350		207
Temperature range (°C)	-20 ~ +80	0 ~ +60	10 ~ 50
Cavitation resistance	○	△	△
Pump service life compared to mineral oil	100 %	50 % ~ 100 %	20 % ~ 80 %

- = Recommended
 △ = Acceptable but with reduced pump life
 * = Do not exceed the rated speed. *
 Maximum speed for size 280 pumps when operated with water glycol:
 1500 rpm

2.4.9 Seals

Fluid type code (see Ordering code)	Generic fluid type	Shaft seal ring material	General seal material (O-Rings)
–	Mineral oil	FPM	NBR
W	Water glycol	NBR	NBR
P	Polyolester	FPM	FPM

2.4.10 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class to NAS 1638 Class 9 (20/18/15 ISO 4406:1999) or cleaner.

2.4.11 Adjustments

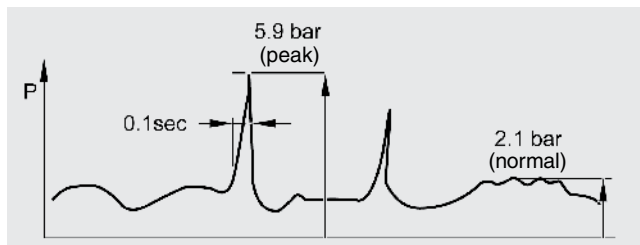
Pump size	Volume	
	Volume adjustment screw rate per ¼ turn	Min. adjustable displacement
	[cm³]	[cm³/rev]
PPV102-63	1.54	22.5
PPV102-112	2.86	56
PPV102-180	3.81	87
PPV102-280	5.10	140
PPV102-360	3.81	2x 87
PPV102-560	5.10	2x 140

2.4.12 Installation notes

Recommended pump installation

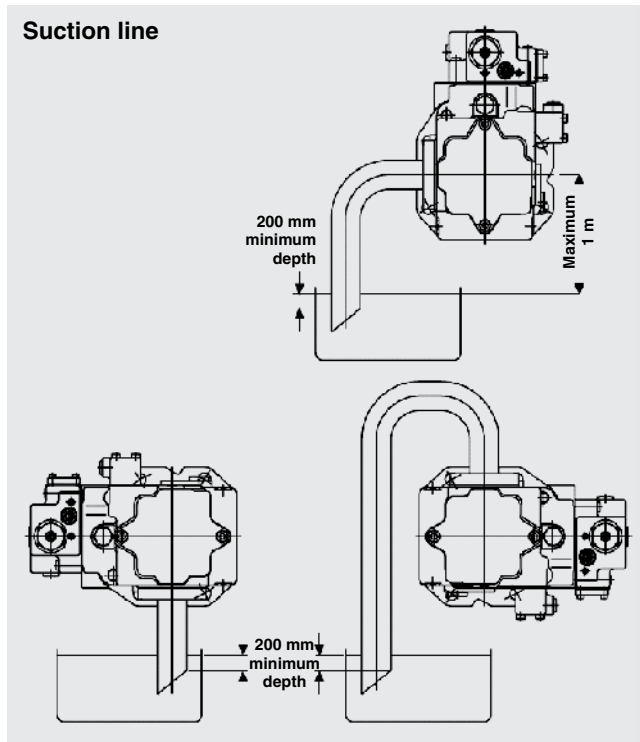
The pump should be installed horizontally with the case drain line initially rising above the level of the pump before continuing to the tank as shown in the diagram below. Do not connect the drain line to the suction line.

The top drain port should always be used and the internal diameter of the drain line should be equal to or larger than the drain port to minimise pressure in the pump case. The pressure in the pump case should not exceed 2.1 bar as shown in the diagram below. Peak pressure should never exceed 5.9 bar.



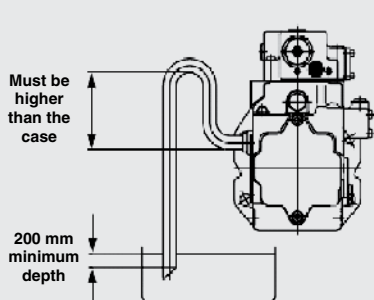
Installing the pump above the tank

Suction line



Drain line

"Goose neck" configuration ensures oil remains in the pump case.



Precautions:

- The suction and drain lines must be immersed at least 200 mm below the lowest oil level under operating conditions.
- The distance between the oil surface and the centre of the shaft must not exceed 1 m.
- The oil in the pump case must be refilled if the pump has not been operated for one month or longer.
- When installing a HYDAC pump always ensure that the fluid in the pump is prevented from draining away during stoppages.

Vertical installation of the pump (shaft at the top)

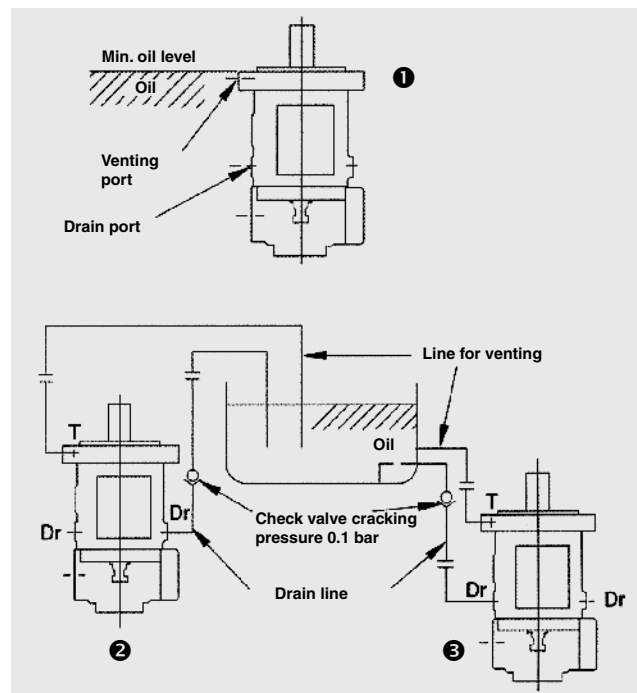
For applications requiring vertical installation (shaft at the top) the pump must be provided with additional means to lubricate the front bearing. Do not use a standard pump for this type of application (a "V - vertical installation" version should be used instead).

The oil level in the tank should be higher than the pump mounting flange (see diagram 1 below).

If the oil level in the tank is lower than the mounting flange, forced lubrication is required through the venting port (1-2 l/min.)

When installing the pump in the tank and submerged in the oil, open the drain and venting ports to provide adequate lubrication to the internal components.

If the pump is installed outside the tank, the drain and venting lines must be run to the tank (see diagram 3). If these lines are higher than the level of the oil (see diagram 2), they must be filled with oil before commissioning.



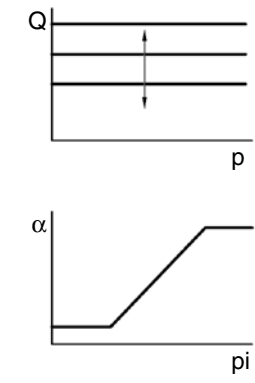
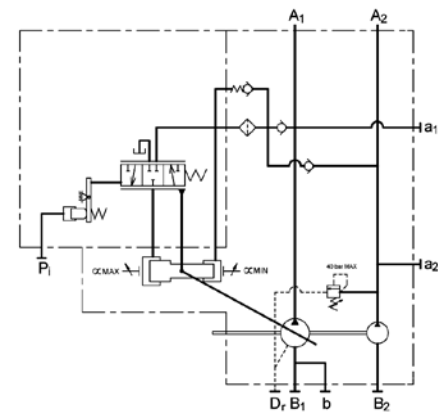
A check valve with cracking pressure of 0.1 bar should be fitted to the case drain port as shown.

Recommended check valves

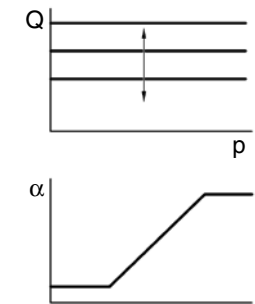
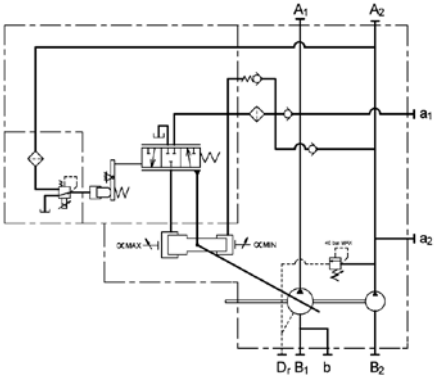
Pump	Check valve	Part no.
PPV102-63	RV-12-0.1X/0 - 0.1 bar	3474099
PPV102-112 to PPV102-280	RV-16-0.1X/0 - 0.1 bar	858636
PPV102-360 to PPV102-560	RV-20-0.1X/0 - 0.1 bar	706734

CONTROL OPTIONS

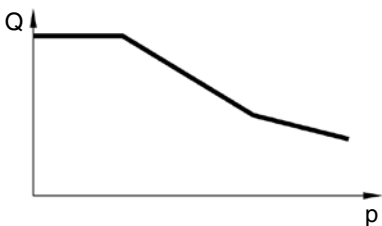
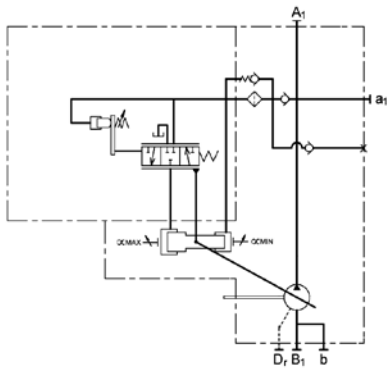
2.4.13 Variable delivery positive displacement control – 0P

Description	Performance characteristics	Hydraulic circuit
The pilot pressure enables the flow rate of the pump to be steplessly adjusted. An increase in pilot pressure will result in an increase in flow, hence the positive control. Also available as negative control - 0N	 Range of displacement control 2.5 – 100 %	

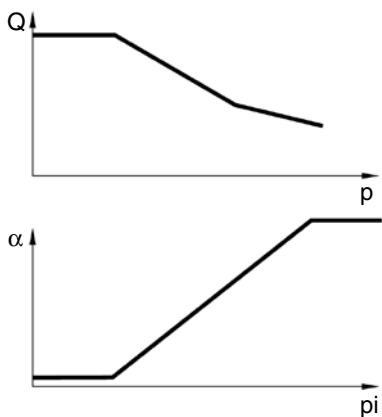
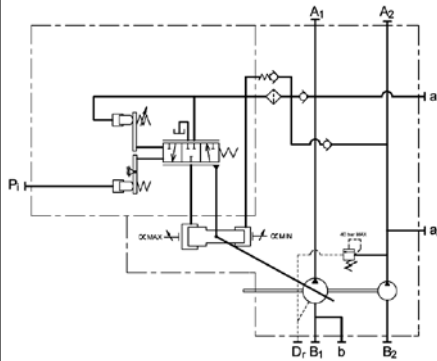
2.4.14 Variable delivery electrical displacement control – 0E

Description	Performance characteristics	Hydraulic circuit
The proportional valve enables the flow rate of the pump to be steplessly adjusted. If the gear pump is also ordered, there is no need for additional external piping for the proportional valve. An electrical amplifier card is also required.	 Input current (mA) E Range of displacement control 2.5 – 100 %	

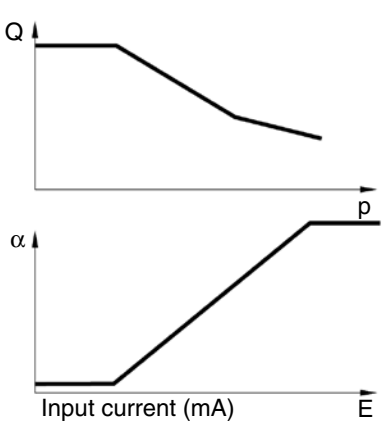
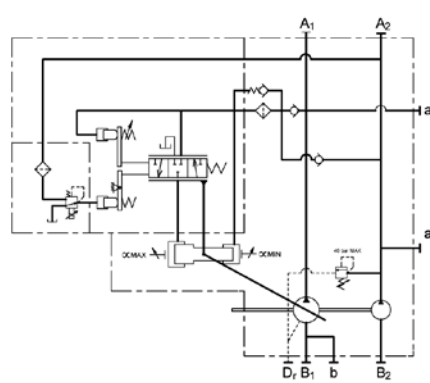
2.4.15 Power control – 10

Description	Performance characteristics	Hydraulic circuit
In response to a rise in operating pressure, the swash plate adjustment angle is reduced, limiting the input power. This control prevents an overload of the drive motor.		

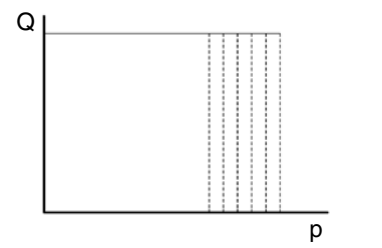
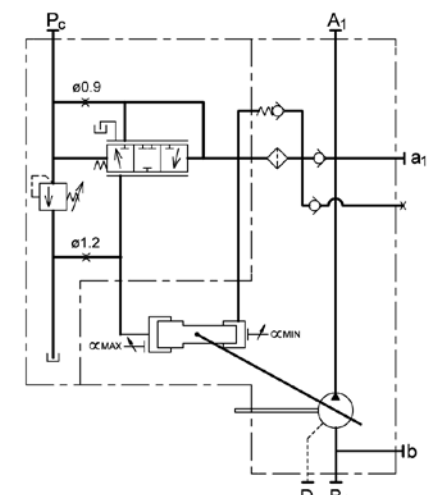
2.4.16 Power and positive displacement control – 1P

Description	Performance characteristics	Hydraulic circuit
This is a combination of power control and positive displacement control. The pilot pressure enables the flow rate of the pump to be steplessly adjusted. An increase in pilot pressure will result in an increase in flow, hence the positive control. Also available as negative control - 1N	 Range of displacement control 15 – 100 %	

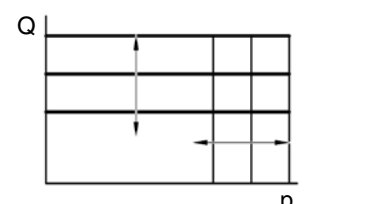
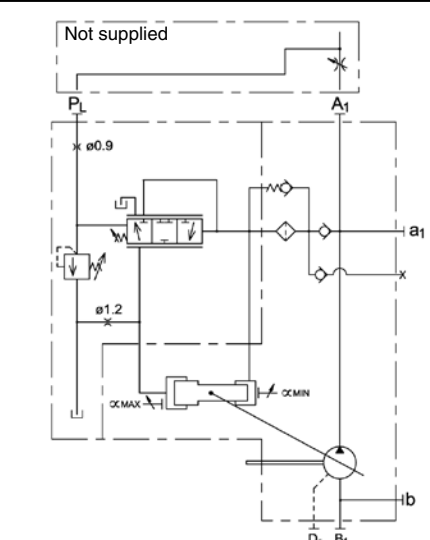
2.3.17 Power and electrical displacement control - 1E

Description	Performance characteristics	Hydraulic circuit
This is a combination of power control and electrical displacement control. The proportional valve enables the flow rate of the pump to be steplessly adjusted. An increase in the input signal will result in an increase in flow. An electrical amplifier card is also required.	 Input current (mA) Range of displacement control 2.5 – 100 %	

2.4.18 Pressure compensation control – 4000

Description	Performance characteristics	Hydraulic circuit
As the system pressure rises to the pre-set value, the swash plate pivots back to prevent the system pressure from exceeding the compensator setting. A pressure relief valve must be built into the system. Note: The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.	 Range of displacement control 0 – 100 %	

2.4.19 Pressure compensation and load sensing control - 4L00

Description	Performance characteristics	Hydraulic circuit
The pump displacement is controlled to match the flow requirements as a function of the system differential pressure (load pressure vs. pump pressure). The factory setting of the differential pressure is 25 bar. In addition, there is a pressure cut-off function incorporated into the control. Note: The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.	 Range of displacement control 0 – 100 %	

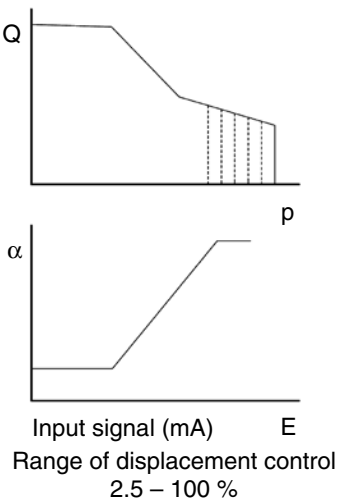
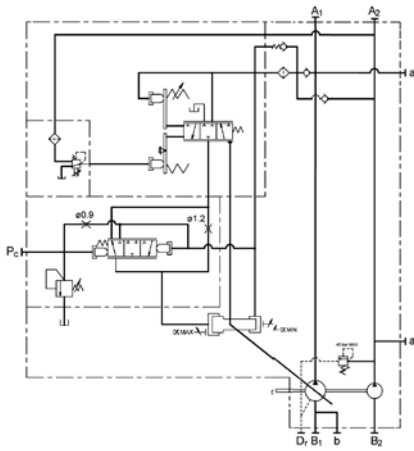
2.4.20 Power and pressure compensation - 70

Description	Performance characteristics	Hydraulic circuit
This is a combination of power control and pressure compensation. Note: The factory pressure setting is 320 bar with an adjustable range of 80 bar to 350 bar.		

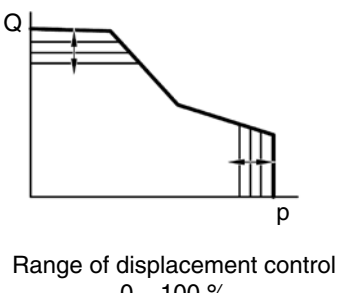
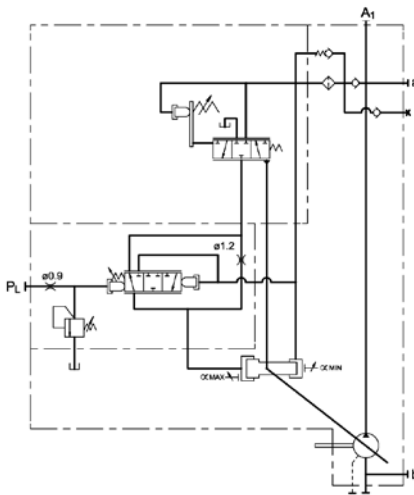
2.4.21 Power, pressure compensation and positive displacement control - 7P

Description	Performance characteristics	Hydraulic circuit
This is a combination of power control and pressure compensation. The pilot pressure enables the flow rate of the pump to be steplessly adjusted. An increase in pilot pressure will result in an increase in flow, hence the positive control. Note: The factory pressure setting is 315 bar with an adjustable range of 80 bar to 350 bar. Also available as negative control - 7N	Range of displacement control 2.5 – 100 %	

2.4.22 Power, pressure compensation and electrical displacement control - 7E

Description	Performance characteristics	Hydraulic circuit
This is a combination of power control, pressure compensation and electrical displacement control. The proportional valve enables the flow rate of the pump to be steplessly adjusted. An increase in the input signal will result in an increase in flow. An electrical amplifier card is also required. Note: The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.	 Input signal (mA) E Range of displacement control 2.5 – 100 %	

2.4.23 Power, pressure compensation and load sensing control - 7L

Description	Performance characteristics	Hydraulic circuit
This is a combination of power control, pressure compensation and load sensing control. The factory setting of the differential pressure is 25 bar with a setting range of 10 bar to 30 bar. Note: The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.	 Range of displacement control 0 – 100 %	

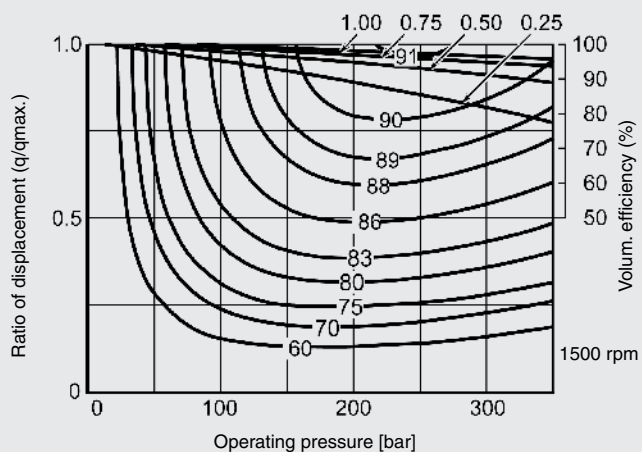
Recommended valve for use with remote pressure compensation

Type:	Part no.:
DB4E-01X-630V	716004

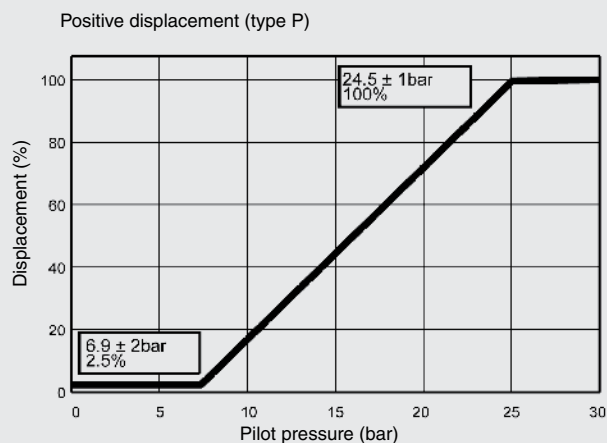
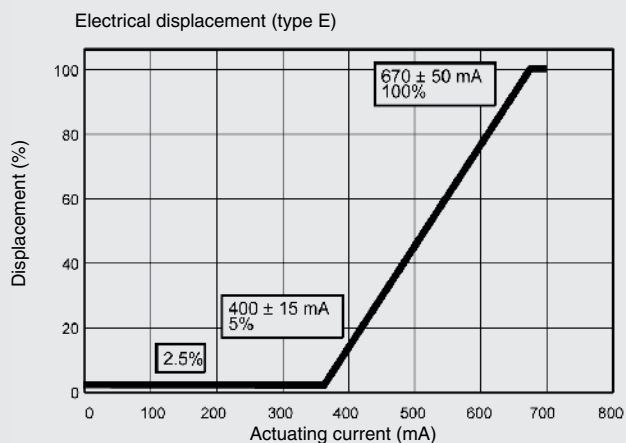
PERFORMANCE DATA

2.4.24 PPV102-63

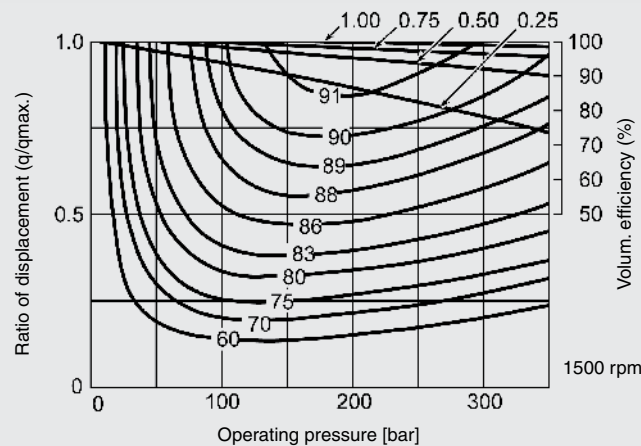
● Efficiency



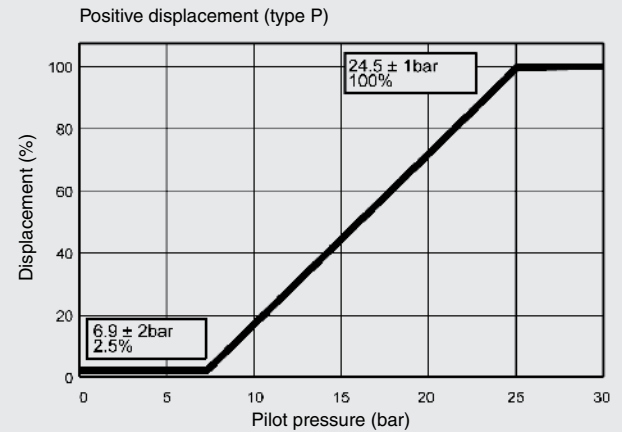
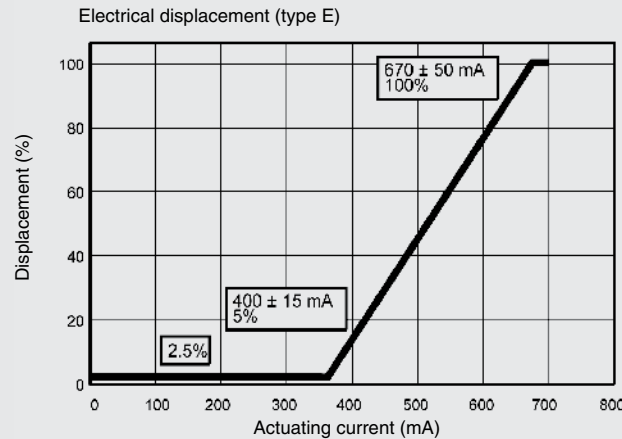
● Displacement control curves



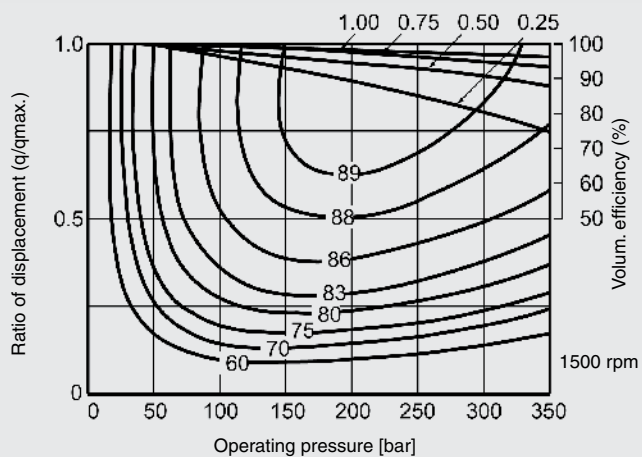
● Efficiency



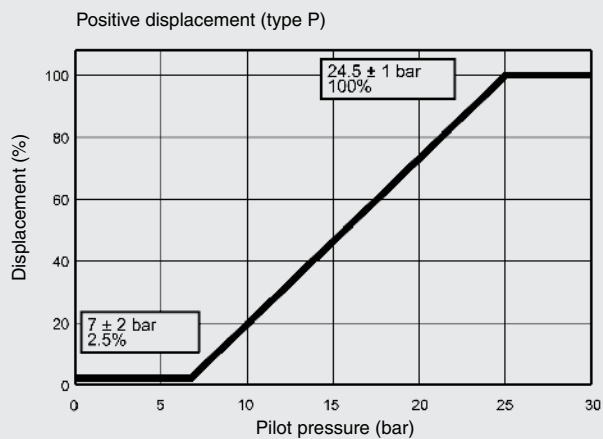
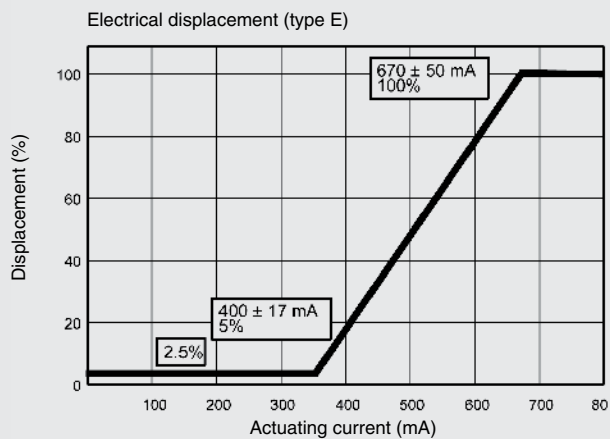
● Displacement control curves



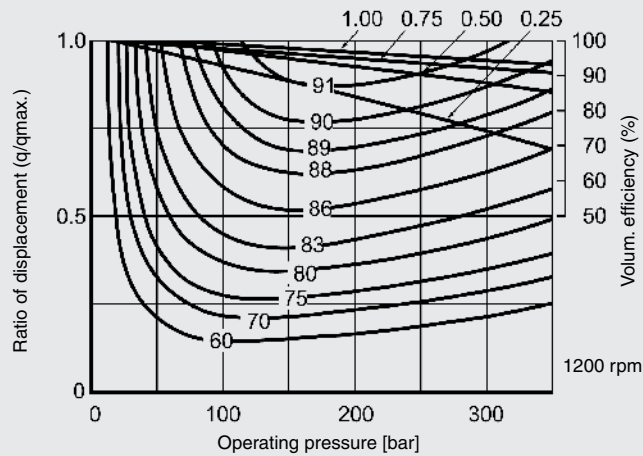
● Efficiency



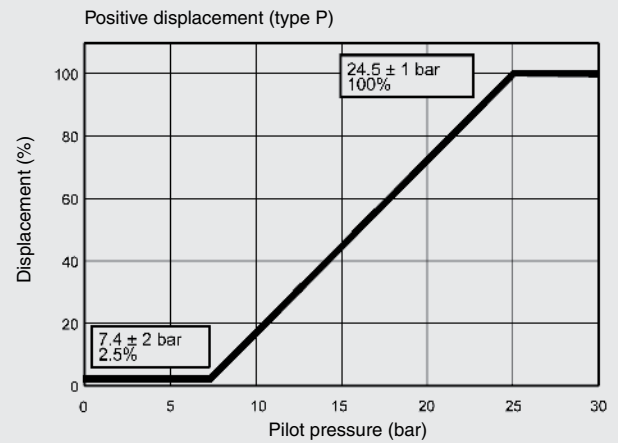
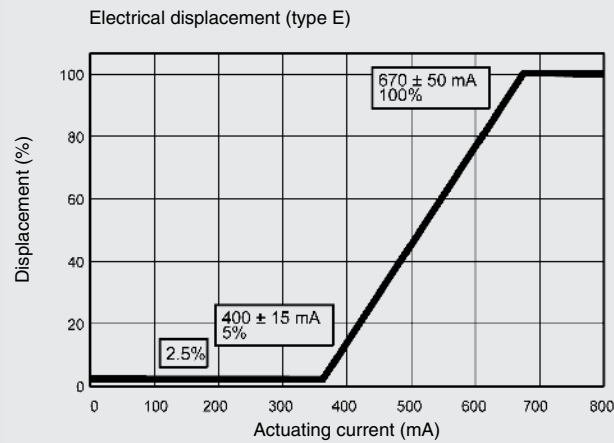
● Displacement control curves



● Efficiency

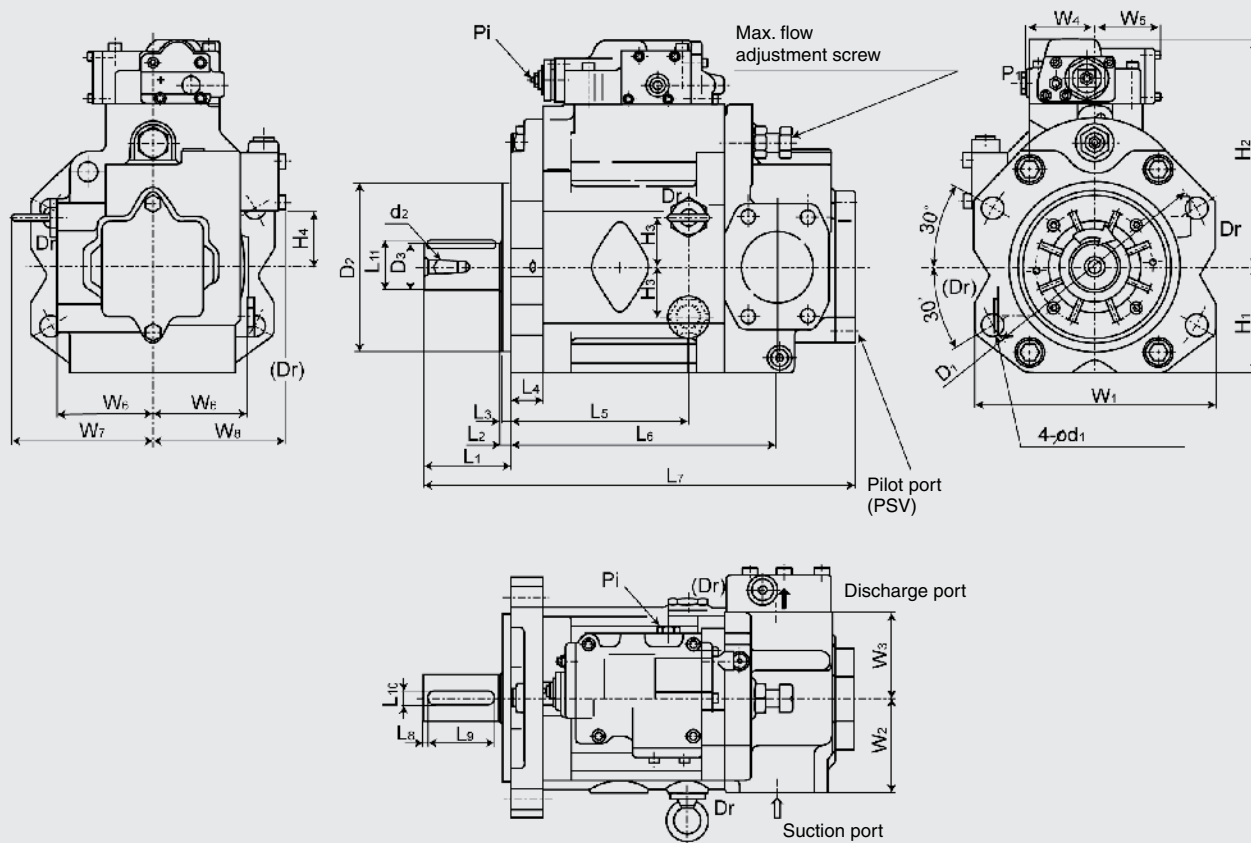


● Displacement control curves



DIMENSIONS

2.4.28 PPV102-63 / -112 / -180 / -280

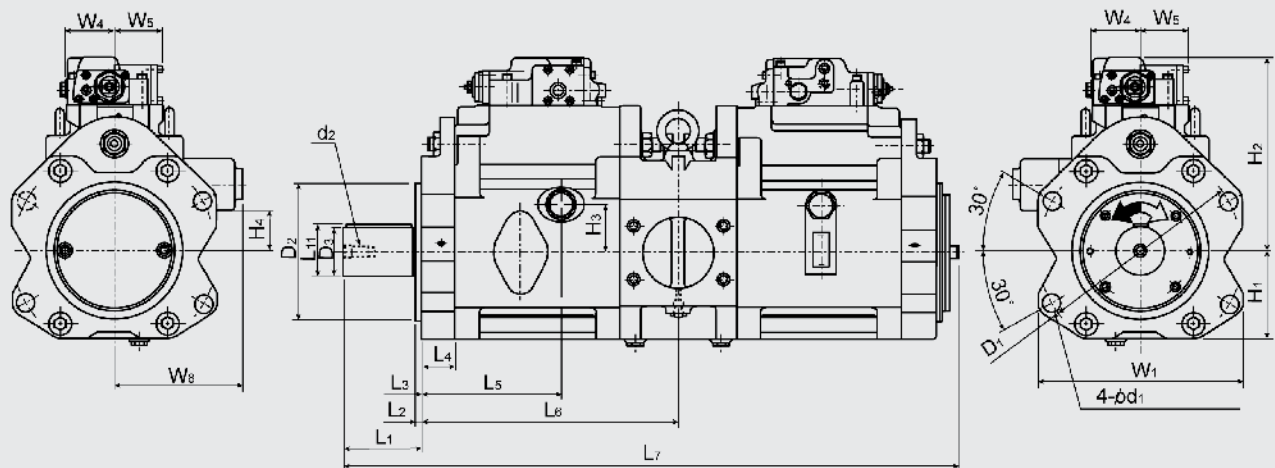


Dimensions (in mm) of single pumps without gear pump

Pump size	D ₁	D ₂	D ₃	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆
63	180	125 ^{-0.050 -0.090}	32 ^{k6}	68	10	8	27	138	210
112	224	160 ^{-0.050 -0.090}	40 ^{k6}	92	10	8	33	167	249
180	250	180 ^{-0.050 -0.090}	50 ^{k6}	92	10	8	36	190	285
280	300	200 ^{-0.050 -0.090}	55 ^{k6}	92	10	8	50	203	351

Pump size	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	H ₁	H ₂	H ₃	H ₄
63	349	4	5	10	35	89	195	37	41
112	419	5	70	12	43	100	220	41	49
180	466	5	70	14	53.5	112	245	53	58
280	539	5	70	16	59	127	286	70	68

Pump size	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	d ₁	d ₂
63	190	70	70	72	69	76	115	113	18	M12
112	234	90	80	72	69	90	138	125	22	M12
180	256	100	92	72	69	101	149	139	22	M16
280	300	120	120	72	69	118	—	167	26	M16



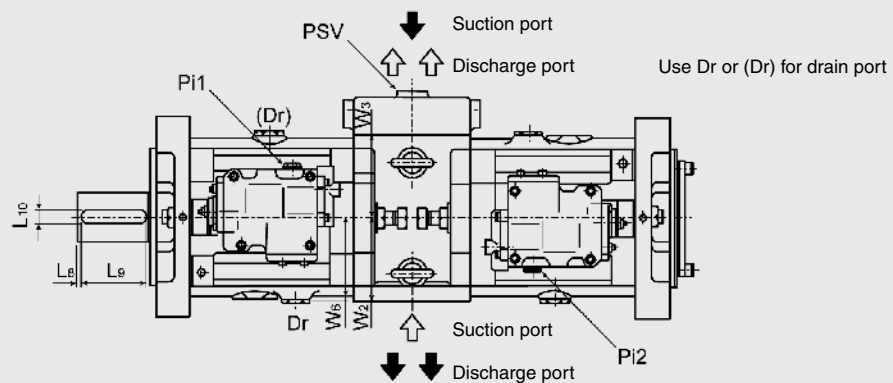
Direction of rotation

Clockwise

Anti-clockwise

(viewed from shaft end)

Note: pump shown
is designed for
clockwise rotation.

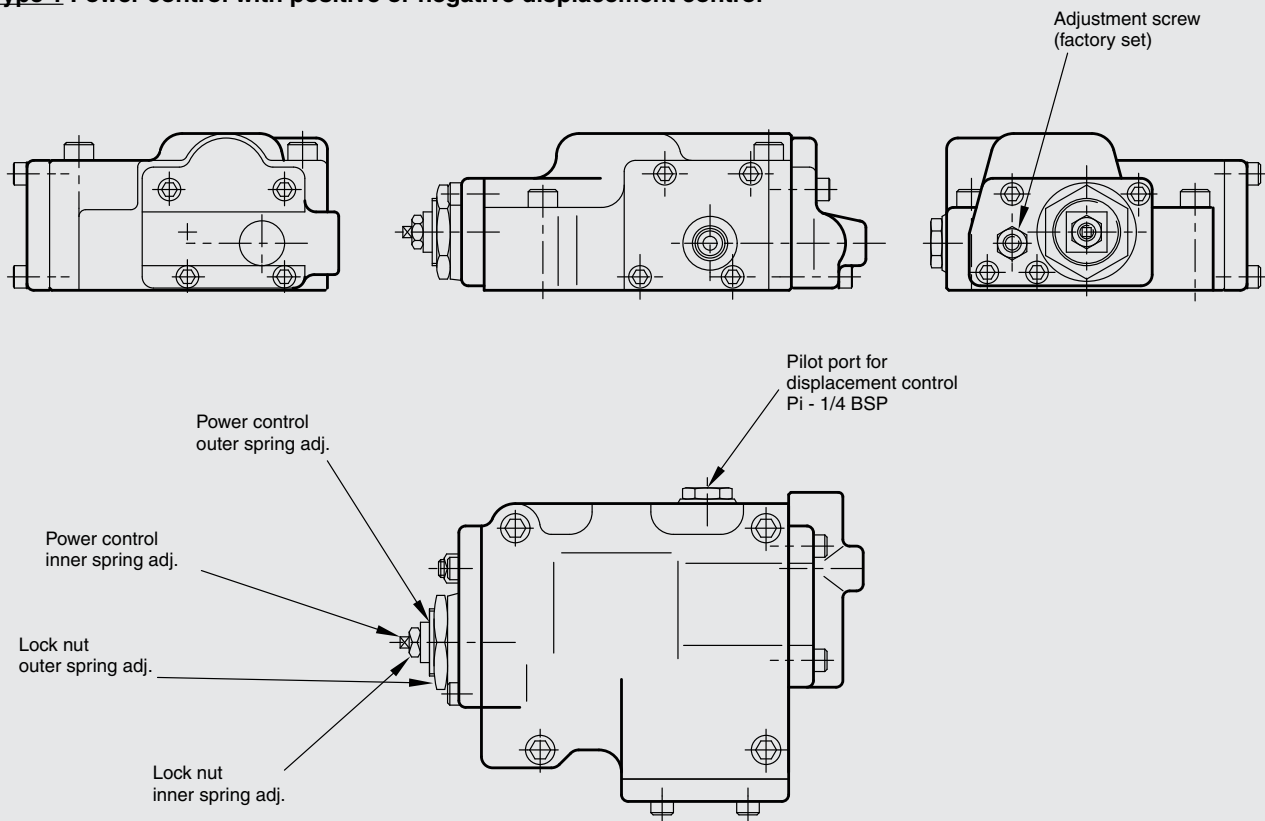
**Dimensions (in mm) of tandem pumps without gear pump**

Pump size	D ₁	D ₂	D ₃	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆
360	250	180 ^{-0.050 -0.090}	60 ^{k6}	115	10	8	36	190	311
560	300	200 ^{-0.050 -0.090}	70 ^{k6}	115	10	9	50	203	374

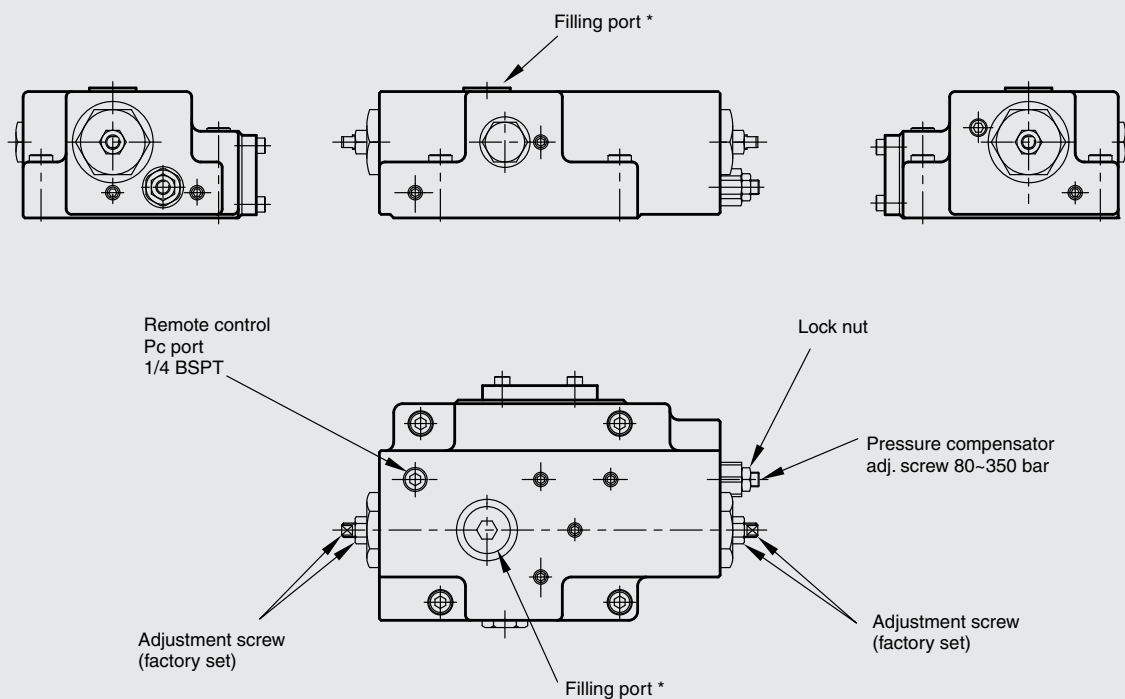
Pump size	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	H ₁	H ₂	H ₃	H ₄
360	786	5	95	18	64	112	245	53	51
560	896	5	95	20	74.5	127	286	70	59

Pump size	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₈	d ₁	d ₂
360	256	100	100	72	69	101	165	22	M16
560	300	120	120	72	69	118	185	26	M16

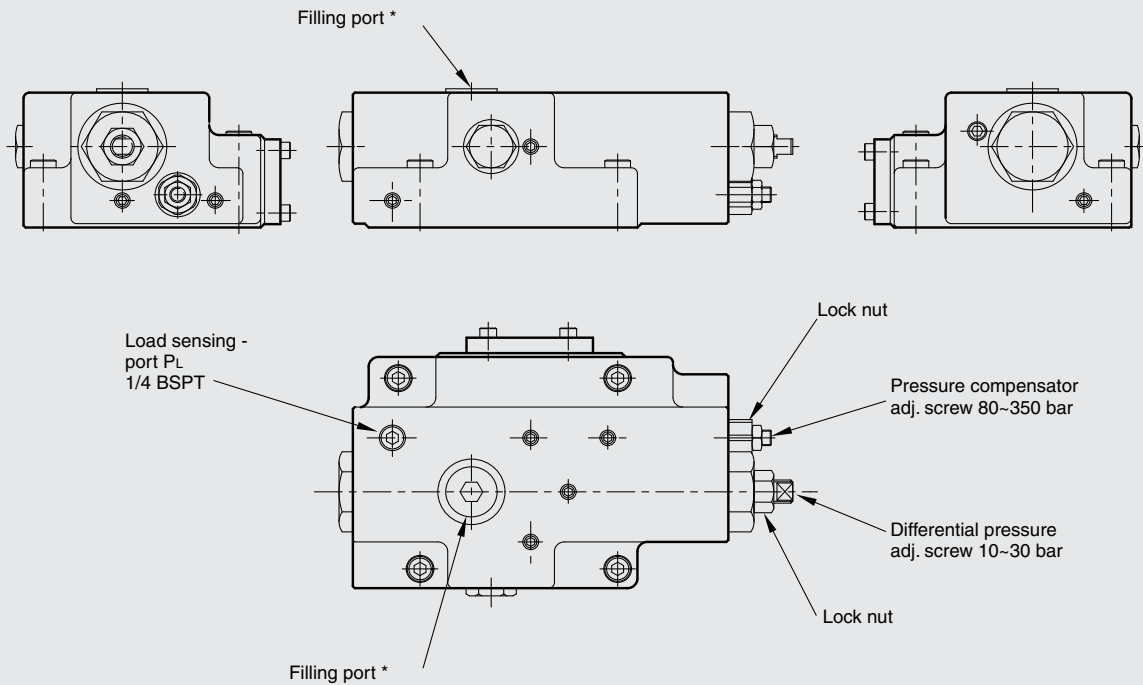
Type 1 Power control with positive or negative displacement control



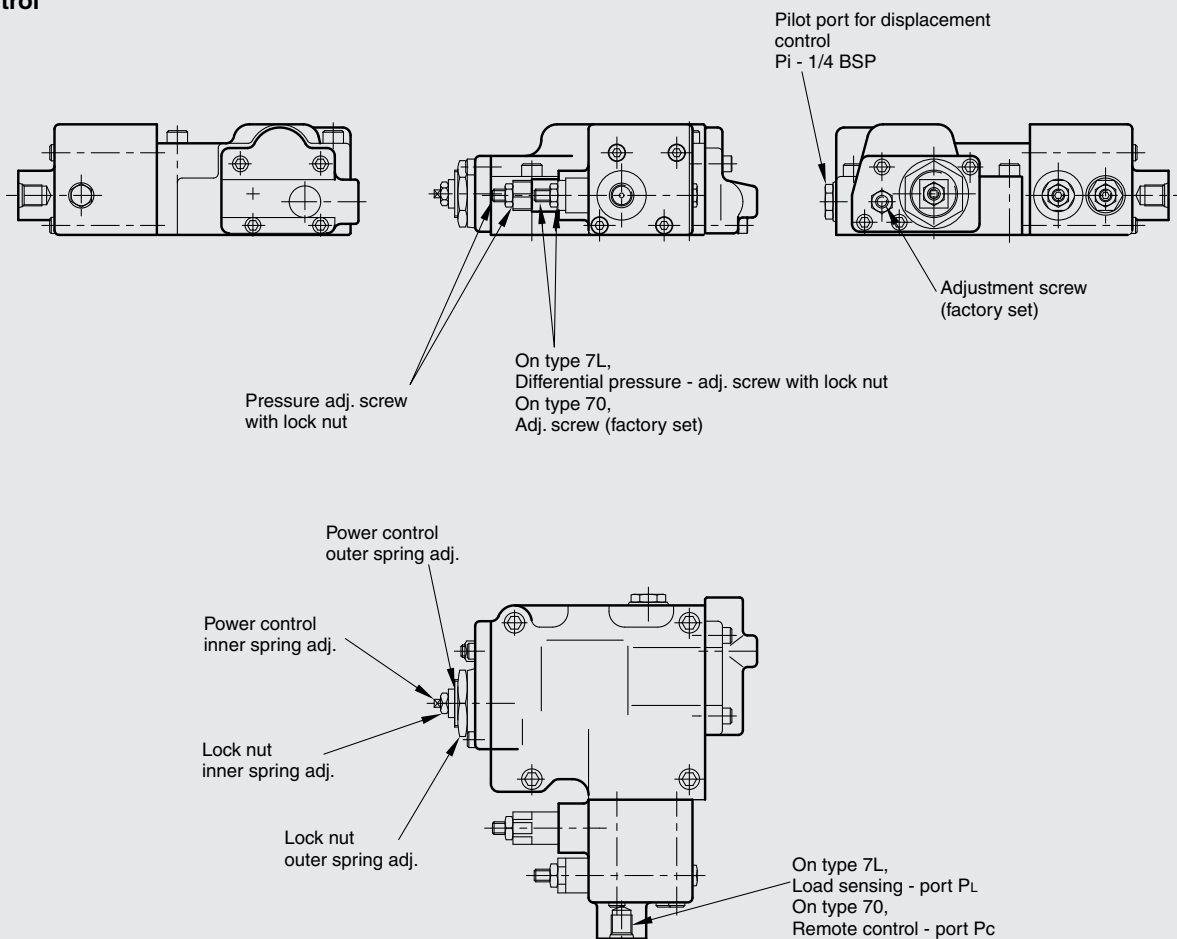
Type 4 Pressure compensation control



Type 4L Pressure compensation and load sensing control



Type 7 Power control with positive or negative displacement control, pressure compensation or load sensing control



2.4.31 Auxiliary ports

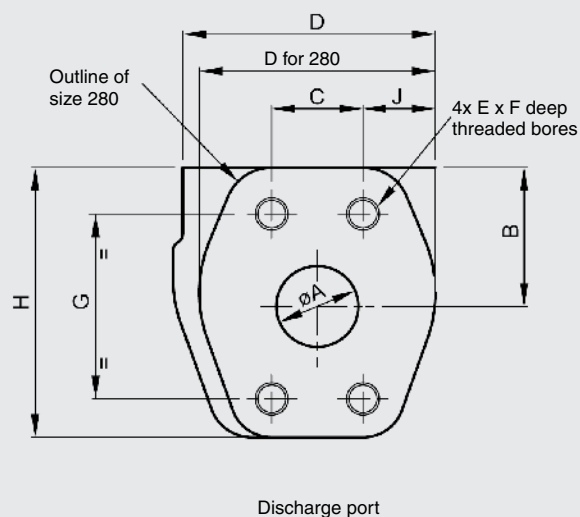
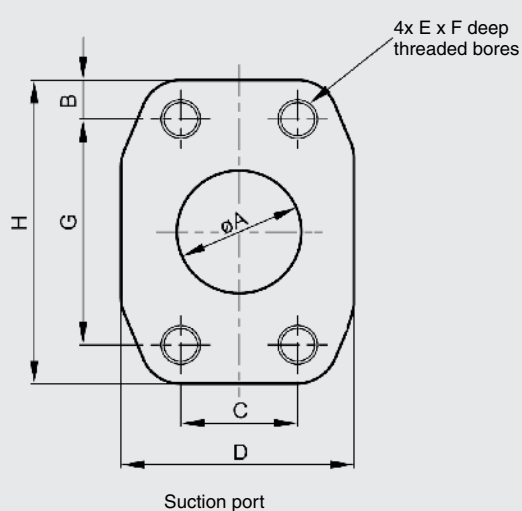
Dimensions of drain ports (in mm)

Pump size	a	b	c	d
63	½ BSP	22.6	2.5	19
112	¾ BSP	30.8	3.5	20
180 / 360	¾ BSP	30.8	3.5	20
280 / 560	¾ BSP	30.8	3.5	20

Other ports

Port	Size
P _C and P _L for 4000 control	¼ BSPT
P _C and P _L for type 7 control	¼ BSP
P _I and P _{SI} pilot port for displacement control	¼ BSP
Measurement ports	¼ BSP
Venting port, V-type Sizes 63, 112, 180, 360	⅛ BSP
Venting port, V-type Sizes 280, 560	¼ BSP

2.4.32 Suction and discharge ports



Suction port

Size	A	B	C	D	E	F	G	H
63	38	12	35.7	71	M12 x 1.75	18	69.9	94
112	64	12	50.8	91	M12 x 1.75	18	88.9	113
180	76	15	61.9	108	M16 x 2.0	24	106.4	136
280	89	15.5	69.9	123	M16 x 2.0	24	120.7	152
360	102	15	77.8	152	M16 x 2.0	24	130.2	162
560	102	18	77.8	152	M16 x 2.0	24	130.2	170

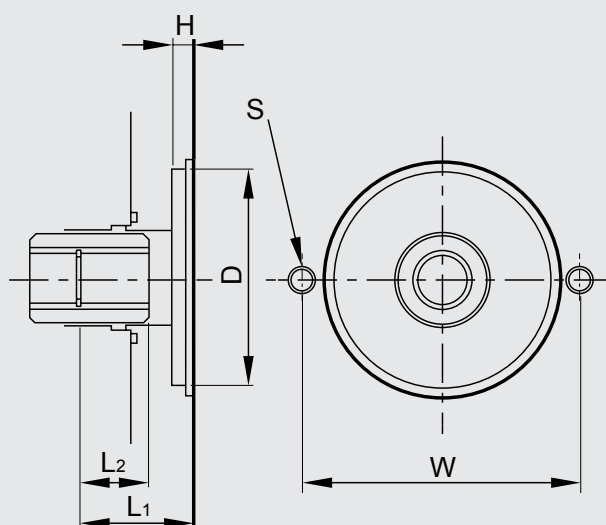
Discharge port

Size	A	B	C	D	E	F	G	H	J
63	25	41	27.8	77	M10 x 1.5	18	57.2	83.5	22
112	32	49	31.8	91	M12 x 1.75	18	66.7	98	30
180	38	58	36.5	111.5	M16 x 2.0	24	79.4	112	36
280	38	70	36.5	96	M16 x 2.0	24	79.4	112	30
360	32	51	31.8	80	M12 x 1.75	22	66.7	102	23
560	38	59	36.5	83	M16 x 2.0	24	79.4	117	16

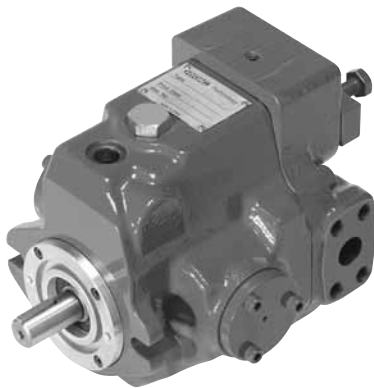
When using confluent block:

360	51	62	44.5	148	M20 x 2.5	30	96.8	124	26
560	51	72	44.5	180	M20 x 2.5	30	96.8	140	23

2.4.33 Through drive for optional gear pump



Pump size		63, 112, 180, 280		280, 360, 560
Ordering code	Without pilot port	7	G	A
	With pilot port	6	H	
Dimensions (SAE type "A" for 63, 112, 180 and 280) (SAE type "B" for 280, 360 and 560)	D	82.5		101.6
	H	8		11
	W	106		146
	S	2x M10 – 16 deep		2x M12 – 20 deep
	L ₁	43	34	43
	L ₂	26	18	26
Dimensions of splined shaft	Standard	SAE flat root, side fit		
	Number of teeth	13	9	13
	Diametral pitch	16/32		
	Pressure angle	30°		
	Root diameter	22.225 ^{+0.279} ₋₀	16.535 ^{+0.279} ₋₀	22.225 ^{+0.279} ₋₀
	Measurement between pins	16.589 ⁺⁰ _{-0.067}	10.089 ⁺⁰ _{-0.095}	16.589 ⁺⁰ _{-0.067}
	Pin diameter	2.743		
Max. torque (Nm)		214	60	214



2.5 LIGHT DUTY SERIES CONTENTS

PPV103

Ordering Code	2.5.1 Light Duty Series
Technical Information	2.5.2 Specifications 2.5.3 Hydraulic fluids 2.5.4 Viscosity range 2.5.5 Temperature range 2.5.6 Specifications and design numbers for special fluids 2.5.7 Seals 2.5.8 Filtration 2.5.9 Adjustments 2.5.10 Installation notes
Control Options	2.5.11 Standard pressure control 2.5.12 Remote pressure control 2.5.13 Availability of control type
Performance Data	2.5.14 PPV103-10 2.5.15 PPV103-16 2.5.16 PPV103-22 2.5.17 PPV103-37 2.5.18 PPV103-56 2.5.19 PPV103-70 2.5.20 PPV103-90 2.5.21 PPV103-145
Dimensions	2.5.22 PPV103-10 2.5.23 PPV103-16 / 22 2.5.24 PPV103-37 2.5.25 PPV103-56 2.5.26 PPV103-70 2.5.27 PPV103-90 2.5.28 PPV103-145

ORDERING CODE

2.5.1 Light Duty Series

PPV103 – 16 – F R 01 H S K – 32 80 – XXXX

Axial piston pump
Light Duty Series

Size

10	10.0 cm ³ /rev
16	15.8 cm ³ /rev
22	22.2 cm ³ /rev
37	36.9 cm ³ /rev
56	56.2 cm ³ /rev
70	70.0 cm ³ /rev (only with control type 07)
90	91.0 cm ³ /rev (only with control type 07)
145	145.0 cm ³ /rev (only with control type 07)

Mounting type

F Flange mounting

Shaft rotation

R Clockwise
viewed from shaft end

Control type

01 Pressure compensator
07 Remote pressure compensator

Pressure setting range (only for control type 01)

B 12 - 70 bar
C 12 - 160 bar (size 16/22/37/56)
20 - 160 bar (size 10)
H 12 - 210 bar (size 16/37/56)
20 - 210 bar (size 10)

Port position

S Side port (not for size 10)
Axial port (only size 16/22/37/56)
– Side and axial ports (only size 10)

Shaft extension

K Parallel keyed shaft

Design number

12 Size 10
32 Size 16/22/37/56
60 Size 70/90/145

Design standard

80 European Design Standard
950 North American Standard

Modification number

XXXX Determined by manufacturer

TECHNICAL INFORMATION

2.5.2 Specifications

Pump size			10	16	22	37	56	70	90	145
Geometric displacement		[cm³/rev]	10.0	15.8	22.2	36.9	56.2	70.0	91.0	145.0
Pressure	Rated	[bar]	160					250		
	Peak		210		160	210		250		
Drive speed	Min.	[rpm]	600							
	max.		1800							
Power (1500 rpm, 160 bar)		[kW]	5	7	8.5*	17	25	31	38	62
Drive torque (160 bar)		[Nm]	32	45	55*	108	159	198	242	395
Pre-fill oil volume		[cm³]	370	600	600	1200	1200	2100	2500	3300
Approx. weight with pressure compensator		[kg]	8.5	16.5	16.5	28.0	35.0	—	—	—
Approx. weight. with remote pressure compensator			8.5	21.0	21.0	29.0	36.0	60.3	77.5	94.0

* size 22 at 140 bar

2.5.3 Hydraulic fluids

The pump series is designed for use with

HL Hydraulic oil
(normal mineral oil)
and

HLP Hydraulic oils of the R&O type
(Rust and Oxidation inhibitor)

For use with other fluids, please contact HYDAC.

2.5.4 Viscosity range

Normal operating viscosity: 20 - 400 cSt (mm²/s)

Maximum viscosity (cold start): 1000 cSt (mm²/s)

2.5.5 Temperature range

-20 to +95 °C

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

2.5.6 Specifications for special fluids

Operating fluid	Size	Operating pressure [bar]		Drive speed [rpm]		Temperature range [°C]	Viscosity range [cSt]	Design number*2
		Rated	Intermittent	Rated	max.			
Water glycol Water > 35 % Polymer solution (HFC)	16-56	140	160 / 140*1	1200	1800*2	0 - 50	20 - 200	30
	70-145	210	210					30
Phosphate ester synthetic (HFD-R)	16-56	140	160 / 140*1	1200	1800*2	0 - 60		80
	70-145	210	210					
Polyolester synthetic (HFD-U)	16-56	160	160	1800	1800	0 - 60		
	70-145	250	250					

*1 – Size 22

*2 – As the specific gravity of water-glycol and phosphate ester fluids is higher than one, an overhead reservoir is required when pumps are operated at 1500 rpm or more

2.5.7 Seals

The pump series is equipped with fluorocarbon (FPM) seals as standard.

Exception: Size 10 with Nitrile (NBR)

If special hydraulic fluids are used, the seal material must be changed if required.

2.5.8 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class to NAS 1638 Class 10 (21/19/16 ISO 4406:1999) or cleaner.

2.5.9 Adjustments

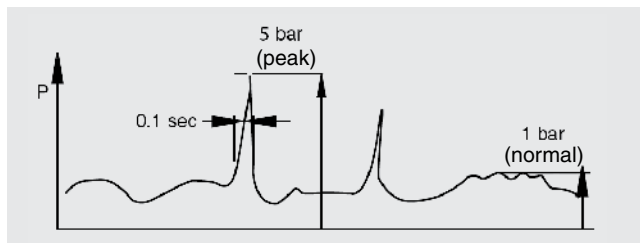
The units are supplied with a minimum discharge pressure and maximum flow rate setting. Pressure and flow rate can be adjusted using the adjustment screws to meet your system requirements.

Pump size	Volume		Pressure
	Volume adjustment screw rate [cm ³ per turn]	Min. adjustable displacement [cm ³ /rev]	Pressure adjustment screw rate [bar per turn]
PPV103-10*01B	1.1	2.0	29
PPV103-10*01C/H	1.1	2.0	54
PPV103-16*01B	1.4	4.0	35
PPV103-16*01C	1.4	4.0	65
PPV103-16*01H	1.4	4.0	79
PPV103-22*01B	2.0	6.0	35
PPV103-22*01C	2.0	6.0	65
PPV103-37*01B	2.9	10	35
PPV103-37*01C	2.9	10	65
PPV103-37*01H	2.9	10	79
PPV103-56*01B	3.9	12	35
PPV103-56*01C	3.9	12	65
PPV103-56*01H	3.9	12	79
PPV103-70*07	4.4	30	
PPV103-90*07	4.8	56	
PPV103-145*07	7.2	83	

2.5.10 Installation notes

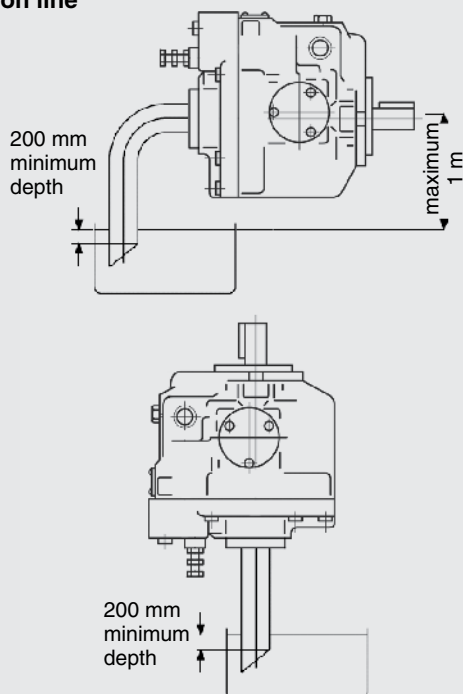
The pump should be installed horizontally with the case drain line initially rising above the level of the pump before continuing to the tank as shown in the diagram below. Do not connect the drain line to the suction line.

The top drain port should always be used and the internal diameter of the drain line should be equal to or larger than the drain port to minimise pressure in the pump case. The pressure in the pump case should not exceed 1 bar as shown in the diagram below. Peak pressure should never exceed 5 bar.



Installing the pump above the tank

Suction line

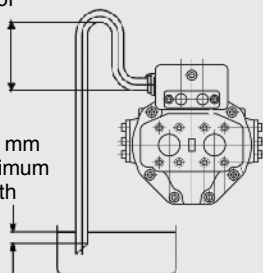


Drain line

"Goose neck" configuration ensures the oil remains in the pump case.

Must be higher than top of pump case

200 mm minimum depth



Precautions:

- The distance between the suction and drain pipes must be 200 mm minimum.
- Suction and drain pipes must be immersed at least 200 mm below the lowest oil level under operating conditions.
- The distance between the oil surface and the centre of the shaft must not exceed 1 m.
- The oil in the pump case must be refilled if the pump has not been operated for one month or longer.
- When installing a HYDAC pump always ensure that the fluid in the pump is prevented from draining away during stoppages.

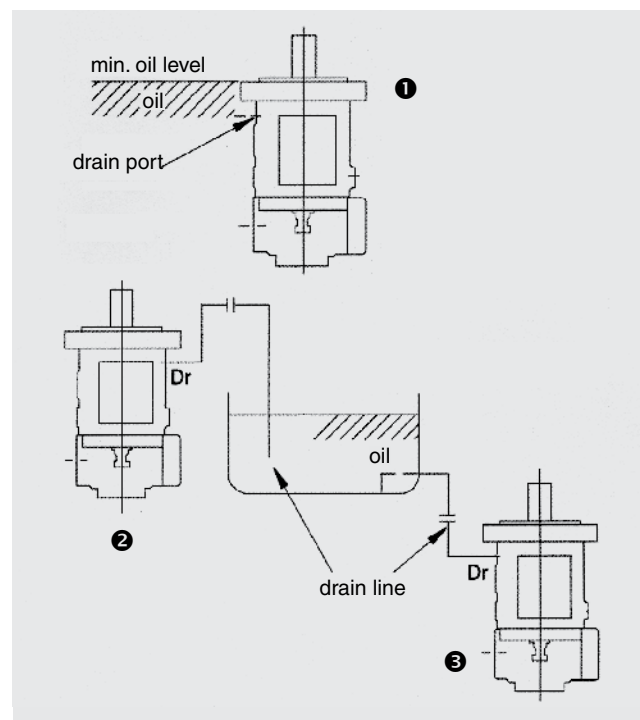
Installing the pump vertically

For applications requiring vertical installation (shaft at the top) please connect lines as shown in the diagram below.

The oil level in the tank should be higher than the pump mounting flange (see diagram ①). If the oil level in the tank is lower than the pump mounting flange then the drain line should be installed as shown in diagram ②.

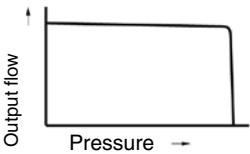
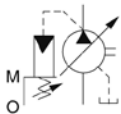
Once the pump is installed in the tank and immersed in the oil, the drain ports must be open to provide adequate lubrication to the internal components.

If the pump is installed outside the tank, there must be a separate drain line to the tank (diagram ③). If the drain line is higher than the oil level, fill the line with oil before commissioning.

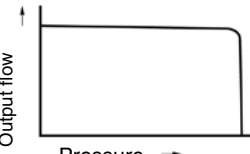
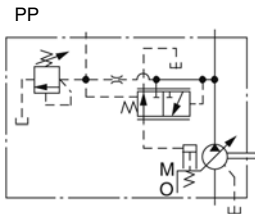


CONTROL OPTIONS

2.5.11 Standard pressure control

Description	Performance characteristics	Symbol
When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically and the set pressure is maintained.		

2.5.12 Remote pressure control

Description	Performance characteristics	Symbol
The pump is used in combination with the pilot relief valve or multistage pressure control valve. By controlling the pilot pressure, the full cut-off pressure can be remote-controlled according to your requirements.		

Recommended valve for use with remote pressure control

Type:	Part no.:
DB3E-02X-350V	397405

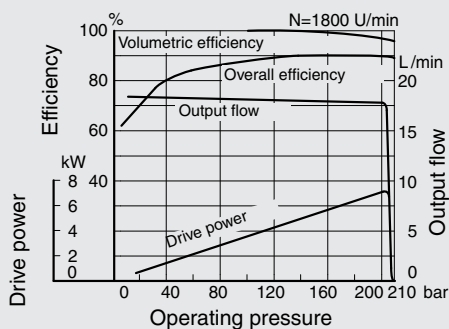
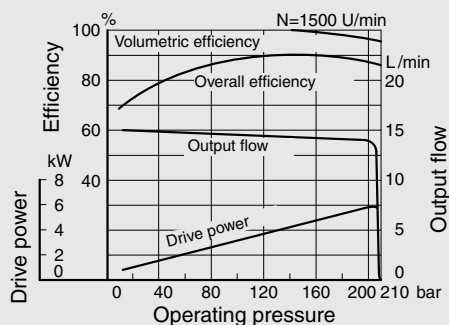
2.5.13 Availability of control type

Pump size	Geometric displacement cm ³ /rev	01 Standard pressure control	07 Remote pressure control
PPV103-10	10.0	•	•
PPV103-16	15.8	•	•
PPV103-22	22.2	•	•
PPV103-37	36.9	•	•
PPV103-56	56.2	•	•
PPV103-70	70.0		•
PPV103-90	91.0		•
PPV103-145	145.0		•

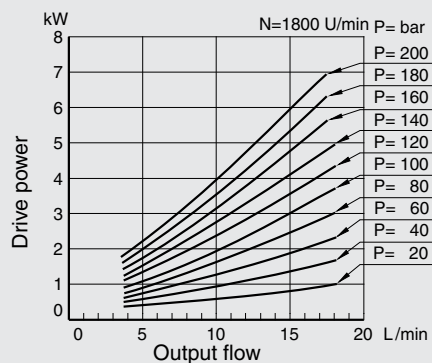
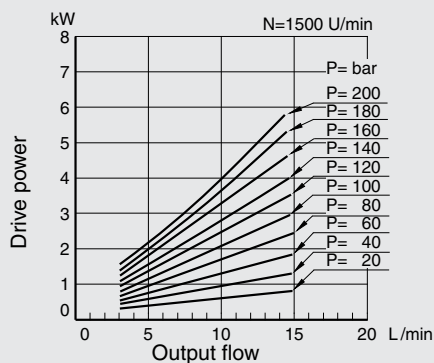
PERFORMANCE DATA

2.5.14 PPV103-10

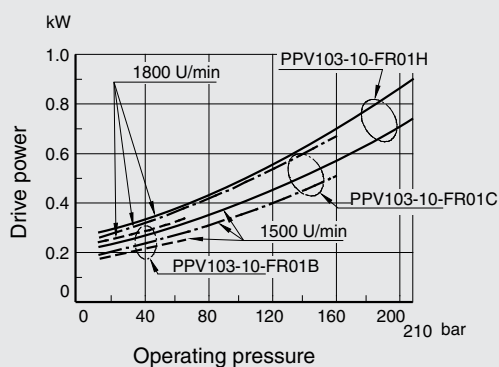
● Performance characteristic curve



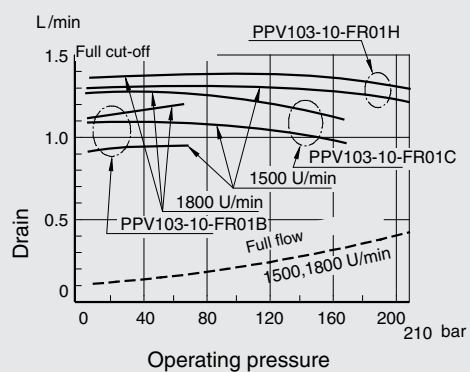
● Drive power



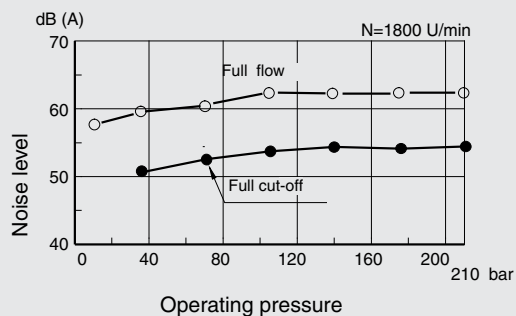
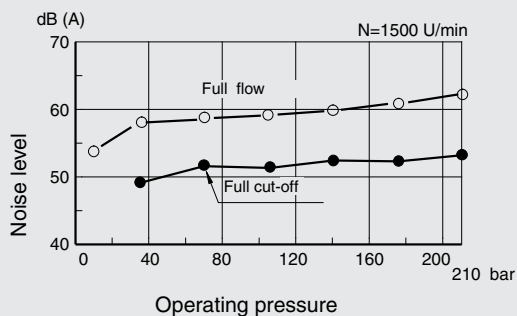
● Full cut-off power



● Drain

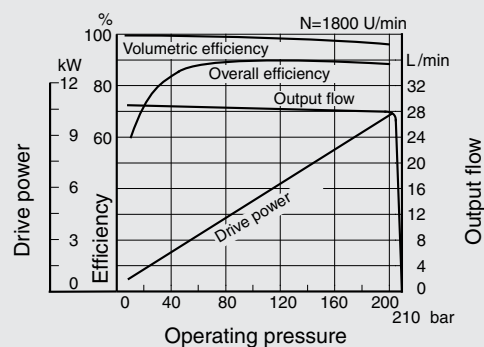
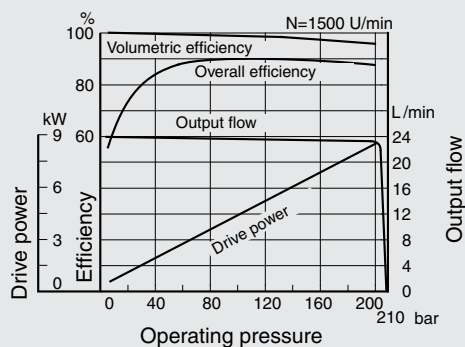


● Noise level



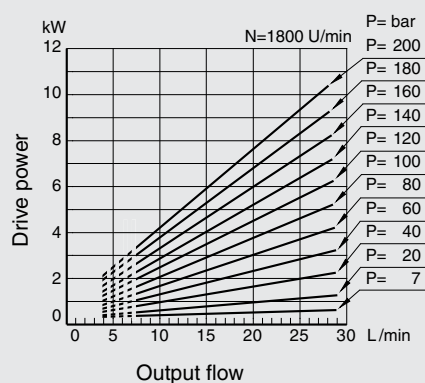
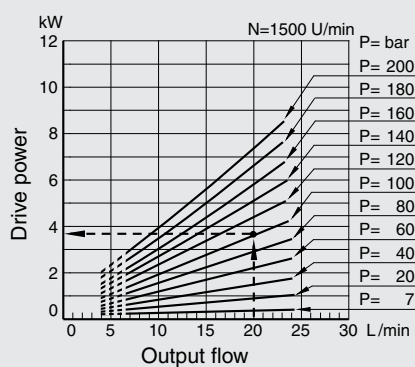
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

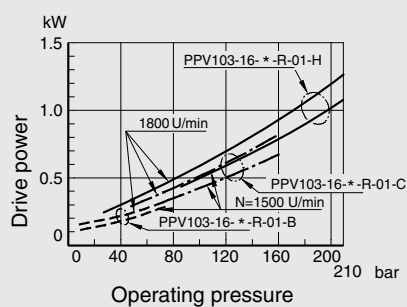


● Drive power

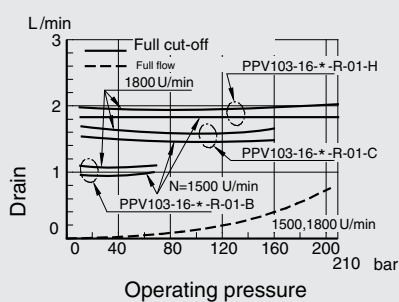
Example: For an operating pressure of 100 bar, an output flow of 20 l/min at 1500 rpm, the input power is approx. 3.7 kW



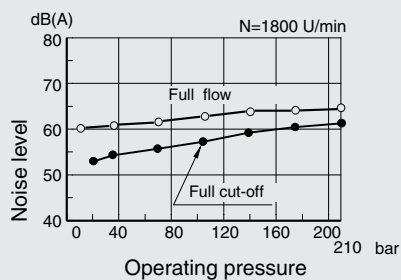
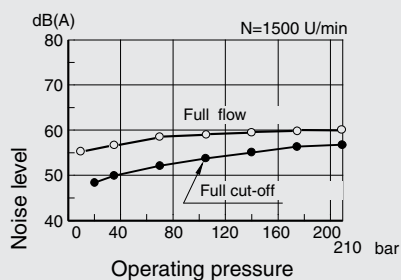
● Full cut-off power



● Drain

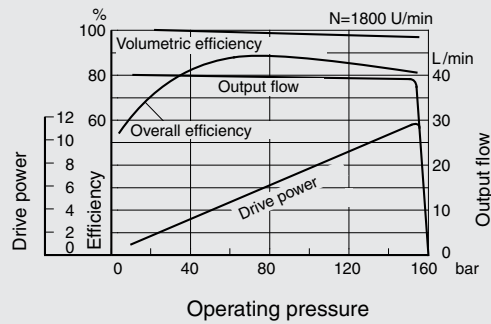
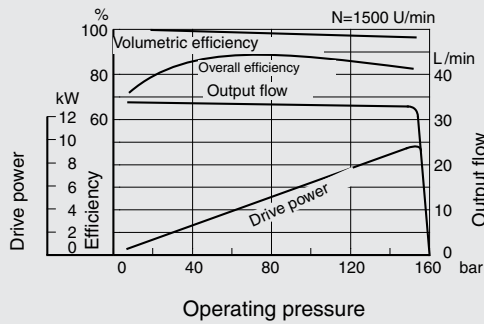


● Noise level



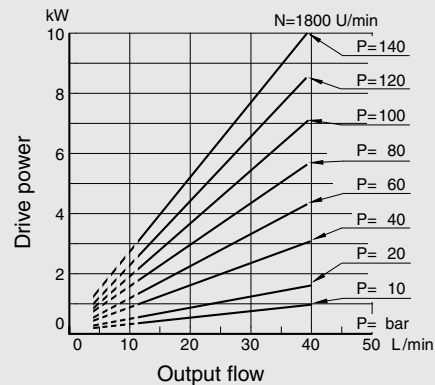
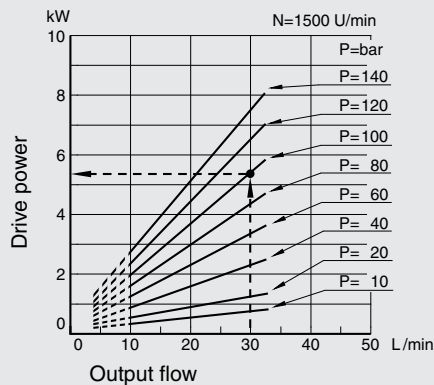
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

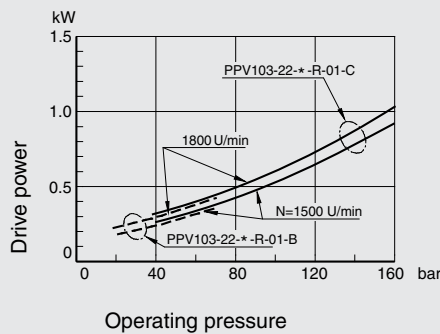


● Drive power

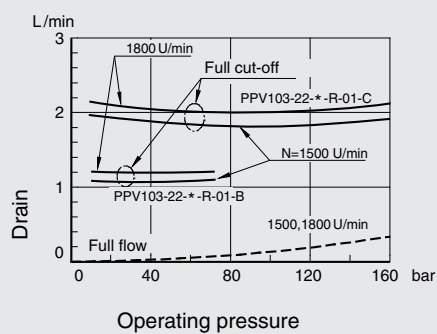
Example: For an operating pressure of 100 bar, an output flow of 30 l/min at 1500 rpm, the input power is approx. 5.4 kW



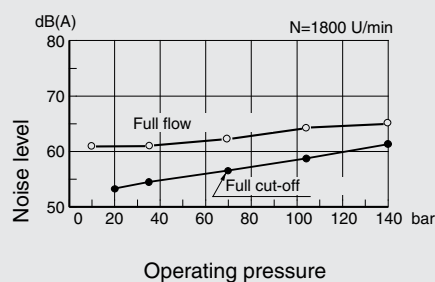
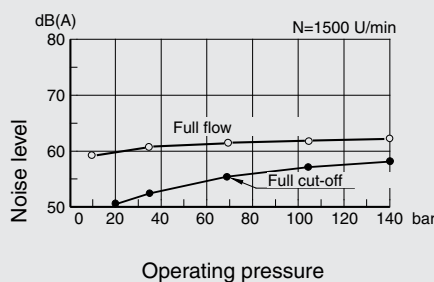
● Full cut-off power



● Drain

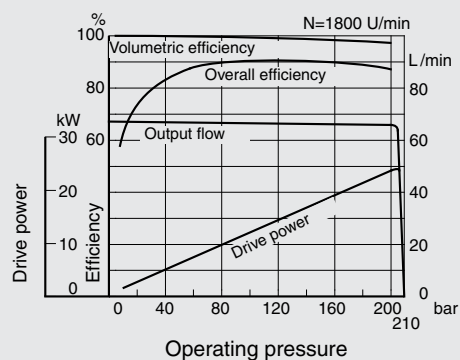
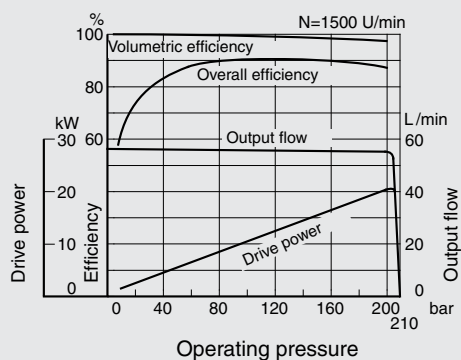


● Noise level



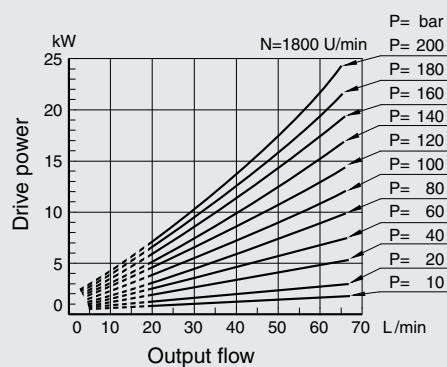
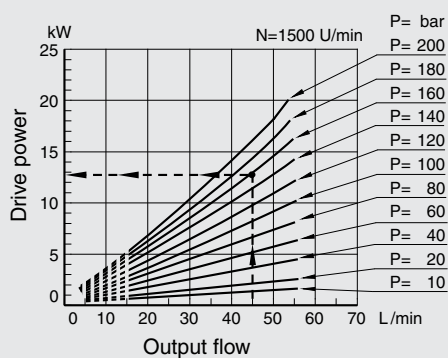
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

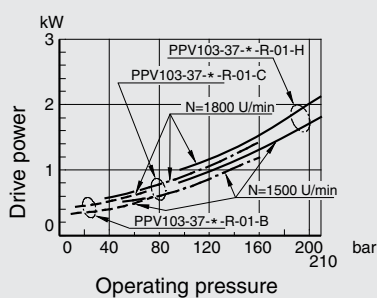


● Drive power

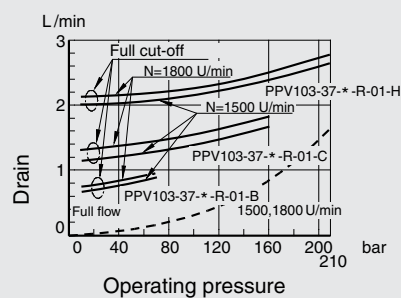
Example: For an operating pressure of 160 bar, an output flow of 45 l/min at 1500 rpm, the input power is approx. 12.6 kW



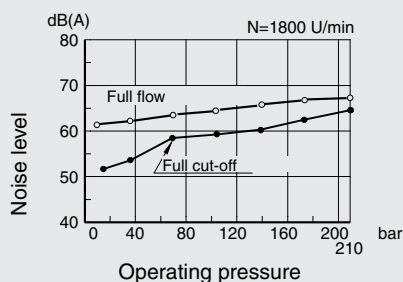
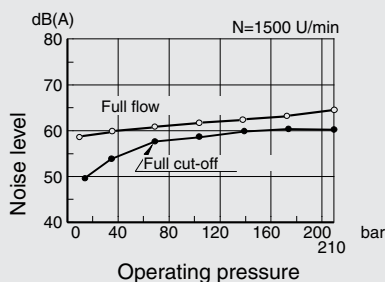
● Full cut-off power



● Drain

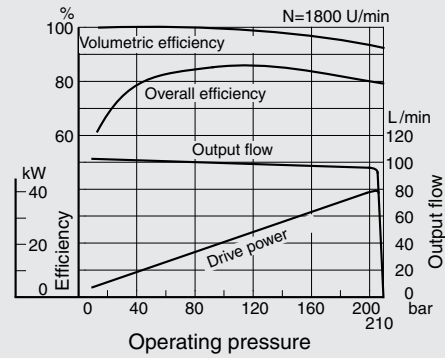
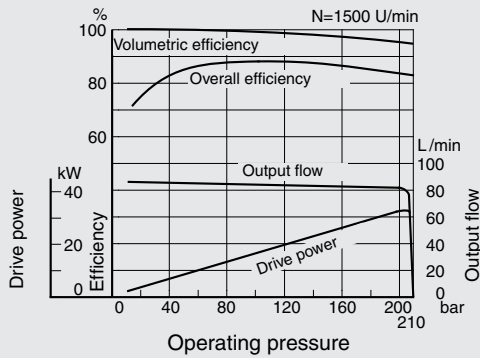


● Noise level



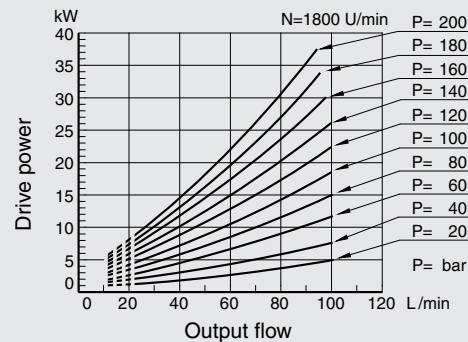
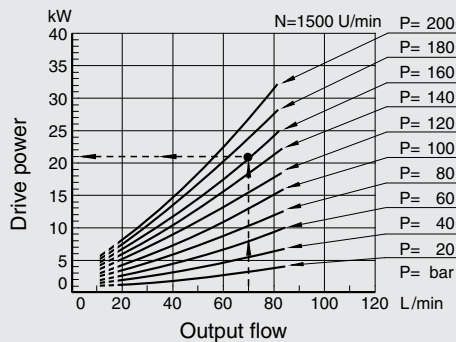
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

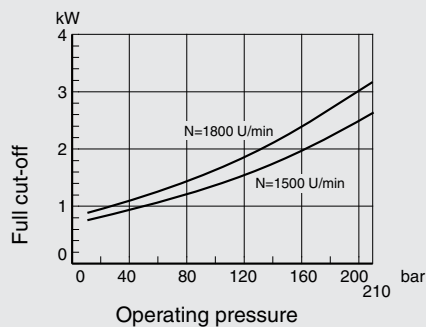


● Drive power

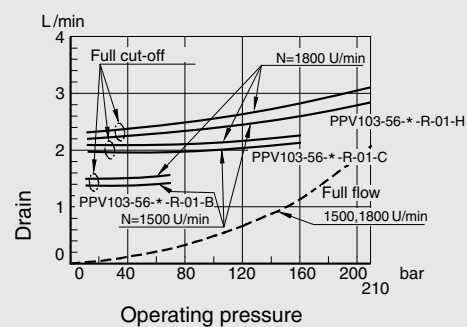
Example: For an operating pressure of 160 bar, an output flow of 70 l/min at 1500 rpm, the input power is approx. 20.8 kW



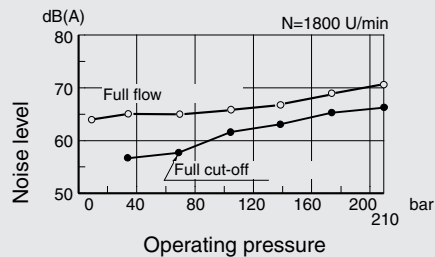
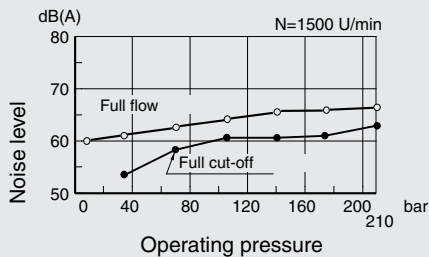
● Full cut-off power



● Drain

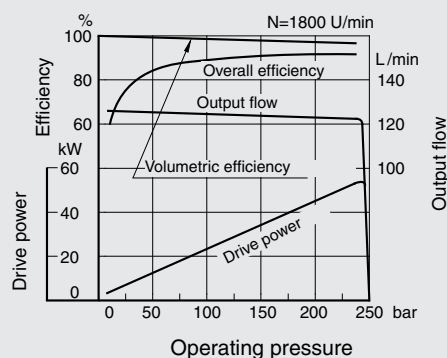
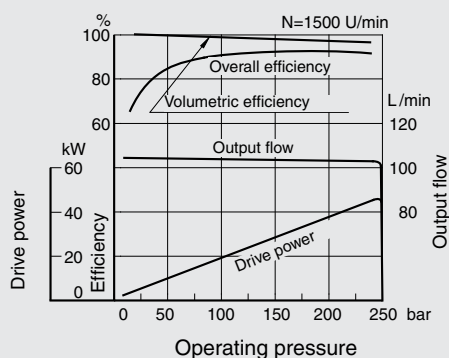


● Noise level



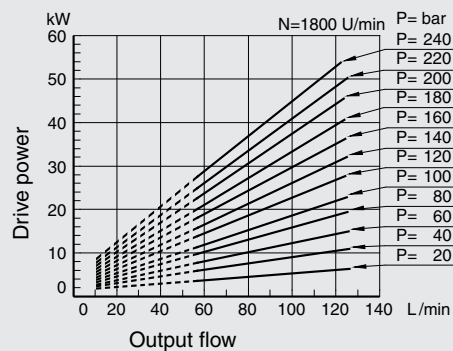
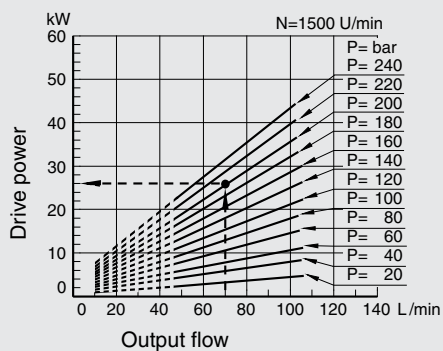
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

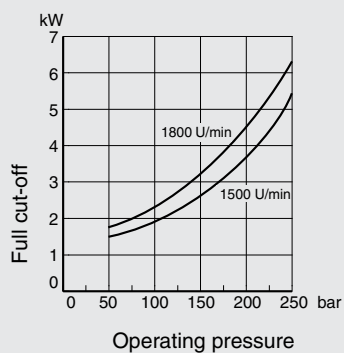


● Drive power

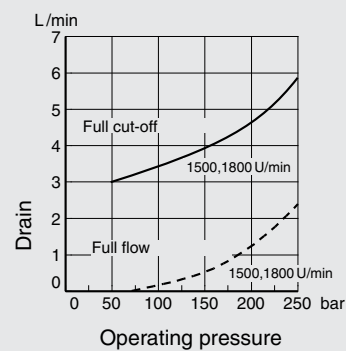
Example: For an operating pressure of 200 bar, an output flow of 70 l/min at 1500 rpm, the input power is approx. 26 kW



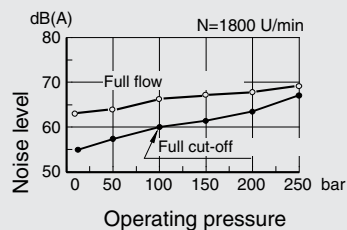
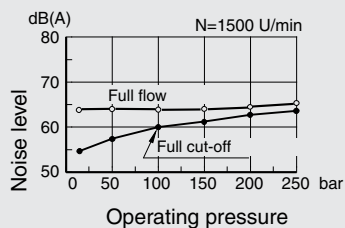
● Full cut-off power



● Drain

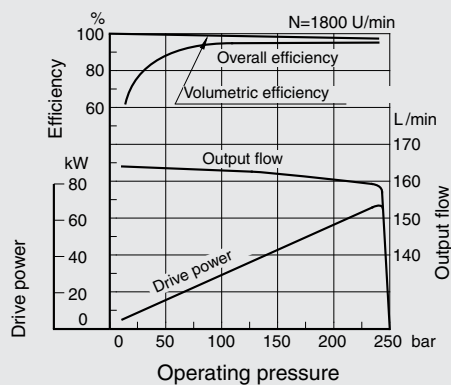
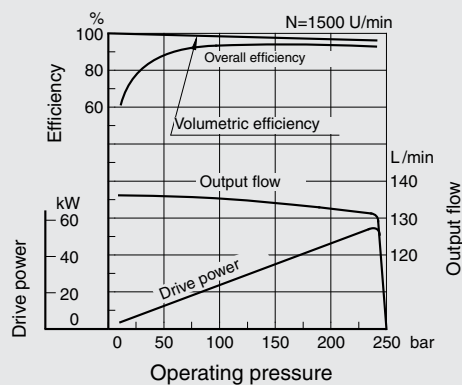


● Noise level



* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

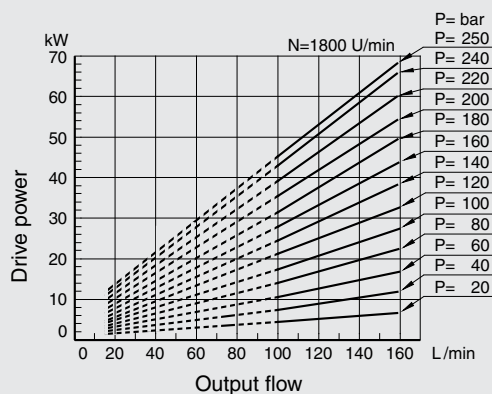
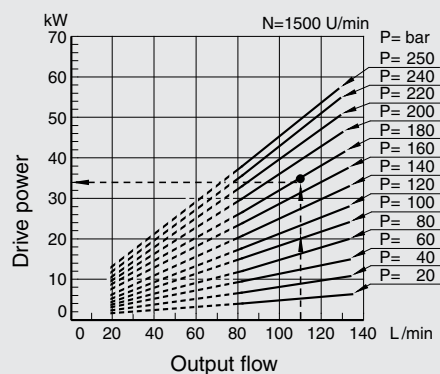
● Performance characteristic curve



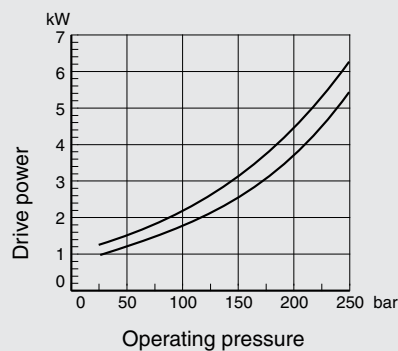
● Drive power

Example:

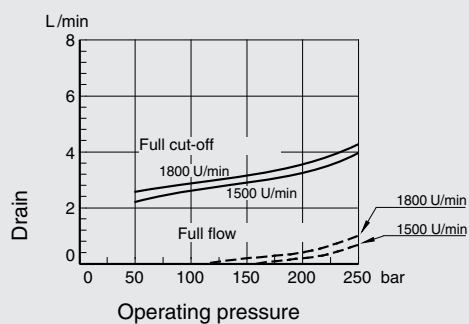
For an operating pressure of 180 bar, an output flow of 110 l/min at 1500 rpm, the input power is approx. 34 kW



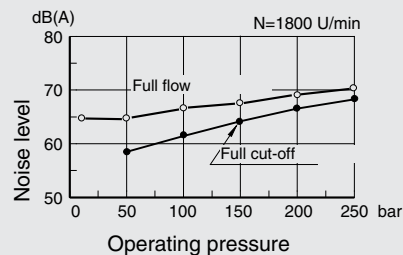
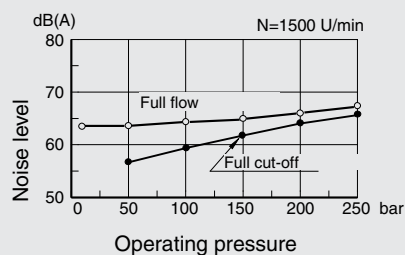
● Full cut-off power



● Drain

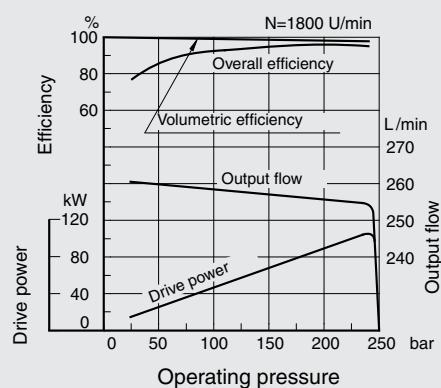
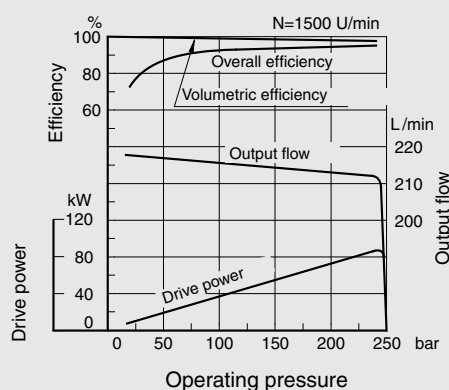


● Noise level



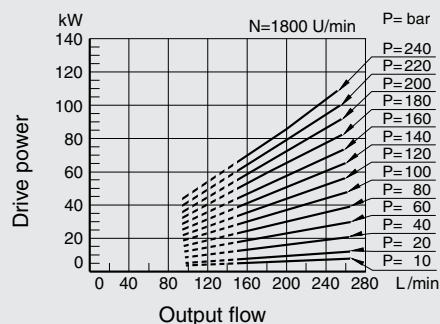
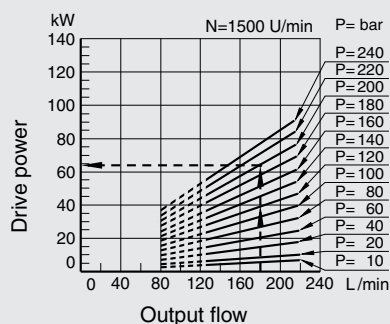
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

● Performance characteristic curve

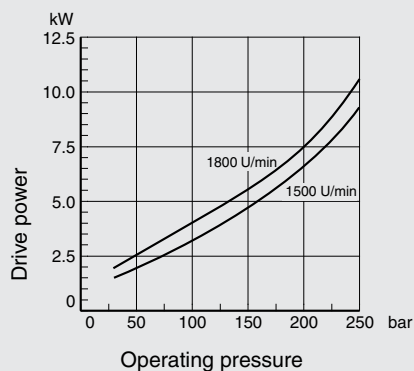


● Drive power

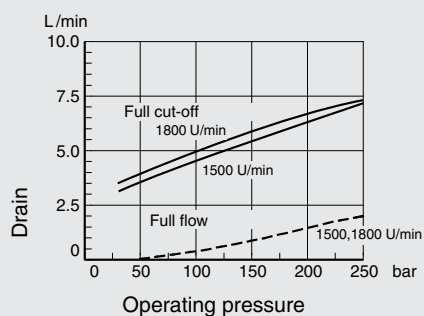
Example: For an operating pressure of 200 bar, an output flow of 180 l/min at 1500 rpm, the input power is approx. 64 kW



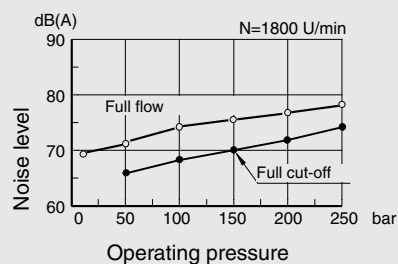
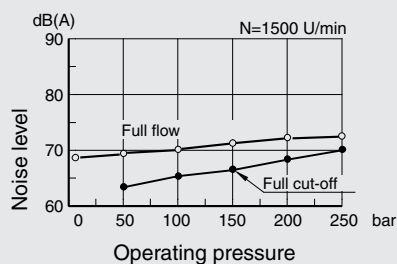
● Full cut-off power



● Drain



● Noise level

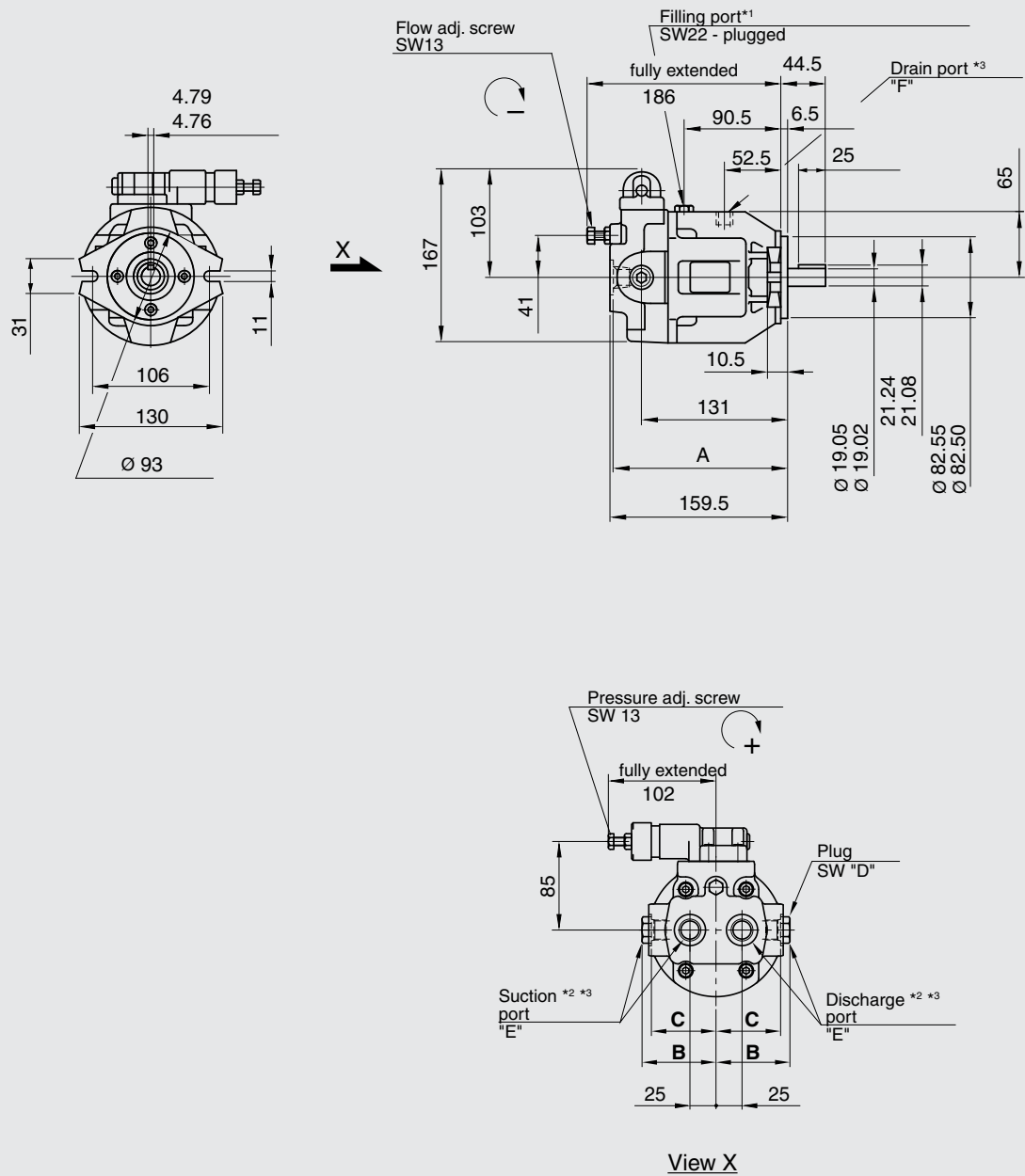


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

DIMENSIONS

2.5.22 PPV103-10

PPV103-10 with pressure control 01

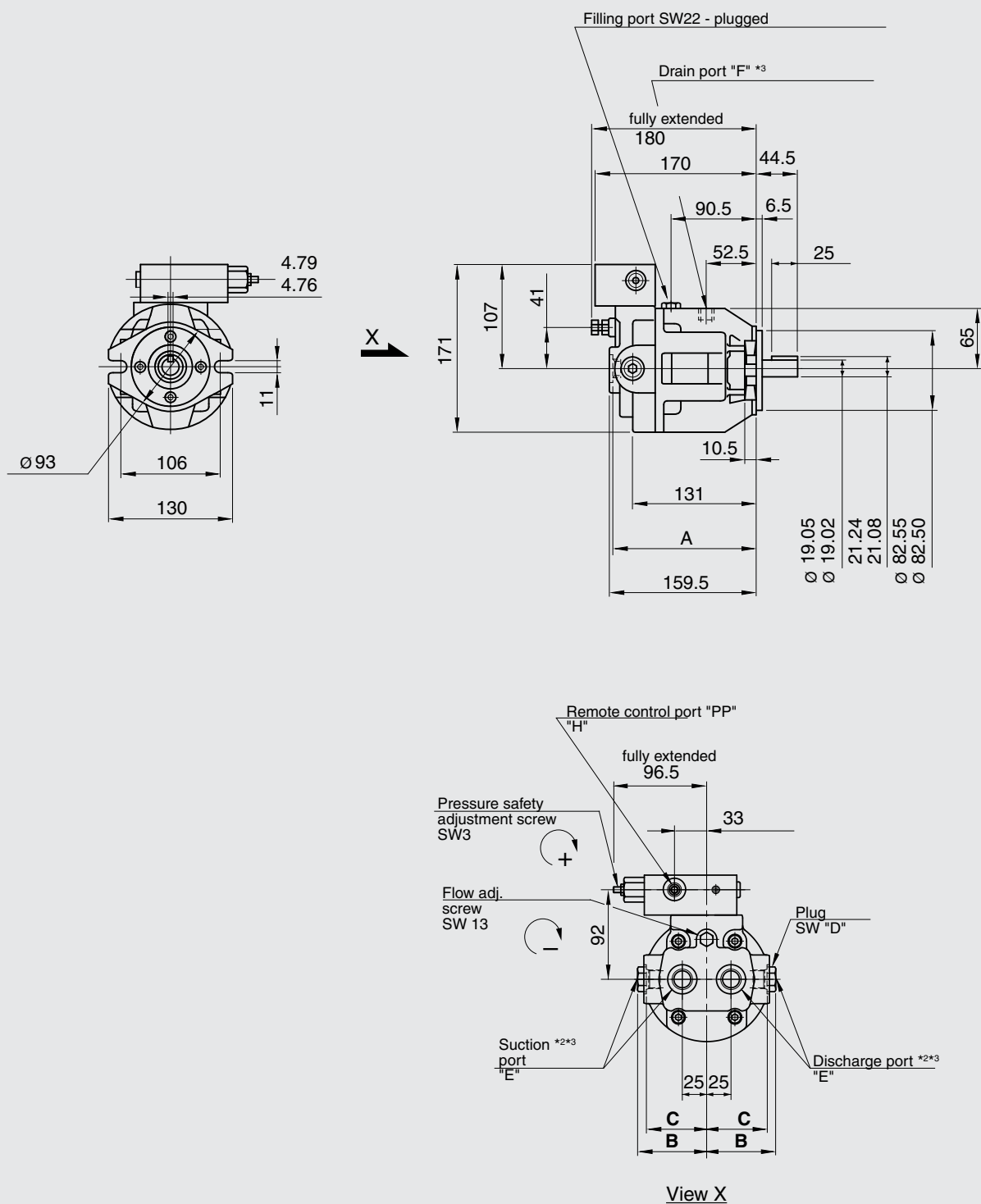


*¹ Install the pump with the filling port at the top.
*² Side and axial suction and discharge ports. Plug any ports that are not required.
*³ Torques for the suction, discharge and drain ports are given in the table below.

Model numbers	Dimensions mm				Thread size	
	A	B	C	D	E	F
PPV103-10 ... 1280 European Standard	159	72	64	27	1/2 BSP.F	3/8 BSP.F
PPV103-10 ... 12950 North American Standard	157	71	62	22	3/4-16 UNF	9/16-18 UNF

Model numbers	Torque Nm	
	Suction and discharge port	Drain port
PPV103-10 ...1280	56-62	33-36
PPV103-10 ...12950	47-51	40-50

PPV103-10 with remote pressure control 07



¹ Install the pump with the filling port at the top.

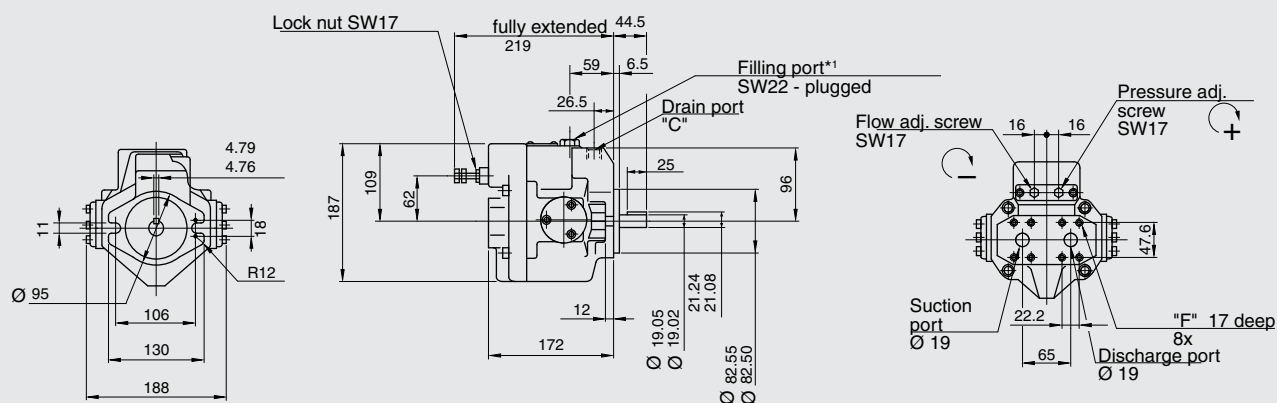
² Side and axial suction and discharge ports. Plug any ports that are not required.

³ Torques for the suction, discharge and drain ports are given in the table on page 154.

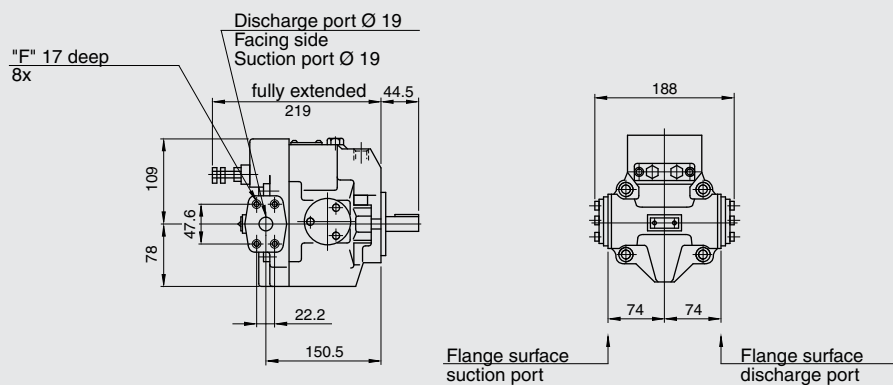
Model numbers	Dimensions mm				Thread size		
	A	B	C	D	E	F	H
PPV103-10 ...1280 European Standard	159	72	64	22	1/2 BSP.F	3/8 BSP.F	1/4 BSP.Tr
PPV103-10 ...12950 North American Standard	157	71	62	27	3/4-16 UNF	9/16-18 UNF	7/16-20 UNF

2.5.23 PPV103-16 / -22

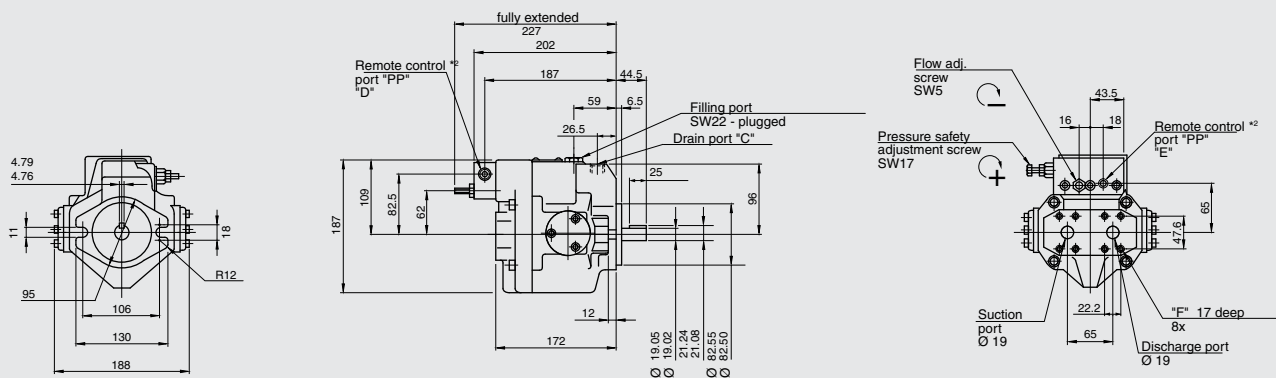
PPV103-16 / -22 with pressure control 01



Side port option



PPV103-16 / -22 with remote pressure control 07

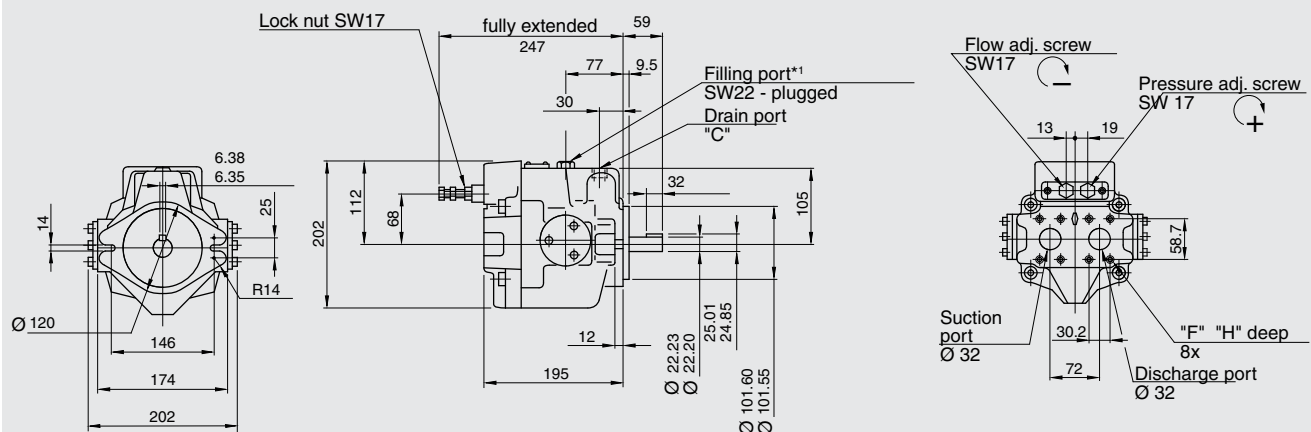


*1 Install the pump with the filling port at the top.

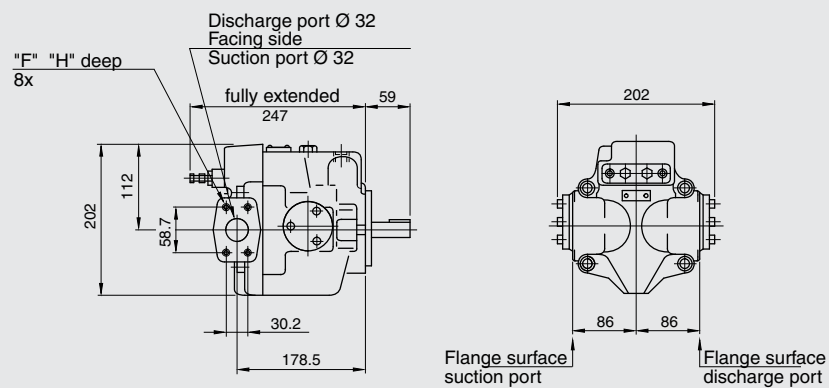
*2 Plug any ports that are not required.

Model numbers	"C" Thread	"D" Thread	"E" Thread	"F" Thread
PPV103-16 / -22 ...3280	3/8 BSP.F	3/8 BSP.F	1/4 BSP.Tr	M10
PPV103-16 / -22 ...3290	3/4-16 UNF	9/16-18 UNF	7/16-20 UNF	3/8-16 UNC

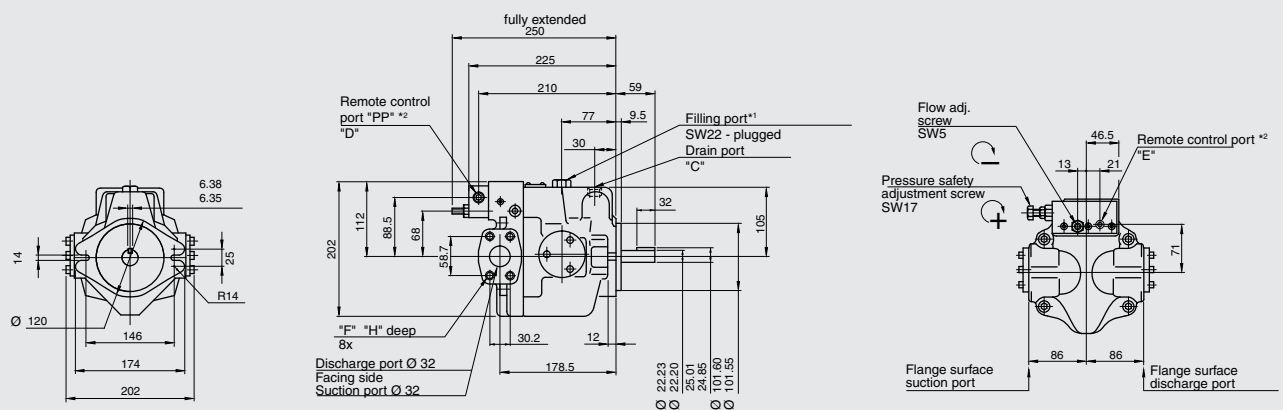
PPV103-37 with pressure control 01



Side port option



PPV103-37 with remote pressure control 07

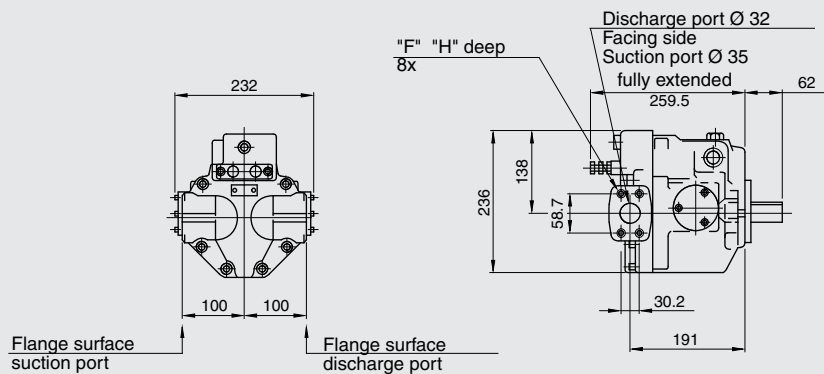


*1 Install the pump with the filling port at the top.

*2 Plug any ports that are not required.

Model numbers	"C" Thread	"D" Thread	"E" Thread	"F" Thread	"H" mm
PPV103-37 ...3280	1/2 BSP.F	3/8 BSP.F	1/4 BSP.Tr	M10	19
PPV103-37 ...3290	7/8-14 UNF	9/16-18 UNF	7/16-20 UNF	7/16-14 UNC	20

Side port option



Technical drawings of the SW5 pump assembly, showing dimensions and labels for various components.

Front View (Left):

- Drain ports
- Dimensions: 41, 49, 7.97, 7.94, 14, 25, R14, 146, 174, 232, Ø 120

Side View (Middle):

- fully extended
- Remote control port "PP" "D"
- Dimensions: 262.5, 237.5, 222.5, 62, 50.5, 9.5, 43.5, 236, 138, 97.5, 90, 77, 58.7, 40, 30.2, 12, 191, 8x
- Discharge port Ø 30 Facing side
- Suction port Ø 35
- Filling port*1 SW22 - plugged
- Drain port*2
- Flow adj. screw SW5
- Pressure safety adjustment screw SW5
- Flange surface suction port
- Flange surface discharge port
- Remote control port*2 "E"
- Dimensions: 13, 21, 46.5, 80, 100, 100

Top View (Right):

- Flange surface suction port
- Flange surface discharge port
- Remote control port*2 "E"
- Dimensions: 13, 21, 46.5, 80, 100, 100

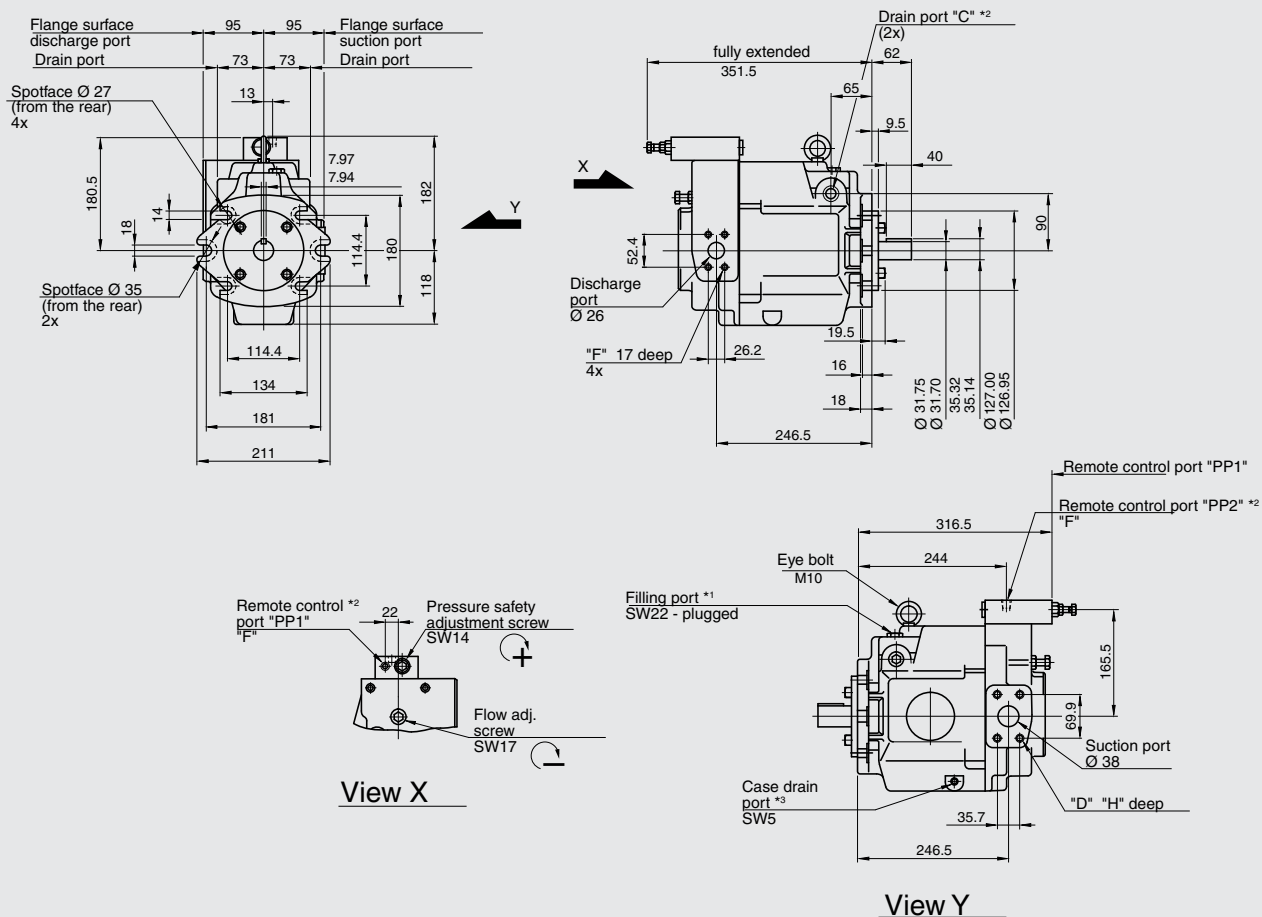
Bottom View (Left):

- Discharge port Ø 30 Facing side
- Suction port Ø 35
- Dimensions: 146, 174, 232, Ø 120

*2 Plug any ports that are not required.

Model numbers	"C" Thread	"D" Thread	"E" Thread	"F" Thread	"H" mm
PPV103-56 ...3280	3/4 BSP.F	3/8 BSP.F	1/4 BSP.Tr	M10	19
PPV103-56 ...3290	1 1/16-12 UNF	9/16-18 UNF	7/16-20 UNF	7/16-14 UNC	20

PPV103-70 with remote pressure control 07

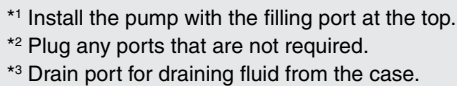


*1 Install the pump with the filling port at the top.

*2 Plug any ports that are not required.

*3 Drain port for draining fluid from the case.

Model numbers	"C" Thread	"D" Thread	"E" Thread	"F" Thread	"H" mm
PPV103-70 ...6080	3/4 BSP.F	M12	M10	1/4 BSP.Tr	19
PPV103-70 ...60950	1 1/16-12 UN	1/2-13 UNC	3/8-16 UNC	7/16-20 UNF	21

DAC160

Variable Displacement Axial Piston Pumps:

Installation Manual



MEDIUM HEAVY DUTY SERIES

PPV100S16
PPV100S37
PPV100S56
PPV100S71
PPV100S100
PPV100S145
PPV100S180



MEDIUM HEAVY DUTY SERIES

PPV100-16
PPV100-37
PPV100-56
PPV100-71
PPV100-100
PPV100-145
PPV100-180



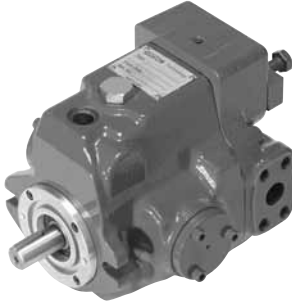
MEDIUM HEAVY DUTY SERIES

PPV101-45
PPV101-80
PPV101-112
PPV101-140
PPV101-200



■ HEAVY DUTY SERIES

PPV102-63
 PPV102-112
 PPV102-180
 PPV102-280
 PPV102-360
 PPV102-560



■ LIGHT DUTY SERIES

PPV103-10
 PPV103-16
 PPV103-22
 PPV103-37
 PPV103-56
 PPV103-70
 PPV103-90
 PPV103-145

To prevent serious accidents, equipment damage, and other property damage, please observe the following precautions, as well as all related regulations regarding safety.

Before using the product, make sure you read and understand all the instructions in the Operator's Manual entirely.

In this catalogue, safety precautions are classified under three headings:

DANGER, WARNING, and CAUTION.

These words are defined as follows:



DANGER

Indicates an imminent danger that is very likely to cause death or severe injury unless the situation is avoided.



WARNING

Indicates a potential danger that may cause death or severe injury unless the situation is avoided.



CAUTION

Indicates a potential danger that may cause a minor or moderate injury or that may result in property damage.



INFORMATION

Indicates useful hints and system tips. They are necessary for correct installation and safe use of the product.



PRECAUTIONS FOR USE

CAUTION

1. To avoid possible injury when handling the products, wear protective safety equipment in accordance with the instructions in the Operator's Manual.



CAUTION

2. Failure to support the weight of the product or lifting the product with improper posture may result in injury to the hands or back. Be sure to follow the instructions in the Operator's Manual.



CAUTION

3. Do not climb on, strike, drop or exert unnecessary force on the product. This may lead to injury or fire due to incorrect operation, damage, or oil leakage.



CAUTION

4. Oil on the product or floor must be cleaned up thoroughly. Oil could cause you to drop the product or slip on the floor.

PRECAUTIONS FOR INSTALLATION, REMOVAL, AND MAINTENANCE



WARNING

1. All installation, removal, maintenance, piping or wiring work should be carried out by properly trained personnel.



WARNING

2. Before beginning any installation, removal, maintenance, piping or wiring work, the following procedures must be carried out. Failure to carry out these procedures may cause the equipment to move suddenly or oil to spill during the work, which may result in serious accidents.

- Shut off the power supply to the equipment and make sure that all the electrical motors or machines cannot restart unintentionally.
- Secure the cylinder rods before installing/removing the cylinder.
- Reduce the pressure in the pipes and cylinders in the hydraulic system to zero pressure.



WARNING

3. Before working on any electrical wiring, be sure to shut off the power supply. Failure to do this may cause an electric shock.



CAUTION

4. Keep all installation holes and surfaces clean. Failure to do this may cause insufficient tightening of the bolts which may lead to a fire due to oil leakage.



CAUTION

5. Before commissioning the device, make sure that all bolts are tightened to the specified torque. Failure to do so may result in incorrect operation, damage, oil leakage, etc.

PRECAUTIONS FOR OPERATION



DANGER

1. Never operate any device in an environment where there is danger of explosion or fire, unless the device is fully protected. This may lead to major and serious accidents including explosion or fire.



WARNING

2. Do not approach the pumps or motors when in operation. Hands or clothes can be caught up and wound into the pumps and motors which can lead to serious injury.



WARNING

3. In event of abnormal operation (unusual sounds, oil leakage, smoke, etc.), immediately stop operation and take appropriate corrective measures.



WARNING

4. Completely discharge air from the cylinder at low pressure. Failure to do so may result in unexpected movement of the cylinder, which in turn may cause injury.



WARNING

5. To adjust the damping, gradually increase the cylinder speed from a low speed (50 mm/s or less). Rapidly accelerating the cylinder may produce an abnormal pressure surge, resulting in damage to the cylinder or the machinery and causing a serious accident.



WARNING

6. Before operating this device for the first time, check that hydraulic and electrical circuits are properly connected and that adjoining surfaces are tightly aligned.



WARNING

7. Do not use the product outside of the specifications described in the catalogue, related data sheets, drawings, etc. Failure to adhere to them may cause incorrect operation, damage or injury.



WARNING

8. During operation, high temperatures may occur in the hydraulic system or solenoid valves. Protective gloves and suits must be worn when in the vicinity of these devices.



WARNING

9. Always operate the device with clean oil, and within established ranges for temperature, viscosity and cleanliness. Failure to adhere to specified limits may result in incorrect operation or fire due to oil leakage.

GENERAL PRECAUTIONS



WARNING

1. Never modify the equipment. If any alterations are made, unexpected machine movement may cause injury.



CAUTION

2. Do not disassemble the products without prior consent of the manufacturer. Failure to adhere to this can cause the products to operate incorrectly which can lead to accidents or damage.



CAUTION

3. For transportation / storage of the product, pay attention to environmental conditions, such as ambient temperature and humidity, and implement anti-dust / anti-corrosion measures.



CAUTION

4. The seals may need to be replaced if the product is used after long-term storage.



CAUTION

5. Read the manual thoroughly and ensure that the seals are replaced properly.

RELATED REGULATIONS



CAUTION

To ensure that this product is used in a safe manner, it is essential to observe the above precautions, as well as all related regulations regarding safety.



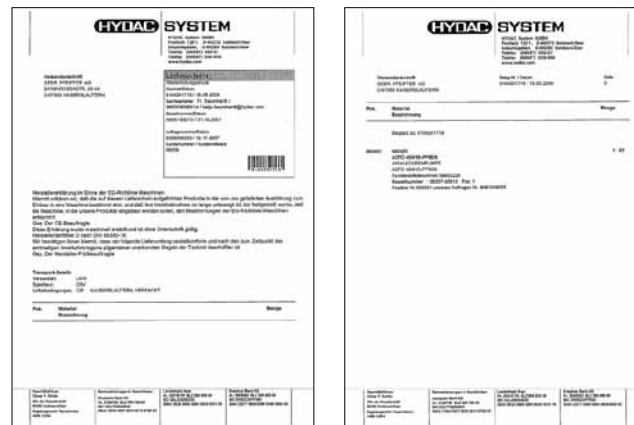
MEDIUM HEAVY DUTY SERIES

Technical specifications

Series	Geometric displacement [cm ³ /rev]	Operating pressure		Drive speed [rpm]
		Rated [bar]	Peak [bar]	
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

Documentation

Check the product's model code and compare it with your paper work.



Delivery note and / or sales acknowledgement.

Direction of rotation

Check the direction of rotation of the shaft and compare it to the drive unit.

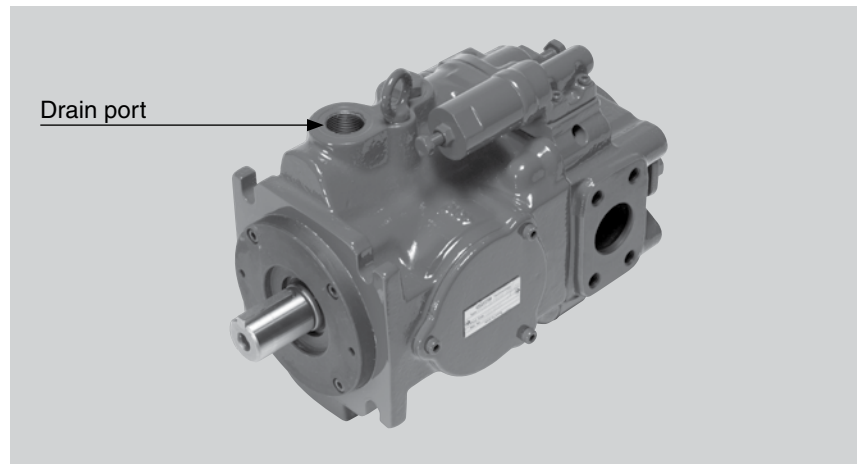
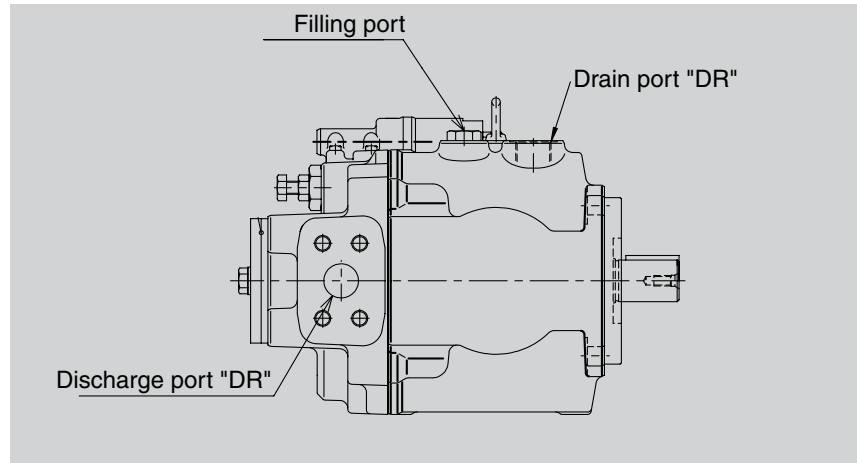
R



Clockwise shaft rotation.
Viewed from (front) end of shaft.

Ports

Suction, discharge, drain and filling ports



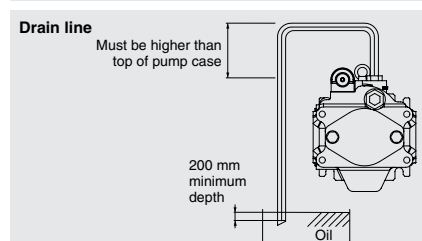
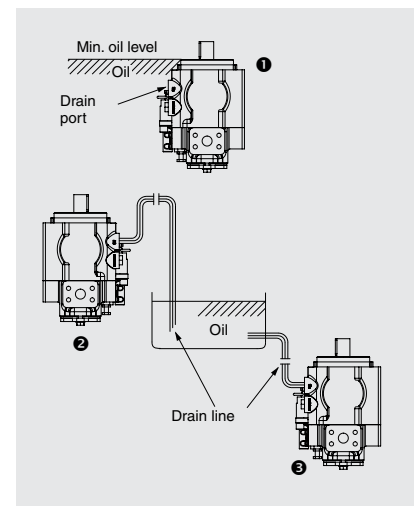
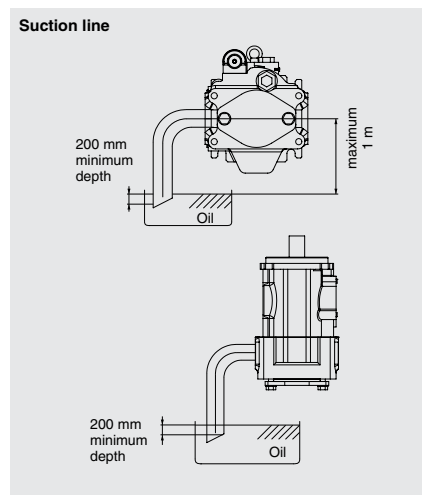
Minimum pump suction pressure
under static and dynamic load:

$$p_{in\ Min} = 0.833 \text{ bar absolute}$$

Maximum pump inlet pressure:

$$p_{in\ Max} = 1.500 \text{ bar absolute}$$

Pump arrangement



Piping



Drain line

Do not combine drain lines.

Always run drain lines separately, not longer than 1 m and the pipe end must be immersed in oil.

Do not restrict drain lines.

A restricted drain line (cooler, filter, valve etc.) can damage the pump.

Do not reduce drain line internal diameter.

The drain line internal diameter must always correspond to the drain hole size on the pump case.



Suction line

Do not restrict suction lines.

A restricted suction line (filter, valve etc.) can generate excessive noise and damage the pump.

Do not reduce the suction line internal diameter.

The suction line internal diameter must always correspond to the flange size on the pump case.



General

Use rubber hoses to reduce noise and excessive load on the pump.

Use high pressure hoses and pipes only at the outlet (discharge port) of the pump.

Commissioning



Prior to commissioning, the pump case must be filled with hydraulic fluid (use filling port). Initial commissioning should be at zero pressure with an open circuit to enable the pump to prime.

Pressure should only be increased once the pump has been fully primed.

Hydraulic fluid



- Normal mineral oil (H, HL)
- Premium hydraulic fluid (HLP)
- Phosphate ester (HFD-R)
- Polyolester (HEES, HFD-U)
- Water glycol (HFC)

Note:

For operating restrictions, please contact HYDAC.

Filtration



For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class to

NAS 1638 Class 10 (21/19/16 ISO 4406:1999) or cleaner.

Viscosity and temperature

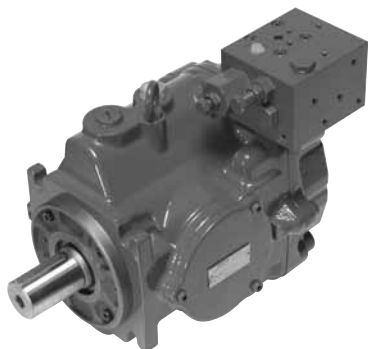


Normal operating viscosity range is 20 – 400 cSt (mm²/s).

Normal operating temperature range is -20 to +95 °C.

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.



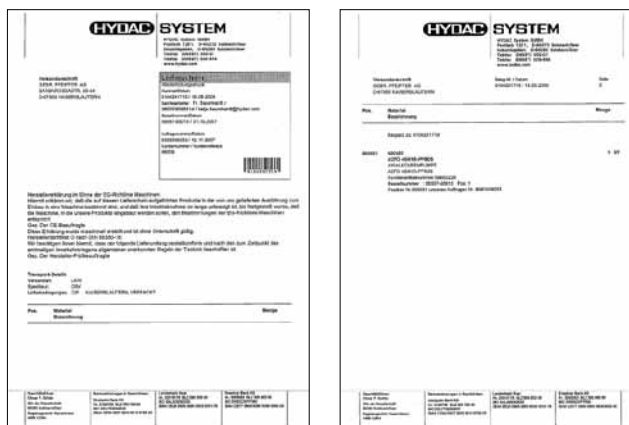
MEDIUM HEAVY DUTY SERIES

Technical specifications

Series	Geometric displacement [cm ³ /rev]	Operating pressure		Drive speed [rpm]
		Rated [bar]	Peak [bar]	
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

Documentation

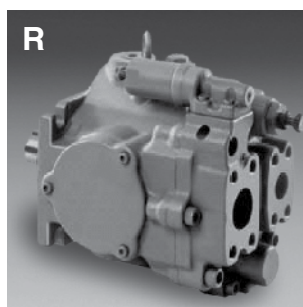
Check the product's model code and compare it with your paper work.



Delivery note and / or sales acknowledgement.

Direction of rotation

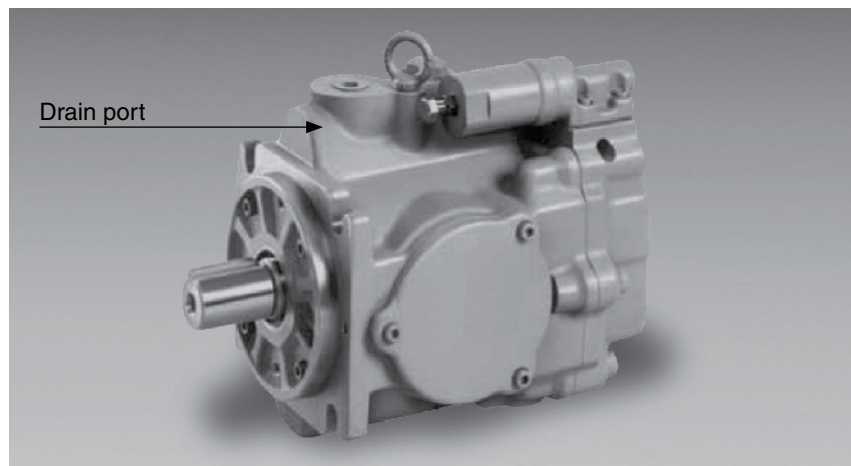
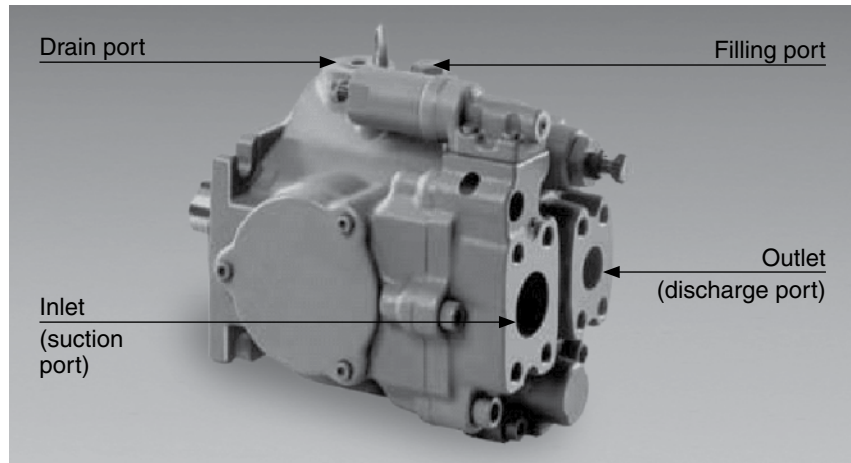
Check the direction of rotation of the shaft and compare it to the drive unit.



Clockwise shaft rotation.
Viewed from (front) end of shaft.

Ports

Suction, discharge, drain and filling ports



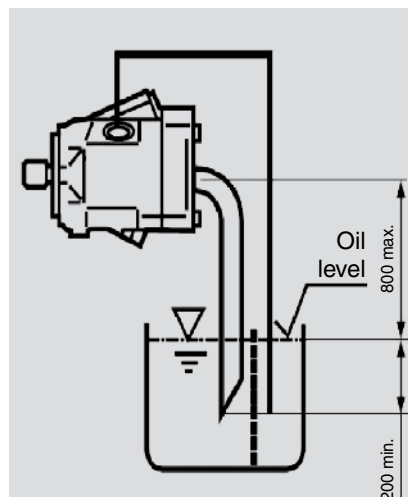
Minimum pump suction pressure
under static and dynamic load:

$$p_{in\ Min} = 0.833\ \text{bar absolute}$$

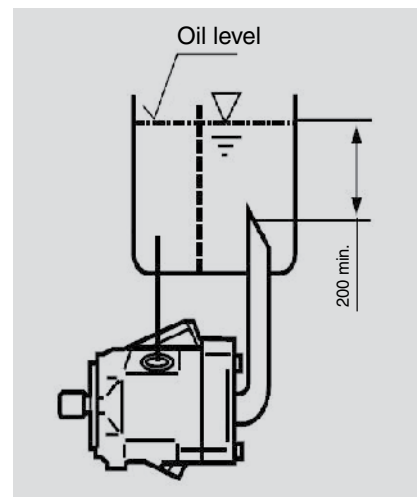
Maximum pump inlet pressure:

$$p_{in\ Max} = 1.500\ \text{bar absolute}$$

Pump arrangement



Standard arrangement:
pump above reservoir.



Preferred arrangement
for best suction characteristics
and low noise level
pump operation.
Pump below reservoir.

Piping



Drain line

Do not combine drain lines.

Always run drain lines separately, not longer than 1 m and the pipe end must be immersed in oil.

Do not restrict drain lines.

A restricted drain line (cooler, filter, valve etc.) can damage the pump.

Do not reduce drain line internal diameter.

The drain line internal diameter must always correspond to the drain hole size on the pump case.



Suction line

Do not restrict suction lines.

A restricted suction line (filter, valve etc.) can generate excessive noise and damage the pump.

Do not reduce the suction line internal diameter.

The suction line internal diameter must always correspond to the flange size on the pump case.



General

Use rubber hoses to reduce noise and excessive load on the pump.

Use high pressure hoses and pipes only at the outlet (discharge port) of the pump.

Commissioning



Prior to commissioning, the pump case must be filled with hydraulic fluid (use filling port). Initial commissioning should be at zero pressure with an open circuit to enable the pump to prime.

Pressure should only be increased once the pump has been fully primed.

Hydraulic fluid



- Normal mineral oil (H, HL)
- Premium hydraulic fluid (HLP)
- Phosphate ester (HFD-R)
- Polyolester (HEES, HFD-U)
- Water glycol (HFC)

Note:

For operating restrictions, please contact HYDAC.

Filtration



For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class to

NAS 1638 Class 10 (21/19/16 ISO 4406:1999) or cleaner.

Viscosity and temperature



Normal operating viscosity range is 20 – 400 cSt (mm²/s).

Normal operating temperature range is -20 to +95 °C.

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.



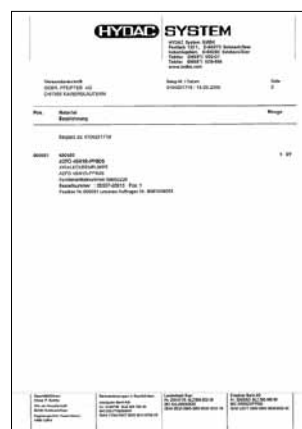
MEDIUM HEAVY DUTY SERIES

Technical specifications

Series	Geometric displacement [cm ³ /rev]	Operating pressure		Drive speed [rpm]
		Nominal pressure [bar]	Peak [bar]	
PPV101-45	45.0	320	350	2700
PPV101-80	80.0			2400
PPV101-112	112.0			2200
PPV101-140	140.0			2200
PPV101-200	200.0			1900

Documentation

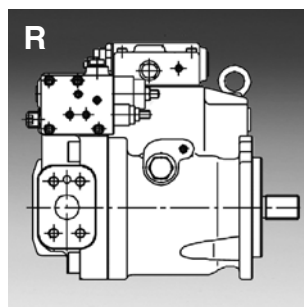
Check the product's model code and compare it with your paper work.



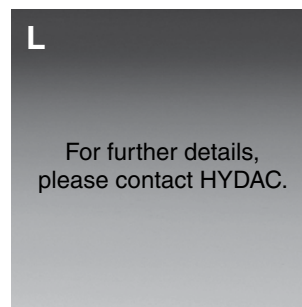
Delivery note and / or sales acknowledgement.

Direction of rotation

Check the direction of rotation of the shaft and compare it to the drive unit.



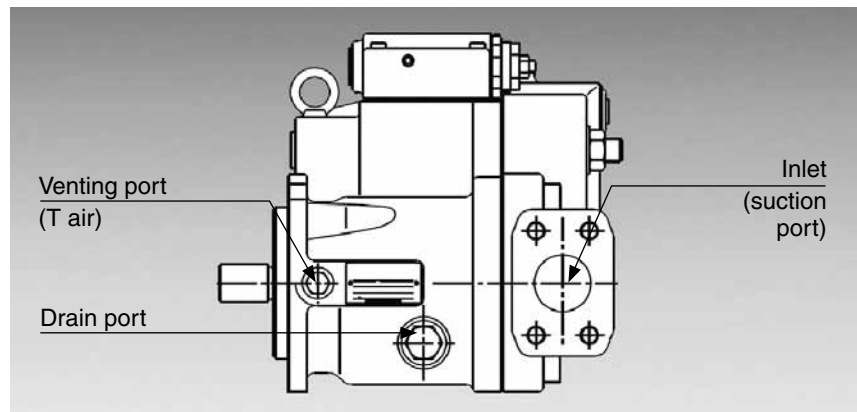
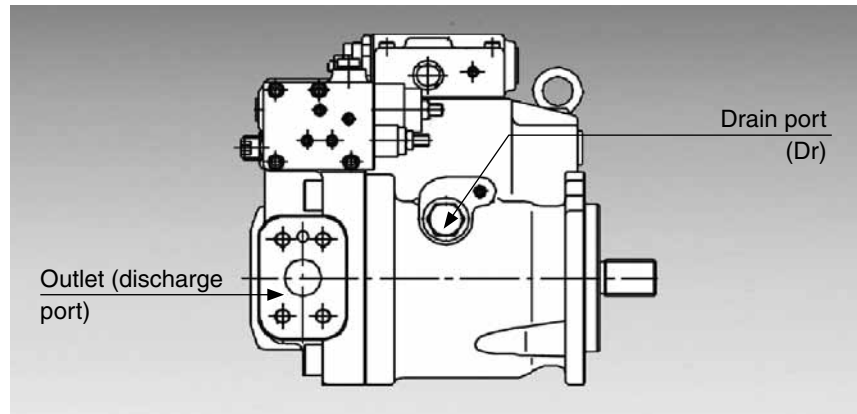
Clockwise shaft rotation.
Viewed from (front) end of shaft.



Anti-clockwise shaft rotation.
Viewed from (front) end of shaft.

Ports

Suction, discharge, drain and venting port



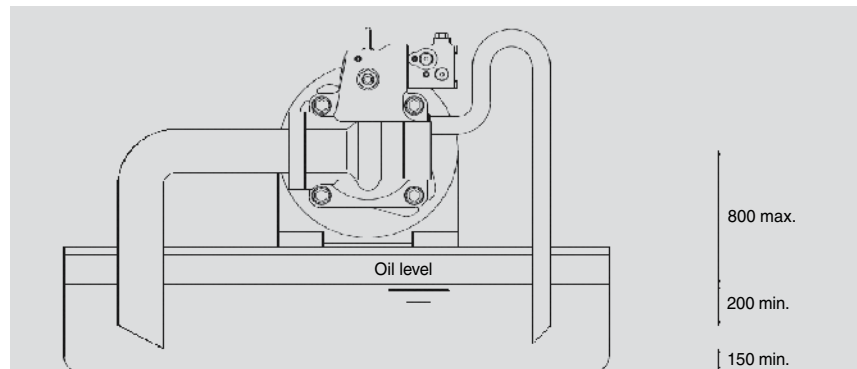
Minimum pump suction pressure
under static and dynamic load:

$$p_{in\ Min} = 1.0\ \text{bar absolute}$$

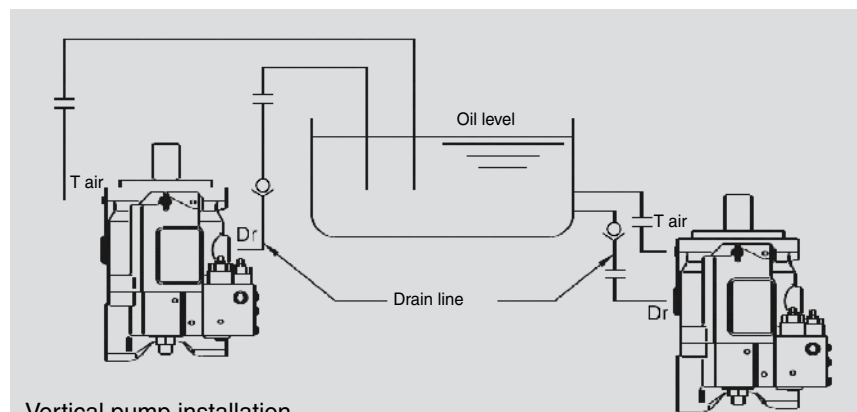
Maximum pump inlet pressure:

$$p_{in\ Max} = 4.5\ \text{bar absolute}$$

Pump arrangement



Standard arrangement: pump above reservoir.



Vertical pump installation

Piping



Drain line

Do not combine drain lines.

Always run drain lines separately, not longer than 1 m and the pipe end must be immersed in oil.

Do not restrict drain lines.

A restricted drain line (cooler, filter, valve etc.) can damage the pump.

Do not reduce drain line internal diameter.

The drain line internal diameter must always correspond to the drain hole size on the pump case.



Suction line

Do not restrict suction lines.

A restricted suction line (filter, valve etc.) can generate excessive noise and damage the pump.

Do not reduce the suction line internal diameter.

The suction line internal diameter must always correspond to the flange size on the pump case.



General

Use rubber hoses to reduce noise and excessive load on the pump.

Use high pressure hoses and pipes only at the outlet (discharge port) of the pump.

Commissioning



Prior to commissioning, the pump case must be filled with hydraulic fluid (use filling port). Initial commissioning should be at zero pressure with an open circuit to enable the pump to prime.

Pressure should only be increased once the pump has been fully primed.

Hydraulic fluid



- Normal mineral oil (H, HL)
- Premium hydraulic fluid (HLP)

Note:

For operating restrictions, please contact HYDAC.

Filtration



For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class to

NAS 1638 Class 9 (21/18/15 ISO 4406:1999) or cleaner.

Viscosity and temperature

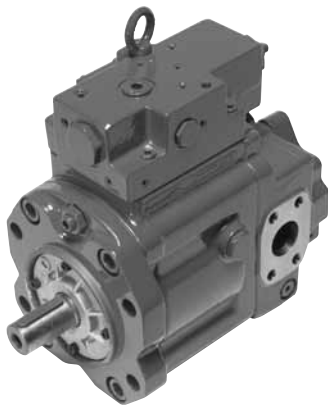


Normal operating viscosity range is 10 – 200 cSt (mm²/s).

Normal operating temperature range is -20 to +95 °C.

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.



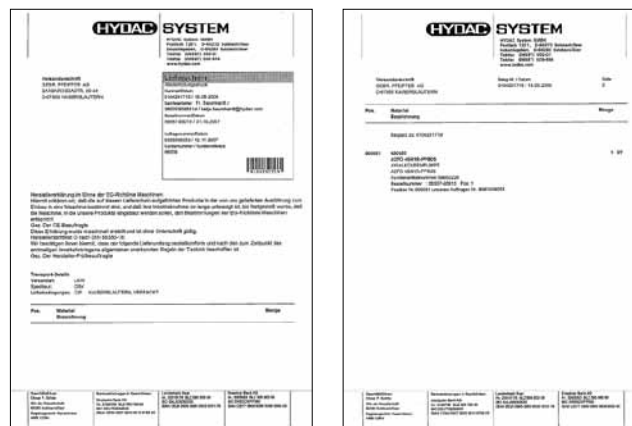
HEAVY DUTY SERIES

Technical specifications

Series	Geometric displacement [cm ³ /rev]	Operating pressure		Drive speed [rpm]
		Nominal pressure [bar]	Peak [bar]	
PPV102-63	63.0	350	400	1800
PPV102-112	112.0			1800
PPV102-180	180.0			1800
PPV102-280	280.0			1500
PPV102-360	2x180.0			1800
PPV102-560	2x280.0			1500

Documentation

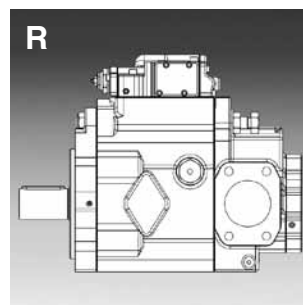
Check the product's model code and compare it with your paper work.



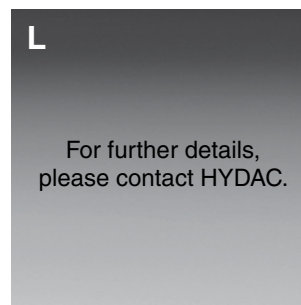
Delivery note and / or sales acknowledgement.

Direction of rotation

Check the direction of rotation of the shaft and compare it to the drive unit.



Clockwise shaft rotation.
Viewed from (front)
end of shaft.

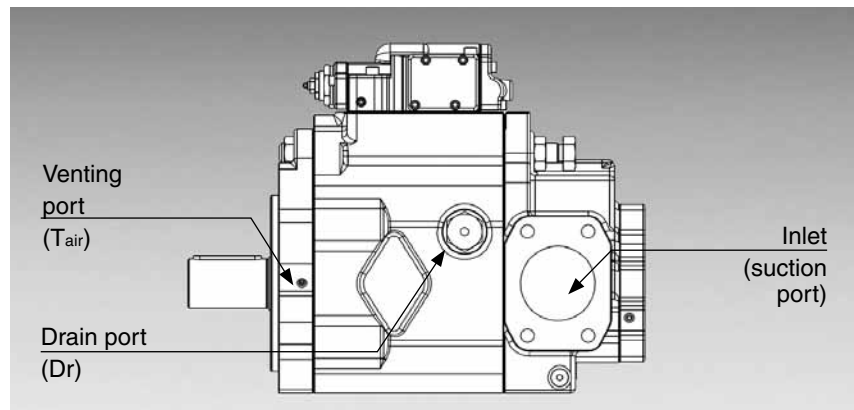
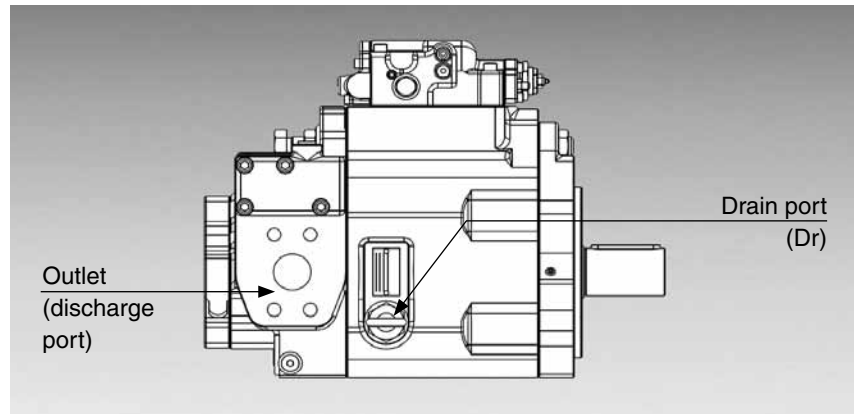


Anti-clockwise shaft rotation.
Viewed from (front)
end of shaft.

For further details,
please contact HYDAC.

Ports

Suction, discharge, drain and venting port



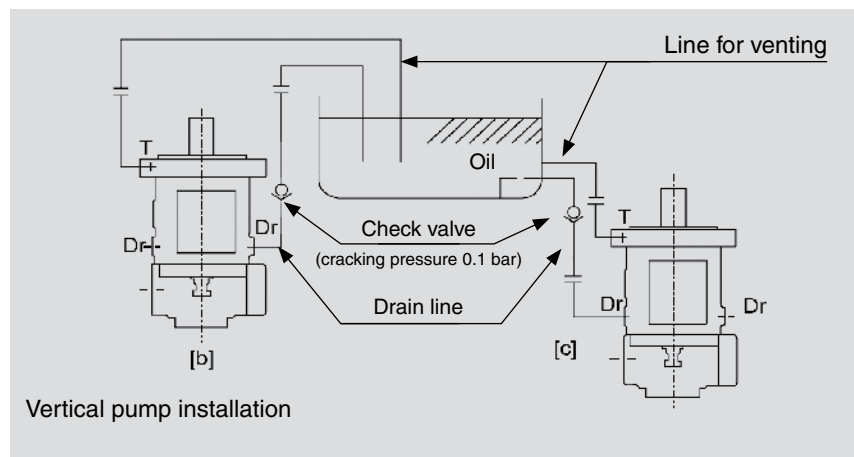
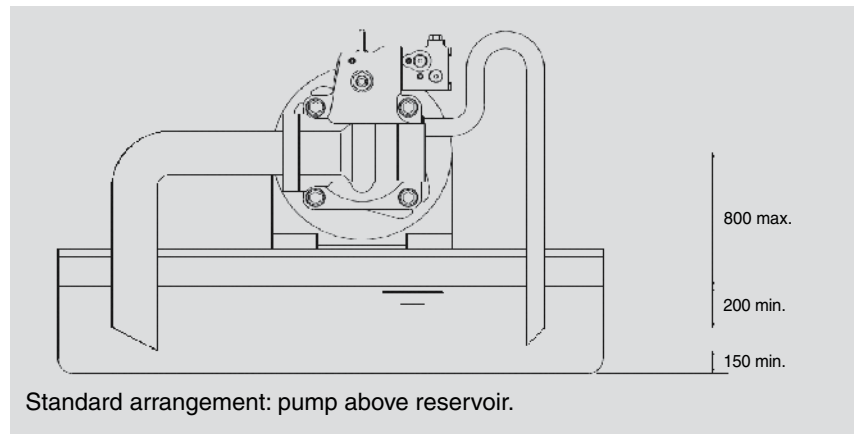
Minimum pump suction pressure
under static and dynamic load:

$$p_{in\ Min} = 0.9 \text{ bar absolute}$$

Maximum pump inlet pressure:

$$p_{in\ Max} = 4.5 \text{ bar absolute}$$

Pump arrangement



Piping



Drain line

Do not combine drain lines.

Always run drain lines separately, not longer than 1 m and the pipe end must be immersed in oil.

Do not restrict drain lines.

A restricted drain line (cooler, filter, valve etc.) can damage the pump.

Do not reduce drain line internal diameter.

The drain line internal diameter must always correspond to the drain hole size on the pump case.



Suction line

Do not restrict suction lines.

A restricted suction line (filter, valve etc.) can generate excessive noise and damage the pump.

Do not reduce the suction line internal diameter.

The suction line internal diameter must always correspond to the flange size on the pump case.



General

Use rubber hoses to reduce noise and excessive load on the pump.

Use high pressure hoses and pipes only at the outlet (discharge port) of the pump.

Commissioning



Prior to commissioning, the pump case must be filled with hydraulic fluid (use filling port). Initial commissioning should be at zero pressure with an open circuit to enable the pump to prime.

Pressure should only be increased once the pump has been fully primed.

Hydraulic fluid



- Normal mineral oil (H, HL)
- Premium hydraulic fluid (HLP)

Note:

For operating restrictions, please contact HYDAC.

Filtration



For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class to
NAS 1638 Class 9 (20/18/15 ISO 4406:1999)
or cleaner.

Viscosity and temperature

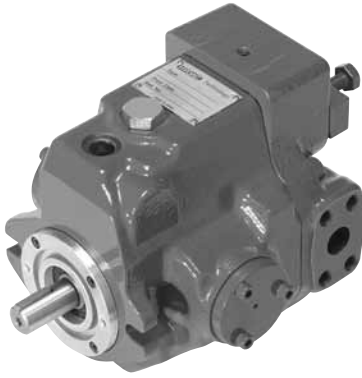


Normal operating viscosity range
is 10 – 200 cSt (mm²/s).

Normal operating temperature range
is -20 to +95 °C.

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.



LIGHT DUTY SERIES

Technical specifications

Series	Geometric displacement [cm ³ /rev]	Operating pressure		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

Documentation

Check the product's model code and compare it with your paper work.

Delivery note and / or sales acknowledgement.

Direction of rotation

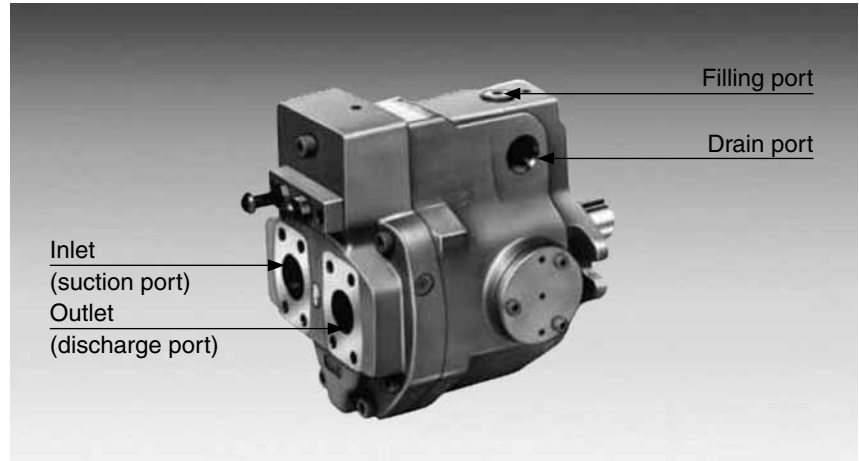
Check the direction of rotation of the shaft and compare it to the drive unit.



Clockwise shaft rotation.
Viewed from (front) end of shaft.

Ports

Suction, discharge, drain and filling ports



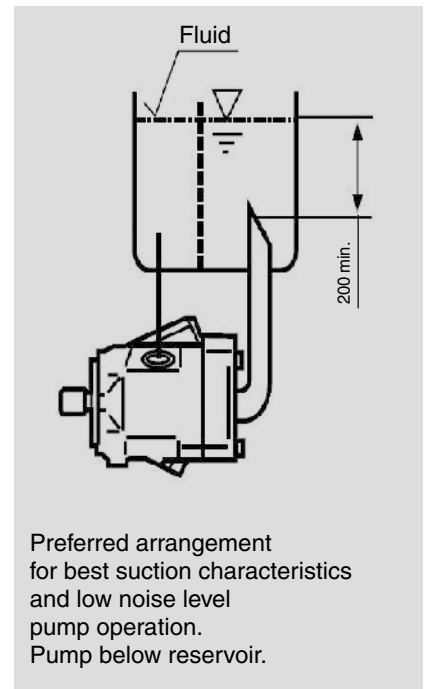
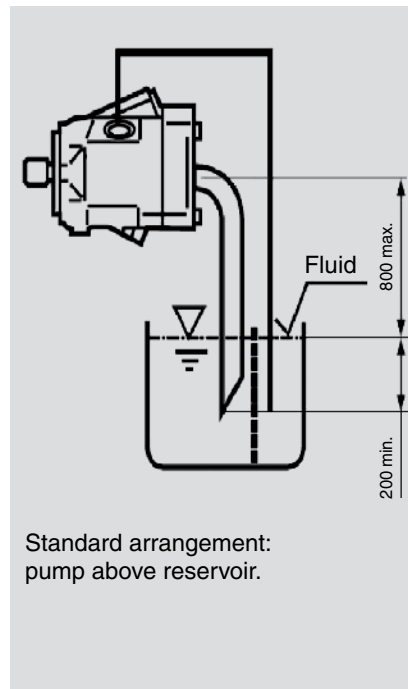
Minimum pump suction pressure
under static and dynamic load:

$$p_{in \text{ Min}} = 0.833 \text{ bar absolute}$$

Maximum pump inlet pressure:

$$p_{in \text{ Max}} = 1.500 \text{ bar absolute}$$

Pump arrangement



Piping



Drain line

Do not combine drain lines.

Always run drain lines separately, not longer than 1 m and the pipe end must be immersed in oil.

Do not restrict drain lines.

A restricted drain line (cooler, filter, valve etc.) can damage the pump.

Do not reduce drain line internal diameter.

The drain line internal diameter must always correspond to the drain hole size on the pump case.



Suction line

Do not restrict suction lines.

A restricted suction line (filter, valve etc.) can generate excessive noise and damage the pump.

Do not reduce the suction line internal diameter.

The suction line internal diameter must always correspond to the flange size on the pump case.



General

Use rubber hoses to reduce noise and excessive load on the pump.

Use high pressure hoses and pipes only at the outlet (discharge port) of the pump.

Commissioning



Prior to commissioning, the pump case must be filled with hydraulic fluid (use filling port). Initial commissioning should be at zero pressure with an open circuit to enable the pump to prime.

Pressure should only be increased once the pump has been fully primed.

Hydraulic fluid



- Normal mineral oil (H, HL)
- Premium hydraulic fluid (HLP)
- Phosphate ester (HFD-R)
- Polyolester (HEES, HFD-U)
- Water glycol (HFC)

Note:

For operating restrictions, please contact HYDAC.

Filtration



For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class to

NAS 1638 Class 10 (21/19/16 ISO 4406:1999) or cleaner.

Viscosity and temperature



Normal operating viscosity range is 20 – 400 cSt (mm²/s).

Normal operating temperature range is -20 to +95 °C.

Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

Variable Displacement Vane Pump

for Open Loop Hydraulic Systems



3. VANE PUMPS

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		1800





3.3 MECHANICAL COMPENSATION

PVV101

Series	Geometric displacement [cm ³ /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 [cm ³ /rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
PVV102-05-16	17.9	120	1800



3.1 VARIABLE DISPLACEMENT, HYDRAULIC COMPENSATION CONTENTS

PVV100

Ordering Code	3.1.1 Hydraulic compensation
Technical Information	3.1.2 Specifications 3.1.3 Hydraulic fluids 3.1.4 Viscosity range 3.1.5 Temperature range 3.1.6 Seals 3.1.7 Filtration 3.1.8 Max. drive and through drive torques 3.1.9 Through drive models 3.1.10 Installation notes 3.1.11 Adjustments
Control Options	3.1.12 Standard pressure control 3.1.13 Remote pressure control 3.1.14 2-stage pressure control, one stage non-adjustable 3.1.15 2-stage pressure control, both adjustable 3.1.16 Proportional pressure control 3.1.17 Load sensing and standard pressure control 3.1.18 Load sensing and remote pressure control 3.1.19 Load sensing and 2-stage pressure control, one stage non-adjustable 3.1.20 Load sensing control and 2-stage pressure control, both adjustable 3.1.21 Load sensing and proportional pressure control
Performance Data	3.1.22 PVV100-1-20 / -25 3.1.23 PVV100-2-31 / -40 / -50 3.1.24 PVV100-3-63 / -80 / -100
Dimensions	3.1.25 PVV100-1-20 / -25 3.1.26 PVV100-2-31 / -40 / -50 3.1.27 PVV100-3-63 / -80 / -100

ORDERING CODE

3.1.1 Variable Displacement Hydraulic Compensation

		PVV100	-	1	-	20	F	H	R	M		Q - KL - XXXX
Variable displacement vane pump with hydraulic compensation												
Size												
1 2 3												
Displacement												
20 25 31 40 50 63 80 100												
Flange and ports												
F	ISO 3019/2 – BSP ISO 228/1 thread											
FS	SAE – BSP ISO 228/1 thread (only size 2 and 3)											
B	Mounting plate – BSP ISO 228/1 thread											
US	SAE – UNF ISO 11926/1 thread											
for size 2 and 3 end pump use FUNC												
FUNC	ISO 3019/2 – UNF ISO 11926/1 thread											
only for size 2 and 3 end pump in combination with US												
Pressure setting range												
H	30 - 160 bar (size 1 and 2)											
30 - 150 bar (size 3)												
Shaft rotation												
R	Clockwise											
(viewed from shaft end)												
Seals												
M	NBR											
E	FPM (FKM)											
Control type												
-	Pressure compensator											
PCS002	Remote pressure compensator											
PCS003	2-stage pressure compensator, one stage non-adjustable											
PCS004	2-stage pressure compensator, adjustable											
PCS005	Proportional pressure compensator											
PCLS001	Load sensing and standard pressure control											
PCLS002	Load sensing and remote pressure control											
PCLS003	Load sensing control and 2-stage pressure control, one stage non-adjustable											
PCLS004	Load sensing control and 2-stage pressure control, both adjustable											
PCLS005	Load sensing and proportional pressure control											
Volume adjustment												
Q	Flow adjustment screw (standard)											
Options												
KL	Key lock compensator											
Modification number												
XXXX	Determined by manufacturer											

TECHNICAL INFORMATION

3.1.2 Specifications

Pump size			20	25	31	40	50	63	80	100
Geometric displacement		[cm³/rev]	22.1	26.9	34.5	42.8	53.1	69.0	86.2	105.5
Pressure	Rated	[bar]	160					150		
Drive speed	Min.	[rpm]	800							
	Max.	[rpm]	1800							
Approx. weight		[kg]	13		33			45		
Max. axial shaft force		[N]	No radial or axial forces allowed.							
Max. radial shaft force		[N]								

3.1.3 Hydraulic fluids

The pump series is designed for use with:

Hydraulic oil (normal mineral oil)
HLP to DIN ISO 51524/2 or
HM ISO 6743/4

Synthetic fluids
(Polyolester, HFD-U)

3.1.4 Viscosity range

Normal operating viscosity: 22 - 68 cSt (mm²/s)

Maximum viscosity at start-up: 400 cSt (mm²/s)

3.1.5 Temperature range

-10 to +50 °C

Note: The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

3.1.6 Seals

The pump series is equipped with NBR or FPM (FKM) seals. The actual seal material is specified in the model code.

3.1.7 Filtration

For maximum pump and system component life time, the system should be protected from contamination by effective filtration. Cleanliness class:

18/16/13 to ISO 4406:1999

or

Class 7 to NAS 1638 or cleaner.

3.1.8 Max. drive and through drive torques

Nominal size		Size 1	Size 2	Size 3
Geometric displacement	[cm³/rev]	20-25	31.5-40-50	63-80-100
Max. torque on primary shaft	[Nm]	197	400	740
Max. through drive torque	[Nm]	55	110	110 / 180*

* only for combination of size 3 and secondary pump size 3

Note:

Multiple pumps should be mounted in decreasing order of their torque. The sum of the individual torques of the pumps must not exceed the maximum torque permitted on the front pump.

3.1.9 Through drive models

Through drive pump	Drive pump PVV		
	100-1	100-2	100-3
PVV100-1-	•	•	•
PVV101-1-	•	•	•
PVV100-2-		•	•
PVV101-2-		•	•
PVV100-3-			•
PVV101-3-			•
PVV102-05-	•	•	•
PVV103-05-			
PVV103-1-			
PVF100-1-	•	•	•
PGI100-2-*	•*	•*	•*
PGI101-3-		•	•
PGI102-2-	•	•	•
PGI102-3-		•	•
PGE101-...-RBQ...	•	•	•
PGE102-...-RBR...	•	•	•
PGE103-...-RBS...		•	•
SAE A	•	•	•
SAE B		•	•

* PGI102-2 NOT 22 cm³ and 25 cm³

For other possible through drives, please contact HYDAC.

3.1.10 Installation notes

Step 1

PVV100 pumps size 1 can be installed in any position. PVV100 pumps sizes 2 and 3 must be installed horizontally with the compensator at the top (see diagram).

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The minimum cross-section of the suction line must be equal to the cross-section of pump port.

The suction lines should be as short as possible, with a minimum number of bends and without reducing the cross-section.

Step 2

All return and drain lines must be positioned so that the returning oil is not drawn out again immediately by the pump (see diagram).

The oil tank must be the correct size to dissipate the thermal power generated by the system components, and to achieve a low circulating speed.

To ensure maximum pump working life, the suction oil temperature must never exceed 50 °C. In systems where the pump runs for a long time at a zero flow setting it is recommended that an oil cooler is installed. The pressure in the drain line must never exceed the value specified.

The drain line must always feed directly into the tank, independently of all other lines and it must extend under the minimum oil level to avoid generating foam. In addition, the drain line must be free of restrictions and situated as far as possible away from the suction line.

Step 3

The pump and motor must be connected using a gear coupling.

During assembly, the minimum distance between the two coupling halves must be strictly observed (see Detail A).

Other types of motor-pump couplings are not permitted.

No induced **radial or axial loads** are permitted on the pump shaft.

Step 4

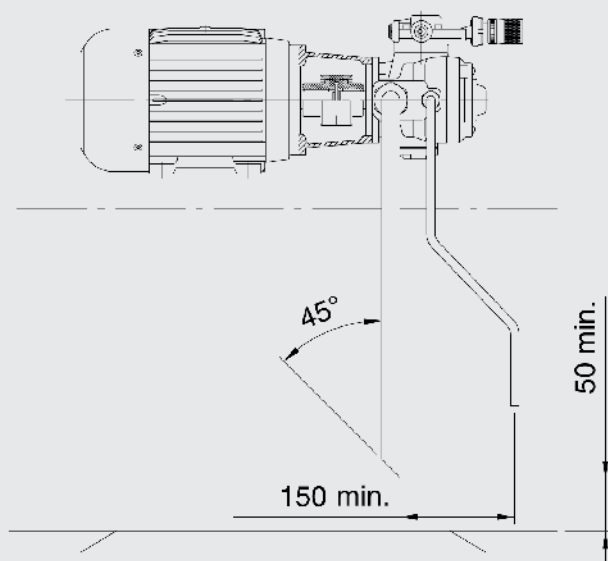
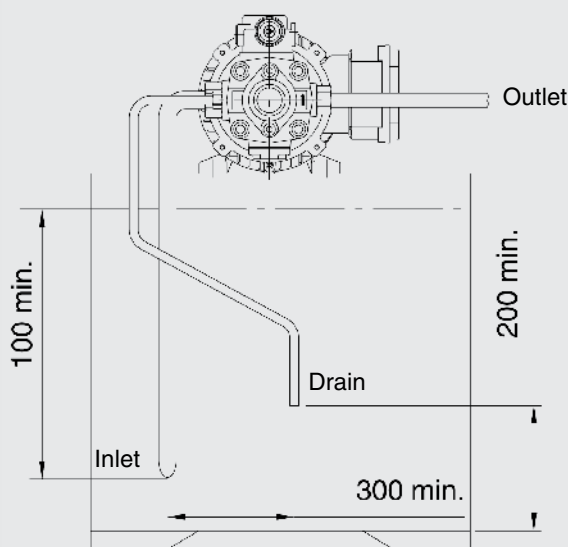
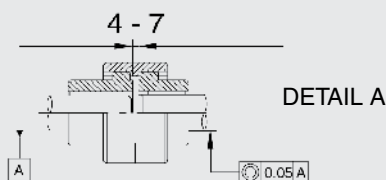
During commissioning, the pump must firstly be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump. Size 2 and 3 have an air bleed port on the compensator.

Venting the pump can take several minutes.

Pump filling (oil emerging from the discharge port) should only take a few seconds. If not, the pump must be switched off and the procedure repeated.

Provided that the system and pump are completely full of oil, the pump can be started up during subsequent operation against a maximum pressure of 30 bar.

During both initial commissioning and subsequent start-up operations, the difference between the oil temperature and the ambient temperature (pump case) must not exceed 20 °C.



Note:

For further information, see brochure section "Installation Instructions for Variable Displacement Vane Pumps".

3.1.11 Adjustments

Pump size	Available displacement [cm ³]	Volume adjustment screw rate [cm ³]	Min. adjustable displacement [cm ³]
PVV100-1-20	22.1	2.7	9.6
PVV100-1-25	26.9	7.5	9.6
PVV100-2-31	34.5	11.7	16.4
PVV100-2-40	42.8	1.5	16.4
PVV100-2-50	53.1	9.8	16.4
PVV100-3-63	69	20.9	23.7
PVV100-3-80	86.2	26.9	23.7
PVV100-3-100	105.5	45.5	23.7

CONTROL OPTIONS

Diagrams and characteristic curves for pressure control:

- 1 Pump with standard pressure control
- 2 Pump with pressure control with CETOP 03 (UNI ISO 4401-03) interface

Ordering code	P	CS002
---------------	---	-------

Ordering code	P	CS003
---------------	---	-------

Ordering code	P	CS004
---------------	---	-------

- 2 Pump with proportional pressure control with CETOP 03 (ISO 4401-03) interface

Ordering code	P	CS005
---------------	---	-------

3.1.12 Standard pressure control

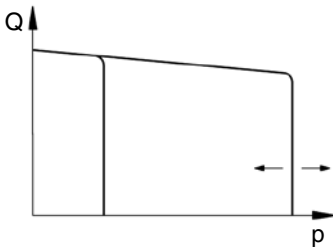
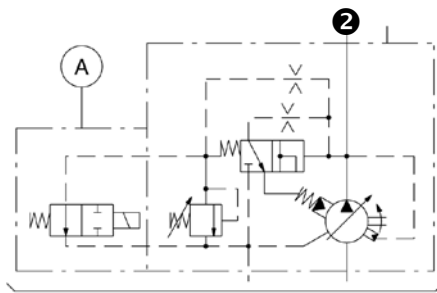
Description	Performance characteristics	Hydraulic circuit
Standard pump with standard pressure control		

3.1.13 Remote pressure control

Description	Performance characteristics	Hydraulic circuit				
Pump with remote pressure control. A – Pressure relief valve (0 - 5 l/min) not supplied. Recommended valve: <table><tr><th>Type</th><th>Part no.</th></tr><tr><td>DB3E-02X-250V180</td><td>562555</td></tr></table> Note: The length of the pilot line between the compensator and the valve must not exceed 5 m. Remote control port 1/4" (BSP) or 1/2" 20 UNF	Type	Part no.	DB3E-02X-250V180	562555		
Type	Part no.					
DB3E-02X-250V180	562555					
<table><tr><td>Ordering code</td><td>P</td><td>CS002</td></tr></table>	Ordering code	P	CS002			
Ordering code	P	CS002				

Ordering code	P	CS002
---------------	---	-------

3.1.14 2-stage pressure control, one stage non-adjustable

Description	Performance characteristics	Hydraulic circuit									
Pump with two pressure stages, one of which is non-adjustable (set to the minimum pressure of the pump). A – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WSM06020V-01-C-N-24DG</td><td>3135462</td></tr></table> Connection housing: <table><tr><td>DPT06020-01x</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CS003</td></tr></table>	Type	Part no.	WSM06020V-01-C-N-24DG	3135462	DPT06020-01x	558020	Ordering code	P	CS003		
Type	Part no.										
WSM06020V-01-C-N-24DG	3135462										
DPT06020-01x	558020										
Ordering code	P	CS003									

3.1.15 2-stage pressure control, adjustable

Description	Performance characteristics	Hydraulic circuit									
Pump with two adjustable pressure stages. A – Pressure relief valve supplied factory-assembled and tested. B – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WKM08130C-01-C-N24DG</td><td>3115602</td></tr></table> Connection housing: <table><tr><td>D08130-01X</td><td>555528</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CS004</td></tr></table>	Type	Part no.	WKM08130C-01-C-N24DG	3115602	D08130-01X	555528	Ordering code	P	CS004		
Type	Part no.										
WKM08130C-01-C-N24DG	3115602										
D08130-01X	555528										
Ordering code	P	CS004									

3.1.16 Proportional pressure control

Description	Control curves	Hydraulic circuit									
Pump with proportional pressure control. A – Proportional valve not supplied. Recommended valve (24V nominal voltage): <table><tr><th>Type</th><th>Part no.</th></tr><tr><td>PDBM06020-01-C-N-210-24PG-18.0</td><td>3362791</td></tr></table> Connection housing: <table><tr><td>DPT06020-01X</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CS005</td></tr></table>	Type	Part no.	PDBM06020-01-C-N-210-24PG-18.0	3362791	DPT06020-01X	558020	Ordering code	P	CS005		
Type	Part no.										
PDBM06020-01-C-N-210-24PG-18.0	3362791										
DPT06020-01X	558020										
Ordering code	P	CS005									

CONTROL OPTIONS

Diagrams and characteristic curves for combined load sensing and pressure control

4 Load sensing pump with standard pressure control

Ordering code	P	CLS001
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5 Load sensing pump with CETOP 03 (ISO 4401-03) interface

Ordering code	P	CLS002 - 3 - 4 - 5
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6 Throttle valve not supplied.

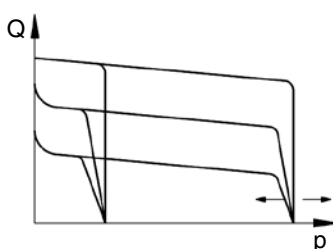
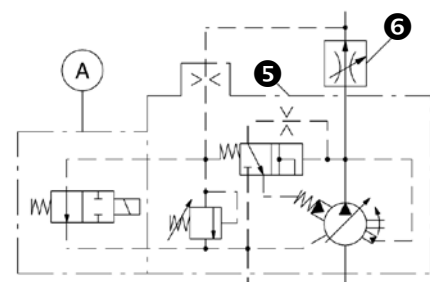
3.1.17 Load sensing and standard pressure control

Description	Control curves	Hydraulic circuit			
Load sensing pump with standard pressure control. <table><tr><td>Ordering code</td><td>P</td><td>CLS001</td></tr></table>	Ordering code	P	CLS001		
Ordering code	P	CLS001			

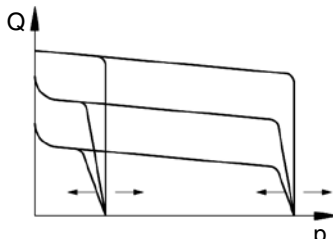
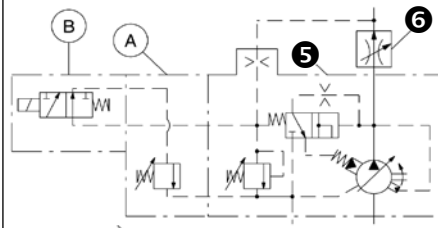
3.1.18 Load sensing and remote pressure control

Description	Control curves	Hydraulic circuit							
Load sensing pump with remote pressure control. A – Pressure relief valve (0 - 5 l/min) not supplied. Recommended valve: <table><tr><th>Type</th><th>Part no.</th></tr><tr><td>DB3E-02X-250V180</td><td>562555</td></tr></table> Note: The length of the pilot line between the compensator and the valve must not exceed 5 m. Remote control port ¼" (BSP) or ½" 20 UNF <table><tr><td>Ordering code</td><td>P</td><td>CLS002</td></tr></table>	Type	Part no.	DB3E-02X-250V180	562555	Ordering code	P	CLS002		
Type	Part no.								
DB3E-02X-250V180	562555								
Ordering code	P	CLS002							

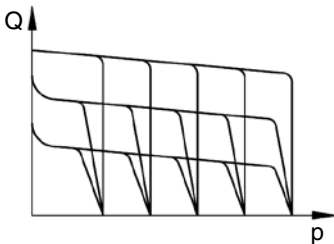
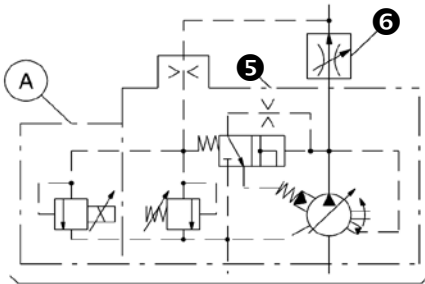
3.1.19 Load sensing and 2-stage pressure control, one stage non-adjustable

Description	Performance characteristics	Hydraulic circuit									
Load sensing pump with two pressure stages, one of which is non-adjustable (set to the minimum pressure of the pump). A – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WSM06020V-01-C-N-24DG</td><td>3135462</td></tr></table> Connection housing: <table><tr><td>DPT06020-01x</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CLS003</td></tr></table>	Type	Part no.	WSM06020V-01-C-N-24DG	3135462	DPT06020-01x	558020	Ordering code	P	CLS003		
Type	Part no.										
WSM06020V-01-C-N-24DG	3135462										
DPT06020-01x	558020										
Ordering code	P	CLS003									

3.1.20 Load sensing and 2-stage pressure control, adjustable

Description	Performance characteristics	Hydraulic circuit									
Load sensing pump with two adjustable pressure stages. A – Pressure relief valve supplied factory-assembled and tested. A – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WKM08130C-01-C-N24DG</td><td>3115602</td></tr></table> Connection housing: <table><tr><td>D08130-01X</td><td>555528</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CLS004</td></tr></table>	Type	Part no.	WKM08130C-01-C-N24DG	3115602	D08130-01X	555528	Ordering code	P	CLS004		
Type	Part no.										
WKM08130C-01-C-N24DG	3115602										
D08130-01X	555528										
Ordering code	P	CLS004									

3.1.21 Load sensing and proportional pressure control

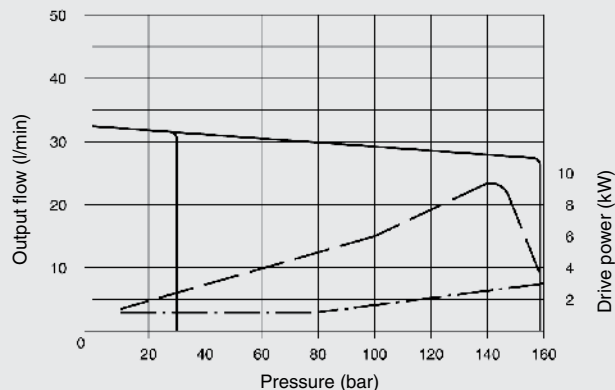
Description	Performance characteristics	Hydraulic circuit									
Load sensing pump with proportional pressure control. A – Proportional valve not supplied. Recommended valve (24V nominal voltage): <table><tr><th>Type</th><th>Part no.</th></tr><tr><td>PDBM06020-01-C-N-210-24PG-18.0</td><td>3362791</td></tr></table> Connection housing: <table><tr><td>DPT06020-01X</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CLS005</td></tr></table>	Type	Part no.	PDBM06020-01-C-N-210-24PG-18.0	3362791	DPT06020-01X	558020	Ordering code	P	CLS005		
Type	Part no.										
PDBM06020-01-C-N-210-24PG-18.0	3362791										
DPT06020-01X	558020										
Ordering code	P	CLS005									

PERFORMANCE DATA

3.1.22 PVV100-1-20 / -25

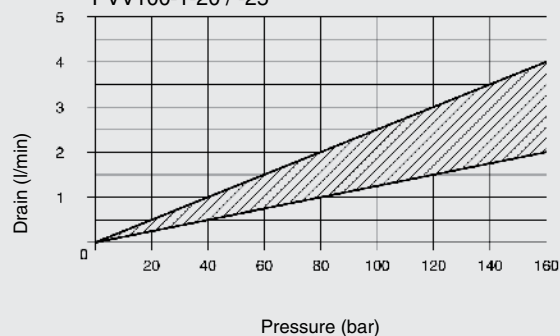
Volumetric efficiency

PVV100-1-20



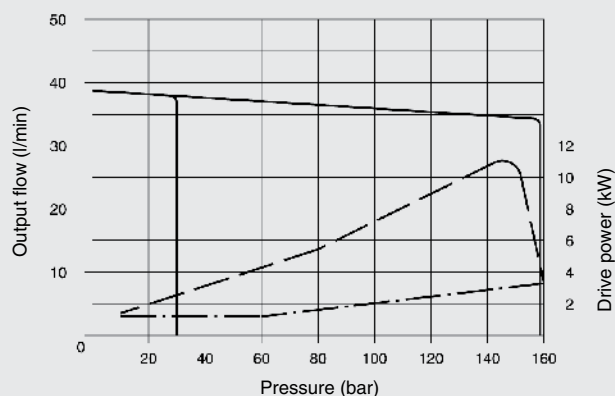
Drain

Values determined with pump on zero flow setting
PVV100-1-20 / -25



Volumetric efficiency

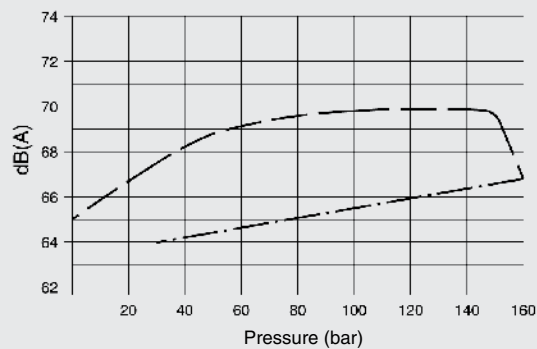
PVV100-1-25



Maximum noise level

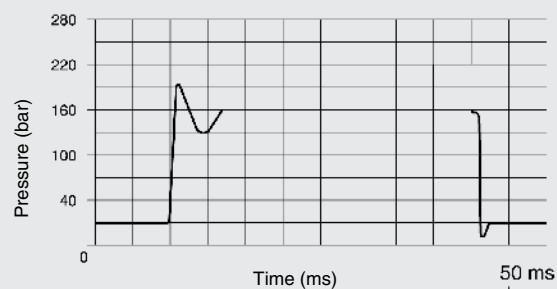
with sound-level meter placed 1 meter
away from pump, flexible coupling

PVV100-1 -20 / -25



Response times and peak pressure

PVV100-1-20 / -25



Drive power at maximum displacement

Drive power at zero flow setting

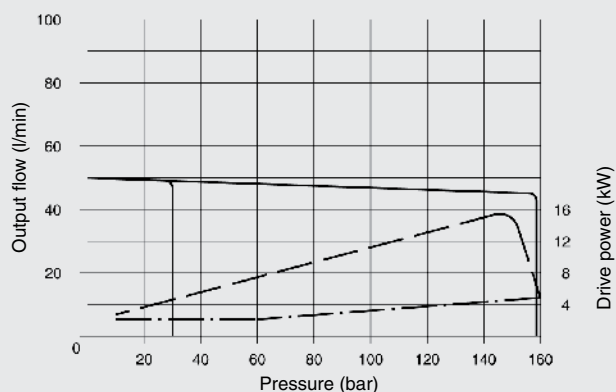
Pressure peaks are due to the test system.

Pressure peaks exceeding 30 %
of the maximum operating pressure
must be avoided.

3.1.23 PVV100-2-31 / -40 / -50

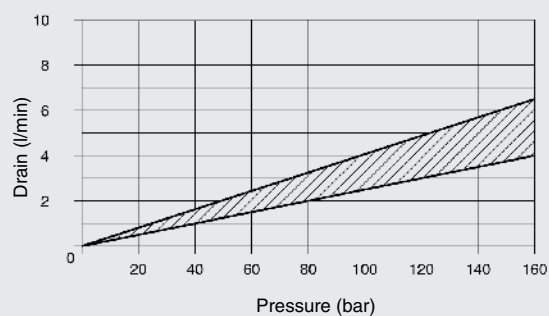
Volumetric efficiency

PVV100-2-31



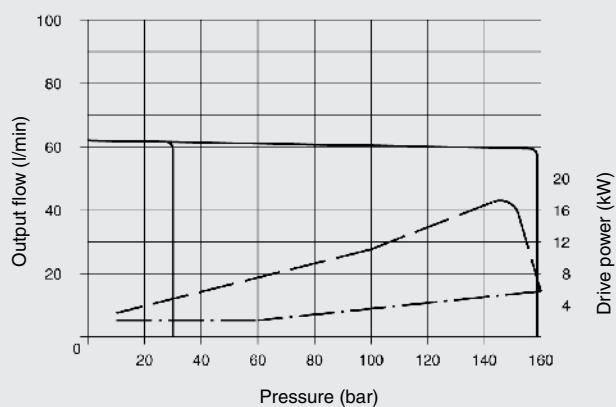
Drain

Values determined with pump on zero flow setting
PVV100-2-31 / -40 / -50



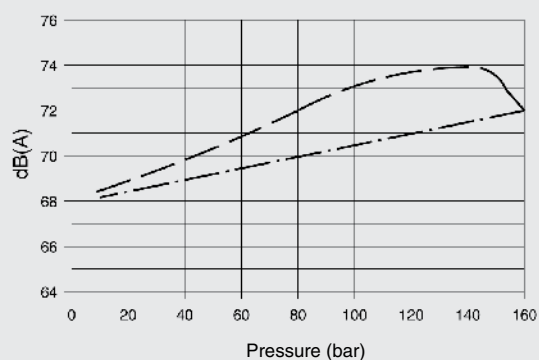
Volumetric efficiency

PVV100-2-40



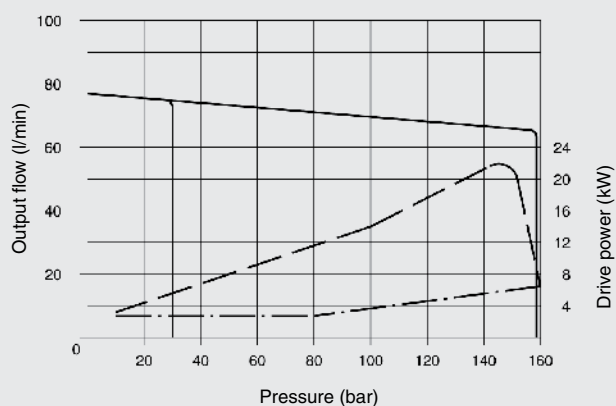
Maximum noise level

with sound-level meter placed 1 meter
away from pump, flexible coupling
PVV100-2-31 / -40 / -50



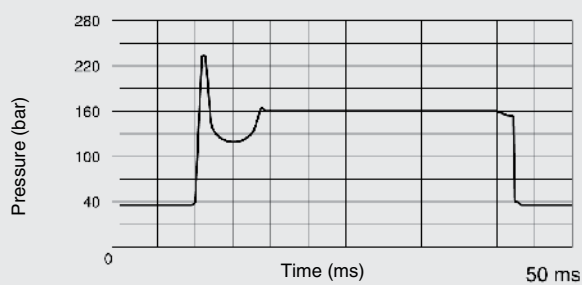
Volumetric efficiency

PVV100-2-50



Response times and peak pressure

PVV100-2-31 / -40 / -50



Drive power at maximum displacement

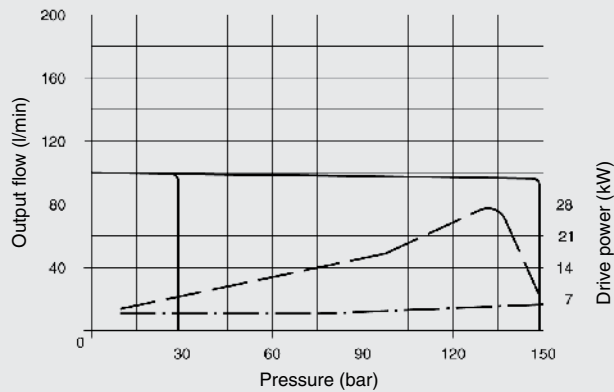
Drive power at zero flow setting

Pressure peaks are due to the test system.
Pressure peaks exceeding 30 %
of the maximum operating pressure
must be avoided.

3.1.24 PVV100-3-63 / -80 / -100

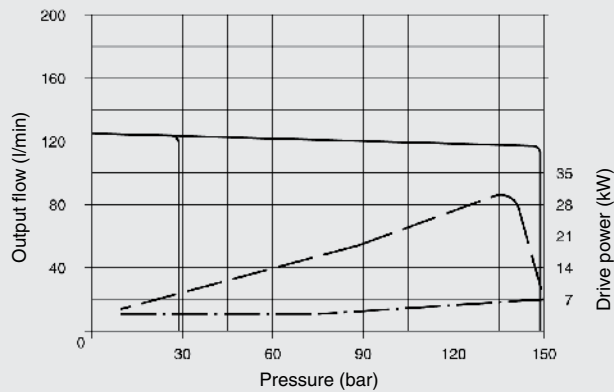
Volumetric efficiency

PVV100-3-63



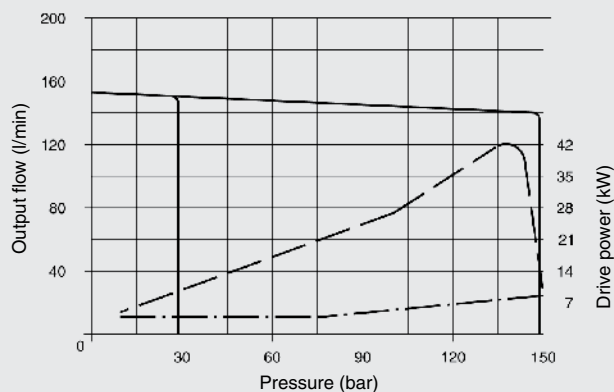
Volumetric efficiency

PVV100-3-80



Volumetric efficiency

PVV100-3-100

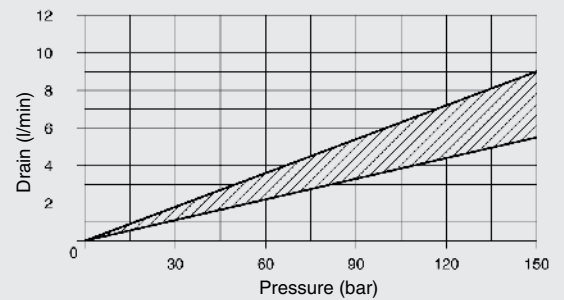


Drive power at maximum displacement

Drive power at zero flow setting

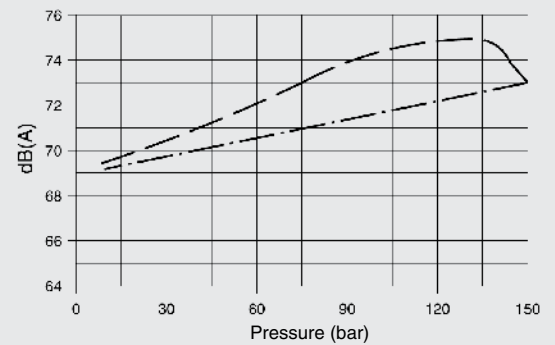
Drain

Values determined with pump on zero flow setting
PVV100-3-63 / -80 / -100



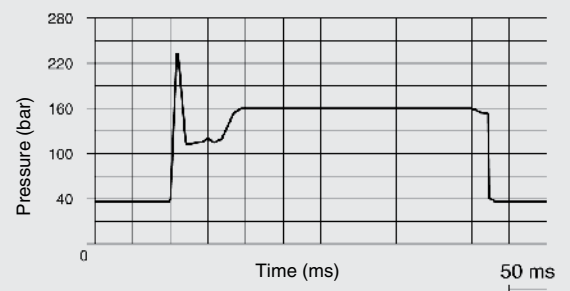
Maximum noise level

with sound-level meter placed 1 meter
away from pump, flexible coupling
PVV100-3-63 / -80 / -100



Response times and peak pressure

PVV100-3-63 / -80 / -100



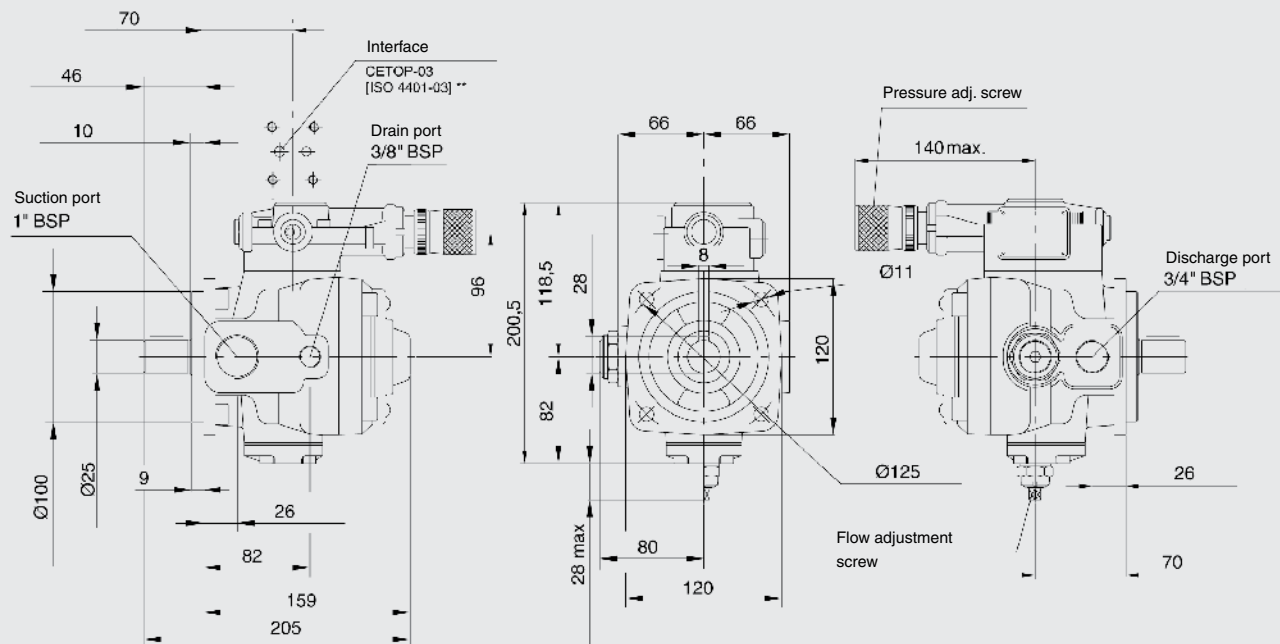
Pressure peaks are due to the test system.

Pressure peaks exceeding 30 %
of the maximum operating pressure
must be avoided.

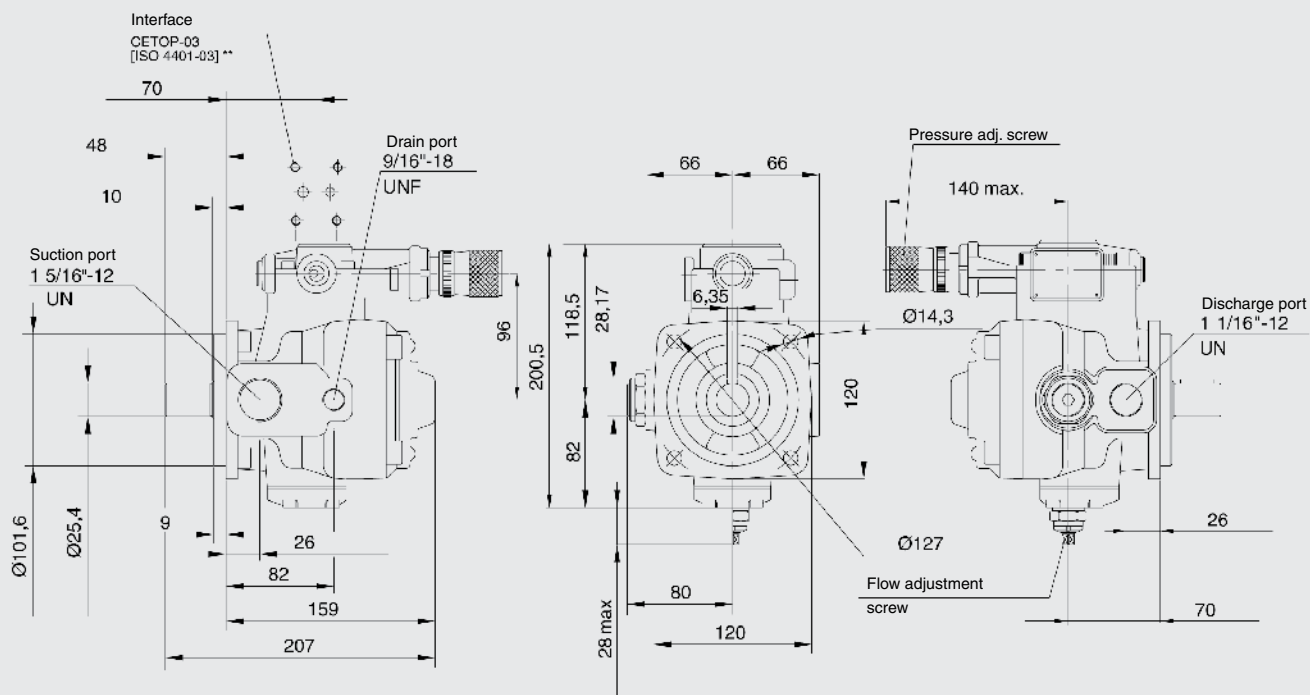
DIMENSIONS

3.1.25 PVV100-1-20 / -25

PVV100-1-20 / -25 (F)

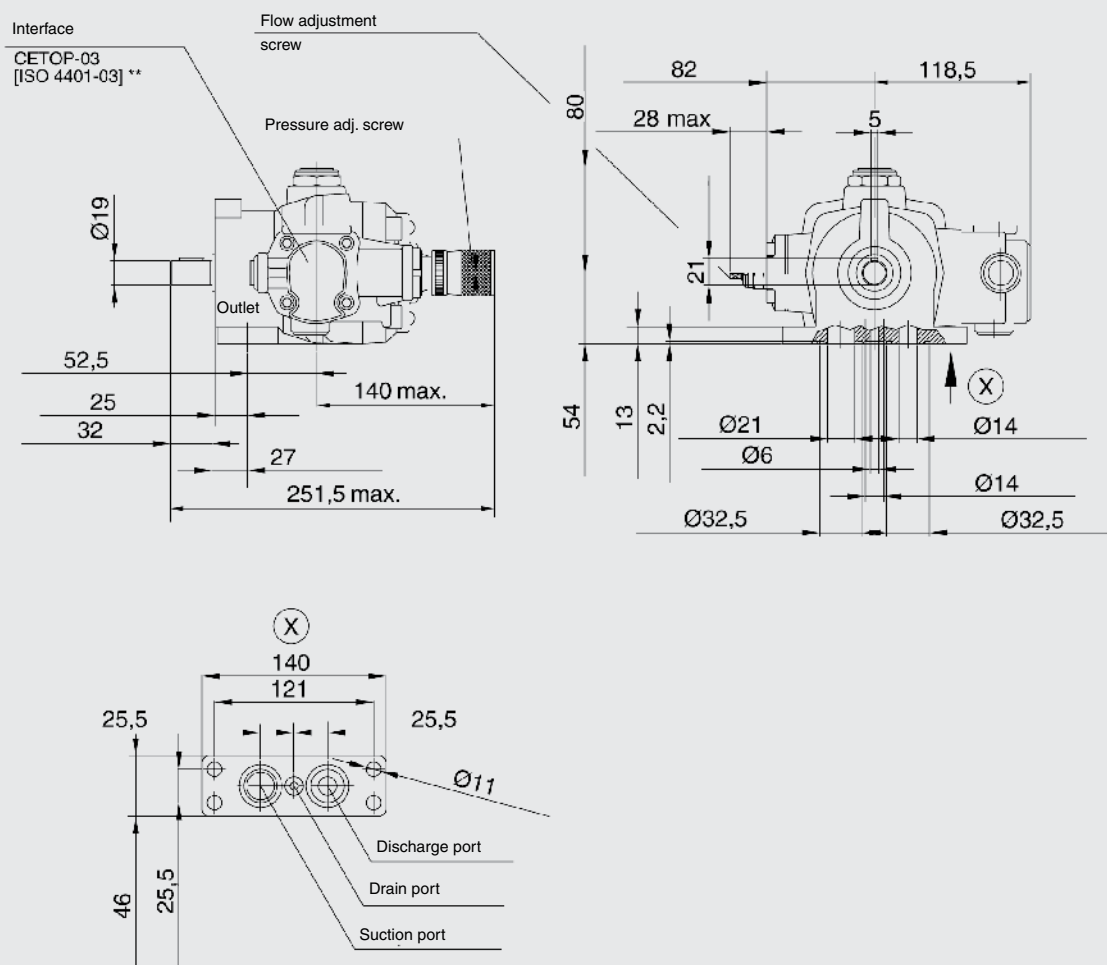


PVV100-1-20 / -25 (US)



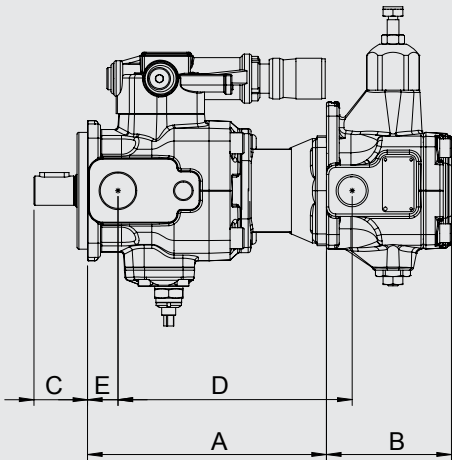
** dependent on model selected

PVV100-1-20 / -25 (B)

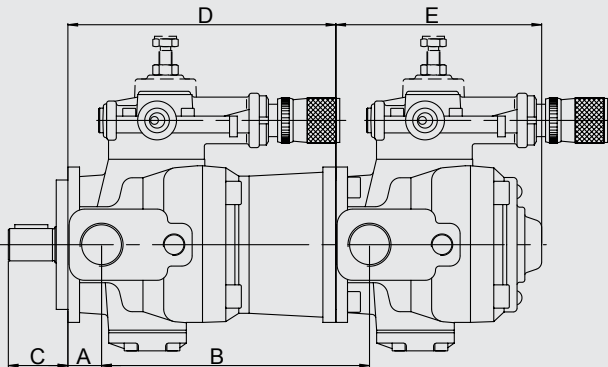


** dependent on model selected

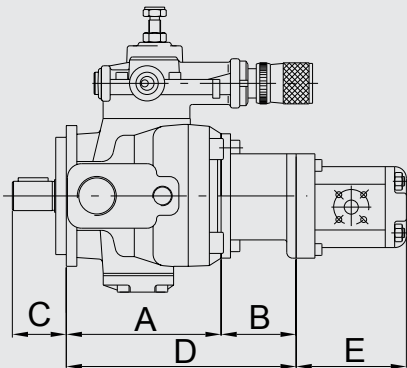
Multiple pumps
Front pump PVV100-1- ... F



End pump	A	B	C	D	E
PVV102-05- ... F / US	204	107	46	200	26
PVV102-05- ... F-GR2	204	120	46	276	26



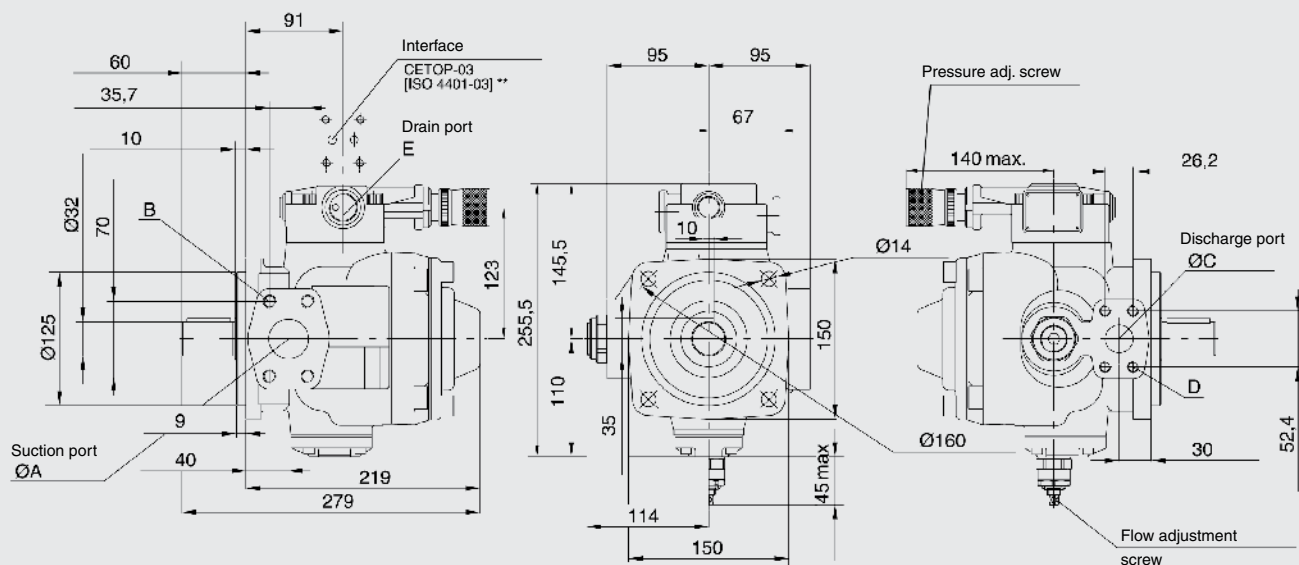
End pump	A	B	C	D	E
PVV100-1- ... F/ PVV101-1- ... F	26	207	46	207	159



End pump	A	B	C	D	E
Gear pump Size 1	132	64	46	196	dependent on gear pump selected
Gear pump Size 2	132	72	46	204	

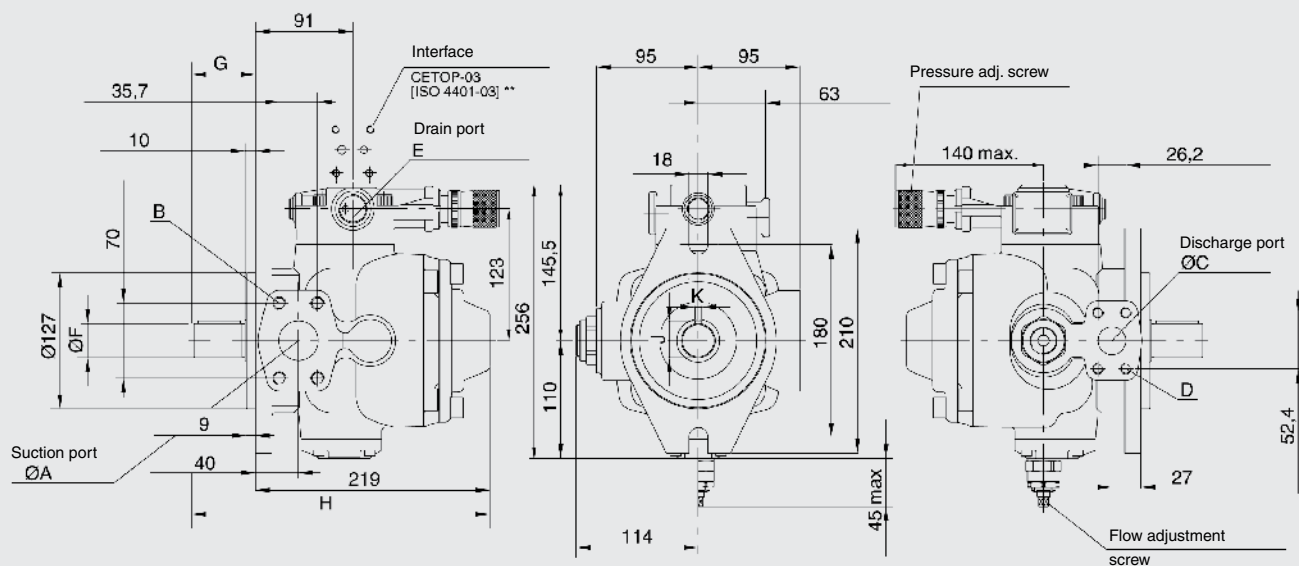
3.1.26 PVV100-2-31 / -40 / -50

PVV100-2-31 / -40 / -50 (F / F UNC)



Flange	ØA	B	ØC	D	E
F (ISO)	38	SAE (3000) 1 1/2" M12 x 45	25	SAE (3000) 1" M10 x 35	3/4" BSP
F UNC (ISO) as end pump	38	SAE (3000) 1 1/2" 1/2"-13 UNC	25	SAE (3000) 1" 3/8"-16 UNC	1 1/16"-12 UN

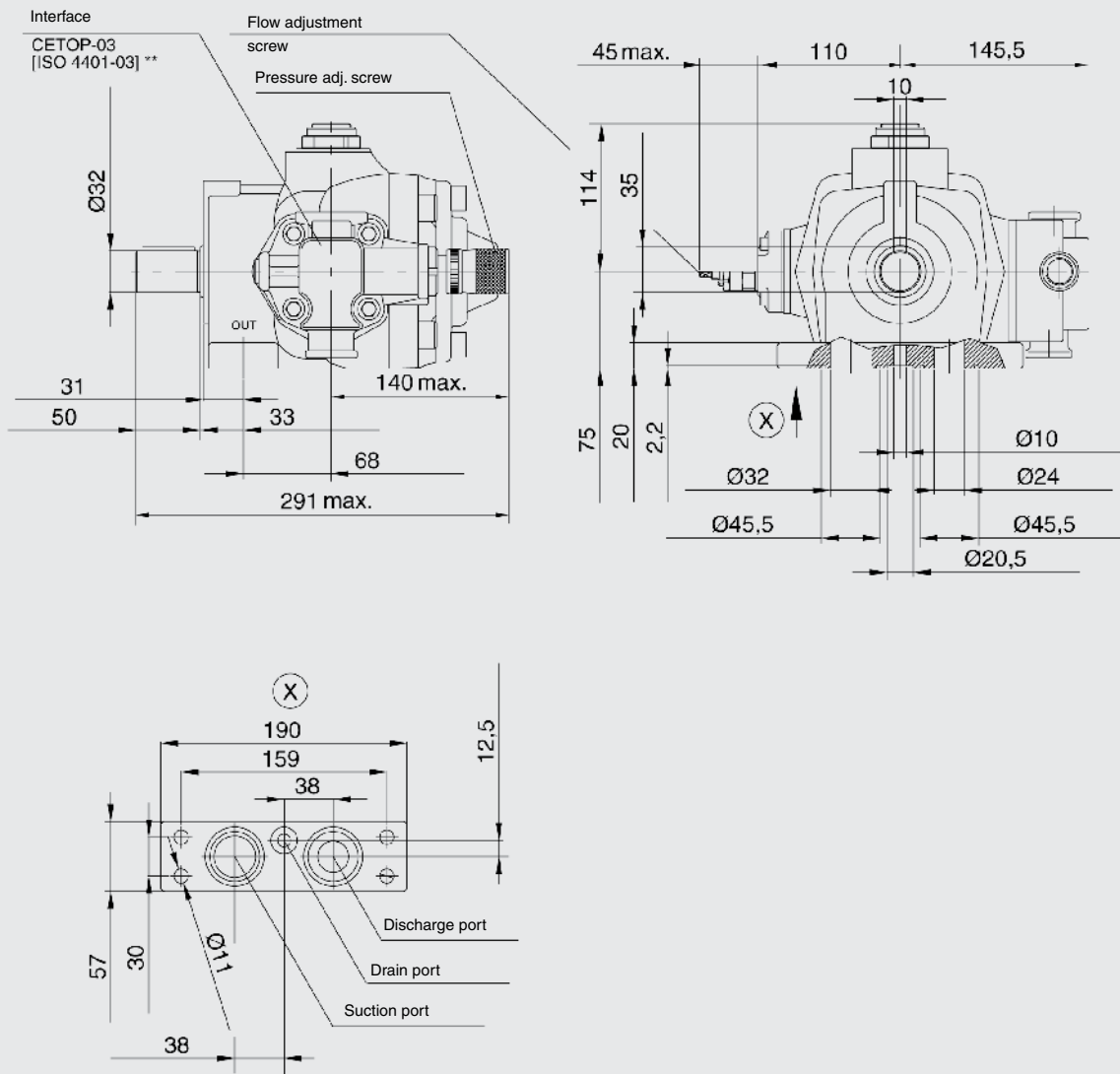
PVV100-2-31 / -40 / -50 (FS / US)



Flange	ØA	B	ØC	D	E	ØF	G	H	J	K
FS (SAE)	38	SAE (3000) 1 1/2" M12 x 45	25	SAE (3000) 1" M10 x 35	3/4" BSP	32	60	279	35	10
US (SAE)	38	SAE (3000) 1 1/2" 1/2"-13 UNC	25	SAE (3000) 1" 3/8"-16 UNC	1 1/16"-12 UN	31.75	58	277	34.5	6.35

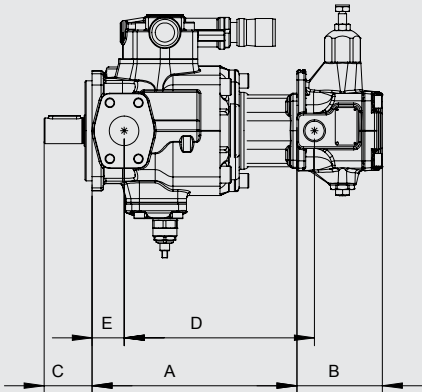
** dependent on model selected

PVV100-2-31 / -40 / -50 (B)

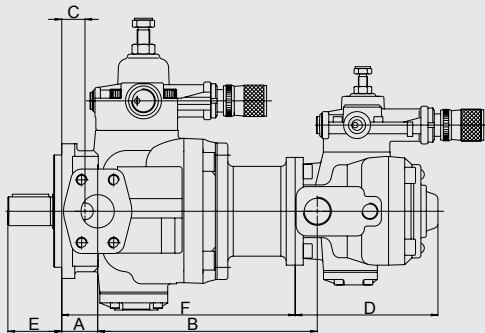


** dependent on model selected

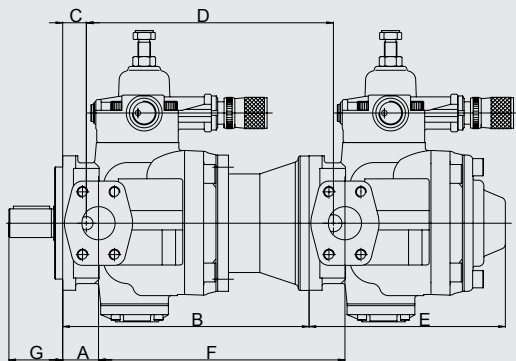
Multiple pumps
Front pump PVV100-2- ... F



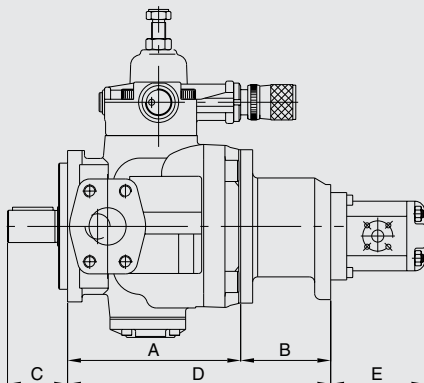
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	238	46
PVV102-05- ... F-GR2	261	107	60	243	46



End pump	A	B	C	D	E	F
PVV100-1- ... F/ PVV101-1- ... F	40	246	30	159	60	260



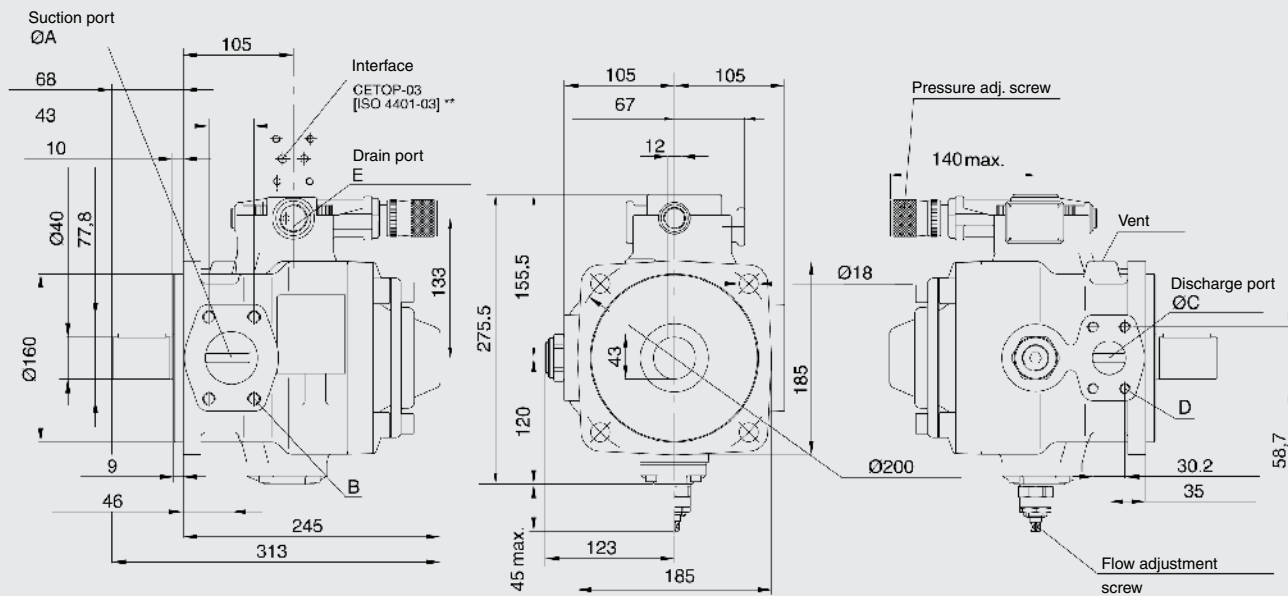
End pump	A	B	C	D	E	F	G
PVV100-2- ... F/ PVV101-2- ... F	40	275	30	275	220	275	60



End pump	A	B	C	D	E
Gear pump size 1	173	90	60	263	dependent on gear pump selected
Gear pump size 2	173	90	60	263	
Gear pump size 3	173	90	60	263	

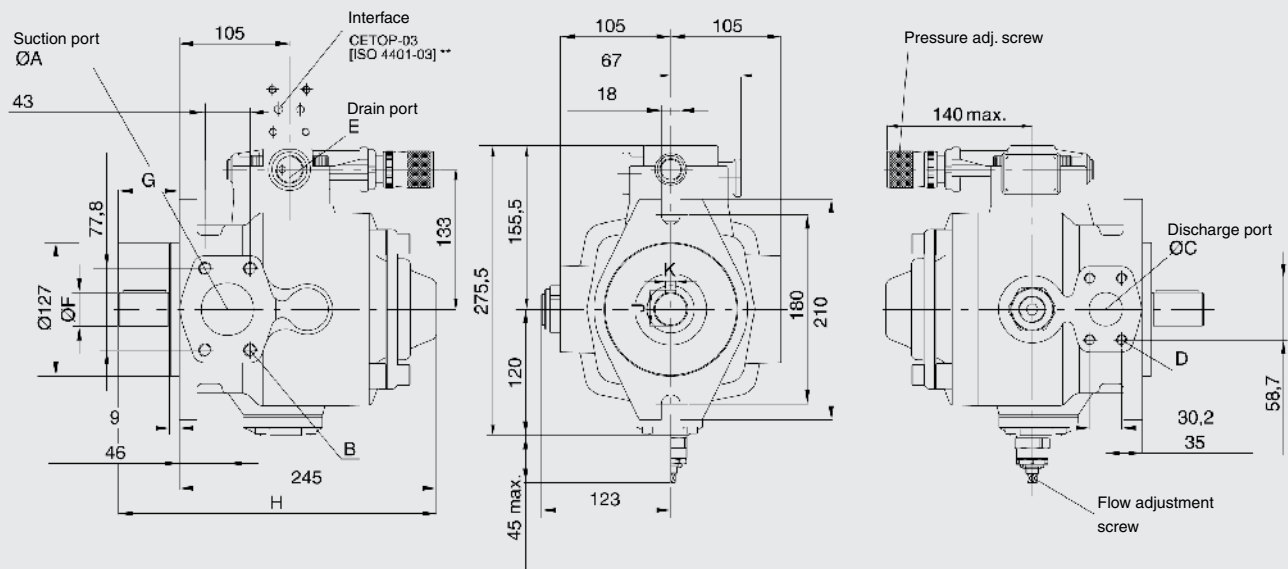
3.1.27 PVV100-3-63 / -80 / -100

PVV100-3-63 / -80 / -100 (F / F UNC)



Flange	ØA	B	ØC	D	E
F (ISO)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 1/4" M10 x 40	3/4" BSP
F UNC (ISO) as end pump	51	SAE (3000) 2" 1/2"-13 UNC	32	SAE (3000) 1 1/4" 7/16"-14 UNC	1 1/16"-12 UN

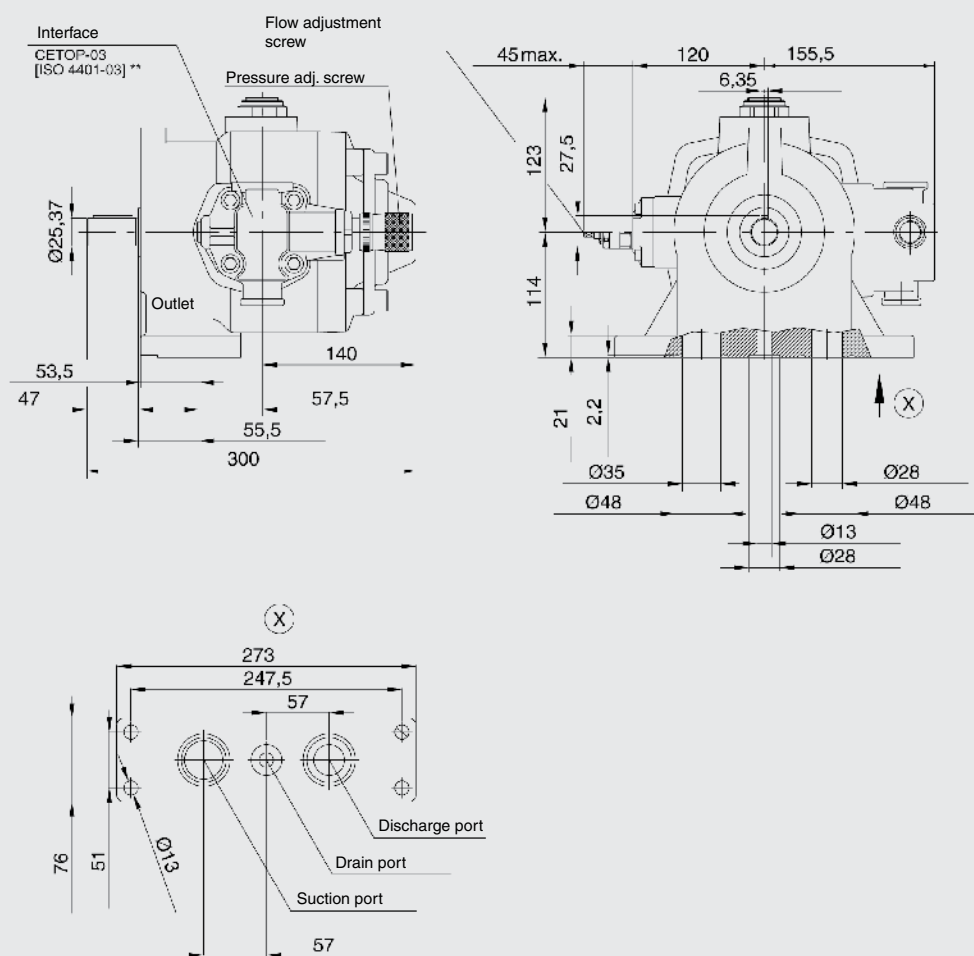
PVV100-3-63 / -80 / -100 (FS / US)



Flange	ØA	B	ØC	D	E	ØF	G	H	J	K
FS (SAE)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 1/4" M10 x 40	3/4" BSP	32	60	305	35	10
US (SAE)	51	SAE (3000) 2" 1/2"-13 UNC	32	SAE (3000) 1 1/4" 7/16"-14 UNC	1 1/16"-12 UN	31.75	58	303	34.5	6.35

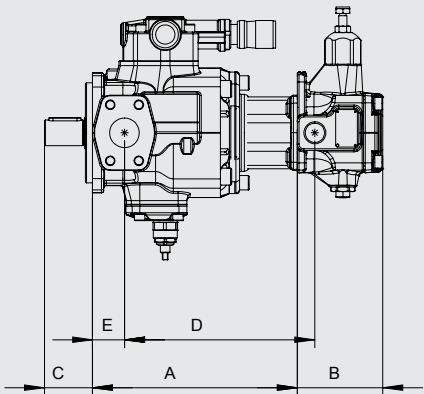
** dependent on model selected

PVV100-3-63 / -80 / -100 (B)

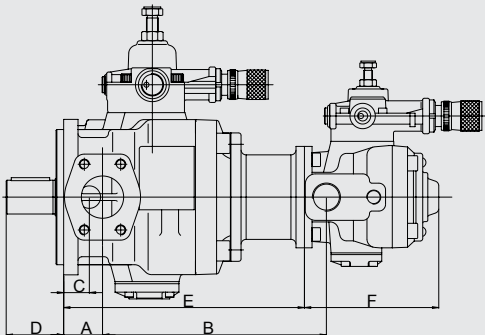


** dependent on model selected

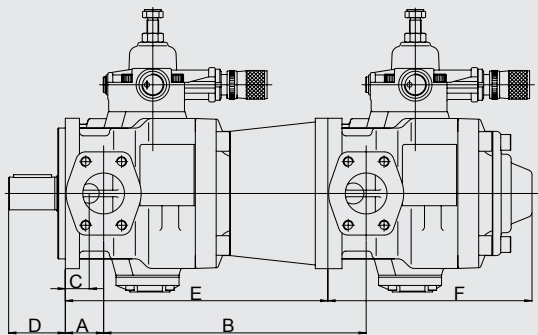
Multiple pumps
Front pump PVV100-3- ... F



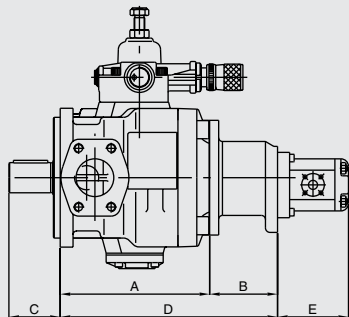
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	238	46
PVV102-05- ... F-GR2	261	107	60	243	46



End pump	A	B	C	D	E	F
PVV100-1- ... F/ PVV101-1- ... F	46	265	35	68	285	159



End pump	A	B	C	D	E	F
PVV100-2- ... F/ PVV101-2- ... F	46	295	35	68	300	220
PVV100-3- ... F/ PVV101-3- ... F	46	315	35	68	315	245



End pump	A	B	C	D	E
Gear pump size 1	198	90	68	288	dependent on gear pump selected
Gear pump size 2	198	90	68	288	
Gear pump size 3	198	90	68	288	



3.2 VARIABLE DISPLACEMENT, HYDRAULIC COMPENSATION CONTENTS

PVV103

Ordering Code	3.2.1 Hydraulic compensation
Technical Information	3.2.2 Specifications 3.2.3 Hydraulic fluids 3.2.4 Viscosity range 3.2.5 Temperature range 3.2.6 Seals 3.2.7 Filtration 3.2.8 Max. drive and through drive torques 3.2.9 Through drive models 3.2.10 Installation notes 3.2.11 Adjustments
Control Options	3.2.12 Standard pressure control 3.2.13 Remote pressure control 3.2.14 2-stage pressure control, one stage non-adjustable 3.2.15 2-stage pressure control, both adjustable 3.2.16 Proportional pressure control 3.2.17 Load sensing and standard pressure control 3.2.18 Load sensing and remote pressure control 3.2.19 Load sensing and 2-stage pressure control, one stage non-adjustable 3.2.20 Load sensing and 2-stage pressure control, both adjustable 3.2.21 Load sensing and proportional pressure control
Performance Data	3.2.22 PVV103-05-16 3.2.23 PVV103-1-32
Dimensions	3.2.24 PVV103-05-16 3.2.25 PVV103-1-32

ORDERING CODE

3.2.1 Variable Displacement Hydraulic Compensation

PVV103 – 05 – 16 F H R M – – XXXX

**Variable displacement vane pump
with hydraulic compensation**

Size

05 | 1

Displacement

16 | 32

Flange and ports

F ISO 3019/2 – BSP ISO 228/1 thread

FGR2 Size 2 gear pump - BSP ISO 228/1 thread

Pressure setting range

H 20 - 250 bar

Shaft rotation

R Clockwise
(viewed from shaft end)

Seals

M NBR

E FPM (FKM)

Control type

– Pressure compensator

PCS002 Remote pressure compensator

PCS003 2-stage pressure compensator, one stage non-adjustable

PCS004 2-stage pressure compensator, adjustable

PCS005 Proportional pressure compensator

PCLS001 Load sensing and standard pressure control

PCLS002 Load sensing and remote pressure control

PCLS003 Load sensing and 2-stage pressure control, one stage non-adjustable

PCLS004 Load sensing and 2-stage pressure control, both adjustable

PCLS005 Load sensing and proportional pressure control

Options

A Through drive for double pump

Modification number

XXXX Determined by manufacturer

TECHNICAL INFORMATION

3.2.2 Specifications

Pump size			16	32
Geometric displacement		[cm³/rev]	17.9	34.5
Rated		[bar]	250	
Peak		[bar]	285	300
Drive speed	min.	[rpm]	800	
	max.	[rpm]	1800	
Approx. weight		[kg]	16.5	27
Max. axial shaft force		[N]	No radial or axial forces allowed.	
Max. radial shaft force		[N]		

3.2.3 Hydraulic fluids

The pump series is designed for use with:

Hydraulic oil (normal mineral oil)

HLP to DIN ISO 51524/2 or

HM ISO 6743/4

Synthetic fluids

(Polyolester, HFD-U)

3.2.4 Viscosity range

Normal operating viscosity: 22 - 68 cSt (mm²/s)

Maximum viscosity at start-up: 400 cSt (mm²/s)

3.2.5 Temperature range

+15 to +60 °C

Note: The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

3.2.6 Seals

The pump series is equipped with NBR or FPM (FKM) seals. The actual seal material is specified in the model code.

3.2.7 Filtration

For maximum pump and system component life time, the system should be protected from contamination by effective filtration. Cleanliness class:

18/16/13 per ISO 4406/99

or

Class 7 to NAS 1638 or cleaner.

3.2.8 Max. drive and through drive torques

Nominal size		Size 05	Size 1
Geometric displacement	[cm³/rev]	17.9	34.5
Max. torque on primary shaft	[Nm]	130	250
Max. through drive torque	[Nm]	55	110

Note:

Multiple pumps should be mounted in decreasing order of their torque. The sum of the individual torques of the pumps must not exceed the maximum torque permitted on the front pump.

3.2.9 Through drive models

Through drive pump	Drive pump	
	PVV103-05-	PVV103-01-
PVV100-1-	•	•
PVV101-1-	•	•
PVV100-2-		•
PVV101-2-		•
PVV100-3-		
PVV101-3-		
PVV102-05-		•
PVV103-05-	•	•
PVV103-1-		•
PGI102-2-	•	•
PGI102-3-		•
PGE101-...-RBQ...	•	
PGE102-...-RBR...	•	•
PGE103-...-RBS...		•
SAE A	•	•
SAE B		•

For other possible through drives, please contact HYDAC.

3.2.10 Installation notes

Step 1

PVV103 pumps size 05 can be installed in any position. PVV103 pumps size 1 must be installed horizontally with the compensator at the top (see diagram).

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The minimum cross-section of the suction line must be equal to or larger than the cross-section of the suction port of the pump.

The suction lines should be as short as possible, with a minimum number of bends and without reducing the cross-section.

When installing a HYDAC pump always ensure that the fluid in the pump is prevented from draining away during stoppages.

Step 2

All return and drain lines must be positioned so that the returning oil is not drawn out again immediately by the pump (see diagram).

The oil tank must be the correct size to dissipate the thermal power generated by the system components, and to achieve a low circulating speed.

To ensure maximum pump working life, the suction oil temperature must never exceed 50 °C. In systems where the pump runs for a long time at a zero flow setting it is recommended that an oil cooler is installed. The pressure in the drain line must never exceed the value specified.

The drain line must always feed directly into the tank, independently of all other lines and it must extend under the minimum oil level to avoid generating foam. In addition, the drain line must be free of restrictions and situated as far as possible away from the suction line.

Step 3

The pump and motor must be connected using a gear coupling.

During assembly, the minimum distance between the two coupling halves must be strictly observed (see Detail A).

Other types of motor-pump couplings are not permitted.

No induced **radial or axial loads** are allowed on the pump shaft.

Step 4

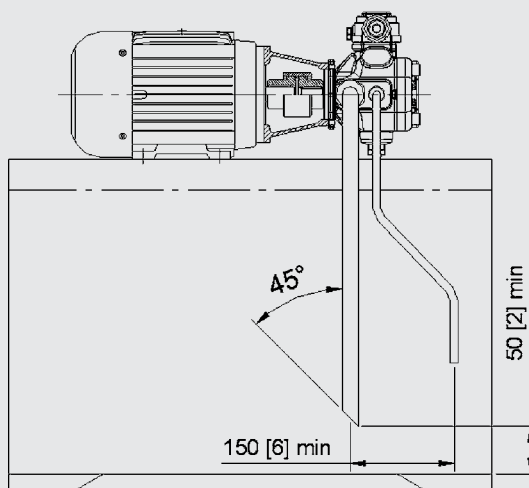
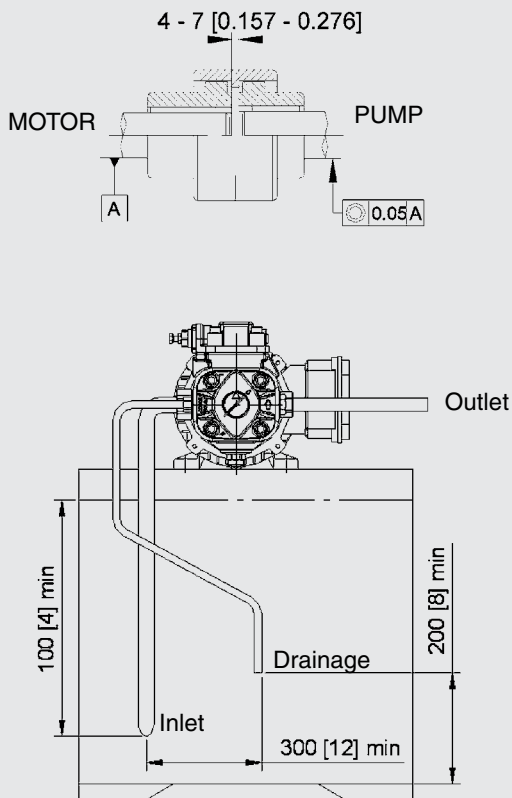
During commissioning, the pump must firstly be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump. Size 1 has an air bleed port on the compensator.

Venting the pump can take several minutes.

Pump filling (oil emerging from the discharge port) should only take a few seconds. If not, the pump must be switched off and the procedure repeated.

Provided that the system and pump are completely full of oil, the pump can be started up during subsequent operation against a maximum pressure of 30 bar.

During both initial commissioning and subsequent start-up operations, the difference between the oil temperature and the ambient temperature (pump case) must not exceed 20 °C.



Note:

For further information, see brochure section "Installation Instructions for Variable Displacement Vane Pumps".

3.2.11 Adjustments

Pump size	Available displacement [cm ³]	Volume adjustment screw rate [cm ³]	Min. adjustable displacement [cm ³]
PVV103-05	17.9	11.0	3.3
PVV103-1	34.5	22.0	8.3

CONTROL OPTIONS

Diagrams and characteristic curves for pressure control:

① Pump with standard pressure control

② Pump with pressure control
with CETOP 03 (UNI ISO 4401-03) interface

Ordering code	P	CS002
---------------	---	-------

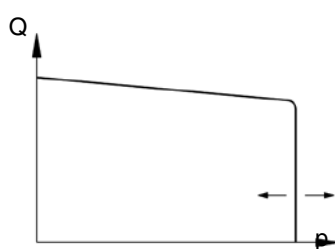
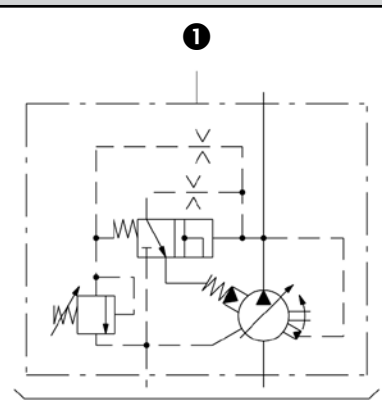
Ordering code	P	CS003
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Ordering code	P	CS004
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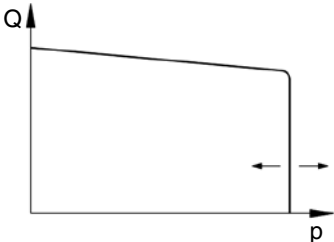
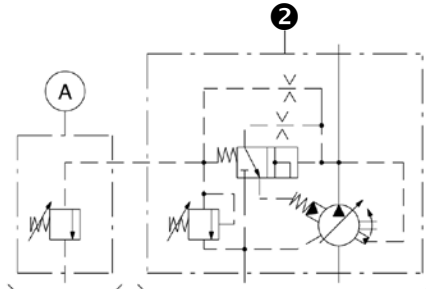
② Pump with proportional pressure control
with CETOP 03 (UNI ISO 4401-03) interface

Ordering code	P	CS005
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3.2.12 Standard pressure control

Description	Performance characteristics	Hydraulic circuit
Standard pump with standard pressure control		

3.2.13 Remote pressure control

Description	Performance characteristics	Hydraulic circuit							
Pump with remote pressure control. A – Pressure relief valve (0 - 5 l/min) not supplied. Recommended valve: <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>DB3E-02X-250V180</td><td>562555</td></tr></table> Note: The length of the pilot line between the compensator and the valve must not exceed 5 m. Remote control port ¼" (BSP) or ½" 20 UNF <table><tr><td>Ordering code</td><td>P</td><td>CS002</td></tr></table>	Type	Part no.	DB3E-02X-250V180	562555	Ordering code	P	CS002		
Type	Part no.								
DB3E-02X-250V180	562555								
Ordering code	P	CS002							

3.2.14 2-stage pressure control, one stage non-adjustable

Description	Performance characteristics	Hydraulic circuit									
Pump with two pressure stages, one of which is non-adjustable (set to the minimum pressure of the pump). A – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WSM06020V-01-C-N-24DG</td><td>3135462</td></tr></table> Connection housing: <table><tr><td>DPT06020-01x</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CS003</td></tr></table>	Type	Part no.	WSM06020V-01-C-N-24DG	3135462	DPT06020-01x	558020	Ordering code	P	CS003		
Type	Part no.										
WSM06020V-01-C-N-24DG	3135462										
DPT06020-01x	558020										
Ordering code	P	CS003									

3.2.15 2-stage pressure control, both adjustable

Description	Performance characteristics	Hydraulic circuit									
Pump with two adjustable pressure stages. A – Pressure relief valve supplied factory-assembled and tested. B – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WKM08130C-01-C-N24DG</td><td>3115602</td></tr></table> Connection housing: <table><tr><td>D08130-01X</td><td>555528</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CS004</td></tr></table>	Type	Part no.	WKM08130C-01-C-N24DG	3115602	D08130-01X	555528	Ordering code	P	CS004		
Type	Part no.										
WKM08130C-01-C-N24DG	3115602										
D08130-01X	555528										
Ordering code	P	CS004									

3.2.16 Proportional pressure control

Description	Control curves	Hydraulic circuit									
Pump with proportional pressure control. A – Proportional valve not supplied. Recommended valve (24V nominal voltage): <table><tr><th>Type</th><th>Part no.</th></tr><tr><td>PDBM06020-01-C-N-210-24PG-18.0</td><td>3362791</td></tr></table> Connection housing: <table><tr><td>DPT06020-01X</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CS005</td></tr></table>	Type	Part no.	PDBM06020-01-C-N-210-24PG-18.0	3362791	DPT06020-01X	558020	Ordering code	P	CS005		
Type	Part no.										
PDBM06020-01-C-N-210-24PG-18.0	3362791										
DPT06020-01X	558020										
Ordering code	P	CS005									

CONTROL OPTIONS

Diagrams and characteristic curves for combined load sensing and pressure control

4 Load sensing pump with standard pressure control

Ordering code	P	CLS001
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5 Load sensing pump with CETOP 03 (ISO 4401-03) interface

Ordering code	P	CLS002 - 3 - 4 - 5
---------------	---	--------------------

6 Throttle valve not supplied.

3.2.17 Load sensing and standard pressure control

Description	Control curves	Hydraulic circuit			
Load sensing pump with standard pressure control. <table><tr><td>Ordering code</td><td>P</td><td>CLS001</td></tr></table>	Ordering code	P	CLS001		
Ordering code	P	CLS001			

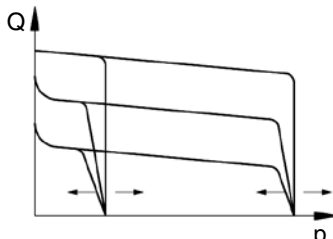
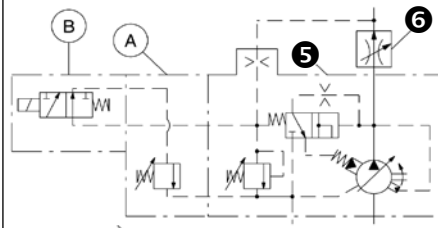
3.2.18 Load sensing and remote pressure control

Description	Control curves	Hydraulic circuit							
Load sensing pump with remote pressure control. A – Pressure relief valve (0 - 5 l/min) not supplied. Recommended valve: <table><tr><th>Type</th><th>Part no.</th></tr><tr><td>DB3E-02X-250V180</td><td>562555</td></tr></table> Note: The length of the pilot line between the compensator and the valve must not exceed 5 m. Remote control port ¼" (BSP) or ½" 20 UNF <table><tr><td>Ordering code</td><td>P</td><td>CLS002</td></tr></table>	Type	Part no.	DB3E-02X-250V180	562555	Ordering code	P	CLS002		
Type	Part no.								
DB3E-02X-250V180	562555								
Ordering code	P	CLS002							

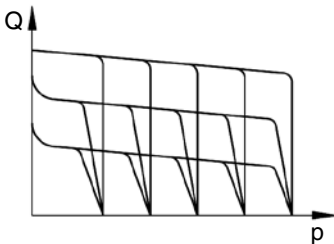
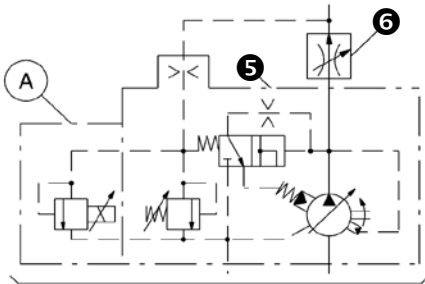
3.2.19 Load sensing and 2-stage pressure control, one stage non-adjustable

Description	Performance characteristics	Hydraulic circuit									
Load sensing pump with two pressure stages, one of which is non-adjustable (set to the minimum pressure of the pump). A – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WSM06020V-01-C-N-24DG</td><td>3135462</td></tr></table> Connection housing: <table><tr><td>DPT06020-01x</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CLS003</td></tr></table>	Type	Part no.	WSM06020V-01-C-N-24DG	3135462	DPT06020-01x	558020	Ordering code	P	CLS003		
Type	Part no.										
WSM06020V-01-C-N-24DG	3135462										
DPT06020-01x	558020										
Ordering code	P	CLS003									

3.2.20 Load sensing and 2-stage pressure control, adjustable

Description	Performance characteristics	Hydraulic circuit									
Load sensing pump with two adjustable pressure stages. A – Pressure relief valve supplied factory-assembled and tested. B – Solenoid valve not supplied. Recommended valve (24V nominal voltage): <table><tr><td>Type</td><td>Part no.</td></tr><tr><td>WKM08130C-01-C-N24DG</td><td>3115602</td></tr></table> Connection housing: <table><tr><td>D08130-01X</td><td>555528</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CLS004</td></tr></table>	Type	Part no.	WKM08130C-01-C-N24DG	3115602	D08130-01X	555528	Ordering code	P	CLS004		
Type	Part no.										
WKM08130C-01-C-N24DG	3115602										
D08130-01X	555528										
Ordering code	P	CLS004									

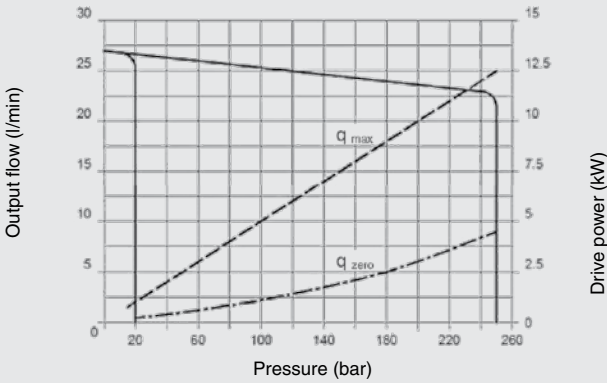
3.2.21 Load sensing and proportional pressure control

Description	Performance characteristics	Hydraulic circuit									
Load sensing pump with proportional pressure control. A – Proportional valve not supplied. Recommended valve (24V nominal voltage): <table><tr><th>Type</th><th>Part no.</th></tr><tr><td>PDBM06020-01-C-N-210-24PG-18.0</td><td>3362791</td></tr></table> Connection housing: <table><tr><td>DPT06020-01X</td><td>558020</td></tr></table> other nominal voltages and connectors on request <table><tr><td>Ordering code</td><td>P</td><td>CLS005</td></tr></table>	Type	Part no.	PDBM06020-01-C-N-210-24PG-18.0	3362791	DPT06020-01X	558020	Ordering code	P	CLS005		
Type	Part no.										
PDBM06020-01-C-N-210-24PG-18.0	3362791										
DPT06020-01X	558020										
Ordering code	P	CLS005									

PERFORMANCE DATA

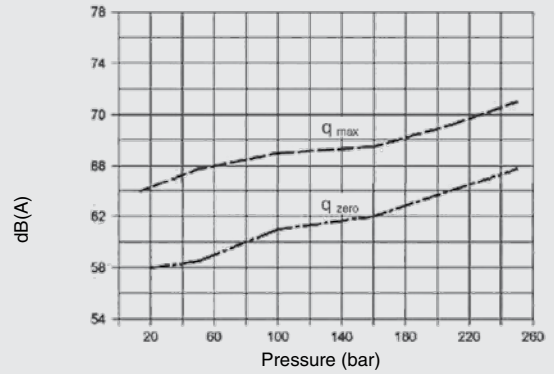
3.2.22 PVV103-05-16

Volumetric efficiency

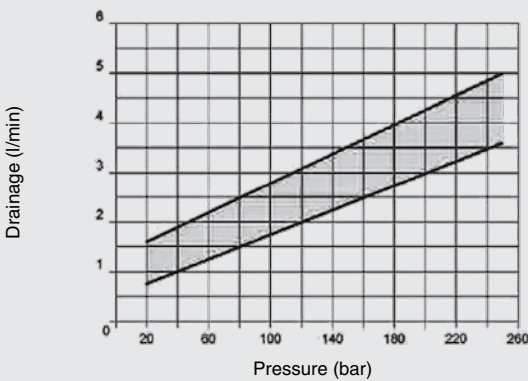


Maximum noise level

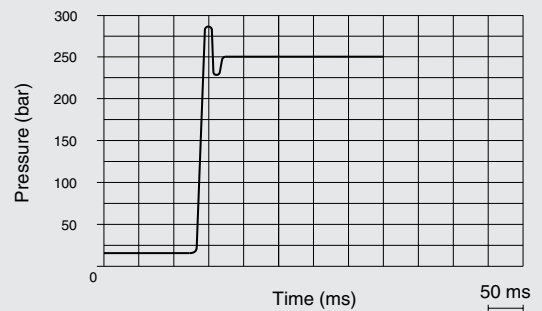
measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling.



Drain port



Response times and peak pressure



Drive power at maximum displacement

Drive power at zero flow setting

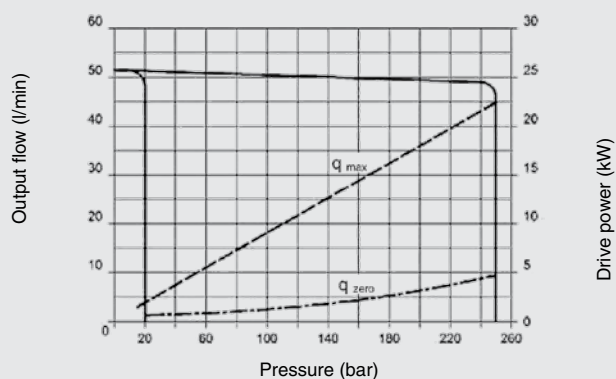
Pressure peaks are due to the test system.

Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

Curve peaks at 285 bar,

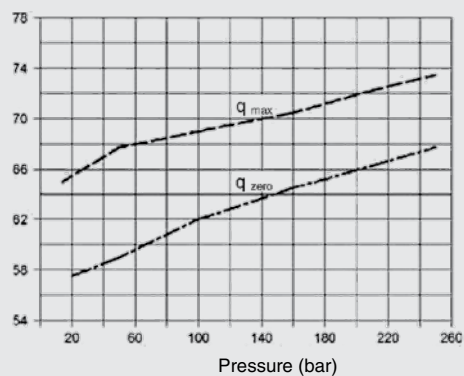
Curve starts at 15 bar

Volumetric efficiency

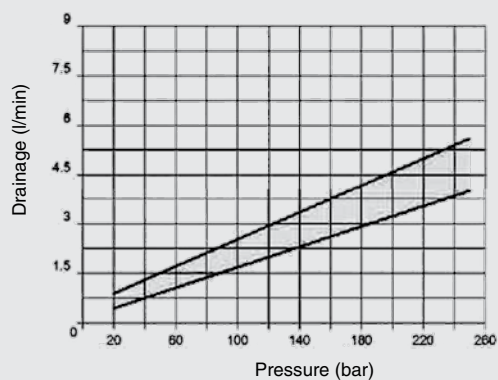


Maximum noise level

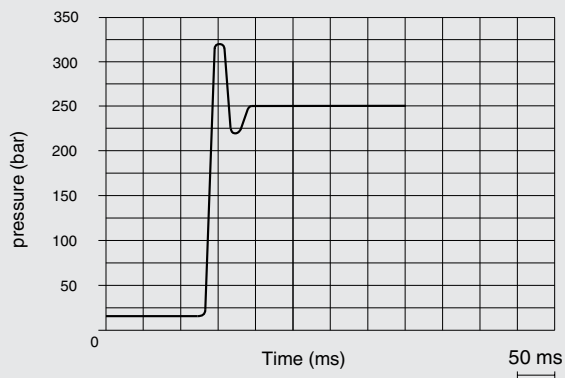
measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling.



Drain port



Response times and peak pressure



Drive power at maximum displacement

Drive power at zero flow setting

Pressure peaks are due to the test system.

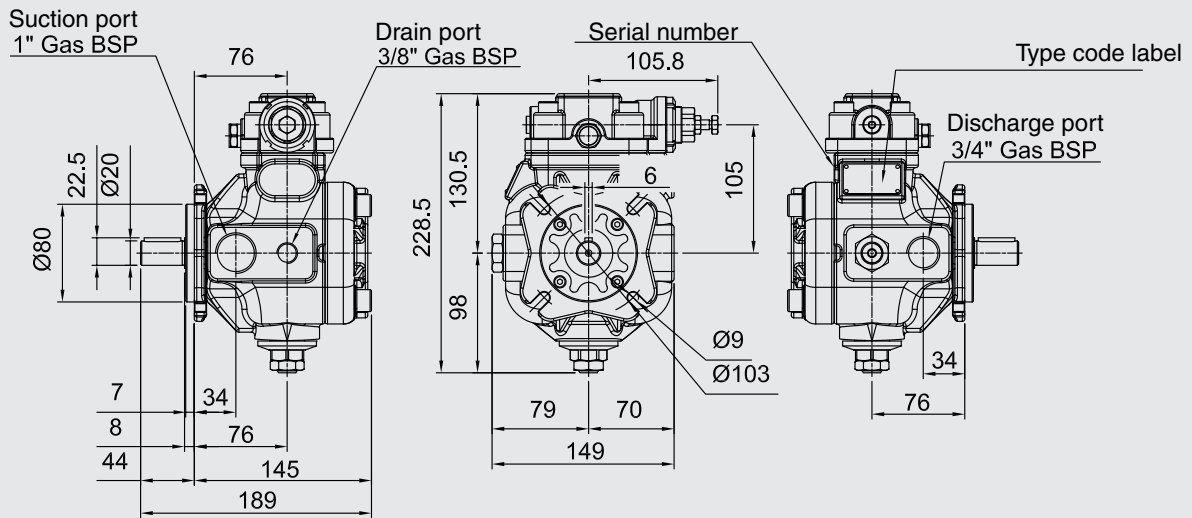
Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

Curve peaks at 300 bar,
Curve starts at 15 bar

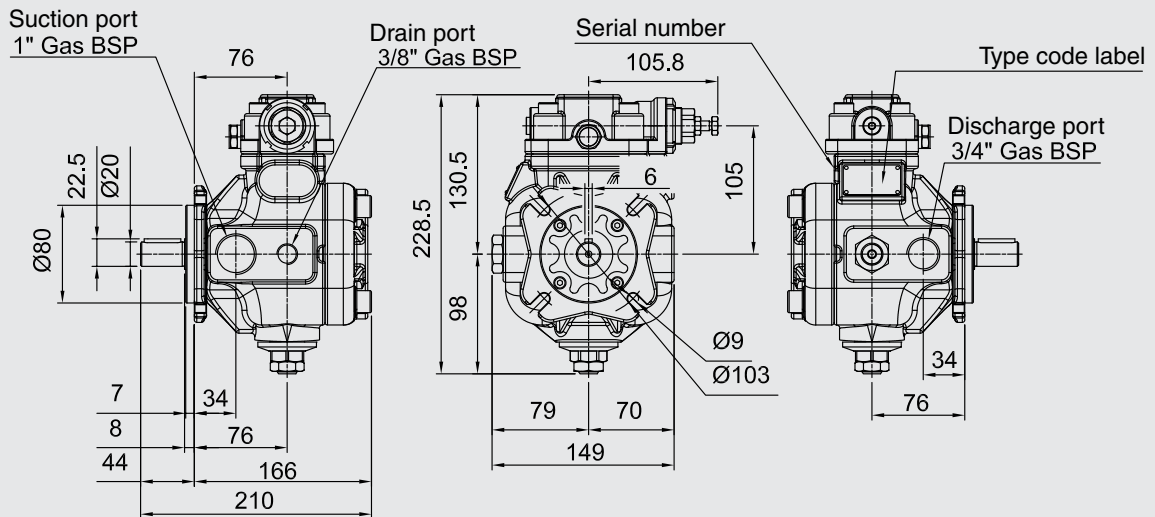
DIMENSIONS

3.2.24 PVV103-05-16

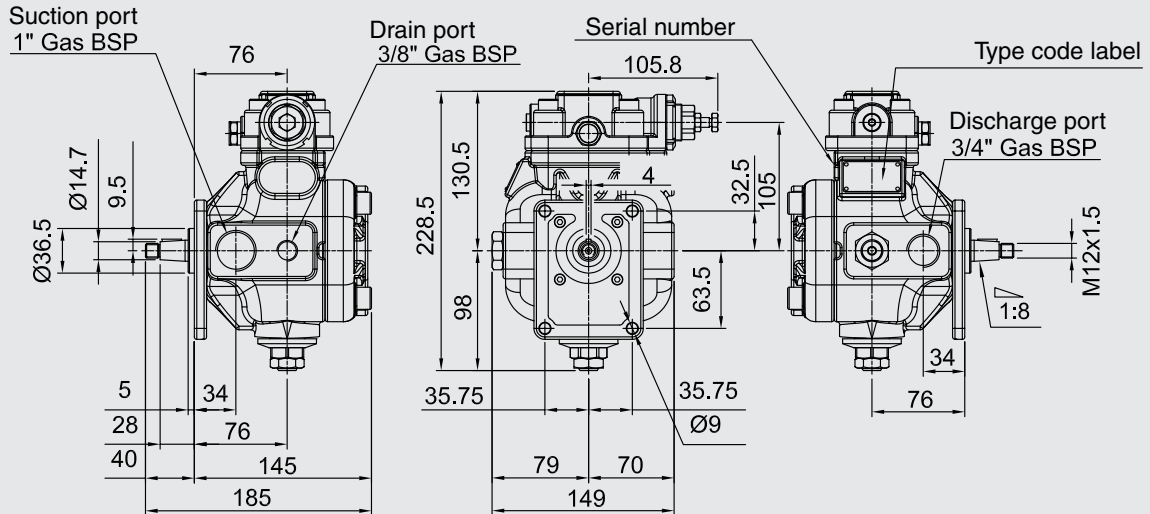
PVV103-05-16 (F)



PVV103-05-16 (F-A)

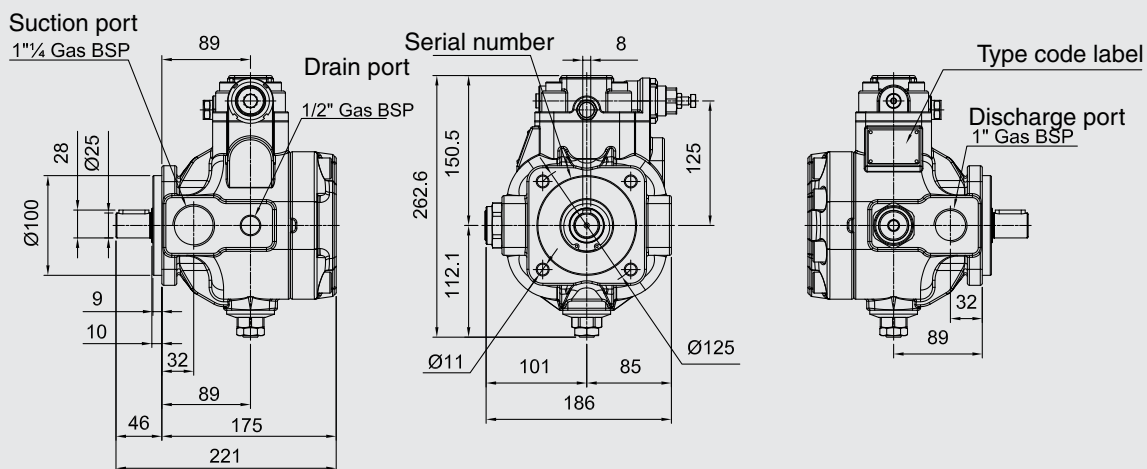


PVV103-05-16 (FGR2)

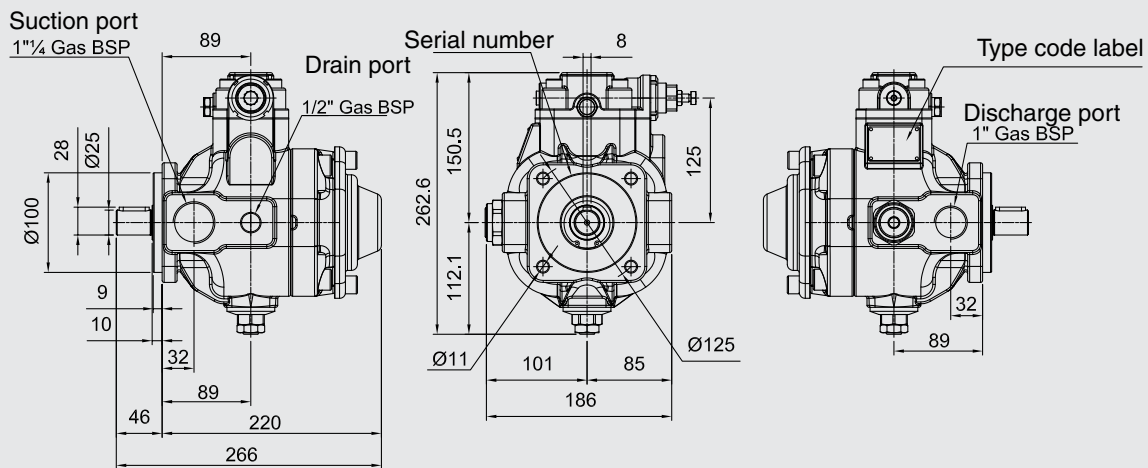


3.2.25 PVV103-1-32

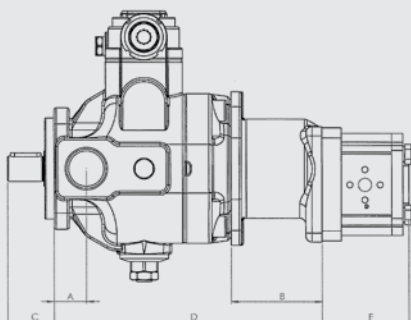
PVV103-01-32 (F)



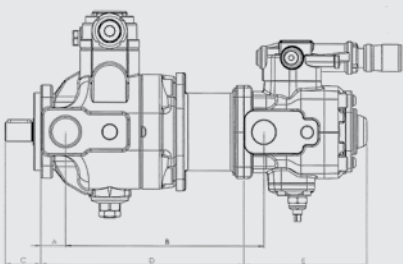
PVV103-01-32 (F-A)



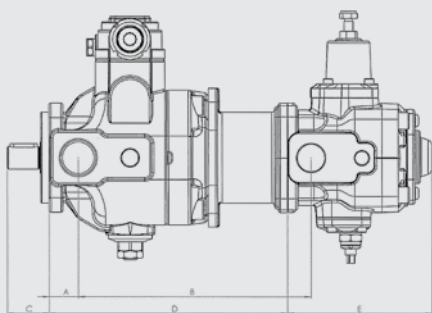
Multiple pumps
Front pump PVV103-05-16 F



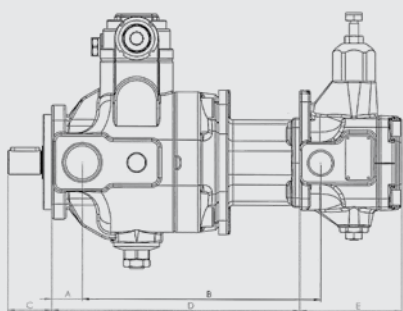
End pump	A	B	C	D	E
Gear pump Size 2	34	72	44	211	dependent on size selected



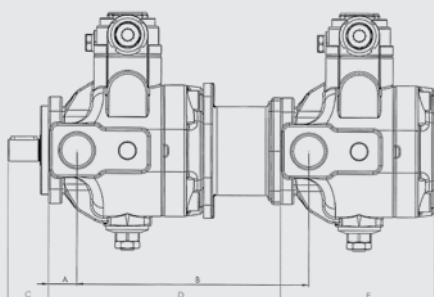
End pump	A	B	C	D	E
PVV100-1- ... F PVV101-1- ... F	34	206	44	214	159



End pump	A	B	C	D	E
PVV103-05- ... F	34	212	44	212	145

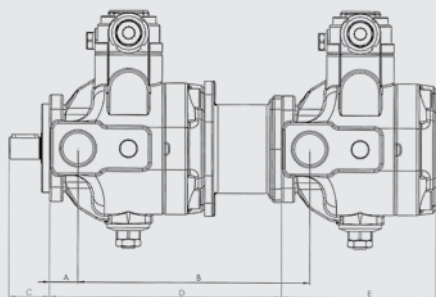
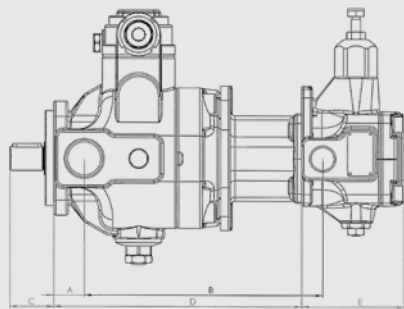
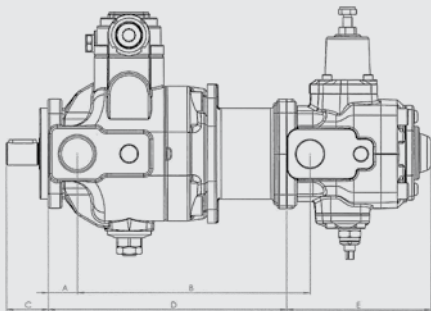
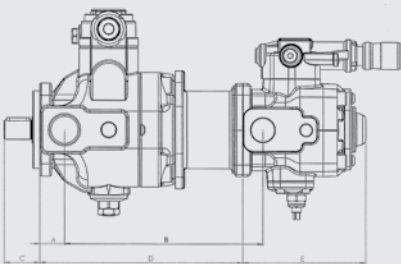
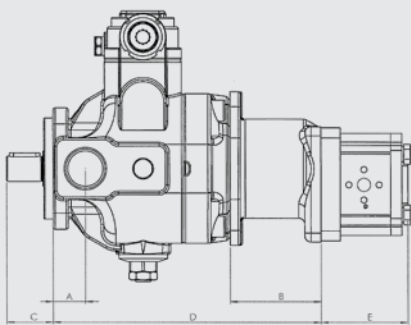


End pump	A	B	C	D	E
PVV102-05- ... F	34	200	44	212	107



End pump	A	B	C	D	E
PVV103-1- ... F	34	212	44	214	175

Multiple pumps
Front pump PVV103-1-32 F



End pump	A	B	C	D	E
Gear pump Size 2	32	90	46	263	dependent on size selected
Gear pump Size 3	32	90	46	263	dependent on size selected

End pump	A	B	C	D	E
PVV100-1- ... F PVV101-1- ... F	32	269	46	260	159

End pump	A	B	C	D	E
PVV100-2- ... F PVV101-2- ... F	32	283	46	275	219

End pump	A	B	C	D	E
PVV100-1- ... F PVV101-1- ... F	32	269	46	260	159

End pump	A	B	C	D	E
PVV100-2- ... F PVV101-2- ... F	32	283	46	275	219

End pump	A	B	C	D	E
PVV102-05- ... F	32	248	46	258	107

End pump	A	B	C	D	E
PVV103-05- ... F	32	260	44	258	145

End pump	A	B	C	D	E
PVV103-1- ... F	32	260	44	260	175



3.3 VARIABLE DISPLACEMENT MECHANICAL COMPENSATION CONTENTS

PVV101

Ordering Code	3.3.1 Mechanical compensation
Technical Information	3.3.2 Specifications 3.3.3 Hydraulic fluids 3.3.4 Viscosity range 3.3.5 Temperature range 3.3.6 Seals 3.3.7 Filtration 3.3.8 Max. drive and through drive torques 3.3.9 Through drive models 3.3.10 Installation notes 3.3.11 Adjustments
Control Options	3.3.12 Standard pressure control
Performance Data	3.3.13 PVV101-1-20 / -25 3.3.14 PVV101-2-31 / -40 / -50 3.3.15 PVV101-3-63 / -80 / -100
Dimensions	3.3.16 PVV101-1-20 / -25 3.3.17 PVV101-2-31 / -40 / -50 3.3.18 PVV101-3-63 / -80 / -100

ORDERING CODE

3.3.1 Variable Displacement Mechanical Compensation

PVV101 – 01 – 20 F H R M Q - KL - XXXX

**Variable displacement vane pump
with mechanical compensation**

Size

1 | 2 | 3

Displacement

20 25 | 31 40 50 | 63 80 100

Flange and ports

F ISO 3019/2 – BSP ISO 228/1 thread
 FS SAE – BSP ISO 228/1 thread (only size 2 and 3)
 FGR2 Size 2 gear pump – BSP ISO 228/1 thread
 B Mounting plate – BSP ISO 228/1 thread
 US SAE – UNF ISO 11926/1 thread
 for size 2 and 3 end pump use FUNC
 FUNC ISO 3019/2 – UNF ISO 11926/1 thread
 only for size 2 and 3 end pump in combination with US

Pressure setting range

L 15 - 50 bar for size 1 / 2 / 3
 H 30 - 80 bar for size 3 only
 30 - 100 bar for size 1 / 2 only

Shaft rotation

R Clockwise
 (viewed from shaft end)

Seals

M NBR
 E FPM (FKM)

Flow adjustment

Q Volume adjustment screw (standard)

Options

KL Key lock compensator
 A Through drive for gear pump (size 05 only)

Modification number

XXXX Determined by manufacturer

TECHNICAL INFORMATION

3.3.2 Specifications

Pump size			20	25	31	40	50	63	80	100
Geometric displacement		[cm³/rev]	22.1	26.9	34.5	42.8	53.1	69.0	86.2	105.5
Pressure	Rated	[bar]	100					80		
Drive speed	min.	[rpm]	800							
	max.	[rpm]	1800							
Approx. weight		[kg]	12.0		32.0			44.0		
Max. axial shaft force		[N]	No radial or axial forces allowed							
Max. radial shaft force		[N]								

3.3.3 Hydraulic fluids

The pump series is designed for use with:

Hydraulic oil (normal mineral oil)
HLP to DIN ISO 51524/2 or
HM ISO 6743/4

Synthetic fluids
(Polyolester, HFD-U)

3.3.4 Viscosity range

Normal operating viscosity: 22 - 68 cSt (mm²/s)

Maximum viscosity at start-up: 400 cSt (mm²/s)

3.3.5 Temperature range

-10 to +50 °C

Note: The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

3.3.6 Seals

The pump series is equipped with NBR or FPM (FKM) seals. The actual seal material is specified in the model code.

3.3.7 Filtration

For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class:

18/16/13 to ISO 4406/99

or

Class 7 to NAS 1638

3.3.8 Max. drive and through drive torques

Nominal size		Size 1	Size 2	Size 3
Geometric displacement	[cm³/rev]	20-25	31.5-40-50	63-80-100
Max. torque on primary shaft	[Nm]	197	400	740
Max. through drive torque	[Nm]	55	110	110 / 180*

* only for combination of size 3 and secondary pump size 3

Note:

Multiple pumps should be mounted in decreasing order of their torque.
The sum of the individual torques of the pumps must not exceed the maximum torque permitted on the front pump.

3.3.9 Through drive models

Through drive pump	Drive pump PVV		
	101-1	101-2	101-3
PVV100-1-	•	•	•
PVV101-1-	•	•	•
PVV100-2-		•	•
PVV101-2-		•	•
PVV100-3-			•
PVV101-3-			•
PVV102-05-	•	•	•
PVV103-05-			
PVV103-1-			
PVF100-1-	•	•	•
PGI100-2-*	•*	•*	•*
PGI101-3-		•	•
PGI102-2-	•	•	•
PGI102-3-		•	•
PGE101-...-RBQ...	•	•	•
PGE102-...-RBR...	•	•	•
PGE103-...-RBS...		•	•
SAE A	•	•	•
SAE B		•	•

* PGI102-2 NOT 22 cm³ and 25 cm³

For other possible through drives, please contact HYDAC.

3.3.10 Installation notes

Step 1

PVV101 pumps size 1 can be installed in any position. PVV101 pumps sizes 2 and 3 must be installed horizontally with the compensator at the top (see diagram).

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The minimum cross-section of the suction line must be equal to the cross-section of pump port.

The suction lines should be as short as possible, with a minimum number of bends and without reducing the cross-section.

Step 2

All return and drain lines must be positioned so that the returning oil is not drawn out again immediately by the pump (see diagram).

The oil tank must be the correct size to dissipate the thermal power generated by the system components, and to achieve a low circulating speed.

To ensure maximum pump working life, the suction oil temperature must never exceed 50 °C. In systems where the pump runs for a long time at a zero flow setting it is recommended that an oil cooler is installed. The pressure in the drain line must never exceed the value specified.

The drain line must always feed directly into the tank, independently of all other lines and it must extend under the minimum oil level to avoid generating foam. In addition, the drain line must be free of restrictions and situated as far as possible away from the suction line.

Step 3

The pump and motor must be connected using a gear coupling.

During assembly, the minimum distance between the two coupling halves must be strictly observed (see Detail A).

Other types of motor-pump couplings are not permitted.

There must be no **radial or axial forces** on the pump shaft.

Step 4

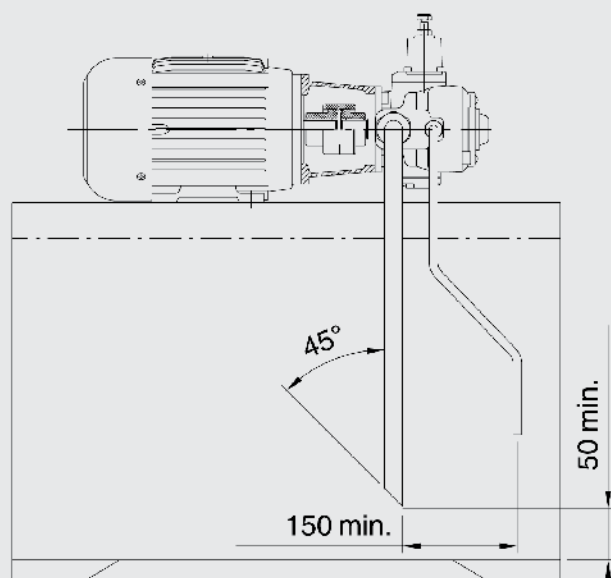
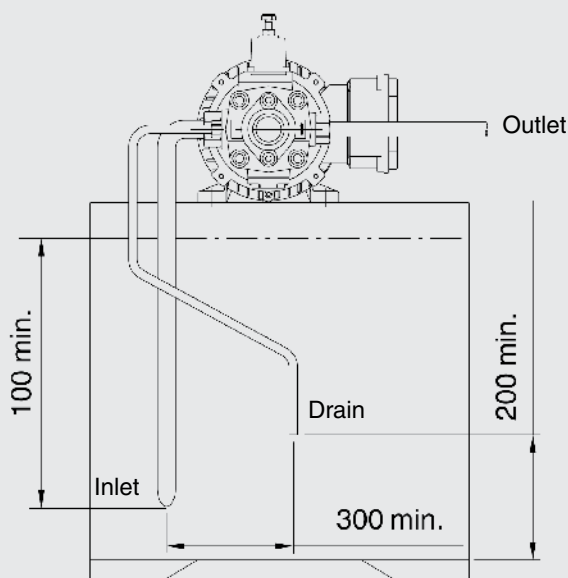
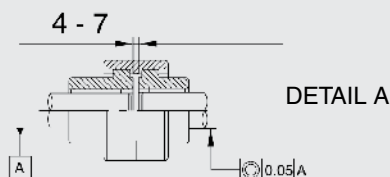
During commissioning, the pump must firstly be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump. Sizes 2 and 3 have an air bleed port on the compensator.

Venting the pump can take several minutes.

Pump filling (oil emerging from the discharge port) should only take a few seconds. If not, the pump must be switched off and the procedure repeated.

Provided that the system and pump are completely full of oil, the pump can be started up during subsequent operation against a maximum pressure of 30 bar.

During both initial commissioning and subsequent start-up operations, the difference between the oil temperature and the ambient temperature (pump case) must not exceed 20 °C.



Note:

For further information, see brochure section "Installation Instructions for Variable Displacement Vane Pumps".

3.3.11 Adjustments

Pump size	Available displacement [cm ³]	Volume adjustment screw rate [cm ³]	Min. adjustable displacement [cm ³]
PVV101-1-20	22.1	2.7	9.6
PVV101-1-25	26.9	7.5	9.6
PVV101-2-31	34.5	11.7	16.4
PVV101-2-40	42.8	1.5	16.4
PVV101-2-50	53.1	9.8	16.4
PVV101-3-63	69	20.9	23.7
PVV101-3-80	86.2	26.9	23.7
PVV101-3-100	105.5	45.5	23.7

CONTROL OPTIONS

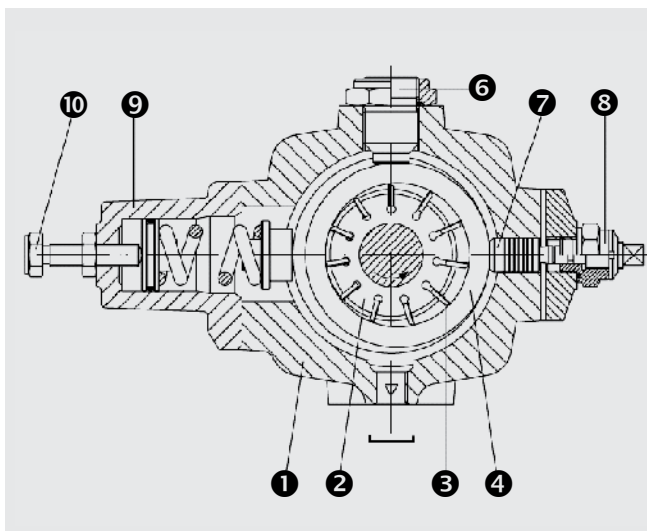
3.3.12 Standard pressure control

The PVV101 variable displacement vane pumps come in three nominal sizes: size 1, 2 and 3, each of which is available with different displacements.

The low pressure pumps, type PVV101 (100 bar), are equipped with a mechanical pressure regulating device.

Pump components include:

- a body **1**,
- a drive rotor **2**,
- which houses the vanes **3**
- that convey the fluid into
- the inlet and outlet chambers;
- a stator **4** (mobile ring) for varying the eccentricity and therefore displacement;
- side distribution plates
- with axial hydrostatic compensation,
- which delimit the inlet and outlet chambers;
- a guide block balancing adjustment screw **6**
- (this must not be altered by the user);
- a displacement adjustment piston **7**,
- a maximum volume adjustment screw **8**
- a pressure regulating device **9**;
- a pressure regulator adjustment **10**.

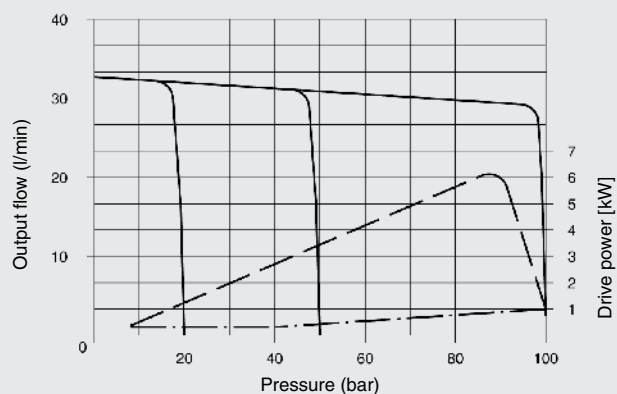


PERFORMANCE DATA

3.3.13 PVV101-1-20 / -25

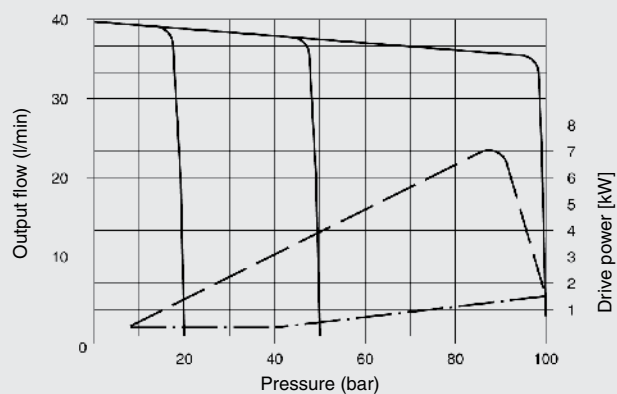
Volumetric efficiency

PVV101-1-20



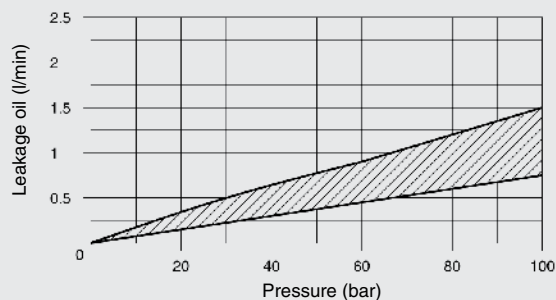
Volumetric efficiency

PVV101-1-25



Leakage oil

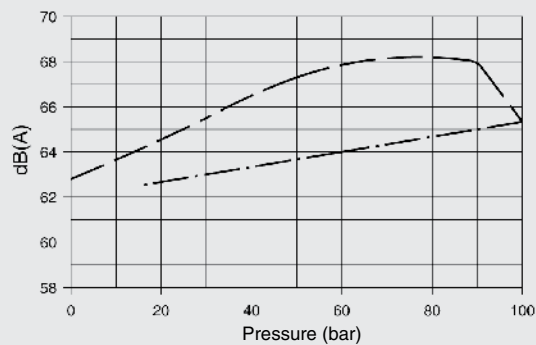
Values determined with pump on zero flow setting
PVV101-1-20 / -25



Maximum noise level

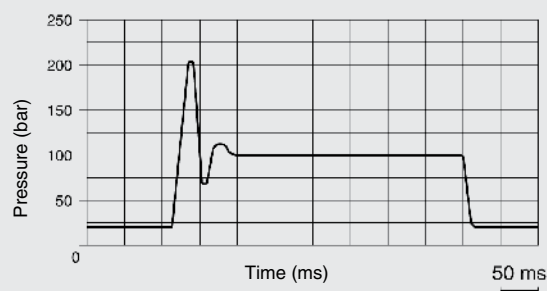
with sound-level meter placed 1 meter
away from pump, flexible coupling

PVV101-1-20 / -25



Response times and peak pressure

PVV101-1-20 / -25



Drive power at maximum displacement

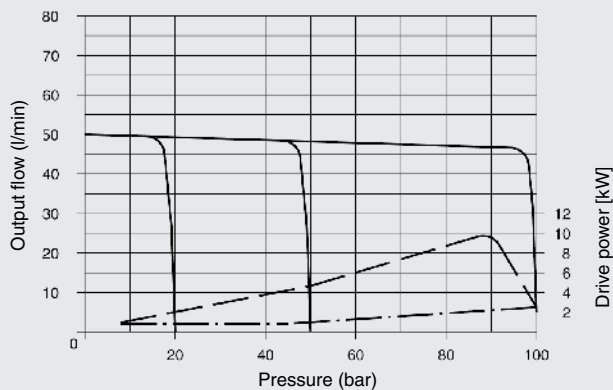
Drive power at zero flow setting

Pressure peaks are due to the test system.

Pressure peaks exceeding 30 %
of the maximum operating pressure
must be avoided.

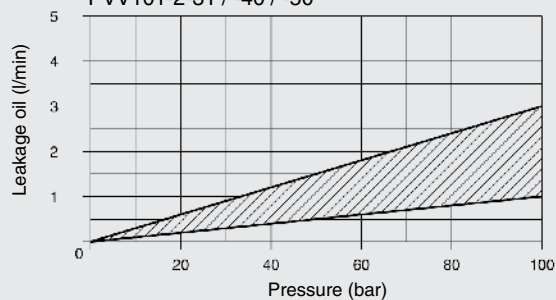
3.3.14 PVV101-2-31 / -40 / -50

Volumetric efficiency
PVV101-2-31

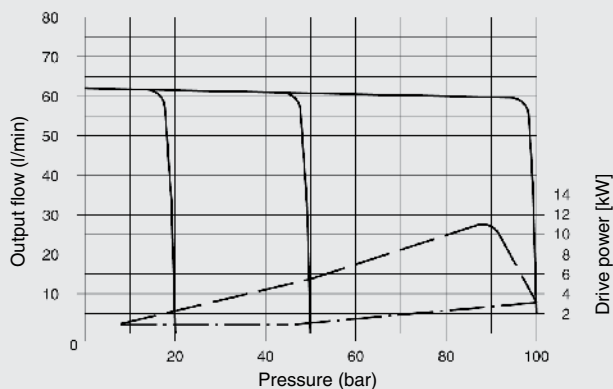


Leakage oil

Values determined with pump on zero flow setting
PVV101-2-31 / -40 / -50

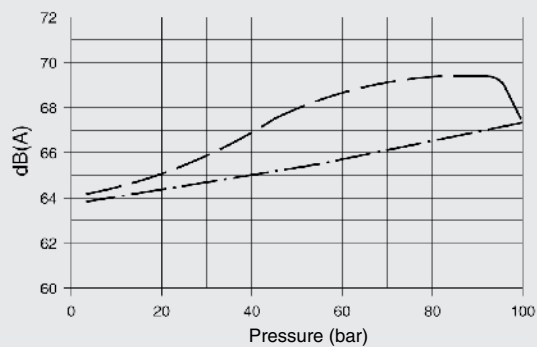


Volumetric efficiency
PVV101-2-40

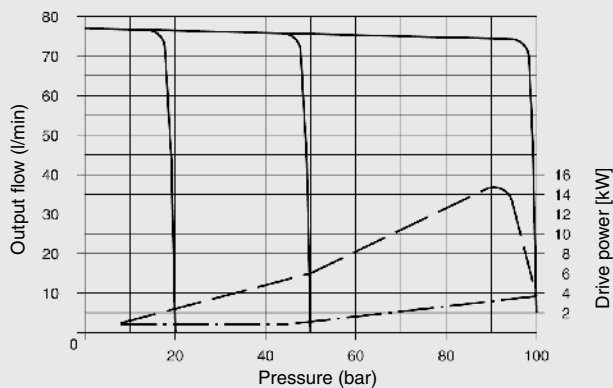


Maximum noise level

with sound-level meter placed 1 meter
away from pump, flexible coupling
PVV101-2-31 / -40 / -50

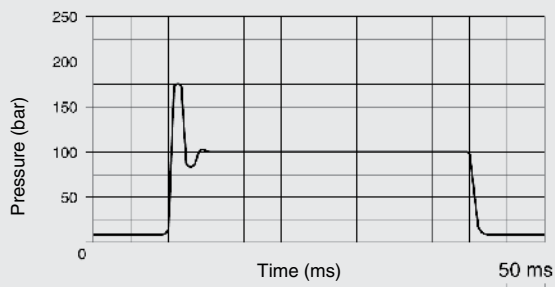


Volumetric efficiency
PVV101-2-50



Response times and peak pressure

PVV101-2-31 / -40 / -50



Drive power at maximum displacement

Drive power at zero flow setting

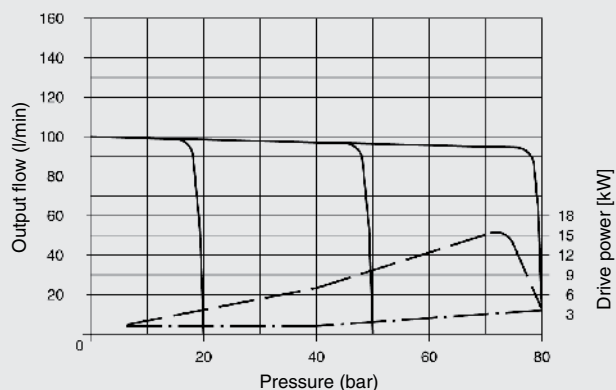
Pressure peaks are due to the test system.

Pressure peaks exceeding 30 %
of the maximum operating pressure
must be avoided.

3.3.15 PVV101-3-63 / -80 / -100

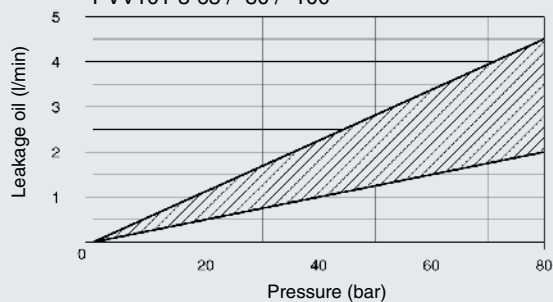
Volumetric efficiency

PVV101-3-63



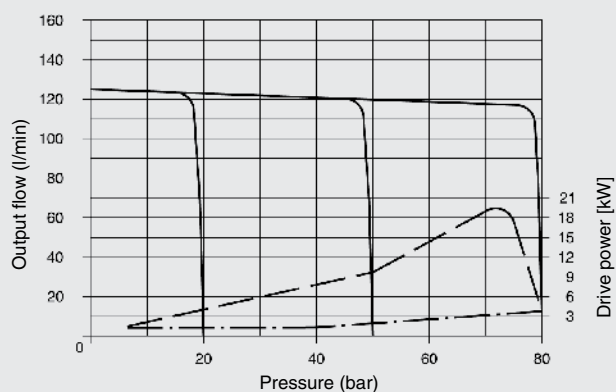
Leakage oil

Values determined with pump on zero flow setting
PVV101-3-63 / -80 / -100



Volumetric efficiency

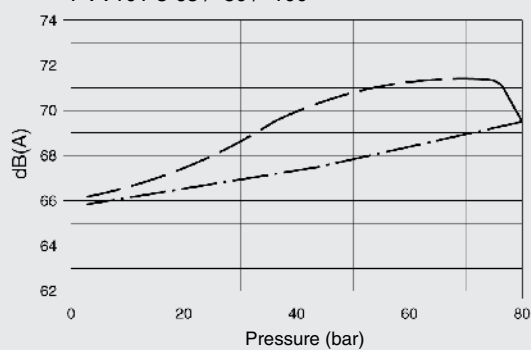
PVV101-3-80



Maximum noise level

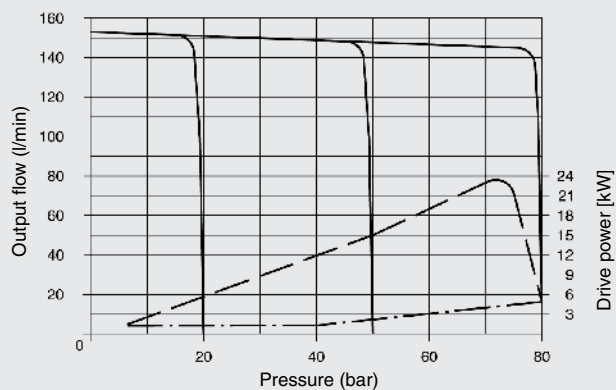
with sound-level meter placed 1 meter
away from pump, flexible coupling

PVV101-3-63 / -80 / -100



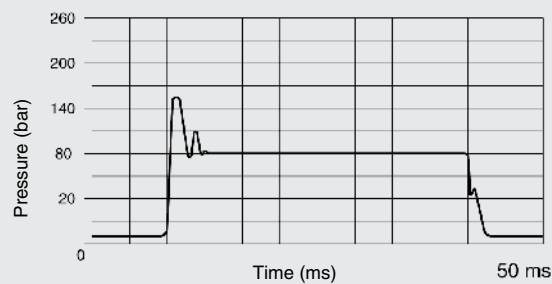
Volumetric efficiency

PVV101-3-100



Response times and peak pressure

PVV101-3-63 / -80 / -100



Drive power at maximum displacement

Drive power at zero flow setting

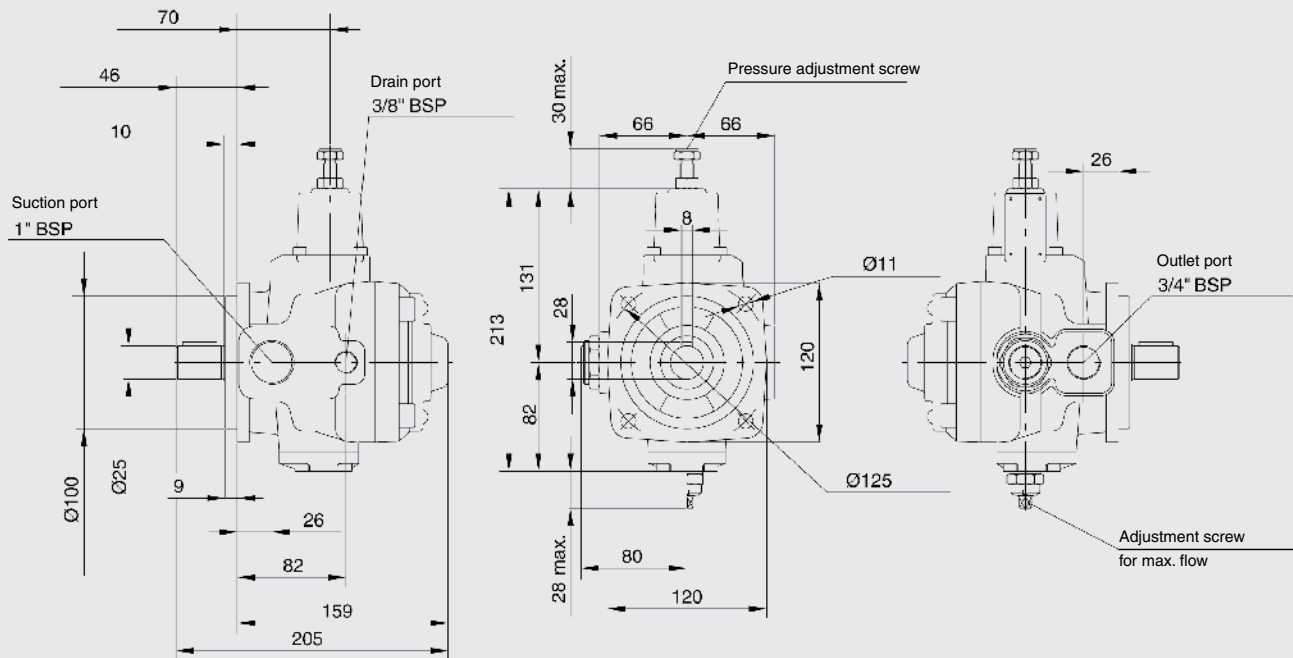
Pressure peaks are due to the test system.

Pressure peaks exceeding 30 %
of the maximum operating pressure
must be avoided.

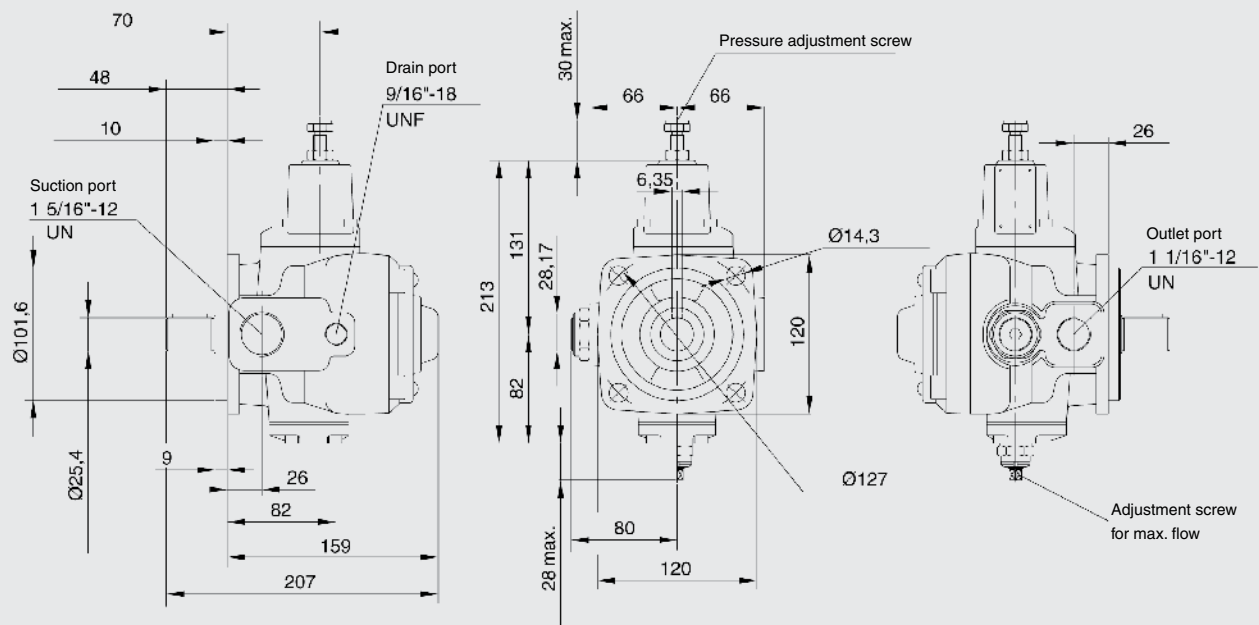
DIMENSIONS

3.3.16 PVV101-1-20 / -25

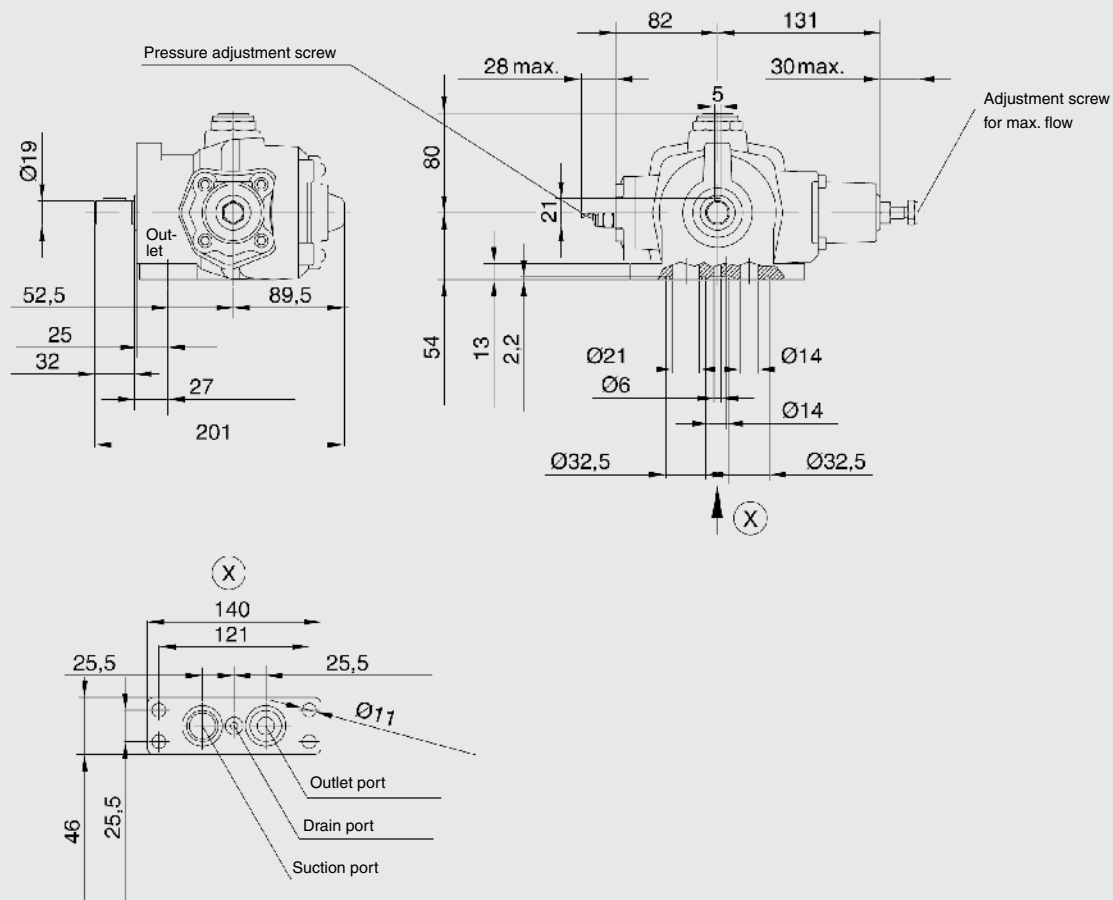
PVV101-1-20 / -25 (F)



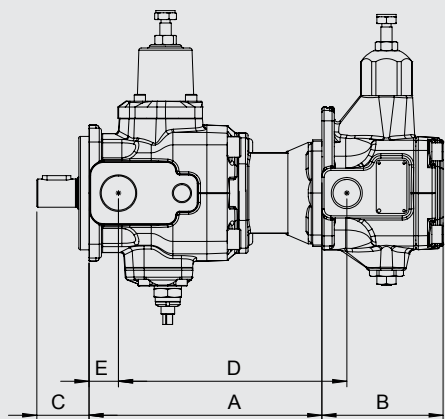
PVV101-1-16 / -20 / -25 (US)



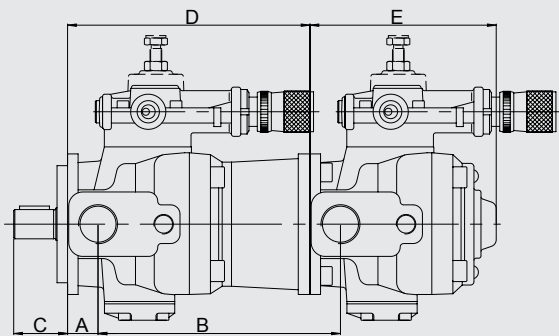
PVV101-1-20 / -25 (B)



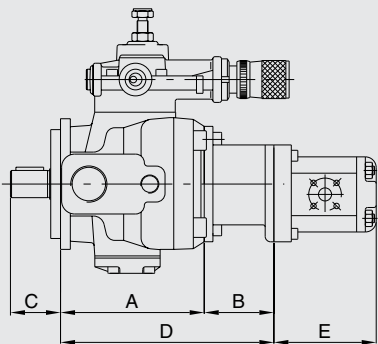
Multiple pumps
Front pump PVV101-1- ... F



End pump	A	B	C	D	E
PVV102-05- ... F / US	205	107	46	200	26
PVV102-05- ... F-GR2	204	107	46	199	26



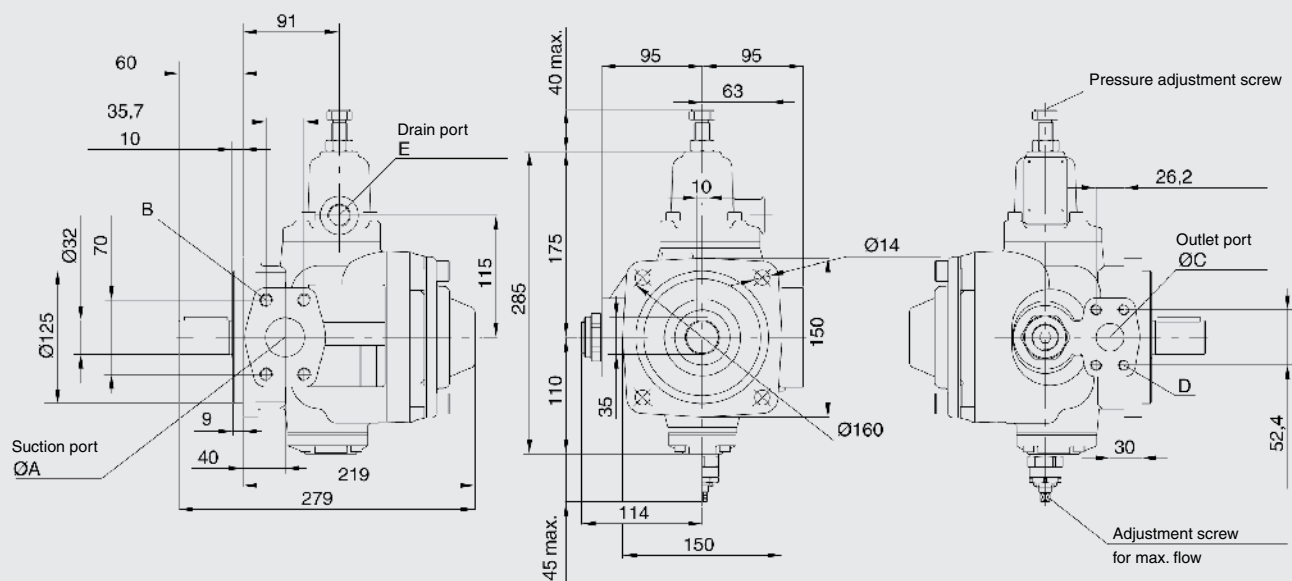
End pump	A	B	C	D	E
PVV100-1- ... F/ PVV101-1- ... F	26	207	46	207	159



End pump	A	B	C	D	E
Gear pump size 1	132	64	46	196	dependent on gear pump selected
Gear pump size 2	132	72	46	204	

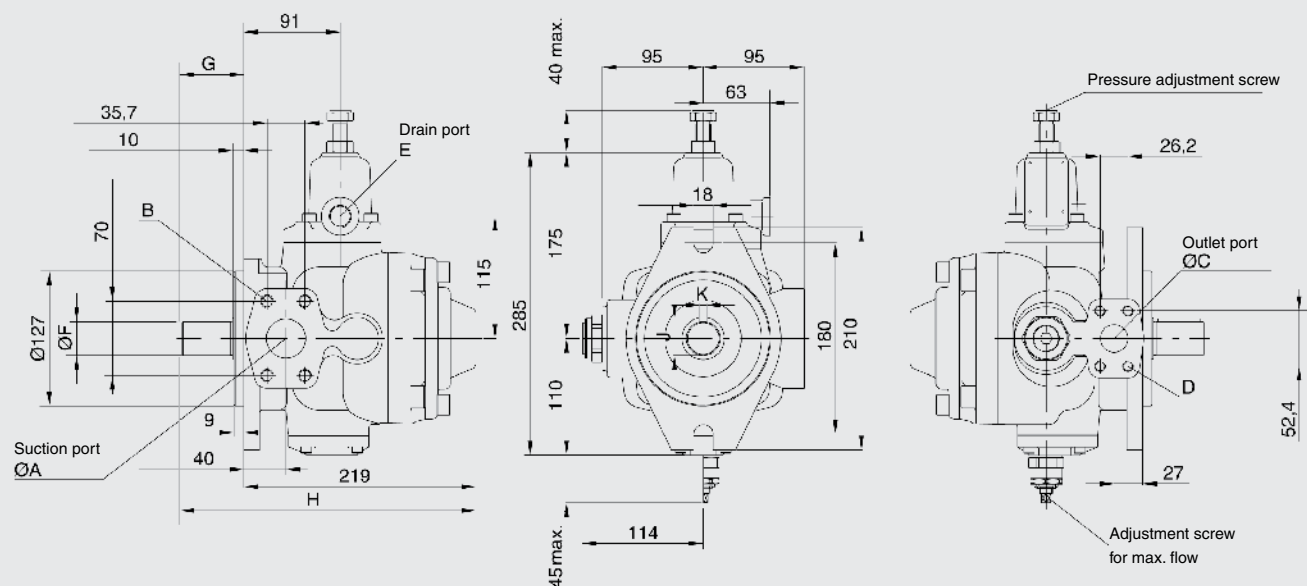
3.3.17 PVV101-2-31 / -40 / -50

PVV101-2-31 / -40 / -50 (F / F UNC)



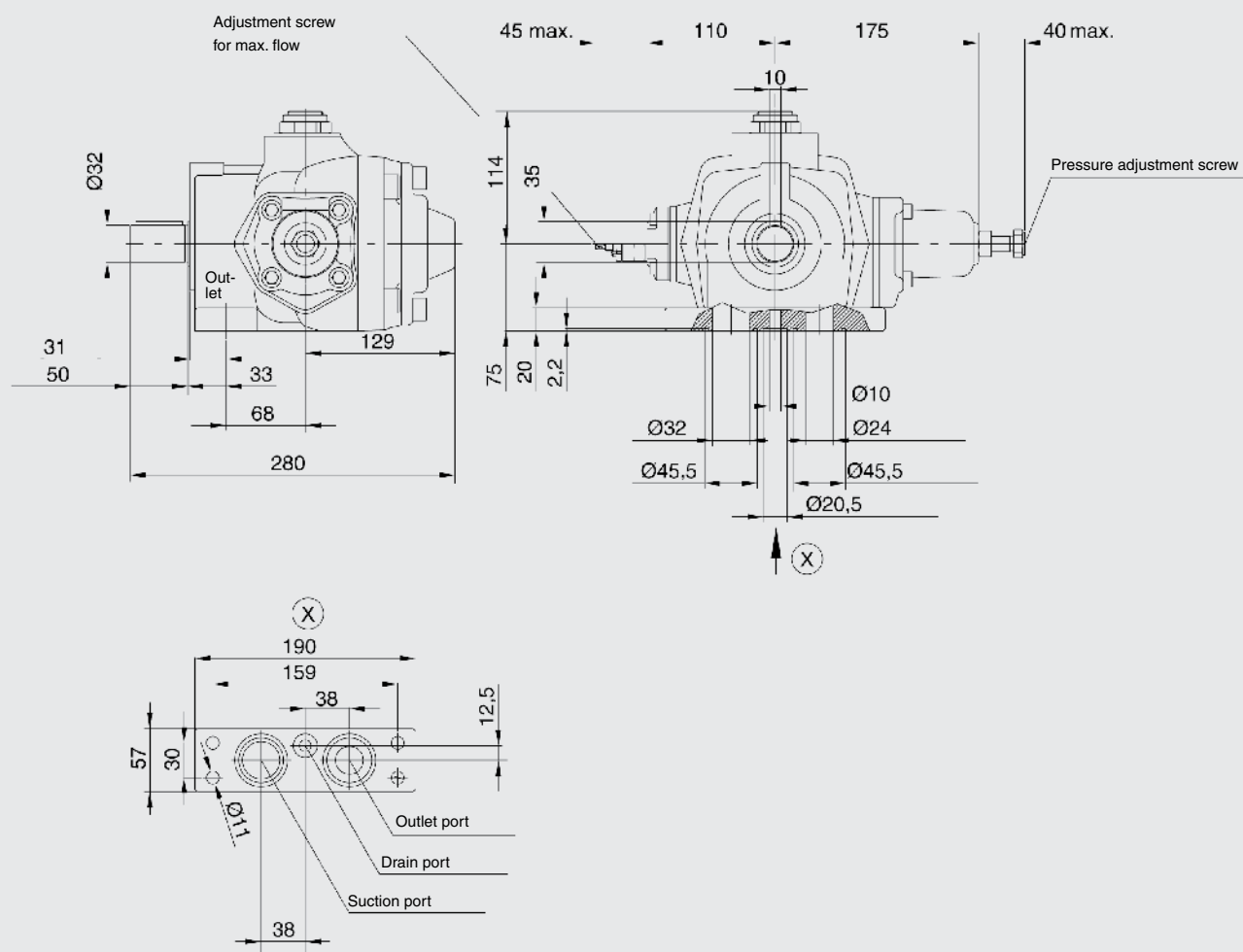
Flange	ØA	B	ØC	D	E
F (ISO)	38	SAE (3000) 1 1/2" M12 x 45	25	SAE (3000) 1" M10 x 35	1/2" BSP
F UNC (ISO) only as end pump	38	SAE (3000) 1 1/2" 1/2"-13 UNC	25	SAE (3000) 1" 3/8"-16 UNC	7/8"-14 UNF

PVV101-2-31 / -40 / -50 (FS / US)

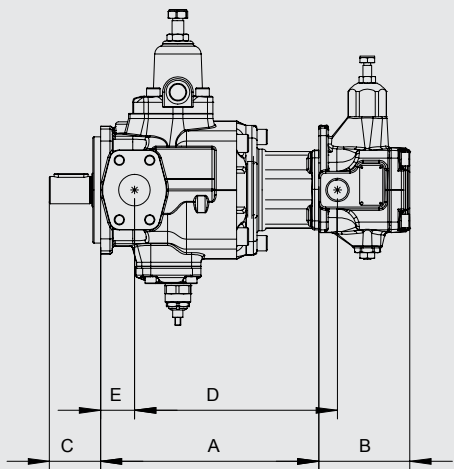


Flange	ØA	B	ØC	D	E	ØF	G	H	J	K
FS (SAE)	38	SAE (3000) 1 1/2" M12 x 45	25	SAE (3000) 1" M10 x 35	1/2" BSP	32	60	279	35	10
US (SAE)	38	SAE (3000) 1 1/2" 1/2"-13 UNC	25	SAE (3000) 1" 3/8"-16 UNC	7/8"-14 UNF	31.75	58	277	34.5	6.35

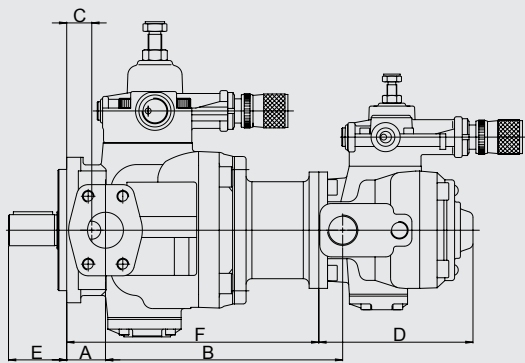
PVV101-2-31 / -40 / -50 (B)



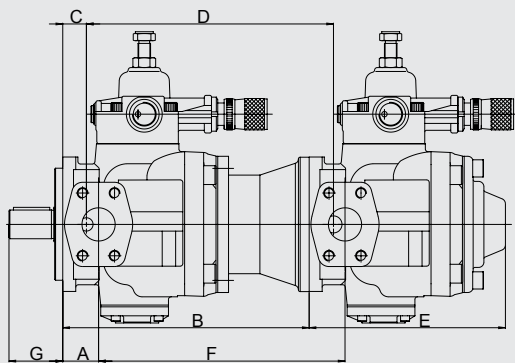
Multiple pumps
Front pump PVV101-2- ... F



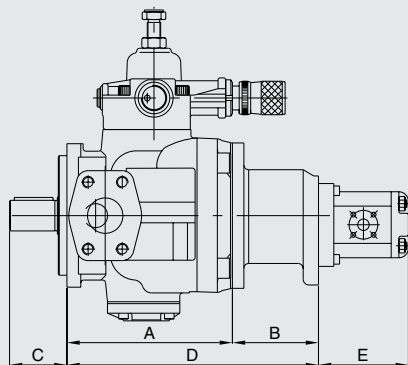
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	240	40
PVV102-05- ... F-GR2	261	107	60	245	40



End pump	A	B	C	D	E	F
PVV100-1- ... F / PVV101-1- ... F	40	246	30	159	60	260



End pump	A	B	C	D	E	F	G
PVV100-2- ... F / PVV101-2- ... F	40	275	30	275	220	275	60



End pump	A	B	C	D	E
Gear pump size 1	173	90	60	263	dependent on gear pump selected
Gear pump size 2	173	90	60	263	
Gear pump size 3	173	90	60	263	

3

Flange	ØA	B	ØC	D	E
F (ISO)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 ¼" M10 x 40	½" BSP
F UNC (ISO) only as end pump	51	SAE (3000) 1 ½" ½"-13 UNC	32	SAE (3000) 1 ¼" 7/16"-14 UNC	7/8"-14 UNF

Technical drawings of the 3000 series pressure washer, showing front, top, and side views with dimensions in mm.

Front View Dimensions:

- Suction port ØA
- Drain port E
- Outlet port ØC
- Adjustment screw for max. flow
- Pressure adjustment screw
- Dimensions: 105, 43, 125, 77.8, 9, 46, 245, H, 185, 305, 120, 45 max., 123, 105, 63, 18, 180, 210, 30.2, 35, 58.7

Top View Dimensions:

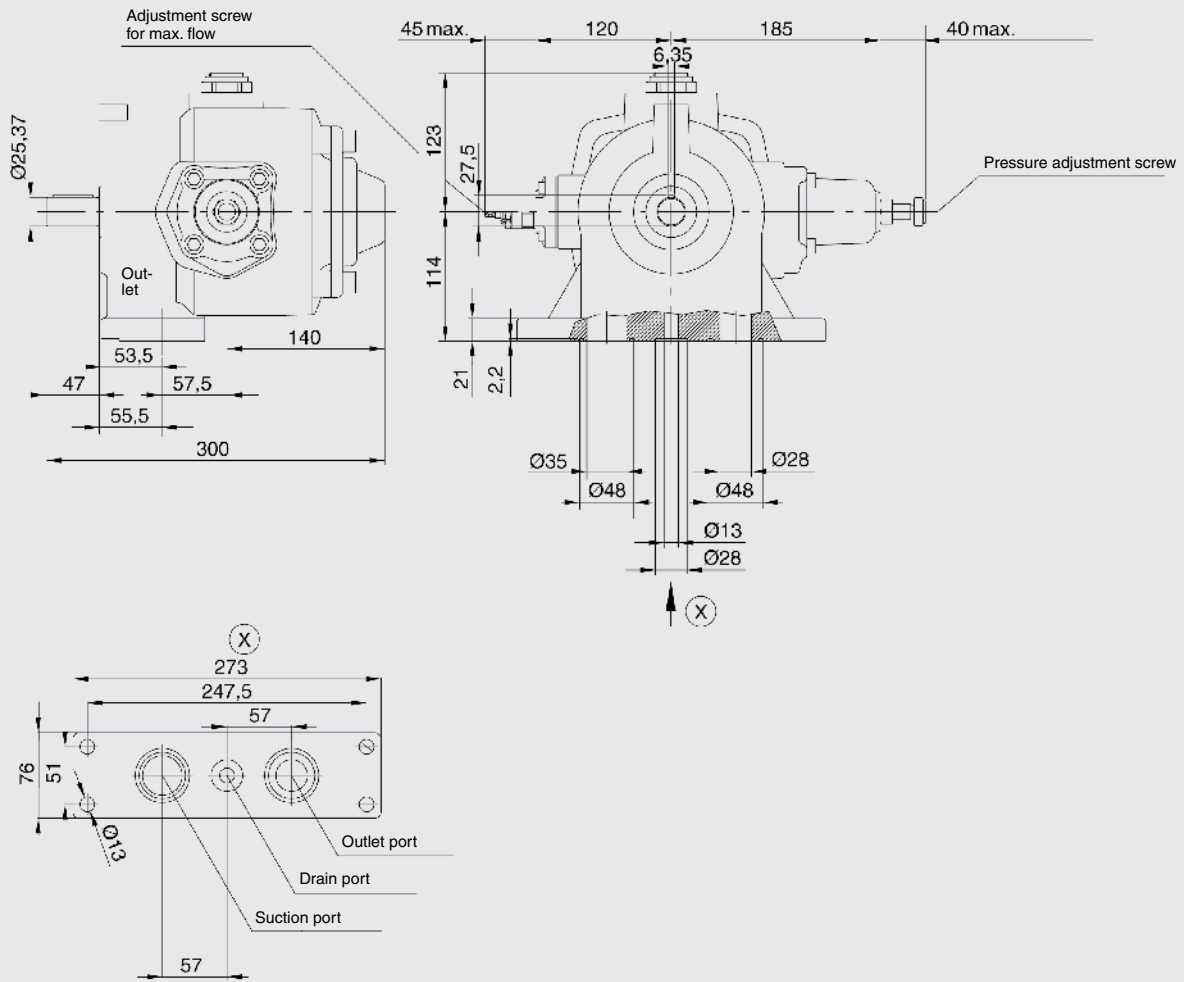
- Dimensions: 105, 63, 18, 180, 210, 123, 45 max., 120, 305, 185, 105, 43, 125, 77.8, 9, 46, 245, H

Side View Dimensions:

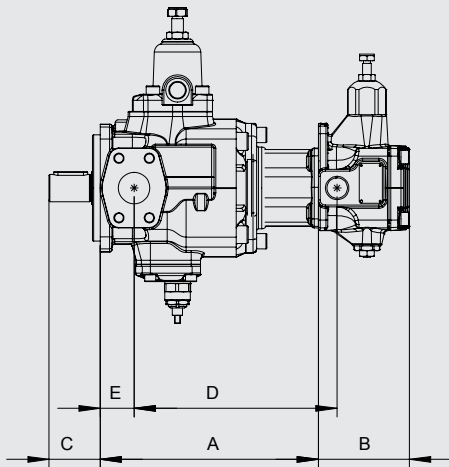
- Dimensions: 105, 63, 18, 180, 210, 123, 45 max., 120, 305, 185, 105, 43, 125, 77.8, 9, 46, 245, H

Flange	Ø A	B	Ø C	D	E	Ø F	G	H	J	K
FS (SAE)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 ¼" M10 x 40	½" BSP	32	60	305	35	10
US (SAE)	51	SAE (3000) 2" ½"-13 UNC	32	SAE (3000) 1 ¼" 7/16"-14 UNC	7/8"-14 UNF	31.75	58	303	34.5	6.35

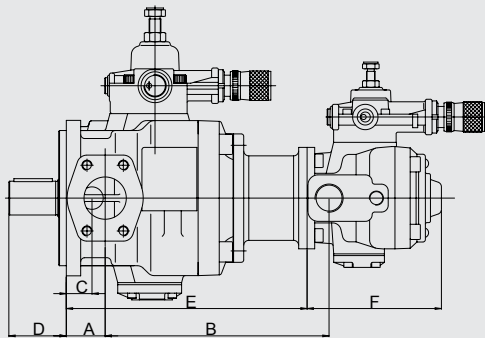
PVV101-3-63 / -80 / -100 (B)



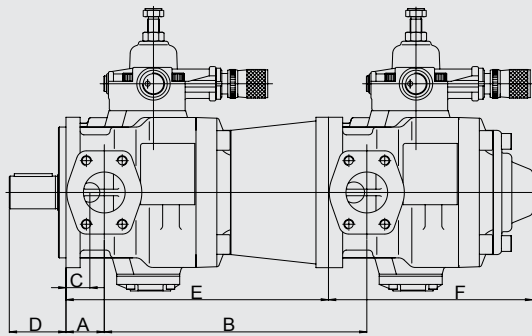
Multiple pumps
Front pump PVV101-3- ... F



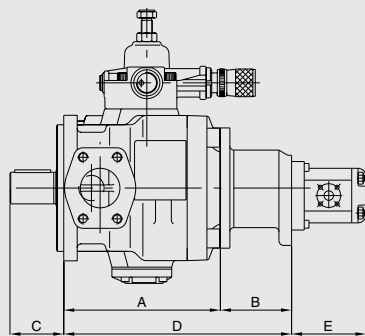
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	240	40
PVV102-05- ... F-GR2	261	107	60	245	40



End pump	A	B	C	D	E	F
PVV100-1- ... F / PVV101-1- ... F	46	265	35	68	285	159



End pump	A	B	C	D	E	F
PVV100-2- ... F / PVV101-2- ... F	46	295	35	68	300	220
PVV100-3- ... F / PVV101-3- ... F	46	315	35	68	315	245



End pump	A	B	C	D	E
Gear pump size 1	198	90	68	288	dependent on gear pump selected
Gear pump size 2	198	90	68	288	
Gear pump size 3	198	90	68	288	



3.4 VARIABLE DISPLACEMENT MECHANICAL COMPENSATION CONTENTS

PVV102

Ordering code	3.4.1 Mechanical compensation
Technical Information	3.4.2 Specifications 3.4.3 Hydraulic fluids 3.4.4 Viscosity range 3.4.5 Temperature range 3.4.6 Seals 3.4.7 Filtration 3.4.8 Max. drive and through drive torques 3.4.9 Through drive models 3.4.10 Installation notes 3.4.11 Adjustments
Control Options	3.4.12 Standard pressure control
Performance Data	3.4.13 PVV102-05-16
Dimensions	3.4.14 PVV102-05-16

ORDERING CODE

3.4.1 Variable Displacement, Mechanical Compensation

PVV102 – 05 – 16 F H R M – – – XXXX

Variable displacement vane pump
with mechanical compensation

Size
05

Displacement
16

Flange and ports
F ISO 3019/2 – BSP ISO 228/1 thread
FGR2 Size 2 gear pump - BSP ISO 228/1 thread

Pressure range
H 20-120 bar

Shaft rotation
R Clockwise
(viewed from shaft end)

Seals
M NBR
E FPM (FKM)

Options
– Single pump (without through drive)
A Through drive for double pump (only for F flange)

Modification number
XXXX Determined by manufacturer

TECHNICAL INFORMATION

3.4.2 Specifications

Pump size		16
Geometric displacement	[cm³/rev]	17.9
Rated	[bar]	120
Peak	[bar]	150
Drive speed	Min.	[rpm] 800
	Max.	[rpm] 1800
Approx. weight	[kg]	7.4
Max. axial shaft force	[N]	No radial or axial forces allowed.
Max. radial shaft force	[N]	

3.4.3 Hydraulic fluids

The pump series is designed for use with:

Hydraulic oil (normal mineral oil)

HLP to DIN ISO 51524/2 or

HM ISO 6743/4

Synthetic fluids

(Polyolester, HFD-U)

3.4.4 Viscosity range

Normal operating viscosity: 22 - 68 cSt (mm²/s)

Maximum viscosity at start-up: 400 cSt (mm²/s)

3.4.5 Temperature range

+15 to +60 °C

Note: The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

3.4.6 Seals

The pump series is equipped with NBR or FPM (FKM) seals. The actual seal material is specified in the model code.

3.4.7 Filtration

For maximum pump and system component life time, the system should be protected from contamination by effective filtration. Cleanliness class:

18/16/13 to ISO 4406/99

or

Class 7 to NAS 1638 or cleaner.

3.4.8 Max. drive and through drive torques

Nominal size		Size 05
Geometric displacement	[cm³/rev]	3.1 - 17.9
Max. torque on primary shaft	[Nm]	110
Max. through drive torque	[Nm]	55

Note:

Multiple pumps should be mounted in decreasing order of their torque. The sum of the individual torques of the pumps must not exceed the maximum torque permitted on the front pump.

3.4.9 Through drive models

Through drive pump	Drive pump PVV102-05-
PVV100-1-	•
PVV101-1-	•
PVV100-2-	
PVV101-2-	
PVV100-3-	
PVV101-3-	
PVV102-05-	•
PVV103-05-	•
PVV103-1-	
PGI102-2-	•
PGI102-3-	
PGE101-...-RBQ...	•
PGE102-...-RBR...	•
PGE103-...-RBS...	
SAE A	•
SAE B	

For other possible through drives, please contact HYDAC.

3.4.10 Installation notes

Step 1

PVV102 pumps size 05 can be installed in any position.

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The minimum cross-section of the suction line must be equal to or larger than the cross-section of the suction port of the pump.

The suction lines should be as short as possible, with a minimum number of bends and without reducing the cross-section.

When installing a HYDAC pump always ensure that the fluid in the pump is prevented from draining away during stoppages.

Step 2

All return and drain lines must be positioned so that the returning oil is not drawn out again immediately by the pump (see diagram).

The oil tank must be the correct size to dissipate the thermal power generated by the system components, and to achieve a low circulating speed. To ensure maximum pump working life, the suction oil temperature must never exceed 50 °C. In systems where the pump runs for a long time at a zero flow setting it is recommended that an oil cooler is installed. The pressure in the drain line must never exceed the value specified. The drain line must always feed directly into the tank, independently of all other lines and it must extend under the minimum oil level to avoid generating foam. In addition, the drain line must be free of restrictions and situated as far as possible away from the suction line

Step 3

The pump and motor must be connected using a gear coupling.

During assembly, the minimum distance between the two coupling halves must be strictly observed (see Detail A).

Other types of motor-pump couplings are not permitted.

There must be no **radial or axial forces** on the pump shaft.

Step 4

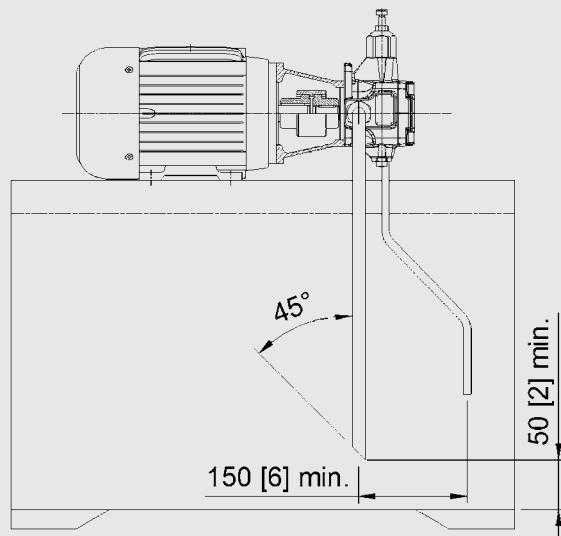
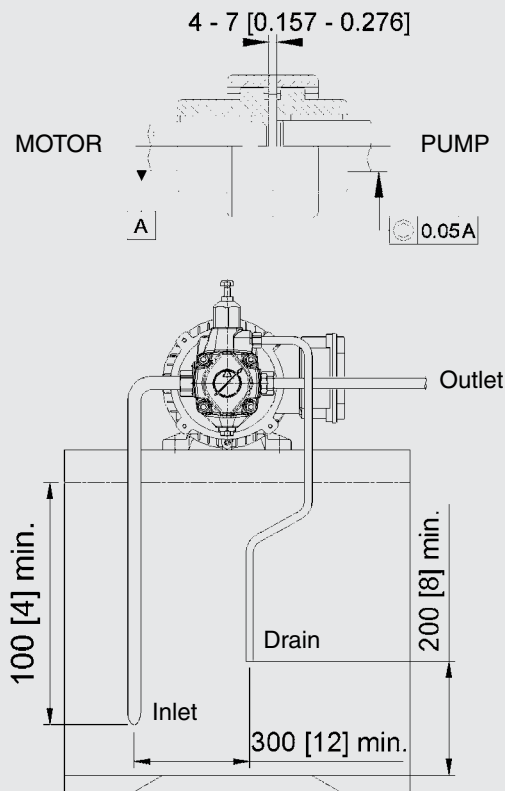
During commissioning, the pump must firstly be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump.

Venting the pump can take several minutes.

Pump filling (oil emerging from the discharge port) should only take a few seconds. If not, the pump must be switched off and the procedure repeated.

Provided that the system and pump are completely full of oil, the pump can be started up during subsequent operation against a maximum pressure of 30 bar.

During both initial commissioning and subsequent start-up operations, the difference between the oil temperature and the ambient temperature (pump case) must not exceed 20 °C.



Note:

For further information, see brochure section "Installation Instructions for Variable Displacement Vane Pumps".

3.4.11 Adjustments

Pump size	Available displacement [cm³]	Volume adjustment screw rate [cm³]	Minimum adjustable displacement [cm³]
PVV102-05-16	17.9	9.7	3.1

CONTROL OPTIONS

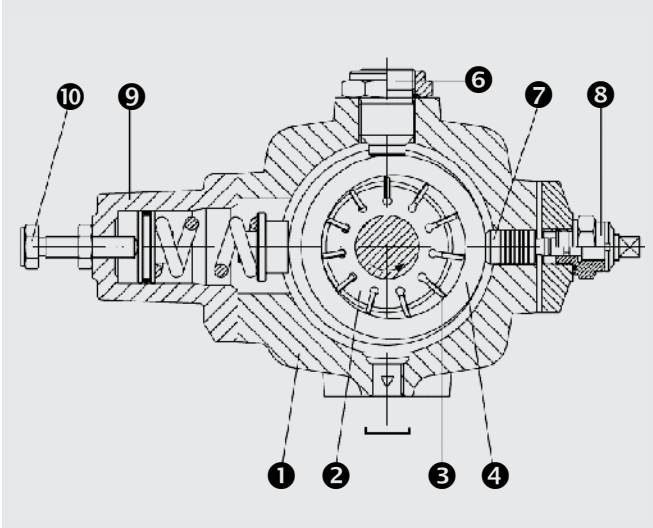
3.4.12 Standard pressure control

The PVV102 variable displacement vane pumps are available in nominal size 05.

The low pressure pumps, type PVV102 (120 bar), are equipped with a mechanical pressure regulating device.

Pump components include:

- a body ①,
- a drive rotor ②,
- which houses the vanes ③
- that convey the fluid into the inlet and outlet chambers;
- a stator ④ (mobile circular ring) for varying the eccentricity and therefore displacement;
- side distribution plates with axial hydrostatic compensation, which delimit the inlet and outlet chambers;
- a guide block balancing adjustment screw ⑥ (this must not be altered by the user);
- a displacement adjustment piston ⑦,
- a maximum volume adjustment screw ⑧
- a pressure regulating device ⑨;
- a pressure regulator adjustment ⑩.



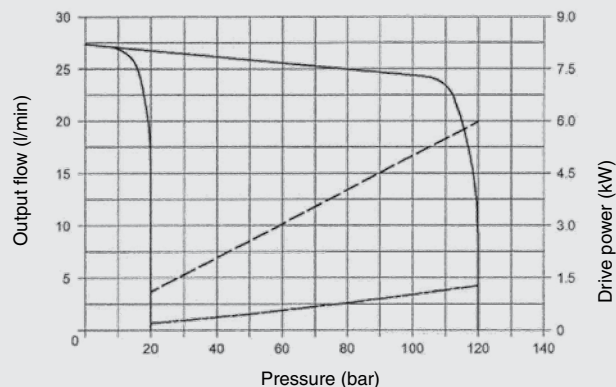
Diagrams and characteristic curves for pressure control:

Description	Performance characteristics	Hydraulic circuit
Standard pump with standard pressure control		

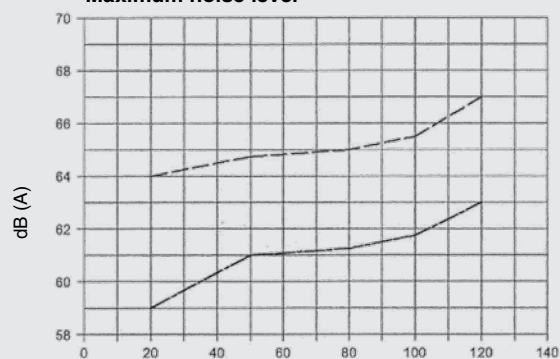
PERFORMANCE DATA

3.4.13 PVV102-05-16

Volumetric efficiency - zero flow setting curve

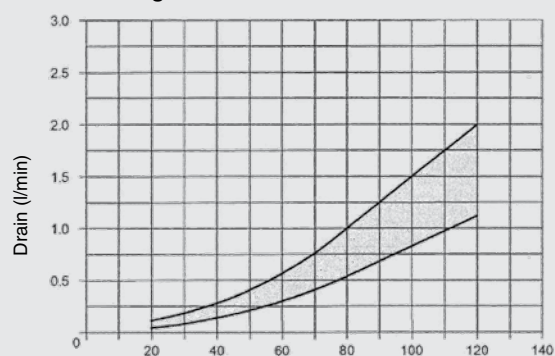


Maximum noise level



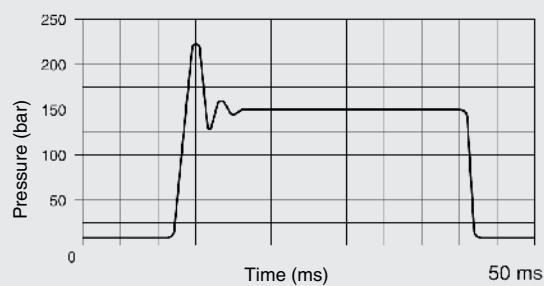
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling

Drainage flow



Values determined with pump on zero flow setting

Control times and dynamic performance



Drive power at maximum displacement

Drive power at zero flow setting

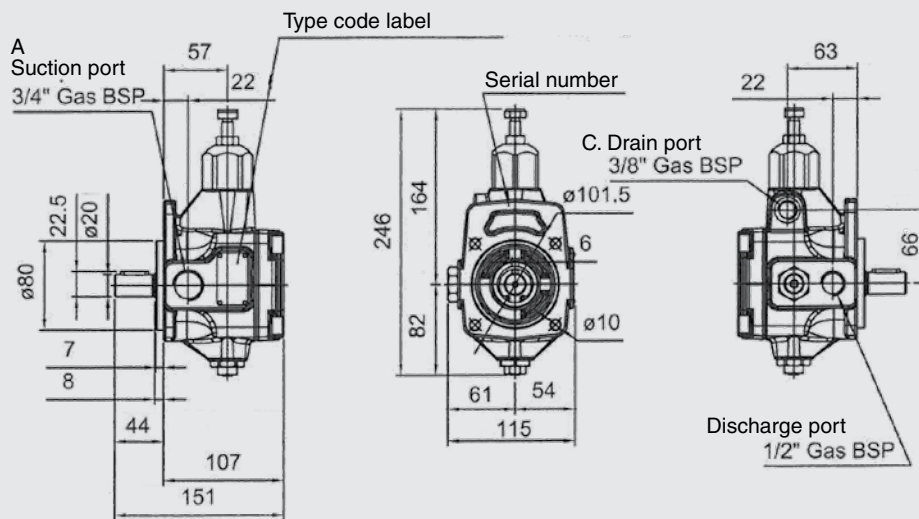
Pressure peaks are due to the test system.

Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

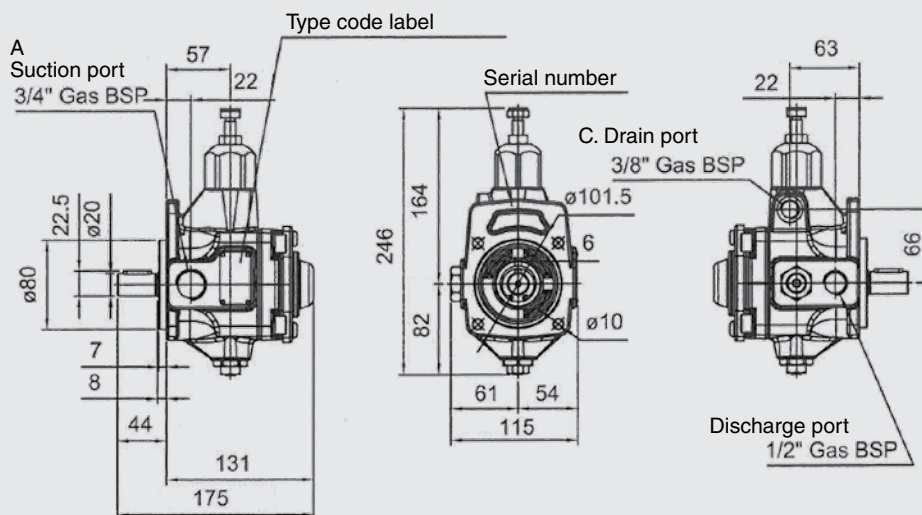
DIMENSIONS

3.4.14 PVV102-05-6

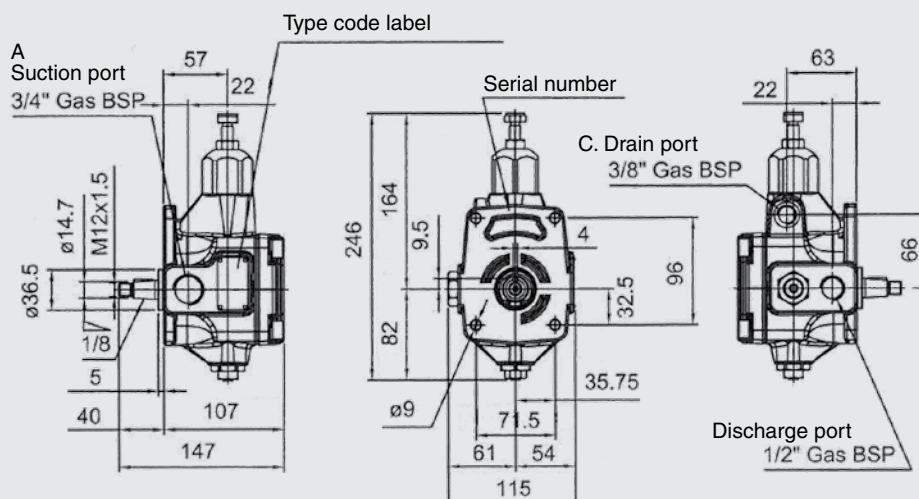
PVV102-05-16



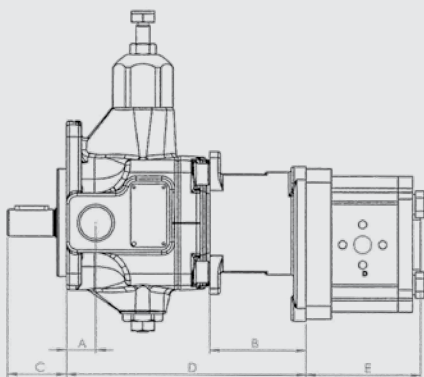
PVV102-05-16 (F - A)



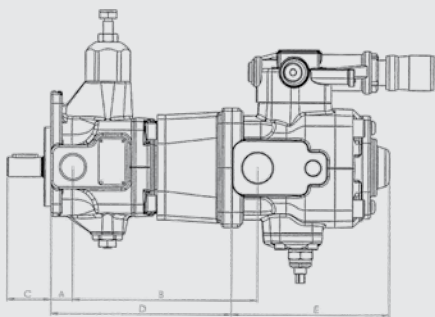
PVV102-05-16 (FGR2)



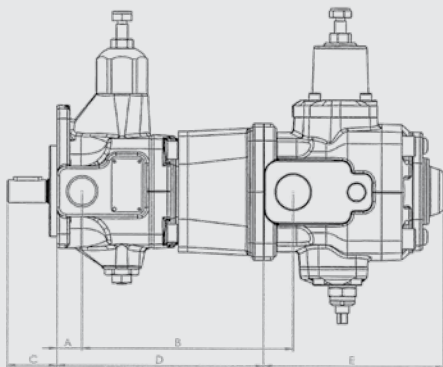
Multiple pumps
Front pump PVV102-05- ... F



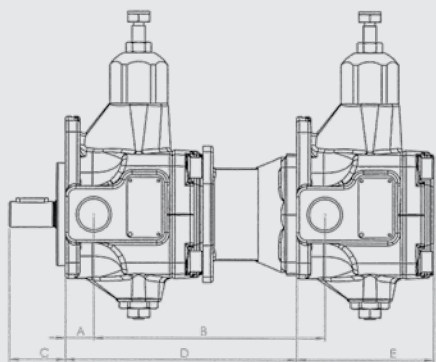
End pump	A	B	C	D	E
Gear pump Size 1	22	72	44	176	dependent on size selected
Gear pump Size 2	22	72	44	176	dependent on size selected



End pump	A	B	C	D	E
PVV100-1- ... F/ PVV101-1- ... F	22	186	44	182	159



End pump	A	B	C	D	E
PVV100-1- ... F/ PVV101-1- ... F	22	186	44	182	159



End pump	A	B	C	D	E
PVV102-05- ... F	22	180	44	180	107

Variable Displacement Vane Pumps:

Installation Manual



HYDRAULIC COMPENSATION

PVV100-1-20
PVV100-1-25
PVV100-2-31
PVV100-2-40
PVV100-2-50
PVV100-3-63
PVV100-3-80
PVV100-3-100



PVV103-05-16
PVV103-05-32



MECHANICAL COMPENSATION

PVV101-1-20
PVV101-1-25
PVV101-2-31
PVV101-2-40
PVV101-2-50
PVV101-3-63
PVV101-3-80
PVV101-3-100



PVV102-05-16

1. WARNING

All HYDAC pumps are carefully checked during manufacture and subjected to stringent testing cycles before shipment.

To achieve optimum performance, avoid damage and maintain the warranty coverage, the following instructions regarding assembly and start up must be strictly observed.

2. INSTALLATION AND ASSEMBLY

Pumps that can be installed vertically and horizontally

-PVV100-1
-PVV101-1
-PVV102-05
-PVV103-05

only horizontally (compensator at the top)

-PVV100-2
-PVV100-3
-PVV101-2
-PVV101-3
-PVV103-1

If the pump is installed above the oil level, particular attention must be paid to the suction pressure (see point 6. Filtration and Fluid Types).



Cleanliness is essential during assembly!

3. FORCE TRANSMISSION

The pump and motor must be connected using a gear coupling.



During assembly, the minimum distance between the two coupling halves must be strictly observed (see fig. 2).

The pump shaft and motor shaft must be carefully aligned: max. misalignment 0.05 mm; angular deviation less than 0.2° (see fig. 2).

There must be no radial or axial forces on the pump shaft.

Other types of motor-pump couplings are not permitted.

4. FLUID RESERVOIR

The oil tank must be the correct size to dissipate the thermal power generated by the system components, and for a low circulating speed to be achieved (the volume of oil should be approximately four times the displacement of all the pumps). In systems where the pump operates for a long time at a zero flow setting it is recommended that an oil cooler is installed.



The maximum operating temperature must never exceed 60 °C.

To ensure maximum pump working life, the suction oil temperature must never exceed 50 °C.

5. PIPING

Suction line

The suction lines should be as short as possible, with a minimum number of bends and without reducing the cross-section.

The pipe end inside the reservoir should be cut at a 45° angle. There should be a minimum distance between the pipe end and the bottom of the reservoir of 50 mm and the pipe end should be submerged in the oil by at least 100 mm under minimum operating conditions (see fig. 1). The minimum cross-section of the suction line pipe must be equal to the internal diameter at the suction port of the pump.

The suction lines must be completely sealed.

Drain line

The drain line must always feed directly into the tank, independently of all other lines.

The line must extend under the minimum oil level to avoid generating foam and to ensure oil remains in the pump after a lengthy stoppage. The drain line must be positioned at the highest possible port to prevent the pump case from emptying.

The drain line must be positioned so that the returning oil is not drawn into the pump again immediately (see fig. 1).

Discharge line

Ensure that the discharge line is of sufficient strength. It is recommended that a check valve and an automatic air bleed valve are fitted in the discharge line for trouble-free operation.



6. FILTRATION AND FLUID TYPES

Size		Size 05	Size 1	Size 2	Size 3
Geometric displacement acc. to UNI-ISO 3662 (cm ³ /rev)		16	20-25-32	31.5-40-50	63-80-100
Actual displacement (cm ³ /rev)		17.9	22.1-26.9-34.5	34.5-42.8-53.1	69-86.2-105.5
Maximum operating pressure (bar)	PVV100		160	160	150
	PVV101	150	100	100	80
	PVV102	120			
	PVV103	250	250		
Control pressure settings (bar)	PVV100		H - 30 / 160 bar	H - 30 / 160 bar	H - 30 / 150 bar
	PVV101	L - 15 / 50 bar	L - 15 / 50 bar	L - 15 / 50 bar	L - 15 / 50 bar
		H - 30 / 100 bar	H - 30 / 100 bar	H - 30 / 100 bar	H - 30 / 80 bar
		K - 80 / 150 bar			
	PVV102	H - 20 / 120 bar			
	PVV103	H - 20 / 250 bar	H - 20 / 250 bar		
Maximum drain port pressure (bar)		1			
Inlet pressure (absolute bar)		0.8 - 1.5			
Drive speed range (rpm)		800 - 1800			
Direction of rotation (viewed from shaft end)		Clockwise - R			
Maximum load on drive shaft		No radial or axial forces allowed.			
Maximum torque on primary shaft (Nm)	PVV100		197	400	740
	PVV101		197	400	740
	PVV102	Conical 70	Cylindr. 110		
	PVV103	130	250		
Fluid type		Mineral oil HM acc. to ISO 6743/4 ; HLP acc. to DIN 51524/2. Organic ester HFD-U acc. to ISO 6743/4 (Quintolubric 888). For other fluids, please contact HYDAC.			
Viscosity range (cSt, mm ² /s)		22 - 86			
Viscosity in starting operation in full flow condition (cSt, mm ² /s)		400 max.			
Viscosity index according to ISO 2909		100 min.			
Suction temperature (°C)	PVV100/ PVV101	-10 / +50			
	PVV102/ PVV103	-15 / +60			
Maximum fluid contamination level		20/18/15 acc. to ISO 4406:1999, CLASS 9 acc. to NAS 1638			
Recommended cleanliness level for a longer working life of the pump		18/16/13 acc. to ISO 4406:1999, CLASS 7 acc. to NAS 1638			

For different operating conditions and/or for further information, please contact HYDAC.

7. COMMISSIONING

Prior to commissioning ensure that any valves and shut-off valves are fully open and that all protective caps are removed. Fill the pump via the drain port and reinstall the drain line. Check that the reservoir is full of oil.



Ensure that the pump shaft can be rotated manually without any resistance.

On pumps sizes 1, 2 and 3 this may be checked by removing the cover B as shown in fig. 3. The shaft end A may then be turned by hand.
Alternatively, it is possible to rotate the electric motor fan, if the cover is temporarily removed.

Check that the direction of rotation of the motor corresponds with the pump direction of rotation: (clockwise) viewed from shaft end.

Start the motor in jogging mode, allowing free circulation of fluid to the reservoir, aid venting of the pump.



The pump should be completely vented within 5 seconds. If it is not, switch off the motor and investigate the cause. The pump must not run dry.

During initial switch-on the pump must run at maximum flow (P connected to T) with the fluid flowing unloaded directly into the reservoir for several minutes (size 05 and size 1 for 3 to 5 minutes; size 2 and size 3 for 7 to 10 minutes).

After this time, all air should be **completely eliminated** from the system. To aid this procedure, size 2 and size 3 (type PVV100) have an air bleed valve on the compensator: unscrew the plug to release the air and then close plug.

Subsequent start-ups at zero flow setting may only be carried out with a maximum pressure of 30 bar, on condition that the system and pump are completely full of oil.



If the pump is set via the optional volume adjustment screw "Q" to less than 50% of the maximum flow, the system may only be switched on if the pump and system are completely full of oil (see point 10. Volume Adjustment Screw).



During the initial start-up operation and subsequent start-ups the difference in temperature between the pump (environment) and the hydraulic fluid must not exceed 20 °C.

If this is the case, the pump may be switched on only in short intervals of approximately 1 to 2 seconds (jogging mode), unloaded, until the temperatures have equalized.

In the event of queries or for further information, please refer to the HYDAC Pump Catalogue or contact HYDAC's technical sales service.

8. ADJUSTMENTS

The only adjustments that customers are able to make to the pump are the pressure (fig. 4 / 5 / 6) and flow (see point 10. Volume adjustment screw) using the adjustment screws on the unit.

Note: the pressure must only be adjusted when the pump is at zero flow setting (i.e. P is closed).

No other alterations may be made to the pump.

9. DIMENSIONS

Fig. 1

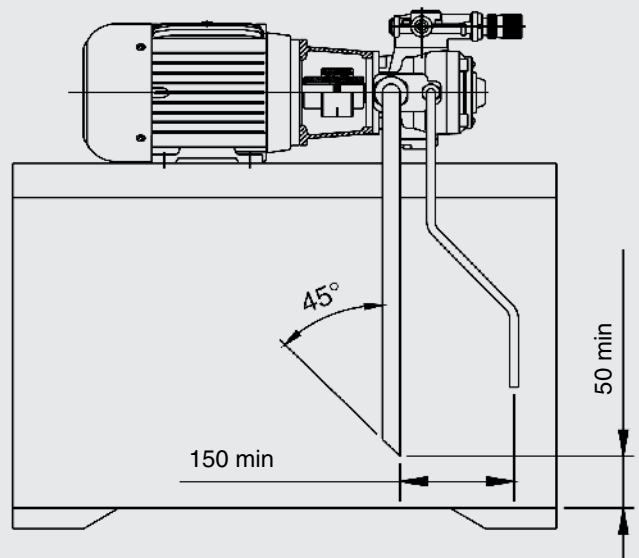
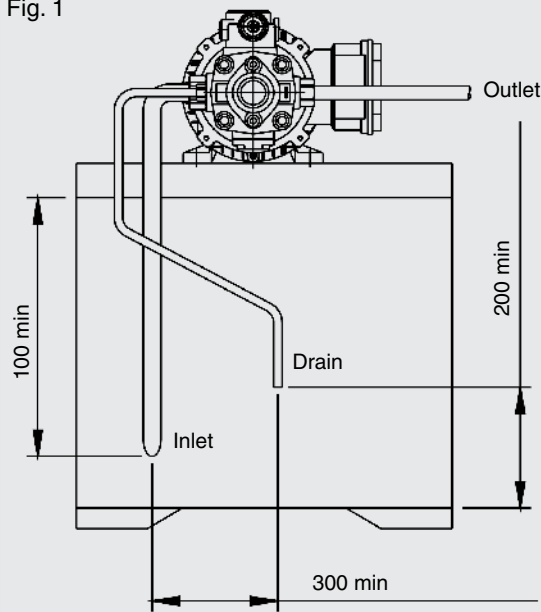


Fig. 2

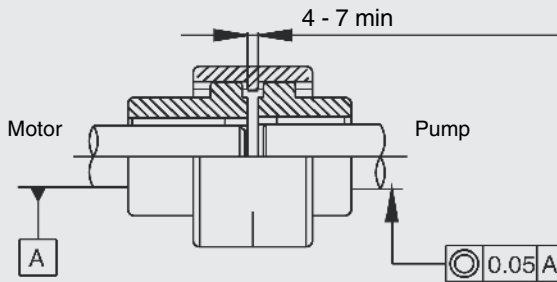


Fig. 3

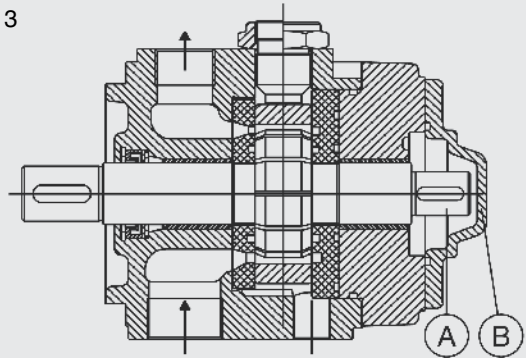
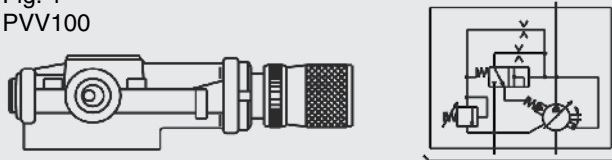


Fig. 4
PVV100



Pressure setting knob

Clockwise rotation increases the operating pressure.

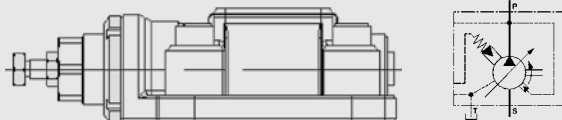
Fig. 5
PVV101
PVV102



Pressure adjustment screw

Clockwise rotation increases the operating pressure.

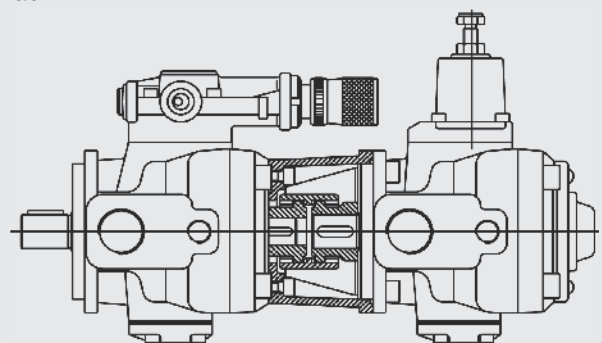
Fig. 6
PVV103



Pressure setting knob

Clockwise rotation increases the operating pressure.

Tab. 2



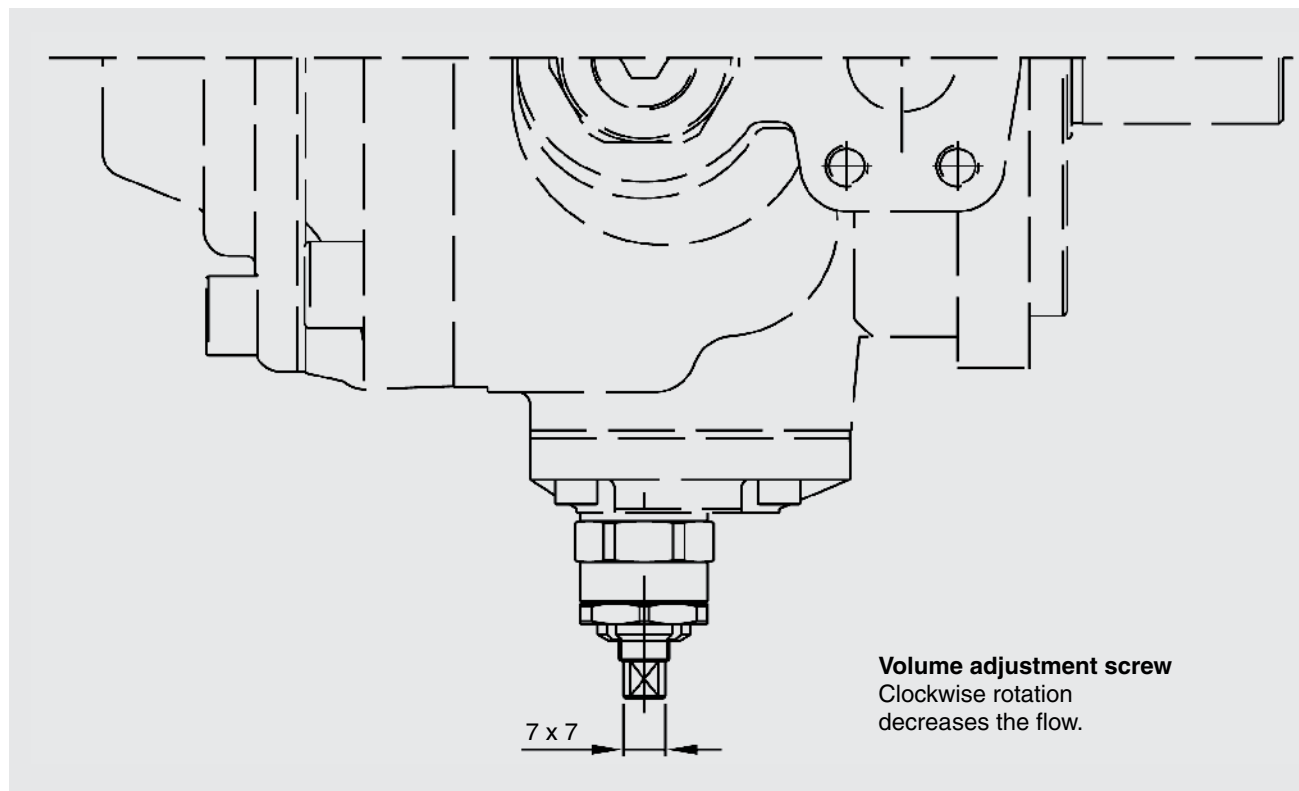
Note:

The sum of the individual torques of the pumps must not exceed the maximum torque permitted on the primary pump.

Primary pump	Max. torque end pump
PVV100- / PVV101- 1	55 Nm
PVV100- / PVV101- 2 / -3	110 Nm
PVV100- / PVV101- 3	180 Nm *
PVV102	55 Nm
PVV103-05	55 Nm
PVV103-01	110 Nm

* only for coupling size 3 and end pump size 3

10. VOLUME ADJUSTMENT SCREW



Geometric displacement (cm ³)	PVV102	PVV103		PVV100 - PVV101							
	16	16	32	20	25	31.5	40	50	63	80	100
Max. flow at 1450 rpm (l/min)	26	26	50	33	39	50	62	78	100	125	152
Min. flow at 1450 rpm (l/min)	4.5	4.8	12	11	17	2.3	14.3	30.3	14	39	66
Decreased flow per screw turn (l/min)	14	16	32	14	14	23.8	23.8	23.8	34.5	34.5	34.5

Data can vary from pump to pump.



If the pump is supplied with a volume adjustment screw "Q" set to less than 50% of the nominal flow, start-up is only permitted on condition that the system and pump are completely filled with fluid.

Fixed Displacement Vane Pumps

for Open Loop Hydraulic Systems



4. VANE PUMPS

4.1 FIXED DISPLACEMENT

PVF100

Series	Geometric displacement [cm ³ /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



4.2 FIXED DISPLACEMENT– DOUBLE PUMP

PVF101

Series	Geometric displacement Stage 2 [cm ³ /rev]	Geometric displacement Stage 1 [cm ³ /rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
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			



4.1 FIXED DISPLACEMENT CONTENTS

PVF100

Ordering Code	4.1.1 Fixed Displacement
Technical Information	4.1.2 Specifications 4.1.3 Hydraulic fluids 4.1.4 Viscosity range 4.1.5 Temperature range 4.1.6 Seals 4.1.7 Filtration 4.1.8 Installation notes
Performance Data	4.1.9 Noise level 4.1.10 PVF100-1- 4.1.11 PVF100-2- 4.1.12 PVF100-3- 4.1.13 PVF100-4-
Dimensions	4.1.14 PVF100-1- 4.1.15 PVF100-2- 4.1.16 PVF100-3- 4.1.17 PVF100-4-

ORDERING CODE

4.1.1 Fixed Displacement Vane Pump

PVF100 –		1	6	F	R	A	A	42	–	XXXX
Fixed displacement vane pump										
Seals										
F-	NBR									
	FPM									
Size										
1										
2										
3										
4										
Displacement										
	6									
	8									
	10									
	12									
PVF100-1-	14									
	17									
	19									
	23									
	25									
	31									
	41									
	47									
PVF100-2-	53									
	59									
	65									
	76									
PVF100-3-	94									
	116									
	136									
	153									
PVF100-4-	184									
	200									
	237									
Installation type										
F	Flange mounting									
Shaft rotation										
R	Clockwise, (viewed from shaft end)									
Discharge port position										
A	Top									
Suction port position										
A	Top									
Design number										
42	Size 1									
41	Size 2									
31	Size 3									
30	Size 4									
Design standard										
	European Standard									
90	North American Standard									
Modification number										
XXXX	Determined by manufacturer									

TECHNICAL INFORMATION

4.1.2 Specifications

Pump size			PVF100-1										PVF100-2			
			6	8	10	12	14	17	19	23	25	31	41	47	53	
Geometric displacement		[cm³/rev]	5.8	8.0	9.4	12.2	13.7	16.6	18.6	22.7	25.3	31.0	41.3	47.2	52.5	
Max. pressure with fluid type	HLP, HFD-U	[bar]	210										160	210		
	HL	[bar]	160										140			
	HFC	[bar]	160													
	HFD-R	[bar]	160										140			
Drive speed	Min.	[rpm]	750 (at 100 cSt max.)										600 (at 100 cSt max.)			
	Max.	[rpm]	1800 (1200 with HFD-R)													
Approx. weight		[kg]	9.0										15.5			

Pump size			PVF100-2		PVF100-3			PVF100-4				
			59	65	76	94	116	136	153	184	200	237
Geometric displacement		[cm³/rev]	58.2	64.7	76.4	93.6	115.6	136.0	153.0	184.0	201.0	237.0
Max. pressure with fluid type	HLP, HFD-U	[bar]	210				160	175				
	HL	[bar]	140									
	HFC	[bar]	160									
	HFD-R	[bar]	140									
Drive speed	Min.	[rpm]	600 (at 100 cSt max.)		600							
	Max.	[rpm]	1800 (1200 with HFD-R)									
Approx. weight		[kg]	15.5		30.9			68.5				

4.1.3 Hydraulic fluids

The pump series is designed for use with:

Hydraulic oil based on mineral oil
(HL, HLP, ISO VG 32 or 46)

Synthetic fluids

(Phosphate ester, HFD-R)
(Polyol ester, HFD-U)
(Water glycolol, HFC)

4.1.4 Viscosity range

Normal operating viscosity:
20 - 400 cSt (mm²/s)

4.1.5 Temperature range

from 0 to +70 °C

4.1.6 Seals

The pump series is equipped with **NBR** seals. When phosphate ester or polyolester fluids are used, FPM seals must be used.

4.1.7 Filtration

For maximum pump and system component life time, the system should be protected from contamination by effective filtration. Cleanliness class:

23/21/18 to ISO 4406:1999

or

Class 12 to NAS 1638

or cleaner.

4.1.8 Installation notes

A. Mounting with coupling

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment must be 0.1 mm and the angular deviation must be less than 0.2°.

B. Suction pressures

The suction pressures at the pump inlet port must be within the values specified in the following table. The internal diameter of the suction pipe must correspond to the internal diameter of the pump suction port.

If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre (0.8 metres when phosphate ester or aqueous fluids are used).

Pump type		Suction pressure		
		Minimum		Maximum
		Mineral oil	Phosphate ester, Aqueous fluid	
PVF100 series Single pumps	PVF100-1 PVF100-2	- 0.2 bar	- 0.16 bar	+0.3 bar
	PVF100-3 PVF100-4	- 0.2 bar *		

* Min. suction pressure at speeds > 1700 rpm:

PVF100-3-116: 0 bar (1 bar abs.)

PVF100-4-237: -0.13 bar

C. Commissioning notes

During initial commissioning or after a lengthy stoppage, the pump may develop suction problems. If this is the case, install an air bleed valve on the discharge side or the air can be released by slightly loosening the joint at the discharge port. As far as possible, the pump should be run in jog mode with unloaded circulation.

D. Other notes

If the pump is to be operated at speeds below 1200 rpm, install the pump with the inlet port at the top to ensure better suction.

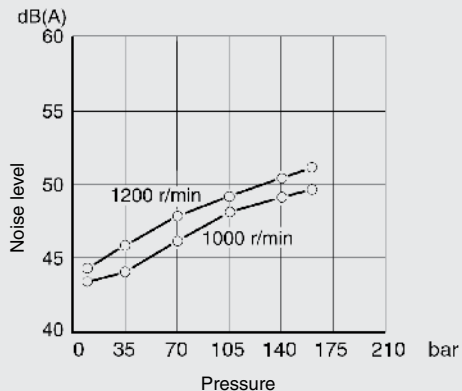
PERFORMANCE DATA

4.1.9 Noise level

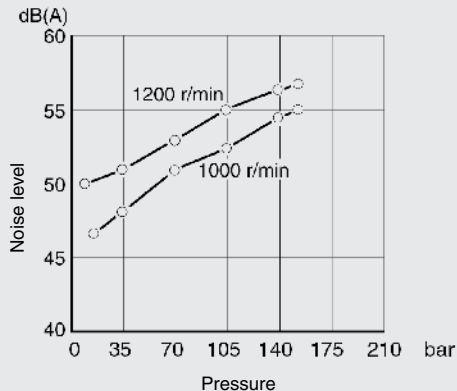
Measurement conditions

Viscosity of the fluid: 20 mm²/s
 Measuring point: 1 metre horizontally away from the pump
 Background noise: 40 dB (A)

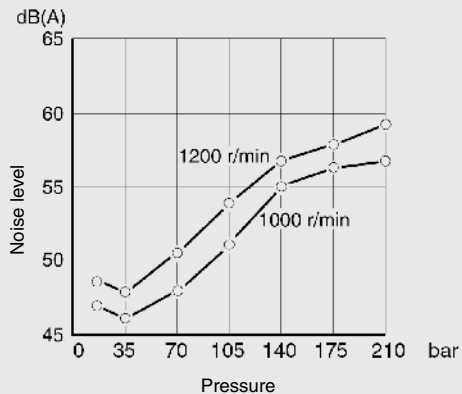
PVF100-1-6



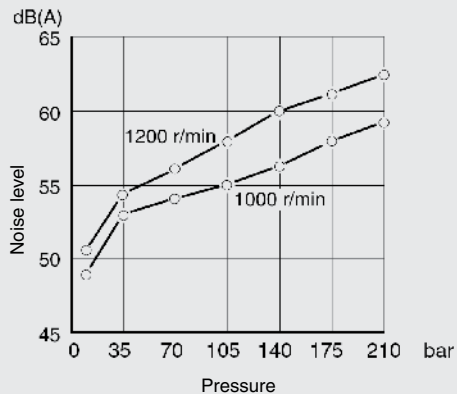
PVF100-1-31



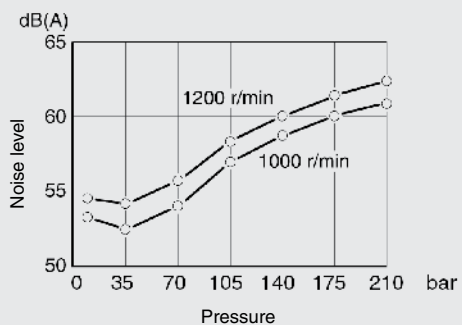
PVF100-2-41



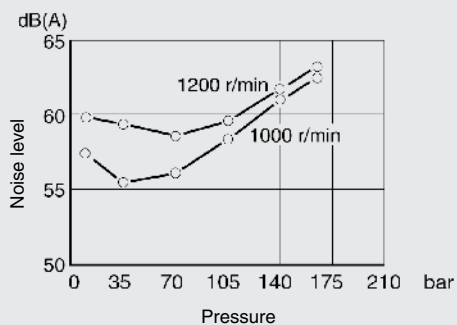
PVF100-2-65



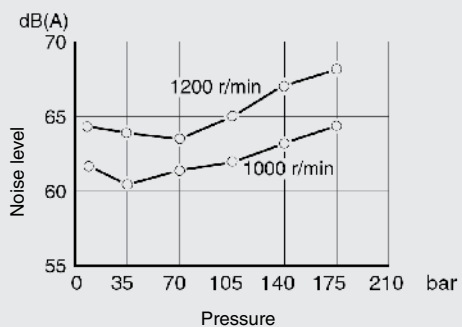
PVF100-3-76



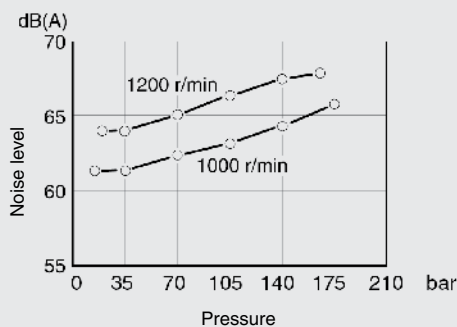
PVF100-3-116



PVF100-4-136



PVF100-4-184

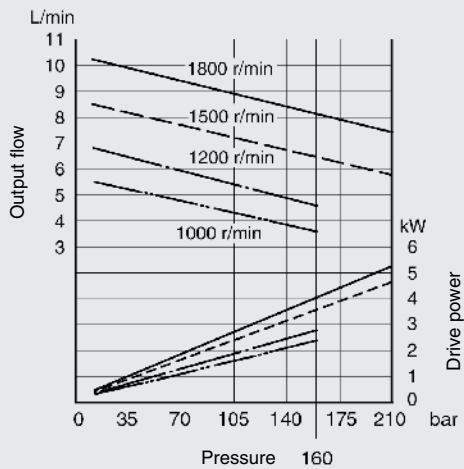


4.1.10 PVF100-1-

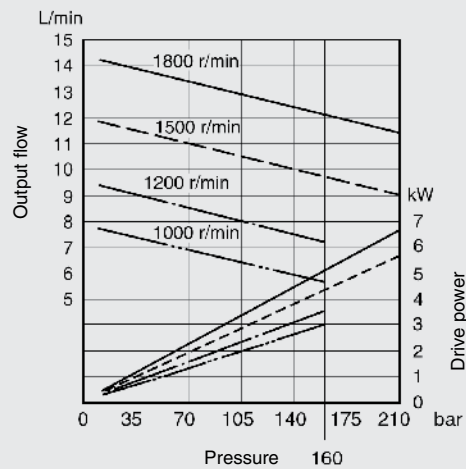
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

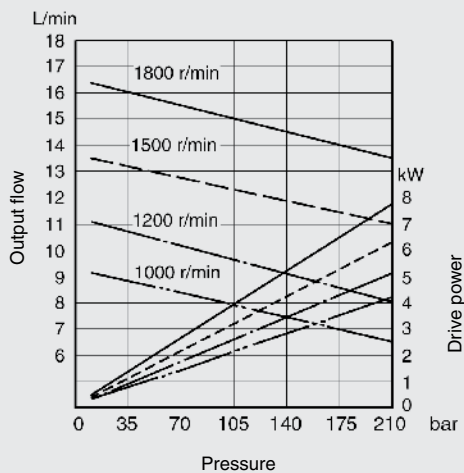
PVF100-1-6



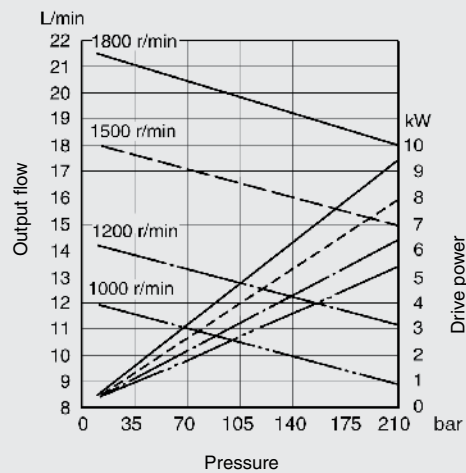
PVF100-1-8



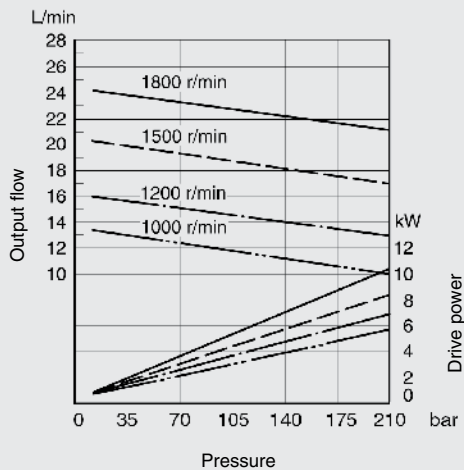
PVF100-1-10



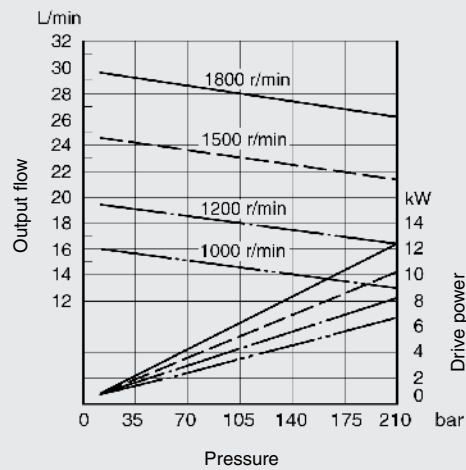
PVF100-1-12



PVF100-1-14



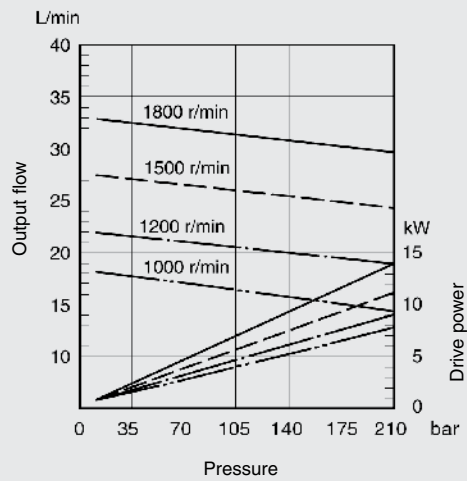
PVF100-1-17



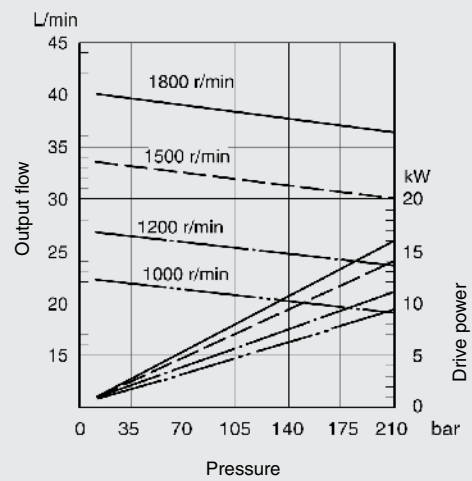
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

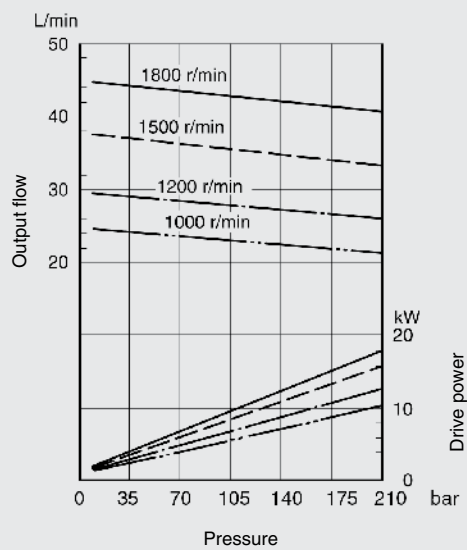
PVF100-1-19



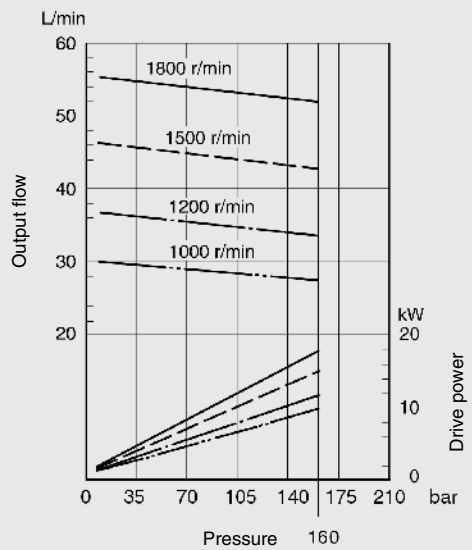
PVF100-1-23



PVF100-1-25



PVF100-1-31

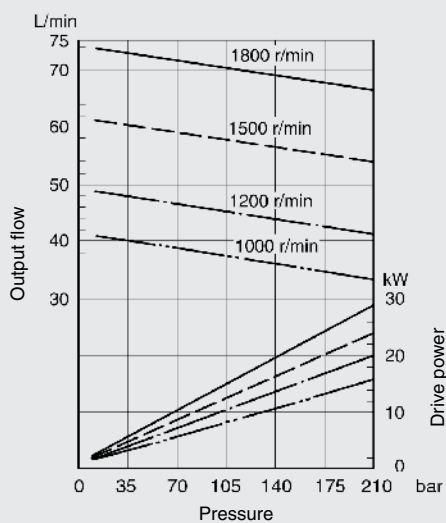


4.1.11 PVF100-2-

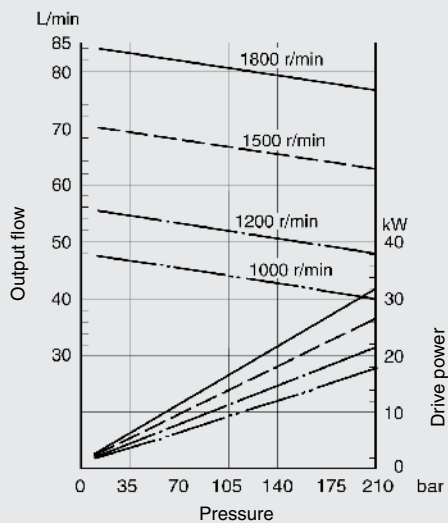
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

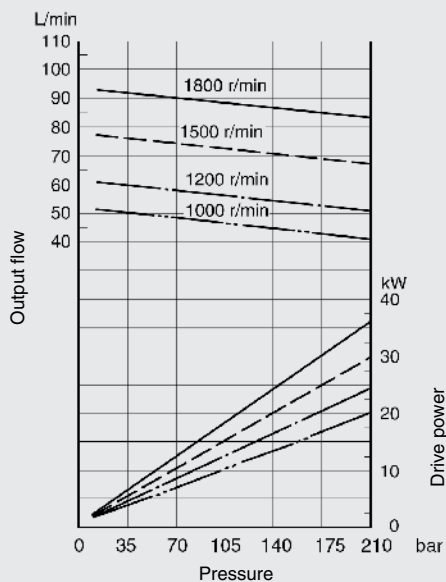
PVF100-2-41



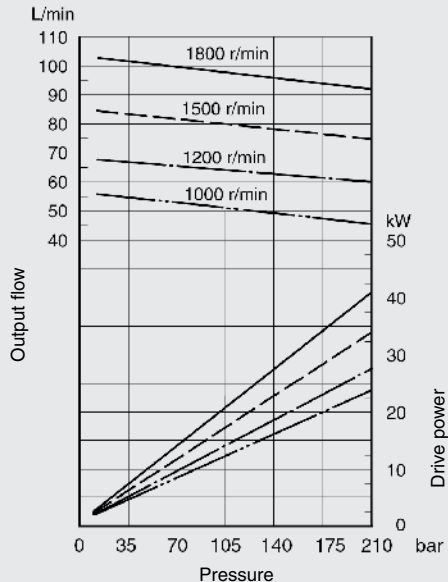
PVF100-2-47



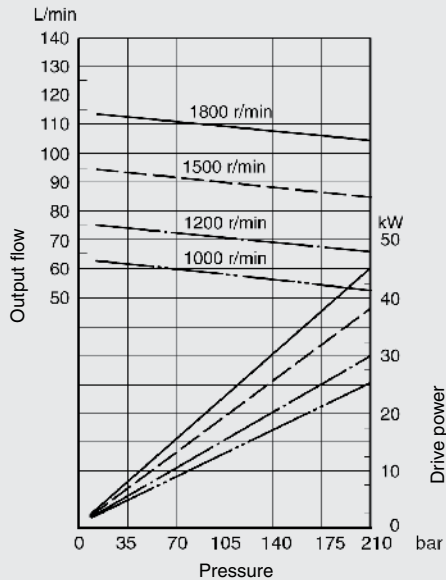
PVF100-2-53



PVF100-2-59



PVF100-2-65

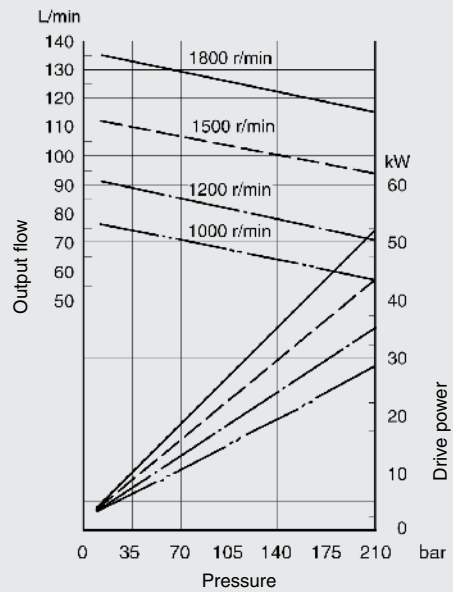


4.1.12 PVF100-3-

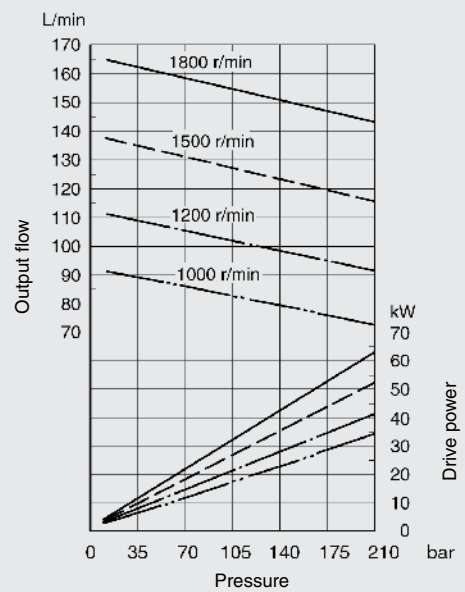
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

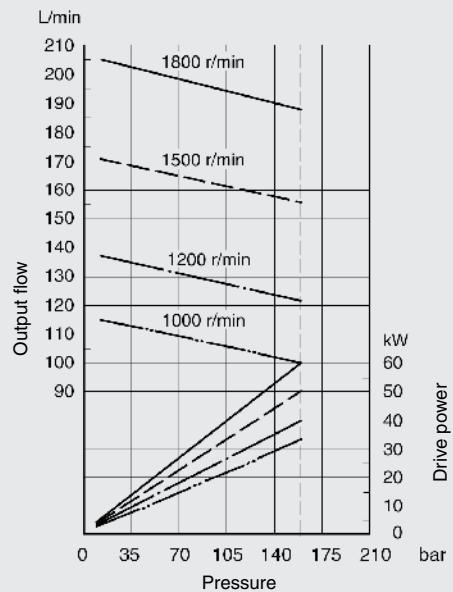
PVF100-3-76



PVF100-3-94



PVF100-3-116

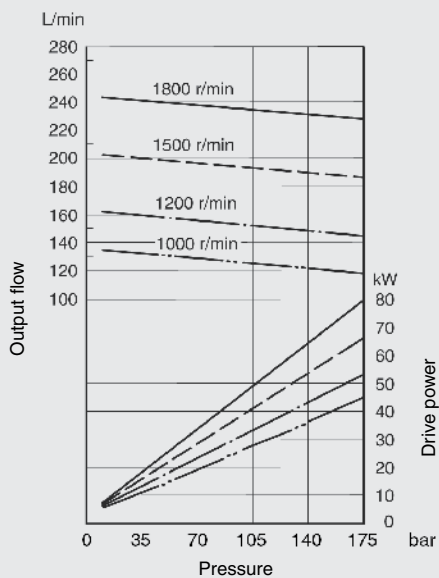


4.1.13 PVF100-4-

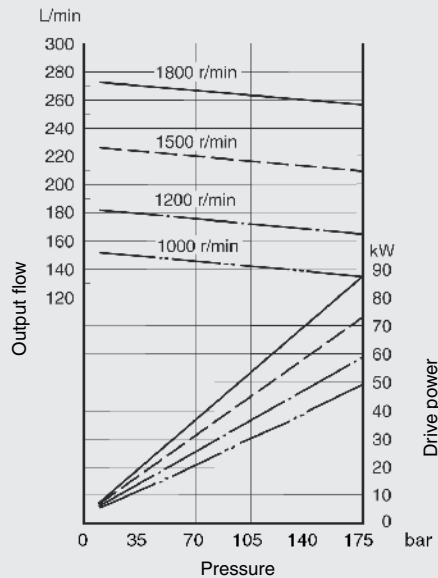
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

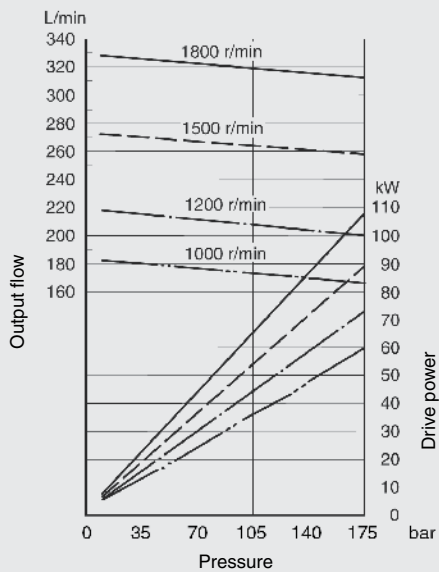
PVF100-4-136



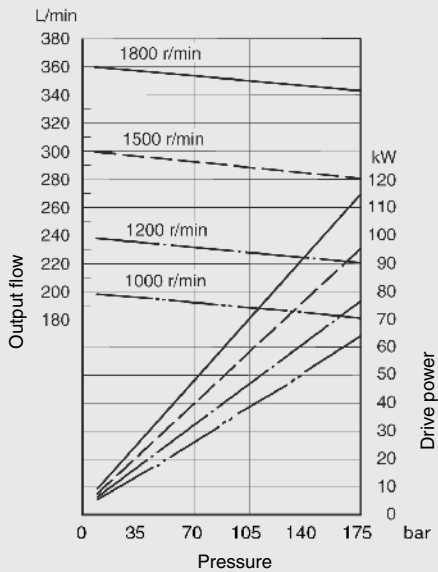
PVF100-4-153



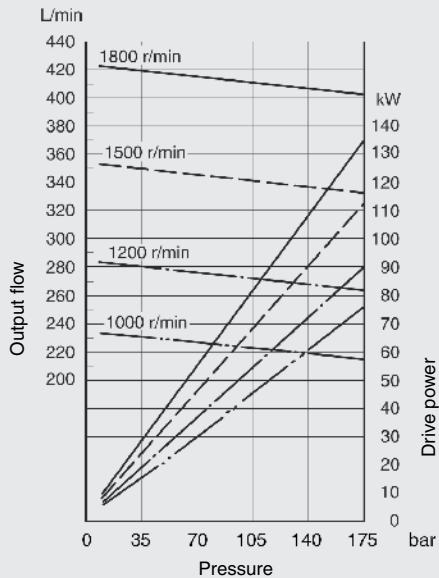
PVF100-4-184



PVF100-4-200

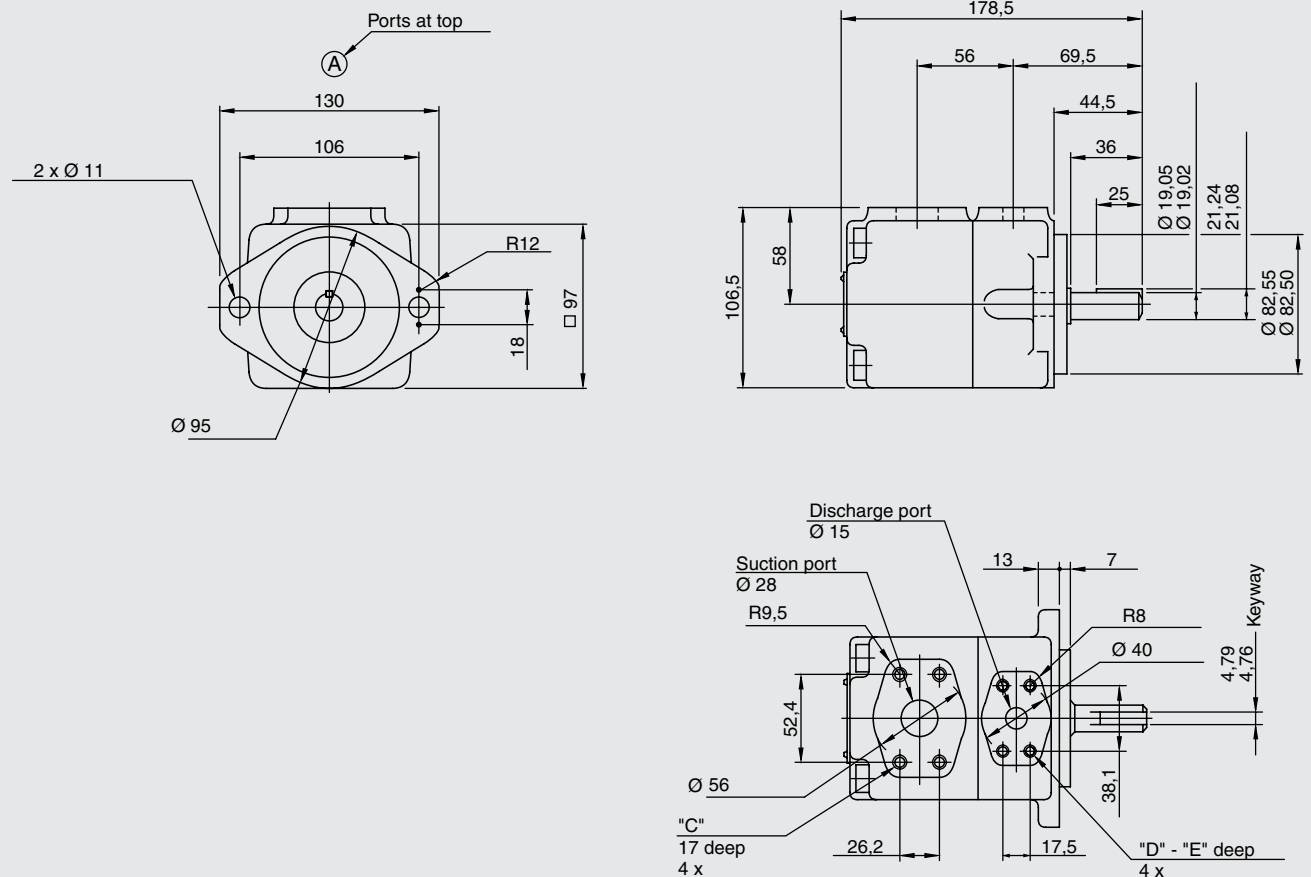


PVF100-4-237



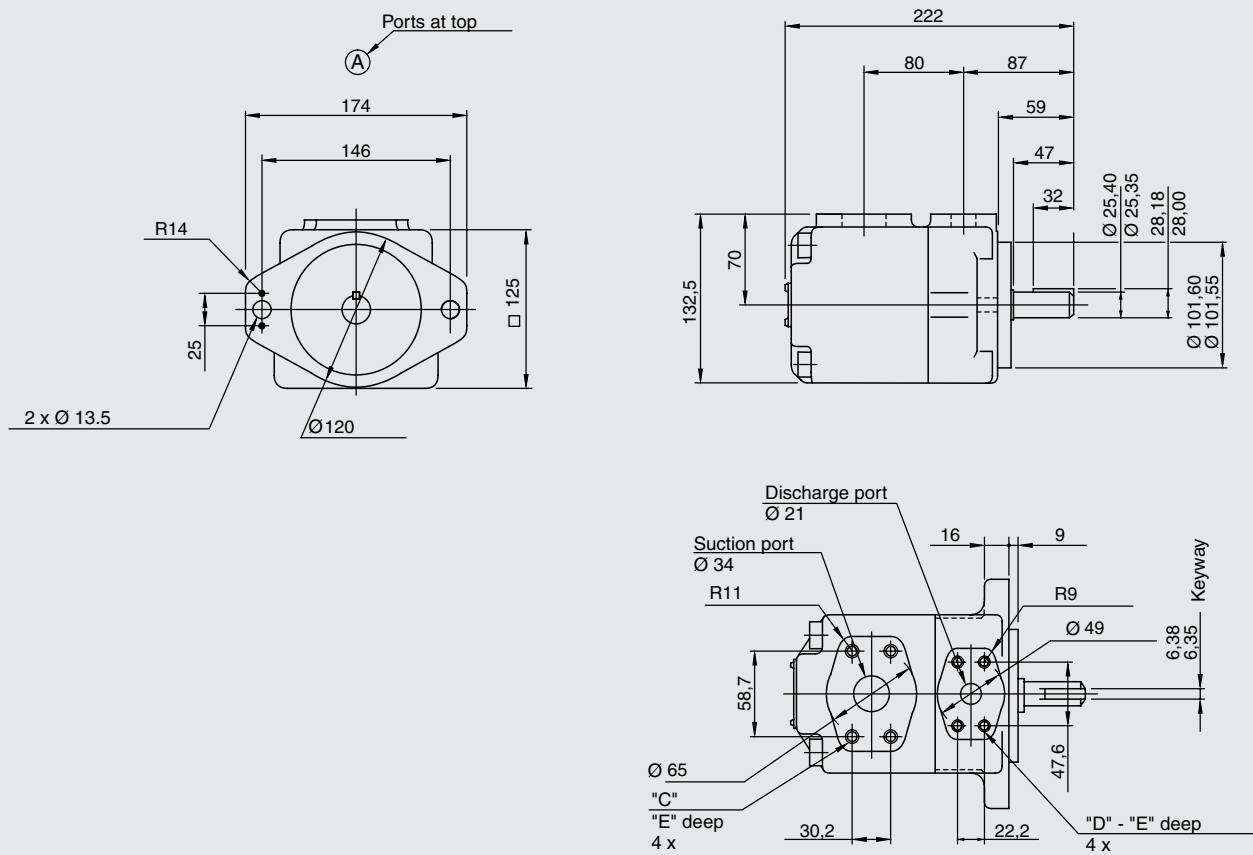
DIMENSIONS

4.1.14 PVF100-1-



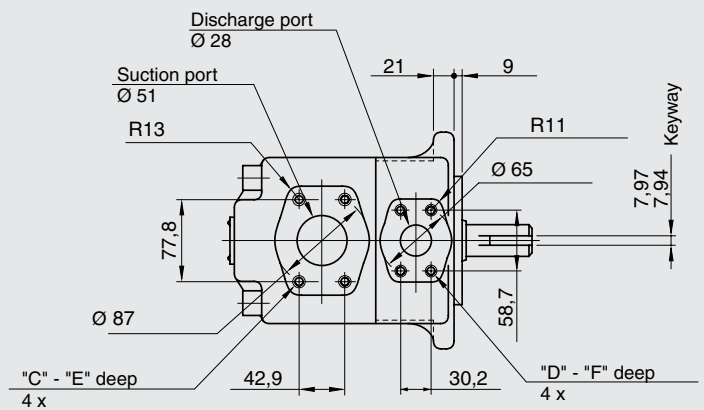
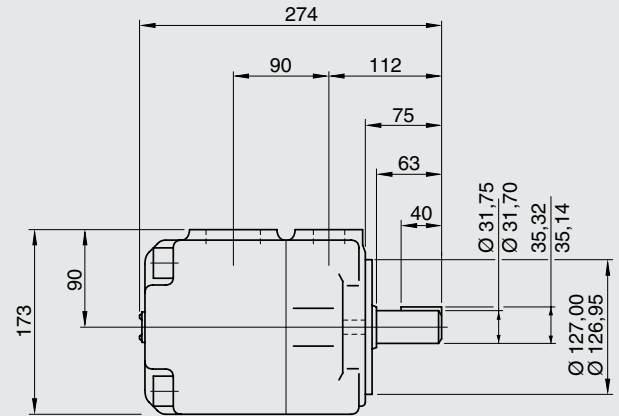
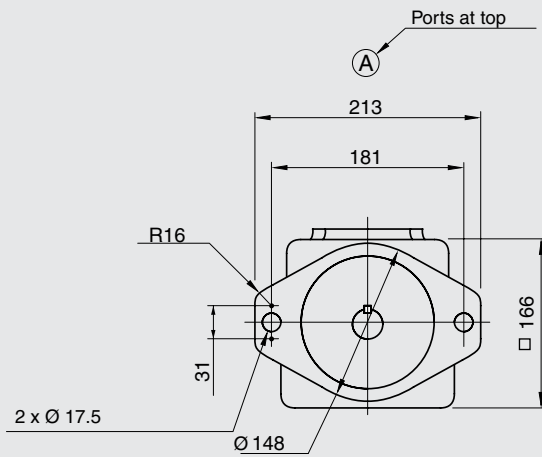
Design Standard	"C" Thread	"D" Thread	E mm
PVF100-1...42 European Standard	M10	M8	14
PVF100-1...4290 US Standard	3/8-16 UNC	5/16-18 UNC	16

4.1.15 PVF100-2-



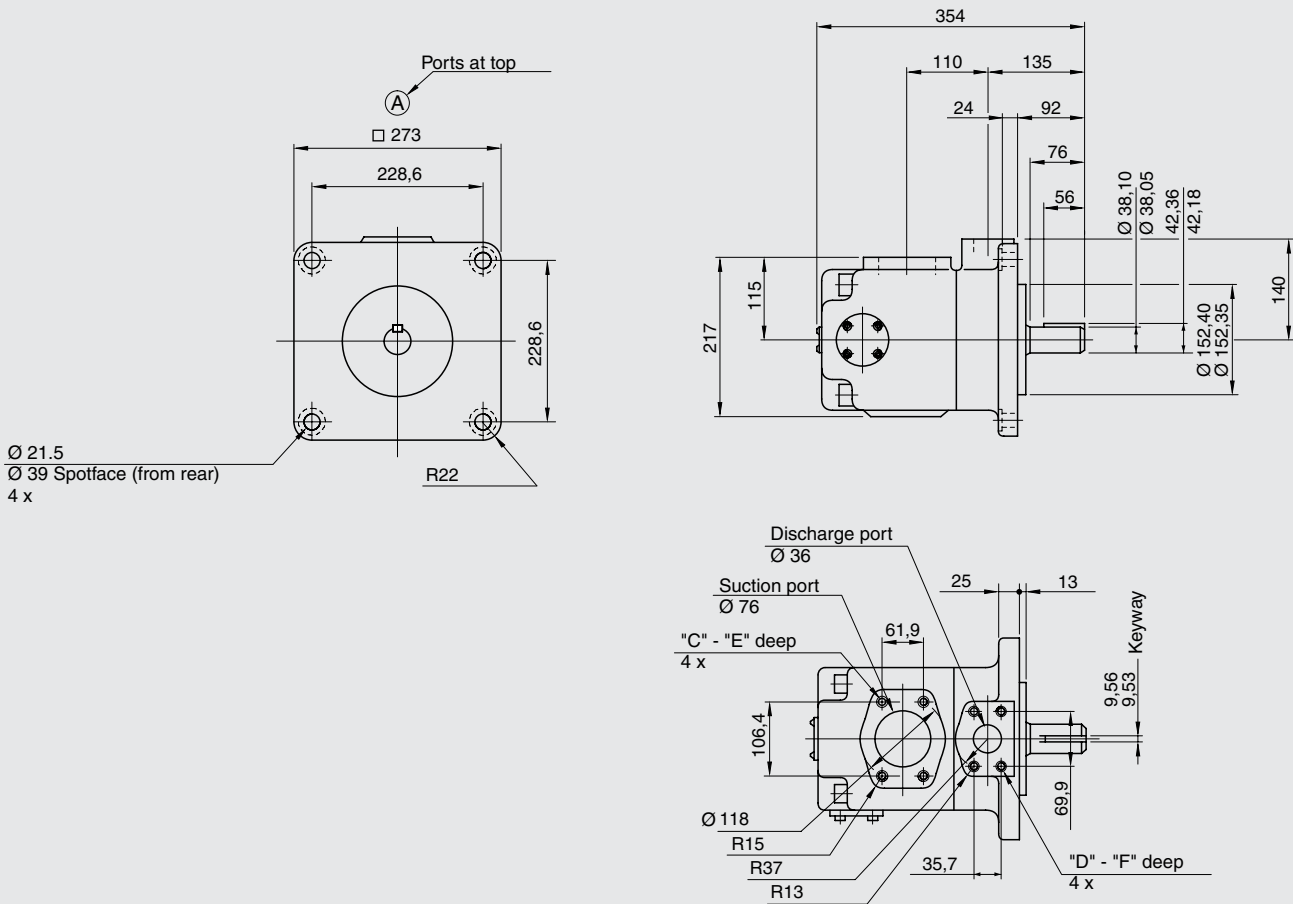
Design Standard	"C" Thread	"D" Thread	E mm
PVF100-2...41 European Standard	M10	M10	19
PVF100-2...4190 US Standard	7/16-14 UNC	3/8-16 UNC	20

4.1.16 PVF100-3-



Design Standard	"C" Thread	"D" Thread	E mm	F mm
PVF100-3...31 European Standard	M12	M10	19	19
PVF100-3...3190 US Standard	1/2-13 UNC	7/16-14 UNC	21	20

4.1.17 PVF100-4-



Design Standard	"C" Thread	"D" Thread	E mm	F mm
PVF100-4...30 European Standard	M16	M12	19	19
PVF100-4...3090 US Standard	5/8-11 UNC	1/2-13 UNC	21	21



4.2 FIXED DISPLACEMENT – DOUBLE PUMP

CONTENTS

PVF101

Ordering Code	4.2.1 Fixed Displacement
Technical Information	4.2.2 Specifications 4.2.3 Hydraulic fluids 4.2.4 Viscosity range 4.2.5 Temperature range 4.2.6 Seals 4.2.7 Filtration 4.2.8 Installation notes
Performance Data	4.2.9 PVF101-1x- 4.2.10 PVF101-2x- / PVF101-x2- 4.2.11 PVF101-3x- / PVF101-x3- 4.2.12 PVF101-x4- 4.2.13 Power limitations
Dimensions	4.2.14 PVF101-12- 4.2.15 PVF101-13- 4.2.16 PVF101-23- 4.2.17 PVF101-33- 4.2.18 PVF101-14- 4.2.19 PVF101-24- 4.2.20 PVF101-34-

ORDERING CODE

4.2.1 Fixed Displacement Vane Pump

PVF101 - 12 - 17 / 59 F R E A A 42 - XXXX

Fixed displacement vane pump

Seals

NBR
FPM

Size

12 23 14 34
13 33 24

Displacement

	Stage 2	Stage 1
	6	26
	8	33
	10	41
PVF101-12-	12 /	47
	17	53
	19	59
	23	65
	25	
	31	

	Stage 2	Stage 1
	41	52
	47	60
PVF101-23-	53 /	66
	59	76
	65	94
		116

	Stage 2	Stage 1
	6	136
	8	153
PVF101-14-	10 /	184
	12	200
	14	237
	17	
	19	
	23	

	Stage 2	Stage 1
	52	136
	60	153
PVF101-34-	66 /	184
	76	200
	94	237
	116	

	Stage 2	Stage 1
	6	
	8	
	10	
	12	76
PVF101-13-	14 /	94
	17	116
	19	
	23	
	25	
	31	

	Stage 2	Stage 1
	76	76
PVF101-33-	94 /	94
	116	116

	Stage 2	Stage 1
	26	136
	33	153
PVF101-24-	41 /	184
	47	200
		237

Installation type

F Flange mounting

Shaft rotation

R Clockwise, viewed from shaft end

Discharge port position, stage 2

E Top left 45° (size 12, 23, 34)

A Top (size 13, 33, 14, 24)

Discharge port position, stage 1

A Top

Suction port position

A Top

Design number

42 Size 12, 13

41 Size 23

31 Size 24, 33, 34

32 Size 14

Design standard

European Standard

90 North American Standard

Modification number

XXXX Determined by manufacturer

TECHNICAL INFORMATION

4.2.2 Specifications

Pump size												
			6	8	10	12	14	17	19	23	25	31
Geometric displacement		[cm³/rev]	6	8	10	12	14	17	19	23	25	31
Max. pressure with fluid type	HLP, HFD-U	[bar]	210 *1		210					210 *2	210	160
	HL	[bar]	160									
	HFC	[bar]	160									
	HFD-R	[bar]	160									
Drive speed	Min.	[rpm]	750 (at 100 cSt max.)									
	max.	[rpm]	1800 (1200 with HFD-R)									

*¹ For pressures above 160 bar a minimum speed of 1450 rpm is required

*² Max. pressure for PVF101-14 with 23 cm³ displacement = 160 bar

Pump size			26	33	41	47	53	59	65
Geometric displacement		[cm ³ /rev]	26	33	41	47	53	59	65
Max. pressure with fluid type	HLP, HFD-U	[bar]	210						
	HL	[bar]	140						
	HFC	[bar]	160						
	HFD-R	[bar]	140						
Drive speed	Min.	[rpm]	600 (at 100 cSt max.)						
	max.	[rpm]	1800 (1200 with HFD-R)						

Pump size													
			52	60	66	76	94	116	136	153	184	200	237
Geometric displacement		[cm³/rev]	52	60	66	76	94	116	136	153	184	200	237
Max. pressure with fluid type	HLP, HFD-U	[bar]	210					160	175				
	HL	[bar]	140										
	HFC	[bar]	160										
	HFD-R	[bar]	140										
Drive speed	Min.	[rpm]	600 (at 100 cSt max.)										
	max.	[rpm]	1800 (1200 with HFD-R)										

Pump size		PVF101-						
		12	13	23	33	14	24	34
Approx. weight	[kg]	25	45.6	51	84	75	78	98

4.2.3 Hydraulic fluids

The pump series is designed for use with:

Hydraulic oil based on mineral oil
(HL, HLP, ISO VG 32 or 46)

Synthetic fluids

(Phosphate ester, HFD-R)
(Polyol ester, HFD-U)
(Water glycolol, HFC)

4.2.4 Viscosity range

Normal operating viscosity:
20 - 400 cSt (mm²/s)

4.2.5 Temperature range

from 0 to +70 °C
with aqueous fluids:
5 to +50 °C

4.2.6 Seals

The pump series is equipped with NBR seals. When phosphate ester or polyolester fluids are used, FPM seals must be used.

4.2.7 Filtration

For maximum pump and system component life time, the system should be protected from contamination by effective filtration. Cleanliness class:

23 / 21 / 18 to ISO 4406:1999

or

Class 12 to NAS 1638

or cleaner.

4.2.8 Installation notes

A. Mounting with coupling

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment is 0.1 mm and the angular deviation must be less than 0.2°.

B. Suction pressures

The suction pressures at the pump inlet port must be within the values specified in the following table. The internal diameter of the suction line must correspond to the internal diameter of the pump suction port.

If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre (0.8 metres when phosphate ester or aqueous fluids are used).

Pump type		Suction pressure		
		Minimum		Maximum
		Mineral oil	Phosphate ester, Aqueous fluid	
PVF101 series Double pumps	PVF101-12	-0.2 bar	-0.16 bar	+0.3 bar
	PVF101-13	-0.2 bar*		
	PVF101-23			
	PVF101-33			
	PVF101-14			
	PVF101-24			
	PVF101-34			

* Min. suction pressure at speeds > 1700 rpm
PVF101 with displacement 94 or 116 cm³/rev: 0 bar (1 bar abs.)
PVF101 with displacement 76 cm³/rev: -0.07 bar
PVF101 with displacement 237 cm³/rev: -0.13 bar

C. Commissioning notes

During initial commissioning or after a lengthy stoppage, the pump may develop suction problems. If this is the case, install an air bleed valve on the discharge side or the air can be released by slightly loosening the joint at the discharge port. As far as possible, the pump should be run in jog mode with unloaded circulation.

D. Other notes

If the pump is to be operated at speeds below 1200 rpm, install the pump with the inlet port at the top to ensure better suction.

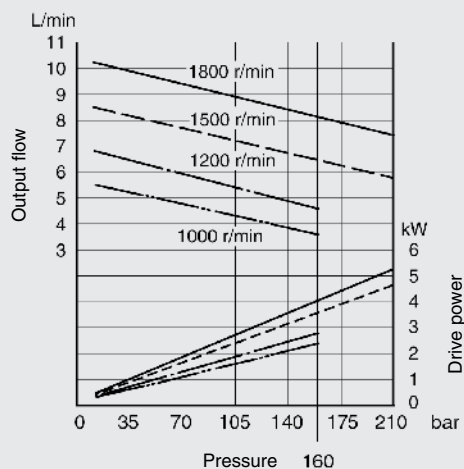
PERFORMANCE DATA

4.2.9 PVF101-1x-

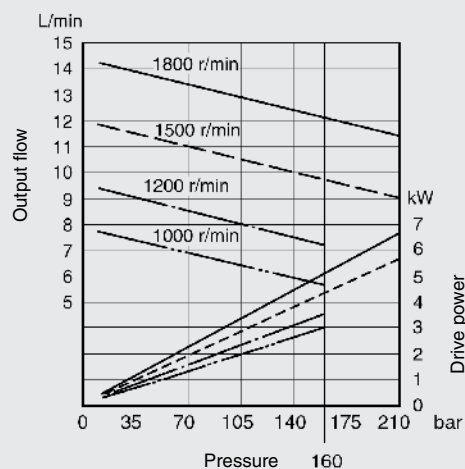
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

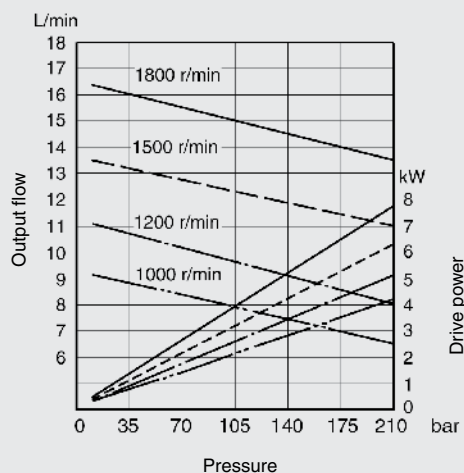
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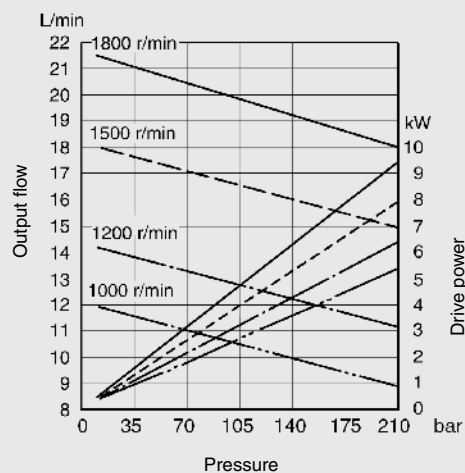
PVF101-1x-8/...



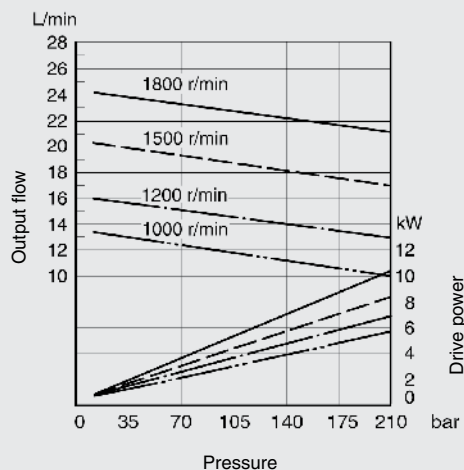
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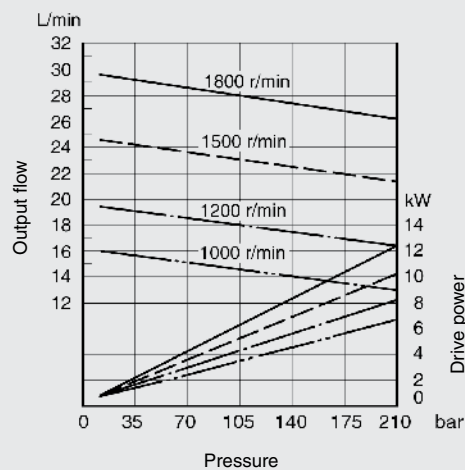
PVF101-1x-12/...



PVF101-1x-14/...

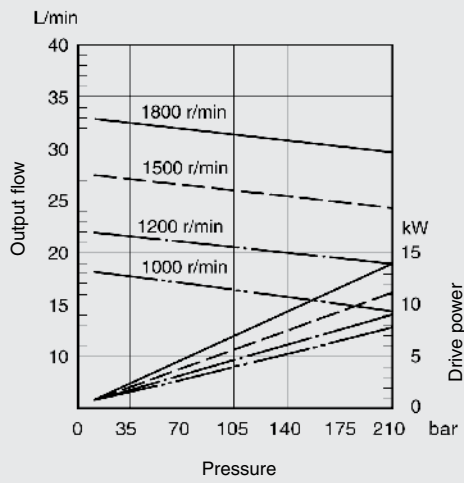


PVF101-1x-17/...

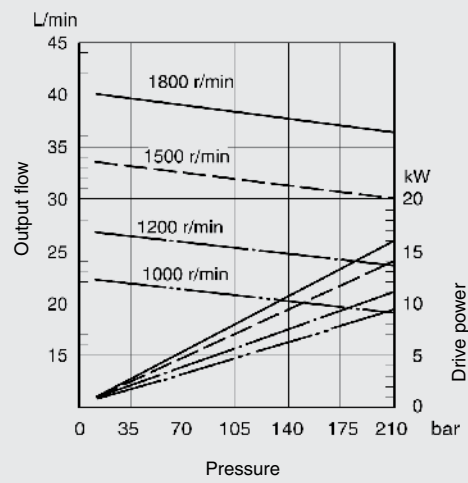


Performance characteristic curves
at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

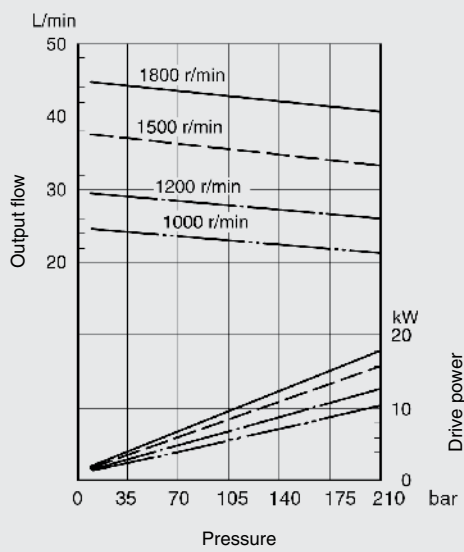
PVF101-1x-19/...



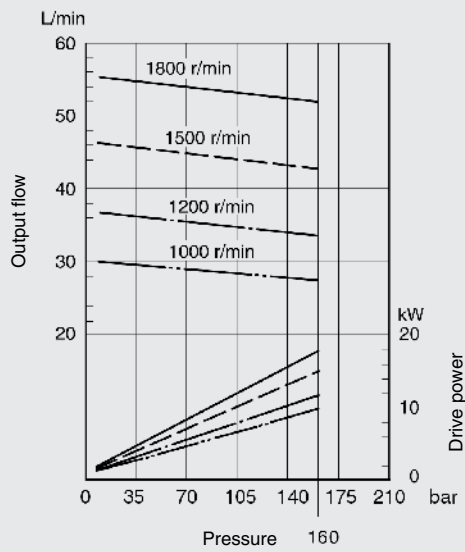
PVF101-1x-23/...



PVF101-1x-25/...



PVF101-1x-31/...

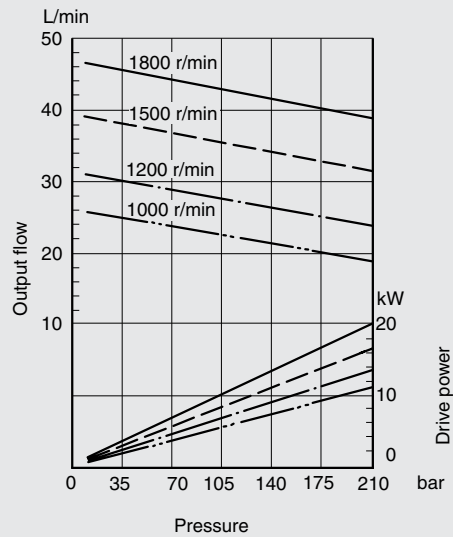


4.2.10 PVF101-2x- / PVF101-x2-

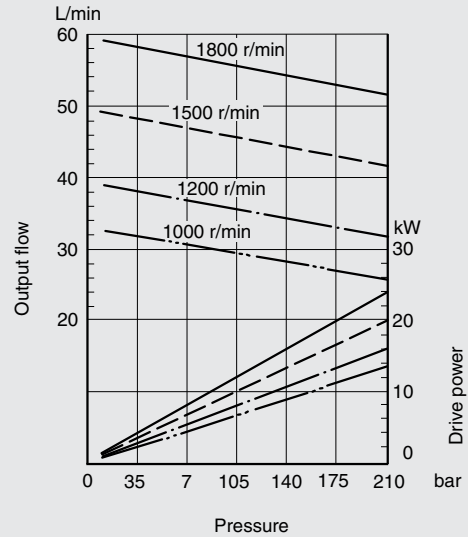
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

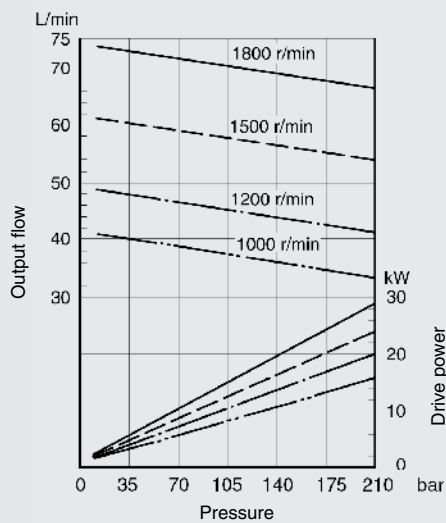
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PVF101-x2-.../26...



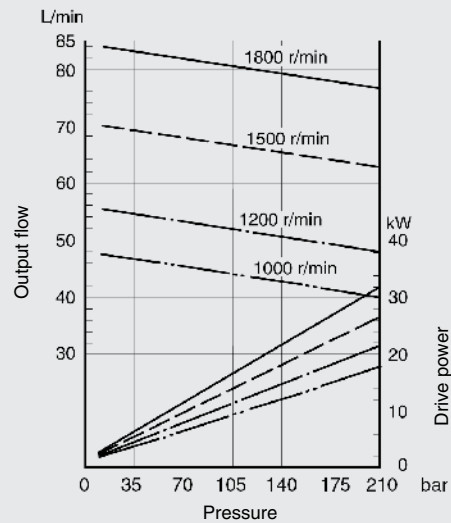
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PVF101-x2-.../33...



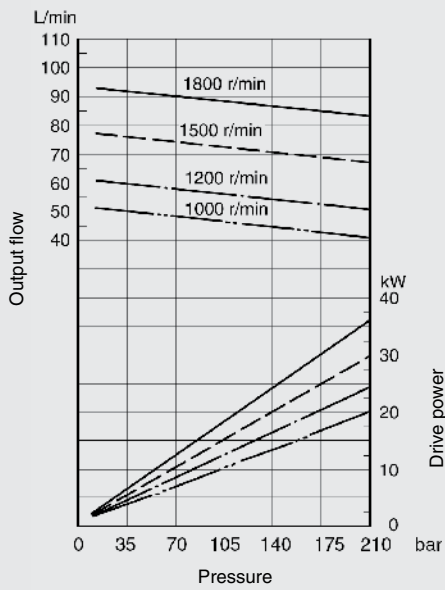
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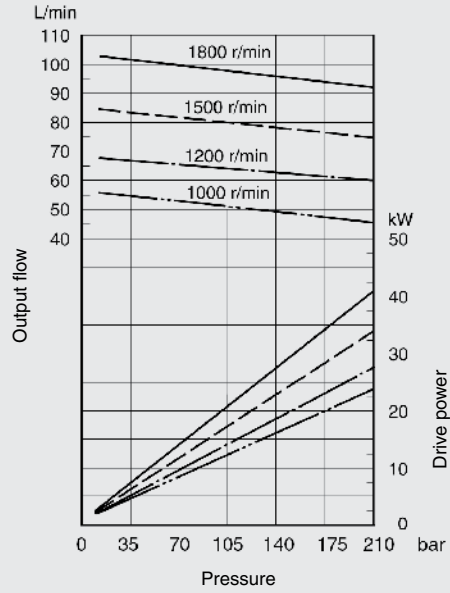
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PVF101-x2-.../47...



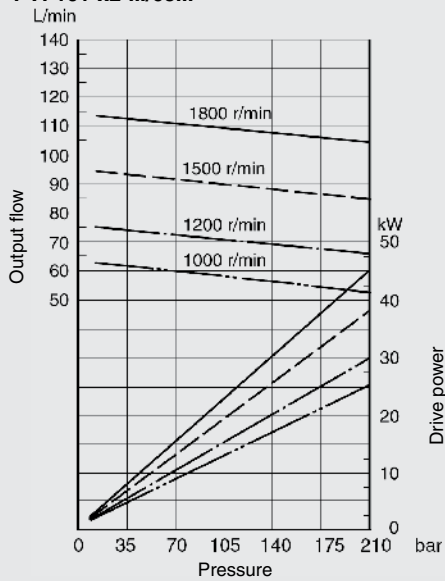
PVF101-2x-53/...
PVF101-x2-.../53...



PVF101-2x-59/...
PVF101-x2-.../59...



PVF101-2x-65/...
PVF101-x2-.../65...

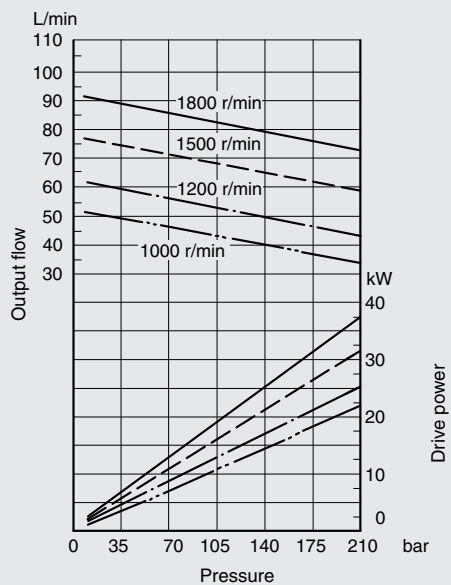


4.2.11 PVF101-3x- / PVF101-x3-

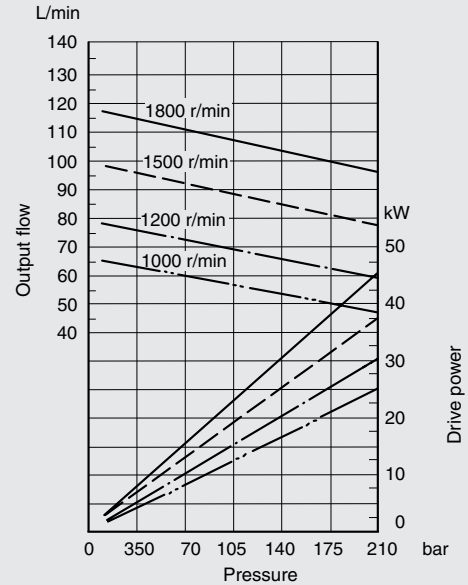
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

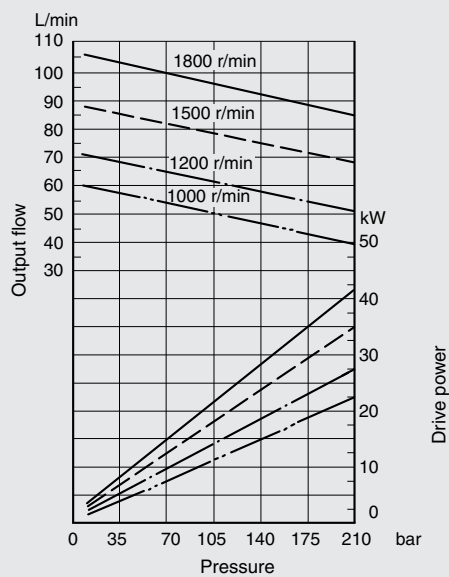
PVF101-3x-52/... PVF101-x3-.../52...



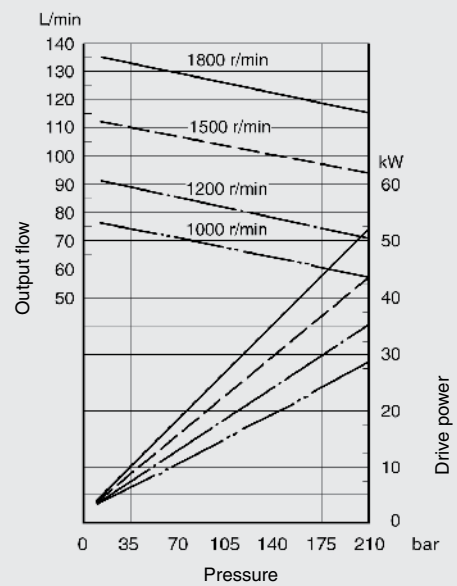
PVF101-3x-66/... PVF101-x3-.../66...



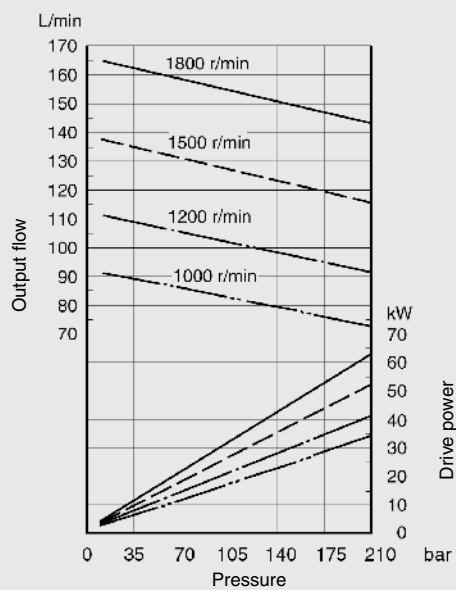
PVF101-3x-60/... PVF101-x3-.../60...



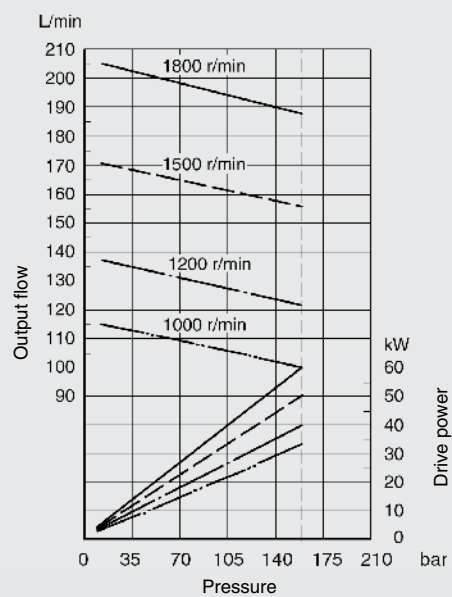
PVF101-3x-76/... PVF101-x3-.../76...



PVF101-3x-94/...
PVF101-x3-.../94...



PVF101-3x-116/...
PVF101-x3-.../116...

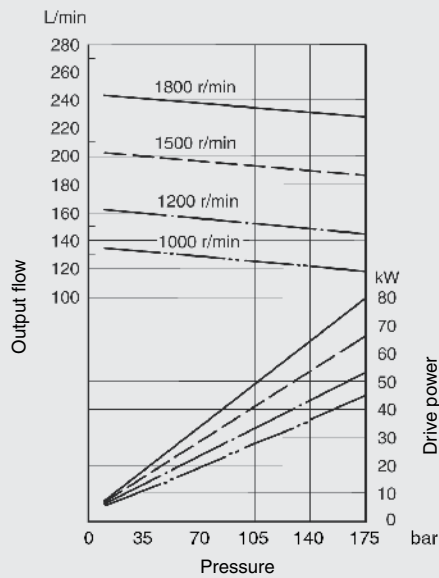


4.2.12 PVF101-x4-

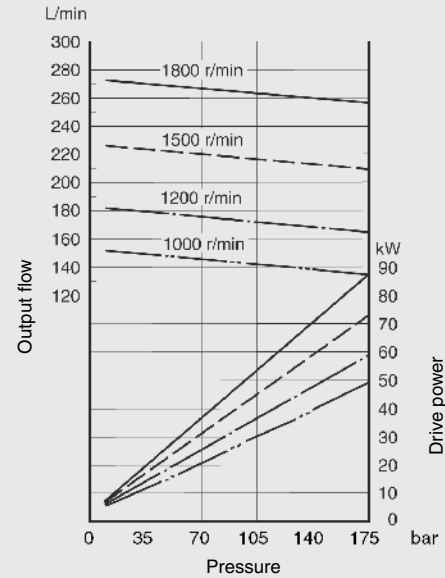
Performance characteristic curves

at viscosity 20 mm²/s (ISO VG32 oil, 50 °C)

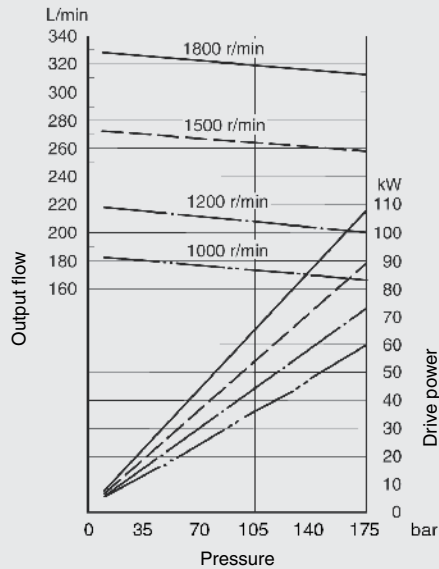
PVF101-x4-.../136...



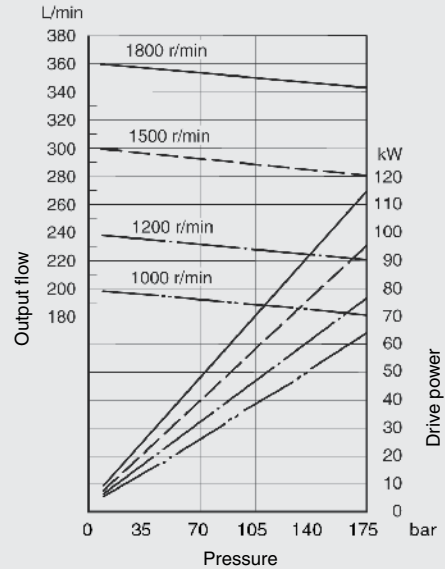
PVF101-x4-.../153...



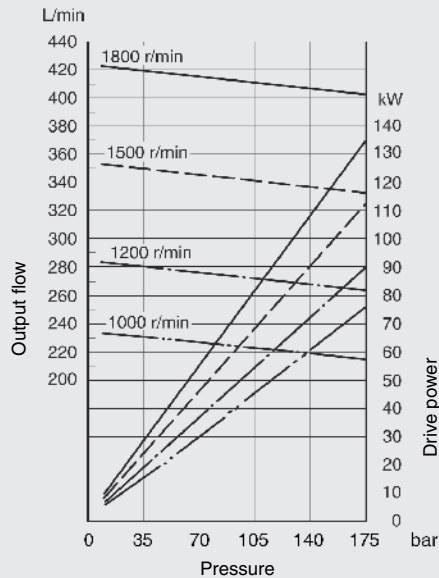
PVF101-x4-.../184...



PVF101-x4-.../200...



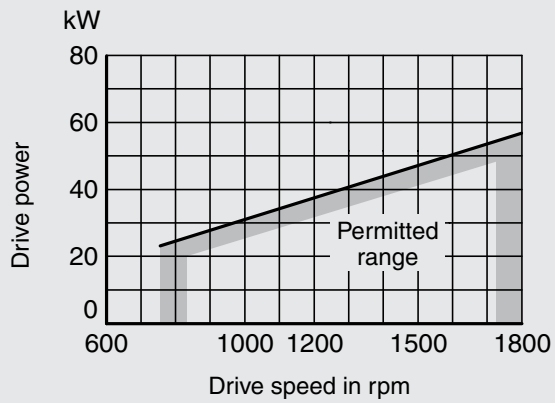
PVF101-x4-.../237...



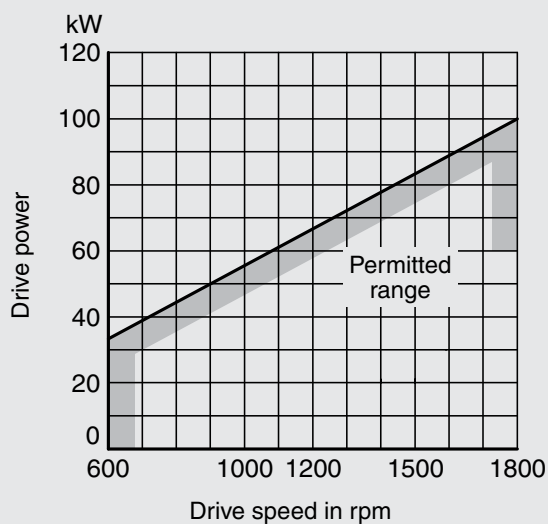
4.2.13 Power limitations

The maximum drive power for sizes PVF101-12 and PVF101-33 is limited, depending on the motor speed.

PVF101-12 – Max. drive power

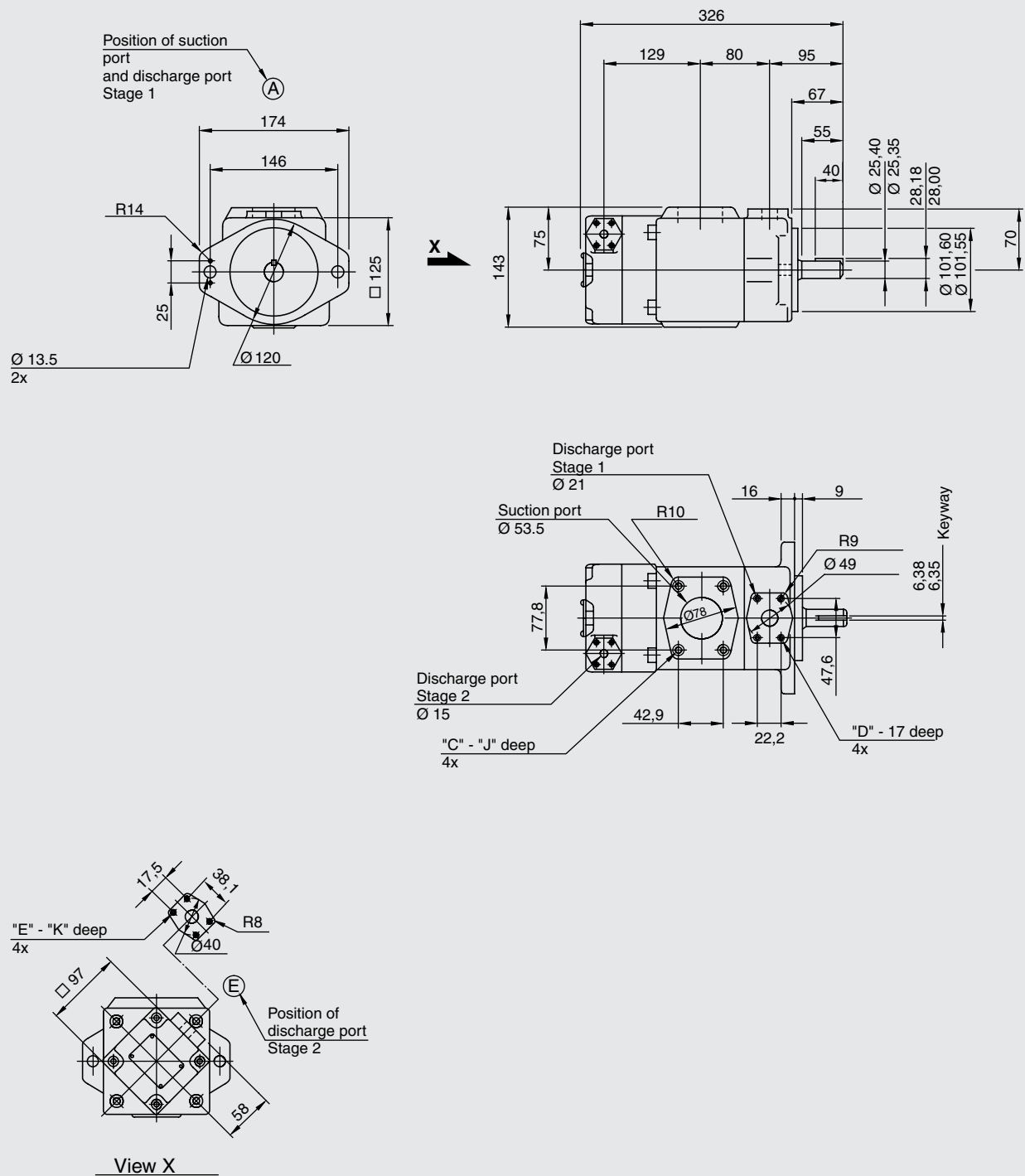


PVF101-33 – Max. drive power



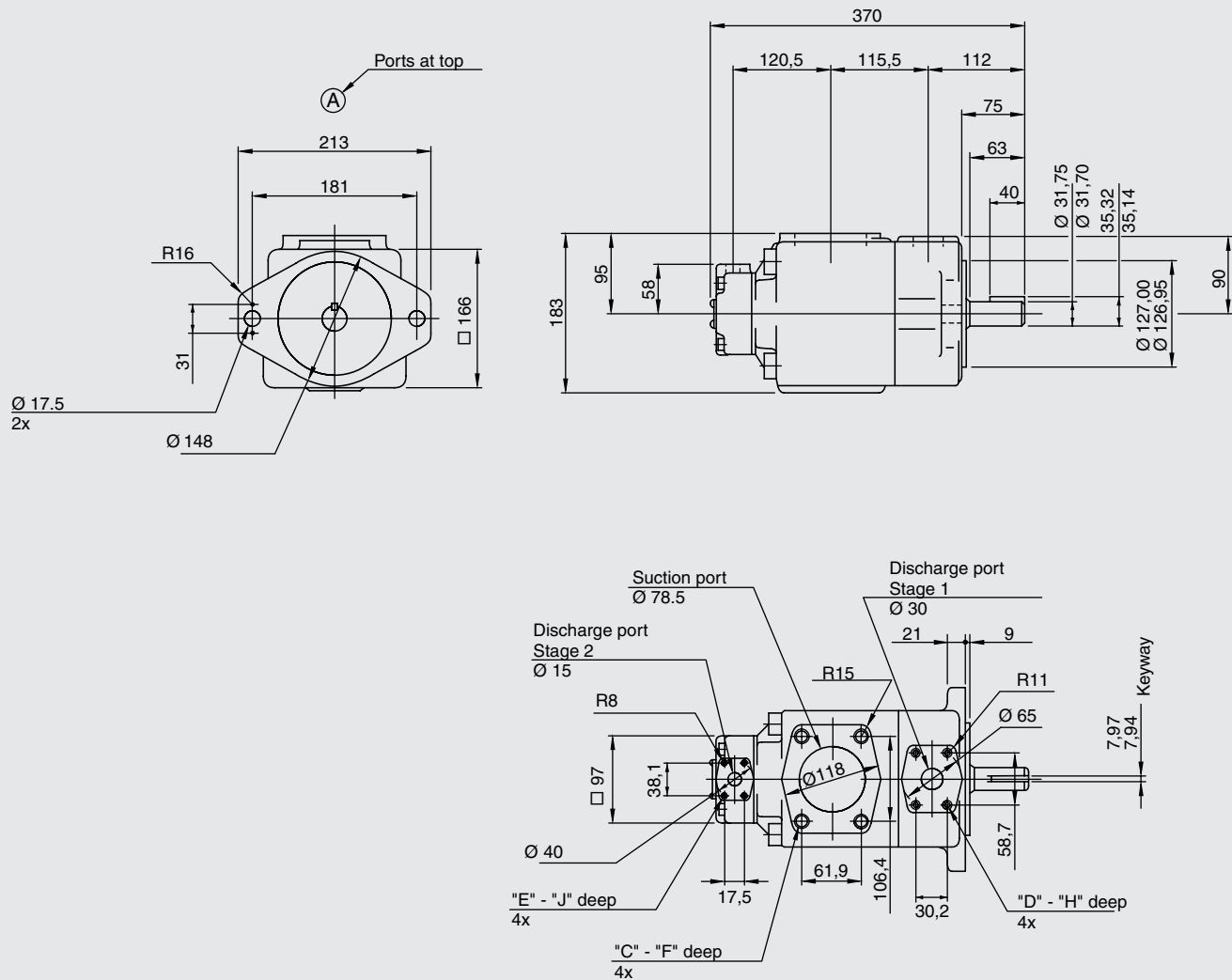
DIMENSIONS

4.2.14 PVF101-12-



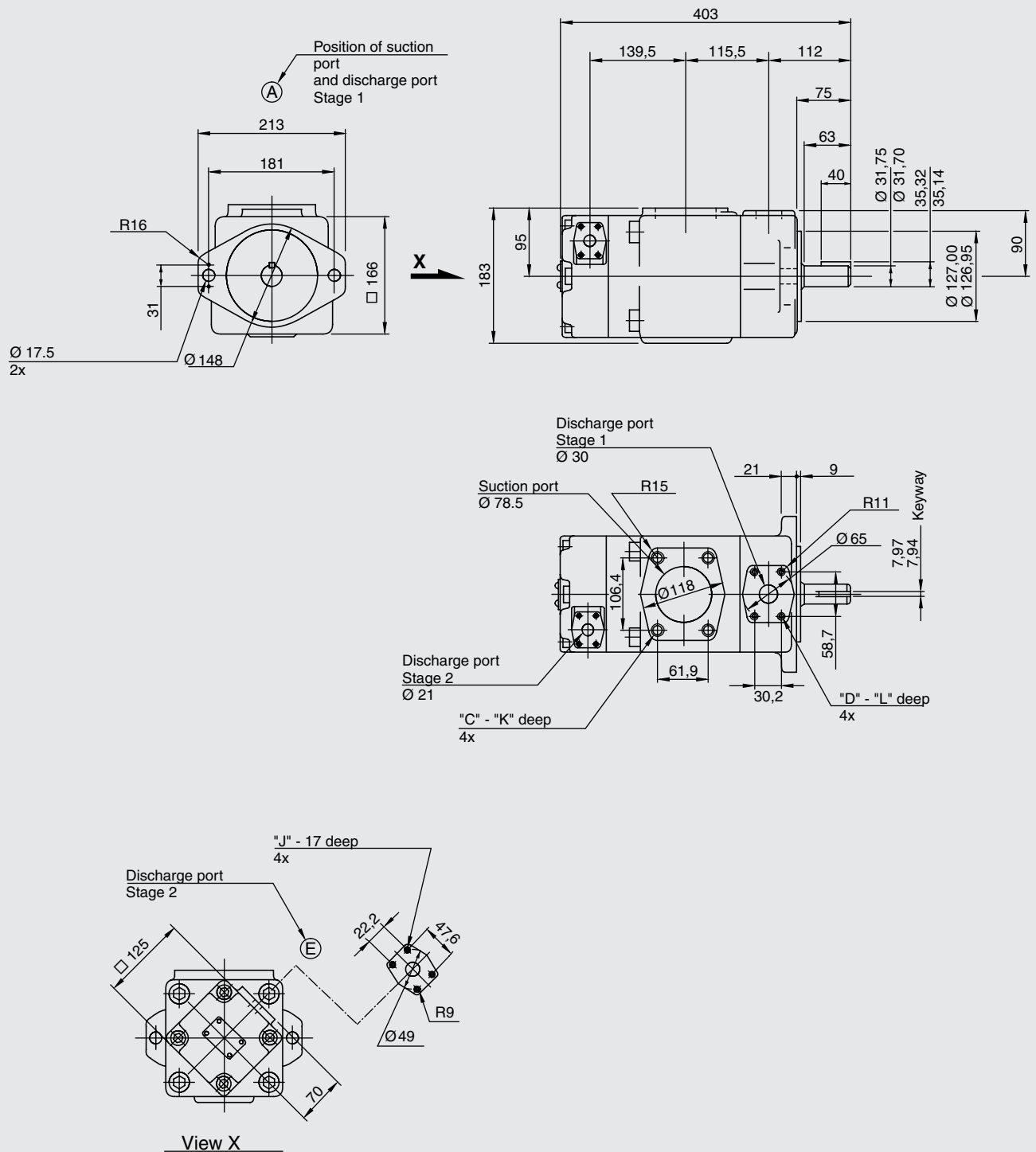
Design Standard	"C" Thread	"D" Thread	"E" Thread	J mm	K mm
PVF101-12-...42 European Standard	M12	M10	M8	19	14
PVF101-12-...4290 US Standard	1/2-13 UNC	3/8-16 UNC	5/16-18 UNC	21	16

4.2.15 PVF101-13-



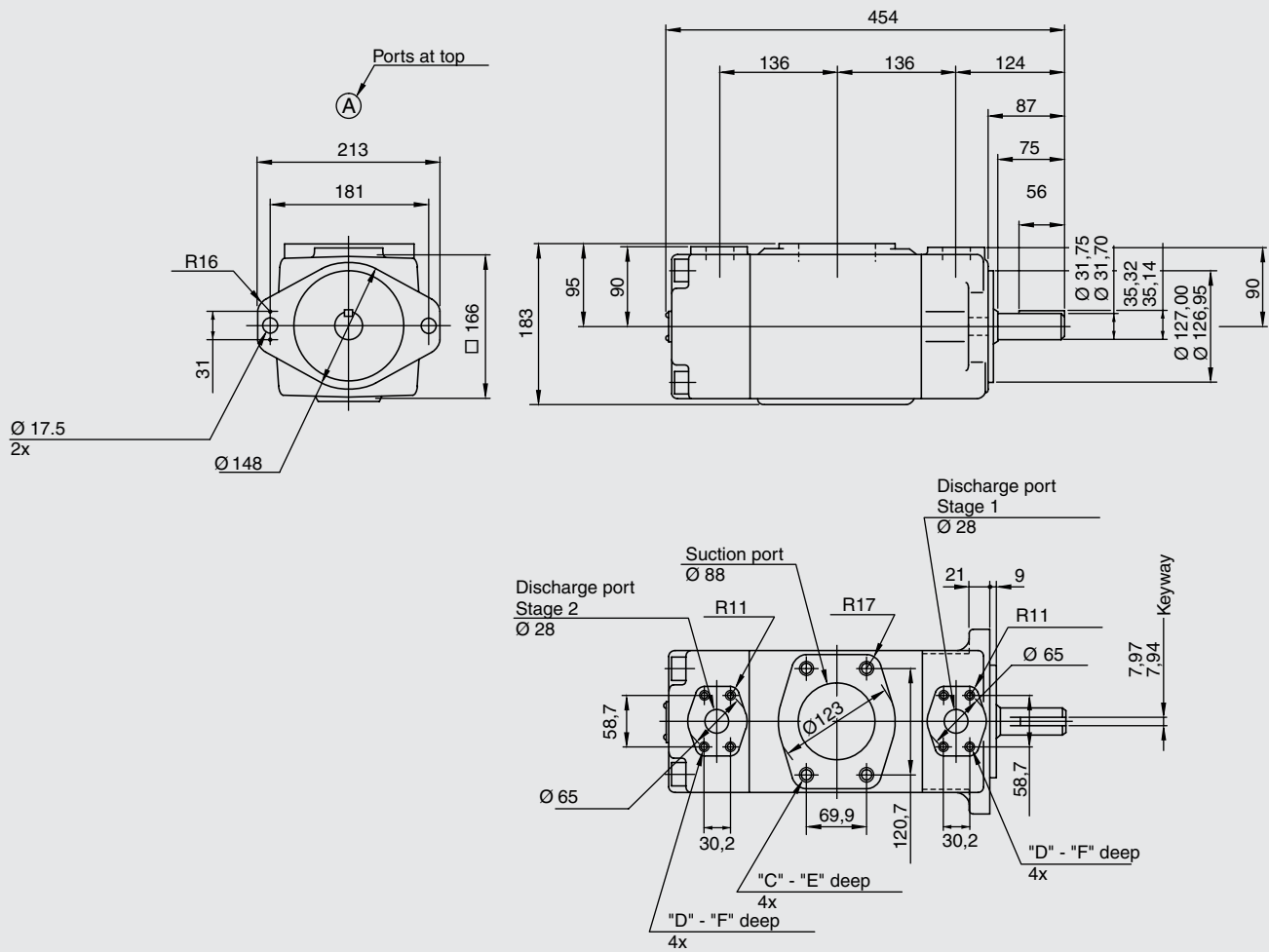
Design Standard	"C" Thread	"D" Thread	"E" Thread	F mm	H mm	J mm
PVF101-13-...42 European Standard	M16	M10	M8	19	19	14
PVF101-13-...4290 US Standard	5/8-11 UNC	7/16-14 UNC	5/16-18 UNC	21	20	16

4.2.16 PVF101-23-



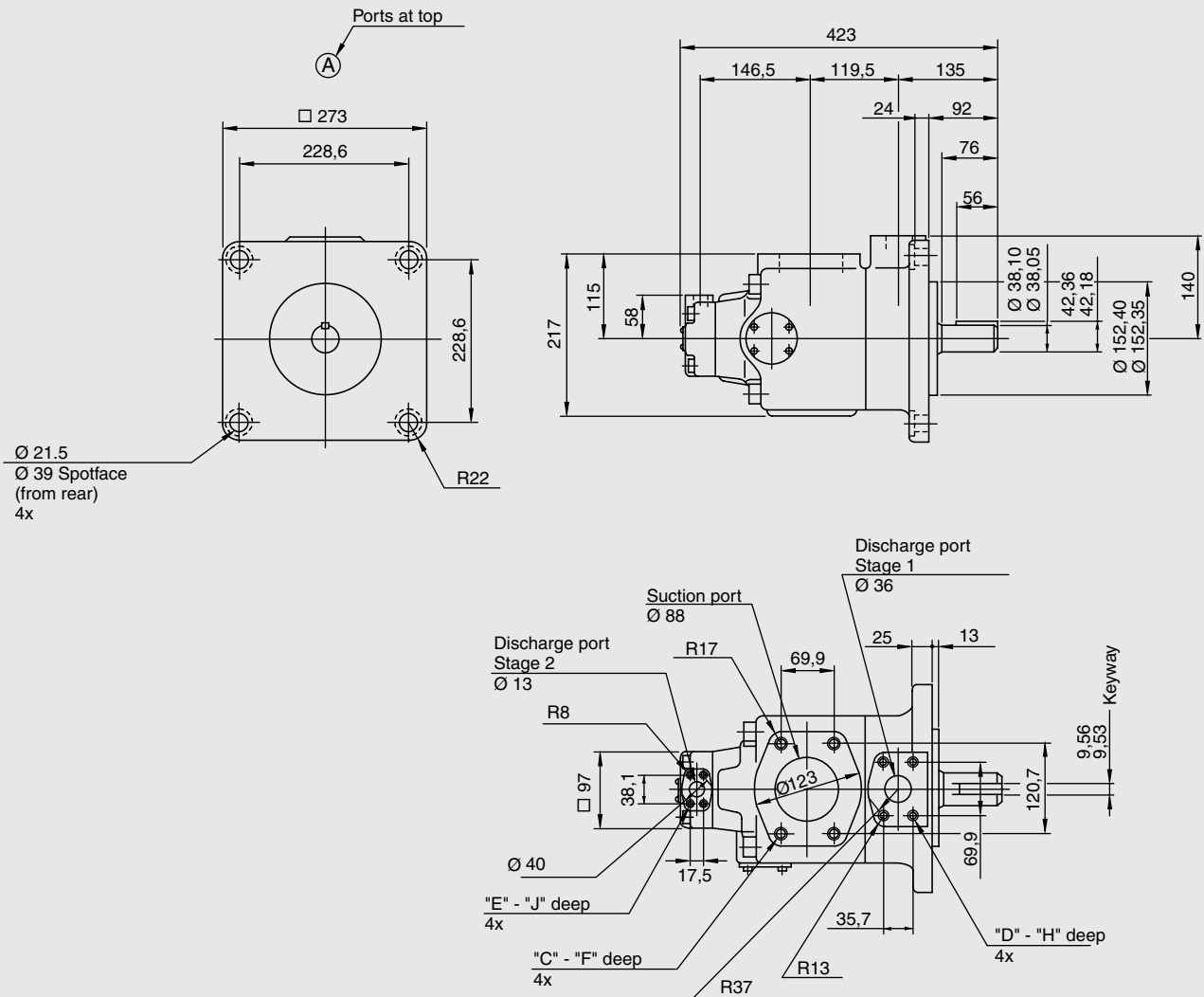
Design Standard	"C" Thread	"D" Thread	"J" Thread	K mm	L mm
PVF101-23-...41 European Standard	M16	M10	M10	19	19
PVF101-23-...4190 US Standard	5/8-11 UNC	7/16-14 UNC	3/8-16 UNC	21	20

4.2.17 PVF101-33-



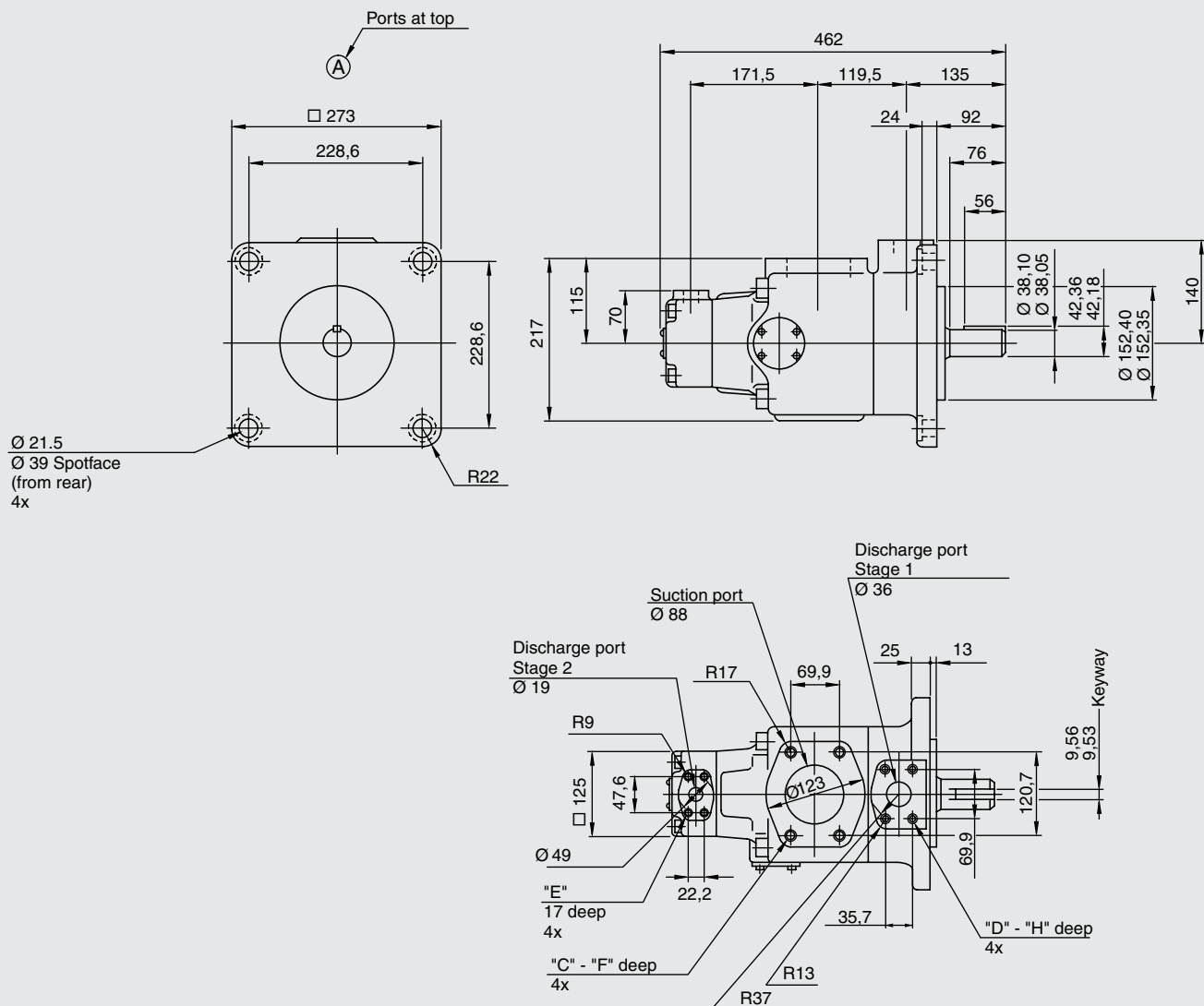
Design Standard	"C" Thread	"D" Thread	E mm	F mm
PVF101-33-...31 European Standard	M16	M10	19	19
PVF101-33-...3190 US Standard	5/8-11 UNC	7/16-14 UNC	21	20

4.2.18 PVF101-14-



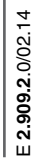
Design Standard	"C" Thread	"D" Thread	"E" Thread	F mm	H mm	J mm
PVF101-14-...32 European Standard	M16	M12	M8	19	19	14
PVF101-14-...3290 US Standard	5/8-11 UNC	1/2-13 UNC	5/16-18 UNC	21	21	16

4.2.19 PVF101-24-



Design Standard	"C" Thread	"D" Thread	"E" Thread	F mm	H mm
PVF101-24-...31 European Standard	M16	M12	M10	19	19
PVF101-24-...3190 US Standard	5/8-11 UNC	1/2-13 UNC	3/8-16 UNC	21	21

4

HYDAC | 285

Fixed Displacement Vane Pumps

Installation Manual



FIXED DISPLACEMENT

PVF100-1-6
PVF100-1-8
PVF100-1-10
PVF100-1-12
PVF100-1-14
PVF100-1-17
PVF100-1-19
PVF100-1-23
PVF100-1-25
PVF100-1-31
PVF100-2-41
PVF100-2-47
PVF100-2-53
PVF100-2-59
PVF100-2-65
PVF100-3-76
PVF100-3-94
PVF100-3-116
PVF100-4-136
PVF100-4-153
PVF100-4-184
PVF100-4-200
PVF100-4-237

FIXED DISPLACEMENT – DOUBLE PUMP

PVF101-12-
PVF101-13-
PVF101-23-
PVF101-33-
PVF101-14-
PVF101-24-
PVF101-34-



To prevent serious accidents, equipment damage, and other property damage, please observe the following precautions, as well as all related regulations regarding safety.

Before using the product, make sure you read and understand all the instructions in the Operator's Manual entirely.

In this catalogue, safety precautions are classified under three headings:

DANGER, WARNING, and CAUTION.

These words are defined as follows:



DANGER

Indicates an imminent danger that is very likely to cause death or severe injury unless the situation is avoided.



WARNING

Indicates a potential danger that may cause death or severe injury unless the situation is avoided.



CAUTION

Indicates a potential danger that may cause a minor or moderate injury or that may result in property damage.



INFORMATION

Indicates useful hints and system tips. They are necessary for correct installation and safe use of the product.



PRECAUTIONS FOR USE

CAUTION

1. To avoid possible injury when handling the products, wear protective safety equipment in accordance with the instructions in the Operator's Manual.



CAUTION

2. Failure to support the weight of the product or lifting the product with improper posture may result in injury to the hands or back. Be sure to follow the instructions in the Operator's Manual.



CAUTION

3. Do not climb on, strike, drop or exert unnecessary force on the product. This may lead to injury or fire due to incorrect operation, damage, or oil leakage.



CAUTION

4. Oil on the product or floor must be cleaned up thoroughly. Oil could cause you to drop the product or slip on the floor.

PRECAUTIONS FOR INSTALLATION, REMOVAL, AND MAINTENANCE



WARNING

1. All installation, removal, maintenance, piping or wiring work should be carried out by properly trained personnel.



WARNING

2. Before beginning any installation, removal, maintenance, piping or wiring work, the following procedures must be carried out. Failure to do so may cause the equipment to move suddenly or oil to spill during the work which may result in serious accidents.

- Shut off the power supply to the equipment and make sure that all the electrical motors or machines cannot restart unintentionally.
- Secure the cylinder rods before installing/removing the cylinder.
- Reduce the pressure in the pipes and cylinders in the hydraulic system to zero pressure.



WARNING

3. Before working on any electrical wiring, be sure to shut off the power supply. Failure to do this may cause an electric shock.



CAUTION

4. Keep all installation holes and surfaces clean. Failure to do this may cause insufficient tightening of the bolts which may lead to a fire due to oil leakage.



CAUTION

5. Before commissioning the device, make sure that all bolts are tightened to the specified torque. Failure to comply with the specifications may result in incorrect operation, damage, oil leakage, etc.

PRECAUTIONS FOR OPERATION



DANGER

1. Never operate any device in an environment where there is danger of explosion or fire, unless the device is fully protected. This may lead to major and serious accidents including explosion or fire.



WARNING

2. Do not approach pumps or motors when in operation. Hands or clothes can be caught up and wound into the pumps and motors which can lead to serious injury.



WARNING

3. In event of abnormal operation (unusual sounds, oil leakage, smoke, etc.), immediately stop operation and take appropriate corrective measures.



WARNING

4. Completely discharge air from the cylinder at low pressure. Failure to do so may result in unexpected movement of the cylinder, which in turn may cause injury.



WARNING

5. To adjust the damping, gradually increase the cylinder speed from a low speed (50 mm/s or less). Rapidly accelerating the cylinder may produce an abnormal pressure surge, resulting in damage to the cylinder or the machinery and causing a serious accident.



WARNING

6. Before operating this device for the first time, check that hydraulic and electrical circuits are properly connected and that adjoining surfaces are tightly aligned.



WARNING

7. Do not use the product outside of the specifications described in the catalogue, related data sheets, drawings, etc. Failure to adhere to them may cause improper operation, damage or injury.



WARNING

8. During operation, high temperatures in the hydraulic system or solenoid valves may occur. Wear protective gloves and clothing when in the vicinity of these devices.



WARNING

9. Always operate the device with clean oil, and within established ranges for temperature, viscosity and cleanliness. Failure to adhere to the specified limits may result in incorrect operation or fire due to oil leakage.

GENERAL PRECAUTIONS



WARNING

1. Never modify the device.
If any alterations are made, unexpected machine movement may cause injury.



CAUTION

2. Do not disassemble the products without prior consent of the manufacturer. Failure to adhere to this can cause the products to operate incorrectly which can lead to accidents or damage.



CAUTION

3. For transportation / storage of the product, pay attention to environmental conditions, such as ambient temperature and humidity, and implement anti-dust / anti-corrosion measures.



CAUTION

4. The seals may need to be replaced if the product is used after long-term storage.



CAUTION

5. Read the manual thoroughly and ensure that the seals are replaced properly.

RELATED REGULATIONS



CAUTION

To ensure that this product is used in a safe manner, it is essential to observe the above precautions, as well as all related regulations regarding safety.



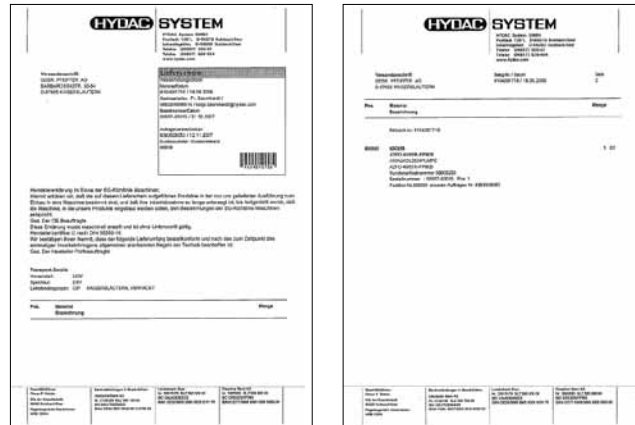
VANE PUMPS FIXED DISPLACEMENT

Technical specifications

Series	Geometric displacement [cm ³ /U]	Operating pressure Rated [bar]	Drive speed [min ⁻¹]
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

Documentation

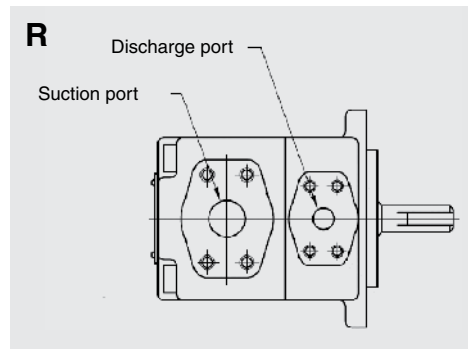
Check the product's model code and compare it with your paper work.



Delivery note and / or sales acknowledgement.

Direction of rotation

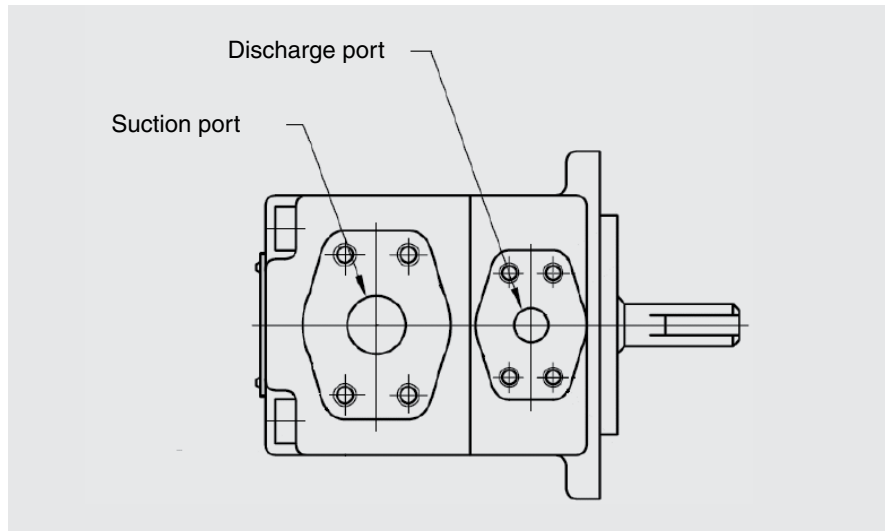
Check the direction of rotation of the shaft and compare it to the drive unit.



Clockwise shaft rotation. Viewed from (front) end of shaft.

Ports

Suction and discharge port



Pump Size		Suction pressure		
		Minimum		Maximum
		Mineral	Synthetic fluids, aqueous fluids	
PVF100 series	PVF100-1 PVF100-2	0.8 bar abs.	0.84 bar abs.	1.3 bar abs.
	PVF100-3 PVF100-4	0.8 bar * abs.		

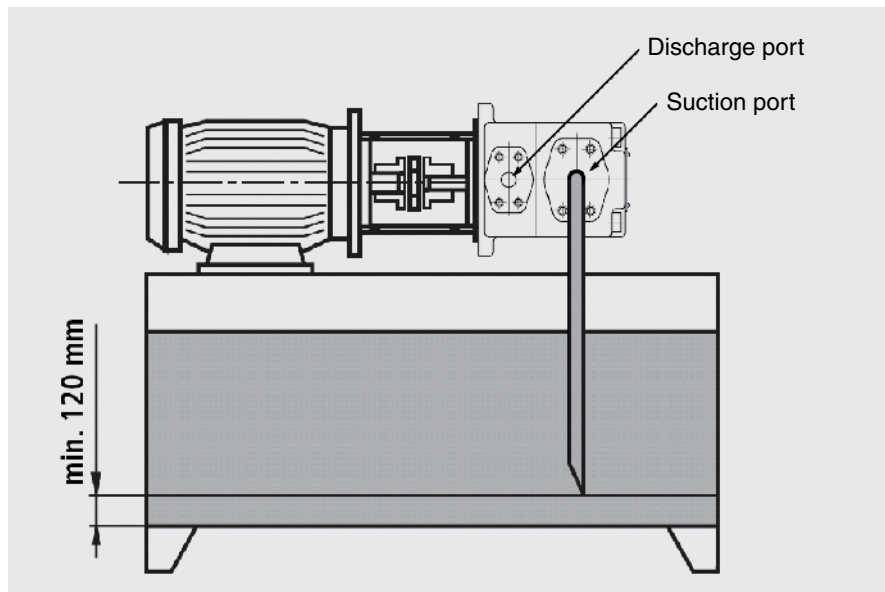
* Minimum suction pressure at drive speeds > 1700 rpm:

PVF100-3-116: 1 bar abs.

PVF100-4-237: 0.87 bar abs.

Pump arrangement

Standard arrangement: pump above reservoir.



PIPING



Suction line

Do not restrict suction lines.

A restricted suction line (filter, valve etc.) can generate excessive noise and damage the pump.

Do not reduce the suction line internal diameter.

The suction line internal diameter must always correspond to the flange size on the pump case.



General

Use rubber hoses to reduce noise and excessive load on the pump.

Use high pressure hoses and pipes only at the outlet (discharge port) of the pump.

Commissioning



Prior to commissioning, the pump case must be filled with hydraulic fluid (use filling port).

Initial commissioning should be at zero pressure with an open circuit to enable the pump to prime.

Pressure should only be increased once the pump has been fully primed.

Hydraulic fluid



- Hydraulic oil based on mineral oil (HL, HLP, ISO VG 32 or 46)

- Synthetic fluids (Phosphate ester, HFD-R, Polyolester, HFD-U, Water glycol, HFC)

Note:

For operating restrictions when using special fluids, please contact HYDAC.

Filtration



For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class:

NAS 1638 Class 12

or

23/21/18 ISO 4406:1999

or cleaner.

Viscosity and temperature



Normal operating viscosity range is 20 – 400 cSt (mm²/s).

Normal operating temperature range is 0 °C to +70 °C.

Temperature range when water glycol is used is: 0 °C to +50 °C



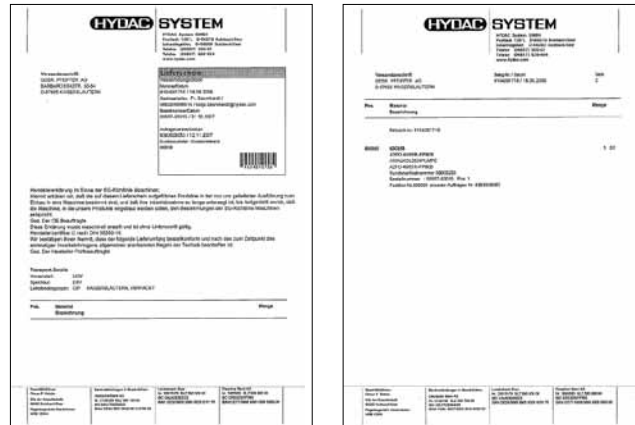
VANE PUMPS FIXED DISPLACEMENT - DOUBLE PUMP

Technical specifications

Series	Geometric displacement 2nd stage [ccm/rev]	1st stage [ccm/rev]	Operating pressure Rated [bar]	Maximum drive speed [rpm]
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			

Documentation

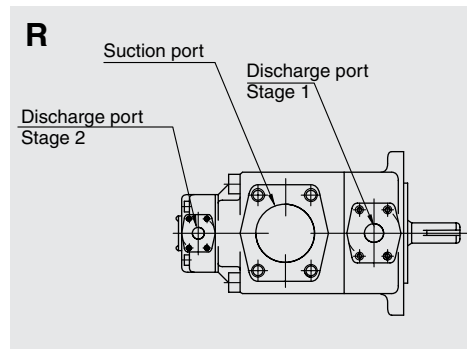
Check the product's model code and compare it with your paper work.



Delivery note and / or sales acknowledgement.

Direction of rotation

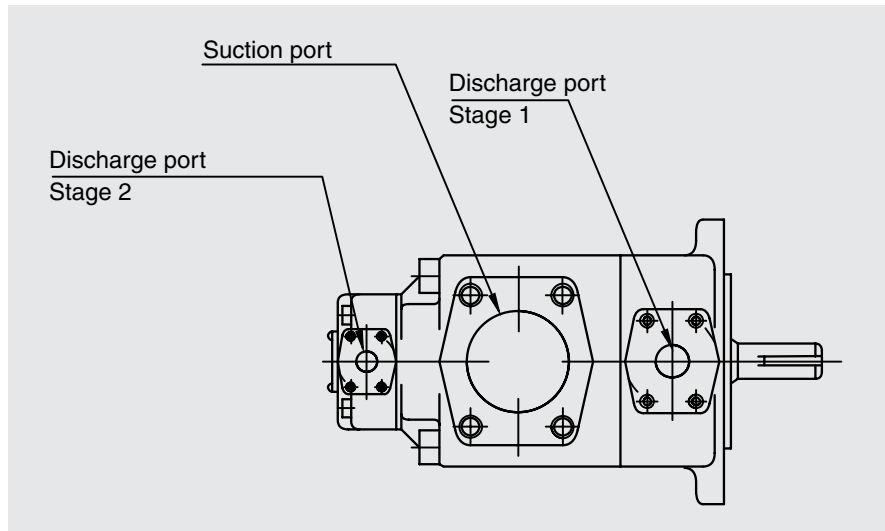
Check the direction of rotation of the shaft and compare it to the drive unit.



Clockwise shaft rotation. Viewed from (front) end of shaft.

Ports

Suction and discharge port

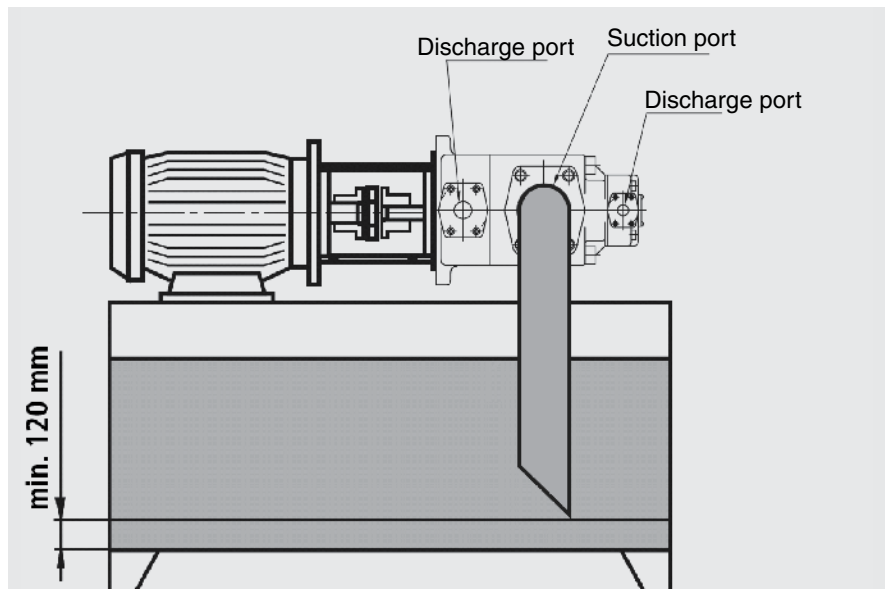


Pump type		Suction pressure		
		Minimum		Maximum
		Mineral oil	Phosphate ester, Aqueous fluid	
PVF101 series Double pumps	PVF101-12	-0.2 bar	-0.16 bar abs.	+0.3 bar abs.
	PVF101-13	-0.2 bar* abs.		
	PVF101-23			
	PVF101-33			
	PVF101-14			
	PVF101-24			
	PVF101-34			

* Min. suction pressure at drive speed > 1700 rpm
 PVF101 with displacement 94 or 116 cm³/rev: 0 bar (1 bar abs.)
 PVF101 with displacement 76 cm³/rev: -0.07 bar
 PVF101 with displacement 237 cm³/rev: -0.13 bar

Pump arrangement

Standard arrangement: pump above reservoir.



PIPING



Suction line

Do not restrict suction lines.

A restricted suction line (filter, valve etc.) can generate excessive noise and damage the pump.

Do not reduce the suction line internal diameter.

The suction line internal diameter must always correspond to the flange size on the pump case.



General

Use rubber hoses to reduce noise and excessive load on the pump.

Use high pressure hoses and pipes only at the outlet (discharge port) of the pump.

Commissioning



Prior to commissioning, the pump case must be filled with hydraulic fluid (use filling port).

Initial commissioning should be at zero pressure with an open circuit to enable the pump to prime.

Pressure should only be increased once the pump has been fully primed.

Hydraulic fluid



- Hydraulic oil based on mineral oil (HL, HLP, ISO VG 32 or 46)

- Synthetic fluids (Phosphate ester, HFD-R, Polyolester, HFD-U, Water glycol, HFC)

Note:

For operating restrictions when using special fluids, please contact HYDAC.

Filtration



For maximum pump and system component life time, the system should be protected from contamination by effective filtration.

Cleanliness class:

NAS 1638 Class 12

or

23/21/18 ISO 4406:1999

or cleaner.

Viscosity and temperature



Normal operating viscosity range is 20 – 400 cSt (mm²/s).

Normal operating temperature range is 0 °C to +70 °C.

Temperature range when used with water glycol: 0 °C to +50 °C

Internal Gear Pumps for Open Loop Hydraulic Systems

INTERNAL GEAR PUMPS

5.1 MEDIUM HEAVY DUTY SERIES SIZE 2 PGI100



Series	Geometric displacement [cm³/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	
PGI100-2-022	22.2				
PGI100-2-025	25.2				280

5.2 MEDIUM HEAVY DUTY SERIES SIZE 3 PGI101



Series	Geometric displacement [cm ³ /rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGI101-3-020	20.0	250	320	325	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				1800
PGI101-3-064	64.4		280	300	

5.3 HEAVY DUTY SERIES SIZE 2/3/6

PGI102



	Geometric displacement [cm ³ /rev]	Operating pressure			Maximum drive speed [rpm]
Series		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	300	300	325	3600
PGI102-2-019	19.3				
PGI102-2-022	22.2				
PGI102-2-025	25.2	250	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		300	325	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			
PGI102-6-100	101.2				
PGI102-6-125	125.7	280	300	320	2000
PGI102-6-160	160.1				
PGI102-6-200	200.9	150	150	165	
PGI102-6-250	249.9				

5.4 MEDIUM HEAVY DUTY SERIES SIZE 5/6

PGI103



Series	Geometric displacement [cm³/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				2500
PGI103-5-100	100.5				2200
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	



5.1 MEDIUM HEAVY DUTY SERIES SIZE 2 CONTENTS

PGI100

Ordering Code	5.1.1 Medium Heavy Duty Series
Technical Information	5.1.2 Specifications 5.1.3 Hydraulic fluids 5.1.4 Viscosity range 5.1.5 Temperature range 5.1.6 Seals 5.1.7 Filtration 5.1.8 Installation notes 5.1.9 Multiple pumps
Performance Data	5.1.10 PGI100
Dimensions	5.1.11 Ports 5.1.12 PGI100 with SAE A flange and parallel shaft with key 5.1.13 PGI100 with SAE A flange and SAE splined shaft 5.1.14 PGI100 with parallel shaft with key 5.1.15 PGI100 with tang 5.1.16 Double pump PGI100 with SAE A flange and parallel shaft with key

ORDERING CODE

5.1.1 Medium Heavy Duty Series

PGI100 - 2 - 005 - R A 0 4 - 11 - XXXX

Medium Heavy Duty Series

Size

Displacement

005	5.4	cm³/rev
006	6.4	cm³/rev
008	7.9	cm³/rev
011	10.9	cm³/rev
013	13.3	cm³/rev
016	15.8	cm³/rev
019	19.3	cm³/rev
022	22.2	cm³/rev
025	25.2	cm³/rev

Shaft rotation (viewed from shaft end)

R	Clockwise
L	Anti-clockwise

Shaft

A	Parallel shaft with key
B	Splined shaft SAE A - J744 16-4 9T
D	Tang drive
K	Parallel keyed shaft with through drive (only for multiple pumps)

Mounting flange

0	SAE J744 82-2 A - Ø 82.55 mm
2	SAE J744 101-2 B - Ø 101.6 mm
3	2-hole mounting, centering Ø 52 mm with O-ring

Ports

4	Square flange DIN 3901 / ISO 8435
---	-----------------------------------

Series

Modification number

XXXX	Determined by manufacturer
------	----------------------------

TECHNICAL INFORMATION

5.1.2 Specifications

Pump size			005	006	008	011	013	016	019	022	025
Geometric displacement		[cm³/rev]	5.4	6.4	7.9	10.9	13.3	15.8	19.3	22.2	25.2
Pressure	Rated	[bar]	250								
	Intermittent		320						300		280
	Peak		320						300		280
Drive speed	min.	[rpm]	200						100		
	max.		4200			4000			3600		
Approx. weight		[kg]	2.9	3.0	3.1	3.3	3.5	3.6	3.8	4.0	4.2

5.1.3 Hydraulic fluids

The pump series is designed for use with

HLP Hydraulic oil

Before using synthetic fluids, please contact HYDAC:

HEES, HETG Environmentally-friendly operating fluids

HFC Water glycol

HFD-U Fire-resistant fluids based on polyolester

HFD-R Fire-resistant fluids based on phosphate ester

5.1.4 Viscosity range

	cSt (mm ² /s)
Minimum viscosity:	10
Normal operating viscosity:	10 - 300
Maximum viscosity:	2,000

5.1.5 Temperature range

Temperature range

-20 to 100 °C

Maximum ambient temperature

-40 to 80 °C

Maximum fluid temperature

-40 to 120 °C

5.1.6 Seals

The pump series is equipped with FPM (Viton) seals as standard.

Before using synthetic fluids, please contact HYDAC.

5.1.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class:

20/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

To ensure a longer service life, cleanliness class:

18/16/13 to ISO 4406:1999

or

Class 7 to NAS 1638.

5.1.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure: 0.8 bar abs.

Maximum suction pressure: 2.0 bar abs.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

C. Drive

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment is 0.2 mm and the angular deviation must be less than 0.2°.

Drive shafts with tang are for direct mounting onto to an electric motor or a gearbox. The driver for the tang is included.

5.1.9 Multiple pumps

Internal gear pumps in the PGI100 series can be combined to form double or triple gear pumps (for larger units please contact HYDAC). The performance characteristics for single pumps generally apply but the following points must be taken into consideration:

- It is recommended that the pump with the largest load is positioned on the drive side.
- The maximum drive speed of the multiple pump is limited to the lowest speed of the individual pumps.
- The maximum drive and through drive torques must be checked for each stage.
- The torques generated by the pump unit can be calculated using the following formula:

$$M_{\max} = \frac{\Delta p_1 \cdot V_1}{20 \cdot \pi \cdot \eta_{mh}} + \frac{\Delta p_2 \cdot V_2}{20 \cdot \pi \cdot \eta_{mh}} + \frac{\Delta p_3 \cdot V_3}{20 \cdot \pi \cdot \eta_{mh}}$$

Maximum drive and through drive torques

Displacement	Drive torque	Through drive torque
005 – 025	100 Nm	100 Nm

- A common suction port is not possible
- There is no sealing between the individual pump stages.

If a double internal gear pump combination is installed vertically in V1 arrangement and there is no guarantee that the primary stage will be completely submerged in the oil in the tank under all operating conditions, we recommend that only the suction port of the primary stage is used to supply the oil to the double internal gear pump combination.

In this case the common suction port of the double internal gear pump combination and the suction port of the secondary stage must be plugged.

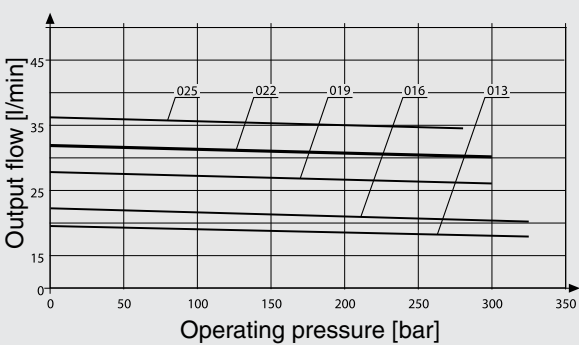
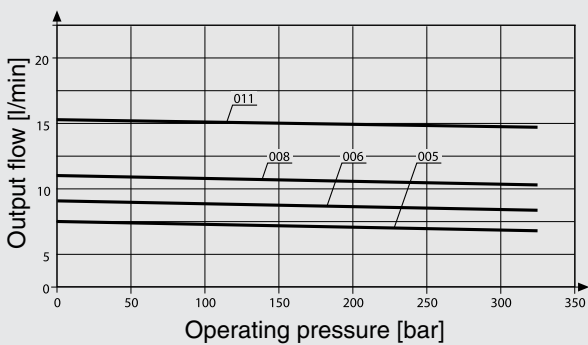
In addition, the suction port of the primary stage must be fitted with an anti-siphon to ensure the fluid remains in the double internal gear pump combination after a lengthy stoppage.

For triple and multiple internal gear pump combinations, please contact HYDAC.

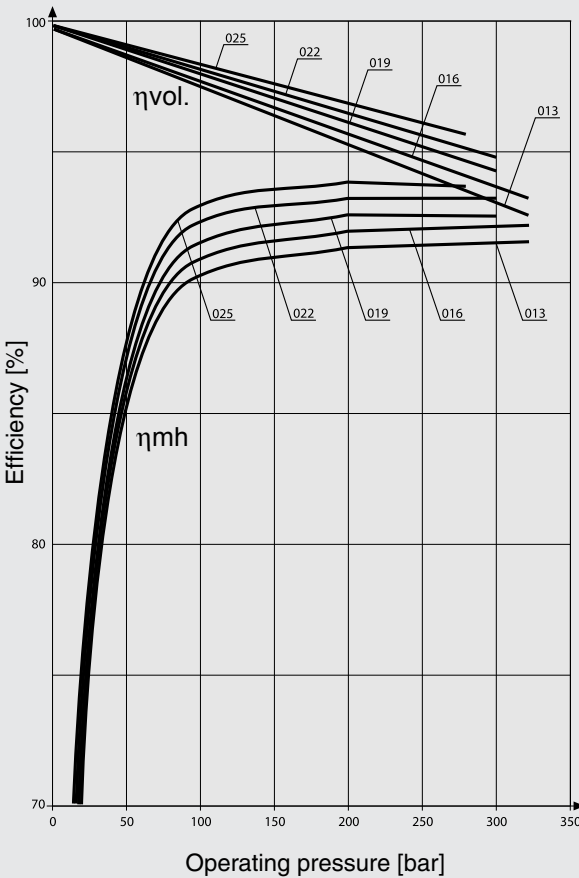
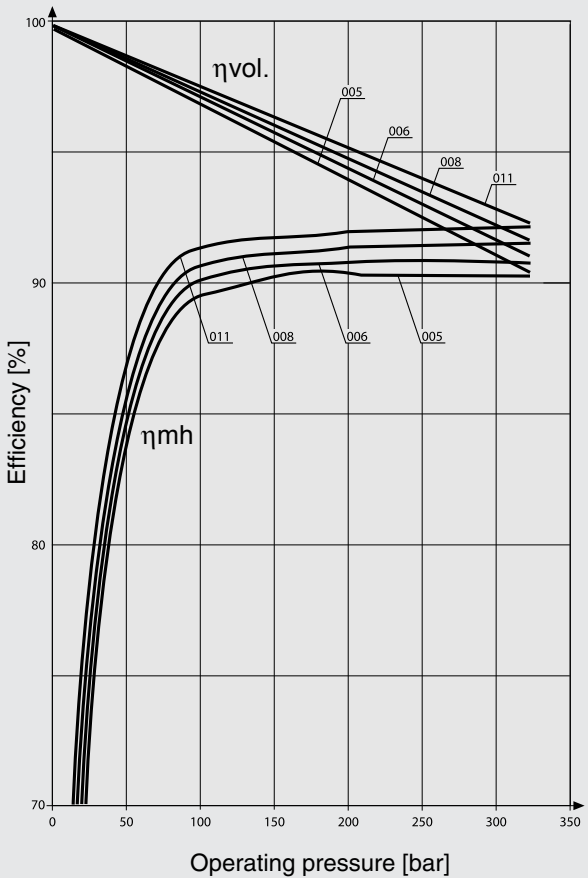
PERFORMANCE DATA

5.1.10 PGI100

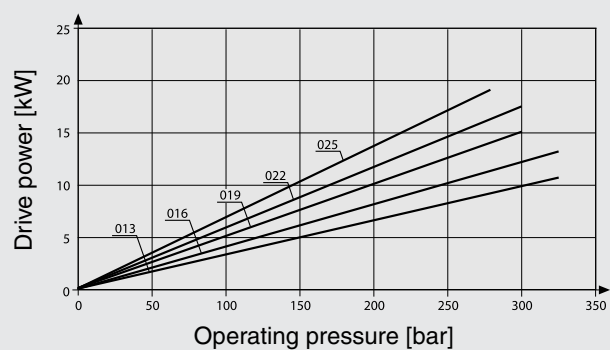
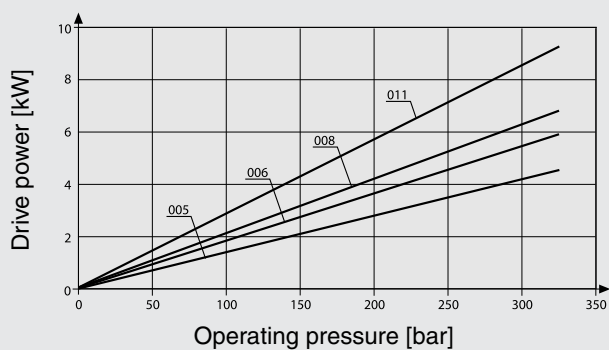
Output flow



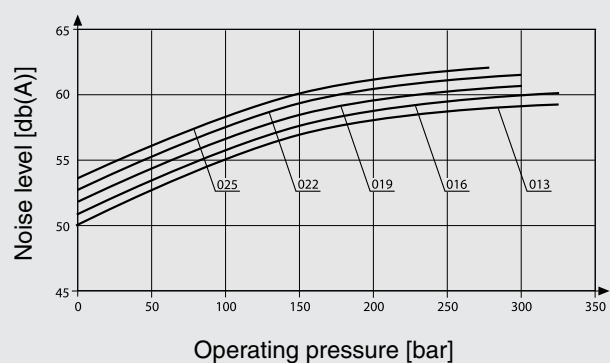
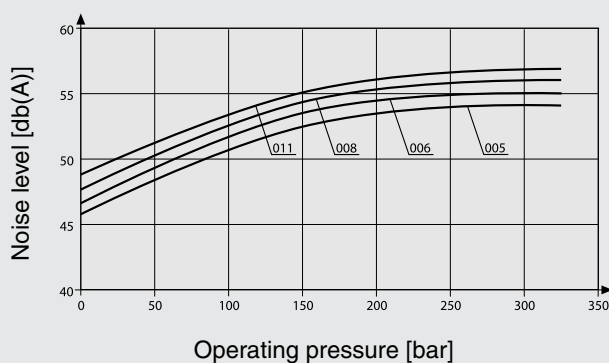
Efficiency



Drive power



Noise level

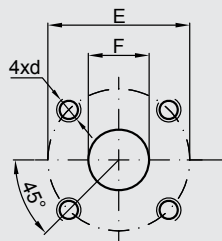


Measurement conditions:

Drive speed 1450 rpm, viscosity 46 mm²/sec, operating temperature 40 °C
Acoustic pressure measured in an anechoic room to DIN 45 635 Sheet 26;
Microphone distance 1.0 m axial.

DIMENSIONS

5.1.11 Ports

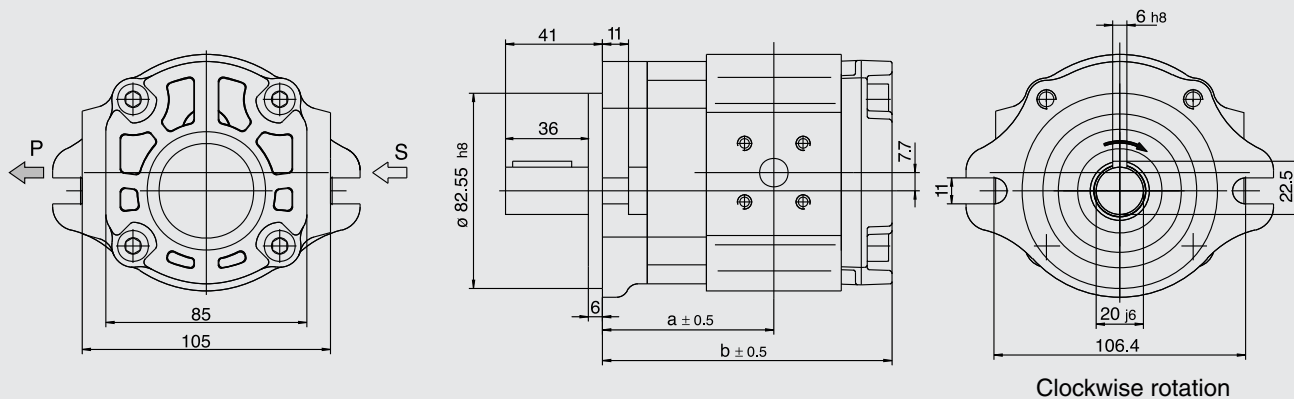


4 Square flange
DIN 3901/ ISO 8435

Displacement	Pressure side			Suction side		
	E	F	d	E	F	d
005 - 006	35	5	M6	40	20	M6
008	35	7	M6	40	20	M6
011 - 013	35	10	M6	40	20	M6
016	35	12	M6	40	20	M6
019 - 025	35	12	M6	55	26	M8

5.1.12 PGI100 with SAE A – flange with parallel shaft with key

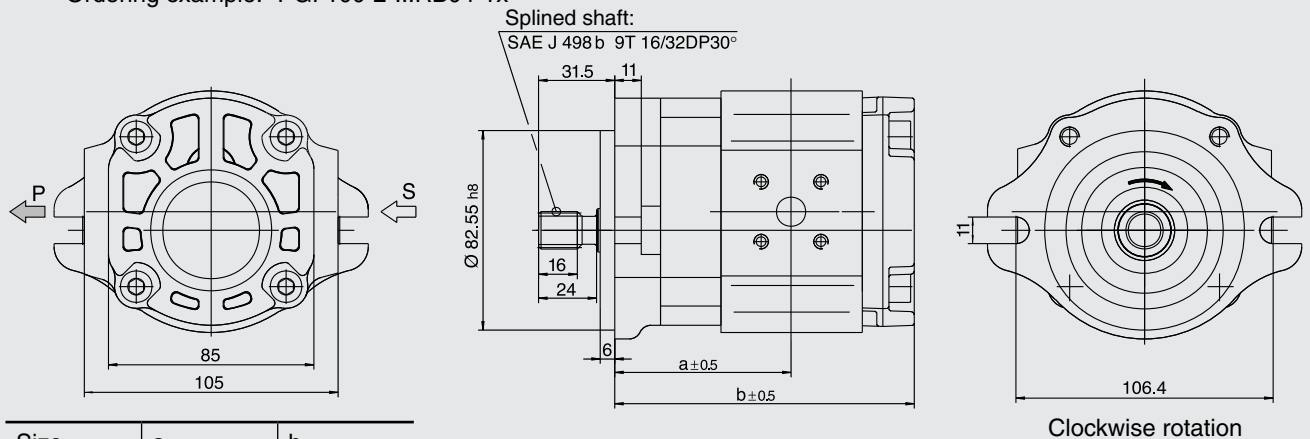
Ordering example: PGI 100-2-...RA04-1x



Size	a	b
005	62	101.5
006	63	103.5
008	64.5	106.5
011	67.5	112.5
013	70	117.5
016	72.5	112.5
019	76	129.5
022	79	135.5
025	82	141.5

5.1.13 PGI100 with SAE A – flange and SAE splined shaft

Ordering example: PGI 100-2-...RB04-1x

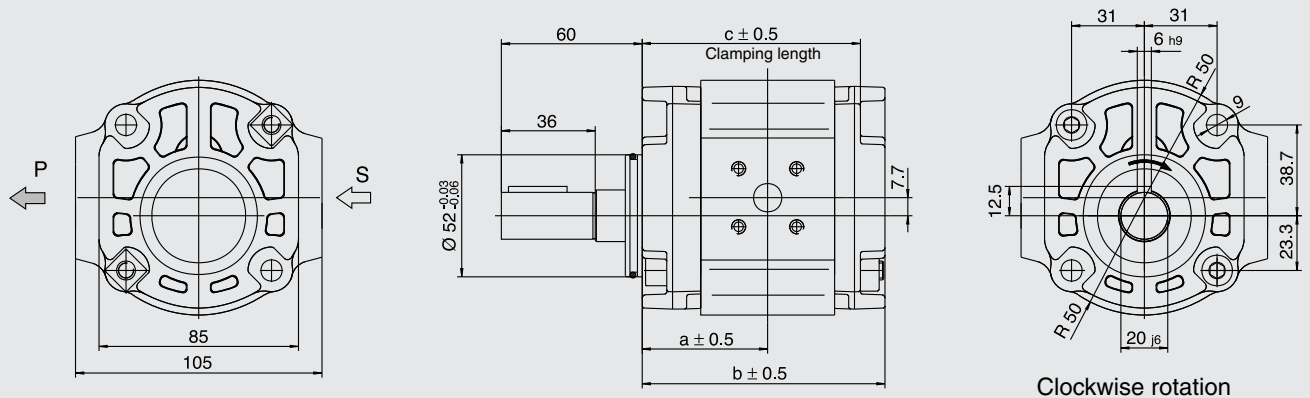


Size	a	b
005	62	101.5
006	63	103.5
008	64.5	106.5
011	67.5	112.5
013	70	117.5
016	72.5	112.5
019	76	129.5
022*	79	135.5
025*	82	141.5

* on request

5.1.14 PGI100 with parallel shaft with key

Ordering example: PGI 100-2-...RA34-1x



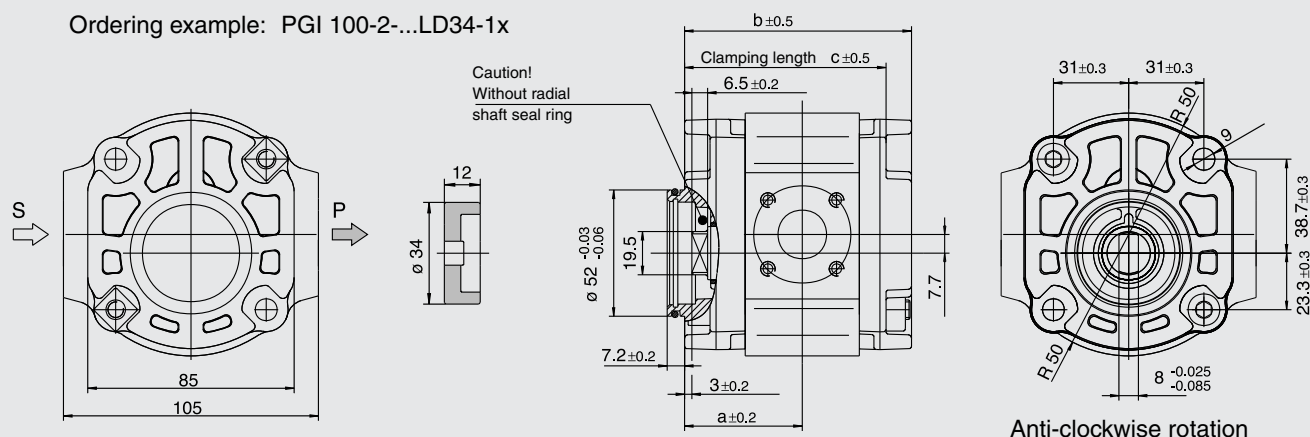
Size	a	b	c
005	43	82.5	72
006	44	84.5	74
008	45.5	87.5	77
011	48.5	93.5	83
013	51	98.5	88
016	53.5	103.5	93
019	57	110.5	100
022	60	116.5	106
025	63	122.5	112

Fixing screws:

2x M8 - ISO 4762 - 10.9 with flat washer ISO 7092
Torque: M = 25 +5 Nm

5.1.15 PGI100 with tang

Ordering example: PGI 100-2-...LD34-1x



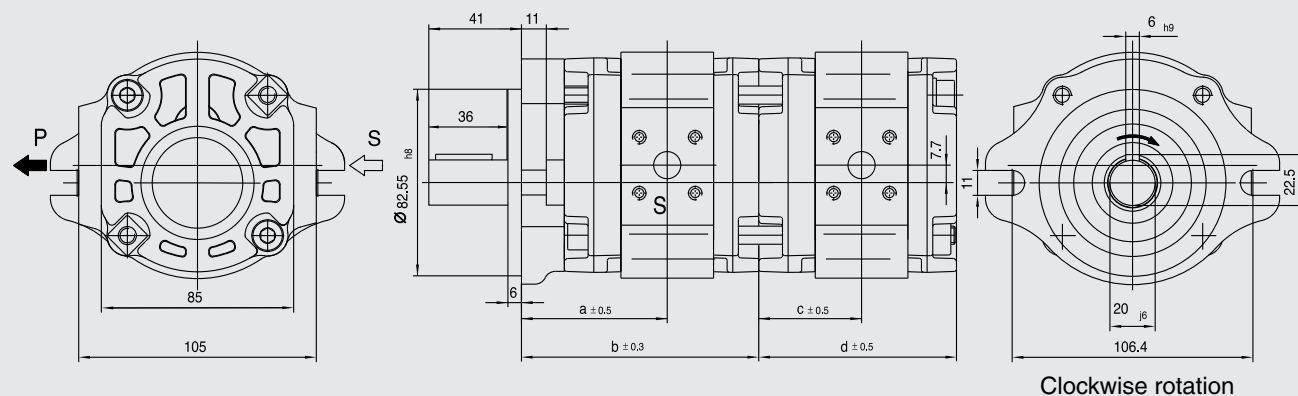
Size	a	b	c
005	43	82.5	72
006	44	84.5	74
008	45.5	87.5	77
011	48.5	93.5	83
013	51	98.5	88
016	53.5	103.5	93
019	57	110.5	100
022	60	116.5	106
025	63	122.5	112

Driver is supplied
Fixing screws:

2x M8 - ISO 4762 - 10.9 with flat washer ISO 7092
Torque: M = 25 +5 Nm

5.1.16 Double pump PGI100 with SAE A – flange and keyed shaft

Ordering example: PGI 100-2-...RK04-1x+
PGI 100-2-...RD34-1x



Size	a	b	c	d
005	62	100	43	82.5
006	63	102	44	84.5
008	64.5	105	45.5	87.5
011	67.5	111	48.5	93.5
013	70	116	51	98.5
016	72.5	121	53.5	103.5
019	76	128	57	110.5
022	79	134	60	116.5
025	82	140	63	122.5



5.2 MEDIUM HEAVY DUTY SERIES SIZE 3 CONTENTS

PGI101

Ordering Code	5.2.1 Medium Heavy Duty Series
Technical Information	5.2.2 Specifications 5.2.3 Hydraulic fluids 5.2.4 Viscosity range 5.2.5 Temperature range 5.2.6 Seals 5.2.7 Filtration 5.2.8 Installation notes 5.2.9 Multiple pump
Performance Data	5.2.10 PGI101
Dimensions	5.2.11 PGI101 with SAE B – 2-hole flange and parallel shaft with key 5.2.12 PGI101 with SAE B – 2-hole flange and splined shaft 5.2.13 Double pump PGI101-3 with SAE B – 2-hole flange and parallel shaft with key 5.2.14 Double pump PGI101-3 + PGI102-2 with SAE B – 2-hole flange and parallel shaft with key

ORDERING CODE

5.2.1 Medium Heavy Duty Series

PGI101 - 3 - 020 - R K 2 3 - 10 - XXXX

Medium Heavy Duty Series _____

Size _____

Displacement _____

020 20.0 cm³/rev
 025 24.8 cm³/rev
 032 32.1 cm³/rev
 040 40.1 cm³/rev
 050 50.3 cm³/rev
 064 64.4 cm³/rev

Shaft rotation (viewed from shaft end) _____

R Clockwise
 L Anti-clockwise

Shaft _____

A Parallel shaft with key (only PGI102-3-064)
 B Splined shaft SAE BB (PGI101-3-064 only)
 K Keyed shaft with through drive (not PGI101-3-064)
 L Splined shaft SAE BB with through drive (not PGI101-3-064)
 P Splined shaft with through drive (only on multiple pumps)

Mounting flange _____

2 SAE J744 101-2 B - Ø 101.6 mm
 3 Direct mounting (only on multiple pumps)

Ports _____

3 SAE flange
 0 Suction port sealed (only on multiple pumps)

Series _____

Modification number _____

XXXX Determined by manufacturer

TECHNICAL INFORMATION

5.2.2 Specifications

Pump size		020	025	032	040	050	064	
Geometric displacement		[cm³/rev]	20.0	24.8	32.1	40.1	50.3	64.4
Pressure	Rated	[bar]	250					
	Intermittent		280			220	190	
	Peak		320		300	280		
Drive speed	Min.	[rpm]	200			100		
	Max.		3600	3200	3000	2500	1800	
Approx. weight		[kg]	8.3	8.6	9.2	9.8	10.5	16.7

5.2.3 Hydraulic fluids

The pump series is designed for use with

HLP Hydraulic oil

Before using synthetic fluids, please contact HYDAC:

HEES, HETG Environmentally-friendly operating fluids

HFC Water glycol

HFD-U Fire-resistant fluids based on polyolester

HFD-R Fire-resistant fluids based on phosphate ester

5.2.4 Viscosity range

	cSt (mm ² /s)
Minimum viscosity:	10
Normal operating viscosity:	10 - 300
Maximum viscosity:	2,000

5.2.5 Temperature range

Temperature range

-20 to 100 °C

Maximum ambient temperature

-40 to 80 °C

Maximum fluid temperature

-40 to 120 °C

5.2.6 Seals

The pump series is equipped with FPM (Viton) seals.

Before using synthetic fluids, please contact HYDAC.

5.2.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class:

20/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

To ensure a longer service life, cleanliness class:

18/16/13 to ISO 4406:1999

or

Class 9 to NAS 1638.

5.2.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure: 0.8 bar abs.

Maximum suction pressure: 2.0 bar abs.

- When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

C. Drive

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment of the shafts is 0.2 mm and the angular deviation must be less than 0.2°.

5.2.9 Multiple pumps

Internal gear pumps in the PGI101 series can be combined to form double or triple gear pumps (for larger units please contact HYDAC). The performance characteristics for single pumps generally apply but the following points must be taken into consideration:

- It is recommended that the pump with the largest load be placed on the drive side.
- The maximum drive speed of the multiple pump is limited to the lowest speed of the single pumps.
- The maximum drive and through drive torques must be checked for each stage.
- The torques generated by the pump unit can be calculated using the following formula:

$$M_{\max} = \frac{\Delta p_1 \cdot V_1}{20 \cdot \pi \cdot \eta_{mh}} + \frac{\Delta p_2 \cdot V_2}{20 \cdot \pi \cdot \eta_{mh}} + \frac{\Delta p_3 \cdot V_3}{20 \cdot \pi \cdot \eta_{mh}}$$

Maximum drive and through drive torques

Displacement	Drive torque		Through drive torque	
	Rated	Max.	Rated	Max.
020 – 050	325 Nm	400 Nm	230 Nm	240 Nm

- Common suction port, separate drain ports
- There is no sealing between the individual pump stages
- PGI101 and PGI102 can be combined to form multiple units.

If a double internal gear pump combination is installed vertically in V1 arrangement and there is no guarantee that the primary stage is completely submerged in the oil in the tank under all operating conditions, we recommend that only the suction port of the primary stage is used to supply the oil to the double internal gear pump combination.

In this case the common suction port of the double internal gear pump combination and the suction port of the secondary stage must be plugged.

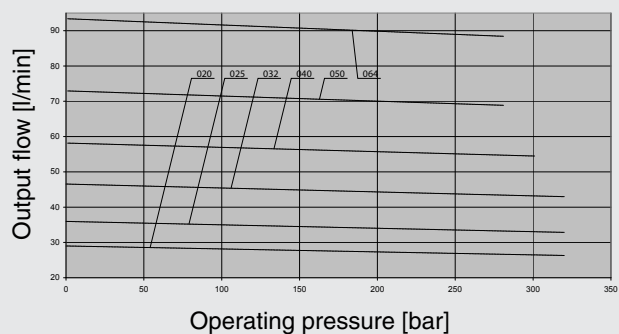
In addition, the suction port of the primary stage must be fitted with an anti-siphon to ensure the fluid remains in the double internal gear pump combination after a lengthy stoppage.

For triple and multiple internal gear pump combinations, please contact HYDAC.

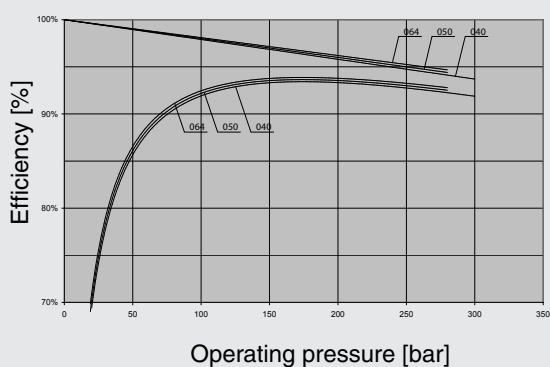
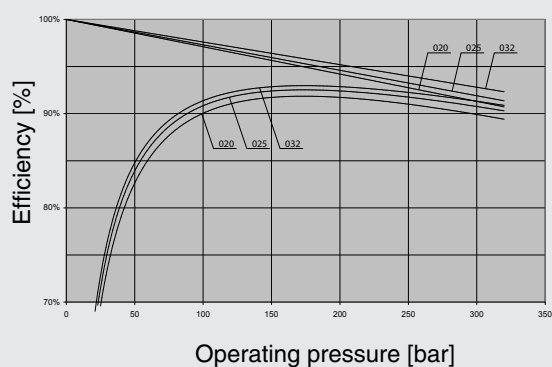
PERFORMANCE DATA

5.2.10 PG1101

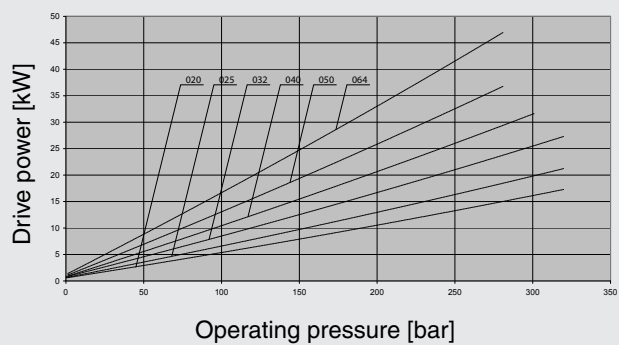
Output flow



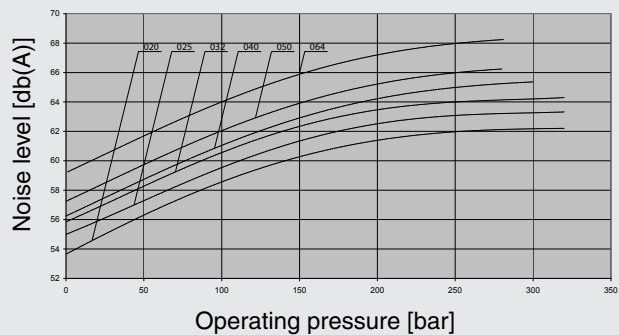
Efficiency



Drive power



Noise level



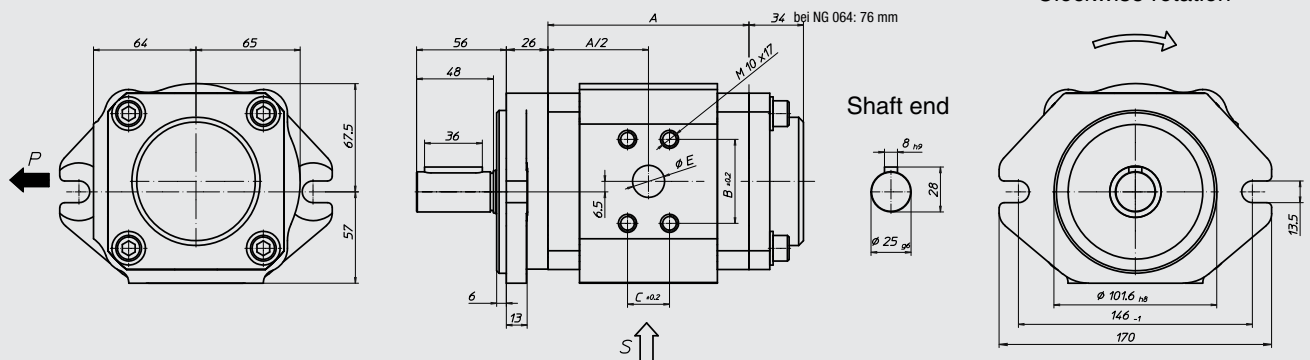
Measurement conditions:

Drive speed 1450 rpm, viscosity 46 mm²/sec, operating temperature 40 °C
Acoustic pressure measured in an anechoic room to DIN 45 635 Sheet 26;
Microphone distance 1.0 m axial.

DIMENSIONS

5.2.11 PGI101 with SAE B – 2-hole flange and parallel shaft with key

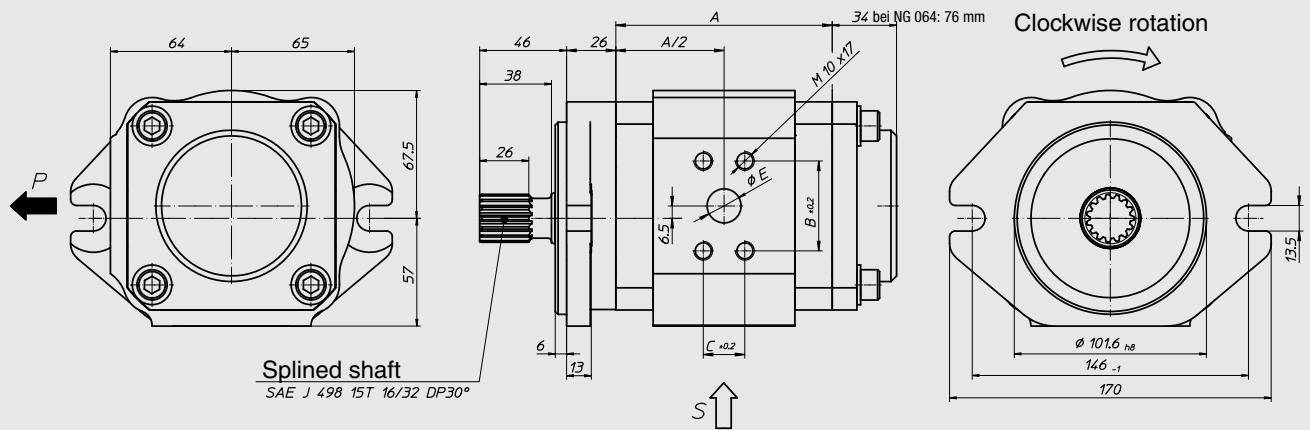
Ordering example: PGI101-3-...RK23-1x



Size	A	B	C	E
020	97.9	47.5	22	18
025	104.4	47.5	22	18
032	114.4	47.5	22	18
040	125.4	52.4	26.2	20
050	139.4	52.4	26.2	20
064	139.4	52.4	26.2	20

5.2.12 PGI101 with SAE B – 2-hole flange and splined shaft

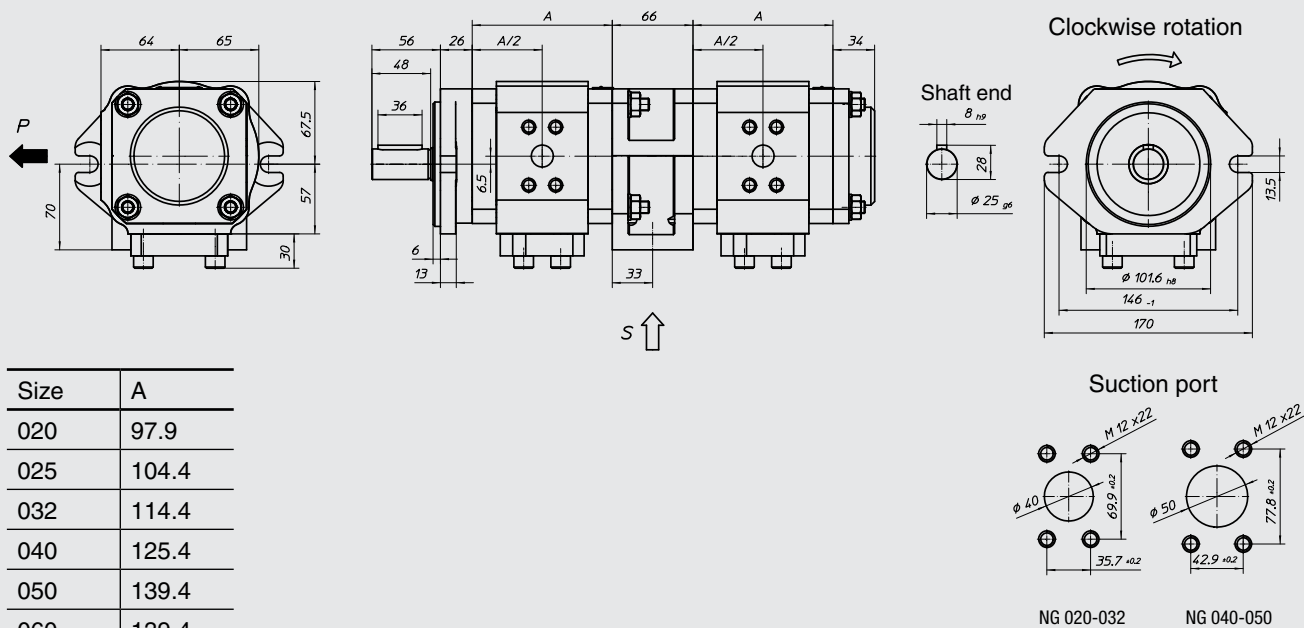
Ordering example: PGI101-3-...RK23-1x



Size	A	B	C	E
020	97.9	47.5	22	18
025	104.4	47.5	22	18
032	114.4	47.5	22	18
040	125.4	52.4	26.2	20
050	139.4	52.4	26.2	20
064	139.4	52.4	26.2	20

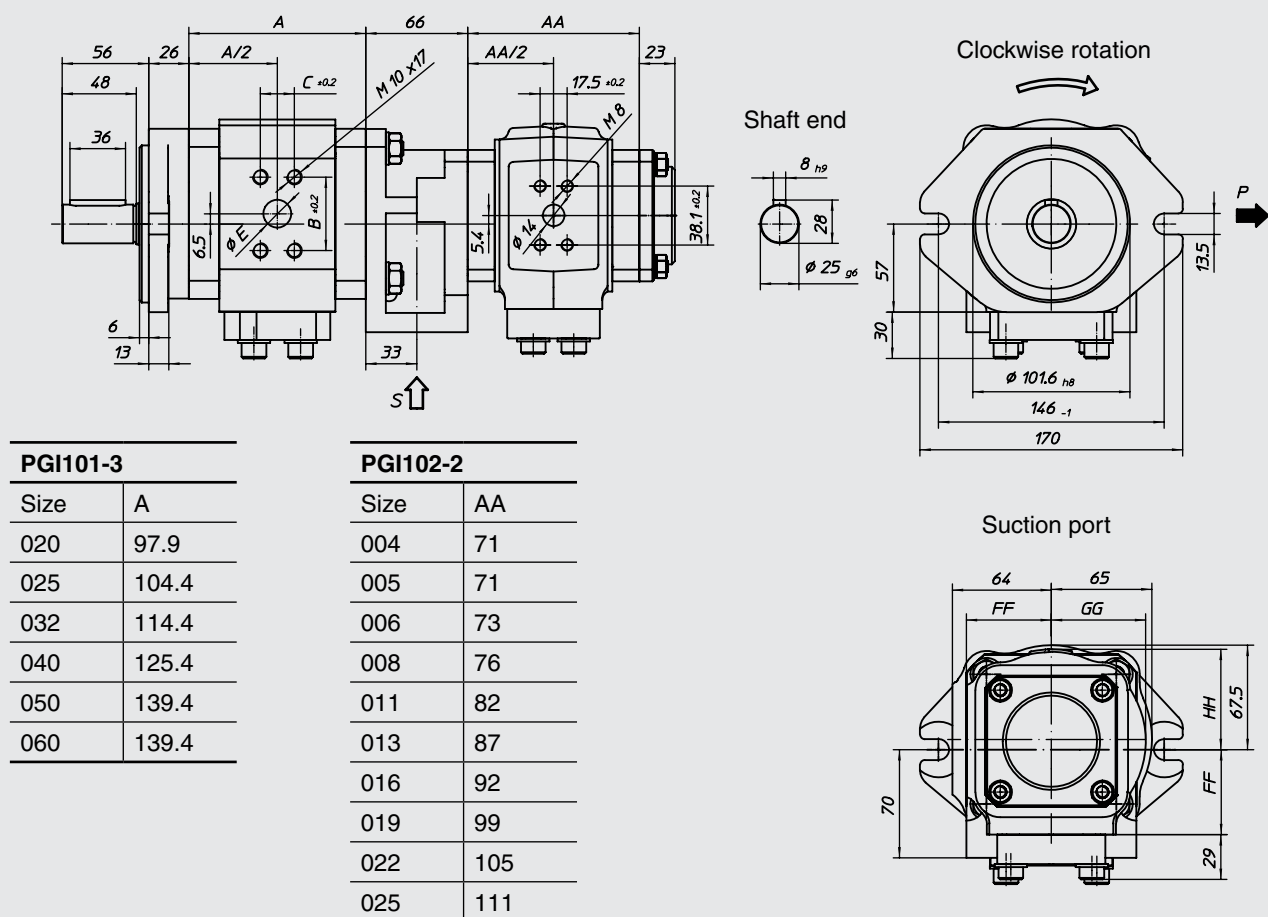
5.2.13 PGI101-3 Double pump with SAE B – 2-hole flange and parallel shaft with key

Ordering example: PGI101-3-...RK20-1x +
PGI101-3-...RP30-1x



5.2.14 PGI101-3 + PGI102-2 with SAE B – 2-hole flange and parallel shaft with key

Ordering example: PGI101-3-...RK20-1x +
PGI102-2-...RP30-1x





5.3 HEAVY DUTY SERIES SIZE 2/3/6

CONTENTS

PGI102

Ordering Code	5.3.1 Heavy Duty Series
Technical Information	5.3.2 Specifications 5.3.3 Hydraulic fluids 5.3.4 Viscosity range 5.3.5 Temperature range 5.3.6 Seals 5.3.7 Filtration 5.3.8 Installation notes 5.3.9 Multiple pumps
Performance Data	5.3.10 PGI102
Dimensions	5.3.11 PGI102-2 5.3.12 PGI102-3 5.3.13 PGI102-6 5.3.14 Double pump PGI102-2 + PGI102-2 5.3.15 Double pump PGI102-3 + PGI102-3 Double pump PGI102-2 + PGI102-2 5.3.16 Double pump PGI102-6 + PGI102-6 Double pump PGI102-6 + PGI102-3 Double pump PGI102-6 + PGI102-2

ORDERING CODE

5.3.1 Heavy Duty Series

PGI102 - 2 - 004 - R K 0 3 - 10 - XXXX

Heavy Duty Series

Size

Displacement

PGI102-2-		PGI102-3-		PGI102-6-	
004	3.8 cm ³ /rev	014	14.6 cm ³ /rev	040	40.8 cm ³ /rev
005	5.4 cm ³ /rev	016	16.0 cm ³ /rev	050	50.6 cm ³ /rev
006	6.4 cm ³ /rev	020	20.0 cm ³ /rev	064	65.3 cm ³ /rev
008	7.9 cm ³ /rev	025	24.8 cm ³ /rev	080	80.0 cm ³ /rev
011	10.9 cm ³ /rev	032	32.1 cm ³ /rev	100	101.2 cm ³ /rev
013	13.3 cm ³ /rev	040	40.1 cm ³ /rev	125	125.7 cm ³ /rev
016	15.8 cm ³ /rev	050	50.3 cm ³ /rev	160	160.1 cm ³ /rev
019	19.3 cm ³ /rev	064	64.6 cm ³ /rev	200	200.9 cm ³ /rev
022	22.2 cm ³ /rev			250	249.9 cm ³ /rev
025	25.2 cm ³ /rev				

Shaft rotation (viewed from shaft end)

- R Clockwise
- L Anti-clockwise

Shaft

- A Parallel shaft with key (only PGI102-3-064)
- K Keyed shaft with through drive (not PGI102-3-064)
- P Splined shaft with through drive (only for multiple pumps)

Mounting flange

- 0 SAE J744 82-2 A - Ø 82.55 mm (size 2)
- 2 SAE J744 101-2 B - Ø 101.6 mm (size 3)
- SAE J744 152-2 D - Ø 152.4 mm (size 6)
- 3 Direct mounting (only on multiple pumps)
- 5 VDMA (on request)

Ports

- 3 SAE flange
- 0 Suction port sealed (only on multiple pumps)

Series

Modification number

- XXXX Determined by manufacturer

TECHNICAL INFORMATION

5.3.2 Specifications

Pump size			PGI102-2-									
			004	005	006	008	011	013	016	019	022	025
Geometric displacement		[cm³/rev]	3.8	5.4	6.4	7.9	10.9	13.3	15.8	19.3	22.2	25.2
Pressure	Rated	[bar]	330							300	250	250
	Intermittent		350							300		280
	Peak		400							325		300
Drive speed	Min.	[rpm]	400									
	Max.		4000			3600				3000		
Approx. weight		[kg]	4.9	4.9	5.0	5.2	5.4	5.5	5.7	6.1	6.3	6.5

Pump size			PGI102-3-							
			014	016	020	025	032	040	050	064
Geometric displacement		[cm³/rev]	14.6	16.0	20.0	24.8	32.1	40.1	50.3	64.6
Pressure	Rated	[bar]	330					280		
	Intermittent		350					300		
	Peak		400					325		
Drive speed	Min.	[rpm]	400							
	Max.		3600		2800			2200	1800	
Approx. weight		[kg]	13.1	13.2	13.4	13.5	13.7	16.4	17.5	19.5

Pump size			PGI102-6-								
			040	050	064	080	100	125	160	200	250
Geometric displacement		[cm³/rev]	40.8	50.6	65.3	80.0	101.2	125.7	160.1	200.9	249.9
Pressure	Rated	[bar]	330		315	300		280		150	
	Intermittent		340		330			300		150	
	Peak		350		340			320		165	
Drive speed	Min.	[rpm]	400								
	Max.		2200			2000			1800		
Approx. weight		[kg]	23	25	28	31	36	41.5	49	58	69

5.3.3 Hydraulic fluids

The pump series is designed for use with

HLP Hydraulic oil

Before using synthetic fluids, please contact HYDAC:

HEES, HETG Environmentally-friendly operating fluids

HFC Water glycol

HFD-U Fire-resistant fluids based on polyolester

HFD-R Fire-resistant fluids based on phosphate ester

5.3.4 Viscosity range

	cSt (mm ² /s)
Minimum viscosity:	10
Normal operating viscosity:	10 - 300
Maximum viscosity:	2,000

5.3.5 Temperature range

Temperature range

-20 to 100 °C

Maximum ambient temperature

-40 to 80 °C

Maximum fluid temperature

-40 to 120 °C

Before using synthetic fluids, please contact HYDAC.

5.3.6 Seals

The pump series is equipped with FPM (Viton) seals. Before using synthetic fluids, please contact HYDAC.

5.3.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class:

20/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

To ensure a longer service life, cleanliness class:

18/16/13 to ISO 4406:1999

or

Class 9 to NAS 1638.

5.3.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure: 0.8 bar abs.

Maximum suction pressure: 2.0 bar abs.

- When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages..

C. Drive

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment of the shafts is 0.2 mm and the angular deviation must be less than 0.2°.

5.3.9 Multiple pumps

Internal gear pumps in the PGI102 series can be combined to form double or triple gear pumps (for larger units please contact HYDAC). The performance characteristics for single pumps generally applies but the following points must be taken into consideration:

- It is recommended that the pump with the largest load be placed on the drive side.
- The maximum drive speed of the multiple pump is limited to the lowest speed of the individual pumps.
- The maximum drive and through drive torques must be checked for each stage.
- The torques generated by the pump unit can be calculated using the following formula:

$$M_{\max} = \frac{\Delta p_1 \cdot V_1}{20 \cdot \pi \cdot \eta_{\text{mh}}} + \frac{\Delta p_2 \cdot V_2}{20 \cdot \pi \cdot \eta_{\text{mh}}} + \frac{\Delta p_3 \cdot V_3}{20 \cdot \pi \cdot \eta_{\text{mh}}}$$

Maximum drive and through drive torques

Size	Drive torque		Through drive torque	
	Rated	Max.	Rated	Max.
2	160 Nm	200 Nm	120 Nm	130 Nm
3	325 Nm	400 Nm	230 Nm	240 Nm
6	1100 Nm	1300 Nm	850 Nm	900 Nm

- Common suction port, separate drain ports
- There is no sealing between the individual pump stages
- PGI101 and PGI102 can be combined to form multiple units.

If a double internal gear pump combination is installed vertically in V1 arrangement and there is no guarantee that the primary stage is completely submerged in the oil in the tank under all operating conditions, we recommend that only the suction port of the primary stage is used to supply the oil to the double internal gear pump combination.

In this case the common suction port of the double internal gear pump combination and the suction port of the secondary stage must be plugged.

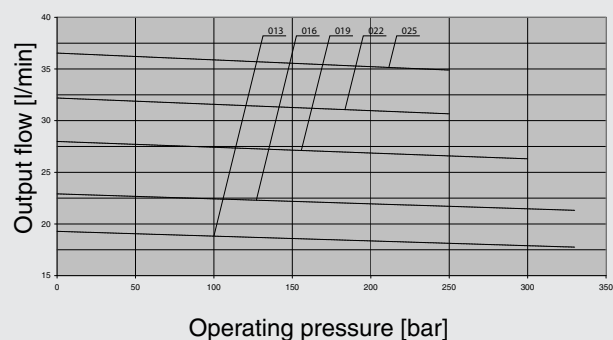
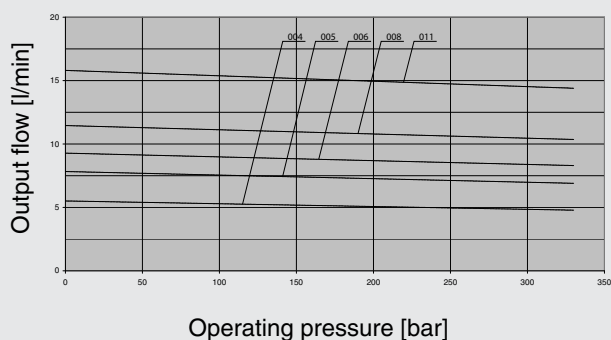
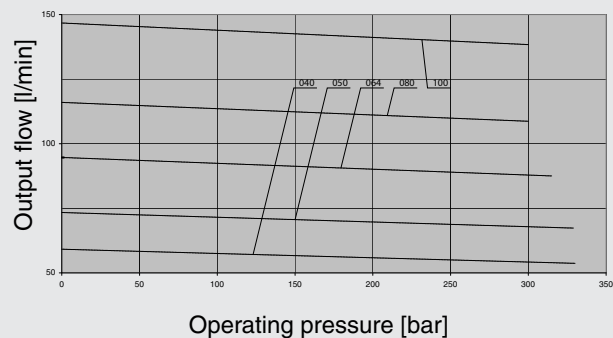
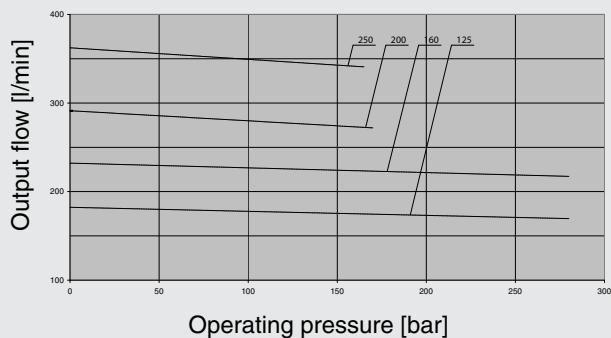
In addition, the suction port of the primary stage must be fitted with an anti-siphon to ensure the fluid remains in the double internal gear pump combination after a lengthy stoppage.

For triple and multiple internal gear pump combinations, please contact HYDAC.

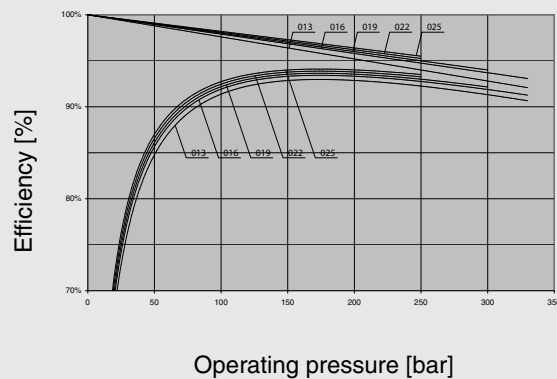
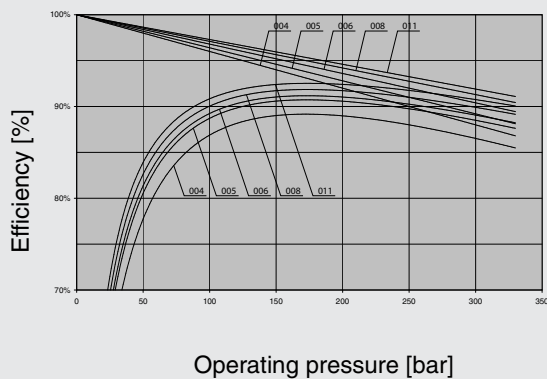
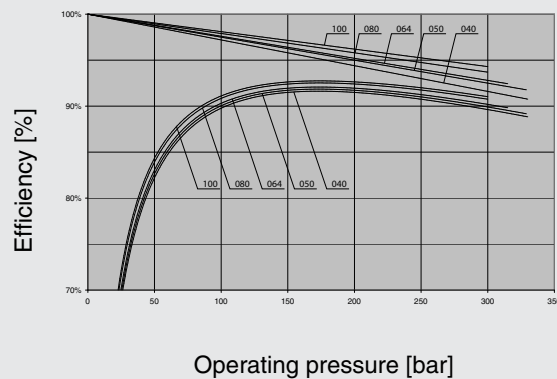
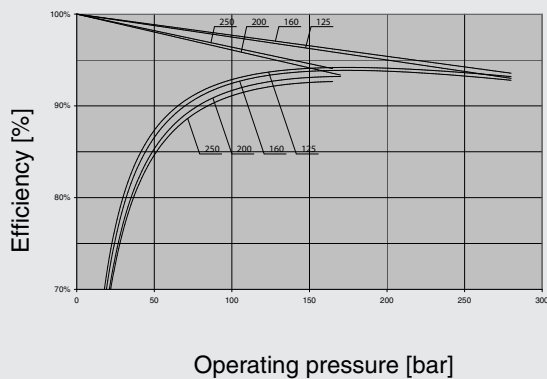
PERFORMANCE DATA

5.3.10 PGI102

Output flow

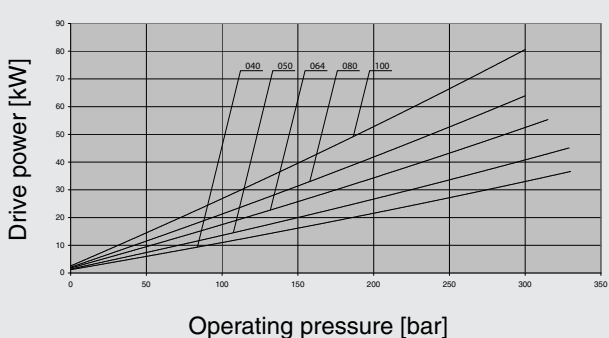
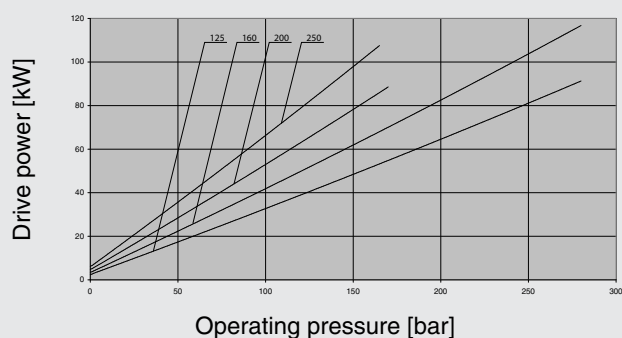
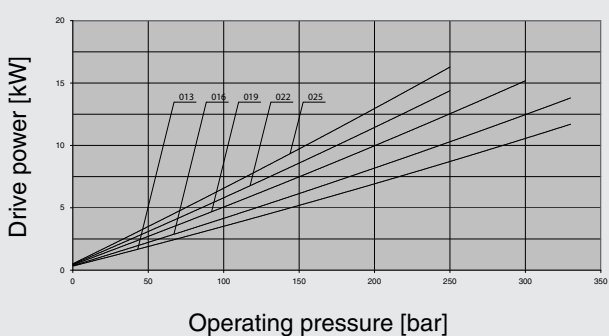
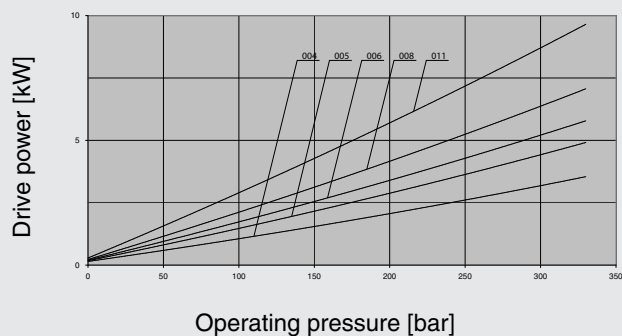
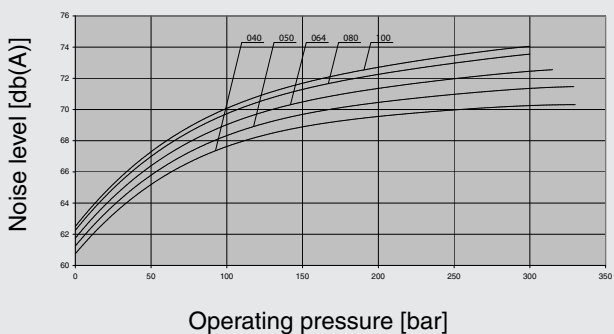
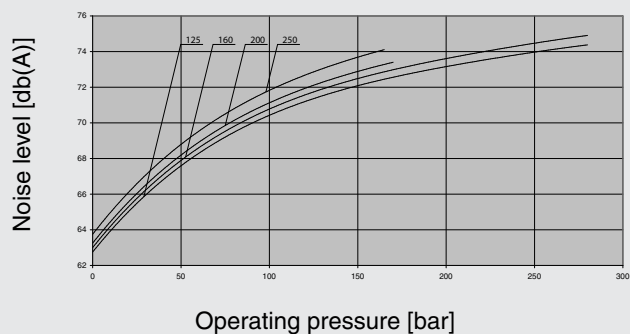
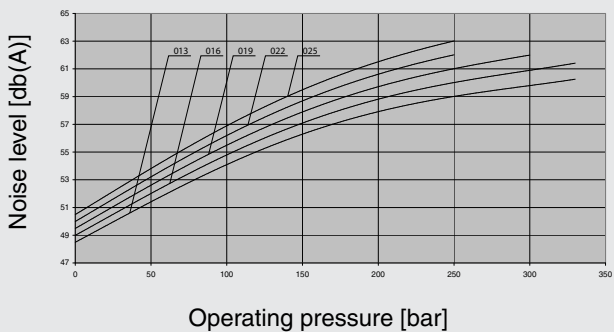
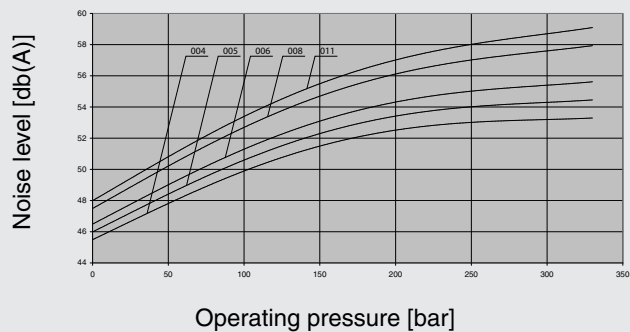


Efficiency



Measurement conditions:

Drive speed 1450 rpm, viscosity 46 mm²/sec, operating temperature 40 °C
Acoustic pressure measured in an anechoic room to DIN 45 635 Sheet 26;
Microphone distance 1.0 m axial.

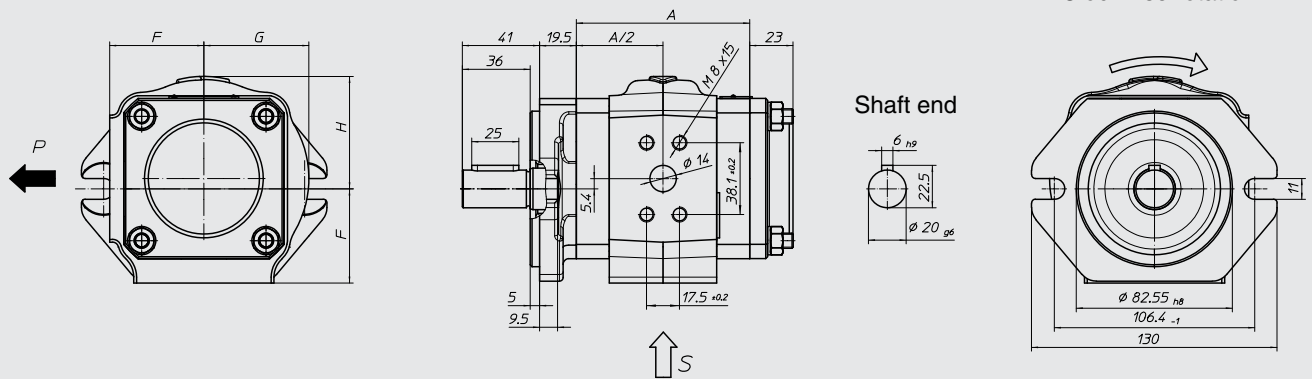
Drive power**Noise level****Measurement conditions:**

Drive speed 1450 rpm, viscosity 46 mm²/sec, operating temperature 40 °C
 Acoustic pressure measured in an anechoic room to DIN 45 635 Sheet 26;
 Microphone distance 1.0 m axial.

DIMENSIONS

5.3.11 PGI102-2

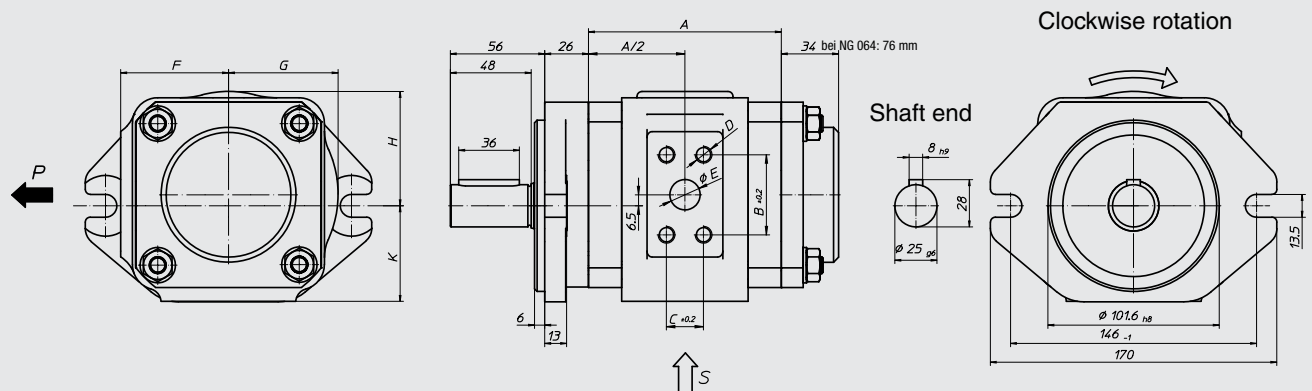
Ordering example: PGI 102-2-...RK03-1x



Size	A	F	G	H	L	M	N	O
004	71	50	54	57	38.1	17.5	14	M8 x 15
005	71	50	54	57	38.1	17.5	14	M8 x 15
006	73	50	54	57	47.5	22.0	19	M10 x 16
008	76	50	54	57	47.5	22.0	19	M10 x 16
011	82	50	54	57	52.4	26.2	25	M10 x 17
013	87	50	54	57	52.4	26.2	25	M10 x 17
016	92	50	54	57	52.4	26.2	25	M10 x 17
019	99	55	59	62	52.4	26.2	25	M10 x 17
022	105	55	59	62	52.4	26.2	25	M10 x 17
025	111	55	59	62	52.4	26.2	25	M10 x 17

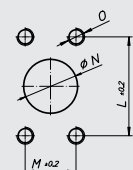
5.3.12 PGI102-3

Ordering example: PGI 102-3-...RK23-1x



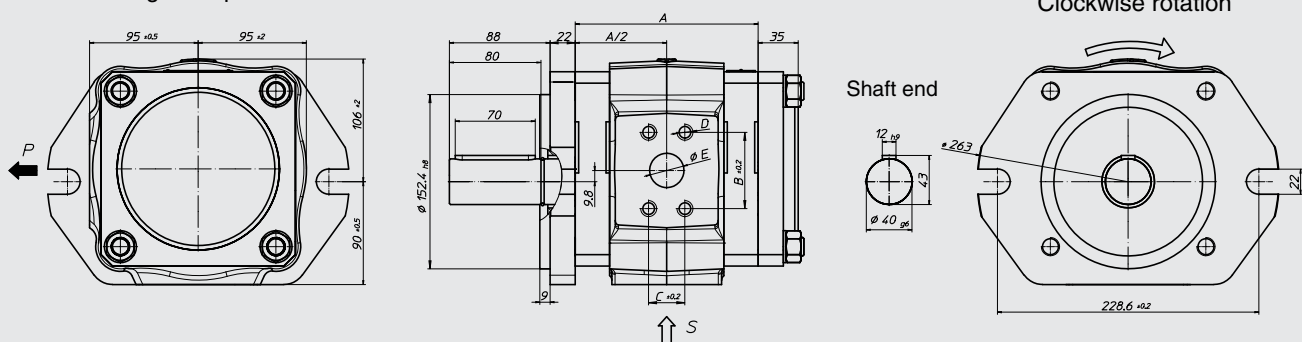
Size	A	B	C	D	E	F	G	H	K	L	M	N	O
014	90.4	38.1	17.5	M8 x 15	14	64	65	67	57	52.4	26.2	25	M10 x 17
016	92.4	38.1	17.5	M8 x 15	14	64	65	67	57	52.4	26.2	25	M10 x 17
020	97.9	47.5	22	M10 x 17	18	64	65	67	57	58.7	30.2	32	M10 x 17
025	104.4	47.5	22	M10 x 17	18	64	65	67	57	58.7	30.2	32	M10 x 17
032	114.4	47.5	22	M10 x 17	18	64	65	67	57	58.7	30.2	32	M10 x 17
040	125.4	52.4	26.2	M10 x 17	20	70	73	79	63	58.7	30.2	32	M10 x 20
050	139.4	52.4	26.2	M10 x 17	20	70	73	79	63	58.7	30.2	32	M10 x 20
064	139.4	52.4	26.2	M10 x 17	20	70	73	79	63	58.7	30.2	32	M10 x 20

Suction port



5.3.13 PGI102-6

Ordering example: PGI102-6-...RK23-1x



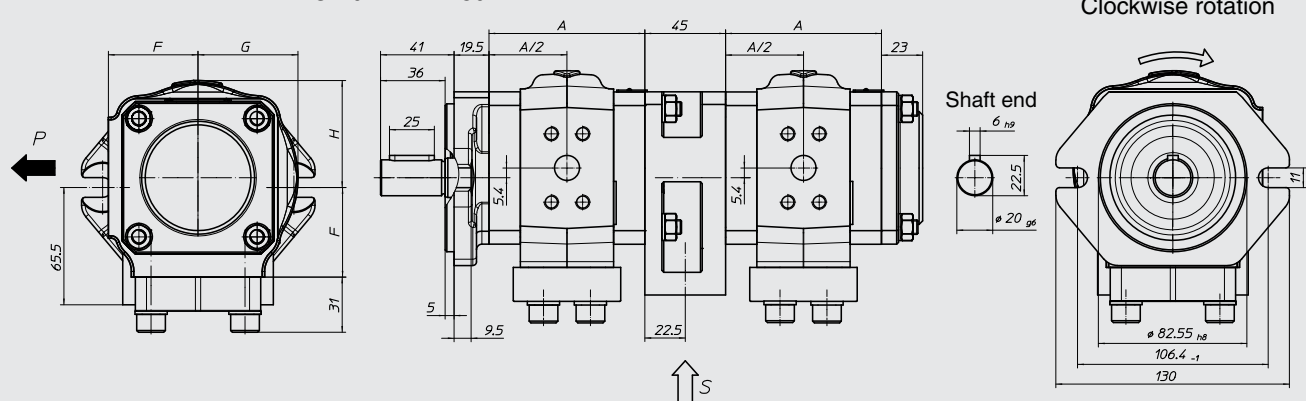
Size	A	B	C	D	E	L	M	N	O
040	123	57.2*	27.8*	M12 x 22	20	69.9	35.7	35	M12 x 25
050	129	57.2*	27.8*	M12 x 22	20	69.9	35.7	40	M12 x 25
064	138	57.2*	27.8*	M12 x 22	20	69.9	35.7	40	M12 x 25
080	147	66.7*	31.8*	M14 x 25	30	77.8	42.9	50	M12 x 25
100	160	66.7*	31.8*	M14 x 25	30	77.8	42.9	50	M12 x 25
125	175	66.7*	31.8*	M14 x 25	30	77.8	42.9	50	M12 x 25
160	196	66.7*	31.8*	M14 x 25	30	88.9	50.8	65	M12 x 25
200	221	79.4*	36.5*	M16 x 28	38	106.4	61.9	76	M16 x 25
250	251	79.4*	36.5*	M16 x 28	38	106.4	61.9	76	M16 x 25

* Discharge port: SAE 518C, High pressure range (code 62)

5.3.14 Double pump PGI102-2 + PGI102-2

Ordering example: PGI102-2-...RK00-1x+

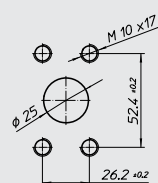
PGI102-2-...RP30-1x



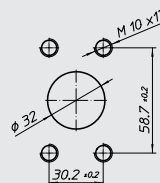
Size	A	F	G	H
004	71	50	54	57
005	71	50	54	57
006	73	50	54	57
008	76	50	54	57
011	82	50	54	57
013	87	50	54	57
016	92	50	54	57
019	99	55	59	62
022	105	55	59	62
025	111	55	59	62

For discharge port see single pump

Suction port NG 004-016

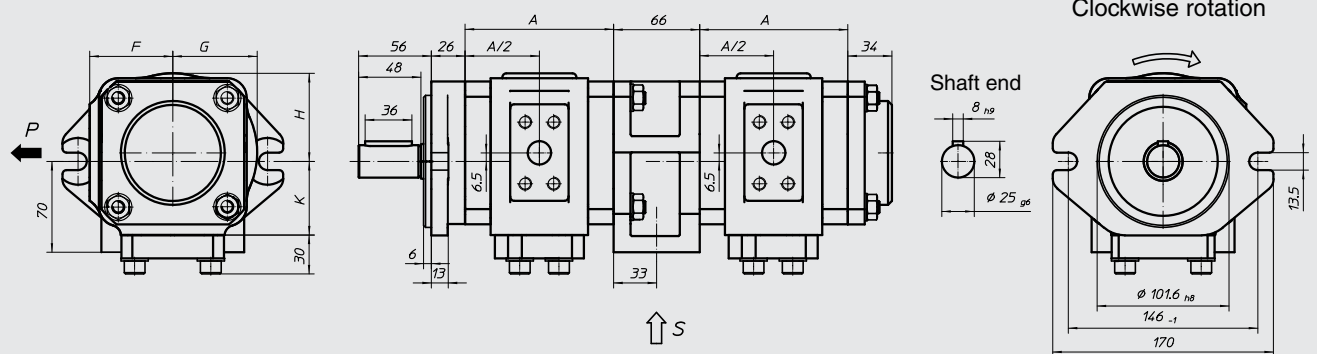


Suction port NG 019-025



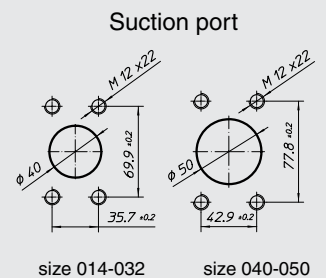
5.3.15 Double pump PGI102-3 + PGI102-3

Ordering example: PGI102-3-...RK20-1x+
PGI102-3-...RP30-1x



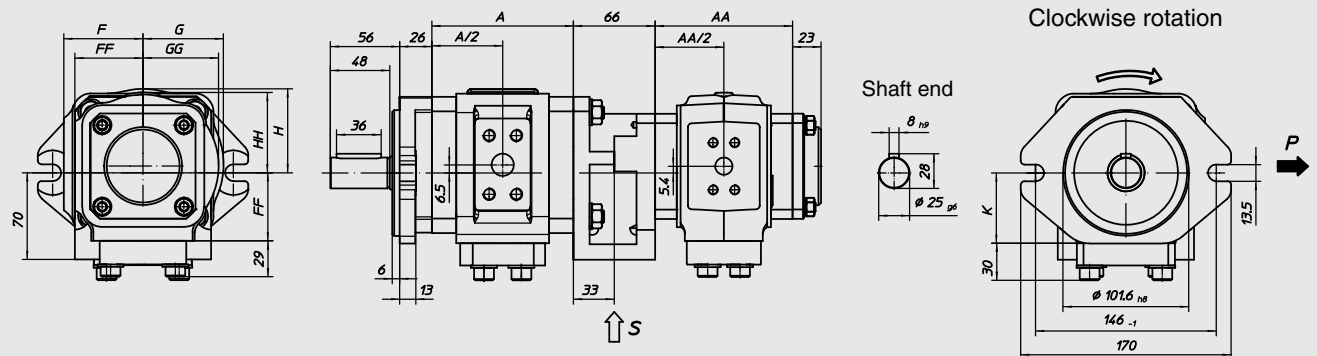
Size	A	F	G	H	K
014	90.4	64	65	67	57
016	92.4	64	65	67	57
020	97.9	64	65	67	57
025	104.4	64	65	67	57
032	114.4	64	65	67	57
040	125.4	70	73	79	63
050	139.4	70	73	79	63

For discharge port see single pump



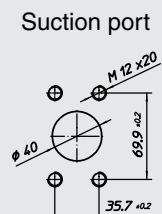
Double pump PGI102-3 + PGI102-2

Ordering example: PGI102-3-...RK20-1x +
PGI102-2-...RP30-1x



Size	A	F	G	H	K
014	90.4	64	65	67	57
016	92.4	64	65	67	57
020	97.9	64	65	67	57
025	104.4	64	65	67	57
032	114.4	64	65	67	57
040	125.4	70	73	79	63
050	139.4	70	73	79	63

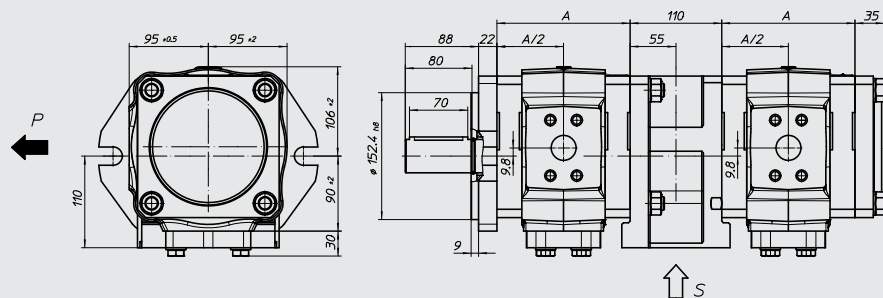
Size	AA	FF	GG	HH
004	71	50	54	57
005	71	50	54	57
006	73	50	54	57
008	76	50	54	57
011	82	50	54	57
013	87	50	54	57
016	92	50	54	57
019	99	55	59	62
022	105	55	59	62
025	111	55	59	62



For discharge port see single pump

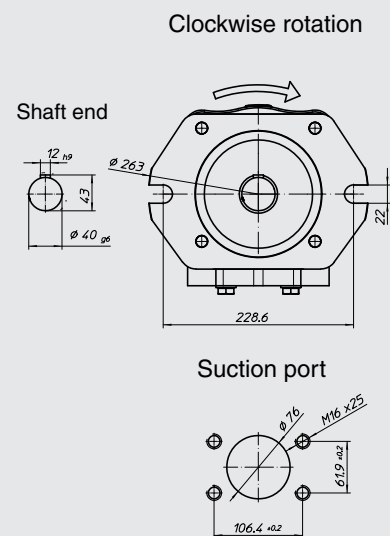
5.3.16 Double pump PGI102-6 + PGI102-6

Ordering example: PGI102-6-...RK20-1x+
PGI102-6-...RP30-1x



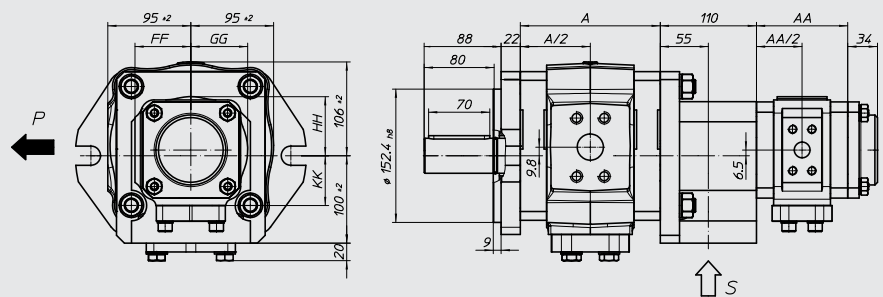
Size	A
040	123
050	129
064	138
080	147
100	160
125	175
160	196
200	221
250	251

For discharge port see single pump



Double pump PGI102-6 + PGI102-3

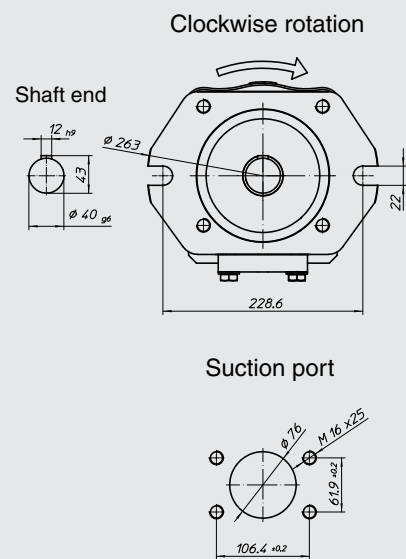
Ordering example: PGI102-6-...RK20-1x +
PGI102-3-...RP30-1x



Size	A
040	123
050	129
064	138
080	147
100	160
125	175
160	196
200	221
250	251

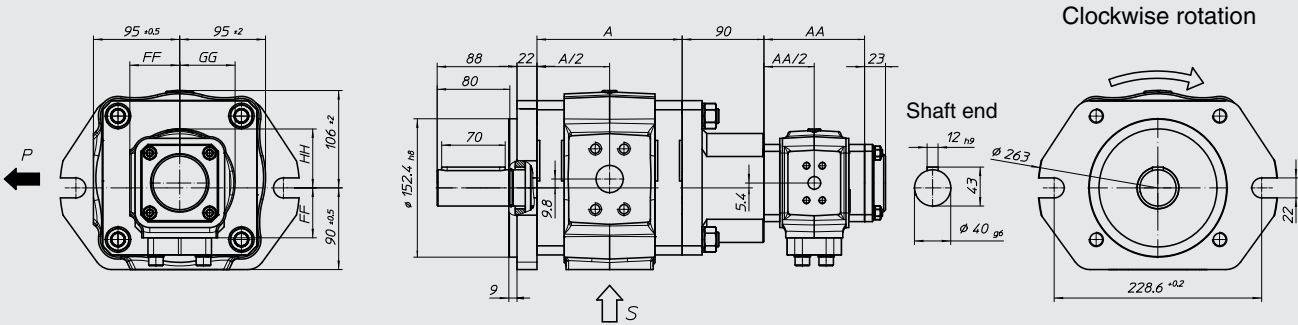
For discharge port see single pump

Size	AA	FF	GG	HH	KK
014	90.4	64	65	67	57
016	92.4	64	65	67	57
020	97.9	64	65	67	57
025	104.4	64	65	67	57
032	114.4	64	65	67	57
040	125.4	70	73	79	63
050	139.4	70	73	79	63



Double pump PGI102-6 + PGI102-2

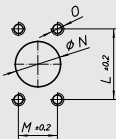
Ordering example: PGI102-6-...RK23-1x +
PGI102-2-...RP30-1x



Size	A	L	M	N	O
040	123	69.9	35.7	35	M12 x 25
050	129	69.9	35.7	40	M12 x 25
064	138	69.9	35.7	40	M12 x 25
080	147	77.8	42.9	50	M12 x 25
100	160	77.8	42.9	50	M12 x 25
125	175	77.8	42.9	50	M12 x 25
160	196	88.9	50.8	65	M12 x 25
200	221	106.4	61.9	76	M16 x 25
250	251	106.4	61.9	76	M16 x 25

Size	AA	FF	GG	HH
004	71	50	54	57
005	71	50	54	57
006	73	50	54	57
008	76	50	54	57
011	82	50	54	57
013	87	50	54	57
016	92	50	54	57
019	99	55	59	62
022	105	55	59	62
025	111	55	59	62

Suction port



For discharge port see single pump



5.4 MEDIUM HEAVY DUTY SERIES SIZE 5/6 CONTENTS

PGI103

Ordering Code	5.4.1 Medium Heavy Duty Series
Technical Information	5.4.2 Specifications 5.4.3 Hydraulic fluids 5.4.4 Viscosity range 5.4.5 Temperature range 5.4.6 Seals 5.4.7 Filtration 5.4.8 Installation notes
Performance Data	5.4.9 PGI103-6
Dimensions	5.4.10 PGI103-5 with SAE C – 2-hole flange and parallel shaft with key 5.4.11 PGI103-5 with SAE C – 2-hole flange and splined shaft

ORDERING CODE

5.4.1 Medium Heavy Duty Series

PGI103 - 5 - 064 - R A 2 3 - 10 - XXXX

Medium Heavy Duty Series _____

Size _____

Displacement _____

PGI103-5-		PGI103-6-	
064	65.3 cm³/rev	125	125.7 cm³/rev
080	80.4 cm³/rev	160	160.1 cm³/rev
100	100.5 cm³/rev	200	200.9 cm³/rev
		250	249.9 cm³/rev

Shaft rotation (viewed from shaft end) _____

R Clockwise
L Anti-clockwise

Shaft _____

A Parallel shaft with key
B Splined shaft SAE C

Mounting flange _____

2 SAE J744 127-2 C - Ø 127 mm (size 5)
SAE J744 152-2 D - Ø 152.4 mm (size 6)

Ports _____

3 SAE flange

Series _____

Modification number _____

XXXX Determined by manufacturer

TECHNICAL INFORMATION

5.4.2 Specifications

Pump size		PGI103-5		
		064	080	100
Geometric displacement	[cm³/rev]	65.3	80.4	100.5
Pressure	Rated	210		
	Intermittent	230		
	Peak	250		
Drive speed	min.	100		
	max.	3000	3000	2500
Approx. weight	[kg]	11.2	13	13.5

Pump size		PGI103-6			
		125	160	200	250
Geometric displacement	[cm³/rev]	125.7	160.1	200.9	249.9
Pressure	Rated	250		160	150
	Intermittent	280		170	150
	Peak	300		180	160
Drive speed	min.	400			
	max.	2200	2000	2200	
Approx. weight	[kg]	27.3	29.9	35.5	37

5.4.3 Hydraulic fluids

The pump series is designed for use with

HLP Hydraulic oil

Before using synthetic fluids, please contact HYDAC:

HEES, HETG Environmentally-friendly fluids

HFC Water glycol

HFD-U Fire-resistant fluids based on polyolester

HFD-R Fire-resistant fluids based on phosphate ester

5.4.4 Viscosity range

	cSt (mm ² /s)
Minimum viscosity:	10
Normal operating viscosity:	10 - 300
Maximum viscosity:	2,000

5.4.5 Temperature range

Temperature range

-20 to 100 °C

Maximum ambient temperature

-40 to 80 °C

Maximum fluid temperature

-40 to 120 °C

5.4.6 Seals

The pump series is equipped with FPM (Viton) seals as standard.

Before using synthetic fluids, please contact HYDAC.

5.4.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class:

20/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

To ensure a longer service life, cleanliness class:

18/16/13 to ISO 4406:1999

or

Class 9 to NAS 1638.

5.4.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure: 0.8 bar abs.

Maximum suction pressure: 2.0 bar abs.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

C. Drive

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment is 0.2 mm and the angular deviation must be less than 0.2°.

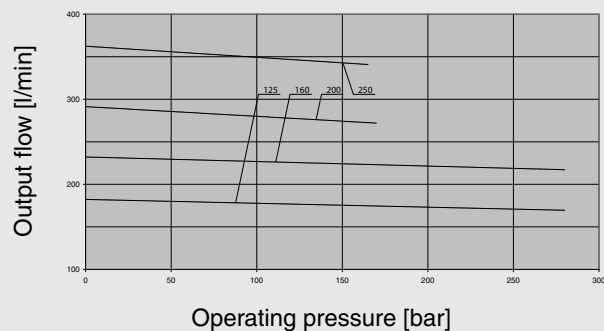
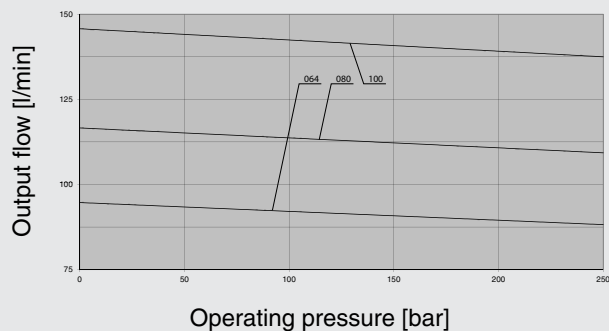
Max. drive torques

Displacement	Drive torque	
	Rated	Max.
064 - 100	720 Nm	900 Nm
125 - 250	1100 Nm	1300 Nm

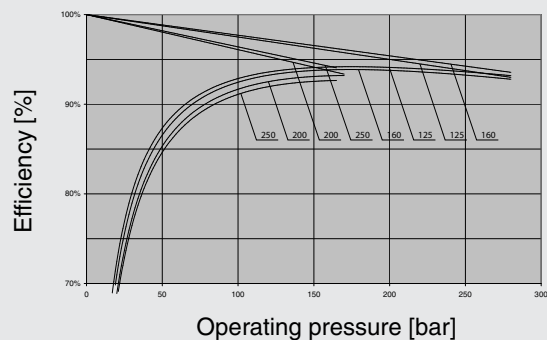
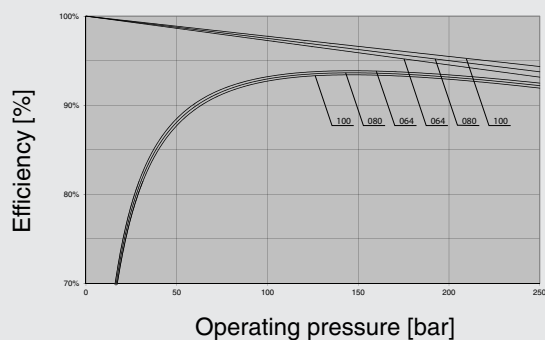
PERFORMANCE DATA

5.4.9 PG103

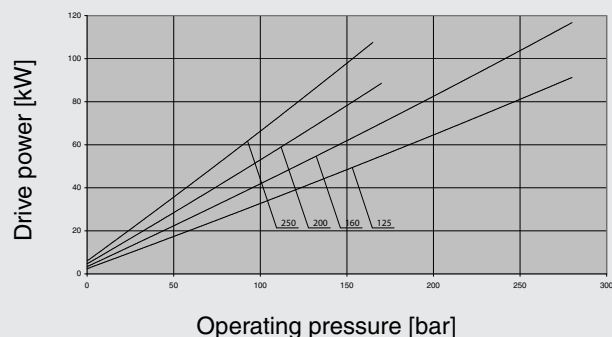
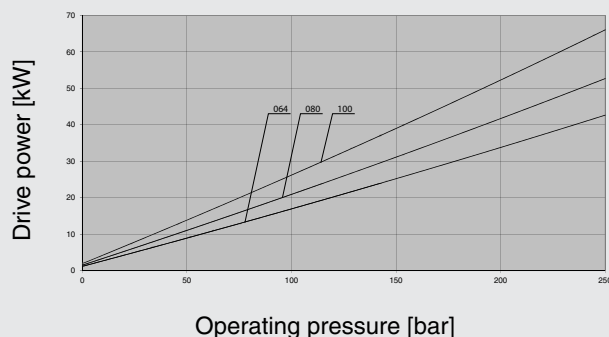
Output flow



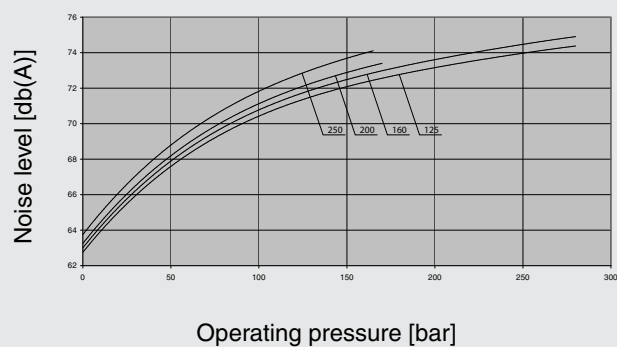
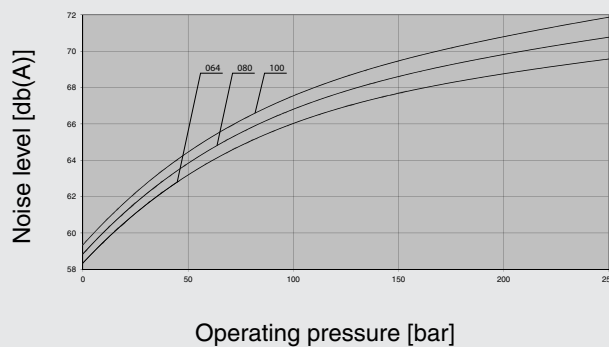
Efficiency



Drive power



Noise level



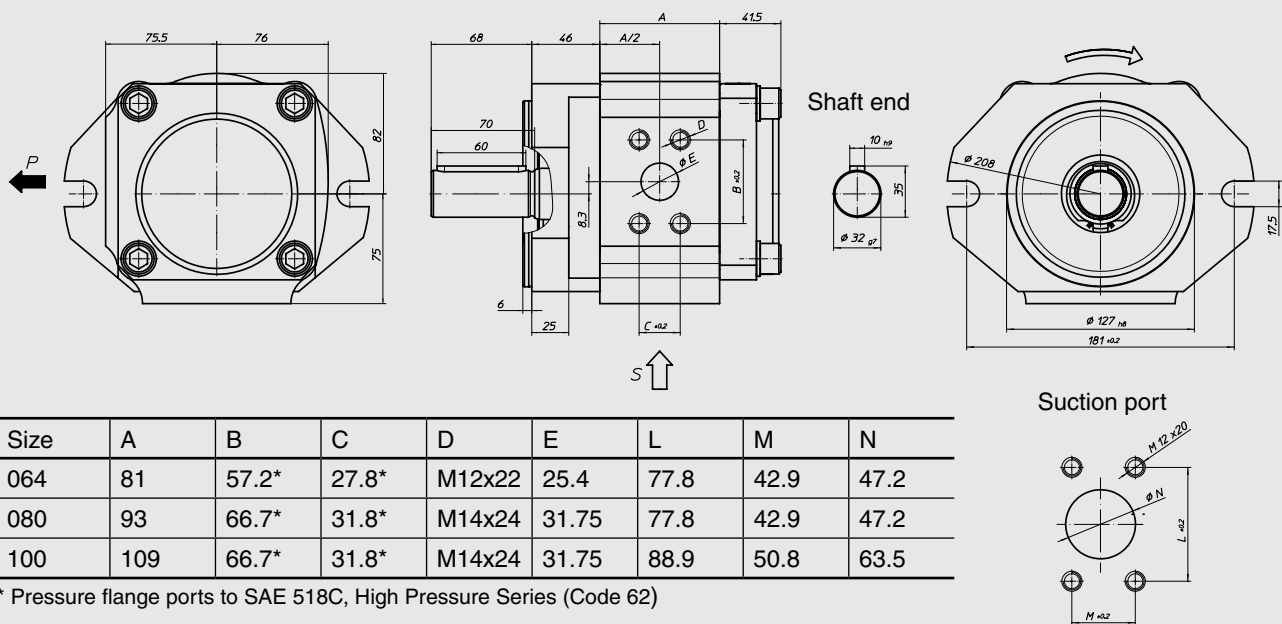
Measurement conditions:

Drive speed 1450 rpm, viscosity 46 mm²/sec, operating temperature 40 °C
Acoustic pressure measured in an anechoic room to DIN 45 635 Sheet 26;
Microphone distance 1.0 m axial.

DIMENSIONS

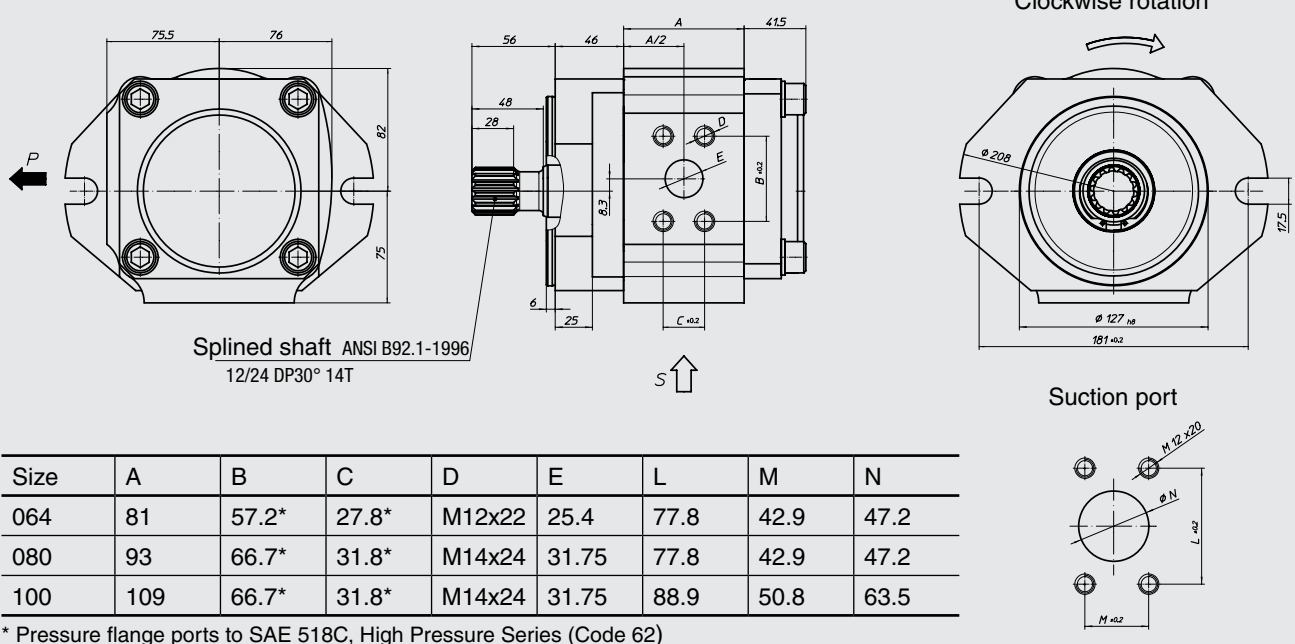
5.4.10 PGI103 with SAE C – 2-hole flange and parallel shaft with key

Ordering example: PGI103-...RA23-1x



5.4.11 PGI103 with SAE C – 2-hole flange and splined shaft

Ordering example: PGI103-...RB23-1x



Internal Gear Pumps Installation Manual



MEDIUM HEAVY DUTY SERIES SIZE 2

PGI100

PGI100-2-005
PGI100-2-006
PGI100-2-008
PGI100-2-011
PGI100-2-013
PGI100-2-016
PGI100-2-019
PGI100-2-022
PGI100-2-025



MEDIUM HEAVY DUTY SERIES SIZE 3/6

PGI101

PGI101-3-020	PGI101-6-125
PGI101-3-025	PGI101-6-160
PGI101-3-032	PGI101-6-200
PGI101-3-040	PGI101-6-250
PGI101-3-050	
PGI101-3-064	



HEAVY DUTY SERIES SIZE 2/3/6

PGI102

PGI102-2-004	PGI102-3-014	PGI102-6-040
PGI102-2-005	PGI102-3-016	PGI102-6-050
PGI102-2-006	PGI102-3-020	PGI102-6-064
PGI102-2-008	PGI102-3-025	PGI102-6-080
PGI102-2-011	PGI102-3-032	PGI102-6-100
PGI102-2-013	PGI102-3-040	PGI102-6-125
PGI102-2-016	PGI102-3-050	PGI102-6-160
PGI102-2-019	PGI102-3-064	PGI102-6-200
PGI102-2-022		PGI102-6-250
PGI102-2-025		



MEDIUM HEAVY DUTY SERIES SIZE 5/6

PGI103

PGI103-5-064	PGI103-6-125
PGI103-5-080	PGI103-6-160
PGI103-5-100	PGI103-6-200
	PGI103-6-250

To prevent serious accidents, equipment damage, and other property damage, please observe the following precautions, as well as all related regulations regarding safety.

Before using the product, make sure you read and understand all the instructions in the Operator's Manual entirely.

In this catalogue, safety precautions are classified under three headings:

DANGER, WARNING, and CAUTION.

These words are defined as follows:



DANGER

Indicates an imminent danger that is very likely to cause death or severe injury unless the situation is avoided.



WARNING

Indicates a potential danger that may cause death or severe injury unless the situation is avoided.



CAUTION

Indicates a potential danger that may cause a minor or moderate injury or that may result in property damage.



INFORMATION

Indicates useful hints and system tips. They are necessary for correct installation and safe use of the product.



PRECAUTIONS FOR USE

CAUTION

1. To avoid possible injury when handling the products, wear protective safety equipment in accordance with the instructions in the Operator's Manual.



CAUTION

2. Failure to support the weight of the product or lifting the product with incorrect posture may result in injury to the hands or back. Be sure to follow the instructions in the Operator's Manual.



CAUTION

3. Do not climb on, strike, drop or exert unnecessary force on the product. This may lead to injury or fire due to incorrect operation, damage, or oil leakage.



CAUTION

4. Oil on the product or floor must be cleaned up thoroughly. Oil could cause you to drop the product or slip on the floor.

PRECAUTIONS FOR INSTALLATION, REMOVAL, AND MAINTENANCE



WARNING

1. All installation, removal, maintenance, piping or wiring work should be carried out by properly trained personnel.



WARNING

2. Before beginning any installation, removal, maintenance, piping or wiring work, the following procedures must be carried out. Failure to do so may cause the equipment to move suddenly or oil to spill during the work, which may result in serious accidents.

- Shut off the power supply to the equipment and make sure that all the electrical motors or machines cannot re-start unintentionally.
- Secure the cylinder rods before installing/removing the cylinder.
- Reduce the pressure in the pipes and cylinders in the hydraulic system to zero pressure.



WARNING

3. Before working on any electrical wiring, be sure to shut off the power supply. Failure to do this may cause an electric shock.



CAUTION

4. Keep all installation holes and surfaces clean. Failure to do this may cause insufficient tightening of the bolts which may lead to a fire due to oil leakage.



CAUTION

5. Before commissioning the device, make sure that all bolts are tightened with the specified torque. Failure to comply with the specifications may cause incorrect operation, damage, oil leakage, etc.

PRECAUTIONS FOR OPERATION



DANGER

1. Never operate any device in an environment where there is danger of explosion or fire, unless the device is fully protected. This may lead to major and serious accidents including explosion or fire.



WARNING

2. Do not approach the pumps or motors when in operation. Hands or clothes can be caught up and wound into the pumps and motors which can lead to serious injury.



WARNING



3. In event of abnormal operation (unusual sounds, oil leakage, smoke, etc.), immediately stop operation and take appropriate corrective measures.

WARNING

4. Completely discharge air from the cylinder at low pressure. Failure to do so may result in unexpected movement of the cylinder, which in turn may cause injury.



WARNING

5. To adjust the damping, gradually increase the cylinder speed from a low speed (50 mm/s or less). Rapidly accelerating the cylinder may produce an abnormal pressure surge, resulting in damage to the cylinder or the machinery and causing a serious accident.



WARNING

6. Before operating this device for the first time, check that hydraulic and electrical circuits are properly connected and that adjoining surfaces are tightly aligned.



WARNING

7. Do not use the product outside of the specifications described in the catalogue, related data sheets, drawings, etc. Failure to adhere to them may cause incorrect operation, damage or injury.



WARNING

8. During operation, high temperatures in the hydraulic system or solenoid valves may occur. Wear protective equipment on hands and body when in the vicinity of these devices.



WARNING

9. Always operate the device with clean oil, and within established ranges for temperature, viscosity and cleanliness. Failure to adhere to the specified limits may result in incorrect operation or fire due to oil leakage.

GENERAL PRECAUTIONS



WARNING

1. Never modify the device.
If any alterations are made, unexpected machine movement may cause injury.



CAUTION

2. Do not disassemble the products without prior consent of the manufacturer. Failure to adhere to this can cause the products to operate incorrectly which can lead to accidents or damage.



CAUTION

3. For transportation / storage of the product, pay attention to environmental conditions, such as ambient temperature and humidity, and implement anti-dust / anti-corrosion measures.



CAUTION

4. The seals may need to be replaced if the product is used after long-term storage.



CAUTION

5. Read the manual thoroughly and ensure that the seals are replaced properly.

RELATED REGULATIONS



CAUTION

To ensure that this product is used in a safe manner, it is essential to observe the above precautions, as well as all related regulations regarding safety.



INTERNAL GEAR PUMPS

Technical specifications

Medium Heavy Duty Series Size 2

PGI100

Series	Geometric displacement [cm³/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	
PGI100-2-022	22.2				
PGI100-2-025	25.2				280

Medium Heavy Duty Series Size 3

PGI101

Series	Geometric displacement [cm ³ /rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGI101-3-020	20.0	250	320	325	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				1800
PGI101-3-064	64.4		280	300	

PGI102

Medium Heavy Duty Series Size 5/6 **PGI103**

Documentation

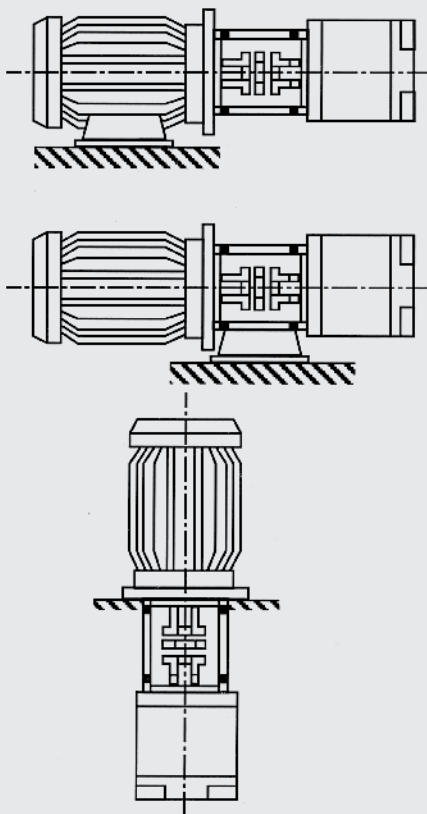
HYDAC		SYSTEM	
Verwendendurft OSM. PTFE/FK AD D-47885 KATERSLIEUEN		Bestell-Nr. 03001 Partikel: 1391, D-030273 Radialschleif Schleifungsfähig: D-030290 Radialschleif Taster: 030017 800-01 Taster: 030017 900-00 www.faghydra.com	
030017 800-01 030017 900-00		Seite 1 030017 171 17.10.2008	
Pos.	Material Bezeichnung	Menge	
Depack KU 0104291719			
030017	030017 AZFD 40000-FFR003 KUNSTSTOFFEINBAU AZFD 40000-FFR003 KUNSTSTOFFEINBAU 030017 Einbaueinheit 030017 800-01 Pos. 1 Position 10 030017 030017 030017 030017 030017	1 ST	

5

INSTALLING THE PUMP

Installation position:

The pumps can be installed vertically (shaft at the top) or horizontally.



Note:

Internal gear pumps are self-priming. They can be installed both above and below the tank level.

The permitted pressure values on the suction side of the pump must not be exceeded (see Technical Specifications).

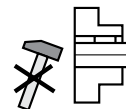
Installation instructions:

Important!

Prior to installing and commissioning the pump, it must be filled with oil from the suction side.

When installing the pump, ensure that:

- the direction of rotation of the drive and pump, marked by an arrow on the case or nameplate, correspond to each other. For example, a drive running anti-clockwise requires a pump which runs clockwise.
- the pump and motor shaft are aligned.
- compensating couplings (flexible drive or curved-gear couplings) are used.
- the pump is driven free of axial and lateral forces. A drive using gear wheels, belts or chains without an adapter bearing is possible only to a limited extent and always requires approval from HYDAC.
- no stresses are caused to the pump by uneven pump support.
- no distortion is caused by incorrectly mounted pipes.
- coupling parts are installed without using force.



When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

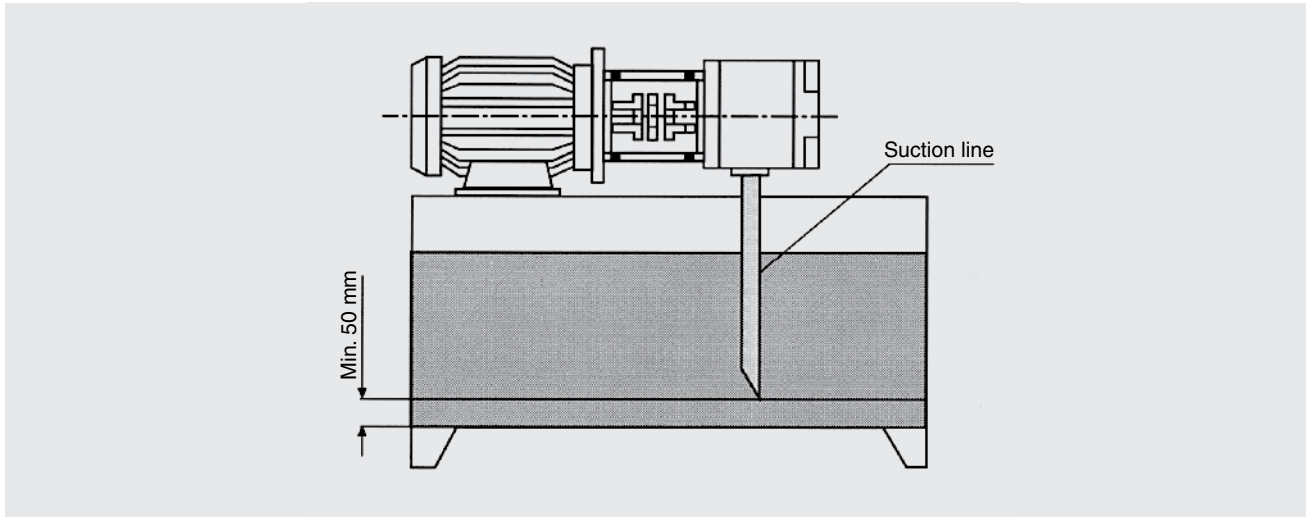
Sealing faces must not be damaged.

Permitted torques for mounting screws at the pump and pipe connections must be adhered to.

When mounting pumps with an O-ring at the drive shaft, make sure the O-ring has been greased and that there is a lead-in chamfer on the mating part to avoid damage to the O-ring.

OIL RESERVOIR

- The amount of oil required in the reservoir depends on the particular operating conditions. It should be at least twice (for intermittent operation and correspondingly long cooling phases) to five times the amount of the pump delivery rate per minute.
- If the reservoir is too small, cooling of the oil may be required.
- The reservoir must be provided with an air breather filter and a strainer in the filling port.
- Prior to filling the reservoir with oil, it must be thoroughly cleaned.
- Oil-resistant paint must be used to paint the reservoir.
- Use baffles to ensure sufficient distance between the suction and return lines and to enable complete deaeration of the oil.
- Recommended suction velocity 0.5 - 1.5 m/s
Maximum return flow velocity 2.0 - 3.0 m/s



OPERATING FLUID

Hydraulic mineral oils:

Selection

- Branded hydraulic oil to DIN 51524, Part 2 must always be used.
- Blending several types of oil, or oil of different manufacturers, must be avoided because it can have a detrimental effect on the hydraulic characteristics of the fluid.

Operating temperature

- The optimum operating temperature is from 40 °C to 60 °C – a short-term maximum temperature from 80 °C to 100 °C is permitted.

Viscosity

Minimum operating viscosity	10 mm ² /s (cSt)
Optimum operating viscosity	25 - 100 mm ² /s (cSt)
Maximum starting viscosity	2000 mm ² /s (cSt)

When selecting the operating medium's viscosity, consideration must be given to the average operating temperatures whilst maintaining the permitted viscosity values.

FIRE-RESISTANT FLUIDS AND OTHER FLUIDS

Please contact HYDAC.

FILTRATION

Careful filtration of the pressure fluid is essential for a long service life and trouble-free operation of the hydraulic system.

Cleanliness level:

- Cleanliness class of the operating fluid:
Code 20/18/15 to ISO 4406:1999
or NAS 1638 Class 9 or cleaner.
- In order to ensure a longer service life we recommend
to ISO 4406 Code 18/16/13 or cleaner
or NAS 1638 Class 7 or cleaner.
- We recommend using a filter with a minimum retention rate of $\beta_{10} > 100$.
- The filter or filter elements must be maintained regularly and replaced, if necessary.
- To check if the filters are operating correctly, they must be fitted with a visual, or preferably an electrical clogging indicator.

PRESSURE LIMITING

- To avoid excessively high pressures in the pump, the pressure relief valve should be positioned as close to the pump outlet as possible and definitely between the pump and the hydraulic system downstream.
- Select an appropriate setting to ensure that the pump's maximum pressure setting will not be exceeded (see Technical Specifications).

FUNCTIONAL TEST AND COMMISSIONING

Direction of rotation:

Internal gear pumps can be supplied in clockwise and anti-clockwise versions. The pump's direction of rotation is determined when viewing the drive shaft and is marked by an arrow on the pump case or the name-plate.

Prior to commissioning the pump, check that the direction of rotation of the drive and pump correspond!

Drive speed:

The permitted range of drive speeds is given in the brochures.

CAUTION!

When operating a combination of pumps, especially when different pump series or sizes are combined, the drive speed must not exceed that permitted for the pump with the lowest speed!

Commissioning:

- It must be possible for the pump to be started without load, that is with a consumer that is unloaded.
- During the **initial commissioning**, the pressure line **must be vented**.
- Vent the system until all cracking noises and foaming have stopped.

At the same time, check the fluid level in the reservoir until the system has been completely vented. Under no circumstances must the oil fall below the minimum level.
- After venting the pump, it should be loaded to the required pressure, and the pressure relief valve should be protected from unauthorised adjustment.
- Prior to switching off the pump, the system should be unloaded.
- After operating for some time, check the filter and oil temperature.

External Gear Pumps for Open Loop Hydraulic Systems

6. EXTERNAL GEAR PUMPS

6.1 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	145	175	210	3000
PGE100-150	1.50			200	2500
PGE100-175	1.75			180	
PGE100-200	2.00	130	160	170	2000

6.2 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	200	220	230	3000
PGE101-610	6.1				2500
PGE101-740	7.4	170	190	200	2500



6.3 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		270	280	3000
PGE102-1200	12				
PGE102-1400	14				
PGE102-1500	15				
PGE102-1600	16	220	250	270	2500
PGE102-1730	17.3	200	220	230	
PGE102-1900	19	180	200	210	
PGE102-2200	22	160	180	190	
PGE102-2500	25	120	140	150	

6.4 SIZE 3

PGE103

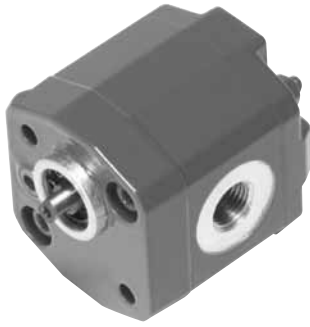
Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGE103-2000	20	250	270	300	3000
PGE103-2250	22.5				
PGE103-2500	25				3000
PGE103-2800	28				
PGE103-3200	32	240	260	280	2800
PGE103-3600	36	230	250	270	2500
PGE103-4200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

6.5 MULTIPLE PUMPS

PGE104

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				





6.1 SIZE 0 CONTENTS

PGE100

Ordering Code	6.1.1 External Gear Pump
Technical Information	6.1.2 Specifications 6.1.3 Hydraulic fluids 6.1.4 Viscosity range 6.1.5 Temperature range 6.1.6 Seals 6.1.7 Filtration 6.1.8 Installation notes
Dimensions	6.1.9 Drive shafts 6.1.10 Mounting flange 6.1.11 Ports 6.1.12 Preferred series

ORDERING CODE

6.1.1 External Gear Pump

PGE100 – 100 – R M K 1 – N – XXXX

External gear pump

Size 0

Displacement

25	0.25 cm³/rev
30	0.30 cm³/rev
50	0.50 cm³/rev
75	0.75 cm³/rev
100	1.00 cm³/rev
125	1.25 cm³/rev
150	1.50 cm³/rev
175	1.75 cm³/rev
200	2.00 cm³/rev

Shaft rotation (viewed from shaft end)

R	Clockwise
L	Anti-clockwise

Shaft

C	Tang
M	Parallel shaft with key Ø 7 mm

Mounting flange

I	2-hole mounting, centering Ø 22 mm
K	Flange, centering Ø 22 mm

Ports

1	Pipe thread ISO 228-1, radial
A	Pipe thread ISO 228-1, axial - discharge port in mounting flange
B	Pipe thread ISO 228-1, axial
9	Special version (only on request)

Seals

N	NBR
V	FPM

Modification number

XXXX Determined by manufacturer

**Not all combinations in the ordering code are possible.
Please refer to 6.1.12 Preferred series or consult HYDAC.**

TECHNICAL INFORMATION

6.1.2 Specifications

Pump size			25	30	50	75	100	125	150	175	200
Geometric displacement		[cm³/rev]	0.25	0.30	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Pressure	Rated	[bar]	170						145	130	130
	Intermittent, max. 20 sec		200						175	160	160
	Peak, max. 0.5 sec		210		230		210		200	180	170
Drive speed	min.	[rpm]	750								
	max.		3500					3000	2500		2000
Approx. weight		[kg]	0.37	0.38	0.39	0.40	0.41	0.43	0.44	0.45	0.47

The continuous and maximum pressures given here only apply to pumps with flange ports. If threaded ports are required, the performance will be reduced. To find out whether a pump with threaded ports can be used in a high pressure application, please consult HYDAC.

6.1.3 Hydraulic fluids

The pump series is designed for use with

HL Hydraulic oil
(normal mineral oil)
and

HLP Hydraulic oils of the R&O type
(Rust and Oxidation inhibitor)

6.1.4 Viscosity range

Normal operating viscosity:
16 - 200 cSt (mm²/s)

6.1.5 Temperature range

Ambient temperature range
-22 to 55 °C

Fluid temperature range
NBR

-25 up to 85 °C

Viton

-15 up to 90 °C

6.1.6 Seals

The pump series is equipped with NBR seals.

If special hydraulic fluids are used, the seal material must be changed if required. Please contact HYDAC.

6.1.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration. Cleanliness class:

21/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

At system pressures above 160 bar cleanliness class:

19/17/14 to ISO 4406:1999

or

Class 8 to NAS 1638 is required.

6.1.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure:
0.8 bar abs.

Maximum suction pressure:
2.2 bar abs.

C. Drive

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment of the shafts is 0.2 mm and the angular deviation must be less than 0.2°.

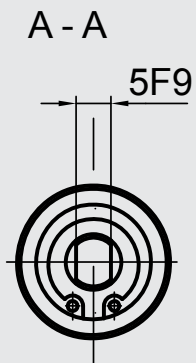
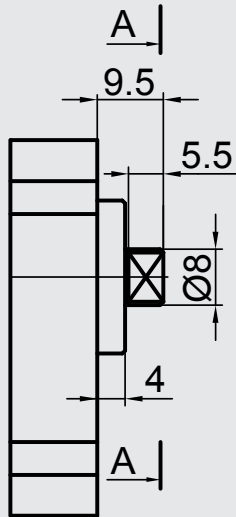
Drive shafts with tang are for direct mounting onto an electric motor or a gearbox. The driver for the tang is not included.

Indirect drives (with gear, chain or belt drives) are not possible.

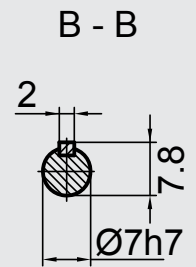
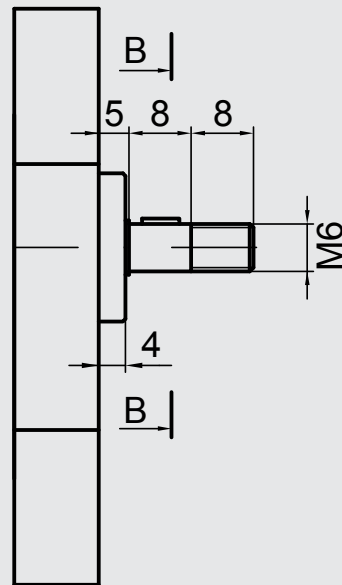
DIMENSIONS

6.1.9 Drive shafts

C Tang

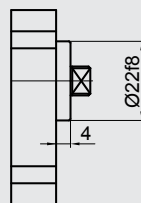
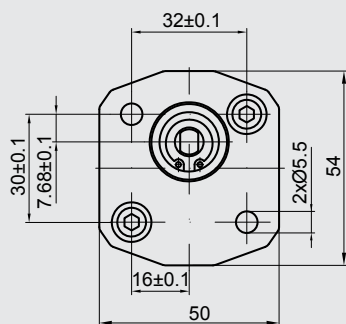


M Parallel shaft with key Ø 7 mm

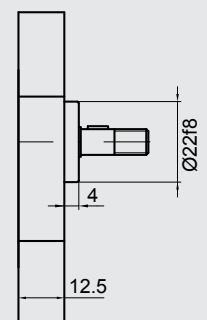
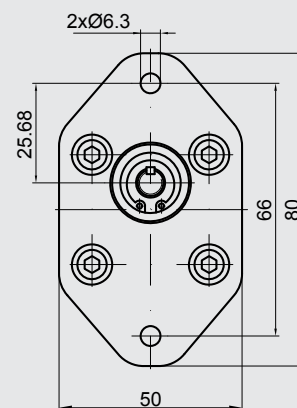


6.1.10 Front cover

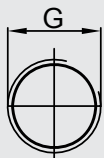
I 2-hole mounting
centering Ø 22 mm



K Flange
centering Ø 22 mm

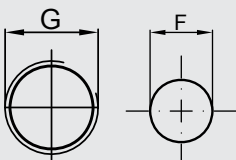


6.1.11 Ports



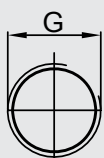
1 Pipe thread
ISO 228/1, radial

Ordering code	Displacement	Outlet G	Inlet G
1	0.25 ... 2 cm ³	G 1/4	G 1/4



A Pipe thread ISO 228/1, axial
discharge port in mounting flange

Ordering code	Displacement	Outlet F	Inlet G
A	0.25 ... 2 cm ³	Ø 5.5	G 1/4

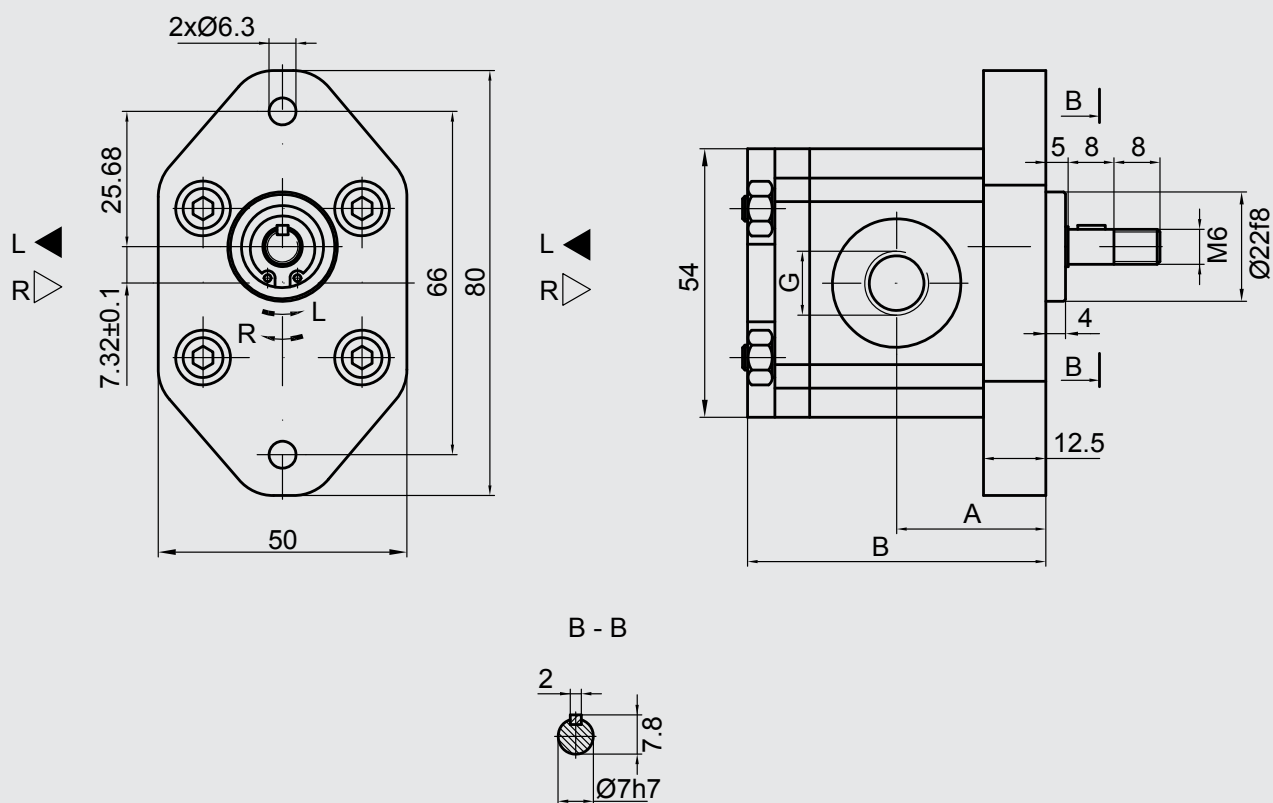


B Pipe thread
ISO 228/1, axial

Ordering code	Displacement	Outlet G	Inlet G
B	0.25 ... 2 cm ³	G 1/4	G 1/4

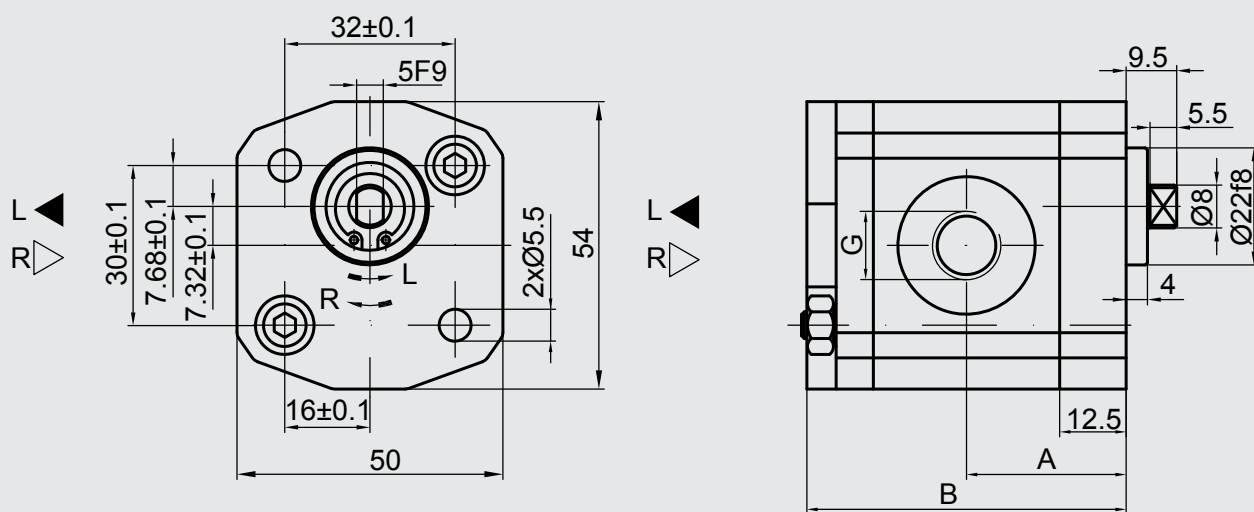
6.1.12 Preferred series

PGE100-...-MK1-N



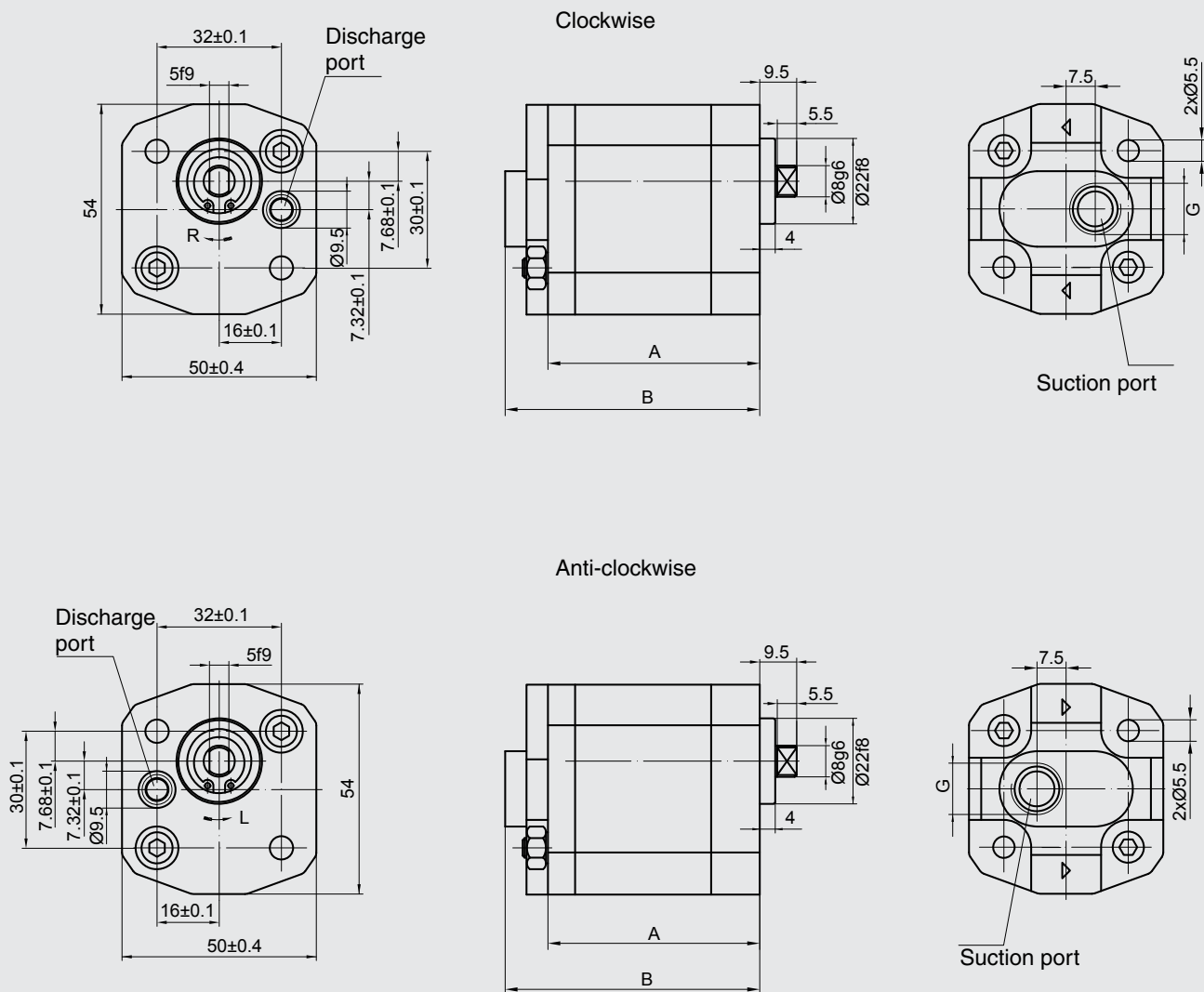
Type	Displacement [cm ³ /rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G
PGE100-25-. MK1-N	0.25	0.3	0.8	170	3500	27.6	55.3	G 1/4	G 1/4
PGE100-30-. MK1-N	0.30	0.4	0.9			27.7	55.7		
PGE100-50-. MK1-N	0.50	0.7	1.6			28.7	57.5		
PGE100-75-. MK1-N	0.75	1.0	2.3			29.9	59.8		
PGE100-100-. MK1-N	1.00	1.4	3.2			31.0	62.0		
PGE100-125-. MK1-N	1.25	1.7	3.4	145	3000	32.1	64.2		
PGE100-150-. MK1-N	1.50	2.1	3.5			33.2	66.5		
PGE100-175-. MK1-N	1.75	2.4	4.1	130	2500	34.3	68.7		
PGE100-200-. MK1-N	2.00	2.8	3.7			35.5	70.9		

PGE100-...-CK1-N



Type	Displacement [cm ³ /rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G
PGE100-25-. CK1-N	0.25	0.3	0.8	170	3500	27.6	55.3	G 1/4	G 1/4
PGE100-30-. CK1-N	0.30	0.4	0.9			27.7	55.7		
PGE100-50-. CK1-N	0.50	0.7	1.6			28.7	57.5		
PGE100-75-. CK1-N	0.75	1.0	2.3			29.9	59.8		
PGE100-100-. CK1-N	1.00	1.4	3.2			31.0	62.0		
PGE100-125-. CK1-N	1.25	1.7	3.4	145	3000	32.1	64.2		
PGE100-150-. CK1-N	1.50	2.1	3.5			33.2	66.5		
PGE100-175-. CK1-N	1.75	2.4	4.1	130	2500	34.3	68.7		
PGE100-200-. CK1-N	2.00	2.8	3.7			35.5	70.9		

PGE100-...-CIA-N



Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimensions				
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G	
PGE100-25-. CIA-N	0.25	0.3	0.8	170	3500	55.3	60.8	G 1/4	Ø 5.5	
PGE100-30-. CIA-N	0.30	0.4	0.9			55.7	61.2			
PGE100-50-. CIA-N	0.50	0.7	1.6			57.5	63.0			
PGE100-75-. CIA-N	0.75	1.0	2.3			59.8	65.3			
PGE100-100-. CIA-N	1.00	1.4	3.2			62.0	67.5			
PGE100-125-. CIA-N	1.25	1.7	3.4	145	2500	64.2	69.7			
PGE100-150-. CIA-N	1.50	2.1	3.5			66.5	72.0			
PGE100-175-. CIA-N	1.75	2.4	4.1	130		68.7	74.2			
PGE100-200-. CIA-N	2.00	2.8	3.7			70.9	76.4			

Technical drawing of a flange with the following dimensions and tolerances:

- Overall width: 50
- Overall height: 54
- Central hole diameter: 16 ± 0.1
- Four mounting holes: $2 \times \varnothing 9.5$
- Distance from center to mounting hole center: 32 ± 0.1
- Distance from outer edge to mounting hole center: 7.32 ± 0.1
- Distance from outer edge to central hole center: 7.68 ± 0.1
- Central hole depth: $5f9$
- Radius: R

Technical drawing of a mechanical part showing dimensions A, B, C, G, 9.5, 5.5, 4, Ø8, and Ø22f8.

Technical drawing of a flange with dimensions: 11.5 ± 0.1 , 11.5 ± 0.1 , and G .

Technical drawing of a flange with the following dimensions and labels:

- Overall width: 32 ± 0.1
- Overall height: 54
- Central hole diameter: $5f9$
- Outer diameter: $2 \times \varnothing 9.5$
- Inner diameter: 16 ± 0.1
- Flange thickness: 30 ± 0.1
- Flange thickness (alternative view): 7.68 ± 0.1
- Flange thickness (alternative view): 7.32 ± 0.1
- Label: L

Technical drawing of a mechanical part (Fig. 1.10) showing dimensions A, B, C, G, and a cross-section with a hole of diameter Ø8 and a slot of width 4. The part has a total width of 9.5 and a height of 5.5.

Technical drawing of a cross-section of a mechanical part. The drawing shows a symmetrical, octagonal-like shape with rounded corners. It features four circular holes arranged in a square pattern. The distance between the centers of the holes is labeled as 11.5 ± 0.1 . The thickness of the part is labeled as G . There are also two smaller circular features, possibly rivets or pins, located on the outer edges of the part.

Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimensions						
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	C [mm]	Inlet G	Outlet G		
PGE100-25-. CIB-N	0.25	0.3	0.8	170	3500	27.6	55.3	60.8	G 1/4	G 1/4		
PGE100-30-. CIB-N	0.30	0.4	0.9			27.7	55.7	61.2				
PGE100-50-. CIB-N	0.50	0.7	1.6			28.7	57.5	63.0				
PGE100-75-. CIB-N	0.75	1.0	2.3			29.9	59.8	65.3				
PGE100-100-. CIB-N	1.00	1.4	3.2			31.0	62.0	67.5				
PGE100-125-. CIB-N	1.25	1.7	3.4		32.1	64.2	69.7					
PGE100-150-. CIB-N	1.50	2.1	3.5	145	2500	33.2	66.5	72.0				
PGE100-175-. CIB-N	1.75	2.4	4.1	130		34.3	68.7	74.2				
PGE100-200-. CIB-N	2.00	2.8	3.7		2000	35.5	70.9	76.4				



6.1 SIZE 1

CONTENTS

PGE101

Ordering Code	6.2.1 External Gear Pump
Technical Information	6.2.2 Specifications 6.2.3 Hydraulic fluids 6.2.4 Viscosity range 6.2.5 Temperature range 6.2.6 Seals 6.2.7 Filtration 6.2.8 Installation notes
Dimensions	6.2.9 Drive shafts 6.2.10 Mounting flange 6.2.11 Ports 6.2.12 Preferred series

ORDERING CODE

6.2.1 External Gear Pump

PGE101 – 100 – R B Q 1 – N – XXXX

External gear pump
Size 1

Displacement

100	1	cm ³ /rev
125	1.25	cm ³ /rev
160	1.6	cm ³ /rev
200	2	cm ³ /rev
250	2.5	cm ³ /rev
315	3.15	cm ³ /rev
365	3.65	cm ³ /rev
420	4.2	cm ³ /rev
500	5	cm ³ /rev
610	6.1	cm ³ /rev
740	7.4	cm ³ /rev

Shaft rotation (viewed from shaft end)

- R Clockwise
- L Anti-clockwise

Shaft

- A Tapered keyed shaft 1:5
- B Tapered keyed shaft 1:8
- C Tang
- Z Special shaft (only on request)

Mounting flange

- L 2-hole mounting, centering Ø 32 mm
- M 2-hole mounting, centering Ø 32 mm with O-ring
- Q Square flange centering Ø 25.4 mm
- Z Special flange (only on request)

Ports

- 1 Pipe thread ISO 228-1
- 2 Metric thread DIN 3852-1
- 3 Thread UN 2B SAE O-ring boss
- 4 Square flange (ital. design)
- 5 Square flange DIN 3901/ ISO 8435
- 9 Special ports (only on request)

Seals

- N NBR
- V FPM

Modification number

XXXX Determined by manufacturer

Not all combinations in the ordering code are possible.
Please refer to 6.2.12 Preferred series, or consult HYDAC.
Special options are possible upon request.

TECHNICAL INFORMATION

6.2.2 Specifications

Pump size			100	125	160	200	250	315	365	420	500	610	740
Geometric displacement		[cm³/rev]	1	1.25	1.6	2	2.5	3.15	3.65	4.2	5	6.1	7.4
Pressure	Rated	[bar]	250									200	170
	Intermittent		280									220	190
	Peak		300									230	200
Drive speed	min.	[rpm]	750										
	max.		3500								3000	2500	2500
Approx. weight		[kg]	1	1.02	1.04	1.05	1.07	1.11	1.14	1.18	1.25	1.3	1.37

The continuous and maximum pressures given here only apply to pumps with flange ports. If threaded ports are required, the performance will be reduced. To find out whether a pump with threaded ports can be used in a high pressure application, please consult HYDAC.

6.2.3 Hydraulic fluids

The pump series is designed for use with

HL Hydraulic oil
(normal mineral oil)
and

HLP Hydraulic oils of the R&O type
(Rust and Oxidation inhibitor)

6.2.4 Viscosity range

Normal operating viscosity:
16 - 200 cSt (mm²/s)

For other viscosity ranges, please contact HYDAC.

6.2.5 Temperature range

Ambient temperature range
-22 to 55 °C

Fluid temperature range
NBR

-25 up to 85 °C

Viton

-15 up to 90 °C

6.2.6 Seals

The pump series is equipped with NBR seals.

If special hydraulic fluids are used, the seal material must be changed if required. Please contact HYDAC.

6.2.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration. Cleanliness class:

21/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

At system pressures above 160 bar cleanliness class:

19/17/14 to ISO 4406:1999

or

Class 8 to NAS 1638 is required.

6.2.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure:
0.8 bar abs.

Maximum suction pressure:
2.2 bar abs.

C. Drive

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum misalignment of the shafts is 0.2 mm and the angular deviation must be less than 0.2°.

Drive shafts with tang are for direct mounting onto an electric motor or a gearbox. The driver for the tang is not included.

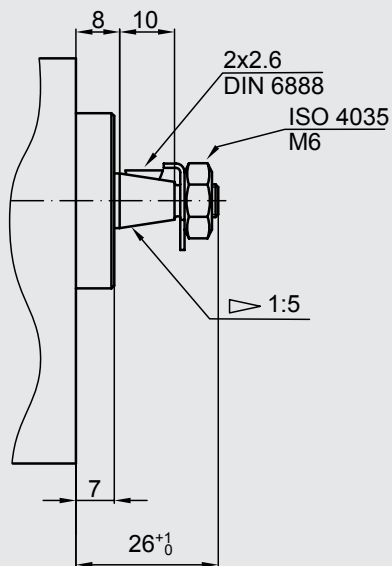
For indirect drives (with gear, chain or belt drives) please consult Hydac.

DIMENSIONS

6.2.9 Drive shafts

A

Tapered keyed
shaft 1:5

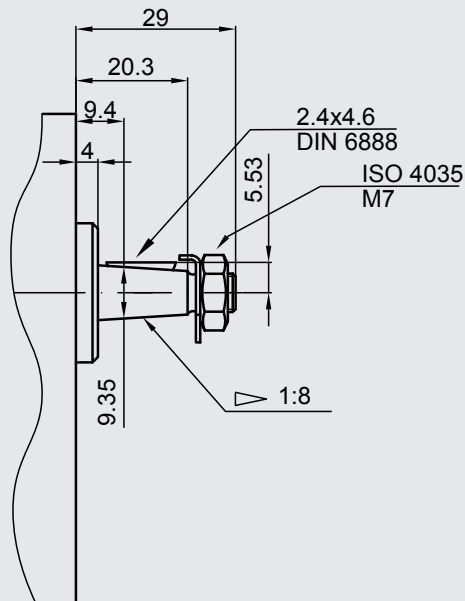


relevant
mounting
flange

L

B

Tapered keyed
shaft 1:8

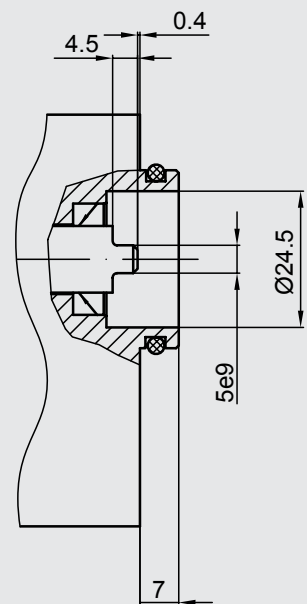


relevant mounting
flange

Q

C

Tang



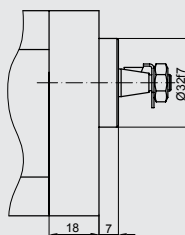
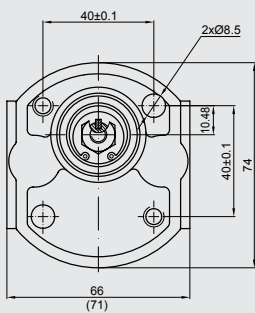
relevant mounting
flange

M

6.2.10 Mounting flange

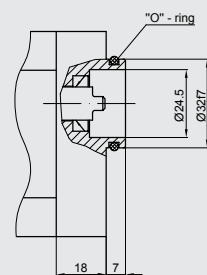
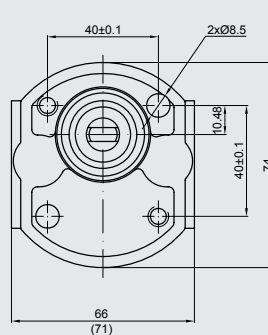
L

2-hole mounting
centering Ø 32 mm



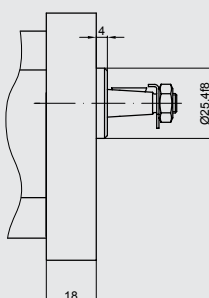
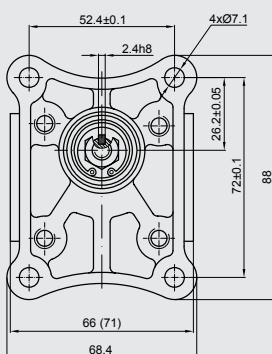
M

2-hole mounting
centering Ø 32 mm with O-ring

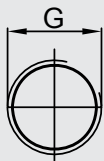


Q

Square flange
centering Ø 25.4 mm

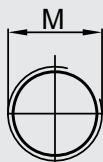


6.2.11 Ports



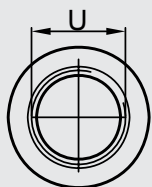
1 Pipe thread ISO 228/1

Ordering code	Displacement	Outlet G	Inlet G
1	1 ... 2.5 cm ³	G 3/8	G 3/8
	3.15 ... 7.4 cm ³	G 3/8	G 1/2



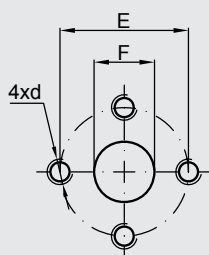
2 Metric thread DIN 3852-1

Ordering code	Displacement	Outlet M	Inlet M
2	1 ... 2.5 cm ³	M16x1.5	M16x1.5
	3.15 ... 6.1 cm ³	M16x1.5	M20x1.5
	7.4 cm ³	M18x1.5	M22x1.5



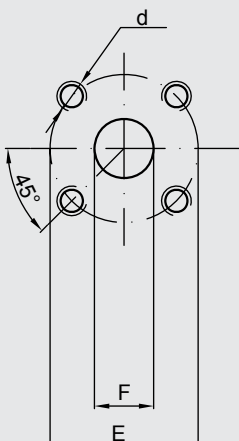
3 Pipe thread UN 2B SAE O-ring boss

Ordering code	Displacement	Outlet U	Inlet U
3	1 ... 6.1 cm ³	9/16-18 UNF	3/4-16 UNF
	7.4 cm ³	3/4 16 UNF	7/8-14 UNF



4 Square flange (Italian design)

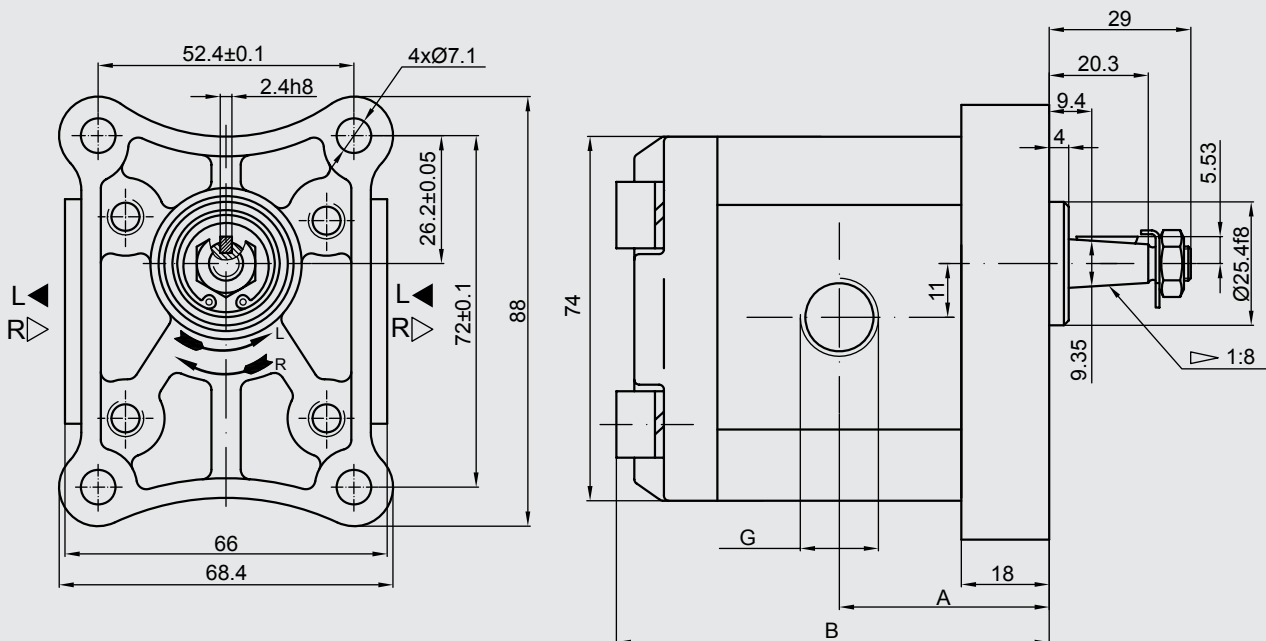
Ordering code	Displacement	Outlet			Inlet		
		F	E	d	F	E	d
4	1 ... 7.4 cm ³	12	30	M6	12	30	M6



5 Square flange DIN 3901/ ISO 8435

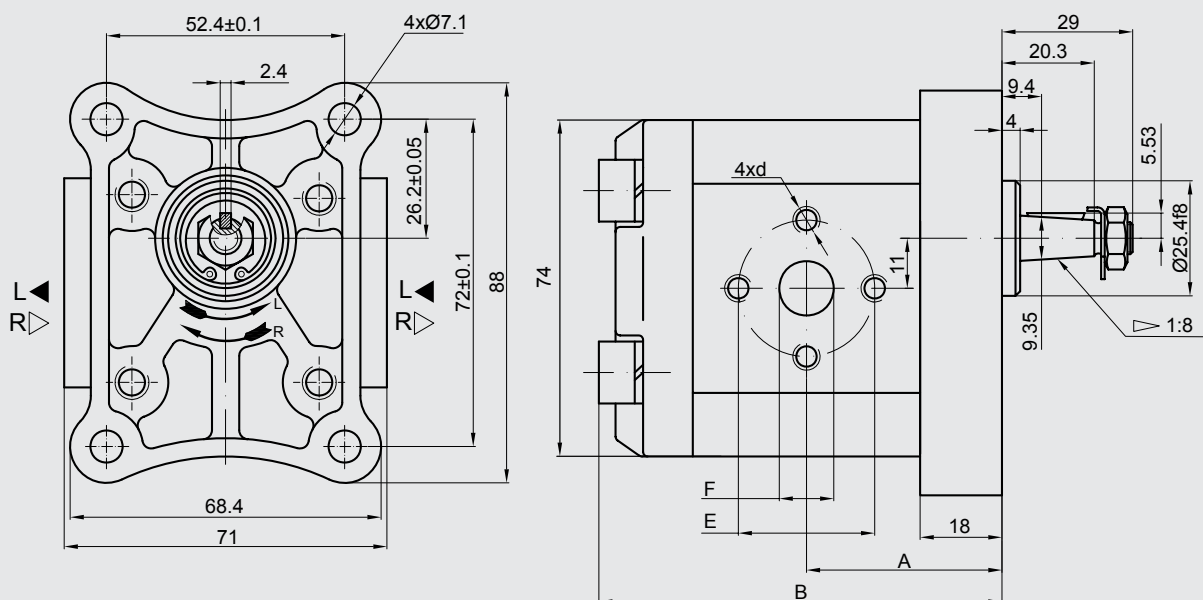
Ordering code	Displacement	Outlet			Inlet		
		F	E	d	F	E	d
5	1 ... 7.4 cm ³	12	30	M6	12	30	M6

PGE101-...-BQ1-N



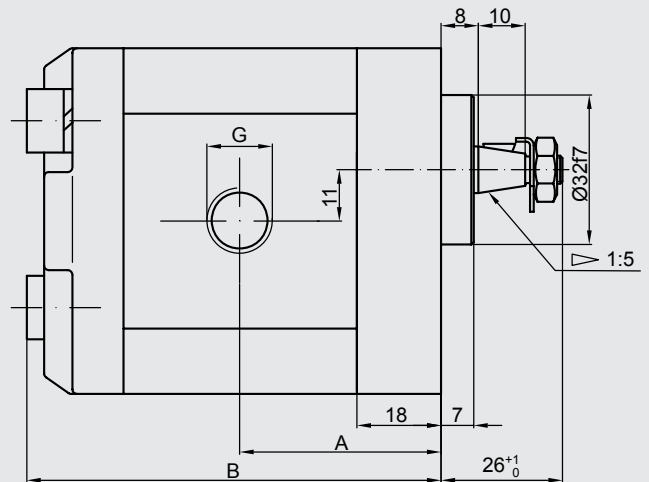
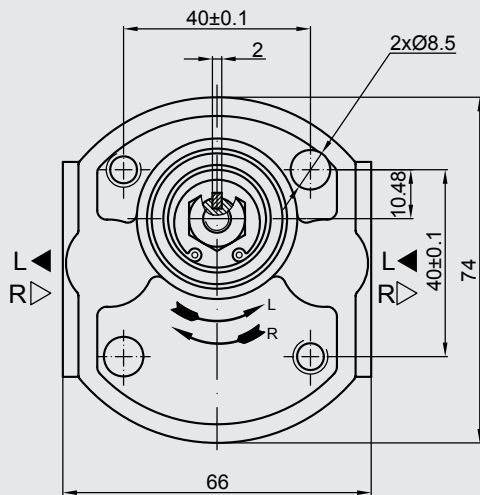
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimension				
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G	
PGE101-100-. BQ1-N	1	1.40	3.26	250	3500	39.1	81	G 3/8"	G 3/8"	
PGE101-125-. BQ1-N	1.25	1.74	4.07			39.5	82			
PGE101-160-. BQ1-N	1.6	2.23	5.21			40.3	83.6			
PGE101-200-. BQ1-N	2	2.82	6.58			41.1	85.2			
PGE101-250-. BQ1-N	2.5	3.53	8.23			42.1	87.2			
PGE101-315-. BQ1-N	3.15	4.44	10.36			43.5	89.8	G 1/2"		
PGE101-365-. BQ1-N	3.65	5.15	12.01			44.4	91.9			
PGE101-420-. BQ1-N	4.2	5.92	13.82			45.5	94.1			
PGE101-500-. BQ1-N	5	7.05	14.10			47.1	97.2			
PGE101-610-. BQ1-N	6.1	8.69	14.49	200	3000	49.4	101.8	G 1/2"		
PGE101-740-. BQ1-N	7.4	10.55	17.58	170	2500	52.1	107.2			

PGE101-...-BQ4-N



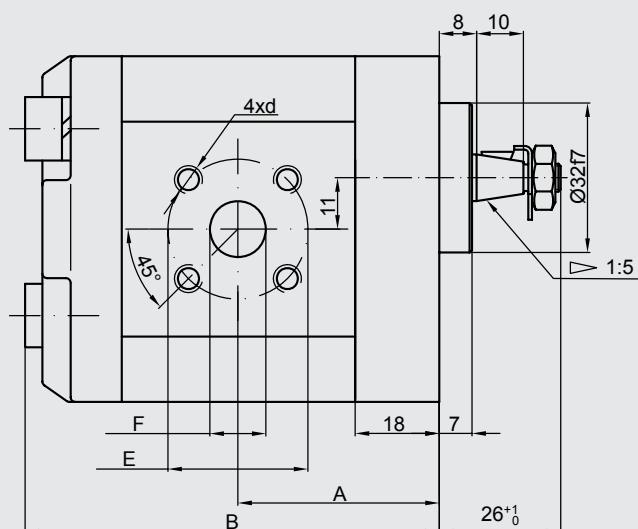
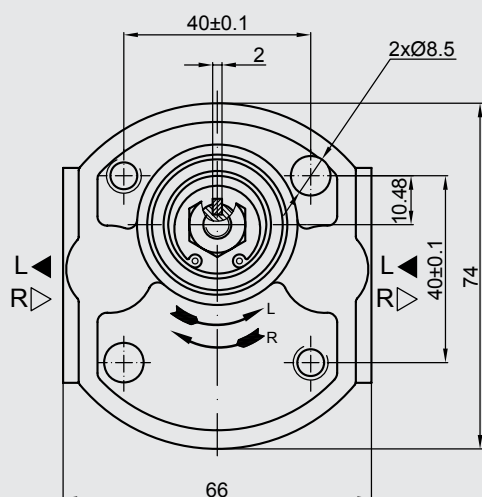
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimension							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet			Outlet		
								E	F	d	E	F	d
PGE101-100-. BQ4-N	1	1.40	3.26	250	3500	39.1	81	Ø 30	Ø 12	M6	Ø 30	Ø 12	M6
PGE101-125-. BQ4-N	1.25	1.74	4.07			39.5	82						
PGE101-160-. BQ4-N	1.6	2.23	5.21			40.3	83.6						
PGE101-200-. BQ4-N	2	2.82	6.58			41.1	85.2						
PGE101-250-. BQ4-N	2.5	3.53	8.23			42.1	87.2						
PGE101-315-. BQ4-N	3.15	4.44	10.36			43.5	89.8						
PGE101-365-. BQ4-N	3.65	5.15	12.01			44.4	91.9						
PGE101-420-. BQ4-N	4.2	5.92	13.82			45.5	94.1						
PGE101-500-. BQ4-N	5	7.05	14.10	200	3000	47.1	97.2	Ø 30	Ø 12	M6	Ø 30	Ø 12	M6
PGE101-610-. BQ4-N	6.1	8.69	14.49			49.4	101.8						
PGE101-740-. BQ4-N	7.4	10.55	17.58			52.1	107.2						

PGE101-...-AL1-N



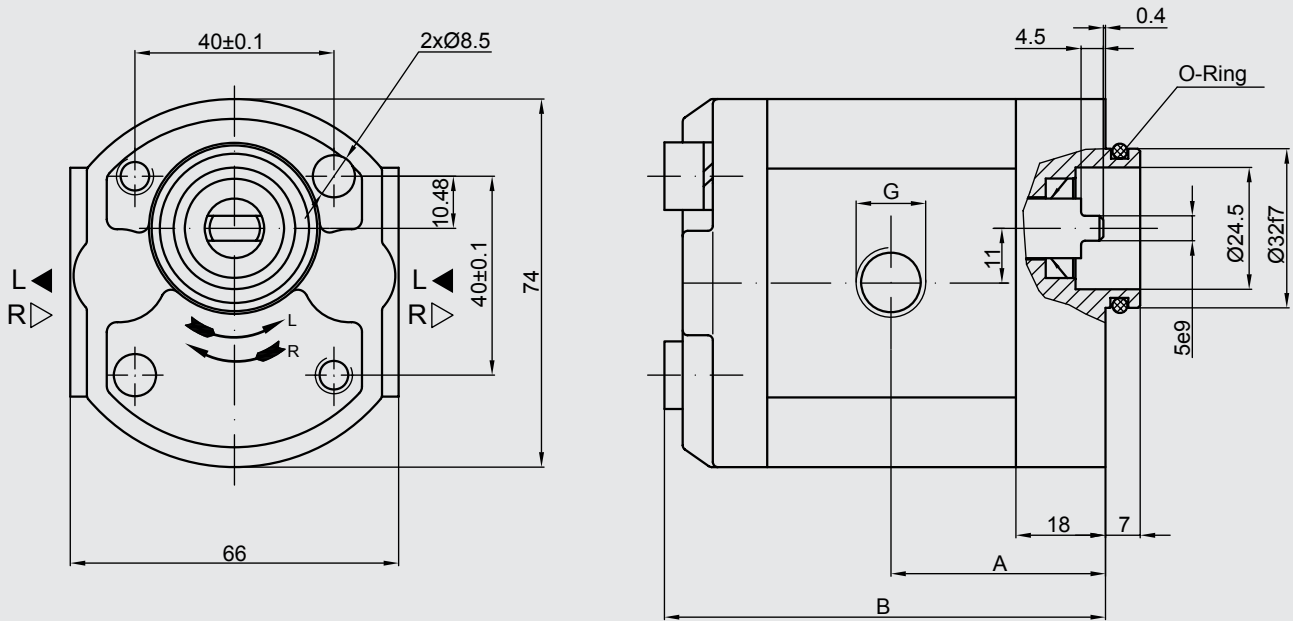
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimension				
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G	
PGE101-100-. AL1-N	1	1.40	3.26	250	3500	39.1	81	G 3/8"	G 3/8"	
PGE101-125-. AL1-N	1.25	1.74	4.07			39.5	82			
PGE101-160-. AL1-N	1.6	2.23	5.21			40.3	83.6			
PGE101-200-. AL1-N	2	2.82	6.58			41.1	85.2			
PGE101-250-. AL1-N	2.5	3.53	8.23			42.1	87.2	G 1/2"		
PGE101-315-. AL1-N	3.15	4.44	10.36			43.5	89.8			
PGE101-365-. AL1-N	3.65	5.15	12.01			44.4	91.9			
PGE101-420-. AL1-N	4.2	5.92	13.82			45.5	94.1			
PGE101-500-. AL1-N	5	7.05	14.10	200	3000	47.1	97.2	G 1/2"		
PGE101-610-. AL1-N	6.1	8.69	14.49			49.4	101.8			
PGE101-740-. AL1-N	7.4	10.55	17.58	170	2500	52.1	107.2			

PGE101-...-AL5-N



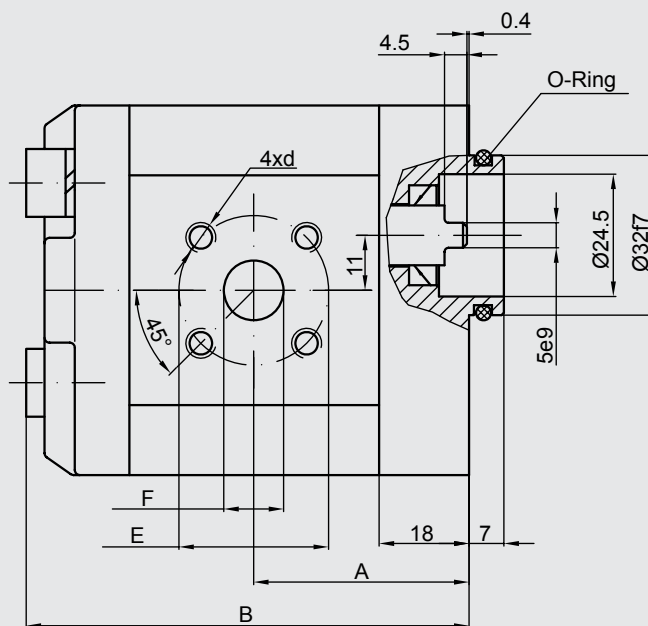
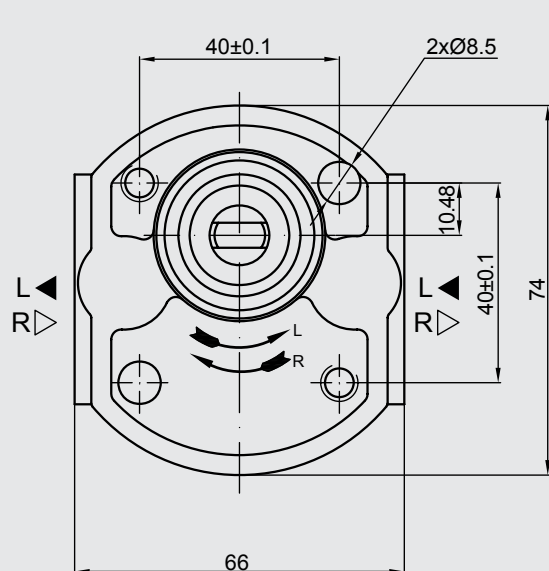
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimension							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet			Outlet		
								E	F	d	E	F	d
PGE101-100-.AL5-N	1	1.40	3.26	250	3500	39.1	81	Ø 30	Ø 12	M6	Ø 30	Ø 12	M6
PGE101-125-.AL5-N	1.25	1.74	4.07			39.5	82						
PGE101-160-.AL5-N	1.6	2.23	5.21			40.3	83.6						
PGE101-200-.AL5-N	2	2.82	6.58			41.1	85.2						
PGE101-250-.AL5-N	2.5	3.53	8.23			42.1	87.2						
PGE101-315-.AL5-N	3.15	4.44	10.36			43.5	89.8						
PGE101-365-.AL5-N	3.65	5.15	12.01			44.4	91.9						
PGE101-420-.AL5-N	4.2	5.92	13.82			45.5	94.1						
PGE101-500-.AL5-N	5	7.05	14.10	200	3000	47.1	97.2	Ø 30	Ø 12	M6	Ø 30	Ø 12	M6
PGE101-610-.AL5-N	6.1	8.69	14.49			49.4	101.8						
PGE101-740-.AL5-N	7.4	10.55	17.58			52.1	107.2						

PGE101-...-CM1-N



Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimension			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G
PGE101-100-. CM1-N	1	1.40	3.26	250	3500	39.1	81	G 3/8"	G 3/8"
PGE101-125-. CM1-N	1.25	1.74	4.07			39.5	82		
PGE101-160-. CM1-N	1.6	2.23	5.21			40.3	83.6		
PGE101-200-. CM1-N	2	2.82	6.58			41.1	85.2		
PGE101-250-. CM1-N	2.5	3.53	8.23			42.1	87.2	G 1/2"	
PGE101-315-. CM1-N	3.15	4.44	10.36			43.5	89.8		
PGE101-365-. CM1-N	3.65	5.15	12.01			44.4	91.9		
PGE101-420-. CM1-N	4.2	5.92	13.82			45.5	94.1		
PGE101-500-. CM1-N	5	7.05	14.10	200	3000	47.1	97.2		
PGE101-610-. CM1-N	6.1	8.69	14.49			49.4	101.8		
PGE101-740-. CM1-N	7.4	10.55	17.58			170	2500	52.1	

PGE101-...-CM5-N



Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Max. speed n [rpm]	Dimension							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet			Outlet		
								E	F	d	E	F	d
PGE101-100-. CM5-N	1	1.40	3.26	250	3500	39.1	81	Ø 30	Ø 12	M6	Ø 30	Ø 12	M6
PGE101-125-. CM5-N	1.25	1.74	4.07			39.5	82						
PGE101-160-. CM5-N	1.6	2.23	5.21			40.3	83.6						
PGE101-200-. CM5-N	2	2.82	6.58			41.1	85.2						
PGE101-250-. CM5-N	2.5	3.53	8.23			42.1	87.2						
PGE101-315-. CM5-N	3.15	4.44	10.36			43.5	89.8						
PGE101-365-. CM5-N	3.65	5.15	12.01			44.4	91.9						
PGE101-420-. CM5-N	4.2	5.92	13.82			45.5	94.1						
PGE101-500-. CM5-N	5	7.05	14.10			47.1	97.2						
PGE101-610-. CM5-N	6.1	8.69	14.49	200	3000	49.4	101.8	Ø 30	Ø 12	M6	Ø 30	Ø 12	M6
PGE101-740-. CM5-N	7.4	10.55	17.58	170	2500	52.1	107.2						



6.3 SIZE 2

CONTENTS

PGE102

Ordering Code

6.3.1 External Gear Pump

Technical Information

6.3.2 Specifications
6.3.3 Hydraulic fluids
6.3.4 Viscosity range
6.3.5 Temperature range
6.3.6 Seals
6.3.7 Filtration
6.3.8 Installation notes

Dimensions

6.3.9 Drive shafts
6.3.10 Mounting flange
6.3.11 Ports
6.3.12 Preferred series

ORDERING CODE

6.3.1 External Gear Pump

PGE102 – 1000 – R B R 1 – N – XXXX

External gear pump

Size 2

Displacement

450	4.5 cm ³ /rev
630	6.3 cm ³ /rev
820	8.2 cm ³ /rev
1000	10.0 cm ³ /rev
1130	11.3 cm ³ /rev
1200	12.0 cm ³ /rev
1400	14.0 cm ³ /rev
1500	15.0 cm ³ /rev
1600	16.0 cm ³ /rev
1730	17.3 cm ³ /rev
1900	19.0 cm ³ /rev
2200	22.0 cm ³ /rev
2500	25.0 cm ³ /rev
2800	28.0 cm ³ /rev

Shaft rotation (viewed from shaft end)

R	Clockwise
L	Anti-clockwise

Shaft

A	Tapered keyed shaft 1:5
B	Tapered keyed shaft 1:8
C	Tang
E	Splined shaft SAE A - J 744 16-4 9T
G	Splined shaft SAE J 744 19-4 11T
H	Keyed shaft SAE A - J 744 16-1 A
I	Keyed shaft ISO Ø 18 mm
Z	Special shaft (only on request)

Mounting flange

N	2-hole mounting, centering Ø 50 mm
O	2-hole mounting, centering Ø 52 mm with O-ring
R	Square flange, centering Ø 36.5 mm
T	Square flange, centering Ø 80 mm
W	SAE J 744 82-2 A Ø 82.55 mm
X	SAE J 744 101-2 B Ø 101.6 mm
Y	Outboard bearing Ø 80 mm, type 1
Z	Special flange (only on request)

Ports

1	Pipe thread ISO 228-1
2	Metric thread DIN 3852-1
3	Thread UN 2B SAE O-ring boss
4	Square flange (Italian design)
5	Square flange DIN 3901/ ISO 8435
9	Special ports (only on request)

Seals

N	NBR
V	FPM

Modification number

XXXX Determined by manufacturer

Not all combinations in the ordering code are possible.

Please refer to point 6.3.12 Preferred series, or consult HYDAC.

Special options are possible upon request.

TECHNICAL INFORMATION

6.3.2 Specifications

Pump size			450	630	820	1000	1130	1200	1400	1500	1600	1730	1900	2200	2500	2800	
Geometric displacement		[cm³/rev]	4.5	6.3	8.2	10	11.3	12	14	15	16	17.3	19	22	25	28	
Pressure	Rated	[bar]	250						250			220	200	180	160	120	
	Intermittent		280						270			250	220	200	180	140	
	Peak		300						280			270	230	210	190	150	
Drive speed	Min.	[rpm]	750														
	Max.		3500						3000				2500				
Approx. weight			[kg]	3.34	3.36	3.37	3.57	3.62	3.64	3.78	4.16	4.2	4.24	4.32	4.44	4.56	4.68

The continuous and maximum pressures given here only apply to pumps with flange ports. If threaded ports are required, the performance will be reduced. To find out whether a pump with threaded ports can be used in a high pressure application, please consult HYDAC.

6.3.3 Hydraulic fluids

The pump series is designed for use with

HL Hydraulic oil
(normal mineral oil)
and

HLP Hydraulic oils of the R&O type
(Rust and Oxidation inhibitor)

6.3.4 Viscosity range

Normal operating viscosity:
16 - 200 cSt (mm²/s)

For other viscosity ranges, please contact HYDAC.

6.3.5 Temperature range

Ambient temperature range
-22 to 55 °C

Fluid temperature range
NBR
-25 to 85 °C
Viton
-15 to 90 °C

6.3.6 Seals

The pump series is equipped with NBR seals.

If special hydraulic fluids are used, the seal material must be changed if required. Please contact HYDAC.

6.3.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration. Cleanliness class:

21/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

At system pressures above 160 bar cleanliness class:

19/17/14 to ISO 4406:1999

or

Class 8 to NAS 1638 is required.

6.3.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure:
0.8 bar abs.

Maximum suction pressure:
2.2 bar abs.

C. Drive

Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum permitted misalignment of the shafts is 0.2 mm and the angular deviation must be less than 0.2°.

Drive shafts with tang are for direct mounting onto an electric motor or a gearbox. The driver for the tang is not included.

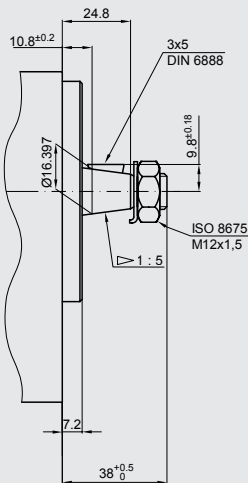
For indirect drives (with gear, chain or belt drives) please consult Hydac.

DIMENSIONS

6.3.9 Drive shafts

A

Tapered keyed
shaft 1:5

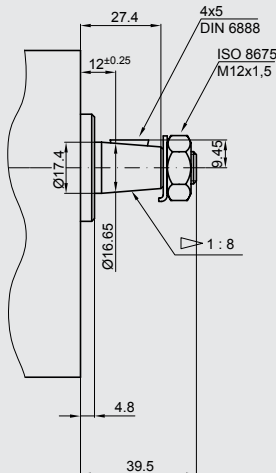


relevant
mounting flange

T
N
Y

B

Tapered keyed
shaft 1:8

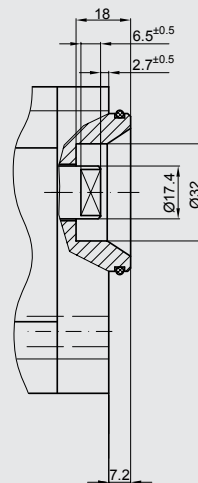


relevant
mounting flange

R

C

Tang

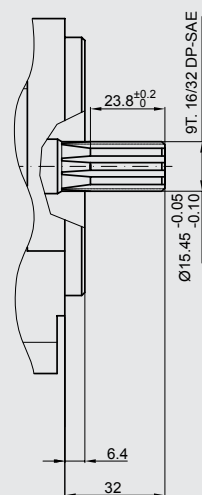


relevant
mounting flange

O

E

Splined shaft
SAE A - J 744 16-4 9T

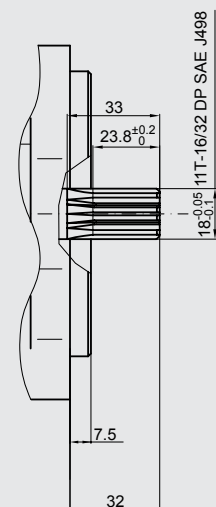


relevant
mounting flange

W

G

Splined shaft
SAE J 744 19-4 11T

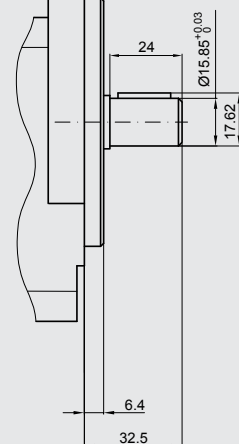


relevant
mounting flange

W
X

H

Keyed shaft
SAE A - J 744 16-1 A

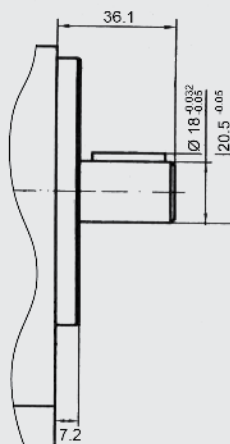


relevant
mounting flange

W

I

Keyed shaft
ISO Ø 18 mm

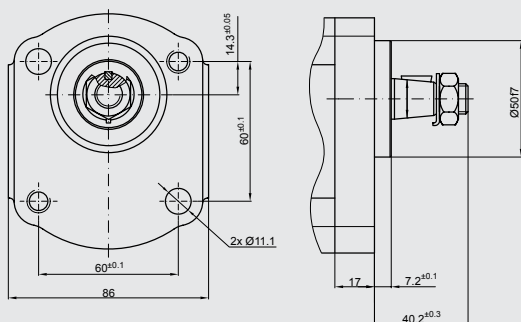


relevant mounting
flange

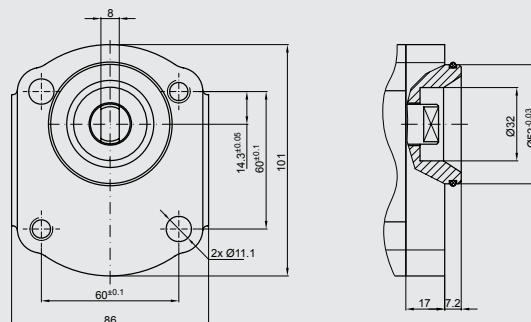
T

6.3.10 Mounting flange

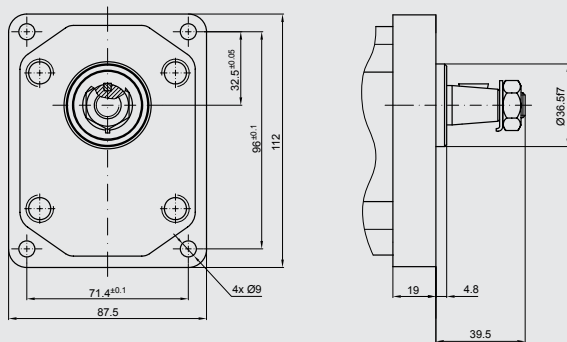
N 2-hole mounting
centering Ø 50 mm



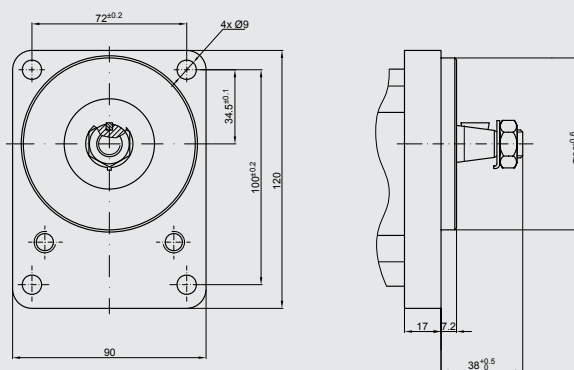
O 2-hole mounting
centering Ø 52 mm with O-ring



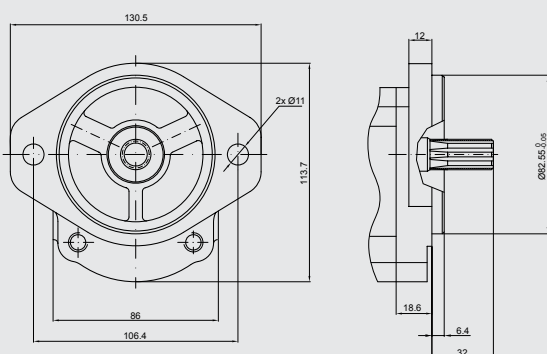
R Square flange
centering Ø 36.5 mm



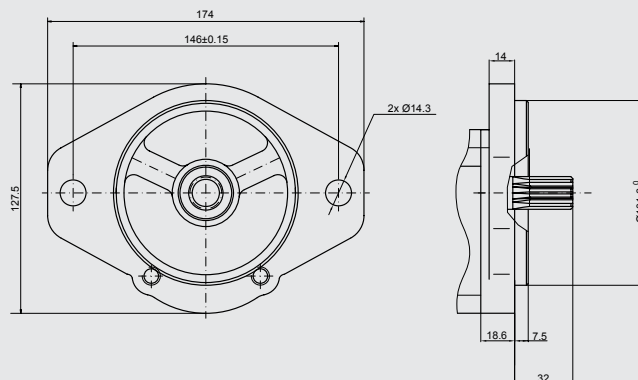
T Square flange
centering Ø 80 mm



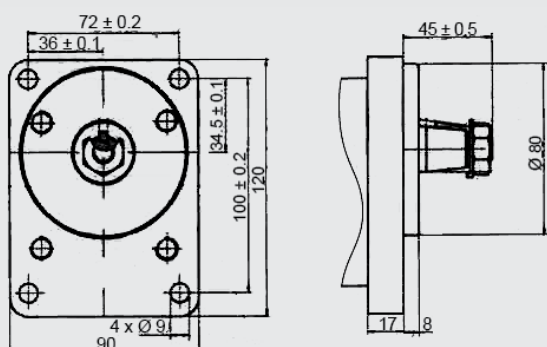
W SAE J 744 82-2 A
Ø 82.55 mm



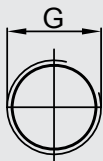
X SAE J 744 101-2 B
Ø 101.6 mm



Y Outboard bearing
Ø 80 mm type 1

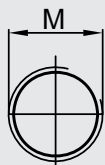


6.3.11 Ports



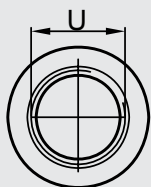
1 Pipe thread ISO 228/1

Ordering code	Displacement	Outlet G	Inlet G
1	4.5 ... 8.2 cm ³	G 1/2	G 1/2
	10 ... 25 cm ³	G 1/2	G 3/4
	28 cm ³	G 3/4	G 1



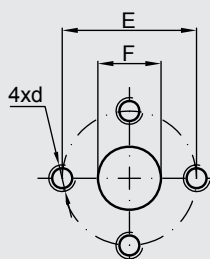
2 Metric thread DIN 3852-1

Ordering code	Displacement	Outlet M	Inlet M
2	4.5 ... 25 cm ³	M16x1.5	M20x1.5
	28 cm ³	M20x1.5	M27x2



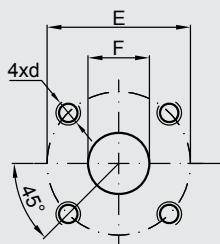
3 Pipe thread UN 2B SAE O-ring boss

Ordering code	Displacement	Outlet U	Inlet U
3	4.5 ... 25 cm ³	7/8" -14 UNF	1 1/16" -12 UN
	28 cm ³	1 1/16" -12 UN	1 5/16" -12 UN



4 Square flange (Italian design)

Ordering code	Displacement	Outlet			Inlet		
		E	F	d	E	F	d
4	4.5 ... 8.2 cm ³	30	13.1	M6	30	13.1	M6
	10 ... 22 cm ³	30	14.2	M6	40	19	M8
	25 ... 28 cm ³	40	19	M8	40	19	M8

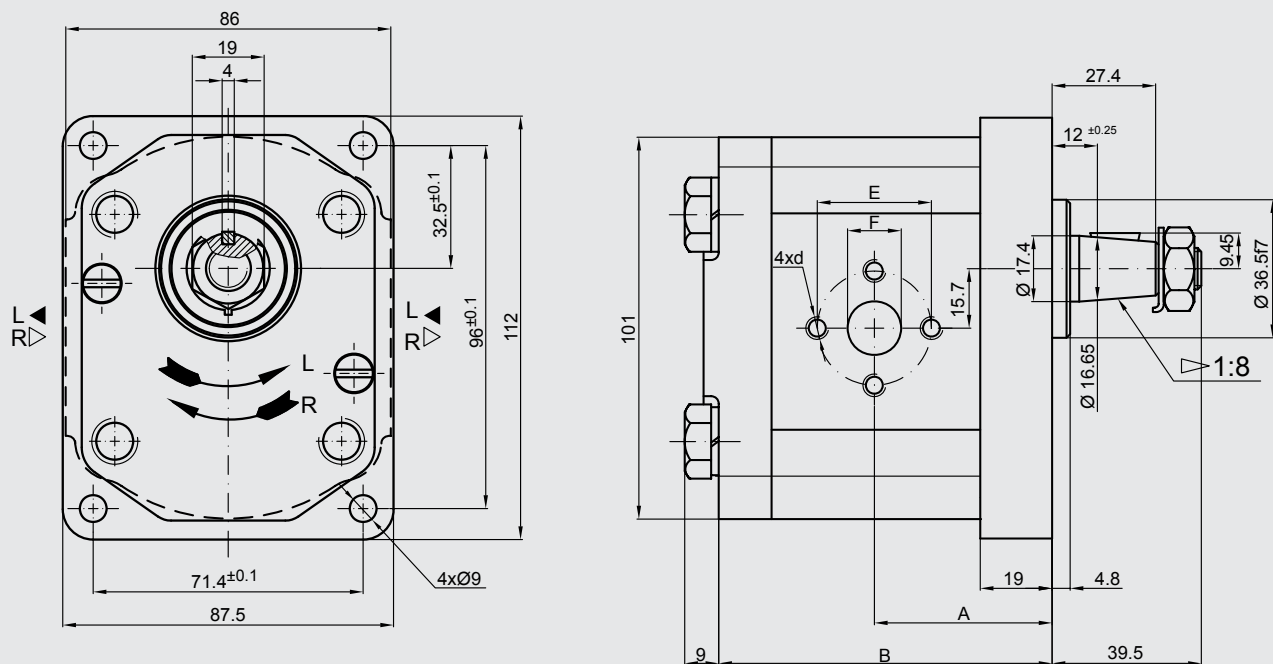


5 Square flange DIN 3901/ ISO 8435

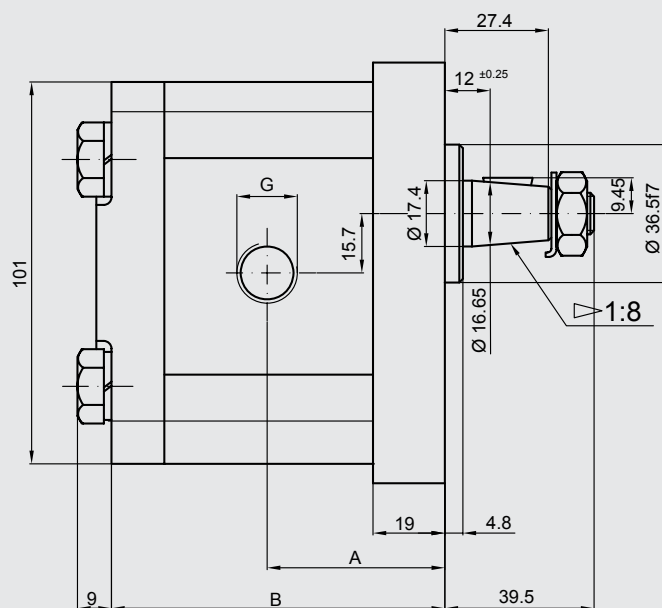
Ordering code	Displacement	Outlet			Inlet		
		E	F	d	E	F	d
5	4.5 ... 6.3 cm ³	35	15	M6	40	15	M6
	8.2 ... 25 cm ³	35	15	M6	40	20	M6
	28 cm ³	40	20	M6	40	20	M6

6.3.12 Preferred series

PGE102-...- BR4-N

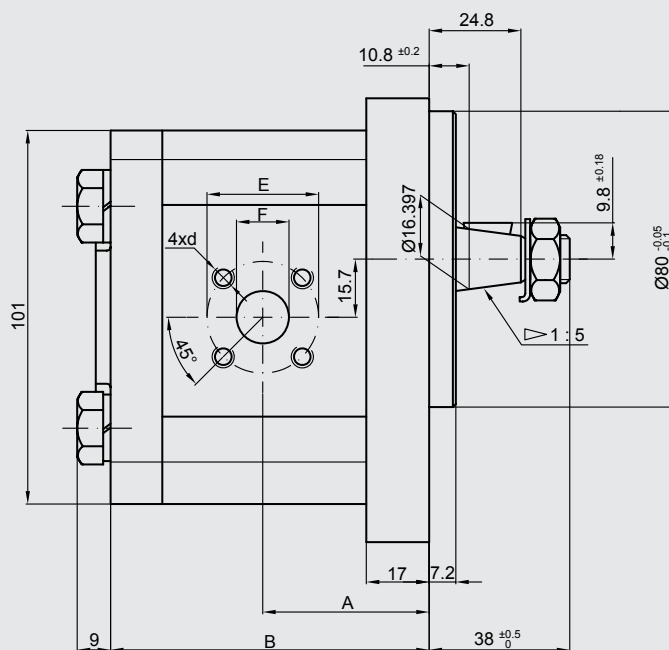
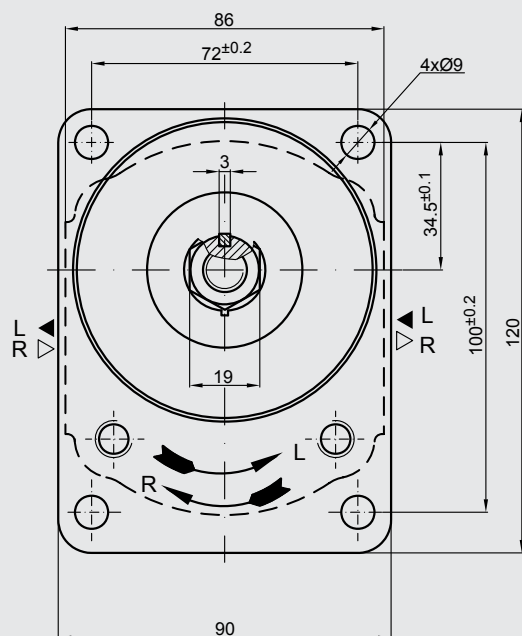


Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet			Outlet		
								E	F	d	E	F	d
PGE102-450-. BR4-N	4.5	6.14	14.33	250	3500	42.5	80	30	13.1	M6	30	13.1	M6
PGE102-630-. BR4-N	6.3	8.69	20.29			42.5	80						
PGE102-820-. BR4-N	8.2	11.32	26.40			42.5	80						
PGE102-1000-. BR4-N	10	13.95	32.55			47	89						
PGE102-1130-. BR4-N	11.3	15.76	36.78			48	91.1						
PGE102-1200-. BR4-N	12	16.92	39.48			48.6	92.3						
PGE102-1400-. BR4-N	14	19.95	46.55			50	95.4						
PGE102-1500-. BR4-N	15	21.60	43.20			56	107.2						
PGE102-1600-. BR4-N	16	23.04	46.08	220	3000	56.9	108.8	40	19	M8	14.2	19	M8
PGE102-1730-. BR4-N	17.3	24.91	49.82			58	110.9						
PGE102-1900-. BR4-N	19	27.36	54.72			59.4	113.8						
PGE102-2200-. BR4-N	22	31.68	52.80	180	2500	61.9	118.8	40	19	M8	19	M8	M8
PGE102-2500-. BR4-N	25	36.00	60.00	160		64.3	123.7						
PGE102-2800-. BR4-N	28	40.32	67.20	120		66.8	128.5						



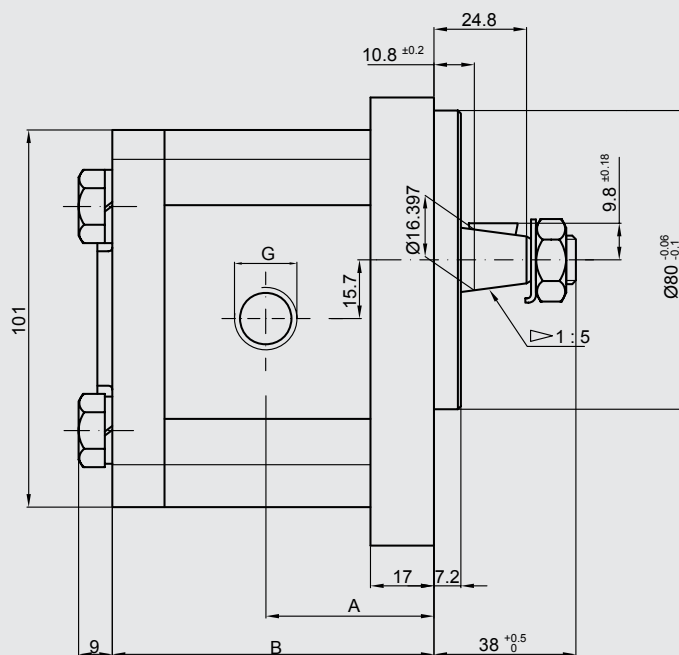
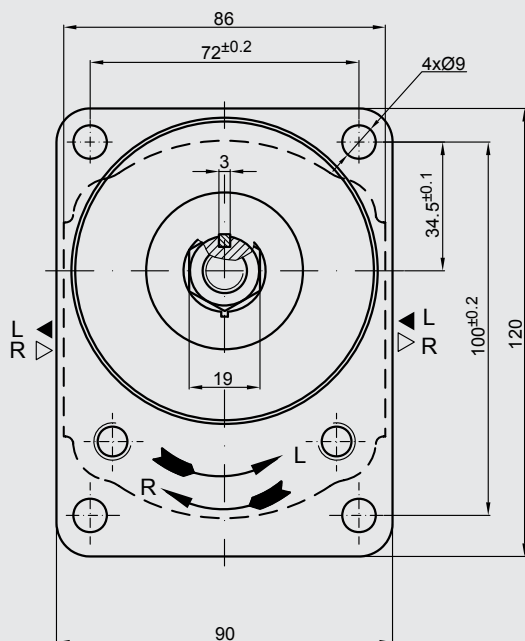
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G
PGE102-450-. BR1-N	4.5	6.14	14.33	250	3500	42.5	80	G 1/2	G 1/2
PGE102-630-. BR1-N	6.3	8.69	20.29			42.5	80		
PGE102-820-. BR1-N	8.2	11.32	26.40			42.5	80		
PGE102-1000-. BR1-N	10	13.95	32.55			47	89	G 3/4	
PGE102-1130-. BR1-N	11.3	15.76	36.78			48	91.1		
PGE102-1200-. BR1-N	12	16.92	39.48			48.6	92.3		
PGE102-1400-. BR1-N	14	19.95	46.55			50	95.4		
PGE102-1500-. BR1-N	15	21.60	43.20			56	107.2		
PGE102-1600-. BR1-N	16	23.04	46.08	56.9	108.8				
PGE102-1730-. BR1-N	17.3	24.91	49.82	220	3000	58	110.9	G 3/4	
PGE102-1900-. BR1-N	19	27.36	54.72	200		59.4	113.8		
PGE102-2200-. BR1-N	22	31.68	52.80	180		61.9	118.8		
PGE102-2500-. BR1-N	25	36.00	60.00	160	2500	64.3	123.7	G 1	G 3/4
PGE102-2800-. BR1-N	28	40.32	67.20	120		66.8	128.5		

PGE102-...-AT5-N



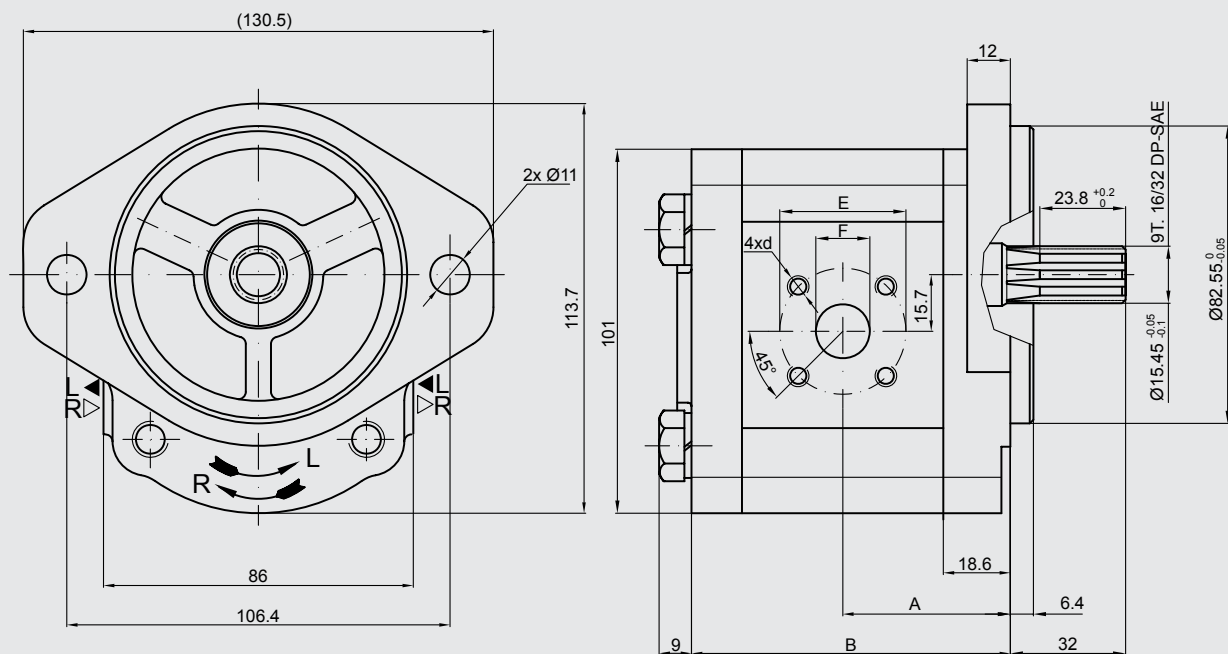
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension					
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet		Outlet	
								E	F	d	
PGE102-450-. AT5-N	4.5	6.14	14.33	250	3500	39.8	78	40	15	M6	35
PGE102-630-. AT5-N	6.3	8.69	20.29			41	81				
PGE102-820-. AT5-N	8.2	11.32	26.40			43.1	83.9				
PGE102-1000-. AT5-N	10	13.95	32.55			47.5	87				
PGE102-1130-. AT5-N	11.3	15.76	36.78				89				
PGE102-1200-. AT5-N	12	16.92	39.48				90.3				
PGE102-1400-. AT5-N	14	19.95	46.55				93.4				
PGE102-1500-. AT5-N	15	21.60	43.20	220	3000	47.5	105.2	20	M6	35	15
PGE102-1600-. AT5-N	16	23.04	46.08				106.8				
PGE102-1730-. AT5-N	17.3	24.91	49.82				108.9				
PGE102-1900-. AT5-N	19	27.36	54.72	200	2500	55	111.8	20	M6	40	20
PGE102-2200-. AT5-N	22	31.68	52.80	180			116.8				
PGE102-2500-. AT5-N	25	36.00	60.00	160			121.7				
PGE102-2800-. AT5-N	28	40.32	67.20	120		64.8	126.5				

PGE102-...-AT1-N



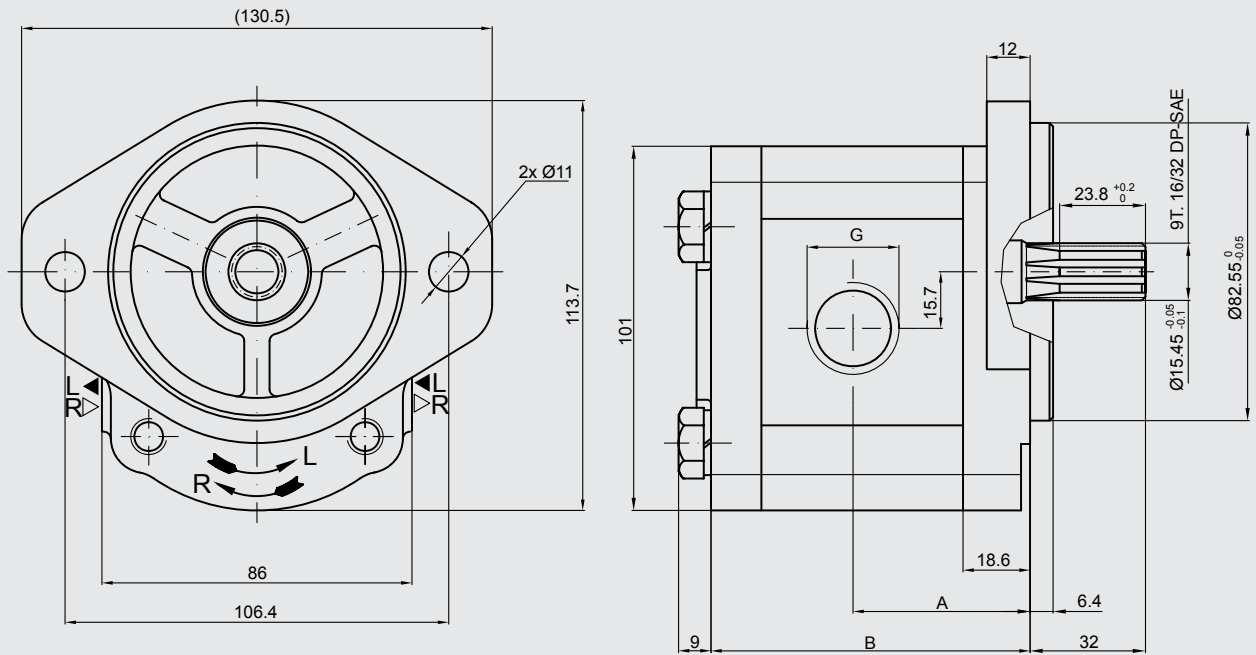
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G
PGE102-450-. AT1-N	4.5	6.14	14.33	250	3500	40.4	78	G 1/2	G 1/2
PGE102-630-. AT1-N	6.3	8.69	20.29			42	81		
PGE102-820-. AT1-N	8.2	11.32	26.40			43.4	83.9		
PGE102-1000-. AT1-N	10	13.95	32.55			45	87		
PGE102-1130-. AT1-N	11.3	15.76	36.78			46	89	G 3/4	
PGE102-1200-. AT1-N	12	16.92	39.48			46.6	90.3		
PGE102-1400-. AT1-N	14	19.95	46.55			48	93.4		
PGE102-1500-. AT1-N	15	21.60	43.20			54	105.2		
PGE102-1600-. AT1-N	16	23.04	46.08	3000	54.9	106.8	G 1		
PGE102-1730-. AT1-N	17.3	24.91	49.82		56	108.9			
PGE102-1900-. AT1-N	19	27.36	54.72		57.4	111.8			
PGE102-2200-. AT1-N	22	31.68	52.80	180	2500	59.9	116.8	G 3/4	
PGE102-2500-. AT1-N	25	36.00	60.00	160		64.3	121.7		
PGE102-2800-. AT1-N	28	40.32	67.20	120	2500	64.8	126.5	G 1	G 3/4

PGE102-...-EW5-N



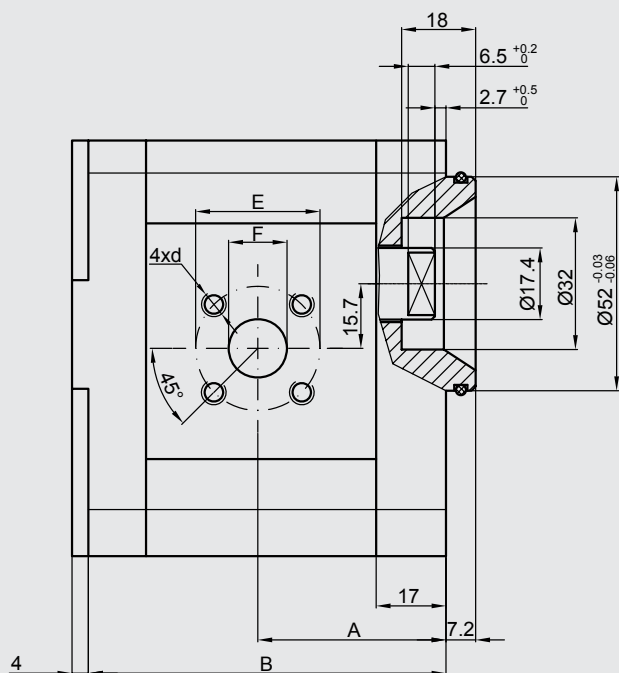
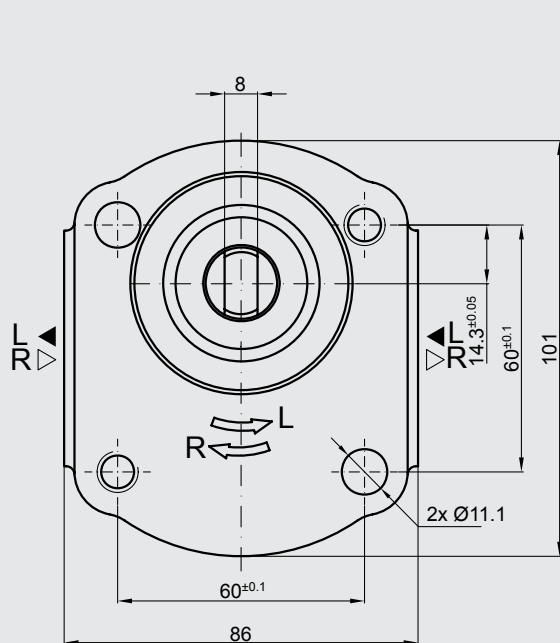
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet		Outlet			
								E	F	d	E	F	d
PGE102-450-. EW5-N	4.5	6.14	14.33	250	3500	42	79.6	40	15	M6	35	15	M6
PGE102-630-. EW5-N	6.3	8.69	20.29			43.6	82.6						
PGE102-820-. EW5-N	8.2	11.32	26.40			45	85.6						
PGE102-1000-. EW5-N	10	13.95	32.55			46.6	88.7						
PGE102-1130-. EW5-N	11.3	15.76	36.78			47.6	90.7						
PGE102-1200-. EW5-N	12	16.92	39.48			48.2	91.9						
PGE102-1400-. EW5-N	14	19.95	46.55			49.6	95						
PGE102-1500-. EW5-N	15	21.60	43.20			55.6	106.8						
PGE102-1600-. EW5-N	16	23.04	46.08	220	3000	56.5	108.4	20	M6	35	15	M6	
PGE102-1730-. EW5-N	17.3	24.91	49.82			57.6	110.5						
PGE102-1900-. EW5-N	19	27.36	54.72			59	113.4						
PGE102-2200-. EW5-N	22	31.68	52.80	180	2500	61.5	118.4	20	M6	35	15	M6	
PGE102-2500-. EW5-N	25	36.00	60.00	160		63.9	123.3						
PGE102-2800-. EW5-N	28	40.32	67.20	120		66.4	128.1						

PGE102-...-EW1-N



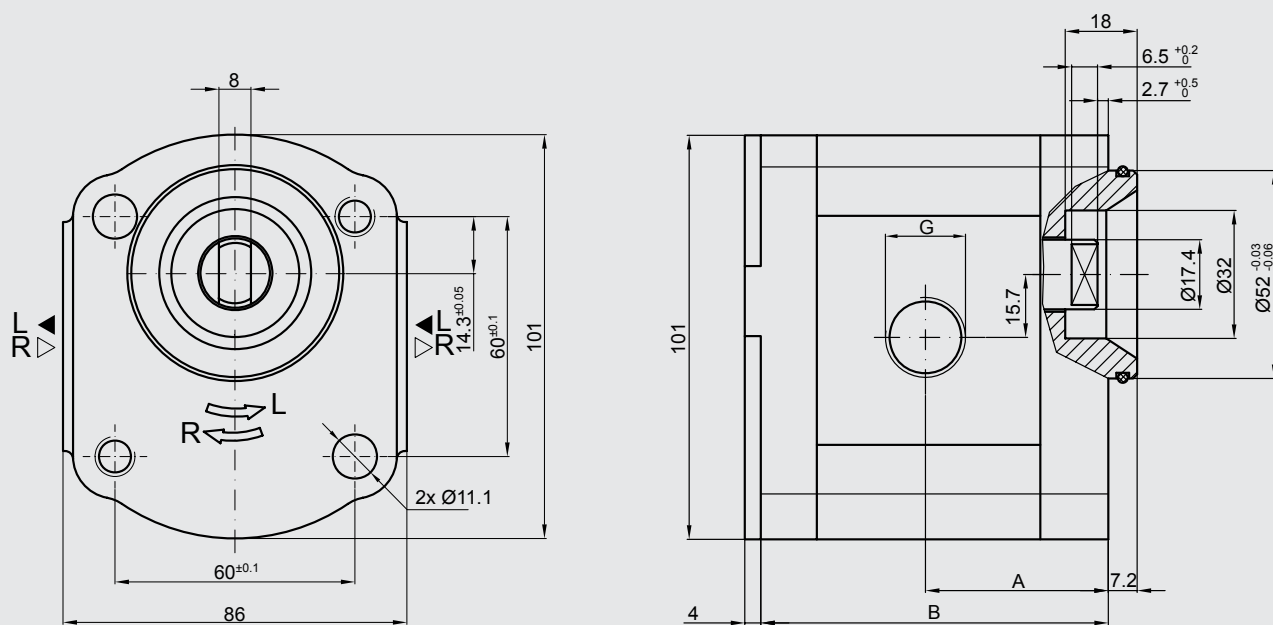
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension				
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G	
PGE102-450-. EW1-N	4.5	6.14	14.33	250	3500	42	79.6	G 1/2	G 1/2	
PGE102-630-. EW1-N	6.3	8.69	20.29			43.6	82.6			
PGE102-820-. EW1-N	8.2	11.32	26.40			45	85.6			
PGE102-1000-. EW1-N	10	13.95	32.55			46.6	88.7			
PGE102-1130-. EW1-N	11.3	15.76	36.78			47.6	90.7	G 3/4		
PGE102-1200-. EW1-N	12	16.92	39.48			48.2	91.9			
PGE102-1400-. EW1-N	14	19.95	46.55			49.6	95			
PGE102-1500-. EW1-N	15	21.60	43.20			55.6	106.8			
PGE102-1600-. EW1-N	16	23.04	46.08	220	3000	56.5	108.4	G 1		G 3/4
PGE102-1730-. EW1-N	17.3	24.91	49.82			57.6	110.5			
PGE102-1900-. EW1-N	19	27.36	54.72			59	113.4			
PGE102-2200-. EW1-N	22	31.68	52.80	180	2500	61.5	118.4			
PGE102-2500-. EW1-N	25	36.00	60.00	160		63.9	123.3			
PGE102-2800-. EW1-N	28	40.32	67.20	120	2500	66.4	128.1		G 1	

PGE102-...-CO5-N



Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet			Outlet		
								E	F	d	E	F	d
PGE102-450-. CO5-N	4.5	6.14	14.33	250	3500	37.3	78	40	20	M6	35	15	M6
PGE102-630-. CO5-N	6.3	8.69	20.29			38.6	81						
PGE102-820-. CO5-N	8.2	11.32	26.40			40.6	83.9						
PGE102-1000-. CO5-N	10	13.95	32.55			45	87						
PGE102-1130-. CO5-N	11.3	15.76	36.78			45	89						
PGE102-1200-. CO5-N	12	16.92	39.48			45	90.3						
PGE102-1400-. CO5-N	14	19.95	46.55			45	93.4						
PGE102-1500-. CO5-N	15	21.60	43.20			54	105.2						
PGE102-1600-. CO5-N	16	23.04	46.08	220	3000	54.9	106.8	40	20	M6	40	20	M6
PGE102-1730-. CO5-N	17.3	24.91	49.82			56	108.9						
PGE102-1900-. CO5-N	19	27.36	54.72			57.4	111.8						
PGE102-2200-. CO5-N	22	31.68	52.80	180	2500	59.9	116.8	40	20	M6	40	20	M6
PGE102-2500-. CO5-N	25	36.00	60.00	160		62.3	121.7						
PGE102-2800-. CO5-N	28	40.32	67.20	120		64.8	126.5						

PGE102-....CO1-N



Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G
PGE102-450-. CO1-N	4.5	6.14	14.33	250	3500	40.5	78	G 1/2	G 1/2
PGE102-630-. CO1-N	6.3	8.69	20.29			42	81		
PGE102-820-. CO1-N	8.2	11.32	26.40			43.5	83.9		
PGE102-1000-. CO1-N	10	13.95	32.55			45	87	G 3/4	
PGE102-1130-. CO1-N	11.3	15.76	36.78			46	89		
PGE102-1200-. CO1-N	12	16.92	39.48			46.5	90.3		
PGE102-1400-. CO1-N	14	19.95	46.55		48	93.4			
PGE102-1500-. CO1-N	15	21.60	43.20		3000	54	105.2	G 3/4	
PGE102-1600-. CO1-N	16	23.04	46.08			54.9	106.8		
PGE102-1730-. CO1-N	17.3	24.91	49.82	56		108.9			
PGE102-1900-. CO1-N	19	27.36	54.72	200	2500	57.4	111.8	G 1	
PGE102-2200-. CO1-N	22	31.68	52.80	180		59.9	116.8		
PGE102-2500-. CO1-N	25	36.00	60.00	160		62.3	121.7		
PGE102-2800-. CO1-N	28	40.32	67.20	120		64.8	126.5		G 3/4



6.4 SIZE 3 CONTENTS

PGE103

Ordering Code	6.4.1 External Gear Pump
Technical Information	6.4.2 Specifications 6.4.3 Hydraulic fluids 6.4.4 Viscosity range 6.4.5 Temperature range 6.4.6 Seals 6.4.7 Filtration 6.4.8 Installation notes
Dimensions	6.4.9 Drive shafts 6.4.10 Mounting flange 6.4.11 Ports 6.4.12 Preferred series

ORDERING CODE

6.4.1 External Gear Pump

PGE103 – 2000 – R B S 1 – N – XXXX

External gear pump
Size 3

Displacement

2000	20.0 cm ³ /rev
2250	22.5 cm ³ /rev
2500	25.0 cm ³ /rev
2800	28.0 cm ³ /rev
3200	32.0 cm ³ /rev
3600	36.0 cm ³ /rev
4200	42.0 cm ³ /rev
4600	46.0 cm ³ /rev
5000	50.0 cm ³ /rev
5500	55.0 cm ³ /rev
6000	60.0 cm ³ /rev

Shaft rotation (viewed from shaft end)

R	Clockwise
L	Anti-clockwise

Shaft

A	Tapered key shaft 1:5
B	Tapered key shaft 1:8
F	Splined shaft SAE B - J 744 22-4 13T
Z	Special shaft (only on request)

Mounting flange

S	Square, centering Ø 50.8 mm
V	Square, centering Ø 105 mm
X	SAE J 744 101-2 B Ø 101.6 mm
Z	Special flange (only on request)

Ports

1	Pipe thread ISO 228-1
4	Square flange (Italian design)
5	Square flange DIN 3901/ ISO 8435
7	SAE flange with metric threads
8	SAE flange with UNC threads
9	Special ports (only on request)

Seals

N	NBR
V	FPM

Modification number

XXXX Determined by manufacturer

Not all combinations in the ordering code are possible.

Please refer to point 6.4.12 Preferred series, or consult HYDAC.

Special options are possible upon request.

TECHNICAL INFORMATION

6.4.2 Specifications

Pump size			2000	2250	2500	2800	3200	3600	4200	4600	5000	5500	6000
Geometric displacement		[cm³/rev]	20	22.5	25.0	28.0	32.0	36.0	42.0	46.0	50.0	55.0	60.0
Pressure	Rated	[bar]	250					240	230	210	185	165	150
	Intermittent		270					260	250	230	200	180	165
	Peak		300					280	270	250	230	200	180
Drive speed	Min.	[rpm]	750										
	Max.		3000					2800	2500	2300	2100	1750	
Approx. weight		[kg]	7.83	8.0	8.16	8.34	8.78	8.99	9.25	9.47	9.60	9.85	10.10

The continuous and maximum pressures given here only apply to pumps with flange ports. If threaded ports are required, the performance will be reduced. To find out whether a pump with threaded ports can be used in a high pressure application, please consult HYDAC.

6.4.3 Hydraulic fluids

The pump series is designed for use with

HL Hydraulic oil
(normal mineral oil)
and

HLP Hydraulic oils of the R&O type
(Rust and Oxidation inhibitor)

6.4.4 Viscosity range

Normal operating viscosity:
16 - 200 cSt (mm²/s)

For other viscosity ranges, please
contact HYDAC.

6.4.5 Temperature range

Ambient temperature range
-22 to 55 °C

Fluid temperature range
NBR

-25 up to 85 °C

Viton

-15 up to 90 °C

6.4.6 Seals

The pump series is equipped with NBR seals.

If special hydraulic fluids are used, the seal material must be changed if required. Please contact HYDAC.

6.4.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration. Cleanliness class:

21/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

At system pressures above 160 bar cleanliness class:

19/17/14 to ISO 4406:1999

or

Class 8 to NAS 1638 is required.

6.4.8 Installation notes

A. Mounting

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction pipe

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure:
0.8 bar abs.

Maximum suction pressure:
2.2 bar abs.

C. Drive

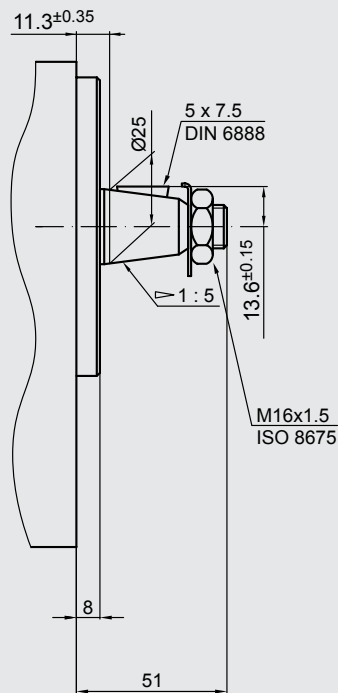
Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum permitted misalignment of the shafts is 0.2 mm and the angular deviation must be less than 0.2°.

For indirect drives (with gear, chain or belt drives) please consult Hydac.

DIMENSIONS

6.4.9 Drive shafts

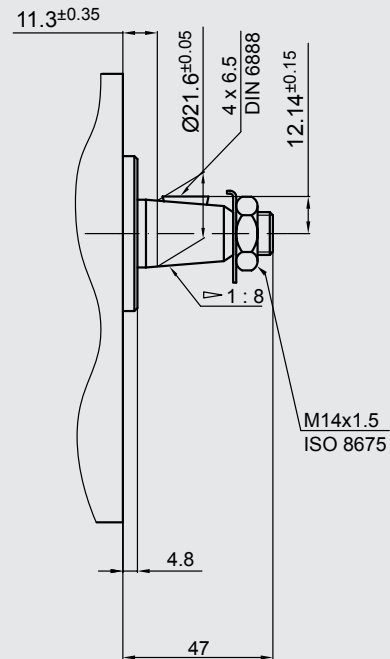
A Tapered keyed shaft 1:5



relevant mounting
flange



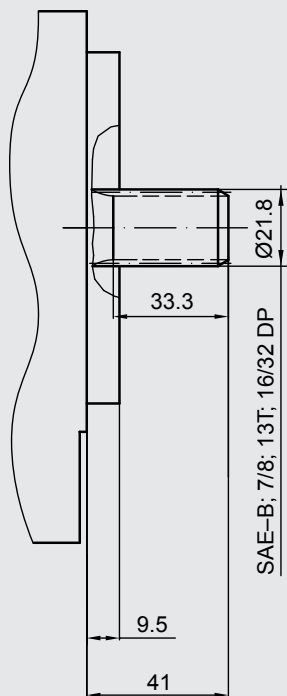
B Tapered keyed shaft 1:8



relevant mounting
flange



F Splined shaft
SAE B - J 744 22-4 13T



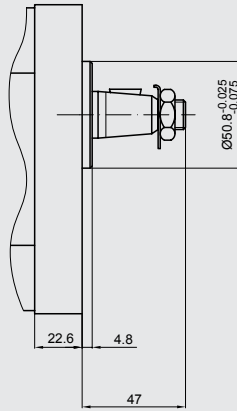
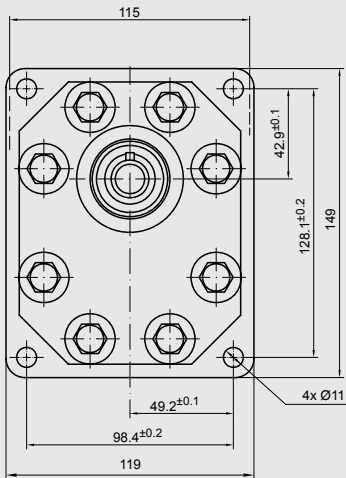
relevant mounting
flange



6.4.10 Mounting flange

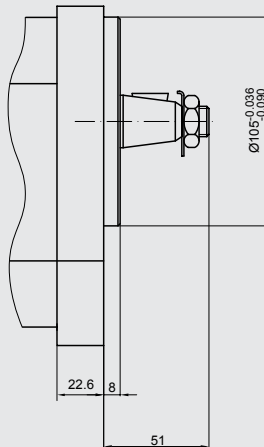
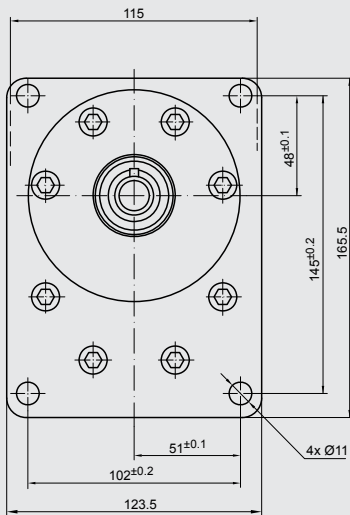
S

Square flange
centering Ø 50.8 mm



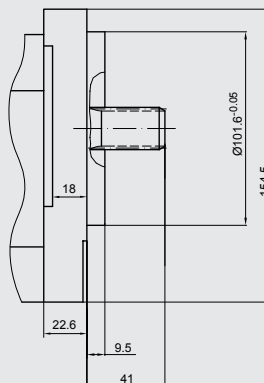
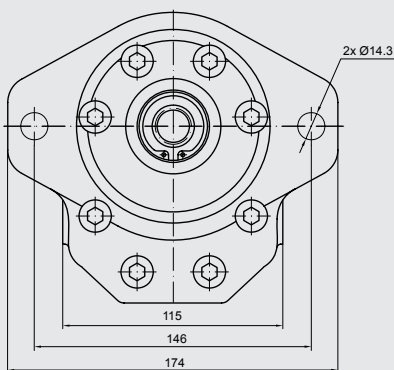
V

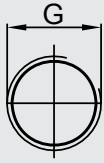
Square flange
centering Ø 105 mm



X

SAE J 744 101-2 B
Ø 101.6 mm

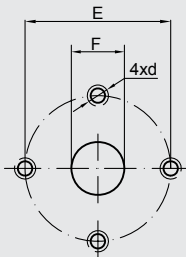




1

Pipe thread
ISO 228/1

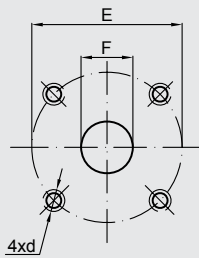
Ordering code	Displacement	Outlet G	Inlet G
1	20 ... 28 cm ³	G 3/4	G 3/4
	32 ... 60 cm ³	G 3/4	G 1



4

Square flange
(Italian design)

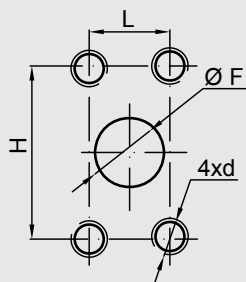
Ordering code	Displacement	Outlet			Inlet		
		F	E	d	F	E	d
4	20 ... 28 cm ³	19	40	M8	19	40	M8
	32 ... 60 cm ³	19	40	M8	27	51	M10



5

Square flange
DIN 3901/ ISO 8435

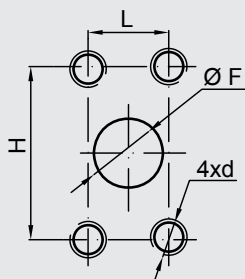
Ordering code	Displacement	Outlet			Inlet		
		F	E	d	F	E	d
5	20 ... 28 cm ³	19	40	M8	19	40	M8
	32 ... 60 cm ³	19	55	M8	27	55	M8



7

SAE flange with metric threads

Ordering code	Displacement	Outlet				Inlet			
		F	H	L	d	F	H	L	d
7	20 ... 28 cm ³	19	47.6	22.2	M10	19	47.6	22.2	M10
	32 ... 60 cm ³	19	47.6	22.2	M10	27	52.4	26.2	M10



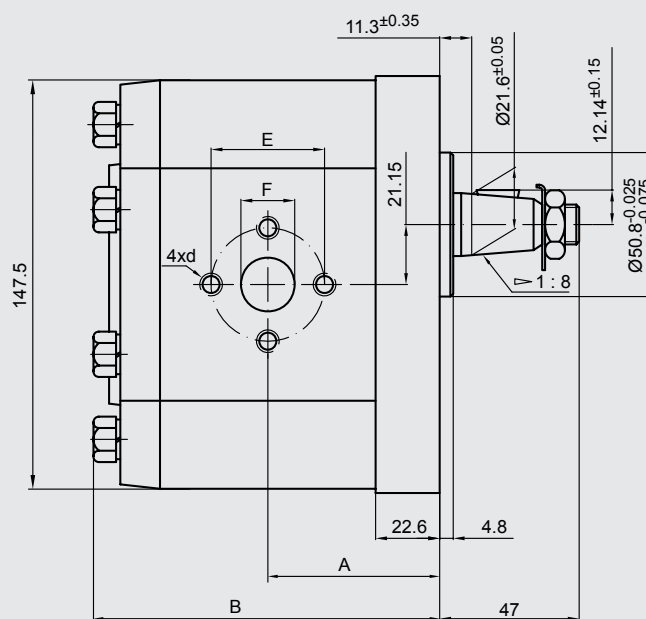
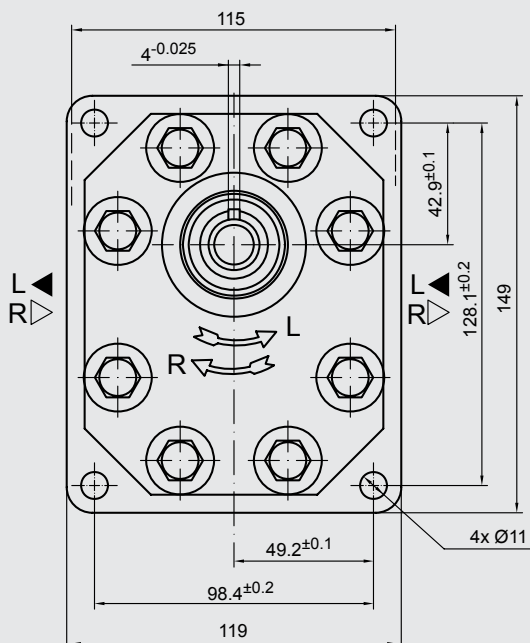
8

SAE flange with UNC threads

Ordering code	Displacement	Outlet				Inlet			
		F	H	L	d	F	H	L	d
8	20 ... 28 cm ³	19	47.6	22.2	3/8 - 16 UNC	19	47.6	22.2	3/8 - 16 UNC
	32 ... 60 cm ³	19	47.6	22.2		27	52.4	26.2	

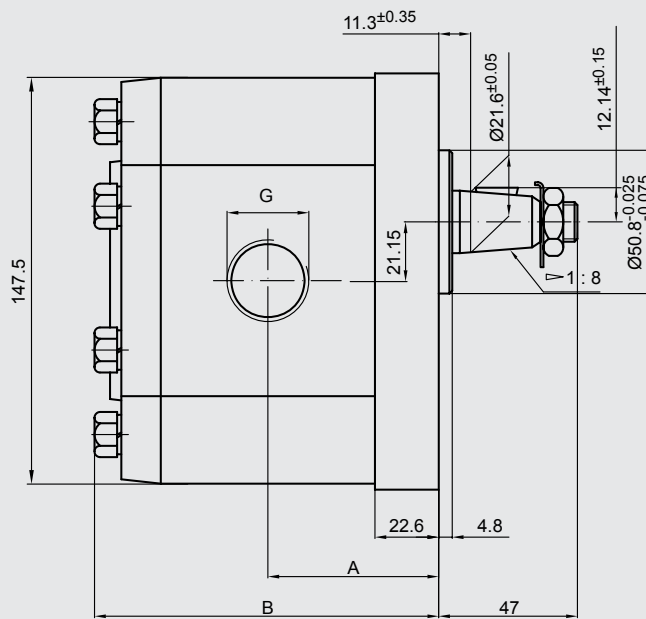
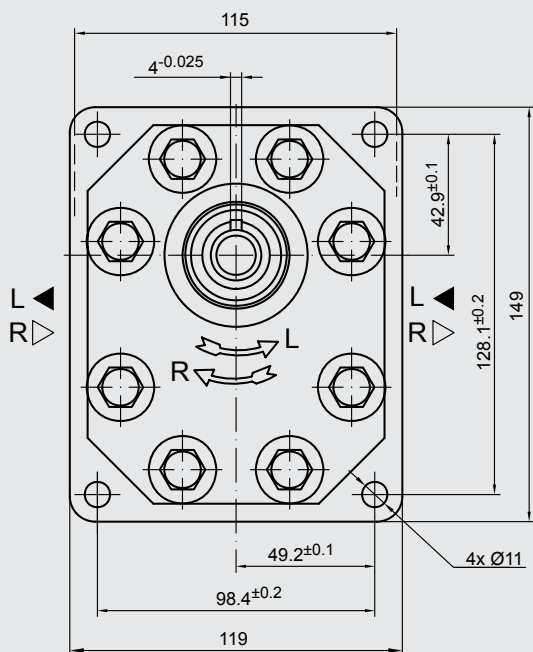
6.4.12 Preferred series

PGE103-...-BS4-N



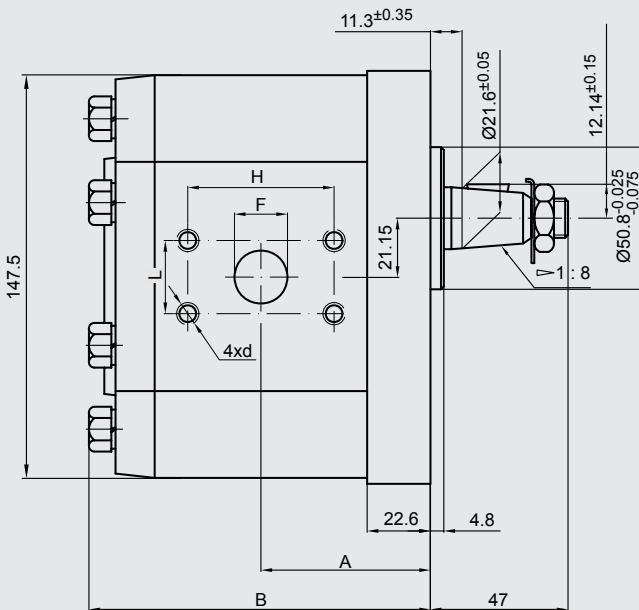
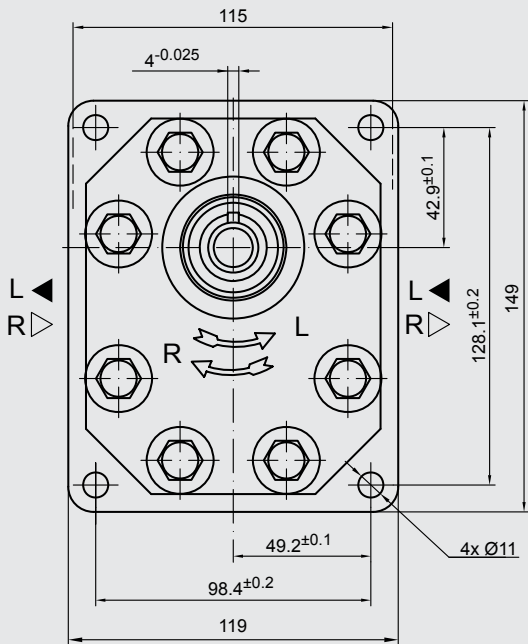
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet		Outlet			
								E	F	d	E	F	d
PGE103-2000-. BS4-N	20	28.2	56.4	250	3000	56.1	116.7	40	19	M8	40	19	M8
PGE103-2250-. BS4-N	22.5	31.7	63.5			57.6	119.7						
PGE103-2500-. BS4-N	25	35.3	70.5			58.3	121.1						
PGE103-2800-. BS4-N	28	39.5	79			60.2	124.7						
PGE103-3200-. BS4-N	32	45.1	90.2			66.5	137.3						
PGE103-3600-. BS4-N	36	51.3	95.8	240	2800	68.0	140.5	51	27	M10	40	19	M8
PGE103-4200-. BS4-N	42	59.9	99.8	230	2500	70.8	146.1						
PGE103-4600-. BS4-N	46	65.6	100.5	210	2300	72.7	149.8						
PGE103-5000-. BS4-N	50	71.3	99.8	185	2100	74.5	153.4						
PGE103-5500-. BS4-N	55	78.4	91.4	165	1750	76.7	157.9						
PGE103-6000-. BS4-N	60	85.5	99.8	150		78.7	162.4						

PGE103-...-BS1-N



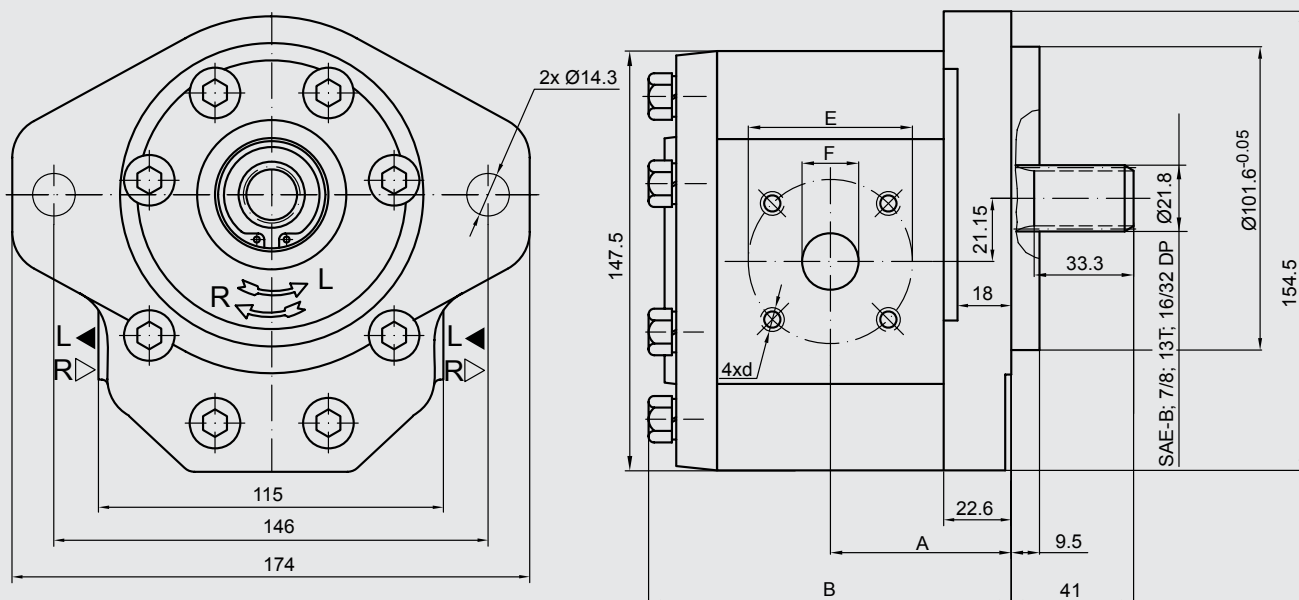
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	Outlet G
PGE103-2000-. BS1-N	20	28.2	56.4	250	3000	56.1	116.7	G 3/4	G 3/4
PGE103-2250-. BS1-N	22.5	31.7	63.5			57.6	119.7		
PGE103-2500-. BS1-N	25	35.3	70.5			58.3	121.1		
PGE103-2800-. BS1-N	28	39.5	79			60.2	124.7		
PGE103-3200-. BS1-N	32	45.1	90.2			66.5	137.3		
PGE103-3600-. BS1-N	36	51.3	95.8	240	2800	68.0	140.5	G 1	
PGE103-4200-. BS1-N	42	59.9	99.8	230	2500	70.8	146.1		
PGE103-4600-. BS1-N	46	65.6	100.5	210	2300	72.7	149.8		
PGE103-5000-. BS1-N	50	71.3	99.8	185	2100	74.5	153.4		
PGE103-5500-. BS1-N	55	78.4	91.4	165	1750	76.7	157.9		
PGE103-6000-. BS1-N	60	85.5	99.8	150		78.7	162.4		

PGE103-...-.BS7-N



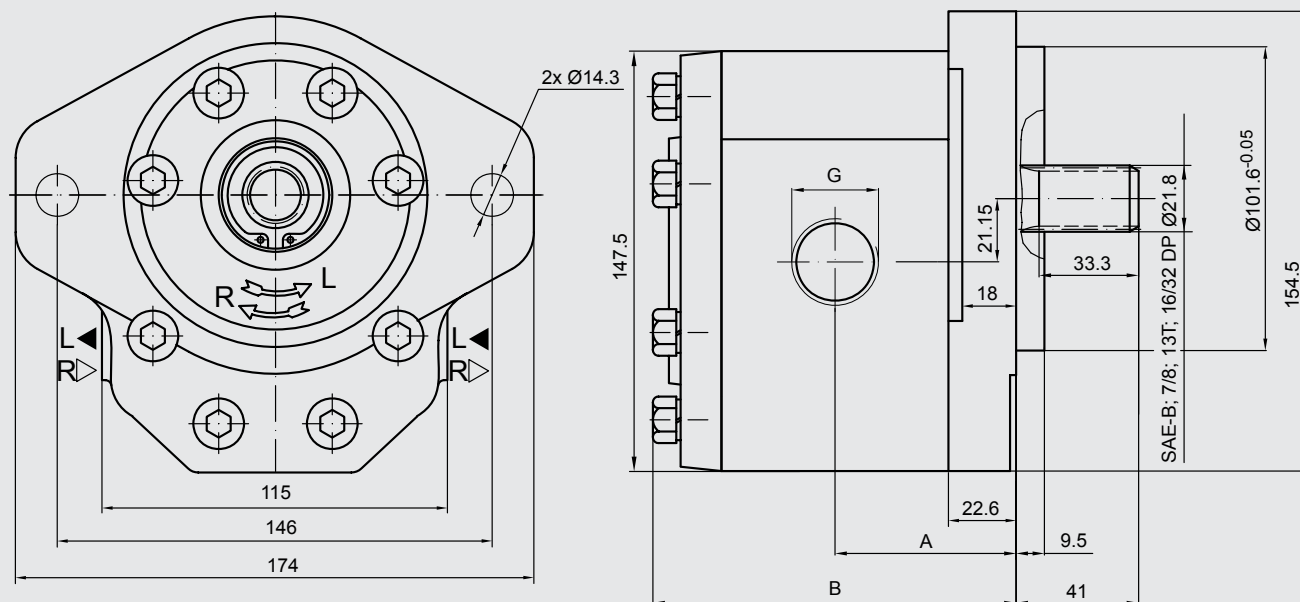
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension									
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet				Outlet			
								H	F	L	d	H	F	L	d
PGE103-2000-. BS7-N	20	28.2	56.4	250	3000	56.1	116.7	52.4	27	26.2	M10	52.4	19	26.2	M10
PGE103-2250-. BS7-N	22.5	31.7	63.5			57.6	119.7								
PGE103-2500-. BS7-N	25	35.3	70.5			58.3	121.1								
PGE103-2800-. BS7-N	28	39.5	79			60.2	124.7								
PGE103-3200-. BS7-N	32	45.1	90.2			66.5	137.3								
PGE103-3600-. BS7-N	36	51.3	95.8	240	2800	68.0	140.5								
PGE103-4200-. BS7-N	42	59.9	99.8	230	2500	70.8	146.1								
PGE103-4600-. BS7-N	46	65.6	100.5	210	2300	72.7	149.8								
PGE103-5000-. BS7-N	50	71.3	99.8	185	2100	74.5	153.4								
PGE103-5500-. BS7-N	55	78.4	91.4	165	1750	76.7	157.9								
PGE103-6000-. BS7-N	60	85.5	99.8	150		78.7	162.4								

PGE103-...-FX5-N



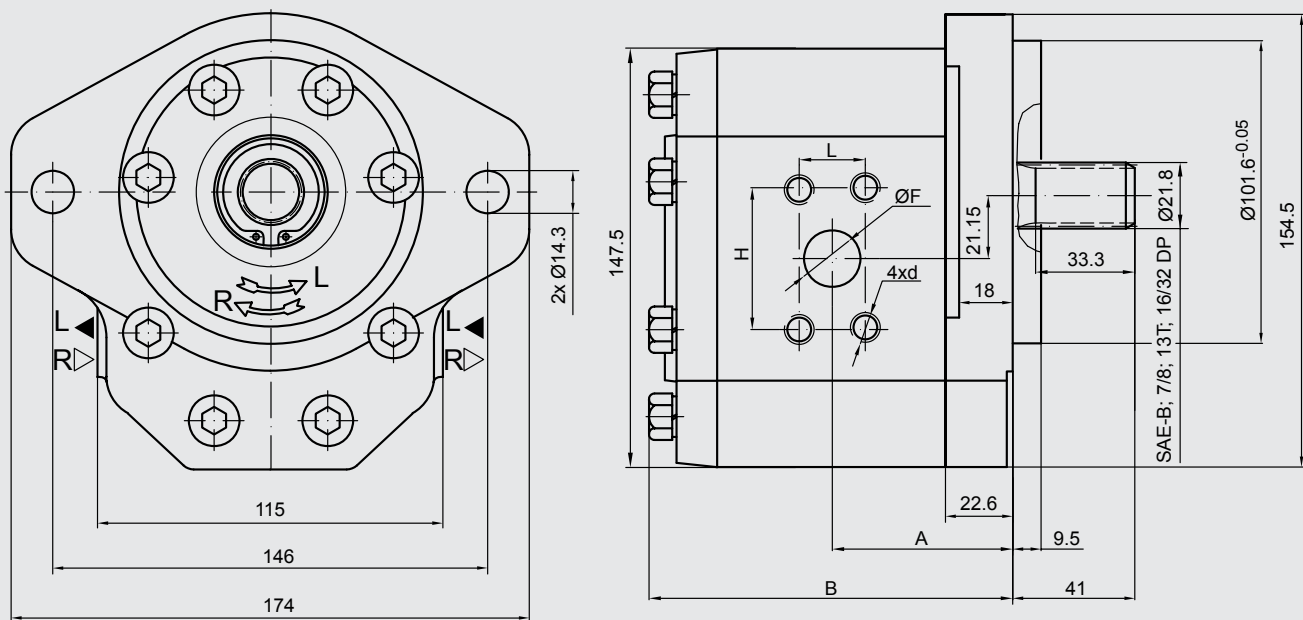
Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension					
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet		Outlet	
								E	F	d	
PGE103-2000-. FX5-N	20	28.2	56.4	250	3000	56.1	116.7	40	19	40	M8
PGE103-2250-. FX5-N	22.5	31.7	63.5			57.6	119.7				
PGE103-2500-. FX5-N	25	35.3	70.5			58.3	121.1				
PGE103-2800-. FX5-N	28	39.5	79			60.2	124.7				
PGE103-3200-. FX5-N	32	45.1	90.2			66.5	137.3				
PGE103-3600-. FX5-N	36	51.3	95.8	240	2800	68.0	140.5	55	27	55	19 M8
PGE103-4200-. FX5-N	42	59.9	99.8	230	2500	70.8	146.1				
PGE103-4600-. FX5-N	46	65.6	100.5	210	2300	72.7	149.8				
PGE103-5000-. FX5-N	50	71.3	99.8	185	2100	74.5	153.4				
PGE103-5500-. FX5-N	55	78.4	91.4	165	1750	76.7	157.9				
PGE103-6000-. FX5-N	60	85.5	99.8	150		78.7	162.4				

PGE103-...-FX1-N



Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension			Outlet G
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet G	
PGE103-2000-. FX1-N	20	28.2	56.4	250	3000	56.1	116.7	G 3/4	G 3/4
PGE103-2250-. FX1-N	22.5	31.7	63.5			57.6	119.7		
PGE103-2500-. FX1-N	25	35.3	70.5			58.3	121.1		
PGE103-2800-. FX1-N	28	39.5	79			60.2	124.7		
PGE103-3200-. FX1-N	32	45.1	90.2			66.5	137.3		
PGE103-3600-. FX1-N	36	51.3	95.8	240	2800	68.0	140.5	G 1	
PGE103-4200-. FX1-N	42	59.9	99.8	230	2500	70.8	146.1		
PGE103-4600-. FX1-N	46	65.6	100.5	210	2300	72.7	149.8		
PGE103-5000-. FX1-N	50	71.3	99.8	185	2100	74.5	153.4		
PGE103-5500-. FX1-N	55	78.4	91.4	165	1750	76.7	157.9		
PGE103-6000-. FX1-N	60	85.5	99.8	150		78.7	162.4		

PGE103-...-FX7-N



Type	Displacement [cm³/rev]	Output flow		Rated [bar]	Drive speed n [rpm]	Dimension									
		at 1500 rpm [l/min]	at max. rpm [l/min]			A [mm]	B [mm]	Inlet				Outlet			
								H	F	L	d	H	F	L	d
PGE103-2000-. FX7-N	20	28.2	56.4	250	3000	56.1	116.7	47.6	19	22.2					
PGE103-2250-. FX7-N	22.5	31.7	63.5			57.6	119.7								
PGE103-2500-. FX7-N	25	35.3	70.5			58.3	121.1								
PGE103-2800-. FX7-N	28	39.5	79			60.2	124.7								
PGE103-3200-. FX7-N	32	45.1	90.2			66.5	137.3								
PGE103-3600-. FX7-N	36	51.3	95.8	240	2800	68.0	140.5	52.4	27	26.2	M10	47.6	19	22.2	M10
PGE103-4200-. FX7-N	42	59.9	99.8	230	2500	70.8	146.1								
PGE103-4600-. FX7-N	46	65.6	100.5	210	2300	72.7	149.8								
PGE103-5000-. FX7-N	50	71.3	99.8	185	2100	74.5	153.4								
PGE103-5500-. FX7-N	55	78.4	91.4	165	1750	76.7	157.9								
PGE103-6000-. FX7-N	60	85.5	99.8	150		78.7	162.4								



6.5 MULTIPLE PUMPS

CONTENTS

PGE104

Ordering Code	6.5.1 External Gear Pump
Technical Information	6.5.2 Specifications 6.5.3 Hydraulic fluids 6.5.4 Viscosity range 6.5.5 Temperature range 6.5.6 Seals 6.5.7 Filtration 6.5.8 General notes 6.5.9 Max. drive and through drive torques 6.5.10 Pressure restrictions for through drive pumps 6.5.11 Installation notes
Dimensions	6.5.12 Drive shafts for front pump size 1 6.5.13 Drive shafts for front pump size 2 6.5.14 Drive shafts for front pump size 3 6.5.15 Mounting flange for front pump size 1 6.5.16 Mounting flange for front pump size 2 6.5.17 Mounting flange for front pump size 3 6.5.18 Ports
Preferred series	6.5.19 Double pump size 1 6.5.20 Triple pump size 1 6.5.21 Double pump size 2 6.5.22 Triple pump size 2 6.5.23 Double pump size 2 / size 1 6.5.24 Triple pump size 2 / size 2 / size 1 6.5.25 Triple pump size 2 / size 1 / size 1 6.5.26 Double pump size 3 6.5.27 Triple pump size 3 6.5.28 Double pump size 3 / size 2 6.5.29 Triple pump size 3 / size 3 / size 2 6.5.30 Triple pump size 3 / size 2 / size 2 6.5.31 Double pump size 3 / size 1 6.5.32 Triple pump size 3 / size 1 / size 1 6.5.33 Triple pump size 3 / size 2 / size 1

ORDERING CODE

6.5.1 External Gear Pump

PGE104 – 1000 / 1000 / 1000 – R B R 1 / 1 / 1 – N – XXXX

External gear pump

Displacement

	Stage 1	Stage 2	Stage 3
Size 1	100	100	100
	125	125	125
	160	160	160
	200	200	200
	250	250	250
	315	315	315
	365	365	365
	420	420	420
	500	500	500
	610	610	610
740	740	740	
Size 2	450	450	450
	630	630	630
	820	820	820
	1000	1000	1000
	1130	1130	1130
	1200	1200	1200
	1400 /	1400 /	1400
	1500	1500	1500
	1600	1600	1600
	1900	1900	1900
	2200	2200	2200
	2500	2500	2500
Size 3	2000	2000	2000
	2250	2250	2250
	2500	2500	2500
	2800	2800	2800
	3200	3200	3200
	3600	3600	3600
	4200	4200	4200
	4600	4600	4600
	5000	5000	5000
	5500	5500	5500
6000	6000	6000	

Shaft rotation (viewed from shaft end)

R Clockwise

L Anti-clockwise

Shaft

A Tapered keyed shaft 1:5

B Tapered keyed shaft 1:8

E Splined shaft SAE A - J 744 16-4 9T (only for front pump size 2)

F Splined shaft SAE B - J 744 22-4 13T (only for front pump size 3)

PGE104 – 1000 / 1000 / 1000 – R B R 1 / 1 / 1 – N – XXXX

Mounting flange

- L 2-hole mounting, centering Ø 32 mm (only for front pump size 1)
- Q Square flange, centering Ø 25.4 mm (only for front pump size 1)
- N 2-hole mounting, centering Ø 50 mm (only for front pump size 2)
- R Square flange, centering Ø 36.5 mm (only for front pump size 2)
- T Square flange, centering Ø 80 mm (only for front pump size 2)
- W SAE J 744 82-2 A Ø 82.55 mm (only for front pump size 2)
- S Square flange, centering Ø 50.8 mm (only for front pump size 3)
- V Square flange, centering Ø 105 mm (only for front pump size 3)
- X SAE J 744 101-2 B Ø 101.6 mm (only for front pump size 3)

Ports

- 1 Pipe thread ISO 228-1
- 2 Metric thread DIN 3852-1
- 3 Thread UN 2B SAE O-ring boss
- 4 Square flange (Italian design)
- 5 Square flange DIN 3901/ ISO 8435
- 7 SAE flange with metric threads (only for size 3)
- 8 SAE flange with UNC threads (only for size 3)
- 9 Special ports (only on request)

Seals

- N NBR
- V FPM

Modification number

XXXX Determined by manufacturer

Not all options in the ordering code are possible.

Only combinations of the same size or in descending order are possible.

Please refer to 6.5.19 ff - Preferred series, or consult HYDAC.

Special options are possible on request.

TECHNICAL INFORMATION

6.5.2 Specifications

Single pump Size 1			100	125	160	200	250	315	365	420	500	610	740
Geometric displacement		[cm³/rev]	1	1.25	1.6	2	2.5	3.15	3.65	4.2	5	6.1	7.4
Pressure	Rated	[bar]	250									200	170
	Peak		300									230	200
Drive speed	Min.	[rpm]	750										
	Max.		3500								3000	2500	
Approx. weight		[kg]	1	1.02	1.04	1.05	1.07	1.11	1.14	1.18	1.25	1.3	1.37

Single pump Size 2			450	630	820	1000	1130	1200	1400	1500	1600	1900	2200	2500
Geometric displacement		[cm³/rev]	4.5	6.3	8.2	10	11.3	12	14	15	16	19	22	25
Pressure	Rated	[bar]	250									200	180	160
	Peak		300						280			230	210	150
Drive speed	Min.	[rpm]	750											
	Max.		3500						2500			2000		
Approx. weight		[kg]	3.34	3.36	3.37	3.57	3.62	3.64	3.78	4.16	4.2	4.32	4.44	4.56

Single pump Size 3			2000	2250	2500	2800	3200	3600	4200	4600	5000	5500	6000
Geometric displacement		[cm³/rev]	20	22.5	25	28	32	36	42	46	50	55	60
Pressure	Rated	[bar]	250					240	230	210	185	165	150
	Peak		300					280	270	250	230	200	180
Drive speed	Min.	[rpm]	750										
	Max.		3000					2800	2500	2300	2100	1750	
Approx. weight		[kg]	7.83	8.0	8.16	8.34	8.78	8.99	9.25	9.47	9.60	9.85	10.10

The continuous and maximum pressures given here only apply to pumps with flange ports. If threaded ports are required, the performance will be reduced. To find out whether a pump with threaded ports can be used in a high pressure application, please contact HYDAC.

6.5.3 Hydraulic fluids

The pump series is designed for use with

HL Hydraulic oil
(normal mineral oil)
and

HLP Hydraulic oils of the R&O type
(Rust and Oxidation inhibitor)

6.5.4 Viscosity range

Normal operating viscosity:
16 - 200 cSt (mm²/s)

For other viscosity ranges, please
contact HYDAC.

6.5.5 Temperature range

Ambient temperature range
-22 to 55 °C

Fluid temperature range
NBR

-25 to 85 °C

Viton

-15 to 90 °C

6.5.6 Seals

The pump series is equipped with NBR seals.

If special hydraulic fluids are used, the seal material must be changed if required. Please contact HYDAC.

6.5.7 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class:

21/ 18/ 15 to ISO 4406:1999

or

Class 9 to NAS 1638 or cleaner.

At system pressures above 160 bar cleanliness class:

19/17/14 to ISO 4406:1999

or

Class 8 to NAS 1638 is required.

6.5.8 General notes

Gear pumps can be combined to form double or triple units (for larger units please contact HYDAC). Generally, the specifications for single pumps apply, but the following must be observed:

- Only pumps of the same size or in decreasing order of size can be combined.
- It is recommended that the pump with the largest displacement is used as the front pump.
- The maximum speed of the multiple unit is limited to that of the individual stage with the lowest speed.
- The maximum pressure of the pump unit or the individual stages is determined by the maximum drive and through drive torques (see point 6.5.9).

6.5.9 Max. drive and through drive torques

Size	Drive shaft	Max. drive torque	Max. through drive torque		
			Secondary pump Size 1	Secondary pump Size 2	Secondary pump Size 3
1	Tapered 1 : 5	30 Nm	30 Nm		
	Tapered 1 : 8	30 Nm			
2	Tapered 1 : 5	193 Nm	30 Nm	65 Nm	
	Tapered 1 : 8	198 Nm			
	Splined SAE A	86 Nm			
3	Tapered 1 : 5	301 Nm	30 Nm	65 Nm	228 Nm
	Tapered 1 : 8	218 Nm			
	Splined SAE B	272 Nm			

The resulting torque can be calculated by the following formula:

$$M_{\max} = \frac{\Delta p_1 \cdot V_1}{20 \cdot \pi \cdot \eta_{mh}} + \frac{\Delta p_2 \cdot V_2}{20 \cdot \pi \cdot \eta_{mh}} + \frac{\Delta p_3 \cdot V_3}{20 \cdot \pi \cdot \eta_{mh}}$$

Efficiency $\eta_{mh} \approx 0.8 - 0.9$

6.5.10 Pressure restrictions for through drive pumps

There is a pressure restriction at maximum pressure for the secondary and any further pumps due to the maximum permitted through drive torque.

Size	Displacement [cm³/rev]	Peak pressure [bar]
2	16	220
	19	190
	22	160
	25	130

6.5.11 Installation notes

The pump can be installed horizontally or vertically with the shaft at the top. If the pump is installed on the tank or above the oil level, the distance between the pump inlet and the oil level should not exceed 1 metre.

When installing a HYDAC pump always ensure that the fluid remains in the pump during stoppages.

B. Suction line

If the pump is installed above the oil level, particular attention must be paid to the suction pressure. The minimum cross-section of the suction pipe must be equal to or larger than the cross-section of the pump port. The suction pressure must be kept within the values specified.

Minimum suction pressure:

0.8 bar abs.

Maximum suction pressure:

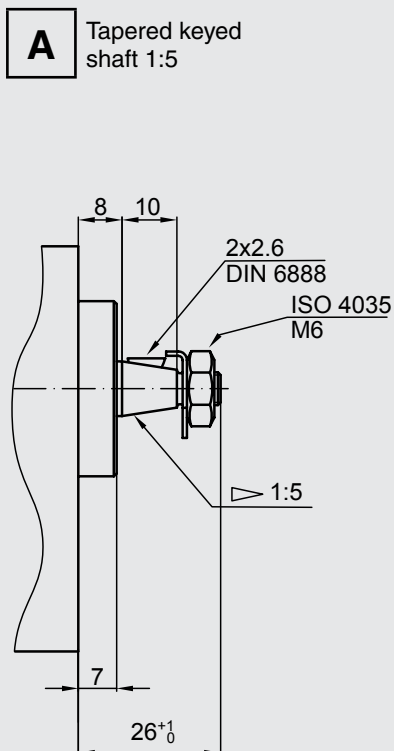
2.2 bar abs.

C. Drive

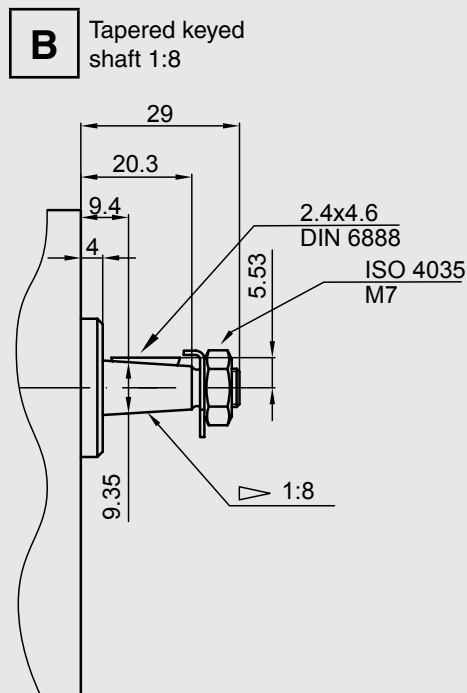
Use a flexible coupling whenever possible. There must not be any radial or axial forces on the pump shaft. The maximum permitted misalignment is 0.2 mm and the angular deviation must be less than 0.2°. Where there may be excessive bending moments or vibrations, the pump unit must be supported by suitable means.

DIMENSIONS

6.5.12 Drive shafts for front pump size 1

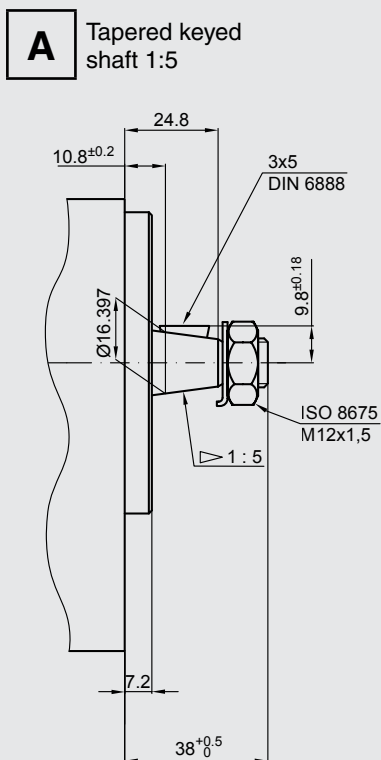


relevant mounting flange: **L**

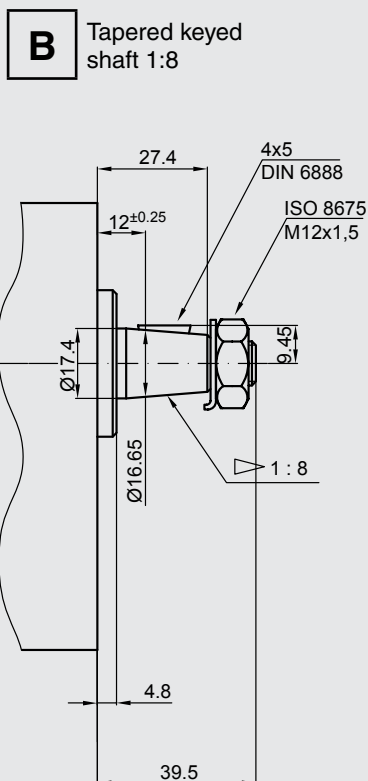


relevant mounting flange: **Q**

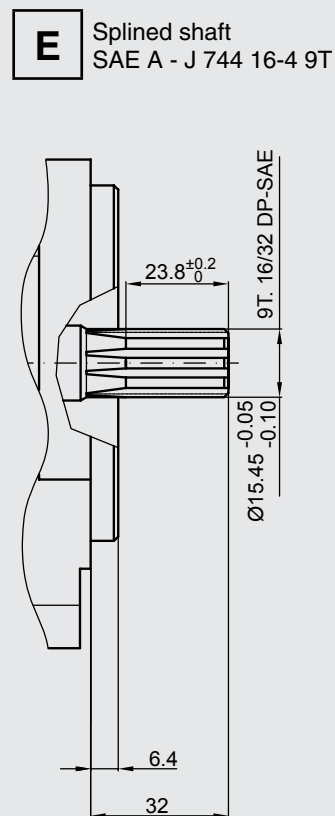
6.5.13 Drive shafts for front pump size 2



relevant mounting flange: **N** **T**



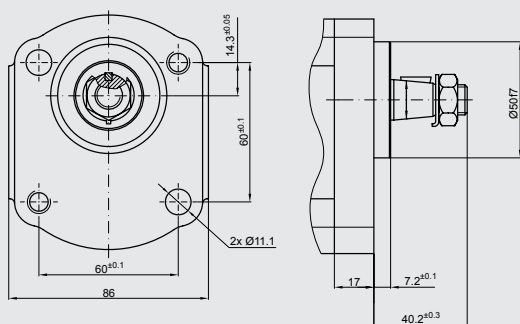
relevant mounting flange: **R**



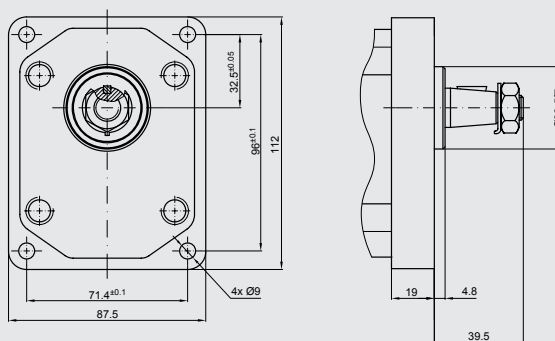
relevant mounting flange: **W**

6.5.16 Mounting flange for front pump size 2

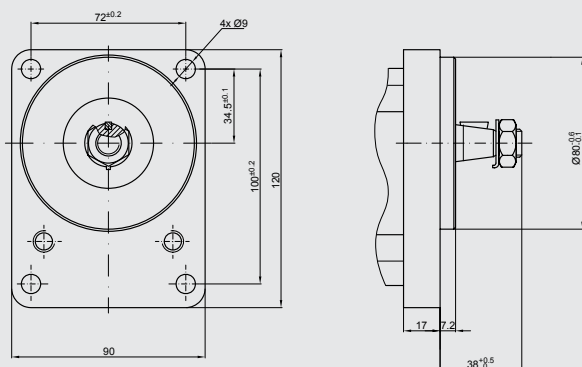
N 2-hole mounting
centering $\varnothing 50$ mm



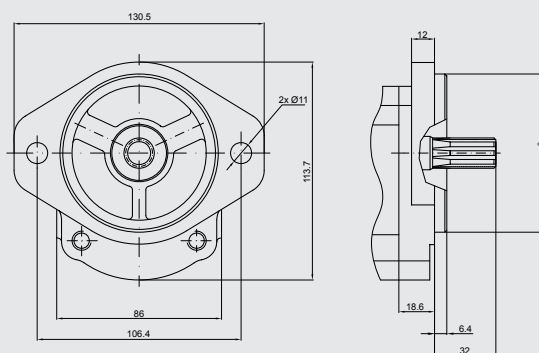
R Square flange
centering $\varnothing 36.5$ mm



T Square flange
centering $\varnothing 80$ mm

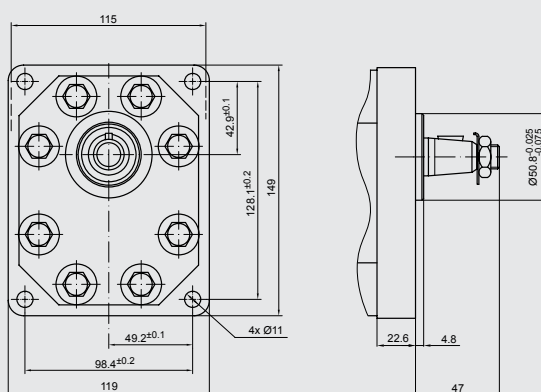


W SAE J 744 82-2 A
 $\varnothing 82.55$ mm

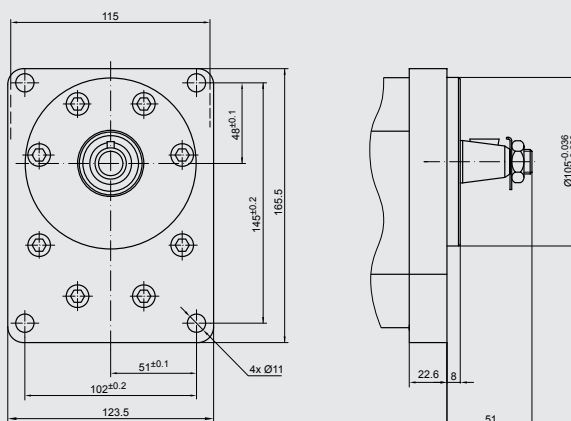


6.5.17 Mounting flange for front pump size 3

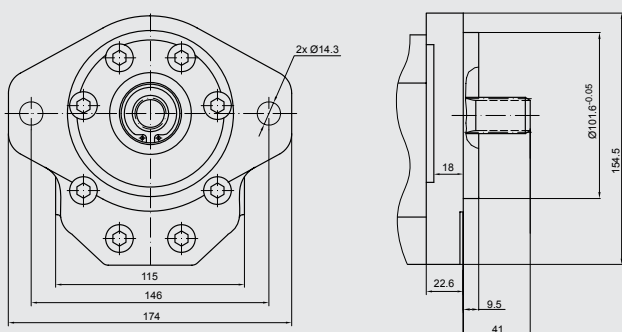
S Square flange
centering $\varnothing 50.8$ mm



V Square flange
centering $\varnothing 105$ mm



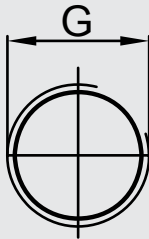
X SAE J 744 101-2 B
 $\varnothing 101.6$ mm



6.5.18 Ports

1

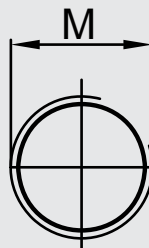
Pipe thread
ISO 228/1



Ordering code	Size	Displacement	Outlet G	Inlet G
1	1	1 ... 2.5 cm ³	G 3/8	G 3/8
		3.15 ... 7.4 cm ³	G 3/8	G 1/2
	2	4.5 ... 8.2 cm ³	G 1/2	G 1/2
		10 ... 25 cm ³	G 1/2	G 3/4
	3	20 ... 28 cm ³	G 3/4	G 3/4
		32 ... 60 cm ³	G 3/4	G1

2

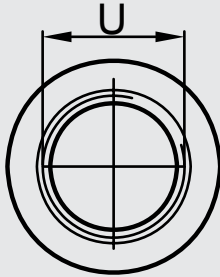
Metric thread
DIN 3852-1



Ordering code	Size	Displacement	Outlet M	Inlet M
2	1	1 ... 2.5 cm ³	M16x1.5	M16x1.5
		3.15 ... 6.1 cm ³	M16x1.5	M20x1.5
		7.4 cm ³	M18x1.5	M22x1.5
	2	4.5 ... 25 cm ³	M16x1.5	M20x1.5

3

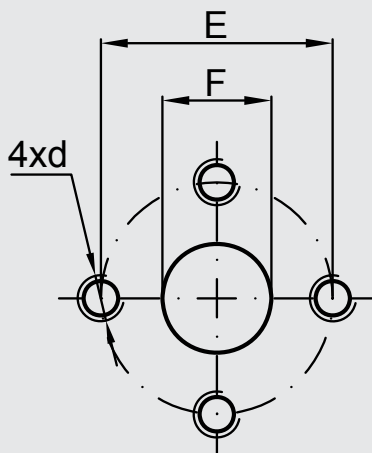
Pipe thread
UN 2B SAE
O-ring boss



Ordering code	Size	Displacement	Outlet U	Inlet U
3	1	1 ... 6.1 cm ³	9/16-18 UNF	3/4-16 UNF
		7.4 cm ³	3/4-16 UNF	7/8-14 UNF
	2	4.5 ... 25 cm ³	7/8-14 UNF	1 1/16-12 UN

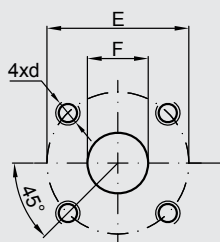
4

Square flange
(Italian design)



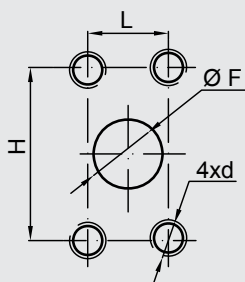
Ordering code	Size	Displacement	Outlet			Inlet		
			F	E	d	F	E	d
4	1	1 ... 7.4 cm ³	12	30	M6	12	30	M6
	2	4.5 ... 8.2 cm ³	13.1	30	M6	13.1	30	M6
		10 ... 22 cm ³	14.2	30	M6	19	40	M8
		25 cm ³	19	40	M8	19	40	M8
	3	20 ... 28 cm ³	19	40	M8	19	40	M8
		32 ... 60 cm ³	19	40	M8	27	51	M10

5 Square flange DIN 3901/ ISO 8435



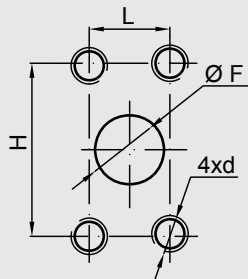
Ordering code	Size	Displacement	Outlet			Inlet		
			F	E	d	F	E	d
5	1	1 ... 7.4 cm ³	12	30	M6	12	30	M6
	2	4.5 ... 6.3 cm ³	15	35	M6	15	40	M6
		8.2 ... 25 cm ³	15	35	M6	20	40	M6
	3	20 ... 28 cm ³	19	40	M8	19	40	M8
		32 ... 60 cm ³	19	55	M8	27	55	M8

7 SAE flange with metric threads



Ordering code	Size	Displacement	Outlet				Inlet			
			F	H	L	d	F	H	L	d
7	3	20 ... 28 cm ³	19	47.6	22.2	M10	19	47.6	22.2	M10
		32 ... 60 cm ³	19	47.6	22.2	M10	27	52.4	26.2	M10

8 SAE flange with UNC threads

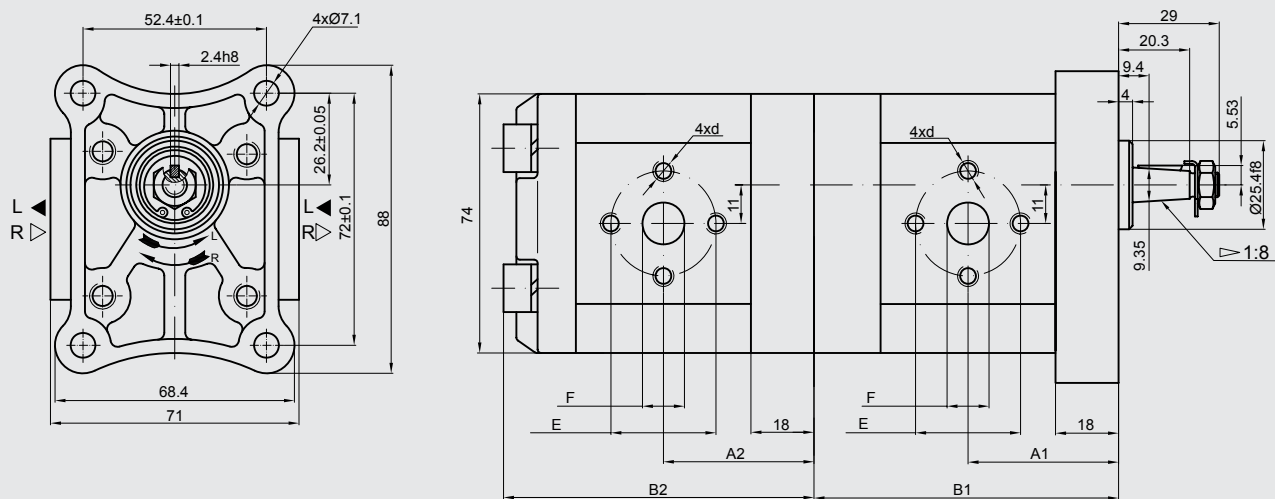


Ordering code	Size	Displacement	Outlet				Inlet			
			F	H	L	d	F	H	L	d
8	3	20 ... 28 cm ³	19	47.6	22.2	3/8 - 16 UNC	19	47.6	22.2	3/8 - 16 UNC
		32 ... 60 cm ³	19	47.6	22.2		27	52.4	26.2	

PREFERRED SERIES

6.5.19 Double pump size 1

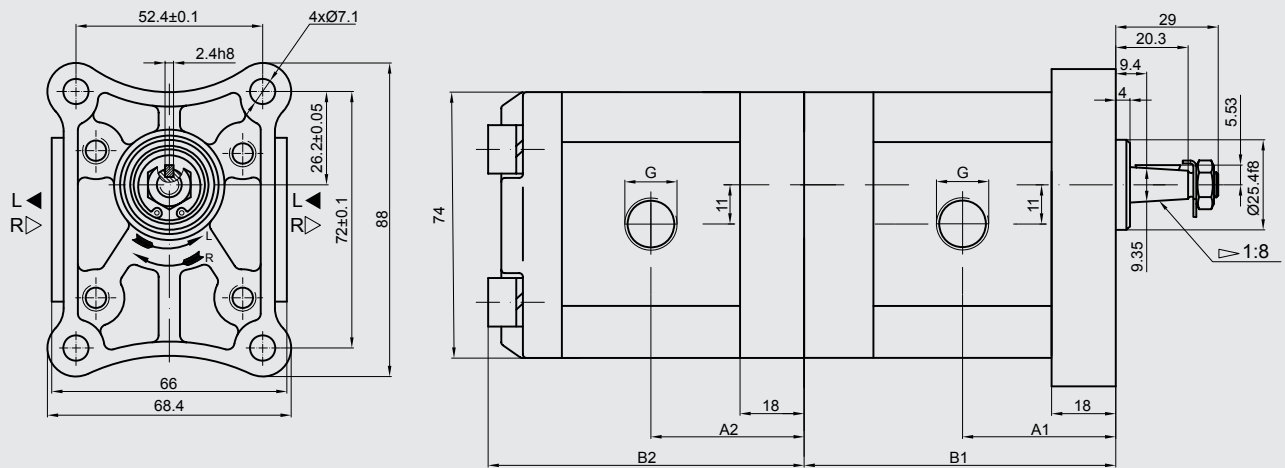
PGE104-.../...-BQ4/4-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
100	1	1.40	3.26	250	3500
125	1.25	1.74	4.07		
160	1.6	2.23	5.21		
200	2	2.82	6.58		
250	2.5	3.53	8.23		
315	3.15	4.44	10.36		
365	3.65	5.15	12.01		
420	4.2	5.92	13.82		
500	5	7.05	16.45	200	3000
610	6.1	8.69	14.49		2500
740	7.4	10.55	17.58		

Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E	F	d	E	F	d
100	39.1	79.1	39.1	79	30	12	M6	30	12	M6
125	39.5	80.1	39.5	80						
160	40.3	81.5	40.3	81.6						
200	41.1	83.2	41.1	83.2						
250	42.1	85.2	42.1	85.2						
315	43.5	87.8	43.5	87.8						
365	44.4	89.8	44.4	89.9						
420	45.5	92	45.5	92.1						
500	47.1	95.2	47.1	95.2						
610	49.4	99.8	49.4	99.8						
740	52.1	105.2	52.1	105.2						

PGE104-.../...-BQ1/1-N

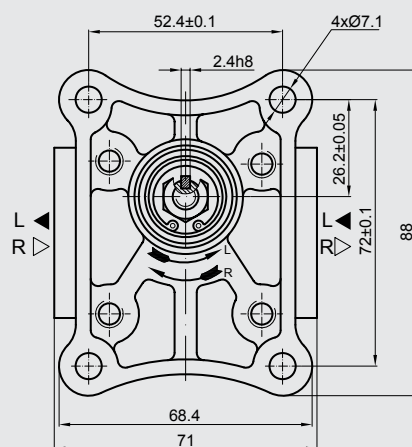
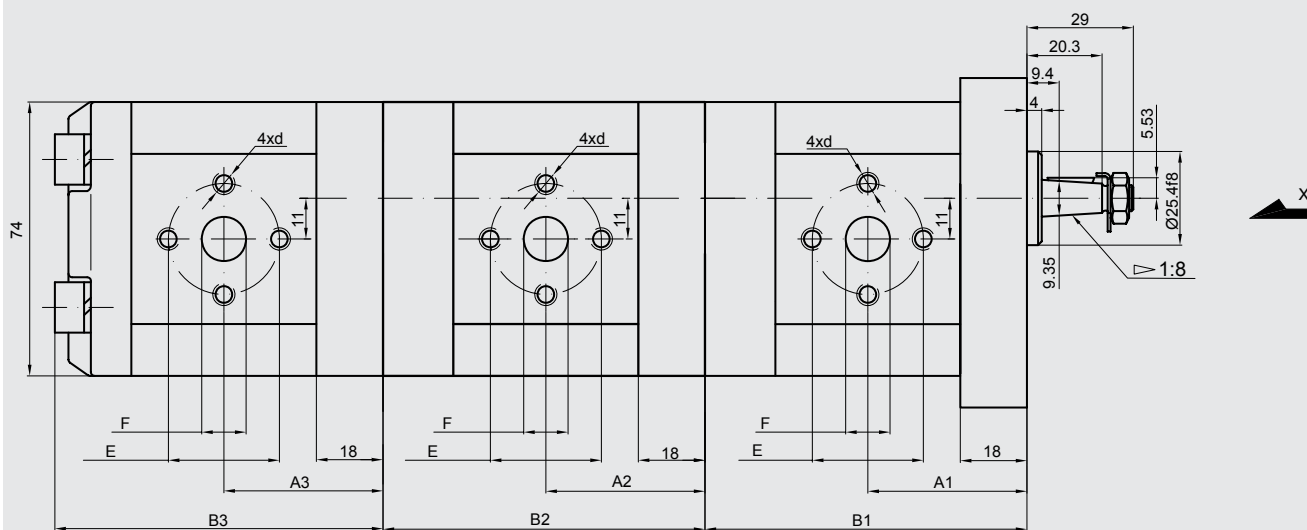


Displacement	Geometric displacement [cm ³ /rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
100	1	1.40	3.26	250	3500
125	1.25	1.74	4.07		
160	1.6	2.23	5.21		
200	2	2.82	6.58		
250	2.5	3.53	8.23		
315	3.15	4.44	10.36		
365	3.65	5.15	12.01		
420	4.2	5.92	13.82		
500	5	7.05	14.10	200	3000
610	6.1	8.69	14.49		2500
740	7.4	10.55	17.58	170	

Displacement	Dimensions				Inlet G	Outlet G
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]		
100	39.1	79.1	39.1	79	G 3/8	G 3/8
125	39.5	80.1	39.5	80		
160	40.3	81.5	40.3	81.6		
200	41.1	83.2	41.1	83.2		
250	42.1	85.2	42.1	85.2		
315	43.5	87.8	43.5	87.8	G 1/2	
365	44.4	89.8	44.4	89.9		
420	45.5	92	45.5	92.1		
500	47.1	95.2	47.1	95.2		
610	49.4	99.8	49.4	99.8		
740	52.1	105.2	52.1	105.2		

6.5.20 Triple pump size 1

PGE104-.../.../...-BQ4/4/4-N



View X

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
100	1	1.40	3.26	250	3500
125	1.25	1.74	4.07		
160	1.6	2.23	5.21		
200	2	2.82	6.58		
250	2.5	3.53	8.23		
315	3.15	4.44	10.36		
365	3.65	5.15	12.01		
420	4.2	5.92	13.82		
500	5	7.05	16.45	200	3000
610	6.1	8.69	14.49		2500
740	7.4	10.55	17.58	170	

Displacement	Dimensions						Inlet			Outlet		
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	E	F	d	E	F	d
100	39.1	79.1	39.1	79	39.1	79	30	12	M6	30	12	M6
125	39.5	80.1	39.5	80	39.5	80						
160	40.3	81.5	40.3	81.6	40.3	81.6						
200	41.1	83.2	41.1	83.2	41.1	83.2						
250	42.1	85.2	42.1	85.2	42.1	85.2						
315	43.5	87.8	43.5	87.8	43.5	87.8						
365	44.4	89.8	44.4	89.9	44.4	89.9						
420	45.5	92	45.5	92.1	45.5	92.1						
500	47.1	95.2	47.1	95.2	47.1	95.2						
610	49.4	99.8	49.4	99.8	49.4	99.8						
740	52.1	105.2	52.1	105.2	52.1	105.2						

Technical drawing of a three-sectioned metal profile. The drawing shows a side view with dimensions and a cross-sectional view on the right.

Dimensions:

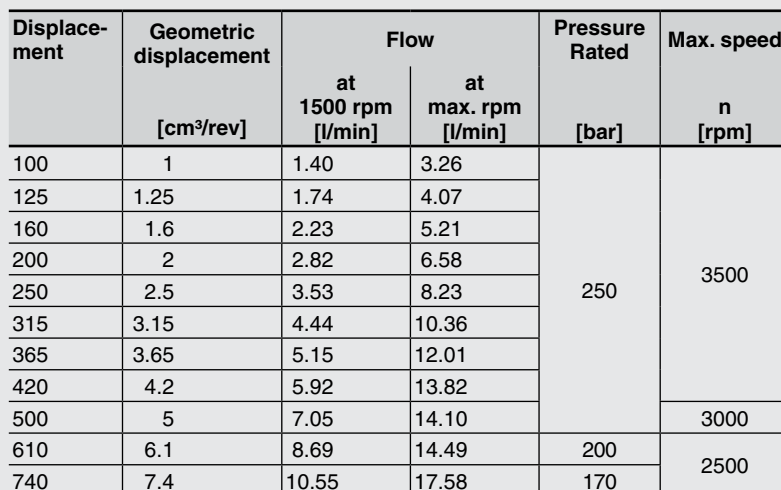
- Overall height: 74
- Section width: 18
- Section length: A1, A2, A3
- Section thickness: B1, B2, B3
- Section thickness: 11
- Section thickness: 4
- Section thickness: 9.4
- Section thickness: 29
- Section thickness: 20.3
- Section thickness: 5.53
- Section thickness: 9.35
- Section thickness: 1:8

Labels:

- G
- A1
- A2
- A3
- B1
- B2
- B3

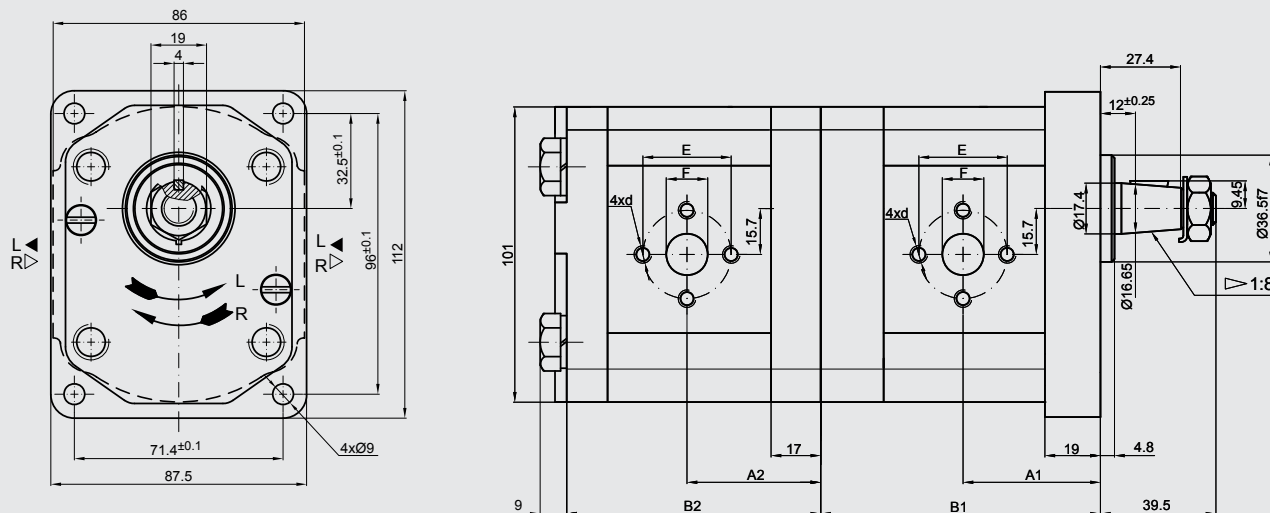
Notes:

- Ø25.418
- 1:8

6

6.5.21 Double pump size 2

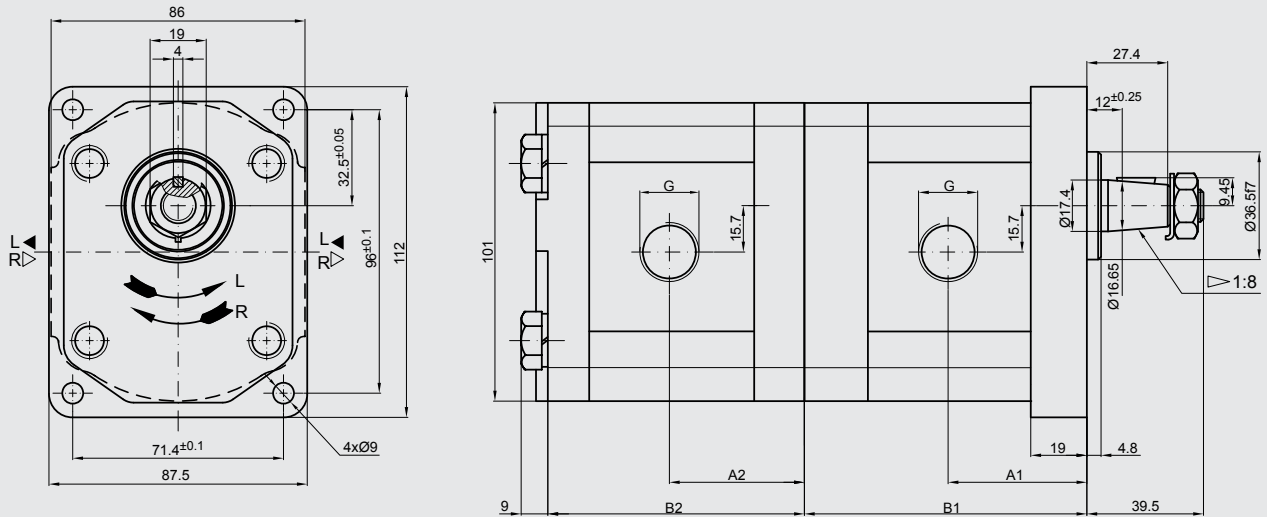
PGE104-.../...-BR4/4-N



Displacement	Geometric displacement [cm ³ /rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00	160	2000

Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E	F	d	E	F	d
450	42.5	87.2	40.5	78	30	13.1	M6	30	13.1	M6
630	44	90.2	42	81						
820	45.5	93.1	43.5	83.9						
1000	47	96.2	45	87	40	19	M8	30	14.2	M6
1130	48	98.2	46	89.1						
1200	48.6	99.5	46.6	90.3						
1400	50	102.6	48	93.4						
1500	51	104.1	49	95						
1600	52	105.8	50	96.6						
1900	54	110.7	52	101.5						
2200	57	115.7	55	106.5						
2500	59.2	120.6	57.2	111.4				40	19	M8

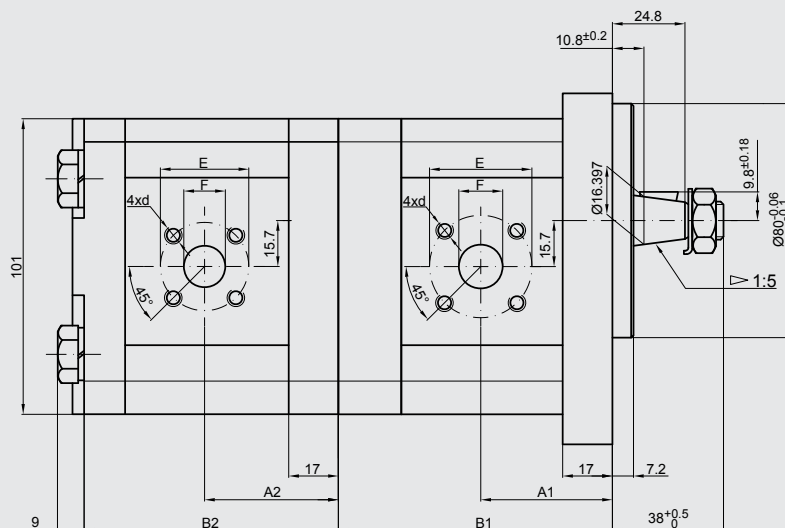
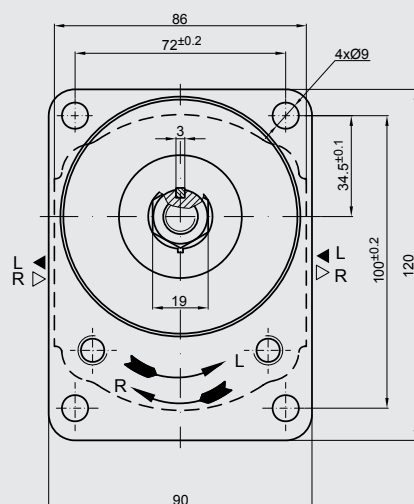
PGE104-.../...-BR1/1-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00	160	2000

Displacement	Dimensions					Inlet G	Outlet G
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
450	42.5	87.2	40.5	78	G 1/2	G 1/2	
630	44	90.2	42	81			
820	45.5	93.1	43.5	83.9			
1000	47	96.2	45	87	G 3/4		G 1/2
1130	48	98.2	46	89			
1200	48.6	99.5	46.5	90.3			
1400	50	102.6	48	93.4			
1500	51	104.1	49	95			
1600	52	105.8	50	96.5			
1900	54	110.7	52	101.5			
2200	57	115.7	55	106.5			
2500	59.2	120.6	57.2	111.4			

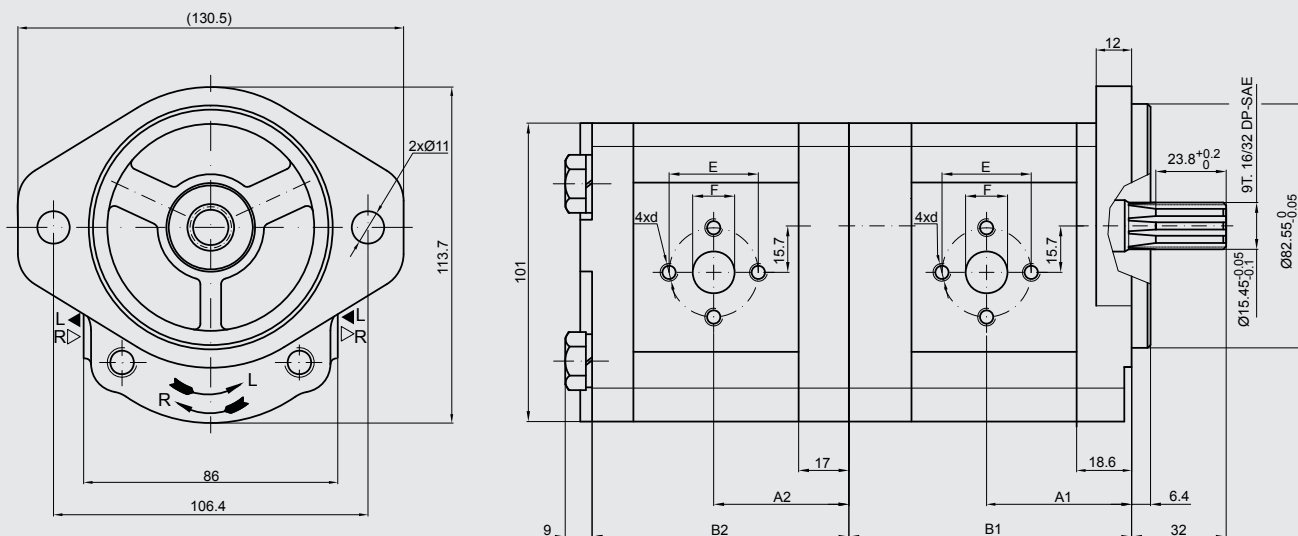
PGE104-.../...-AT5/5-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00	160	2000

Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E	F	d	E	F	d
450	39.8	85.2	37.3	78	40	15	M6	35	15	M6
630	41	88.2	38.6	81						
820	43.1	91.1	40.6	83.9						
1000	47.5	94.1	45	87						
1130	47.5	96.2	45	89						
1200	47.5	97.5	45	90.3						
1400	47.5	100.6	45	93.4						
1500	47.5	102.1	45	95						
1600	47.5	103.8	45	96.5						
1900	47.5	108.7	45	101.5						
2200	55	113.7	52.5	106.5						
2500	57.2	118.5	57.2	111.4						

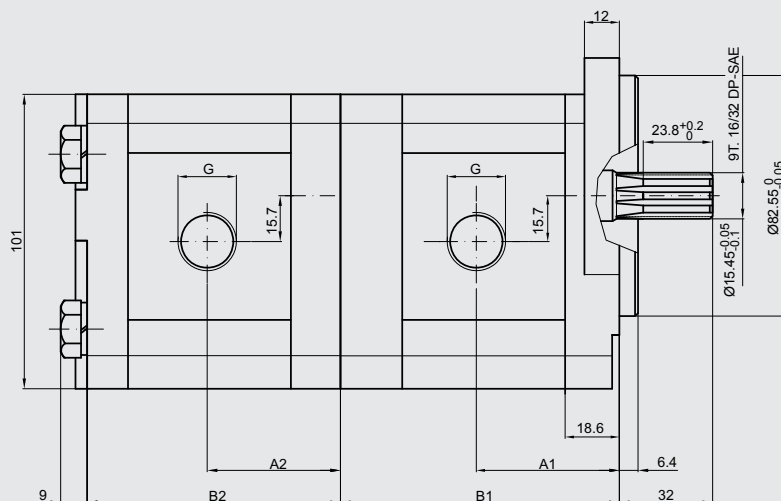
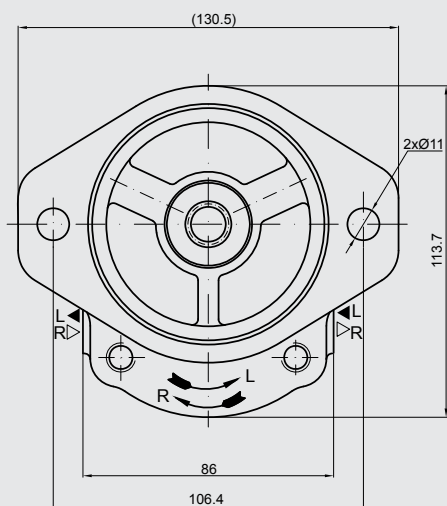
PGE104-.../...-EW4/4-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00	160	2000

Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E	F	d	E	F	d
450	42.1	86.8	40.5	78	30	13.1	M6	30	13.1	M6
630	43.6	89.8	42	81						
820	45.1	92.7	43.5	83.9						
1000	46.6	95.7	45	87						
1130	47.6	97.8	46	89.1	40	19	M8	40	19	M8
1200	48.2	99.1	46.6	90.3						
1400	49.6	102.1	48	93.4						
1500	50.6	103.7	49	95						
1600	51.6	105.3	50	96.6						
1900	53.6	110.3	52	101.5						
2200	56.6	115.3	55	106.5						
2500	58.8	120.2	57.2	111.4						

PGE104-.../...-EW1/1-N

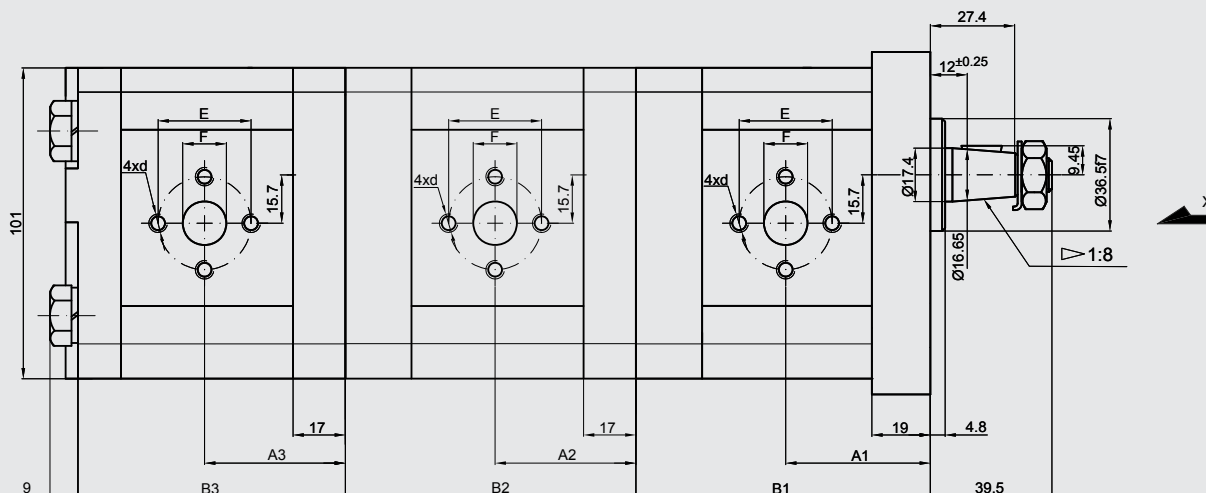


Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00	160	2000

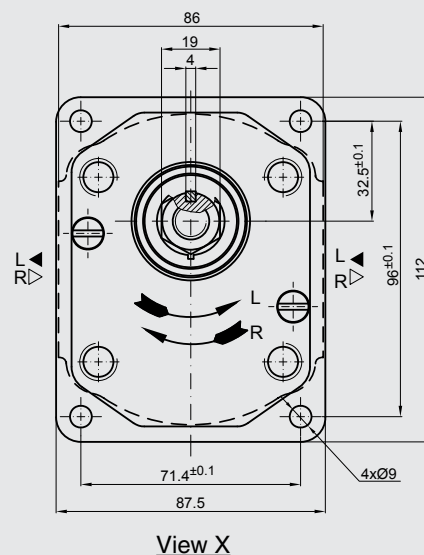
Displacement	Dimensions					Inlet G	Outlet G
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
450	42	86.8	40.5	78	G 1/2	G 1/2	
630	43.6	86.8	42	81			
820	45	86.8	43.5	83.9			
1000	46.6	95.8	45	87	G 3/4		
1130	47.6	97.9	46	89			
1200	48.2	99.1	46.5	90.3			
1400	49.6	102.1	48	93.4			
1500	50.6	103.7	49	95			
1600	51.6	105.3	50	96.5			
1900	53.6	110.3	52	101.5			
2200	56.6	115.3	55	106.5			
2500	58.8	120.2	57.2	111.4			

6.5.22 Triple pump size 2

PGE104-.../...-BR4/4/4-N

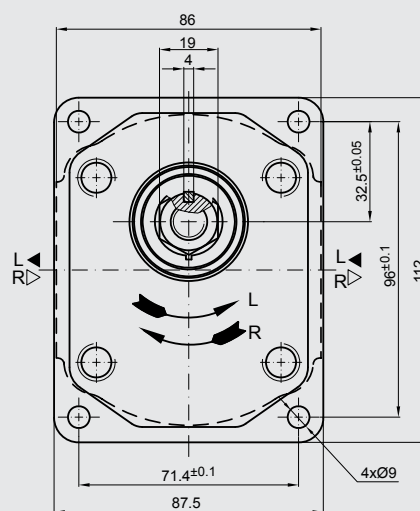
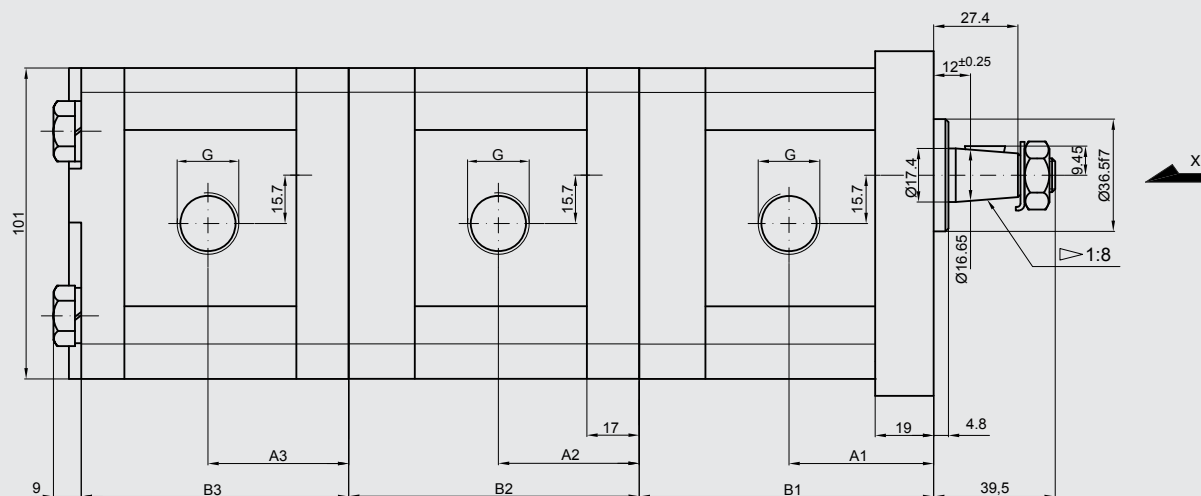


Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00	160	2000



Displacement	Dimensions						Inlet			Outlet		
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	E	F	d	E	F	d
450	42.5	87.2	40.5	85.2	40.5	78	30	13.1	M6	30	13.1	M6
630	44	90.2	42	88.2	42	81						
820	45.5	93.1	43.5	91.1	43.5	83.9						
1000	47	96.2	45	94.1	45	87	40	19	M8	40	19	M8
1130	48	98.2	46	96.2	46	89.1						
1200	48.6	99.5	46.6	97.5	46.6	90.3						
1400	50	102.6	48	100.6	48	93.4						
1500	51	104.1	49	102.1	49	95						
1600	52	105.8	50	103.8	50	96.6						
1900	54	110.7	52	108.7	52	101.5						
2200	57	115.7	55	113.7	55	106.5						
2500	59.2	120.6	57.2	118.5	57.2	111.4						

PGE104-.../.../...-BR1/1/1-N

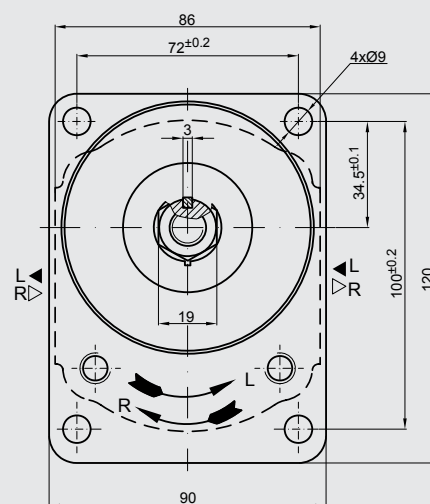
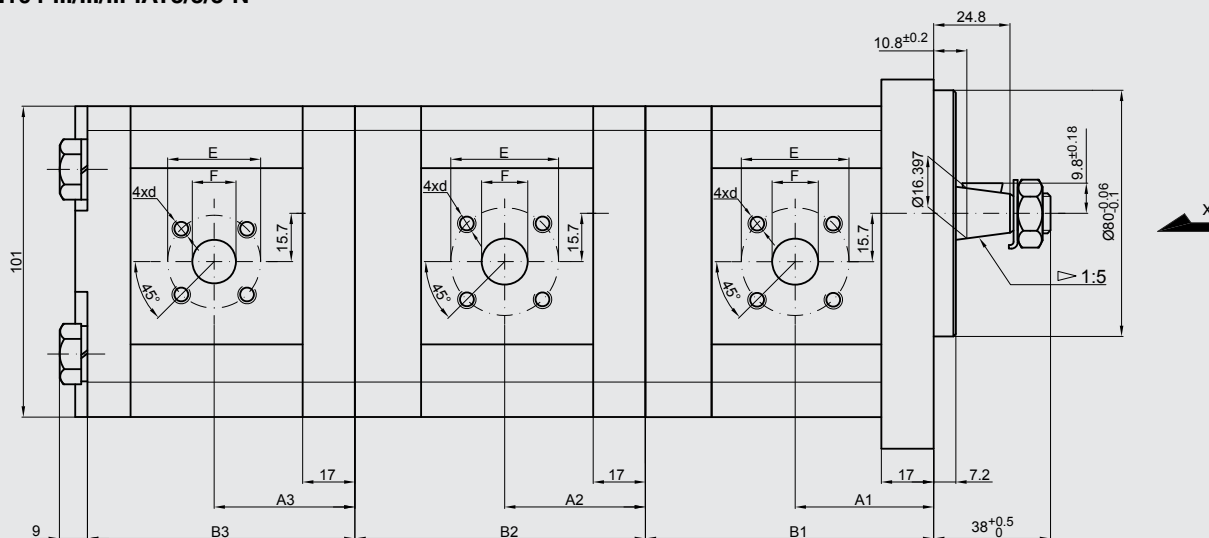


View X

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00	160	2000

Displacement	Dimensions						Inlet G	Outlet G
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]		
450	42.5	87.2	40.5	85.2	40.5	78	G 1/2	G 1/2
630	44	90.2	42	88.2	42	81		
820	45.5	93.1	43.5	91.1	43.5	83.9		
1000	47	96.2	45	94.1	45	87	G 3/4	
1130	48	98.2	46	96.2	46	89		
1200	48.6	99.5	46.6	97.5	46.5	90.3		
1400	50	102.6	48	100.6	48	93.4		
1500	51	104.1	49	102.1	49	95		
1600	52	105.8	50	103.8	50	96.6		
1900	54	110.7	52	108.7	52	101.5		
2200	57	115.7	55	113.7	55	106.5		
2500	59.2	120.6	57.2	118.5	57.2	111.4		

PGE104-.../...-AT5/5/5-N



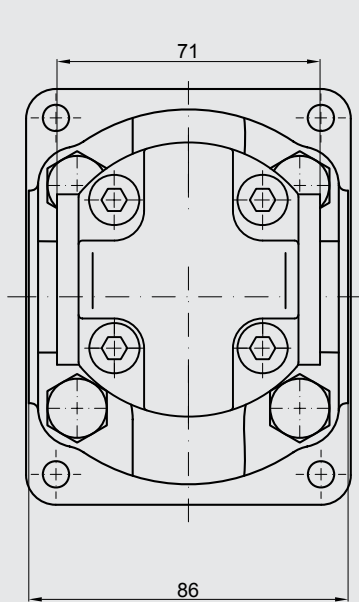
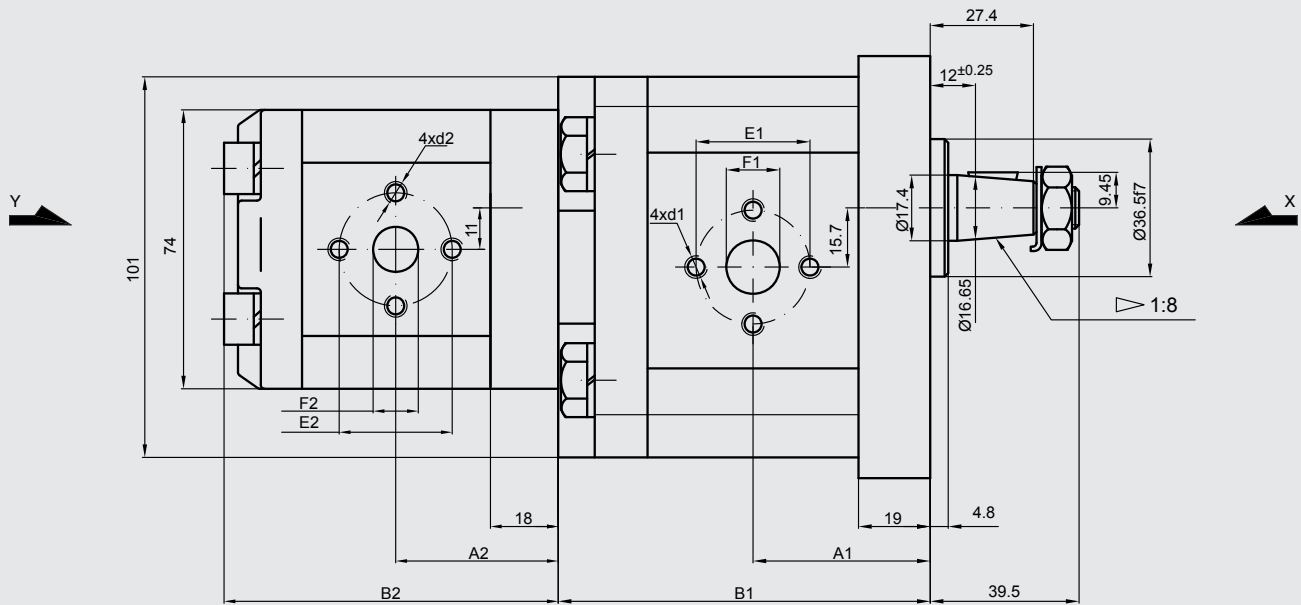
View X

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24		
2500	25	36.00	48.00		

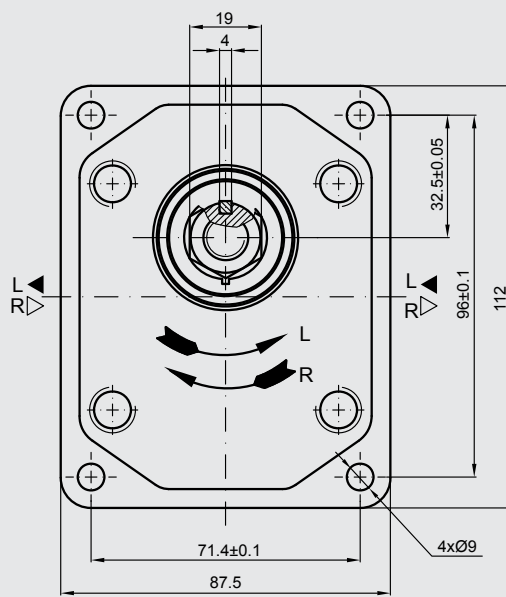
Displacement	Dimensions						Inlet			Outlet		
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	E	F	d	E	F	d
450	39.8	85.2	40.5	85.2	37.3	78	40	15	M6	35	15	M6
630	41	88.2	42	88.2	38.6	81						
820	43.1	91.1	43.5	91.1	40.6	83.9						
1000	47.5	94.1	45	94.1	45	87						
1130	47.5	96.2	46	96.2	45	89						
1200	47.5	97.5	46.6	97.5	45	90.3						
1400	47.5	100.6	48	100.6	45	93.4						
1500	47.5	102.1	49	102.1	45	95						
1600	47.5	103.8	50	103.8	45	96.5						
1900	47.5	108.7	52	108.7	45	101.5						
2200	55	113.7	55	113.7	52.5	106.5	20					
2500	57.2	118.5	57.2	118.5	57.2	111.4						

6.5.23 Double pump size 2 / size 1

PGE104-.../...-BR4/4-N



View Y



View X

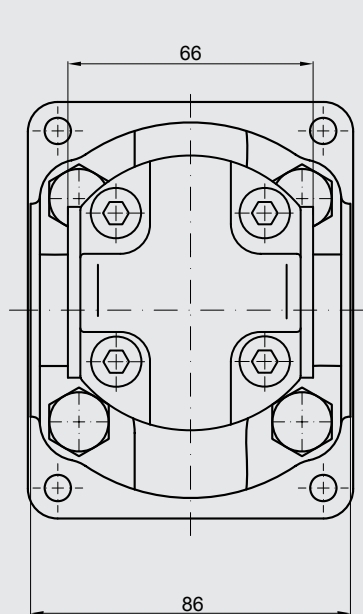
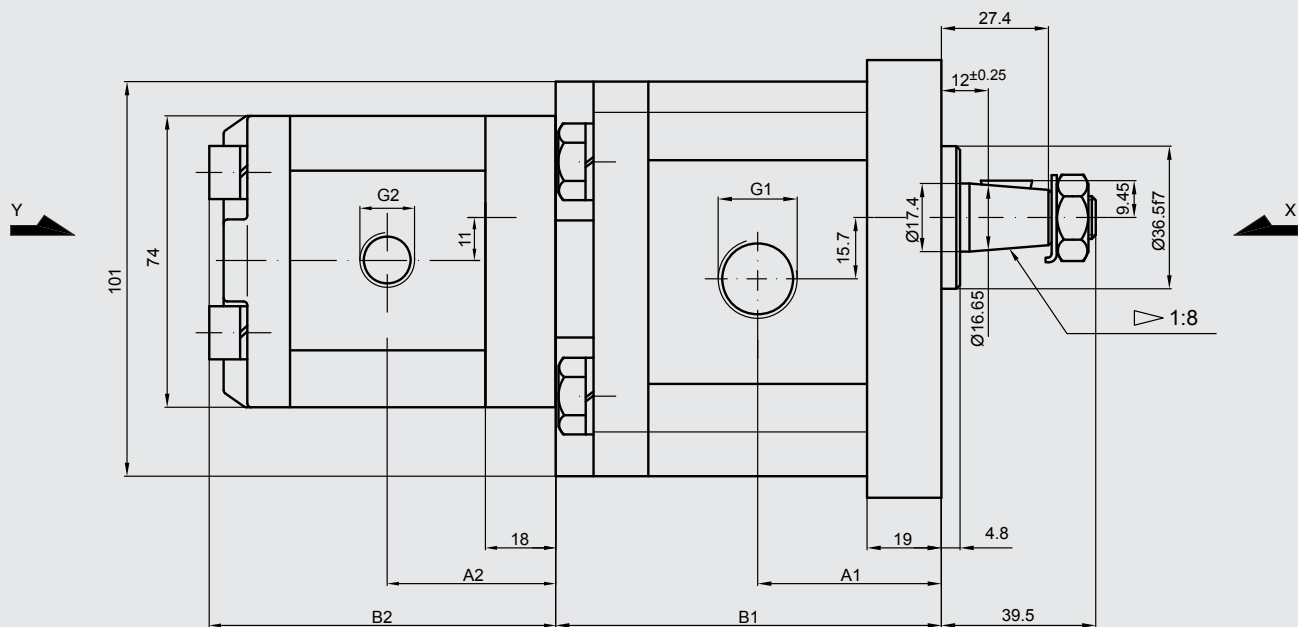
Front pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
450	4.5	6.14	14.33	250	3500	42.5	89.7	30	13.1	M6	30	13.1	M6
630	6.3	8.69	20.29			44	92.7						
820	8.2	11.32	26.40			45.5	95.6						
1000	10	13.95	32.55			47	98.7						
1130	11.3	15.76	36.78			48	100.7						
1200	12	16.92	39.48			48.6	102						
1400	14	19.95	46.55			50	105.1						
1500	15	21.60	36.00			51	106.6						
1600	16	23.04	38.40			52	108.3						
1900	19	27.36	45.60	200	2500	54	113.2						
2200	22	31.68	42.24	180		57	118.2						
2500	25	36.00	48.00	160	2000	59.2	123.1				40	19	M8

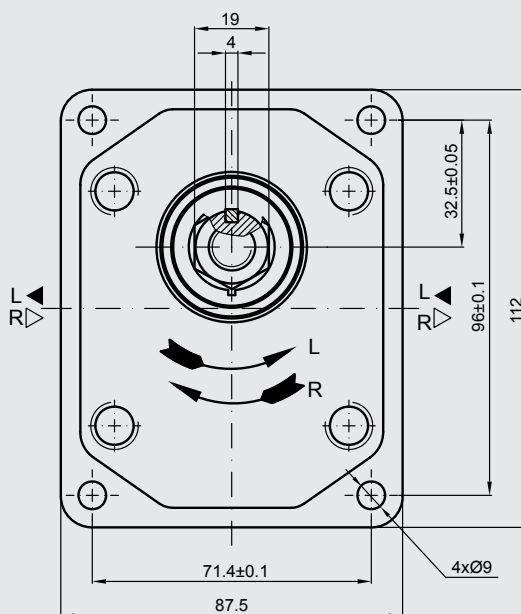
End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
100	1	1.40	3.26	250	3500	39.1	81	30	12	M6	30	12	M6
125	1.25	1.74	4.07			39.5	82						
160	1.6	2.23	5.21			40.3	83.6						
200	2	2.82	6.58			41.1	85.2						
250	2.5	3.53	8.23			42.1	87.2						
315	3.15	4.44	10.36			43.5	89.8						
365	3.65	5.15	12.01			44.4	91.9						
420	4.2	5.92	13.82			45.5	94.1						
500	5	7.05	14.10		3000	47.1	97.2						
610	6.1	8.69	14.49	200	2500	49.4	101.8						
740	7.4	10.55	17.58	170		52.1	107.2						

PGE104-.../...-BR1/1-N



View Y



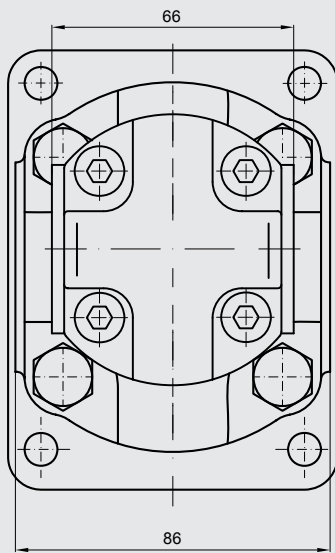
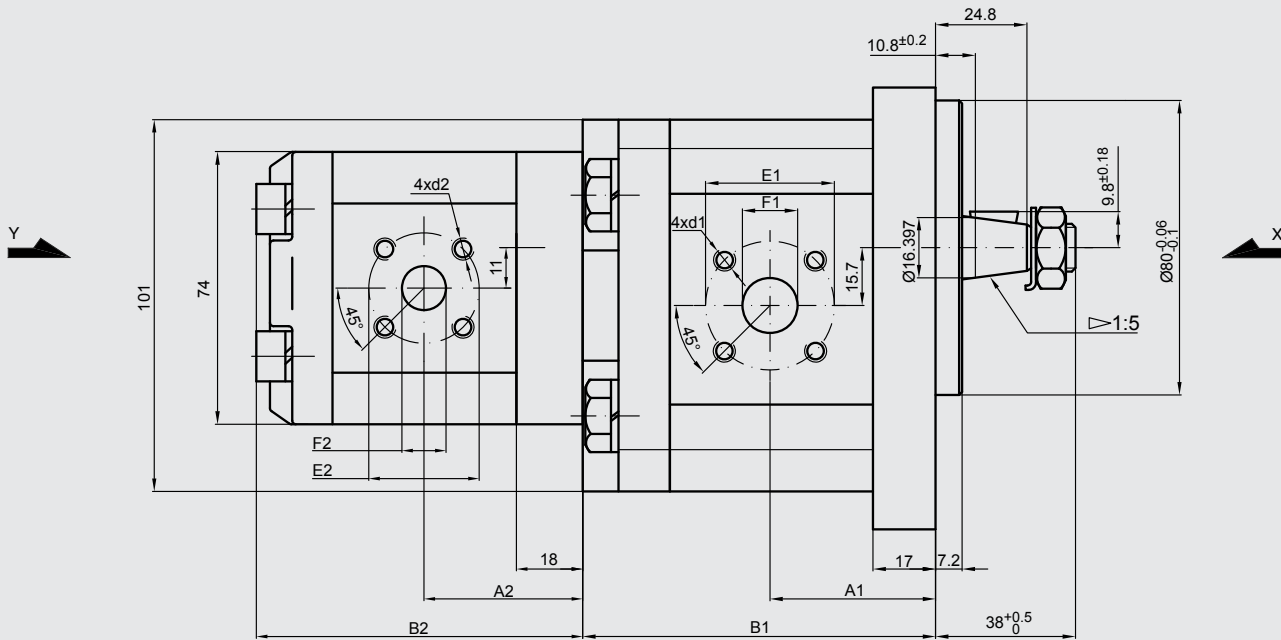
View X

Front pump size 2:

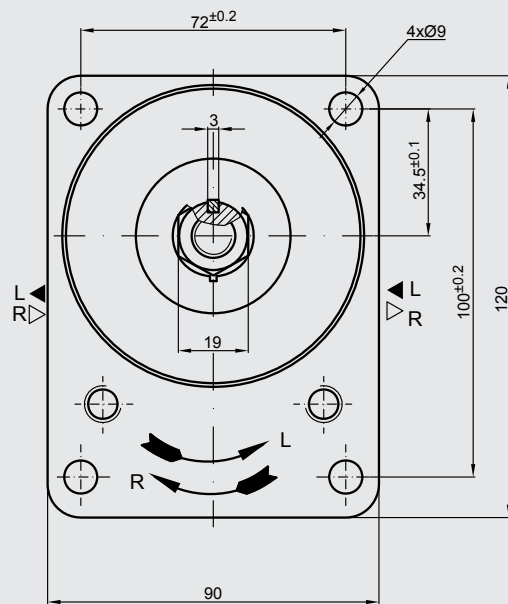
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
450	4.5	6.14	14.33	250	3500	42.5	89.7	G 1/2	G 1/2
630	6.3	8.69	20.29			44	92.7		
820	8.2	11.32	26.40			45.5	95.6		
1000	10	13.95	32.55			47	98.7	G 3/4	
1130	11.3	15.76	36.78			48	100.7		
1200	12	16.92	39.48			48.6	102		
1400	14	19.95	46.55			50	105.1		
1500	15	21.60	36.00		2500	51	106.6		
1600	16	23.04	38.40			52	108.3		
1900	19	27.36	45.60	54		113.2			
2200	22	31.68	42.24	180	2000	57	118.2		
2500	25	36.00	48.00	160		59.2	123.1		

End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions				
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet G2	Outlet G2	
100	1	1.40	3.26	250	3500	39.1	81	G 3/8	G 3/8	
125	1.25	1.74	4.07			39.5	82			
160	1.6	2.23	5.21			40.3	83.6			
200	2	2.82	6.58			41.1	85.2			
250	2.5	3.53	8.23			42.1	87.2	G 1/2		
315	3.15	4.44	10.36			43.5	89.8			
365	3.65	5.15	12.01			44.4	91.9			
420	4.2	5.92	13.82			45.5	94.1			
500	5	7.05	14.10		3000	47.1	97.2			
610	6.1	8.69	14.49	200	2500	49.4	101.8			
740	7.4	10.55	17.58	170		52.1	107.2			



View Y



View X

Front pump size 2:

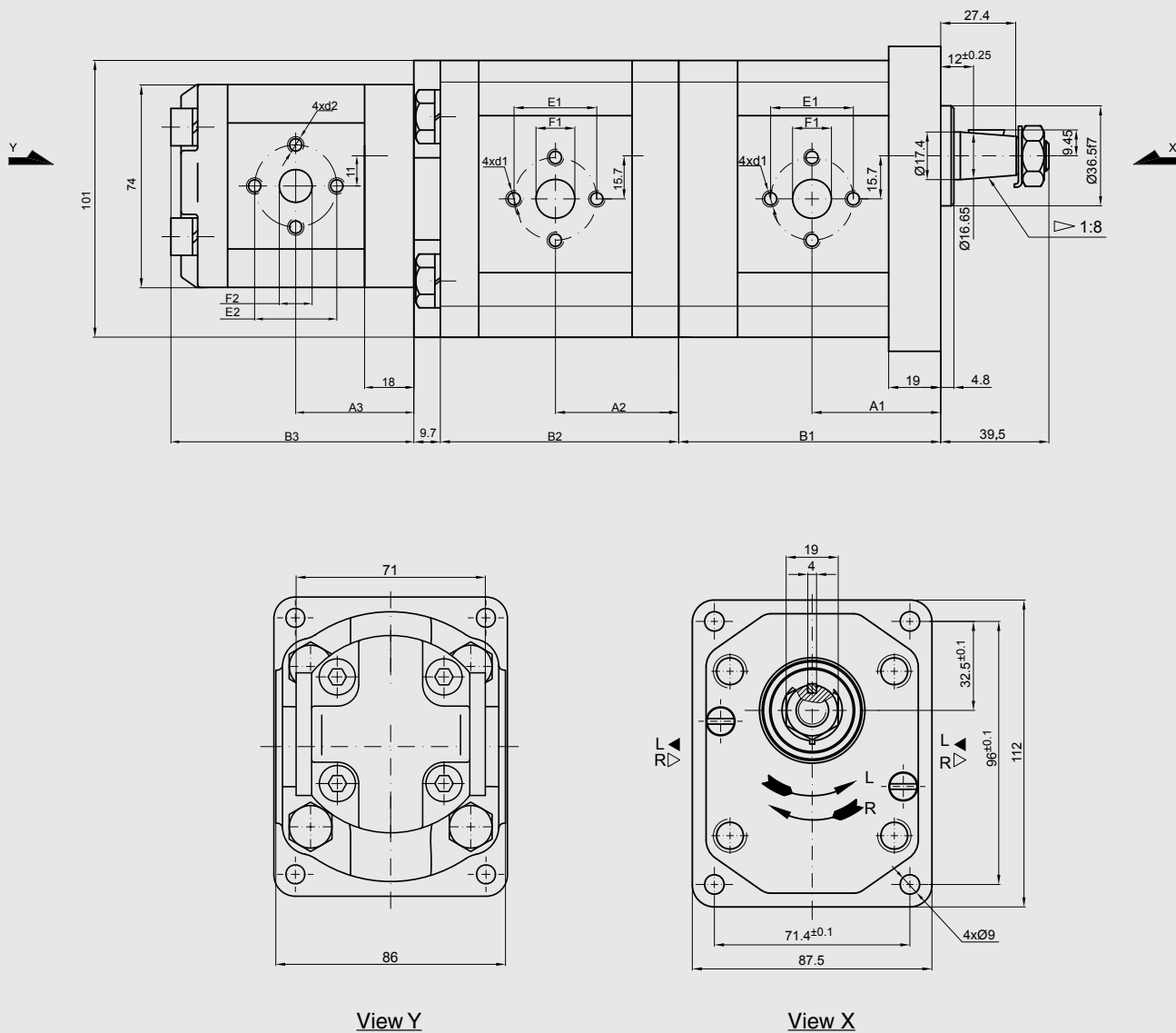
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
450	4.5	6.14	14.33	250	3500	39.8	87.6	40	15	M6	35	15	M6
630	6.3	8.69	20.29			41	90.6						
820	8.2	11.32	26.40			43.1	93.5						
1000	10	13.95	32.55			47.5	96.6						
1130	11.3	15.76	36.78			47.5	98.7						
1200	12	16.92	39.48			47.5	99.9						
1400	14	19.95	46.55			47.5	103						
1500	15	21.60	36.00		2500	47.5	104.5						
1600	16	23.04	38.40			47.5	106.2						
1900	19	27.36	45.60	200	2000	47.5	111.1						
2200	22	31.68	42.24	180		55	116.1						
2500	25	36.00	48.00	160		57.5	121.1						

End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
100	1	1.40	3.26	250	3500	39.1	81	30	12	M6	30	12	M6
125	1.25	1.74	4.07			39.5	82						
160	1.6	2.23	5.21			40.3	83.6						
200	2	2.82	6.58			41.1	85.2						
250	2.5	3.53	8.23			42.1	87.2						
315	3.15	4.44	10.36			43.5	89.8						
365	3.65	5.15	12.01			44.4	91.9						
420	4.2	5.92	13.82			45.5	94.1						
500	5	7.05	14.10		3000	47.1	97.2						
610	6.1	8.69	14.49	200	2500	49.4	101.8						
740	7.4	10.55	17.58	170		52.1	107.2						

6.5.24 Triple pump size 2 / size 2 / size 1

PGE104-.../.../...-BR4/4/4-N



Front and middle pump size 2:

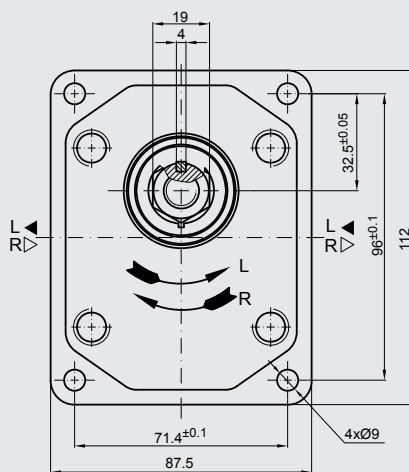
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24	180	2000
2500	25	36.00	48.00	160	

Displacement	Dimensions									
	A1	B1	A2	B2	Inlet			Outlet		
	[mm]	[mm]	[mm]	[mm]	E1	F1	d1	E1	F1	d1
450	42.5	87.2	40.5	78	30	13.1	M6	30	13.1	M6
630	44	90.2	42	81						
820	45.5	93.1	43.5	83.9						
1000	47	96.2	45	87						
1130	48	98.2	46	89.1	40	19	M8		14.2	
1200	48.6	99.5	46.6	90.3						
1400	50	102.6	48	93.4						
1500	51	104.1	49	95						
1600	52	105.8	50	96.6						
1900	54	110.7	52	101.5						
2200	57	115.7	55	106.5						
2500	59.2	120.6	57.2	111.4				40	19	M8

End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
100	1	1.40	3.26	250	3500	39.1	81	30	12	M6	30	12	M6
125	1.25	1.74	4.07			39.5	82						
160	1.6	2.23	5.21			40.3	83.6						
200	2	2.82	6.58			41.1	85.2						
250	2.5	3.53	8.23			42.1	87.2						
315	3.15	4.44	10.36			43.5	89.8						
365	3.65	5.15	12.01			44.4	91.9						
420	4.2	5.92	13.82			45.5	94.1						
500	5	7.05	14.10			3000	47.1						
610	6.1	8.69	14.49	200	2500	49.4	101.8						
740	7.4	10.55	17.58	170		52.1	107.2						

Y



View X

Front and middle pump size 2:

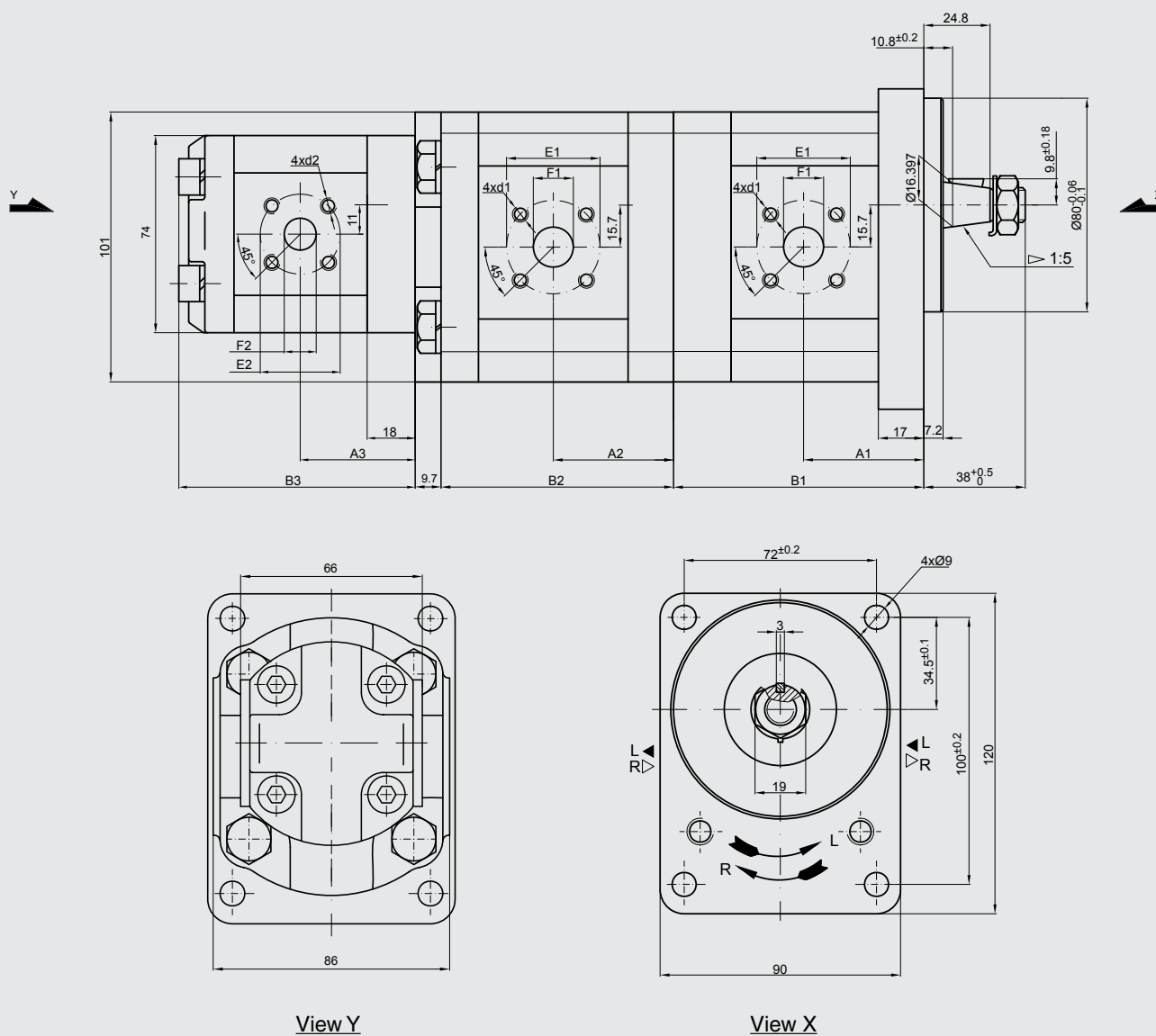
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		2500
1600	16	23.04	38.40		
1900	19	27.36	45.60	200	
2200	22	31.68	42.24	180	2000
2500	25	36.00	48.00	160	

Displacement	Dimensions					Inlet G1	Outlet G1
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
450	42.5	87.2	40.5	78	G 1/2	G 1/2	
630	44	90.2	42	81			
820	45.5	93.1	43.5	83.9			
1000	47	96.2	45	87	G 3/4		
1130	48	98.2	46	89.1			
1200	48.6	99.5	46.6	90.3			
1400	50	102.6	48	93.4			
1500	51	104.1	49	95			
1600	52	105.8	50	96.6			
1900	54	110.7	52	101.5			
2200	57	115.7	55	106.5			
2500	59.2	120.6	57.2	111.4			

End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet G2	Outlet G2
100	1	1.40	3.26	250	3500	39.1	81	G 3/8	G 3/8
125	1.25	1.74	4.07			39.5	82		
160	1.6	2.23	5.21			40.3	83.6		
200	2	2.82	6.58			41.1	85.2		
250	2.5	3.53	8.23			42.1	87.2		
315	3.15	4.44	10.36			43.5	89.8		
365	3.65	5.15	12.01			44.4	91.9		
420	4.2	5.92	13.82			45.5	94.1		
500	5	7.05	14.10		3000	47.1	97.2	G 1/2	
610	6.1	8.69	14.49		200	2500	49.4		
740	7.4	10.55	17.58	170	52.1		107.2		

PGE104-.../.../...-AT5/5/5-N



Front and middle pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24	180	2000
2500	25	36.00	48.00	160	

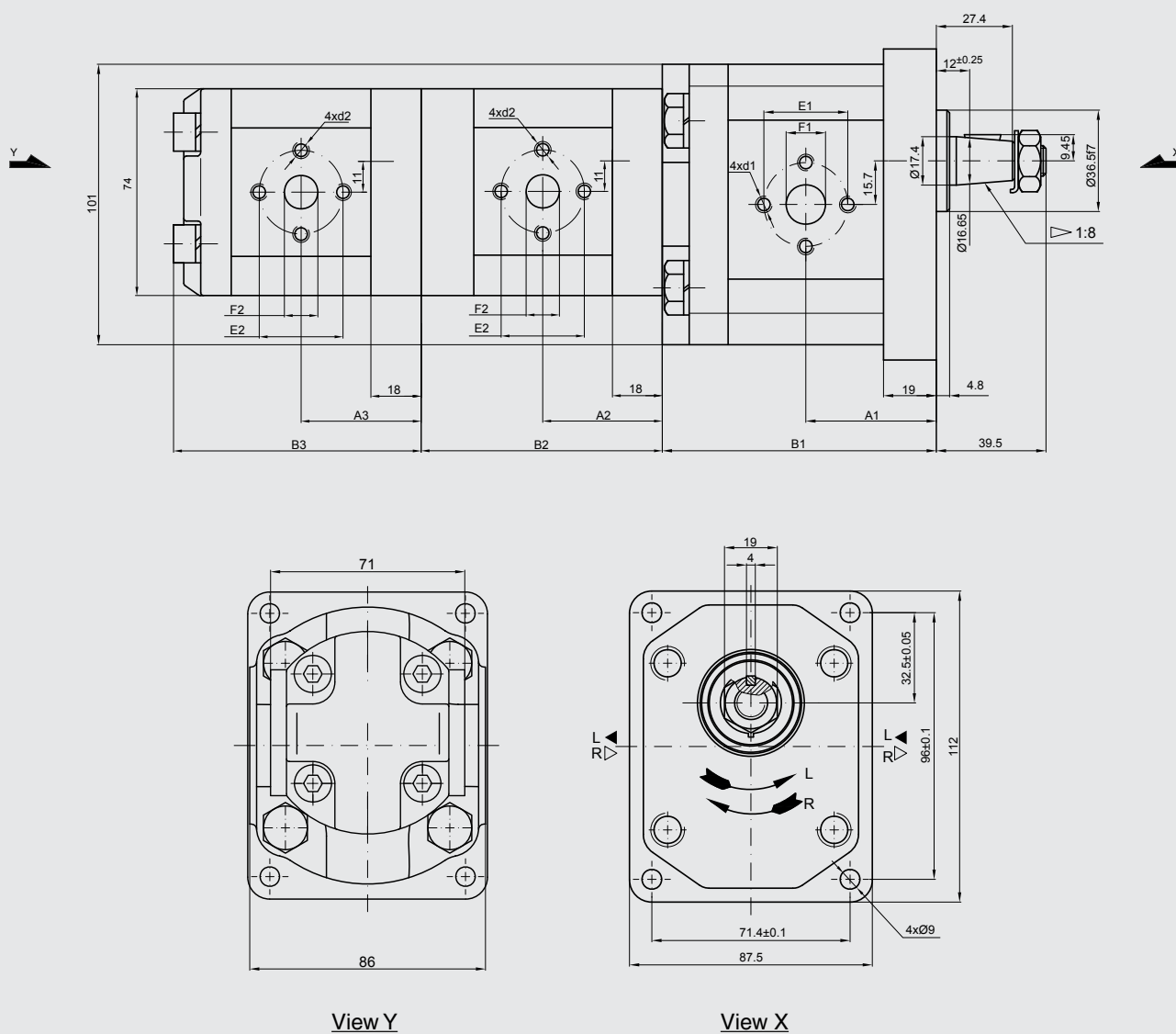
Displacement	Dimensions									
	A1	B1	A2	B2	Inlet			Outlet		
	[mm]	[mm]	[mm]	[mm]	E1	F1	d1	E1	F1	d1
450	39.8	85.2	40.5	78	40	15	M6	35	15	M6
630	41	88.2	42	81		20				
820	43.1	91.1	43.5	83.9						
1000	47.5	94.1	45	87						
1130	47.5	96.2	46	89.1						
1200	47.5	97.5	46.6	90.3						
1400	47.5	100.6	48	93.4						
1500	47.5	102.1	49	95						
1600	47.5	103.8	50	96.6						
1900	47.5	108.7	52	101.5						
2200	55	113.7	55	106.5						
2500	57.2	118.5	57.2	111.4						

End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
100	1	1.40	3.26	250	3500	39.1	81	30	12	M6	30	12	M6
125	1.25	1.74	4.07			39.5	82						
160	1.6	2.23	5.21			40.3	83.6						
200	2	2.82	6.58			41.1	85.2						
250	2.5	3.53	8.23			42.1	87.2						
315	3.15	4.44	10.36			43.5	89.8						
365	3.65	5.15	12.01			44.4	91.9						
420	4.2	5.92	13.82			45.5	94.1						
500	5	7.05	14.10			3000	47.1						
610	6.1	8.69	14.49	200	2500	49.4	101.8						
740	7.4	10.55	17.58	170		52.1	107.2						

6.5.25 Triple pump size 2 / size 1 / size 1

PGE104-.../.../...-BR4/4/4-N



Front pump size 2:

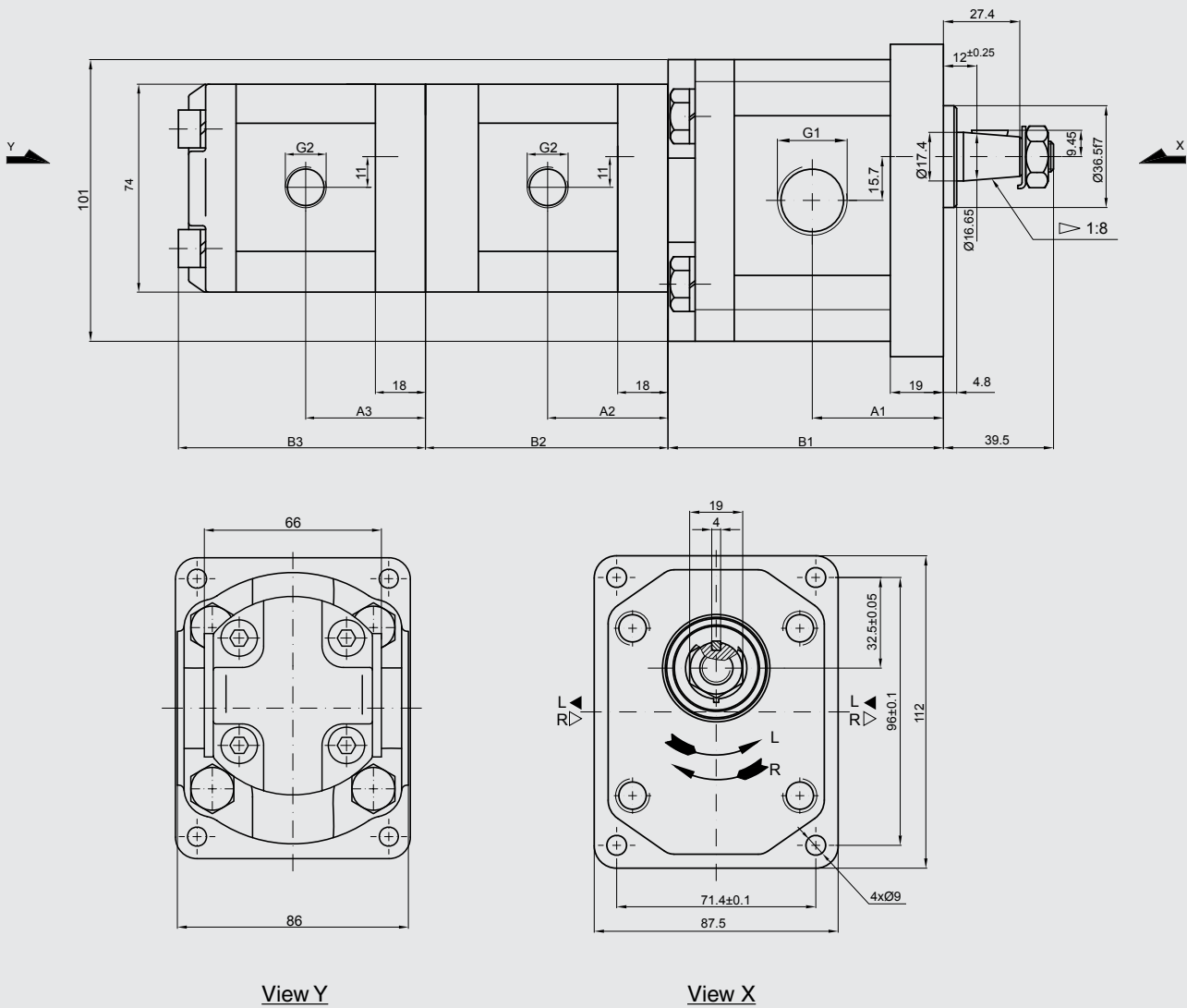
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
450	4.5	6.14	14.33	250	3500	42.5	89.7	30	13.1	M6	30	13.1	M6
630	6.3	8.69	20.29			44	92.7						
820	8.2	11.32	26.40			45.5	95.6						
1000	10	13.95	32.55			47	98.7						
1130	11.3	15.76	36.78			48	100.7						
1200	12	16.92	39.48			48.6	102						
1400	14	19.95	46.55			50	105.1						
1500	15	21.60	36.00			51	106.6						
1600	16	23.04	38.40			52	108.3						
1900	19	27.36	45.60	200	2500	54	113.2						
2200	22	31.68	42.24	180		57	118.2						
2500	25	36.00	48.00	160		59.2	123.1				40	19	M8

Middle and end pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
100	1	1.40	3.26	250	3500
125	1.25	1.74	4.07		
160	1.6	2.23	5.21		
200	2	2.82	6.58		
250	2.5	3.53	8.23		
315	3.15	4.44	10.36		
365	3.65	5.15	12.01		
420	4.2	5.92	13.82		
500	5	7.05	14.10		3000
610	6.1	8.69	14.49	200	2500
740	7.4	10.55	17.58	170	

Displacement	Dimensions									
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	Inlet			Outlet		
					E2	F2	d2	E2	F2	d2
100	39.1	79	39.1	79	30	12	M6	30	12	M6
125	39.5	80	39.5	80						
160	40.3	81.6	40.3	81.6						
200	41.1	83.2	41.1	83.2						
250	42.1	85.2	42.1	85.2						
315	43.5	87.8	43.5	87.8						
365	44.4	89.9	44.4	89.9						
420	45.5	92.1	45.5	92.1						
500	47.1	95.2	47.1	95.2						
610	49.4	99.8	49.4	99.8						
740	52.1	105.2	52.1	105.2						

PGE104-.../.../...-BR1/1/1-N



Front pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
450	4.5	6.14	14.33	250	3500	42.5	89.7	G 1/2	G 1/2
630	6.3	8.69	20.29			44	92.7		
820	8.2	11.32	26.40			45.5	95.6		
1000	10	13.95	32.55			47	98.7	G 3/4	
1130	11.3	15.76	36.78			48	100.7		
1200	12	16.92	39.48			48.6	102		
1400	14	19.95	46.55			50	105.1		
1500	15	21.60	36.00		2500	51	106.6		
1600	16	23.04	38.40			52	108.3		
1900	19	27.36	45.60	200	2000	54	113.2		
2200	22	31.68	42.24	180		57	118.2		
2500	25	36.00	48.00	160		59.2	123.1		

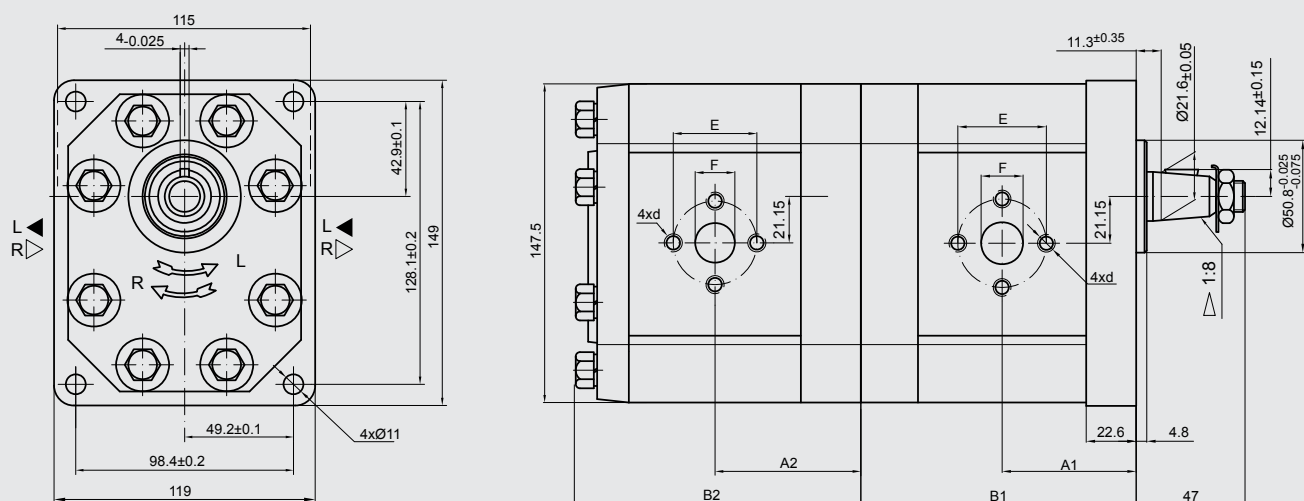
Middle and end pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
100	1	1.40	3.26	250	3500
125	1.25	1.74	4.07		
160	1.6	2.23	5.21		
200	2	2.82	6.58		
250	2.5	3.53	8.23		
315	3.15	4.44	10.36		
365	3.65	5.15	12.01		
420	4.2	5.92	13.82		
500	5	7.05	14.10		3000
610	6.1	8.69	14.49	200	2500
740	7.4	10.55	17.58	170	

Displacement	Dimensions				Inlet G2	Outlet G2
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]		
100	39.1	79	39.1	79	G 3/8	G 3/8
125	39.5	80	39.5	80		
160	40.3	81.6	40.3	81.6		
200	41.1	83.2	41.1	83.2		
250	42.1	85.2	42.1	85.2		
315	43.5	87.8	43.5	87.8	G 1/2	
365	44.4	89.9	44.4	89.9		
420	45.5	92.1	45.5	92.1		
500	47.1	95.2	47.1	95.2		
610	49.4	99.8	49.4	99.8		
740	52.1	105.2	52.1	105.2		

6.5.26 Double pump size 3

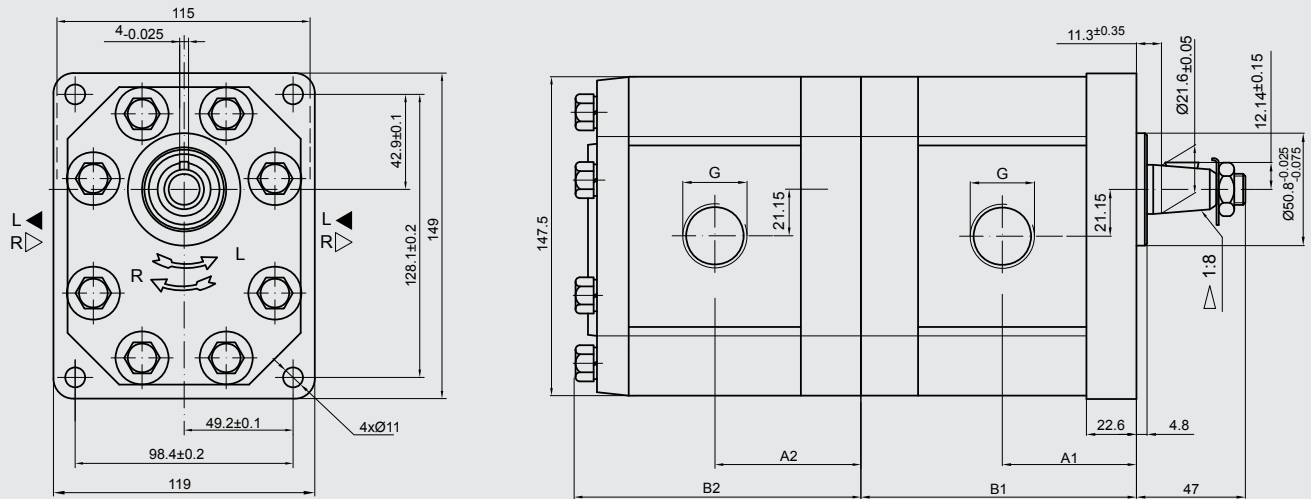
PGE104-.../...-BS4/4-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E	F	d	E	F	d
2000	56.1	114.7	58.3	118.9	40	19	M8	40	19	M8
2250	57.6	117.7	59.7	121.9						
2500	58.3	119.1	60.5	123.3						
2800	60.2	122.7	62.4	126.9						
3200	66.5	135.3	68.7	139.5	51	27	M10			
3600	68.0	138.5	70.2	142.7						
4200	70.8	144.0	73.0	148.3						
4600	72.7	147.8	74.9	152.0						
5000	74.5	151.4	76.7	155.6						
5500	76.7	155.9	78.9	160.1						
6000	78.7	160.4	80.9	164.6						

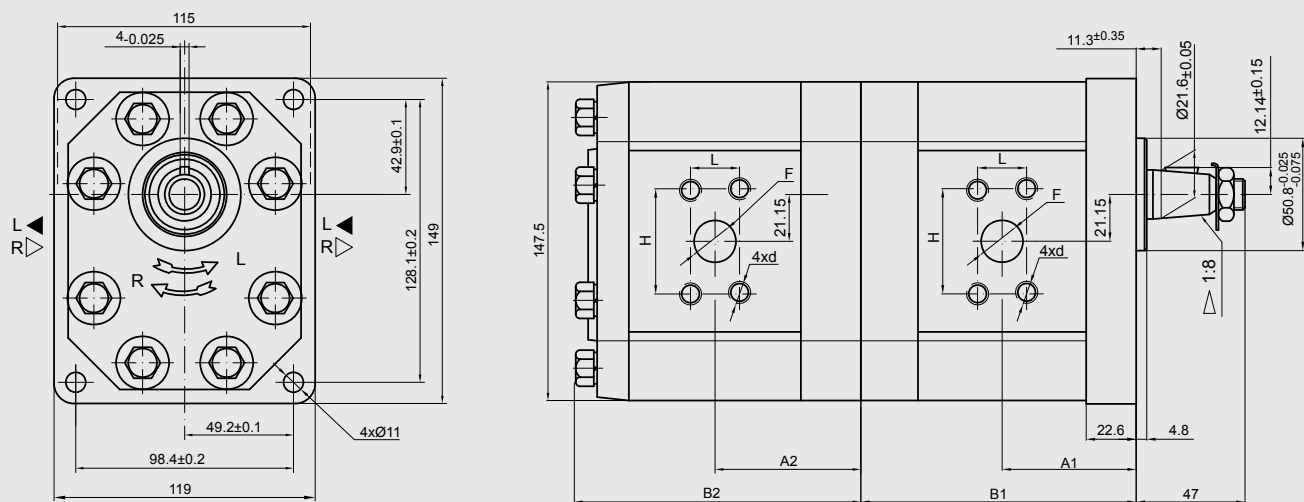
PGE104-.../...-BS1/1-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions					Inlet G	Outlet G
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
2000	56.1	114.7	58.3	118.9	G 3/4	G 3/4	
2250	57.6	117.7	59.7	121.9			
2500	58.3	119.1	60.5	123.3			
2800	60.2	122.7	62.4	126.9			
3200	66.5	135.3	68.7	139.5			
3600	68.0	138.5	70.2	142.7	G 1		
4200	70.8	144.0	73.0	148.3			
4600	72.7	147.8	74.9	152.0			
5000	74.5	151.4	76.7	155.6			
5500	76.7	155.9	78.9	160.1			
6000	78.7	160.4	80.9	164.6			

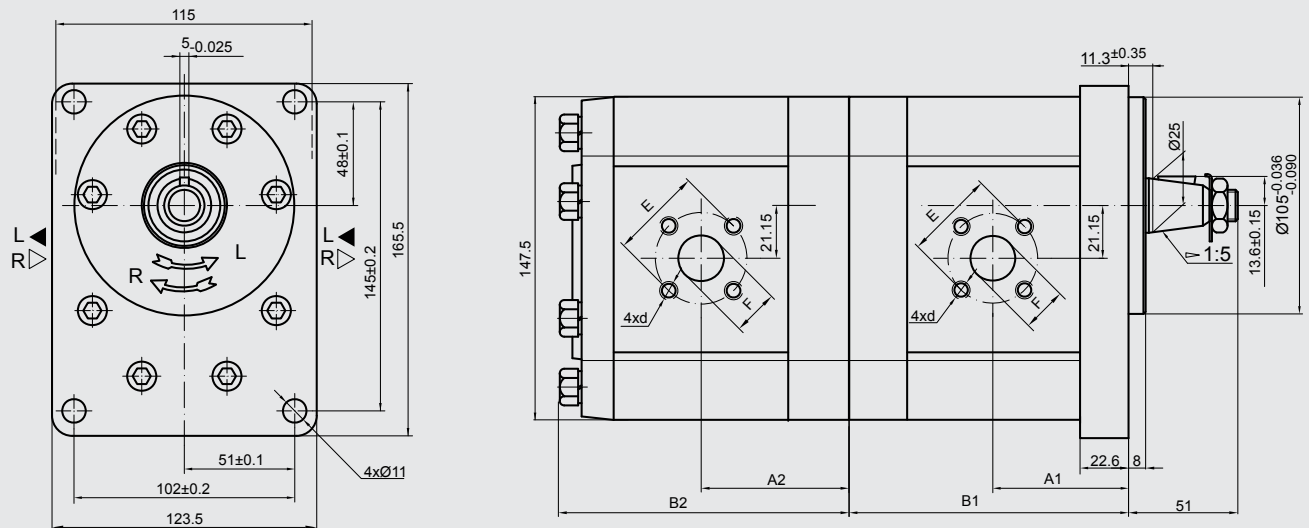
PGE104-.../...-BS7/7-N



Displacement	Geometric displacement [cm ³ /rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions											
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet				Outlet			
					F	d	H	L	F	d	H	L
2000	56.1	114.7	58.3	118.9	19	M10	47.6	22.2	19	M10	47.6	22.2
2250	57.6	117.7	59.7	121.9								
2500	58.3	119.1	60.5	123.3								
2800	60.2	122.7	62.4	126.9								
3200	66.5	135.3	68.7	139.5	27	M10	52.4	26.2	19	M10	47.6	22.2
3600	68.0	138.5	70.2	142.7								
4200	70.8	144.0	73.0	148.3								
4600	72.7	147.8	74.9	152.0								
5000	74.5	151.4	76.7	155.6								
5500	76.7	155.9	78.9	160.1								
6000	78.7	160.4	80.9	164.6								

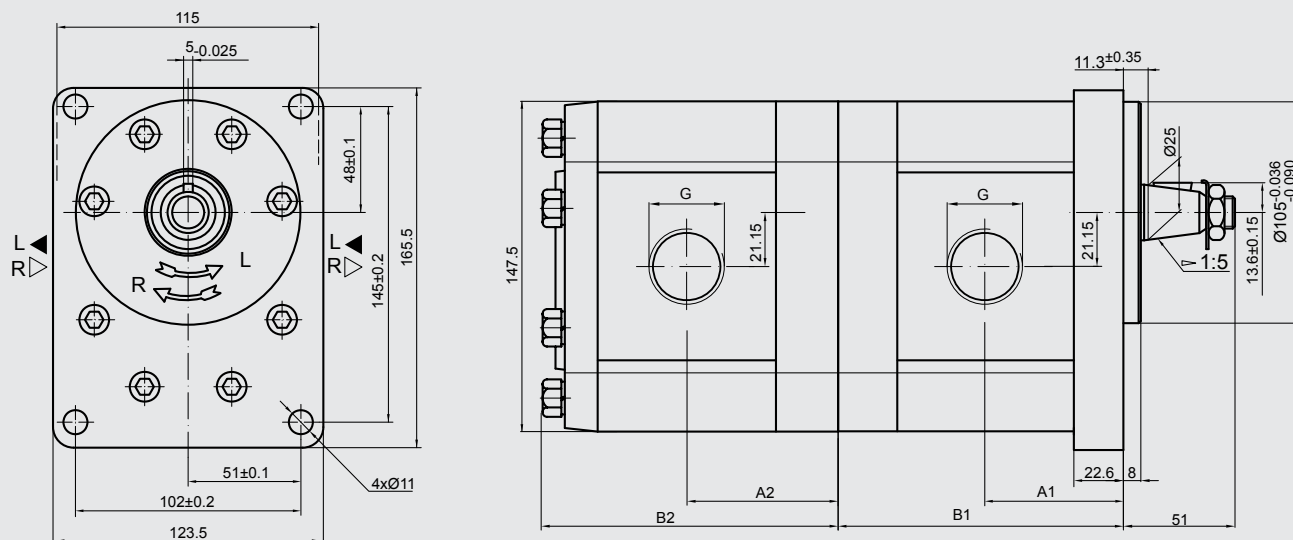
PGE104-.../...-AV5/5-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E	F	d	E	F	d
2000	56.1	114.7	58.3	118.9	40	19	M8	40	19	M8
2250	57.6	117.7	59.7	121.9						
2500	58.3	119.1	60.5	123.3						
2800	60.2	122.7	62.4	126.9						
3200	66.5	135.3	68.7	139.5						
3600	68.0	138.5	70.2	142.7	55	27	M8	55	19	M8
4200	70.8	144.0	73.0	148.3						
4600	72.7	147.8	74.9	152.0						
5000	74.5	151.4	76.7	155.6						
5500	76.7	155.9	78.9	160.1						
6000	78.7	160.4	80.9	164.6						

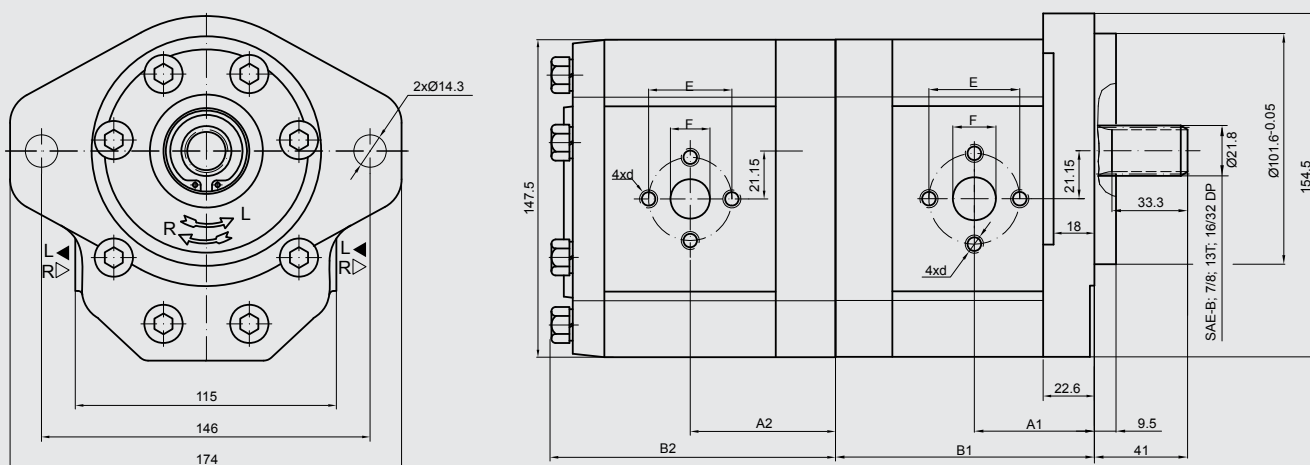
PGE104-.../...-AV1/1-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions				Inlet G	Outlet G	
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
2000	56.1	114.7	58.3	118.9	G 3/4	G 3/4	
2250	57.6	117.7	59.7	121.9			
2500	58.3	119.1	60.5	123.3			
2800	60.2	122.7	62.4	126.9			
3200	66.5	135.3	68.7	139.5	G 1		G 3/4
3600	68.0	138.5	70.2	142.7			
4200	70.8	144.0	73.0	148.3			
4600	72.7	147.8	74.9	152.0			
5000	74.5	151.4	76.7	155.6			
5500	76.7	155.9	78.9	160.1			
6000	78.7	160.4	80.9	164.6			

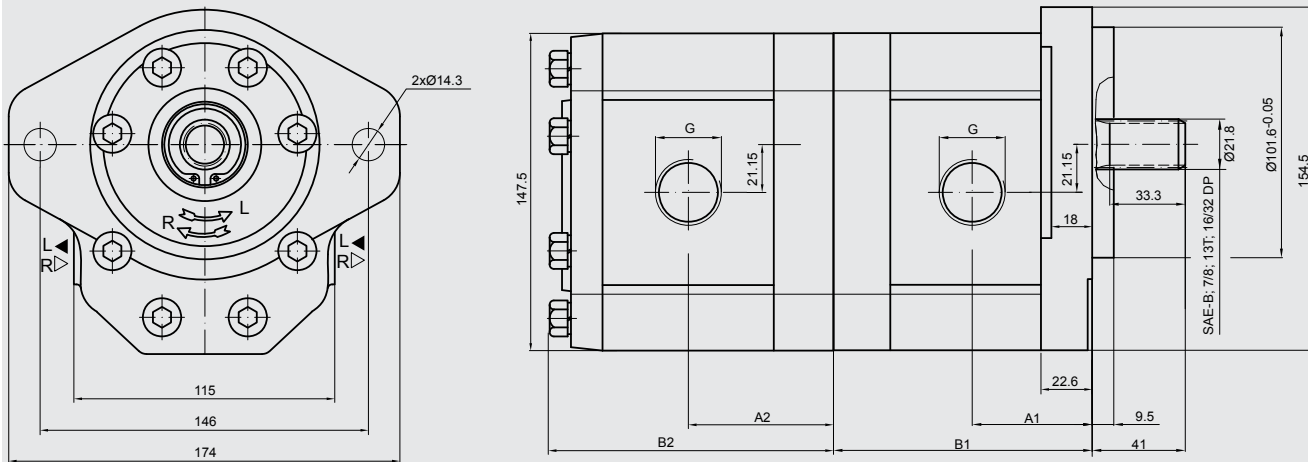
PGE104-.../...-FX4/4-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E	F	d	E	F	d
2000	56.1	114.7	58.3	118.9	40	19	M8	40	19	M8
2250	57.6	117.7	59.7	121.9						
2500	58.3	119.1	60.5	123.3						
2800	60.2	122.7	62.4	126.9						
3200	66.5	135.3	68.7	139.5	51	27	M10			
3600	68.0	138.5	70.2	142.7						
4200	70.8	144.0	73.0	148.3						
4600	72.7	147.8	74.9	152.0						
5000	74.5	151.4	76.7	155.6						
5500	76.7	155.9	78.9	160.1						
6000	78.7	160.4	80.9	164.6						

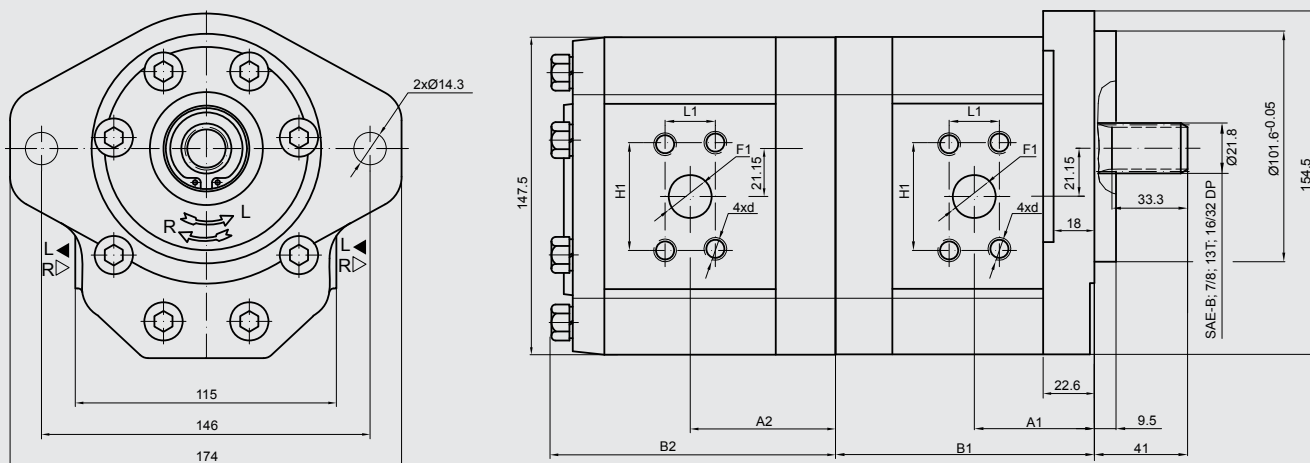
PGE104-.../...-FX1/1-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions					Inlet G	Outlet G
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
2000	56.1	114.7	58.3	118.9	G 3/4	G 3/4	
2250	57.6	117.7	59.7	121.9			
2500	58.3	119.1	60.5	123.3			
2800	60.2	122.7	62.4	126.9			
3200	66.5	135.3	68.7	139.5	G 1		G 3/4
3600	68.0	138.5	70.2	142.7			
4200	70.8	144.0	73.0	148.3			
4600	72.7	147.8	74.9	152.0			
5000	74.5	151.4	76.7	155.6			
5500	76.7	155.9	78.9	160.1			
6000	78.7	160.4	80.9	164.6			

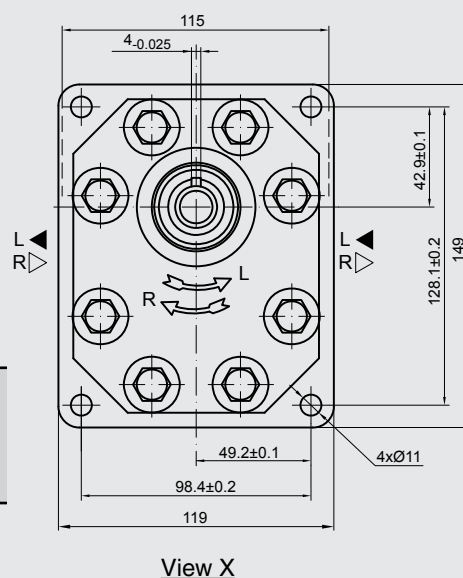
PGE104-.../...-FX7/7-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions											
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet				Outlet			
					F1	d	H1	L1	F1	d	H1	L1
2000	56.1	114.7	58.3	118.9	19	M10	47.6	22.2	19	M10	47.6	22.2
2250	57.6	117.7	59.7	121.9								
2500	58.3	119.1	60.5	123.3								
2800	60.2	122.7	62.4	126.9								
3200	66.5	135.3	68.7	139.5								
3600	68.0	138.5	70.2	142.7	27	M10	52.4	26.2	19	M10	47.6	22.2
4200	70.8	144.0	73.0	148.3								
4600	72.7	147.8	74.9	152.0								
5000	74.5	151.4	76.7	155.6								
5500	76.7	155.9	78.9	160.1								
6000	78.7	160.4	80.9	164.6								

PGE104-.../.../...-BS4/4/4-N

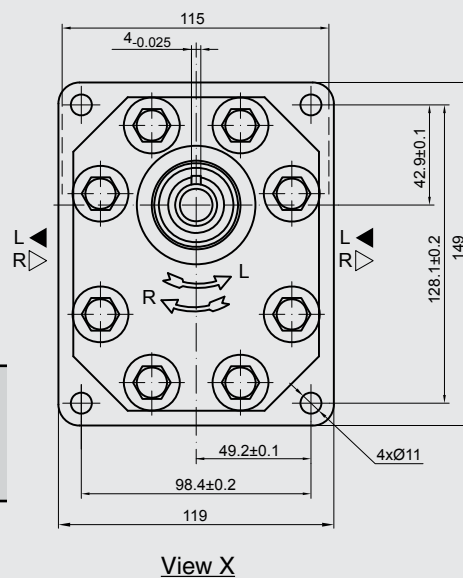
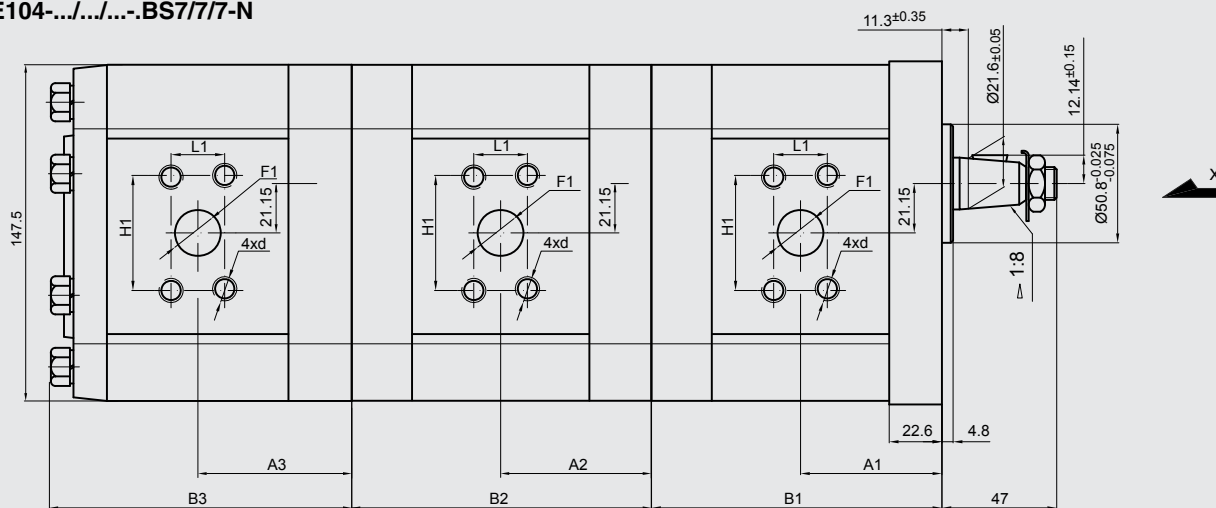


Displacement	Dimensions						Inlet			Outlet					
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	E	F	d	E	F	d			
2000	56.1	114.7	58.5	117.1	58.3	118.9	40	19	M8	40	19	M8			
2250	57.6	117.7	60.0	120.1	59.7	121.9									
2500	58.3	119.1	60.8	121.5	60.5	123.3									
2800	60.2	122.7	62.5	125.1	62.4	126.9									
3200	66.5	135.3	68.8	137.7	68.7	139.5	51	27	M10						
3600	68.0	138.5	70.5	140.9	70.2	142.7									
4200	70.8	144.0	73.2	146.5	73.0	148.3									
4600	72.7	147.8	75.1	150.2	74.9	152.0									
5000	74.5	151.4	76.9	153.8	76.7	155.6									
5500	76.7	155.9	79.1	158.3	78.9	160.1									
6000	78.7	160.4	81.4	162.8	80.9	164.6									

[illegible]

Displacement	Dimensions						Inlet G	Outlet G	
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]			
2000	56.1	114.7	58.5	117.1	58.3	118.9	G 3/4	G 3/4	
2250	57.6	117.7	60.0	120.1	59.7	121.9			
2500	58.3	119.1	60.8	121.5	60.5	123.3			
2800	60.2	122.7	62.5	125.1	62.4	126.9			
3200	66.5	135.3	68.8	137.7	68.7	139.5	G 1		G 3/4
3600	68.0	138.5	70.5	140.9	70.2	142.7			
4200	70.8	144.0	73.2	146.5	73.0	148.3			
4600	72.7	147.8	75.1	150.2	74.9	152.0			
5000	74.5	151.4	76.9	153.8	76.7	155.6			
5500	76.7	155.9	79.1	158.3	78.9	160.1			
6000	78.7	160.4	81.4	162.8	80.9	164.6			

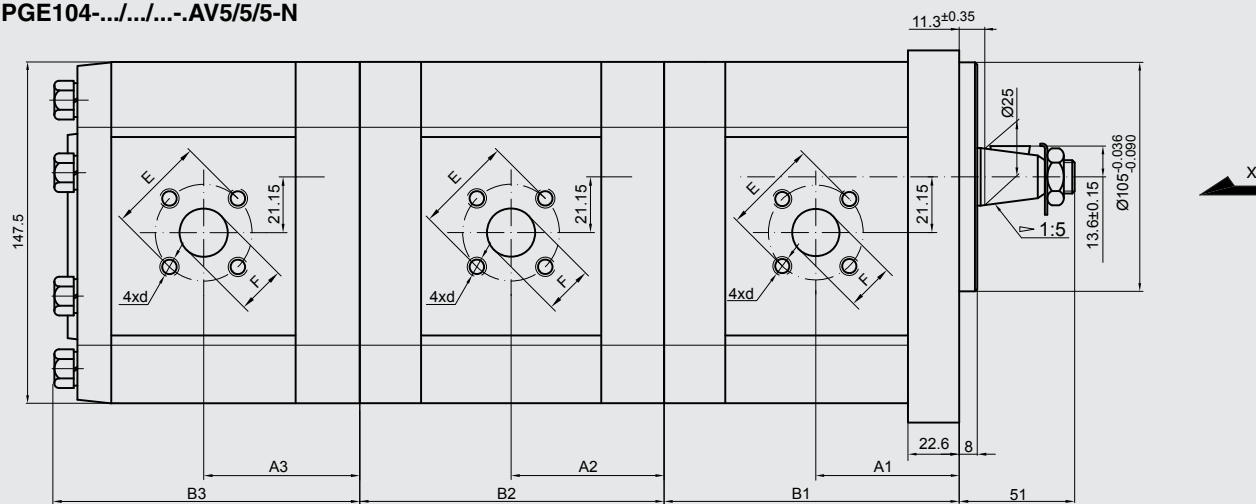
PGE104-.../.../...-BS7/7/7-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions													
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	F1	Inlet				Outlet		
								d	H1	L1	F1	d	H1	L1
2000	56.1	114.7	58.5	117.1	58.3	118.9	19	M10	47.6	22.2	19	M10	47.6	22.2
2250	57.6	117.7	60.0	120.1	59.7	121.9								
2500	58.3	119.1	60.8	121.5	60.5	123.3								
2800	60.2	122.7	62.5	125.1	62.4	126.9								
3200	66.5	135.3	68.8	137.7	68.7	139.5	27		52.4	26.2				
3600	68.0	138.5	70.5	140.9	70.2	142.7								
4200	70.8	144.0	73.2	146.5	73.0	148.3								
4600	72.7	147.8	75.1	150.2	74.9	152.0								
5000	74.5	151.4	76.9	153.8	76.7	155.6								
5500	76.7	155.9	79.1	158.3	78.9	160.1								
6000	78.7	160.4	81.4	162.8	80.9	164.6								

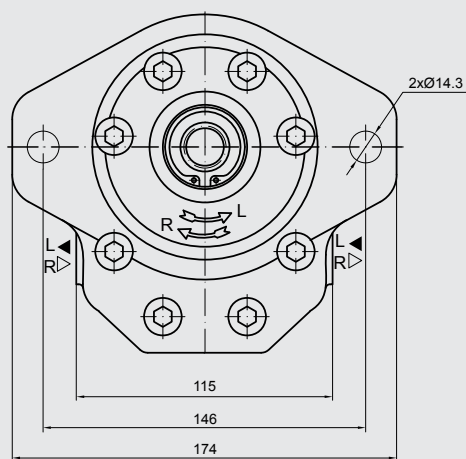
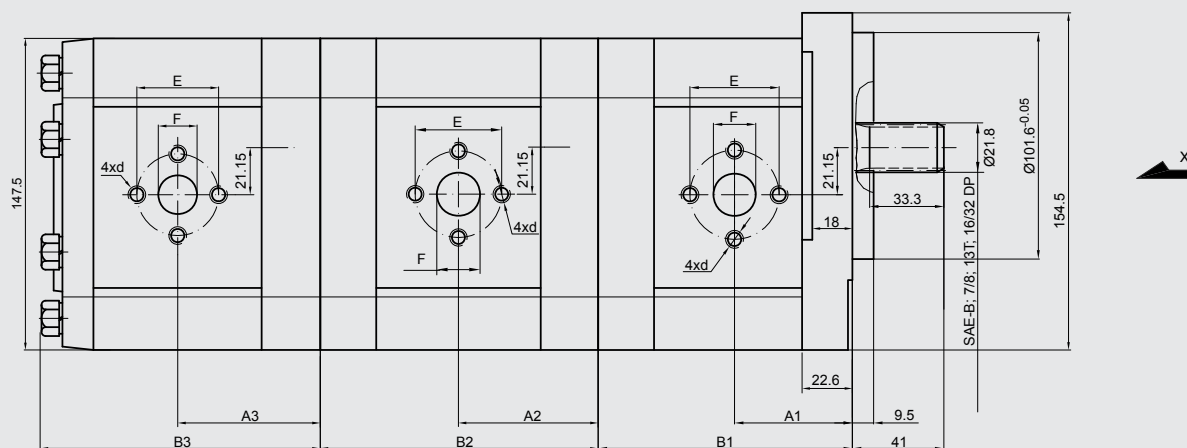
PGE104-.../...-AV5/5/5-N



Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions						Inlet			Outlet		
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	E	F	d	E	F	d
2000	56.1	114.7	58.5	117.1	58.3	118.9	40	19	M8	40	19	M8
2250	57.6	117.7	60.0	120.1	59.7	121.9						
2500	58.3	119.1	60.8	121.5	60.5	123.3						
2800	60.2	122.7	62.5	125.1	62.4	126.9						
3200	66.5	135.3	68.8	137.7	68.7	139.5						
3600	68.0	138.5	70.5	140.9	70.2	142.7	55	27	M8	55	19	M8
4200	70.8	144.0	73.2	146.5	73.0	148.3						
4600	72.7	147.8	75.1	150.2	74.9	152.0						
5000	74.5	151.4	76.9	153.8	76.7	155.6						
5500	76.7	155.9	79.1	158.3	78.9	160.1						
6000	78.7	160.4	81.4	162.8	80.9	164.6						

PGE104-.../.../...-FX4/4/4-N

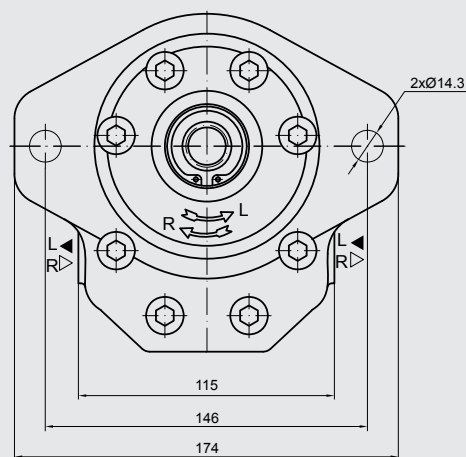
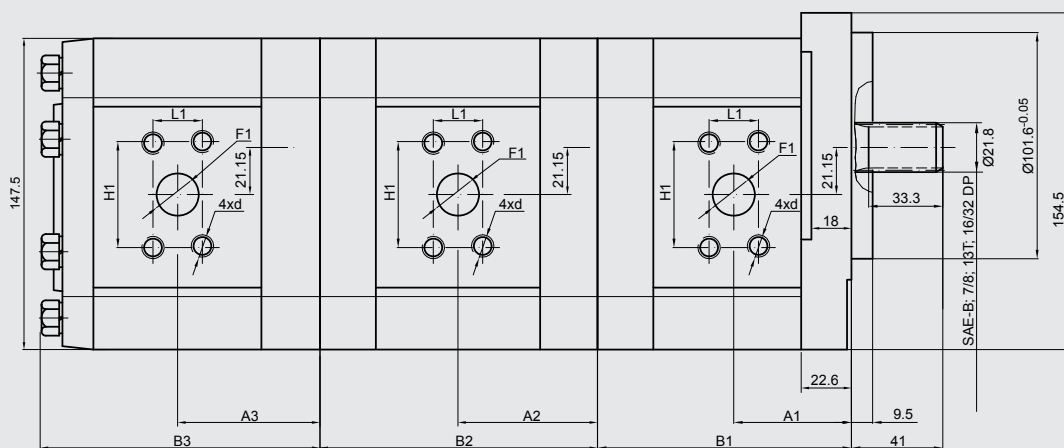


View X

Displacement	Geometric displacement [cm ³ /rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions						Inlet			Outlet		
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	E	F	d	E	F	d
2000	56.1	114.7	58.5	117.1	58.3	118.9	40	19	M8	40	19	M8
2250	57.6	117.7	60.0	120.1	59.7	121.9						
2500	58.3	119.1	60.8	121.5	60.5	123.3						
2800	60.2	122.7	62.5	125.1	62.4	126.9						
3200	66.5	135.3	68.8	137.7	68.7	139.5						
3600	68.0	138.5	70.5	140.9	70.2	142.7	51	27	M10	40	19	M8
4200	70.8	144.0	73.2	146.5	73.0	148.3						
4600	72.7	147.8	75.1	150.2	74.9	152.0						
5000	74.5	151.4	76.9	153.8	76.7	155.6						
5500	76.7	155.9	79.1	158.3	78.9	160.1						
6000	78.7	160.4	81.4	162.8	80.9	164.6						

PGE104-.../...-FX7/7/7-N



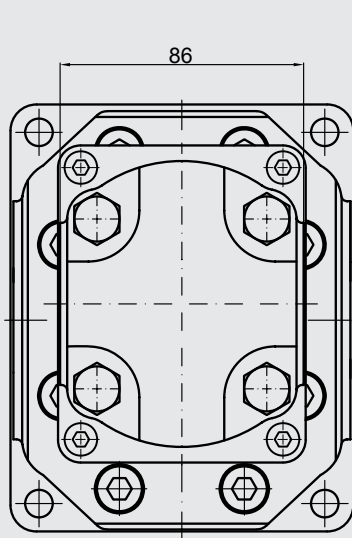
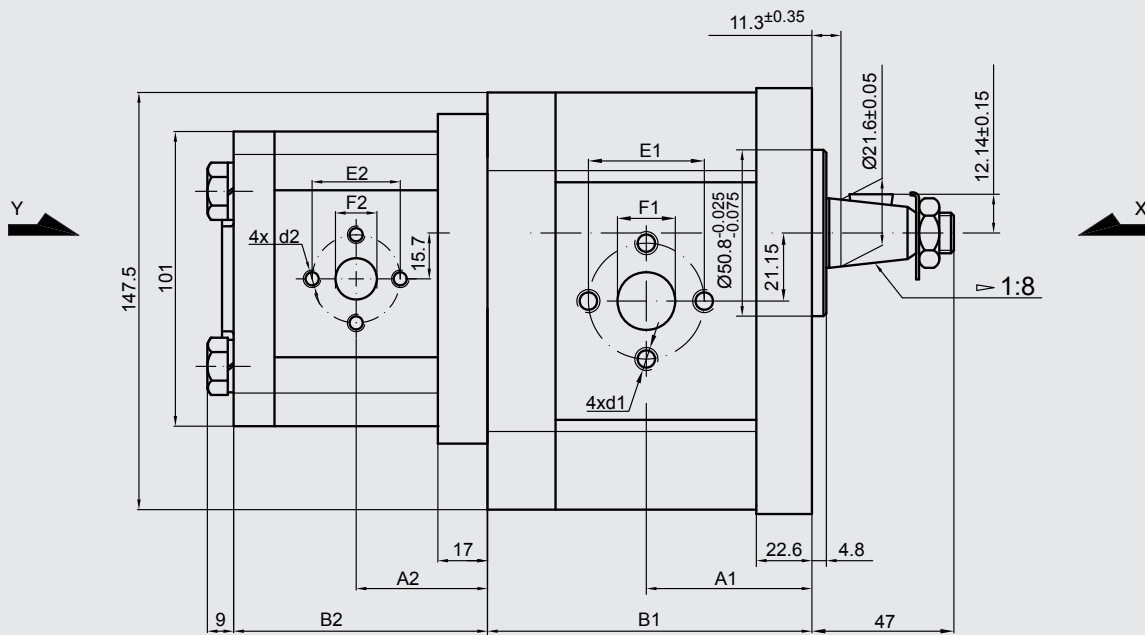
View X

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

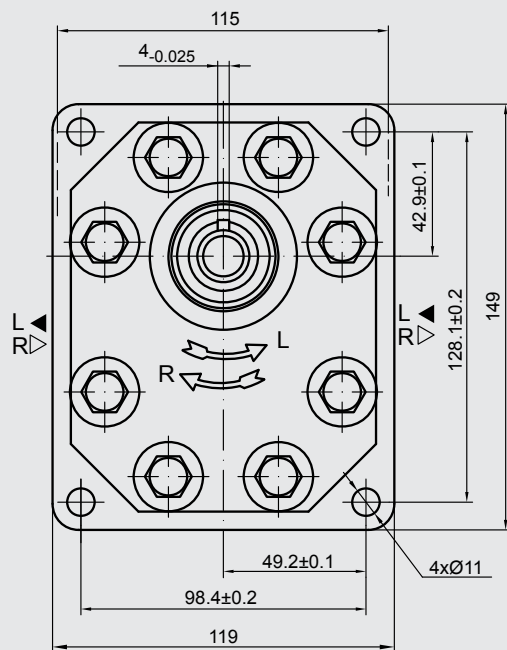
Displacement	Dimensions						Inlet				Outlet			
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	F1	d	H1	L1	F1	d	H1	L1
2000	56.1	114.7	58.5	117.1	58.3	118.9	19	M10	47.6	22.2	19	M10	47.6	22.2
2250	57.6	117.7	60.0	120.1	59.7	121.9								
2500	58.3	119.1	60.8	121.5	60.5	123.3								
2800	60.2	122.7	62.5	125.1	62.4	126.9								
3200	66.5	135.3	68.8	137.7	68.7	139.5								
3600	68.0	138.5	70.5	140.9	70.2	142.7	27	M10	52.4	26.2	19	M10	47.6	22.2
4200	70.8	144.0	73.2	146.5	73.0	148.3								
4600	72.7	147.8	75.1	150.2	74.9	152.0								
5000	74.5	151.4	76.9	153.8	76.7	155.6								
5500	76.7	155.9	79.1	158.3	78.9	160.1								
6000	78.7	160.4	81.4	162.8	80.9	164.6								

6.5.28 Double pump size 3 / size 2

PGE104-.../...-BS4/4-N



View Y



View X

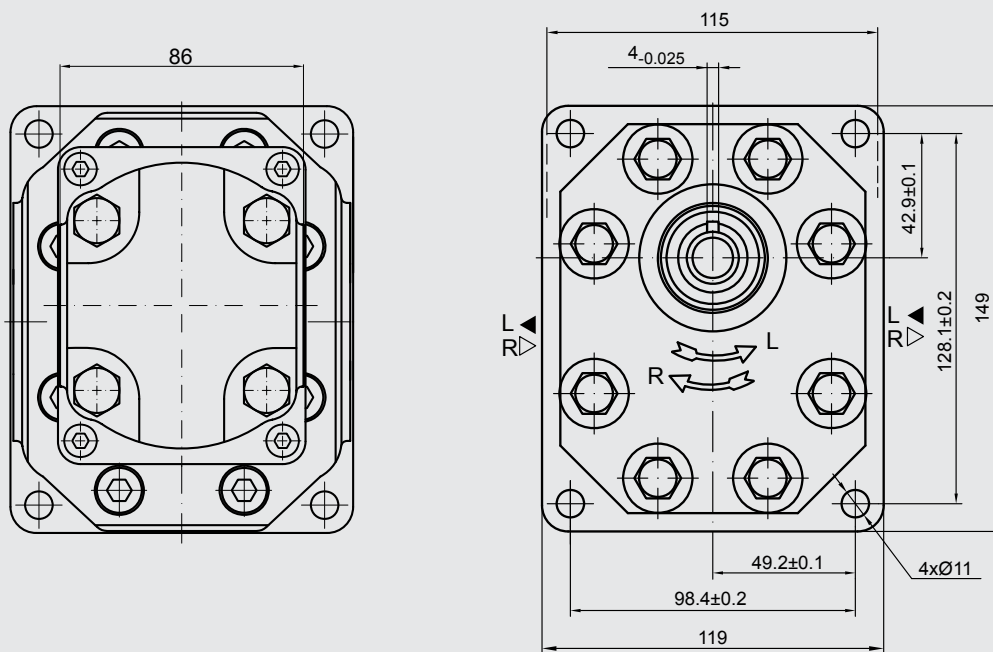
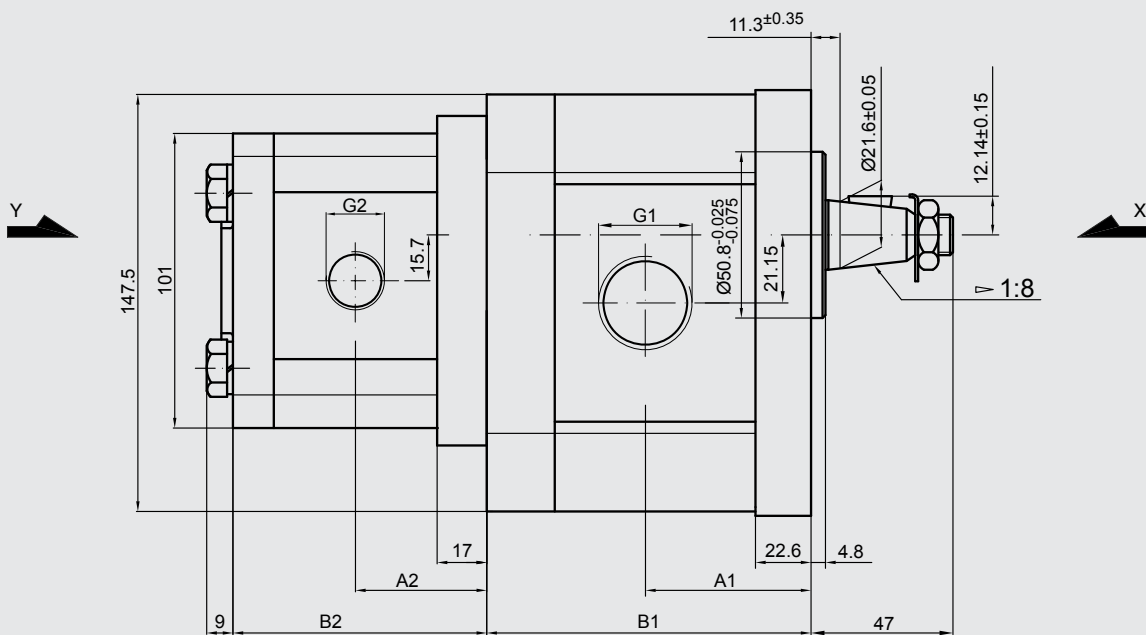
Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			Inlet			Outlet				
						A1 [mm]	B1 [mm]	E1	F1	d1	E1	F1	d1
2000	20	28.2	56.4	250	3000	56.1	114.7	40	19	M8	40	19	M8
2250	22.5	31.7	63.5			57.6	117.7						
2500	25	35.3	70.5			58.3	119.1						
2800	28	39.5	79.0			60.2	122.7						
3200	32	45.1	90.2			66.5	135.3						
3600	36	51.3	95.8	240	2800	68.0	138.5	51	27	M10			
4200	42	59.9	99.8	230	2500	70.8	144.0						
4600	46	65.6	100.5	210	2300	72.7	147.8						
5000	50	71.3	99.8	185	2100	74.5	151.4						
5500	55	78.4	91.4	165	1750	76.7	155.9						
6000	60	85.5	99.8	150		78.7	160.4						

End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
450	4.5	6.14	14.33	250	3500	40.5	78	30	13.1	M6	30	13.1	M6
630	6.3	8.69	20.29			42	81						
820	8.2	11.32	26.40			43.5	83.9						
1000	10	13.95	32.55			45	87	40	19	M8			
1130	11.3	15.76	36.78			46	89.1						
1200	12	16.92	39.48			46.6	90.3						
1400	14	19.95	46.55			48	93.4						
1500	15	21.60	36.00		49	95							
1600	16	23.04	38.40		2500	50	96.6						
1900	19	27.36	45.60	200		52	101.5						
2200	22	31.68	42.24	180		2000	55	106.5					
2500	25	36.00	48.00	160	57.2		111.4				40	19	M8

PGE104-.../...-BS1/1-N

View Y

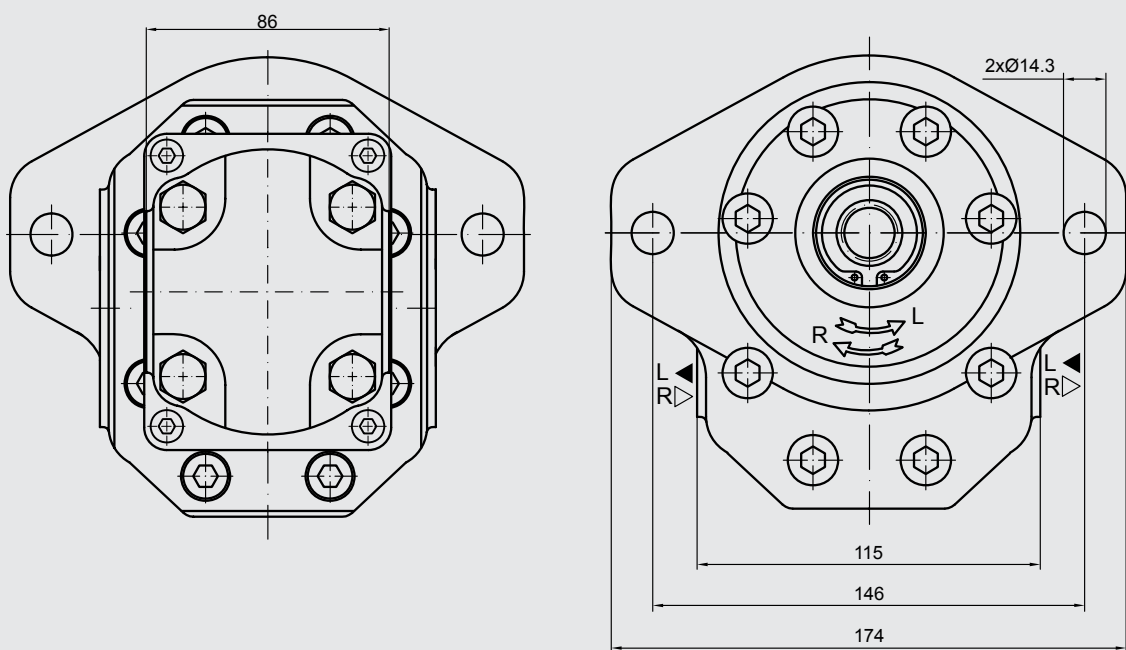
View X

Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
2000	20	28.2	56.4	250	3000	56.1	114.7	G 3/4	G 3/4
2250	22.5	31.7	63.5			57.6	117.7		
2500	25	35.3	70.5			58.3	119.1		
2800	28	39.5	79.0			60.2	122.7		
3200	32	45.1	90.2			66.5	135.3	G 1	
3600	36	51.3	95.8	240	2800	68.0	138.5		
4200	42	59.9	99.8	230	2500	70.8	144.0		
4600	46	65.6	100.5	210	2300	72.7	147.8		
5000	50	71.3	99.8	185	2100	74.5	151.4		
5500	55	78.4	91.4	165	1750	76.7	155.9		
6000	60	85.5	99.8	150		78.7	160.4		

End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet G2	Outlet G2
450	4.5	6.14	14.33	250	3500	40.5	78	G 1/2	G 1/2
630	6.3	8.69	20.29			42	81		
820	8.2	11.32	26.40			43.5	83.9		
1000	10	13.95	32.55			45	87	G 3/4	
1130	11.3	15.76	36.78			46	89.1		
1200	12	16.92	39.48			46.6	90.3		
1400	14	19.95	46.55		48	93.4			
1500	15	21.60	36.00		2500	49	95		
1600	16	23.04	38.40			50	96.6		
1900	19	27.36	45.60	200		52	101.5		
2200	22	31.68	42.24	180	2000	55	106.5		
2500	25	36.00	48.00	160		57.2	111.4		



View X

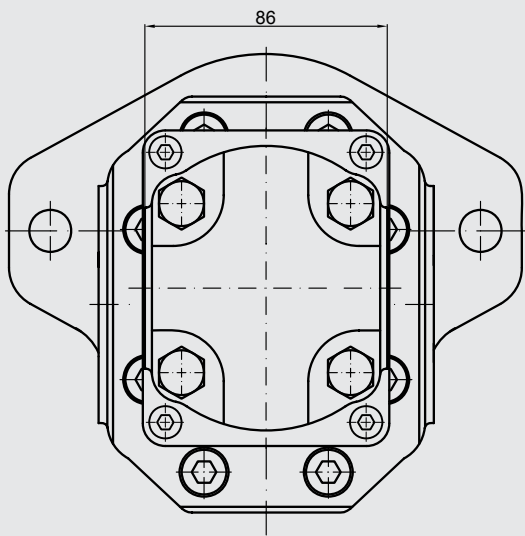
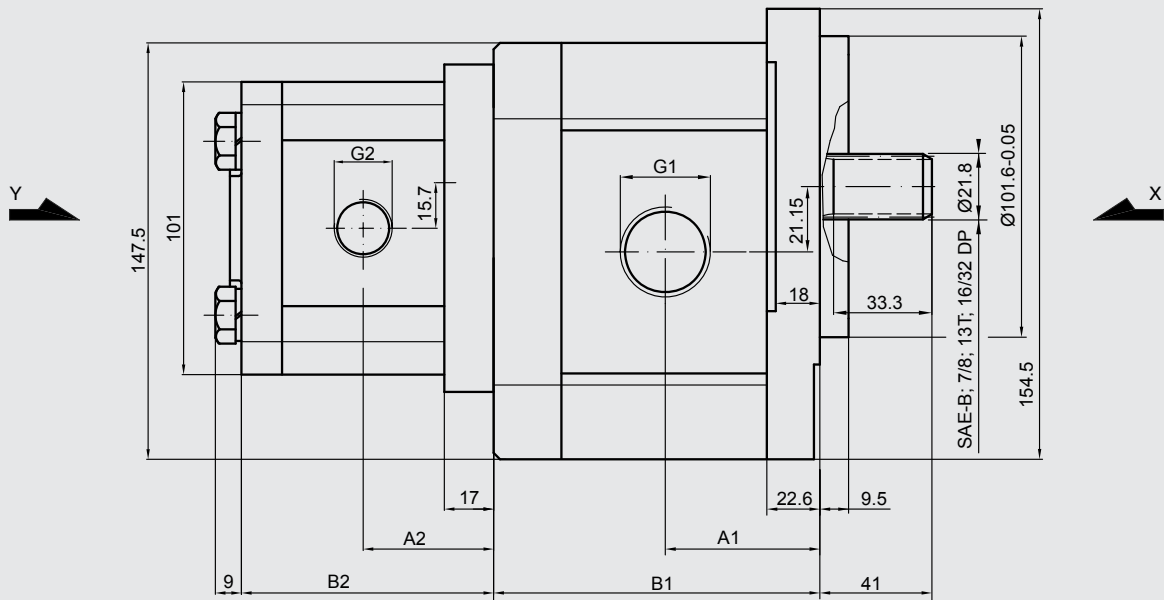
Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
2000	20	28.2	56.4	250	3000	56.1	114.7	40	19	M8	40	19	M8
2250	22.5	31.7	63.5			57.6	117.7						
2500	25	35.3	70.5			58.3	119.1						
2800	28	39.5	79.0			60.2	122.7						
3200	32	45.1	90.2			66.5	135.3						
3600	36	51.3	95.8	240	2800	68.0	138.5	51	27	M10			
4200	42	59.9	99.8	230	2500	70.8	144.0						
4600	46	65.6	100.5	210	2300	72.7	147.8						
5000	50	71.3	99.8	185	2100	74.5	151.4						
5500	55	78.4	91.4	165	1750	76.7	155.9						
6000	60	85.5	99.8	150		78.7	160.4						

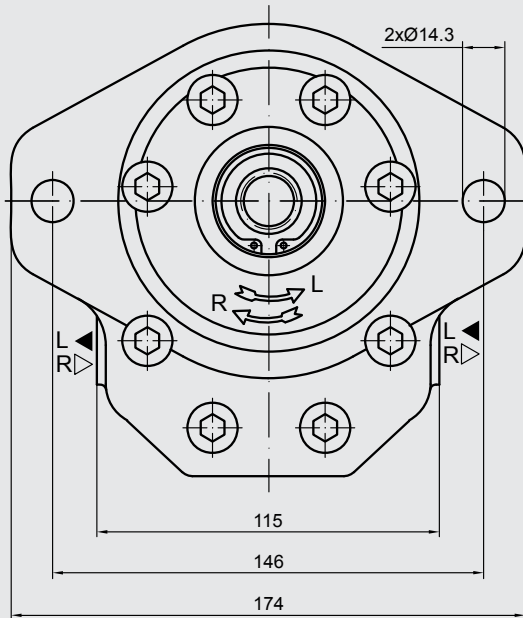
End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
450	4.5	6.14	14.33	250	3500	40.5	78	30	13.1	M6	30	13.1	M6
630	6.3	8.69	20.29			42	81						
820	8.2	11.32	26.40			43.5	83.9						
1000	10	13.95	32.55			45	87	40	19	M8			
1130	11.3	15.76	36.78			46	89.1						
1200	12	16.92	39.48			46.6	90.3						
1400	14	19.95	46.55			48	93.4						
1500	15	21.60	36.00		2500	49	95	40	19	M8			
1600	16	23.04	38.40			50	96.6						
1900	19	27.36	45.60	52		101.5							
2200	22	31.68	42.24	180	2000	55	106.5	40	19	M8			
2500	25	36.00	48.00	160		57.2	111.4						

PGE104-.../...-FX1/1-N



View Y



View X

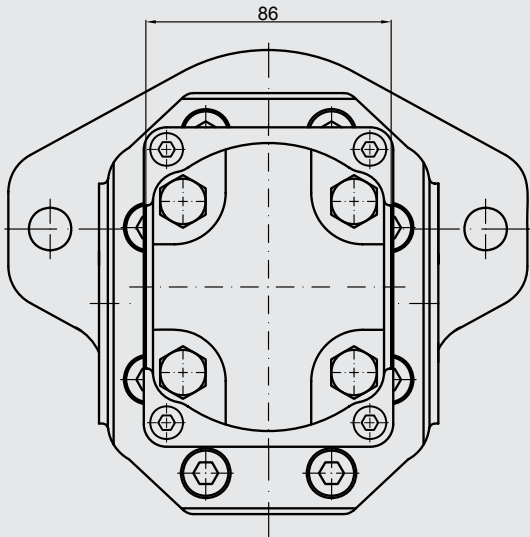
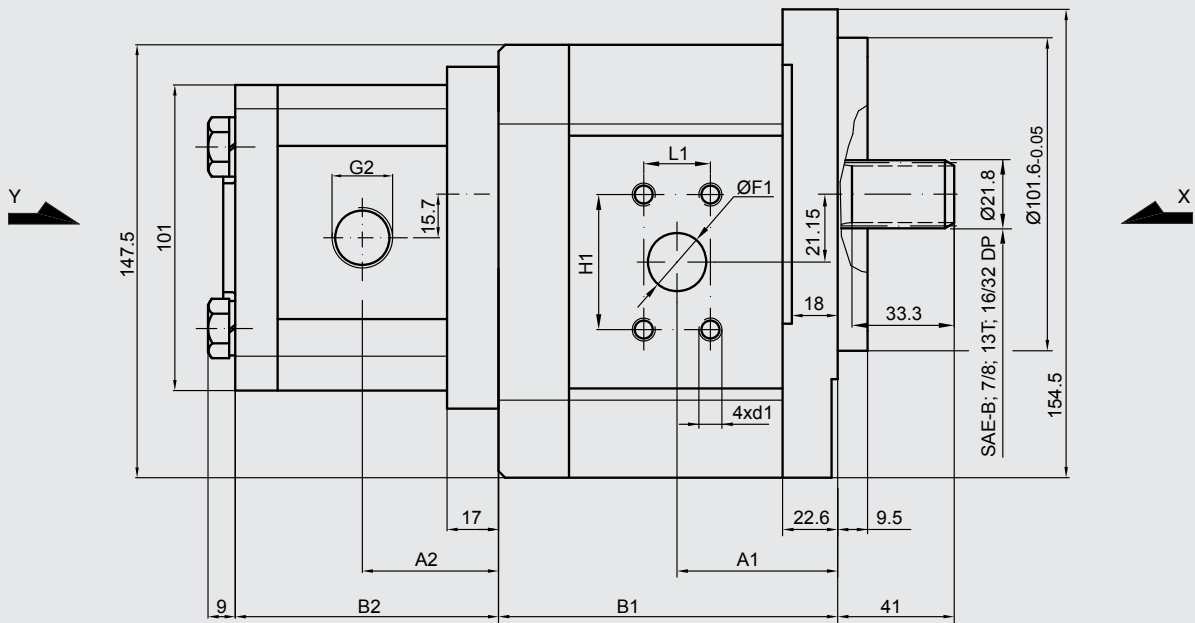
Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
2000	20	28.2	56.4	250	3000	56.1	114.7	G 3/4	G 3/4
2250	22.5	31.7	63.5			57.6	117.7		
2500	25	35.3	70.5			58.3	119.1		
2800	28	39.5	79.0			60.2	122.7		
3200	32	45.1	90.2			66.5	135.3		
3600	36	51.3	95.8	240	2800	68.0	138.5	G 1	
4200	42	59.9	99.8	230	2500	70.8	144.0		
4600	46	65.6	100.5	210	2300	72.7	147.8		
5000	50	71.3	99.8	185	2100	74.5	151.4		
5500	55	78.4	91.4	165	1750	76.7	155.9		
6000	60	85.5	99.8	150		78.7	160.4		

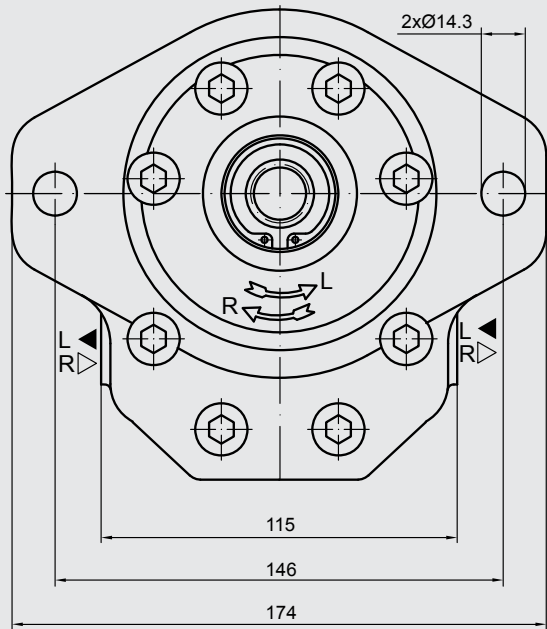
End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet G2	Outlet G2
450	4.5	6.14	14.33	250	3500	40.5	78	G 1/2	G 1/2
630	6.3	8.69	20.29			42	81		
820	8.2	11.32	26.40			43.5	83.9		
1000	10	13.95	32.55			45	87	G 3/4	
1130	11.3	15.76	36.78			46	89.1		
1200	12	16.92	39.48			46.6	90.3		
1400	14	19.95	46.55			48	93.4		
1500	15	21.60	36.00		2500	49	95		
1600	16	23.04	38.40			50	96.6		
1900	19	27.36	45.60	200		52	101.5		
2200	22	31.68	42.24	180	2000	55	106.5		
2500	25	36.00	48.00	160		57.2	111.4		

PGE104-.../...-FX7/1-N



View Y



View X

Front pump size 3:

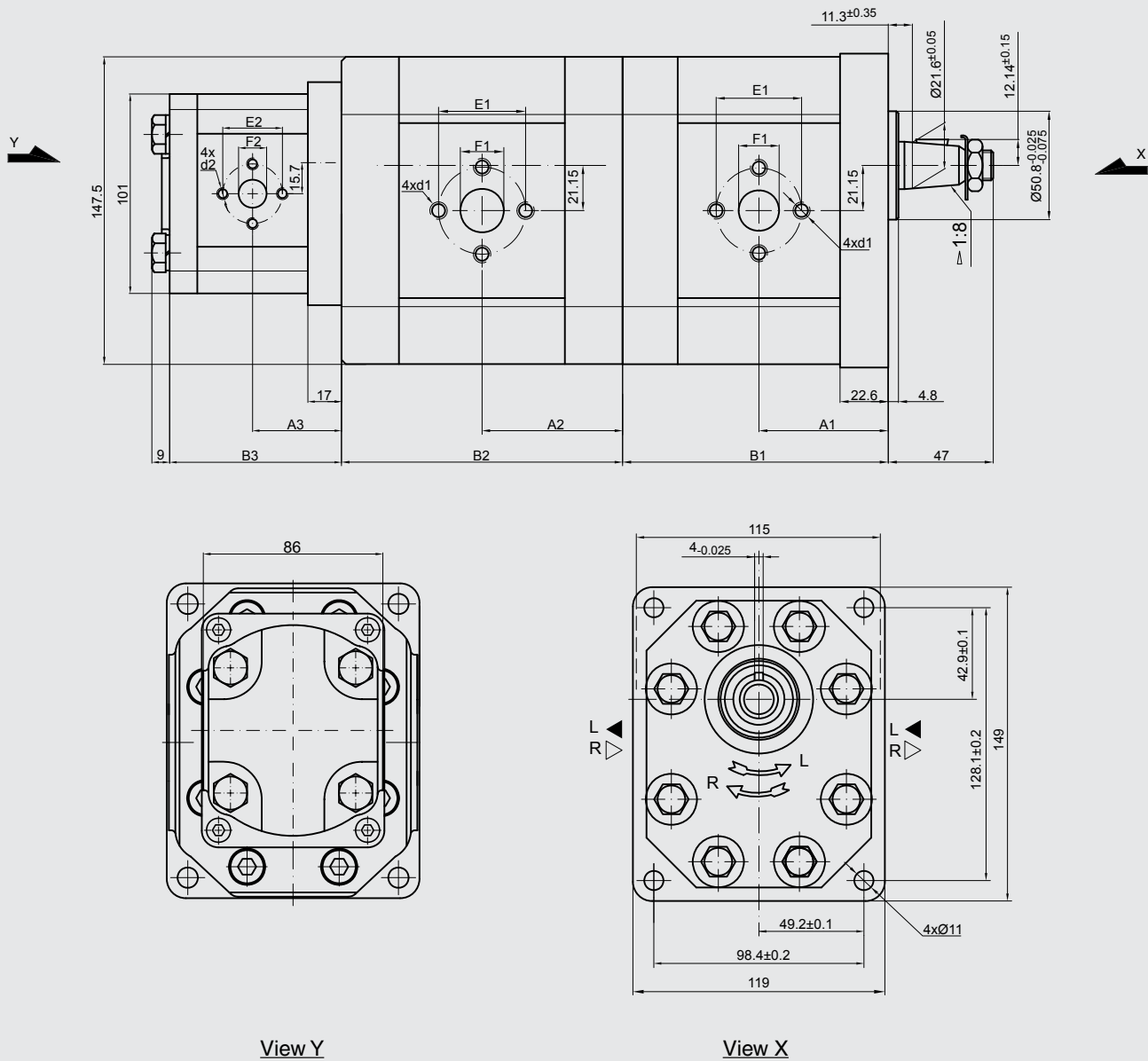
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions									
		at 1500 rpm [l/min]	at max. rpm [l/min]			Inlet				Outlet					
						A1 [mm]	B1 [mm]	F1	d1	H1	L1	F1	d1	H1	L1
2000	20	28.2	56.4	250	3000	56.1	114.7	19	M10	47.6	22.2	19	M10	47.6	22.2
2250	22.5	31.7	63.5			57.6	117.7								
2500	25	35.3	70.5			58.3	119.1								
2800	28	39.5	79.0			60.2	122.7								
3200	32	45.1	90.2			66.5	135.3								
3600	36	51.3	95.8	240	2800	68.0	138.5	27	M10	52.4	26.2	19	M10	47.6	22.2
4200	42	59.9	99.8	230	2500	70.8	144.0								
4600	46	65.6	100.5	210	2300	72.7	147.8								
5000	50	71.3	99.8	185	2100	74.5	151.4								
5500	55	78.4	91.4	165	1750	76.7	155.9								
6000	60	85.5	99.8	150		78.7	160.4								

End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet G2	Outlet G2
450	4.5	6.14	14.33	250	3500	40.5	78	G 1/2	G 1/2
630	6.3	8.69	20.29			42	81		
820	8.2	11.32	26.40			43.5	83.9		
1000	10	13.95	32.55			45	87	G 3/4	
1130	11.3	15.76	36.78			46	89.1		
1200	12	16.92	39.48			46.6	90.3		
1400	14	19.95	46.55			48	93.4		
1500	15	21.60	36.00		49	95			
1600	16	23.04	38.40		50	96.6			
1900	19	27.36	45.60	200	52	101.5			
2200	22	31.68	42.24	180	2000	55	106.5		
2500	25	36.00	48.00	160		57.2	111.4		

6.5.29 Triple pump size 3 / size 3 / size 2

PGE104-.../.../...-BS4/4/4-N



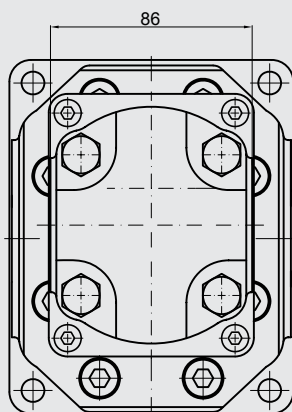
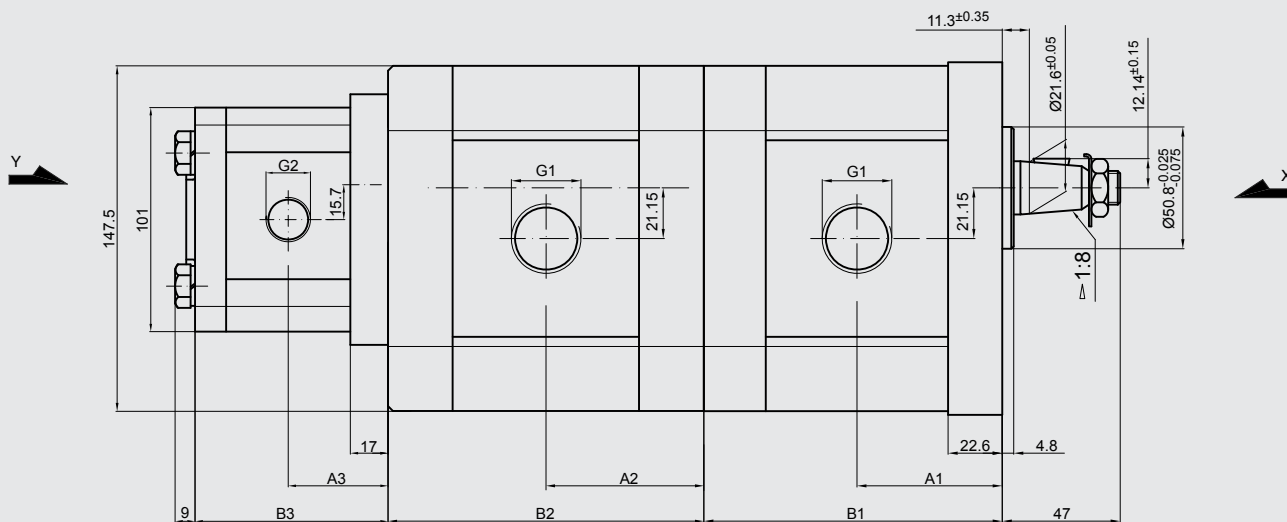
Front and middle pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

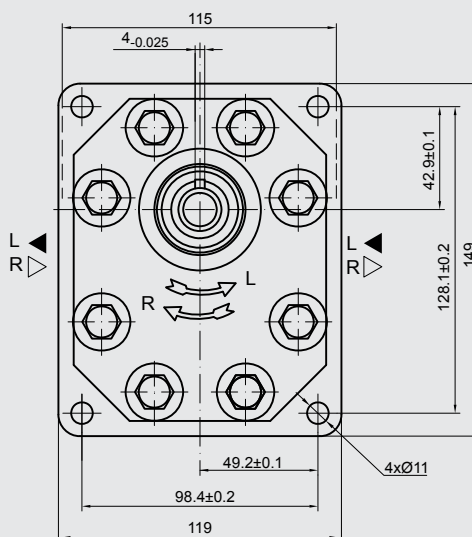
Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E1	F1	d1	E1	F1	d1
2000	56.1	114.7	58.5	117.1	40	19	M8	40	19	M8
2250	57.6	117.7	60.0	120.1						
2500	58.3	119.1	60.8	121.5						
2800	60.2	122.7	62.5	125.1						
3200	66.5	135.3	68.8	137.7	51	27	M10			
3600	68.0	138.5	70.5	140.9						
4200	70.8	144.0	73.2	146.5						
4600	72.7	147.8	75.1	150.2						
5000	74.5	151.4	76.9	153.8						
5500	76.7	155.9	79.1	158.3						
6000	78.7	160.4	81.4	162.8						

End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
450	4.5	6.14	14.33	250	3500	40.5	78	30	13.1	M6	30	13.1	M6
630	6.3	8.69	20.29			42	81						
820	8.2	11.32	26.40			43.5	83.9						
1000	10	13.95	32.55			45	87						
1130	11.3	15.76	36.78			46	89.1						
1200	12	16.92	39.48			46.6	90.3						
1400	14	19.95	46.55			48	93.4						
1500	15	21.60	36.00		2500	49	95	40	19	M8			
1600	16	23.04	38.40			50	96.6						
1900	19	27.36	45.60	52		101.5							
2200	22	31.68	42.24	180	2000	55	106.5						
2500	25	36.00	48.00	160		57.2	111.4						



View Y



View X

Front and middle pump size 3:

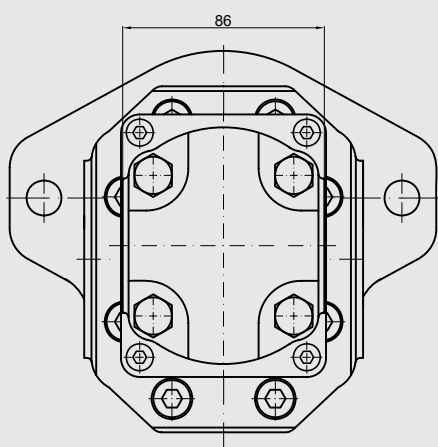
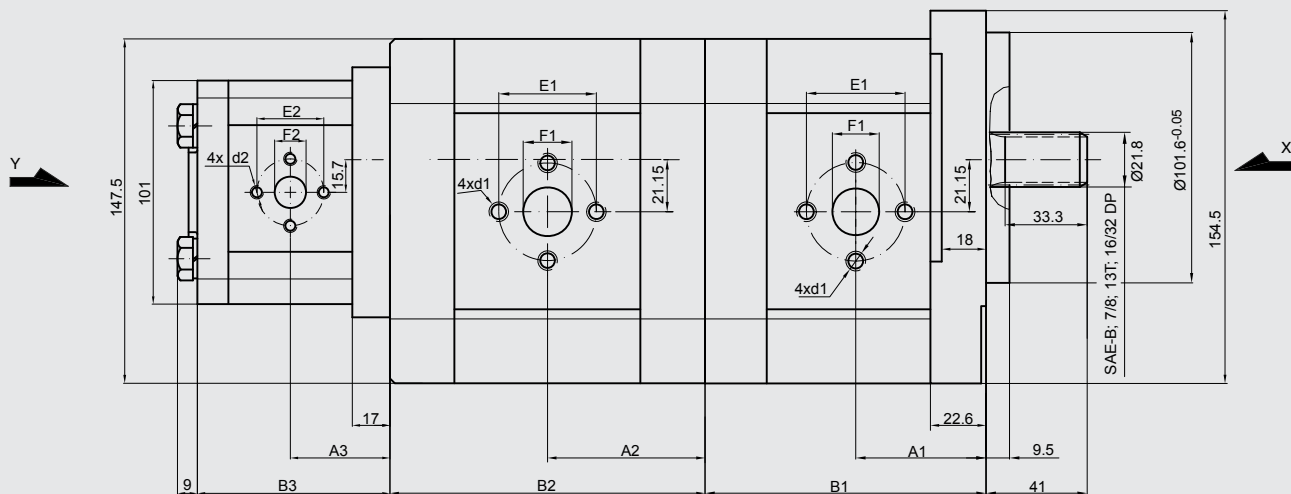
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

Displacement	Dimensions					Inlet G1	Outlet G1
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
2000	56.1	114.7	58.5	117.1	G 3/4	G 3/4	
2250	57.6	117.7	60.0	120.1			
2500	58.3	119.1	60.8	121.5			
2800	60.2	122.7	62.5	125.1			
3200	66.5	135.3	68.8	137.7	G 1		
3600	68.0	138.5	70.5	140.9			
4200	70.8	144.0	73.2	146.5			
4600	72.7	147.8	75.1	150.2			
5000	74.5	151.4	76.9	153.8			
5500	76.7	155.9	79.1	158.3			
6000	78.7	160.4	81.4	162.8			

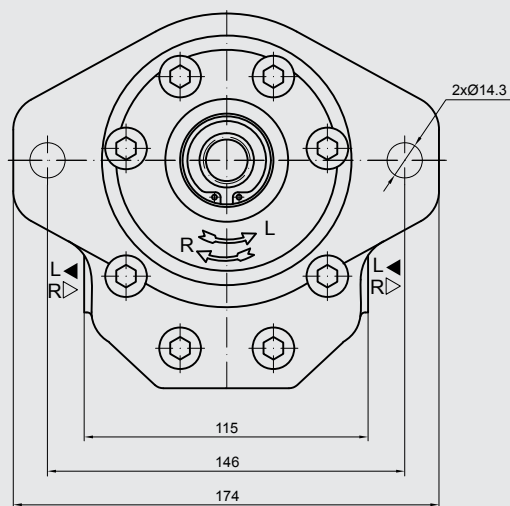
End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet G2	Outlet G2
450	4.5	6.14	14.33	250	3500	40.5	78	G 1/2	G 1/2
630	6.3	8.69	20.29			42	81		
820	8.2	11.32	26.40			43.5	83.9	G 3/4	
1000	10	13.95	32.55			45	87		
1130	11.3	15.76	36.78			46	89.1		
1200	12	16.92	39.48			46.6	90.3		
1400	14	19.95	46.55			48	93.4		
1500	15	21.60	36.00		2500	49	95		
1600	16	23.04	38.40			50	96.6		
1900	19	27.36	45.60			52	101.5		
2200	22	31.68	42.24	180	2000	55	106.5		
2500	25	36.00	48.00	160		57.2	111.4		

PGE104-.../.../...-FX4/4/4-N



View Y



View X

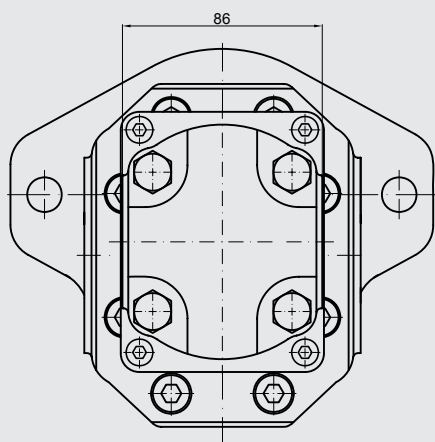
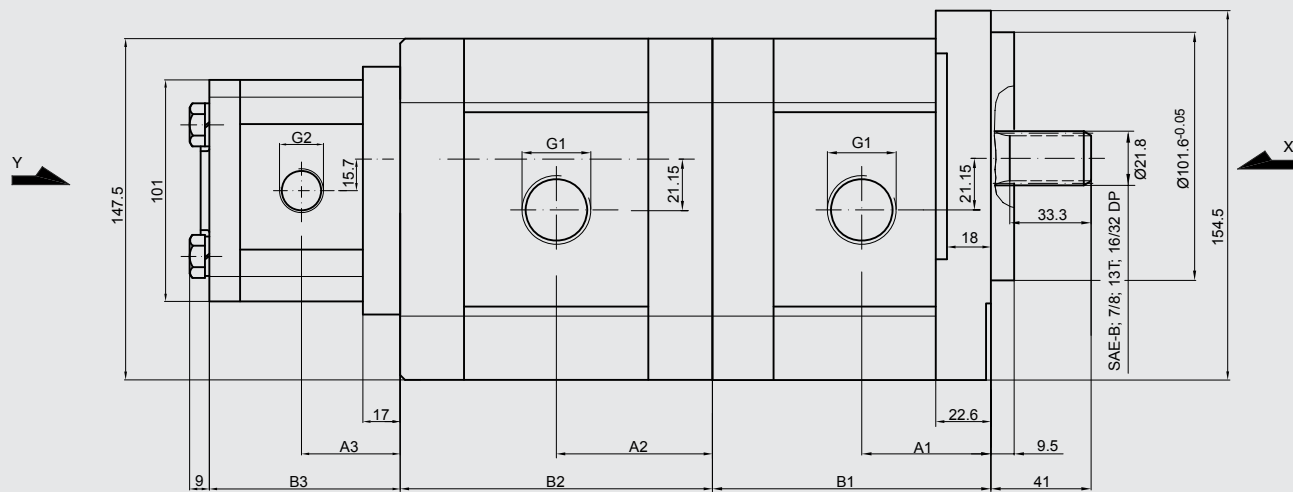
Front and middle pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

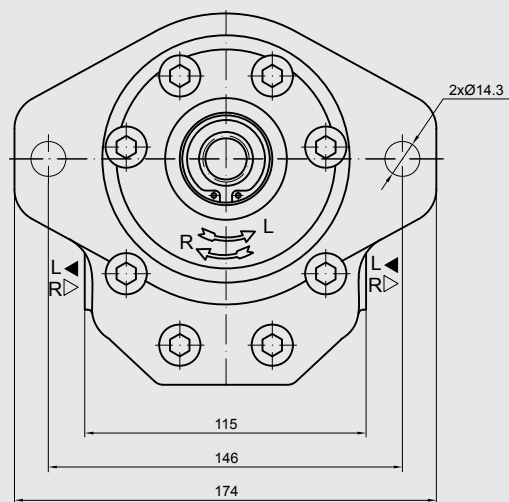
Displacement	Dimensions									
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]	Inlet			Outlet		
					E1	F1	d1	E1	F1	d1
2000	56.1	114.7	58.5	117.1	40	19	M8	40	19	M8
2250	57.6	117.7	60.0	120.1						
2500	58.3	119.1	60.8	121.5						
2800	60.2	122.7	62.5	125.1						
3200	66.5	135.3	68.8	137.7	51	27	M10			
3600	68.0	138.5	70.5	140.9						
4200	70.8	144.0	73.2	146.5						
4600	72.7	147.8	75.1	150.2						
5000	74.5	151.4	76.9	153.8						
5500	76.7	155.9	79.1	158.3						
6000	78.7	160.4	81.4	162.8						

End pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
450	4.5	6.14	14.33	250	3500	40.5	78	30	13.1	M6	30	13.1	M6
630	6.3	8.69	20.29			42	81						
820	8.2	11.32	26.40			43.5	83.9						
1000	10	13.95	32.55			45	87						
1130	11.3	15.76	36.78			46	89.1						
1200	12	16.92	39.48			46.6	90.3						
1400	14	19.95	46.55			48	93.4						
1500	15	21.60	36.00		2500	49	95	40	19	M8			
1600	16	23.04	38.40			50	96.6						
1900	19	27.36	45.60	52		101.5							
2200	22	31.68	42.24	180	2000	55	106.5						
2500	25	36.00	48.00	160		57.2	111.4						



View Y



View X

Front and middle pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
2000	20	28.2	56.4	250	3000
2250	22.5	31.7	63.5		
2500	25	35.3	70.5		
2800	28	39.5	79.0		
3200	32	45.1	90.2		
3600	36	51.3	95.8	240	2800
4200	42	59.9	99.8	230	2500
4600	46	65.6	100.5	210	2300
5000	50	71.3	99.8	185	2100
5500	55	78.4	91.4	165	1750
6000	60	85.5	99.8	150	

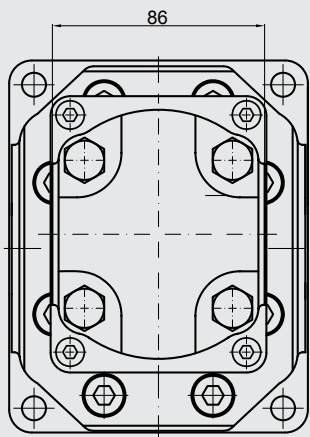
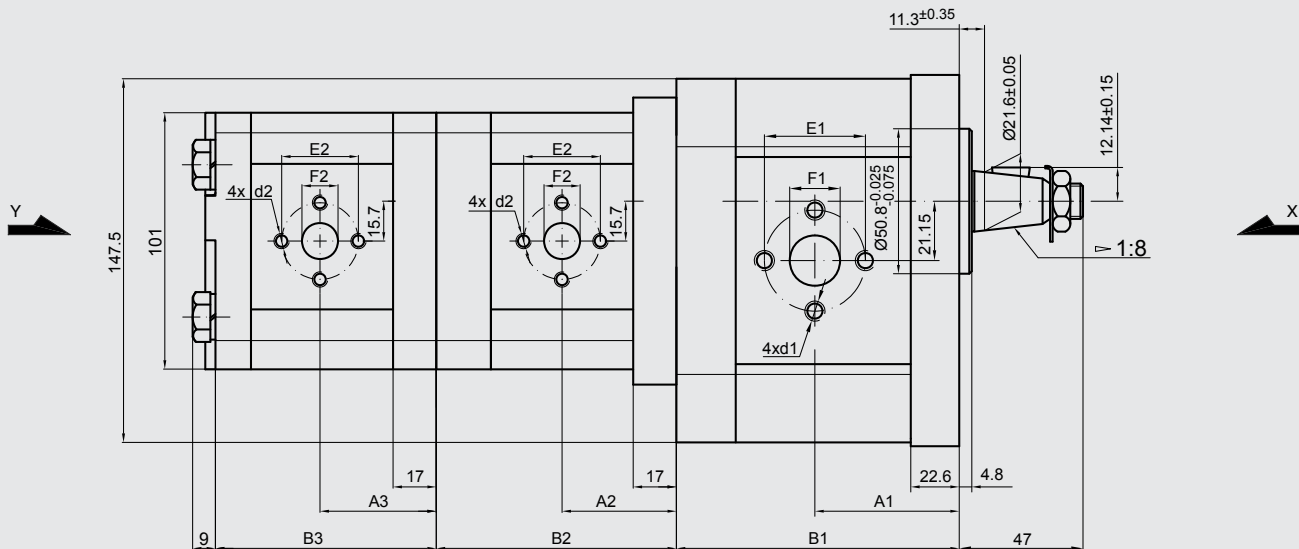
Displacement	Dimensions					Inlet G1	Outlet G1
	A1 [mm]	B1 [mm]	A2 [mm]	B2 [mm]			
2000	56.1	114.7	58.5	117.1	G 3/4	G 3/4	
2250	57.6	117.7	60.0	120.1			
2500	58.3	119.1	60.8	121.5			
2800	60.2	122.7	62.5	125.1			
3200	66.5	135.3	68.8	137.7	G 1		
3600	68.0	138.5	70.5	140.9			
4200	70.8	144.0	73.2	146.5			
4600	72.7	147.8	75.1	150.2			
5000	74.5	151.4	76.9	153.8			
5500	76.7	155.9	79.1	158.3			
6000	78.7	160.4	81.4	162.8			

End pump size 2:

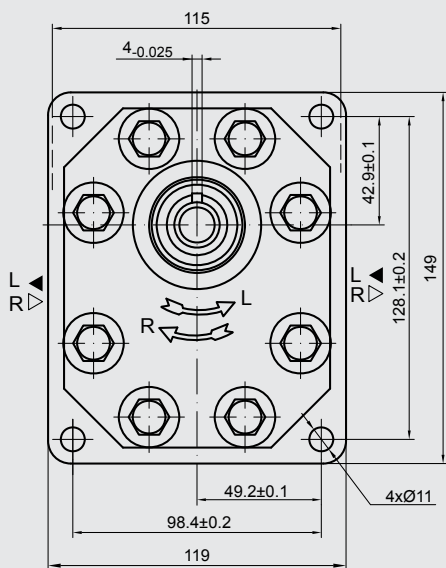
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet G2	Outlet G2
450	4.5	6.14	14.33	250	3500	40.5	78	G 1/2	G 1/2
630	6.3	8.69	20.29			42	81		
820	8.2	11.32	26.40			43.5	83.9		
1000	10	13.95	32.55			45	87	G 3/4	
1130	11.3	15.76	36.78			46	89.1		
1200	12	16.92	39.48			46.6	90.3		
1400	14	19.95	46.55		48	93.4			
1500	15	21.60	36.00		2500	49	95		
1600	16	23.04	38.40			50	96.6		
1900	19	27.36	45.60	200		52	101.5		
2200	22	31.68	42.24	180	2000	55	106.5		
2500	25	36.00	48.00	160		57.2	111.4		

6.5.30 Triple pump size 3 / size 2 / size 2

PGE104-.../.../...-BS4/4/4-N



View Y



View X

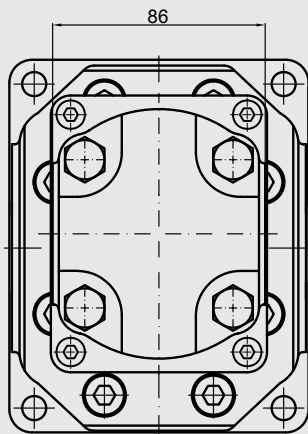
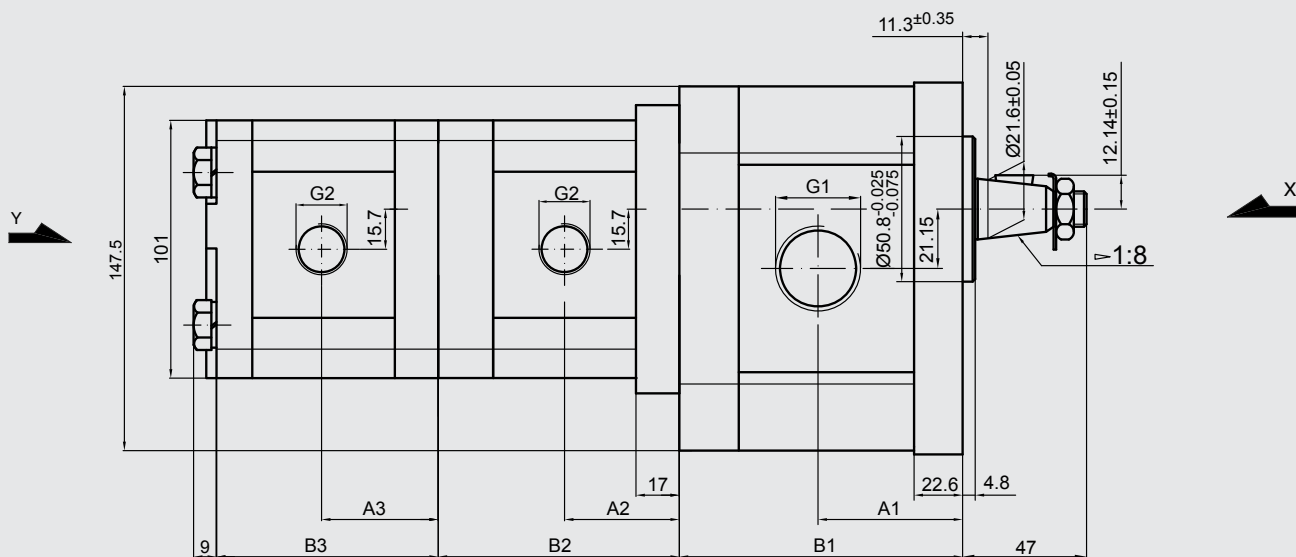
Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
2000	20	28.2	56.4	250	3000	56.1	114.7	40	19	M8	40	19	M8
2250	22.5	31.7	63.5			57.6	117.7						
2500	25	35.3	70.5			58.3	119.1						
2800	28	39.5	79.0			60.2	122.7						
3200	32	45.1	90.2			66.5	135.3						
3600	36	51.3	95.8	240	2800	68.0	138.5	51	27	M10			
4200	42	59.9	99.8	230	2500	70.8	144.0						
4600	46	65.6	100.5	210	2300	72.7	147.8						
5000	50	71.3	99.8	185	2100	74.5	151.4						
5500	55	78.4	91.4	165	1750	76.7	155.9						
6000	60	85.5	99.8	150		78.7	160.4						

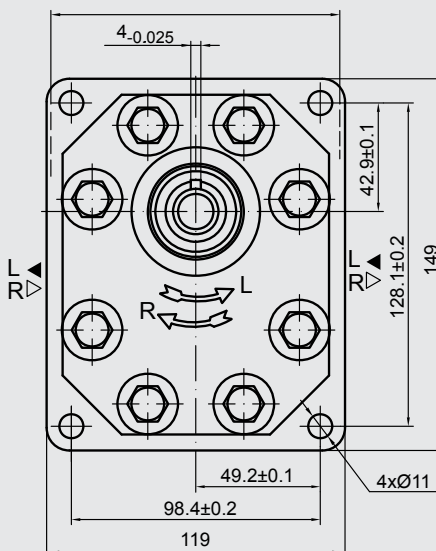
Middle and end pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40		
1900	19	27.36	45.60	200	2500
2200	22	31.68	42.24	180	
2500	25	36.00	48.00	160	

Displacement	Dimensions									
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	Inlet			Outlet		
					E2	F2	d2	E2	F2	d2
450	40.5	78	40.5	85.2	30	13.1	M6	30	13.1	M6
630	42	81	42	88.2						
820	43.5	83.9	43.5	91.1						
1000	45	87	45	94.2						
1130	46	89.1	46	96.3	40	19	M8	14.2	19	M8
1200	46.6	90.3	46.6	97.5						
1400	48	93.4	48	100.6						
1500	49	95	49	102.1						
1600	50	96.6	50	103.8						
1900	52	101.5	52	108.7						
2200	55	106.5	55	113.7						
2500	57.2	111.4	57.2	118.6				40	19	M8



View Y



View X

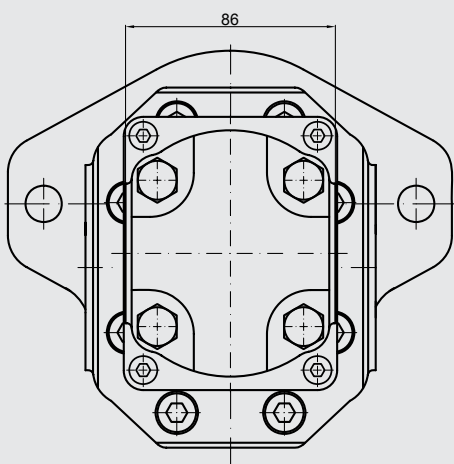
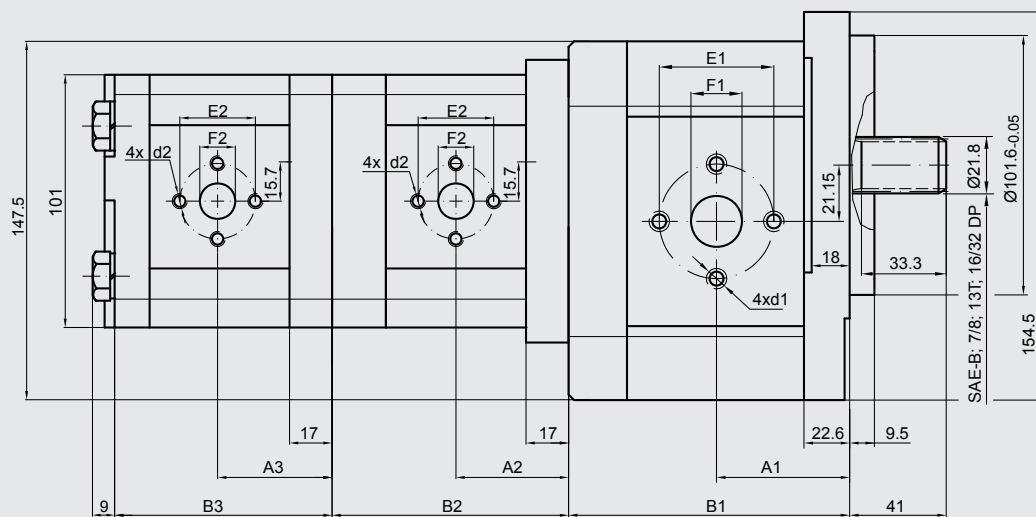
Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
2000	20	28.2	56.4	250	3000	56.1	114.7	G 3/4	G 3/4
2250	22.5	31.7	63.5			57.6	117.7		
2500	25	35.3	70.5			58.3	119.1		
2800	28	39.5	79.0			60.2	122.7		
3200	32	45.1	90.2			66.5	135.3	G 1	
3600	36	51.3	95.8	240	2800	68.0	138.5		
4200	42	59.9	99.8	230	2500	70.8	144.0		
4600	46	65.6	100.5	210	2300	72.7	147.8		
5000	50	71.3	99.8	185	2100	74.5	151.4		
5500	55	78.4	91.4	165	1750	76.7	155.9		
6000	60	85.5	99.8	150		78.7	160.4		

Middle and end pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24	180	2000
2500	25	36.00	48.00	160	

Displacement	Dimensions					Inlet G2	Outlet G2
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]			
450	40.5	85.2	40.5	78	G 1/2	G 1/2	
630	42	88.2	42	81			
820	43.5	91.1	43.5	83.9			
1000	45	94.2	45	87	G 3/4		
1130	46	96.3	46	89			
1200	46.6	97.5	46.6	90.3			
1400	48	100.6	48	93.4			
1500	49	102.1	49	95			
1600	50	103.8	50	96.5			
1900	52	108.7	52	101.5			
2200	55	113.7	55	106.5			
2500	57.2	118.6	57.2	111.4			



View X

Front pump size 3:

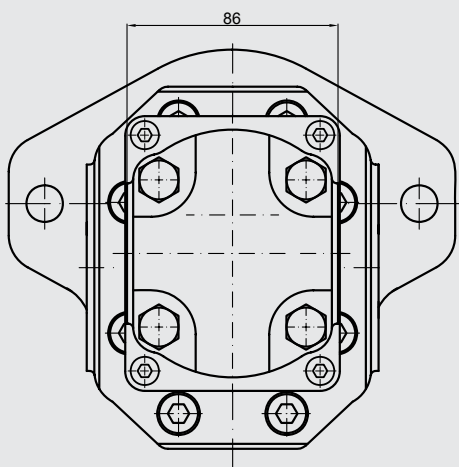
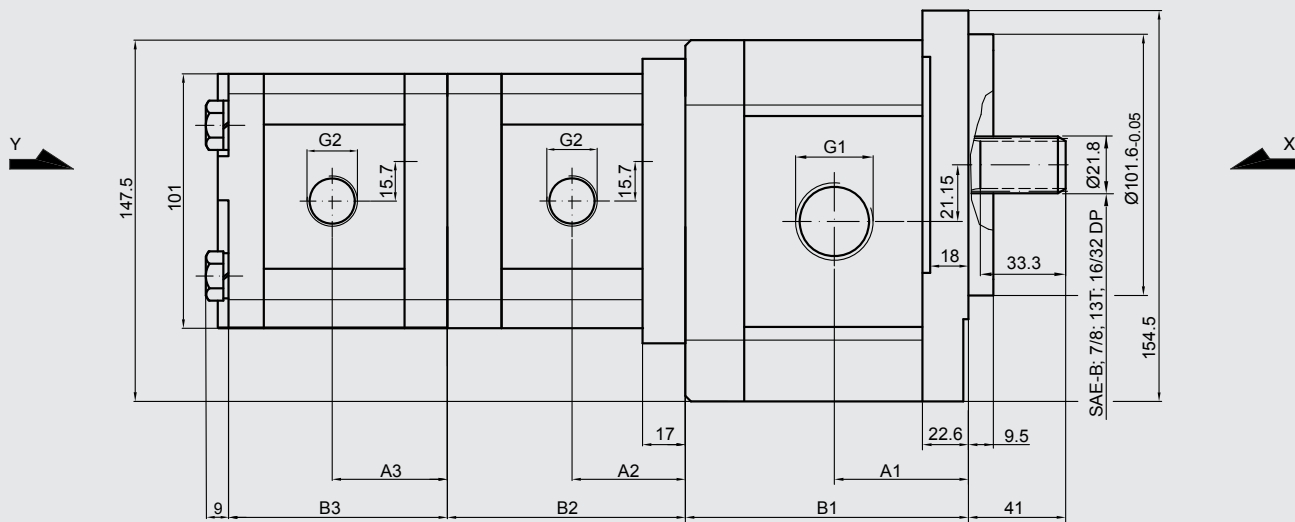
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
2000	20	28.2	56.4	250	3000	56.1	114.7	40	19	M8	40	19	M8
2250	22.5	31.7	63.5			57.6	117.7						
2500	25	35.3	70.5			58.3	119.1						
2800	28	39.5	79.0			60.2	122.7						
3200	32	45.1	90.2			66.5	135.3						
3600	36	51.3	95.8	240	2800	68.0	138.5	51	27	M10	40	19	M8
4200	42	59.9	99.8	230	2500	70.8	144.0						
4600	46	65.6	100.5	210	2300	72.7	147.8						
5000	50	71.3	99.8	185	2100	74.5	151.4						
5500	55	78.4	91.4	165	1750	76.7	155.9						
6000	60	85.5	99.8	150		78.7	160.4						

Middle and end pump size 2:

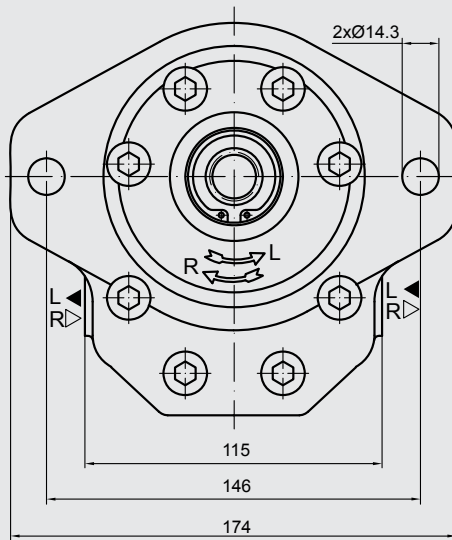
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40		
1900	19	27.36	45.60	200	2500
2200	22	31.68	42.24	180	
2500	25	36.00	48.00	160	

Displacement	Dimensions										
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	Inlet			Outlet			
					E2	F2	d2	E2	F2	d2	
450	40.5	85.2	40.5	78	30	13.1	M6	30	13.1	M6	
630	42	88.2	42	81							
820	43.5	91.1	43.5	83.9							
1000	45	94.2	45	87	40	19	M8		14.2		M6
1130	46	96.3	46	89							
1200	46.6	97.5	46.6	90.3							
1400	48	100.6	48	93.4							
1500	49	102.1	49	95							
1600	50	103.8	50	96.6							
1900	52	108.7	52	101.5							
2200	55	113.7	55	106.5							
2500	57.2	118.6	57.2	111.4				40	19	M8	

PGE104-.../.../...-FX1/1/1-N



View Y



View X

Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
2000	20	28.2	56.4	250	3000	56.1	114.7	G 3/4	G 3/4
2250	22.5	31.7	63.5			57.6	117.7		
2500	25	35.3	70.5			58.3	119.1		
2800	28	39.5	79.0			60.2	122.7		
3200	32	45.1	90.2			66.5	135.3	G 1	
3600	36	51.3	95.8	240	2800	68.0	138.5		
4200	42	59.9	99.8	230	2500	70.8	144.0		
4600	46	65.6	100.5	210	2300	72.7	147.8		
5000	50	71.3	99.8	185	2100	74.5	151.4		
5500	55	78.4	91.4	165	1750	76.7	155.9		
6000	60	85.5	99.8	150		78.7	160.4		

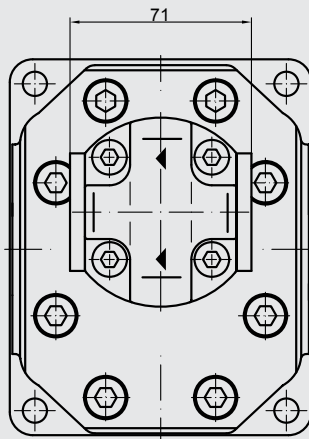
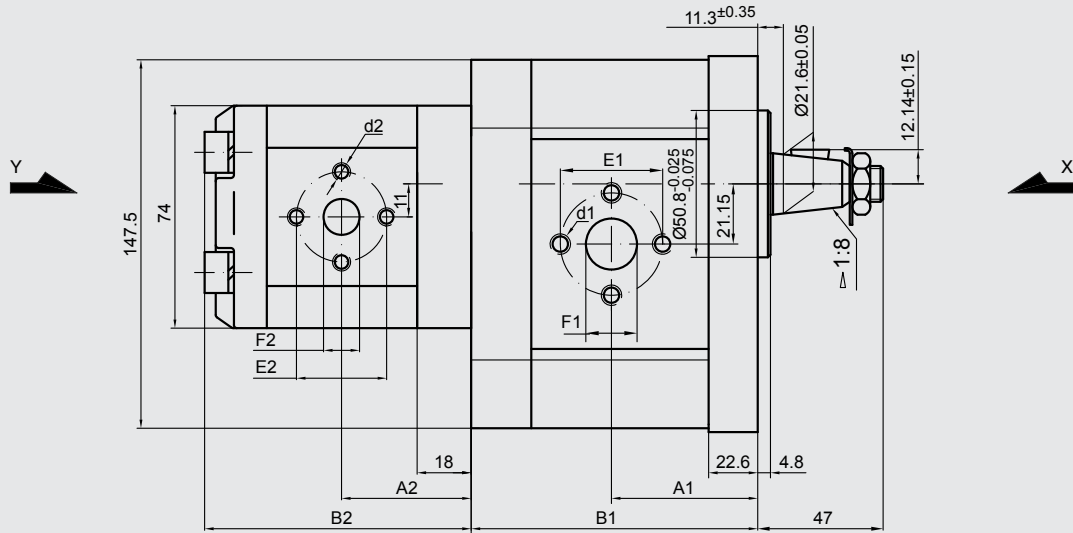
Middle and end pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
450	4.5	6.14	14.33	250	3500
630	6.3	8.69	20.29		
820	8.2	11.32	26.40		
1000	10	13.95	32.55		
1130	11.3	15.76	36.78		
1200	12	16.92	39.48		
1400	14	19.95	46.55		
1500	15	21.60	36.00		
1600	16	23.04	38.40	200	2500
1900	19	27.36	45.60		
2200	22	31.68	42.24	180	2000
2500	25	36.00	48.00	160	

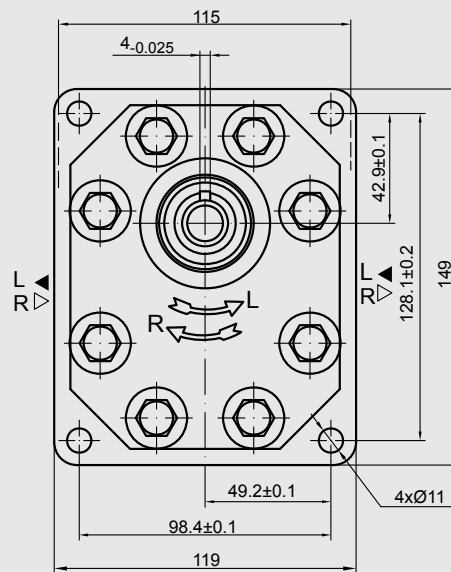
Displacement	Dimensions					Inlet G2	Outlet G2
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]			
450	40.5	85.2	40.5	78	G 1/2	G 1/2	
630	42	88.2	42	81			
820	43.5	91.1	43.5	83.9			
1000	45	94.2	45	87	G 3/4		
1130	46	96.3	46	89			
1200	46.6	97.5	46.5	90.3			
1400	48	100.6	48	93.4			
1500	49	102.1	49	95			
1600	50	103.8	50	96.5			
1900	52	108.7	52	101.5			
2200	55	113.7	55	106.5			
2500	57.2	118.6	57.2	111.4			

6.5.31 Double pump size 3 / size 1

PGE104-.../...-BS4/4-N



View Y



View X

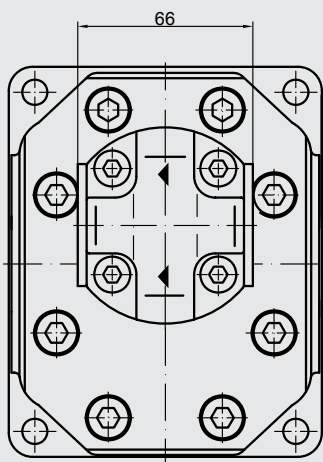
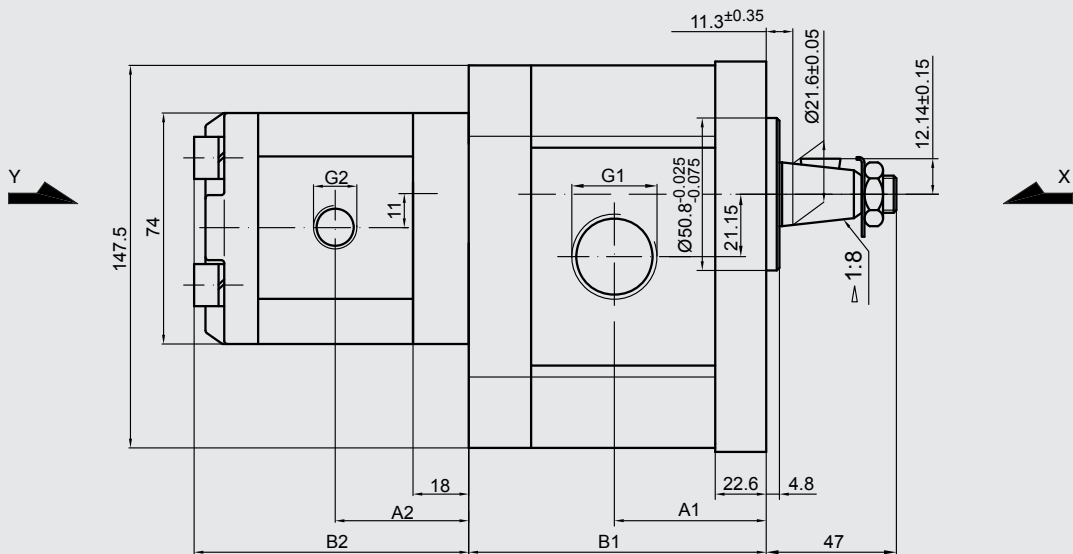
Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
2000	20	28.2	56.4	250	3000	56.1	117.2	40	19	M8	40	19	M8
2250	22.5	31.7	63.5			57.6	120.2						
2500	25	35.3	70.5			58.3	121.6						
2800	28	39.5	79.0			60.2	125.2						
3200	32	45.1	90.2			66.5	137.8						
3600	36	51.3	95.8	240	2800	68.0	141.0	51	27	M10			
4200	42	59.9	99.8	230	2500	70.8	146.5						
4600	46	65.6	100.5	210	2300	72.7	150.3						
5000	50	71.3	99.8	185	2100	74.5	153.9						
5500	55	78.4	91.4	165	1750	76.7	158.4						
6000	60	85.5	99.8	150		78.7	162.9						

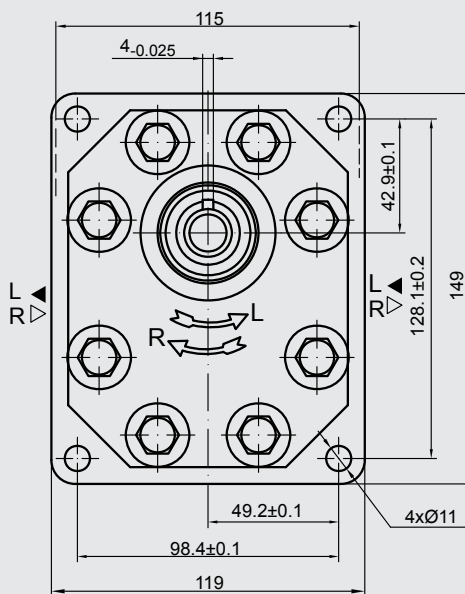
End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
100	1	1.40	3.26	250	3500	39.1	81	30	12	M6	30	12	M6
125	1.25	1.74	4.07			39.5	82						
160	1.6	2.23	5.21			40.3	83.6						
200	2	2.82	6.58			41.1	85.2						
250	2.5	3.53	8.23			42.1	87.2						
315	3.15	4.44	10.36			43.5	89.8						
365	3.65	5.15	12.01			44.4	91.9						
420	4.2	5.92	13.82			45.5	94.1						
500	5	7.05	14.10		3000	47.1	97.2						
610	6.1	8.69	14.49	200	2500	49.4	101.8						
740	7.4	10.55	17.58	170		52.1	107.2						

PGE104-.../...-BS1/1-N



View Y



View X

Front pump size 3:

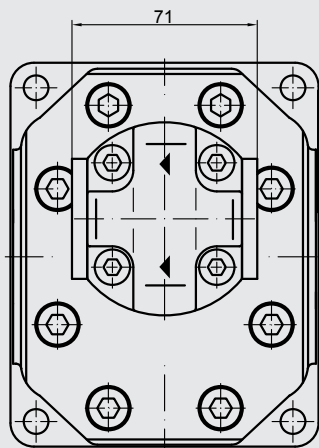
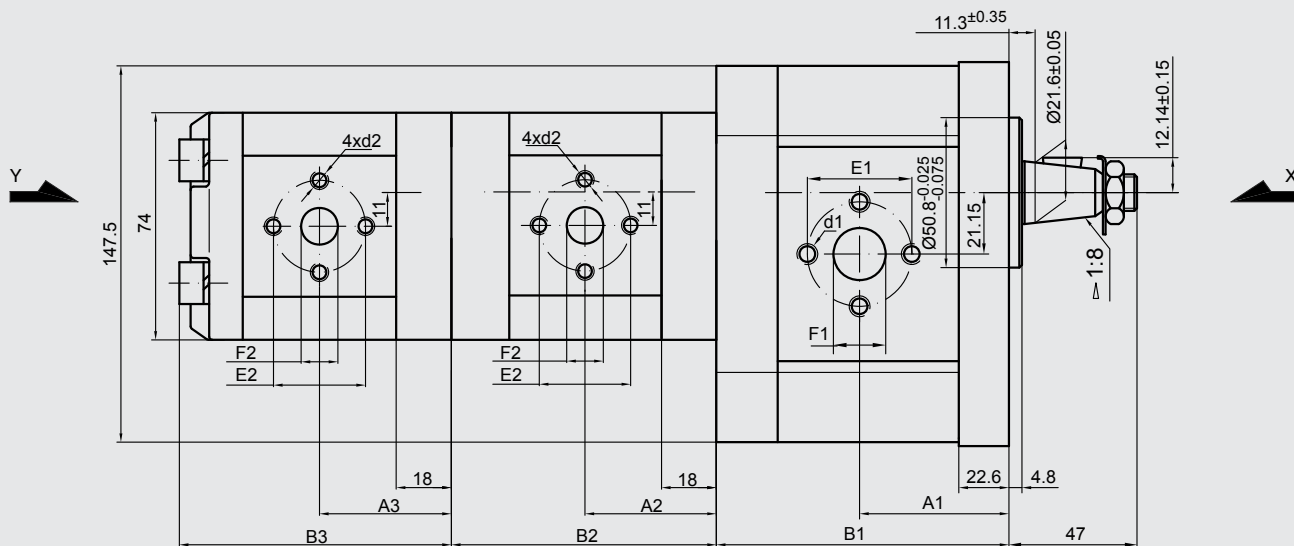
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
2000	20	28.2	56.4	250	3000	56.1	117.2	G 3/4	G 3/4
2250	22.5	31.7	63.5			57.6	120.2		
2500	25	35.3	70.5			58.3	121.6		
2800	28	39.5	79.0			60.2	125.2		
3200	32	45.1	90.2			66.5	137.8	G 1	
3600	36	51.3	95.8	240	2800	68.0	141.0		
4200	42	59.9	99.8	230	2500	70.8	146.5		
4600	46	65.6	100.5	210	2300	72.7	150.3		
5000	50	71.3	99.8	185	2100	74.5	153.9		
5500	55	78.4	91.4	165	1750	76.7	158.4		
6000	60	85.5	99.8	150		78.7	162.9		

End pump size 1:

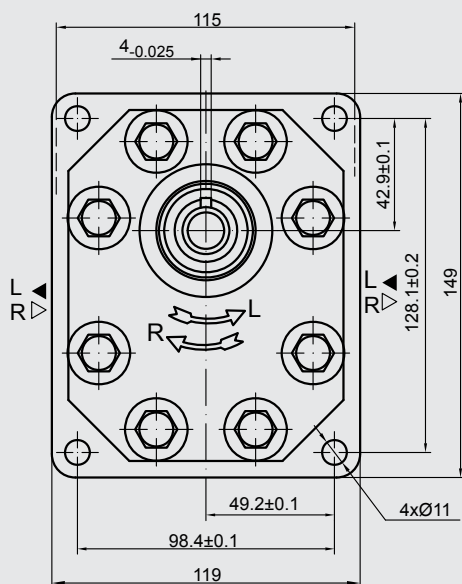
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet G2	Outlet G2
100	1	1.40	3.26	250	3500	39.1	81	G 3/8	G 3/8
125	1.25	1.74	4.07			39.5	82		
160	1.6	2.23	5.21			40.3	83.6		
200	2	2.82	6.58			41.1	85.2		
250	2.5	3.53	8.23			42.1	87.2		
315	3.15	4.44	10.36			43.5	89.8	G 1/2	
365	3.65	5.15	12.01			44.4	91.9		
420	4.2	5.92	13.82			45.5	94.1		
500	5	7.05	14.10		3000	47.1	97.2		
610	6.1	8.69	14.49		200	2500	49.4		
740	7.4	10.55	17.58	170	52.1		107.2		

6.5.32 Triple pump size 3 / size 1 / size 1

PGE104-.../.../...-BS4/4/4-N



View Y



View X

Front pump size 3:

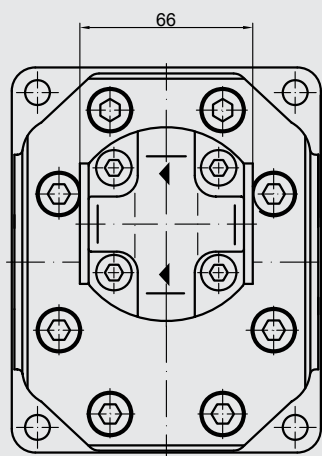
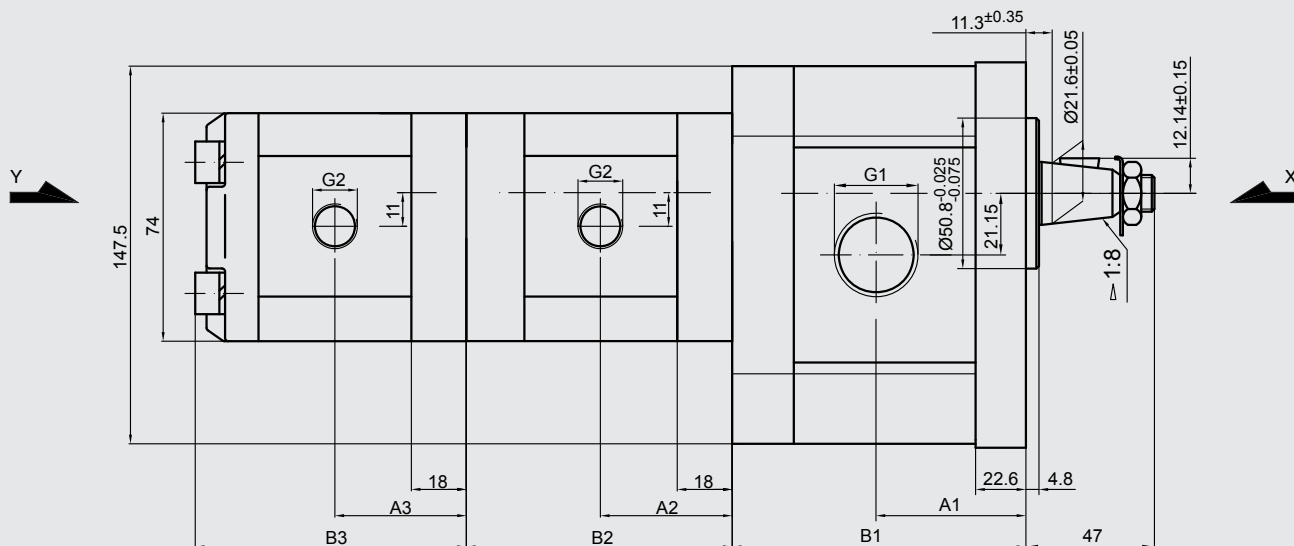
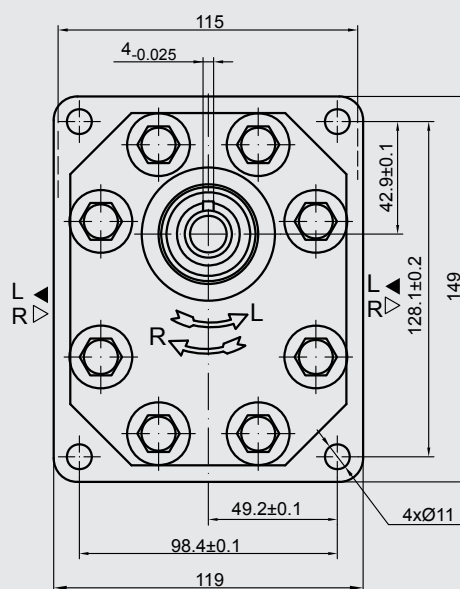
Displacement	Geometric displacement	Flow		Pressure Rated	Max. speed	Dimensions							
		at 1500 rpm	at max. rpm			A1	B1	Inlet			Outlet		
	[cm³/rev]	[l/min]	[l/min]	[bar]	n			[mm]	[mm]	E1	F1	d1	E1
2000	20	28.2	56.4	250	3000	56.1	117.2	40	19	M8	40	19	M8
2250	22.5	31.7	63.5			57.6	120.2						
2500	25	35.3	70.5			58.3	121.6						
2800	28	39.5	79.0			60.2	125.2						
3200	32	45.1	90.2			66.5	137.8						
3600	36	51.3	95.8	240	2800	68.0	141.0	51	27	M10			
4200	42	59.9	99.8	230	2500	70.8	146.5						
4600	46	65.6	100.5	210	2300	72.7	150.3						
5000	50	71.3	99.8	185	2100	74.5	153.9						
5500	55	78.4	91.4	165	1750	76.7	158.4						
6000	60	85.5	99.8	150		78.7	162.9						

Middle and end pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
100	1	1.40	3.26	250	3500
125	1.25	1.74	4.07		
160	1.6	2.23	5.21		
200	2	2.82	6.58		
250	2.5	3.53	8.23		
315	3.15	4.44	10.36		
365	3.65	5.15	12.01		
420	4.2	5.92	13.82		
500	5	7.05	14.10	200	3000
610	6.1	8.69	14.49		2500
740	7.4	10.55	17.58	170	

Displacement	Dimensions									
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]	Inlet			Outlet		
					E2	F2	d2	E2	F2	d2
100	39.1	79	39.1	79	30	12	M6	30	12	M6
125	39.5	80	39.5	80						
160	40.3	81.6	40.3	81.6						
200	41.1	83.2	41.1	83.2						
250	42.1	85.2	42.1	85.2						
315	43.5	87.8	43.5	87.8						
365	44.4	89.9	44.4	89.9						
420	45.5	92.1	45.5	92.1						
500	47.1	95.2	47.1	95.2						
610	49.4	99.8	49.4	99.8						
740	52.1	105.2	52.1	105.2						

PGE104-.../.../...-BS1/1/1-N

View Y

View X

Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
2000	20	28.2	56.4	250	3000	56.1	117.2	G 3/4	G 3/4
2250	22.5	31.7	63.5			57.6	120.2		
2500	25	35.3	70.5			58.3	121.6		
2800	28	39.5	79.0			60.2	125.2		
3200	32	45.1	90.2			66.5	137.8	G 1	
3600	36	51.3	95.8	240	2800	68.0	141.0		
4200	42	59.9	99.8	230	2500	70.8	146.5		
4600	46	65.6	100.5	210	2300	72.7	150.3		
5000	50	71.3	99.8	185	2100	74.5	153.9		
5500	55	78.4	91.4	165	1750	76.7	158.4		
6000	60	85.5	99.8	150		78.7	162.9		

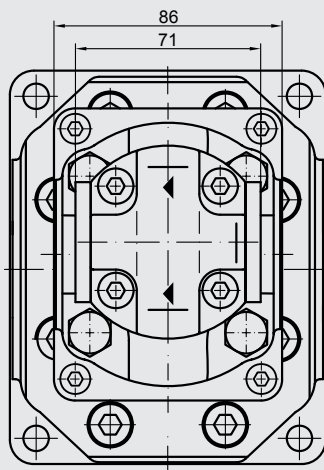
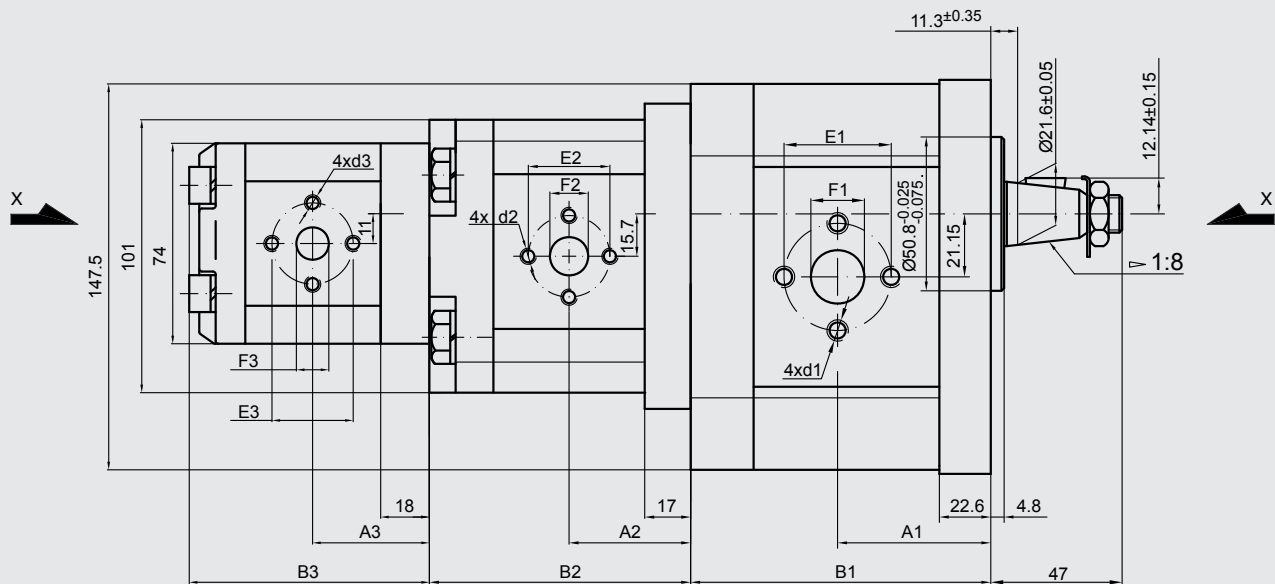
Middle and end pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]
		at 1500 rpm [l/min]	at max. rpm [l/min]		
100	1	1.40	3.26	250	3500
125	1.25	1.74	4.07		
160	1.6	2.23	5.21		
200	2	2.82	6.58		
250	2.5	3.53	8.23		
315	3.15	4.44	10.36		
365	3.65	5.15	12.01		
420	4.2	5.92	13.82		
500	5	7.05	14.10	200	3000
610	6.1	8.69	14.49		2500
740	7.4	10.55	17.58	170	

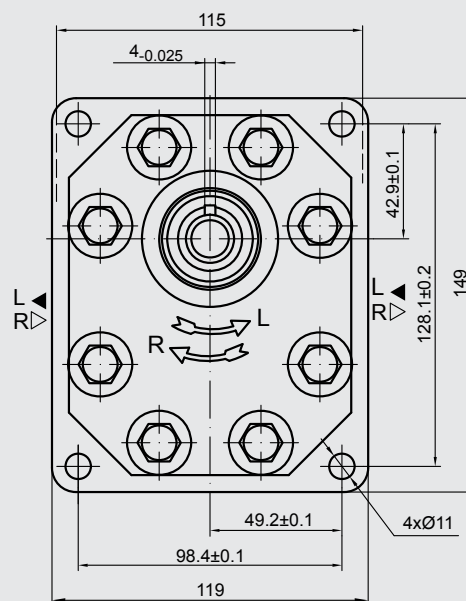
Displacement	Dimensions					Inlet G2	Outlet G2		
	A2 [mm]	B2 [mm]	A3 [mm]	B3 [mm]					
100	39.1	79	39.1	79	G 3/8	G 3/8			
125	39.5	80	39.5	80					
160	40.3	81.6	40.3	81.6					
200	41.1	83.2	41.1	83.2					
250	42.1	85.2	42.1	85.2					
315	43.5	87.8	43.5	87.8	G 1/2			G 3/8	
365	44.4	89.9	44.4	89.9					
420	45.5	92.1	45.5	92.1					
500	47.1	95.2	47.1	95.2					
610	49.4	99.8	49.4	99.8					
740	52.1	105.2	52.1	105.2					

6.5.33 Triple pump size 3 / size 2 / size 1

PGE104-.../.../...-BS4/4/4-N



View Y



View X

Front pump size 3:

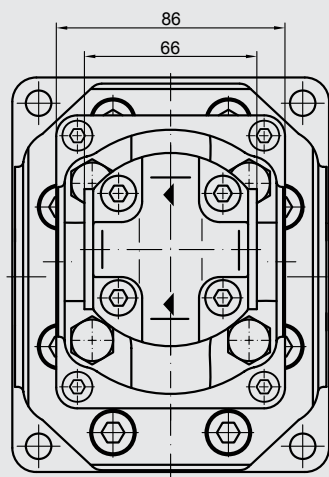
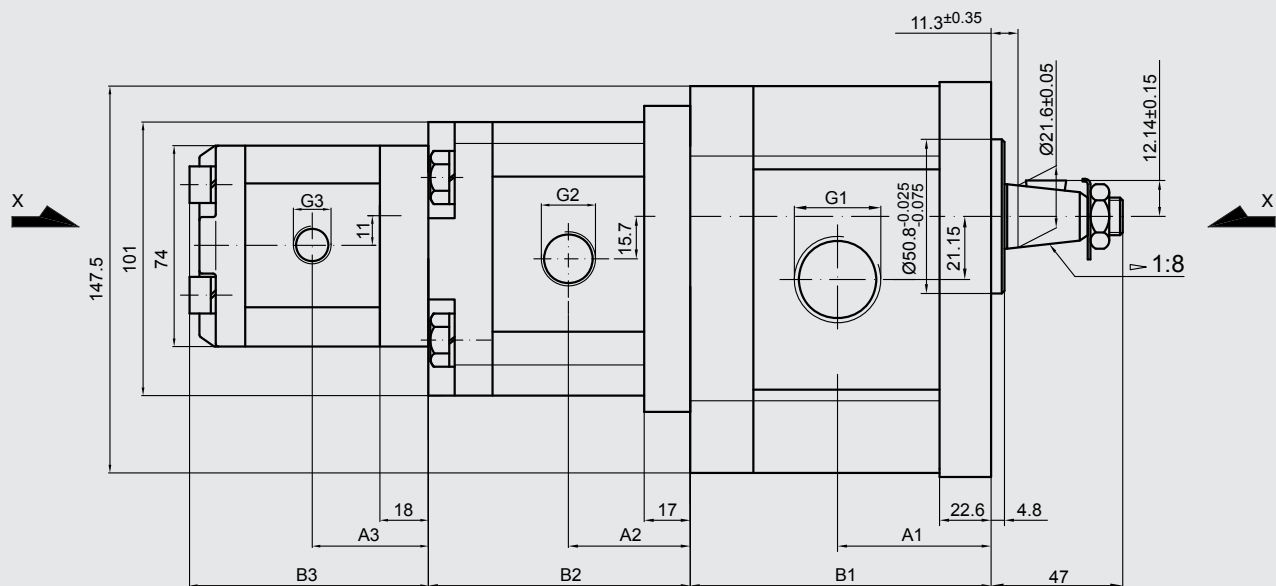
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet			Outlet		
								E1	F1	d1	E1	F1	d1
2000	20	28.2	56.4	250	3000	56.1	114.7	40	19	M8	40	19	M8
2250	22.5	31.7	63.5			57.6	117.7						
2500	25	35.3	70.5			58.3	119.1						
2800	28	39.5	79.0			60.2	122.7						
3200	32	45.1	90.2			66.5	135.3						
3600	36	51.3	95.8	240	2800	68.0	138.5	51	27	M10	40	19	M8
4200	42	59.9	99.8	230	2500	70.8	144.0						
4600	46	65.6	100.5	210	2300	72.7	147.8						
5000	50	71.3	99.8	185	2100	74.5	151.4						
5500	55	78.4	91.4	165	1750	76.7	155.9						
6000	60	85.5	99.8	150		78.7	160.4						

Middle pump size 2:

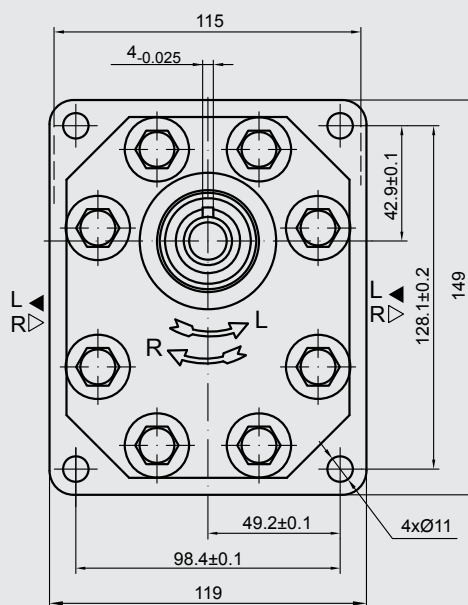
Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet			Outlet		
								E2	F2	d2	E2	F2	d2
450	4.5	6.14	14.33	250	3500	40.5	87.6	30	13.1	M6	30	13.1	M6
630	6.3	8.69	20.29			42	90.6						
820	8.2	11.32	26.40			43.5	93.5						
1000	10	13.95	32.55			45	96.6	40	19	M8			
1130	11.3	15.76	36.78			46	98.7						
1200	12	16.92	39.48			46.6	99.9						
1400	14	19.95	46.55			48	103						
1500	15	21.60	36.00		2500	49	104.5	40	19	M8			
1600	16	23.04	38.40			50	106.2						
1900	19	27.36	45.60	200		52	111.1						
2200	22	31.68	42.24	180	2000	55	116.1	40	19	M8			
2500	25	36.00	48.00	160		57.2	121.1						

End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions							
		at 1500 rpm [l/min]	at max. rpm [l/min]			Inlet			Outlet				
						A3 [mm]	B3 [mm]	E3	F3	d3	E3	F3	d3
100	1	1.40	3.26	250	3500	39.1	81	30	12	M6	30	12	M6
125	1.25	1.74	4.07			39.5	82						
160	1.6	2.23	5.21			40.3	83.6						
200	2	2.82	6.58			41.1	85.2						
250	2.5	3.53	8.23			42.1	87.2						
315	3.15	4.44	10.36			43.5	89.8						
365	3.65	5.15	12.01			44.4	91.9						
420	4.2	5.92	13.82			45.5	94.1						
500	5	7.05	14.10			3000	47.1						
610	6.1	8.69	14.49	200	2500	49.4	101.8						
740	7.4	10.55	17.58	170		52.1	107.2						



View Y



View X

Front pump size 3:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A1 [mm]	B1 [mm]	Inlet G1	Outlet G1
2000	20	28.2	56.4	250	3000	56.1	114.7	G 3/4	G 3/4
2250	22.5	31.7	63.5			57.6	117.7		
2500	25	35.3	70.5			58.3	119.1		
2800	28	39.5	79.0			60.2	122.7		
3200	32	45.1	90.2			66.5	135.3	G 1	
3600	36	51.3	95.8	240	2800	68.0	138.5		
4200	42	59.9	99.8	230	2500	70.8	144.0		
4600	46	65.6	100.5	210	2300	72.7	147.8		
5000	50	71.3	99.8	185	2100	74.5	151.4		
5500	55	78.4	91.4	165	1750	76.7	155.9		
6000	60	85.5	99.8	150		78.7	160.4		

Middle pump size 2:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions			
		at 1500 rpm [l/min]	at max. rpm [l/min]			A2 [mm]	B2 [mm]	Inlet G2	Outlet G2
450	4.5	6.14	14.33	250	3500	40.5	87.6	G 1/2	G 1/2
630	6.3	8.69	20.29			42	90.6		
820	8.2	11.32	26.40			43.5	93.5		
1000	10	13.95	32.55			45	96.6	G 3/4	
1130	11.3	15.76	36.78			46	98.7		
1200	12	16.92	39.48			46.6	99.9		
1400	14	19.95	46.55			48	103		
1500	15	21.60	36.00		2500	49	104.5		
1600	16	23.04	38.40			50	106.2		
1900	19	27.36	45.60	200		52	111.1		
2200	22	31.68	42.24	180	2000	55	116.1		
2500	25	36.00	48.00	160		57.2	121.1		

End pump size 1:

Displacement	Geometric displacement [cm³/rev]	Flow		Pressure Rated [bar]	Max. speed n [rpm]	Dimensions				
		at 1500 rpm [l/min]	at max. rpm [l/min]			A3 [mm]	B3 [mm]	Inlet G3	Outlet G3	
100	1	1.40	3.26	250	3500	39.1	81	G 3/8	G 3/8	
125	1.25	1.74	4.07			39.5	82			
160	1.6	2.23	5.21			40.3	83.6			
200	2	2.82	6.58			41.1	85.2			
250	2.5	3.53	8.23			42.1	87.2	G 1/2		
315	3.15	4.44	10.36			43.5	89.8			
365	3.65	5.15	12.01			44.4	91.9			
420	4.2	5.92	13.82			45.5	94.1			
500	5	7.05	14.10		3000	47.1	97.2			
610	6.1	8.69	14.49	200	2500	49.4	101.8			
740	7.4	10.55	17.58	170		52.1	107.2			

External Gear Pumps Installation Manual



SIZE 0

PGE100-25
PGE100-30
PGE100-50
PGE100-75
PGE100-100
PGE100-125
PGE100-150
PGE100-175
PGE100-200



SIZE 1

PGE101-100
PGE101-125
PGE101-160
PGE101-200
PGE101-250
PGE101-315
PGE101-365
PGE101-420
PGE101-500
PGE101-610
PGE101-740



SIZE 2

PGE102-450
PGE102-630
PGE102-820
PGE102-1000
PGE102-1130
PGE102-1200
PGE102-1400
PGE102-1500
PGE102-1600
PGE102-1730
PGE102-1900
PGE102-2200
PGE102-2500
PGE102-2800



SIZE 3

PGE103-2000
PGE103-2250
PGE103-2500
PGE103-2800
PGE103-3200
PGE103-3600
PGE103-4200
PGE103-4600
PGE103-5000
PGE103-5500
PGE103-6000



MULTIPLE PUMPS

PGE104-

	Stage 1	Stage 2	Stage 3
Size 1	100	100	100
	125	125	125
	160	160	160
	200	200	200
	250	250	250
	315	315	315
	365	365	365
	420	420	420
	500	500	500
	610	610	610
	740	740	740
Size 2	450	450	450
	630	630	630
	820	820	820
	1000	1000	1000
	1130	1130	1130
	1200	1200	1200
	1400 /	1400 /	1400
	1500	1500	1500
	1600	1600	1600
	1900	1900	1900
	2200	2200	2200
	2500	2500	2500
Size 3	2000	2000	2000
	2250	2250	2250
	2500	2500	2500
	2800	2800	2800
	3200	3200	3200
	3600	3600	3600
	4200	4200	4200
	4600	4600	4600
	5000	5000	5000
	5500	5500	5500
	6000	6000	6000

To prevent serious accidents, equipment damage, and other property damage, please observe the following precautions, as well as all related regulations regarding safety.

Before using the product, make sure you read and understand all the instructions in the Operator's Manual entirely.

In this catalogue, safety precautions are classified under three headings:

DANGER, WARNING, and CAUTION.

These words are defined as follows:



DANGER

Indicates an imminent danger that is very likely to cause death or severe injury unless the situation is avoided.



WARNING

Indicates a potential danger that may cause death or severe injury unless the situation is avoided.



CAUTION

Indicates a potential danger that may cause a minor or moderate injury or that may result in property damage.



INFORMATION

Indicates useful hints and system tips. They are necessary for correct installation and safe use of the product.

PRECAUTIONS FOR USE

CAUTION

1. To avoid possible injury when handling the products, wear protective safety equipment in accordance with the instructions in the Operator's Manual.

CAUTION

2. Failure to support the weight of the product or lifting the product with incorrect posture may result in injury to the hands or back. Be sure to follow the instructions in the Operator's Manual.

CAUTION

3. Do not climb on, strike, drop or exert unnecessary force on the product. This may lead to injury or fire due to incorrect operation, damage, or oil leakage.

CAUTION

4. Oil on the product or floor must be cleaned up thoroughly. Oil could cause you to drop the product or slip on the floor.

PRECAUTIONS FOR INSTALLATION, REMOVAL, AND MAINTENANCE

WARNING

1. All installation, removal, maintenance, piping or wiring work should be carried out by properly trained personnel.

WARNING

2. Before beginning any installation, removal, maintenance, piping or wiring work, the following procedures must be carried out. Failure to do so may cause the equipment to move suddenly or oil to spill during the work, which may result in serious accidents.

- Shut off the power supply to the equipment and make sure that all the electrical motors and machines cannot restart unintentionally.
- Secure the cylinder rods before installing/removing the cylinder.
- Reduce the pressure in the pipes and cylinders in the hydraulic system to zero pressure.

WARNING

3. Before working on any electrical wiring, be sure to shut off the power supply. Failure to do this may cause an electric shock.

CAUTION

4. Keep all installation holes and surfaces clean. Failure to do this may cause insufficient tightening of the bolts which may lead to a fire due to oil leakage.

CAUTION

5. Before commissioning the device, make sure that all bolts are tightened with the specified torque. Failure to comply with the specifications may cause incorrect operation, damage, oil leakage, etc.

PRECAUTIONS FOR OPERATION



DANGER

1. Never operate any device in an environment where there is danger of explosion or fire, unless the device is fully protected. This may lead to major and serious accidents including explosion or fire.



WARNING

2. Do not approach the pumps or motors when in operation. Hands or clothes can be caught up and wound into the pumps and motors which can lead to serious injury.



WARNING

3. In event of abnormal operation (unusual sounds, oil leakage, smoke, etc.), immediately stop operation and take appropriate corrective measures.



WARNING

4. Completely discharge air from the cylinder at low pressure. Failure to do so may result in unexpected movement of the cylinder, which in turn may cause injury.



WARNING

5. To adjust the damping, gradually increase the cylinder speed from a low speed (50 mm/s or less). Rapidly accelerating the cylinder may produce an abnormal pressure surge, resulting in damage to the cylinder or the machinery and causing a serious accident.



WARNING

6. Before operating this device for the first time, check that hydraulic and electrical circuits are properly connected and that adjoining surfaces are tightly aligned.



WARNING

7. Do not use the product outside of the specifications described in the catalogue, related data sheets, drawings, etc. Failure to adhere to them may cause incorrect operation, damage or injury.



WARNING

8. During operation, high temperatures in the hydraulic system or solenoid valves may occur. Wear protective equipment on hands and body when in the vicinity of these devices.



WARNING

9. Always operate the device with clean oil, and within established ranges for temperature, viscosity and cleanliness. Failure to adhere to the specified limits may result in incorrect operation or fire due to oil leakage.

GENERAL PRECAUTIONS



WARNING

1. Never modify the device.
If any alterations are made, unexpected machine movement may cause injury.



CAUTION

2. Do not disassemble the products without prior consent of the manufacturer. Failure to adhere to this can cause the products to operate incorrectly which can lead to accidents or damage.



CAUTION

3. For transportation / storage of the product, pay attention to environmental conditions, such as ambient temperature and humidity, and implement anti-dust / anti-corrosion measures.



CAUTION

4. The seals may need to be replaced if the product is used after long-term storage.



CAUTION

5. Read the manual thoroughly and ensure that the seals are replaced properly.

RELATED REGULATIONS



CAUTION

To ensure that this product is used in a safe manner, it is essential to observe the above precautions, as well as all related regulations regarding safety.



EXTERNAL GEAR PUMPS

Technical specifications

Size 0

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	145	175	210	3000
PGE100-150	1.50			200	2500
PGE100-175	1.75			180	
PGE100-200	2.00	130	160	170	2000

Size 1

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	200	220	230	3000
PGE101-610	6.1				2500
PGE101-740	7.4	170	190	200	2500

Size 2

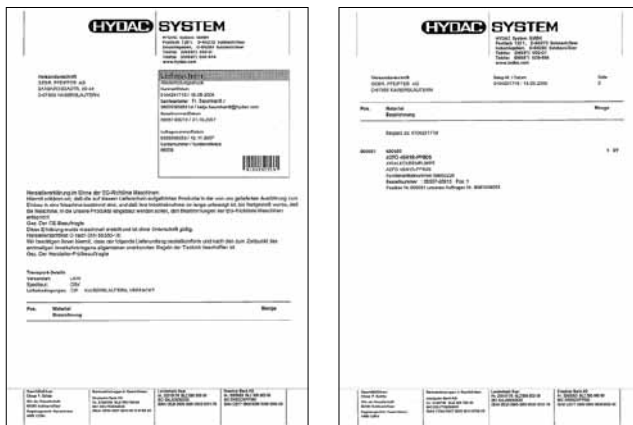
Series	Geometric displacement [ccm/rev]	Operating pressure			Maximum drive speed [rpm]
		Rated [bar]	Intermittent [bar]	Peak [bar]	
PGE102-450	4.5	250	280	300	3500
PGE102-630	6.3				
PGE102-820	8.2				
PGE102-1000	10				
PGE102-1100	11.3				
PGE102-1200	12				
PGE102-1400	14				
PGE102-1500	15		270	280	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	

Size 3

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				max. 3000
	3 + 3 + 3				
	3 + 3 + 2				
	3 + 3 + 1				
	3 + 2 + 2				
	3 + 2 + 1				
3 + 1 + 1					

Check the product's model code and compare it with your paper work.



6

Operating fluid:

Hydraulic oils with viscosities of 20 to 200 mm²/s (cSt). Recommended oil viscosity 50 to 100 mm²/s (cSt) at 40 °C. A viscosity of up to 385 mm²/s is possible during start-up. Different types/brands of oil must never be mixed, since this can result in loss of lubrication qualities. The operating oil must be changed periodically. The interval between changes will depend on the operating conditions and must be determined by the operator. At oil change, the reservoir and the filters must also be cleaned.

Temperature range: -20 °C to +80 °C.

Recommended filtration rating: 25 µm or cleaner.

Rpm: from 750 rpm to the maximum value for the particular pump.

Direction of rotation:

Clockwise or anticlockwise when viewed from shaft end - note the arrow marked on the front cover. Rotation in the wrong direction is not permitted as this will damage the rotary shaft seal.

Flow direction - inlet and outlet:

Inlet and outlet are marked on the body / rear cover. Usually, the larger opening is the suction port.]

Suction pressure:

The suction line of the pump must always draw steadily without intake of air. The permitted vacuum pressure is 0.2 bar (0.8 bar abs.). Positive pressure greater than 0.5 bar above atmospheric pressure (max. atmospheric pressure 1.5 bar absolute) is not permitted.

Drive shaft:

Radial and axial forces on the shaft are not permitted.

Drive:

The pump can be used for direct drive using flexible or other couplings allowing a gap of 0.2 mm in a radial direction. The axial tolerance of the driving shaft in relation to the leading shaft of the pump must not exceed 0.1 mm. Belt and chain driven applications, as well as vibrations and unbalanced drive are not permitted.

Piping:

The suction line must be completely sealed, as short as possible and of adequate diameter to withstand permitted vacuum pressures and oil speeds of 0.6 up to 1 m/s. If a filter is fitted to the inlet, it must have sufficient capacity so as not to impede suction (see Suction Pressure).

The discharge line must be short and have as few curved sections and joints as possible. If there are vibrations between the pump and the motor (for example, from an internal-combustion engine or vibrations in the hydraulic system), a rubber hose must be used.

Permitted speed of the oil is 2 - 5 m/s.

Reservoir:

The volume and the design of the tank depend on the operating conditions. For the pump, the suction and the return lines must be positioned such that the returning oil is not drawn out again immediately, i.e. they must be positioned as far as possible from each other. The pipe ends must be cut at an angle of less than 45° and pointing in opposite directions. The suction line must be mounted at least 50 mm above the bottom, so as to avoid contamination deposited on the bottom. In order to avoid foaming, all the pipes must be at least 50 mm below the lowest permitted oil level.

Mounting:

The pumps must be aligned centrally to the diameter of the mounting flange. Ensure the suction and discharge lines are connected correctly, and check the direction of rotation (note direction of arrow).

Initial start-up:

First check that the pump is mounted correctly. Start and stop (jog) the pump several times (off-load) to allow the pump to fill with oil. This is necessary to ensure bearing lubrication and to bleed all air from the hydraulic system to prevent erratic operation. After lines are full, the pressure may be increased gradually to the required operating pressure. Never exceed the maximum operating pressure for the relevant pump type.

Bell Housing Set



7. BELL HOUSING SET

7.1 DESCRIPTION

HYDAC Accessories offers a full range of bell housing sets to suit HYDAC pumps to ensure simple and efficient connection to drive motors.

Depending on the requirements, the sets include the appropriate bell housings and couplings. As an option, bell housing foot brackets and damping rails are also available.

7.2 BELL HOUSINGS - DESIGNS

Bell housings are connecting elements between drive motors and hydraulic pumps.

They are made from an aluminium alloy, in dimensions according to VDMA 24561. Both connecting flanges are supplied ready for installation.

Using a HYDAC bell housing eliminates costly alignment work.

Available designs:

- Rigid bell housing (PTS)
- Flexible bell housing (PT)
- Flexible bell housing with oil-air cooler (PTK)

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.

7.3 ORDERING CODE

PTK – 2001 / 2.0 / PPV100 / 016 / S F00 - 00

Bell housing design

PTS = rigid bell housing

PT = flexible bell housing

PTK = flexible bell housing with oil-air cooler

Size of set

Size of set	Motor size	Power at 1500 rpm *
160	71	0.25 - 0.37 kW
2001	80	0.55 - 0.75 kW
200	90S-90L	1.1 - 1.5 kW
250	100L-112M	2.2 - 4 kW
300	132S-132M	5.5 - 7.5 kW
350	160M-160L	11 - 15 kW
3501	180M-180L	18.5 - 22 kW
400	200L	30 kW
450	225S-225M	37 - 45 kW
550	250M	55 kW
5501	280S-280M	75 - 90 kW
660	315S-315M	110 - 132 kW
6601	315L	160 - 200 kW

* For other motor speeds or sizes please contact HYDAC.

Version

2.0 = Standard

5.3 = to CNOMO standard (drain and mounting bore with grille)

Pump series

PPV100S	Axial piston pump, medium heavy duty series
PPV100	Axial piston pump, medium heavy duty series
PPV101	Axial piston pump, medium heavy duty series
PPV102	Axial piston pump, heavy duty series
PPV103	Axial piston pump, light duty series
PVF100	Vane pump, fixed displacement
PVF101	Vane pump, fixed displacement, double pump
PVV100	Vane pump, variable displacement, hydraulic compensation
PVV103	Vane pump, variable displacement, hydraulic compensation
PVV101	Vane pump, variable displacement, mechanical compensation
PVV102	Vane pump, variable displacement, mechanical compensation
PGE100	External gear pump, size 0
PGE101	External gear pump, size 1
PGE102	External gear pump, size 2
PGE103	External gear pump, size 3
PGE104	External gear pump, multiple pumps
PGI100	Internal gear pump, medium heavy duty series, size 2
PGI101	Internal gear pump, medium heavy duty series, size 3
PGI102	Internal gear pump, heavy duty series, size 2/3/6
PGI103	Internal gear pump, medium heavy duty series, size 5/6

Set designation

HYDAC issues the designation of the set.

Please use our software selection tool software. The program can be downloaded free of charge from our website:

www.hydac.com under >> Service >> Downloads >> Software >> Accessories >> Bell housing sets.

7.4 ACCESSORIES

In addition to the bell housing sets, HYDAC Accessories also offers foot brackets and damping rails.

Detailed information is given in our brochure "Bell Housing Accessories" (E 5.616), which can be downloaded from our web site www.hydac.com.

Foot brackets

HYDAC foot brackets for simple installation of the motor pump unit to the power unit.

- Foot brackets to VDMA 24561
- The lightweight and heavy series are available from stock
- Reduction of the motor bearing bracket to IMB5/V1
- Simple replacement of the electric motor
- Hydraulic pump and pipework setup without an electric motor also possible
- Available sizes:
Light duty series: PF-160/3 to PF-300/3
Heavy duty series: PF-250/4 to PF-660/4

Damping rails

HYDAC damping rails decouple vibrations and reduce noise emissions

- For foot brackets to VDMA 24561 in the light and heavy duty designs
- Resistant to mineral oil due to NBR rubber compound
- Designed for load-bearing when installed horizontally
- Noise-reduction and vibration-damping
- Available from stock
- Special lengths and/or special designs available on request
- Available sizes:
FDS.../3 for foot brackets for the light duty series
FDS.../4 for foot brackets for the heavy duty series



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