

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	[cm ³ /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	[cm ³ /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

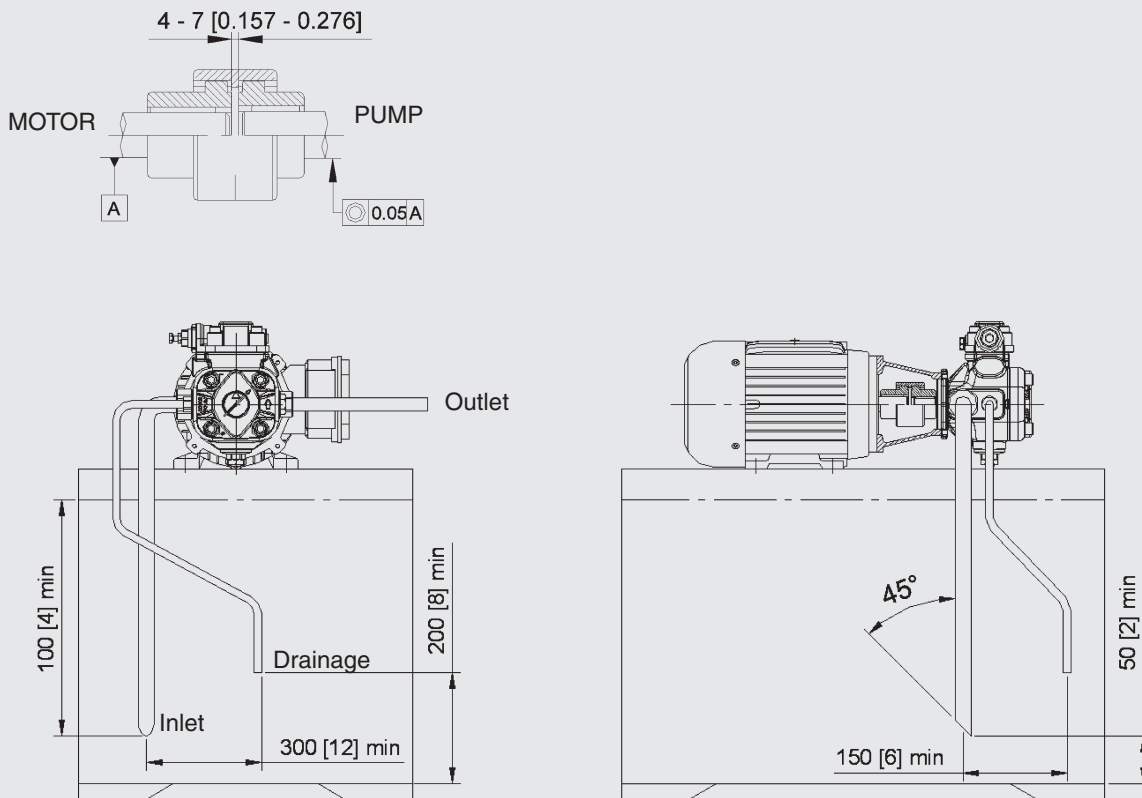
During commissioning, the pump must firstly be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump. Size 1 has an air bleed port on the compensator.

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
---------------	---	-------

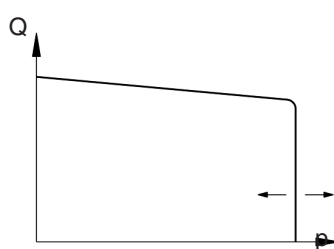
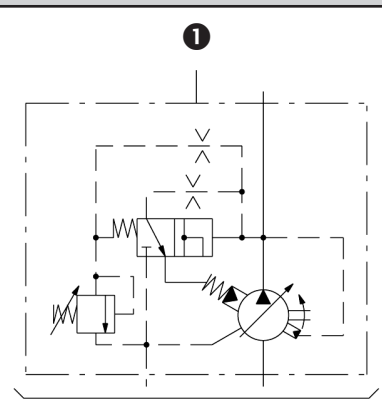
Ordering code	P	CS003
---------------	---	-------

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

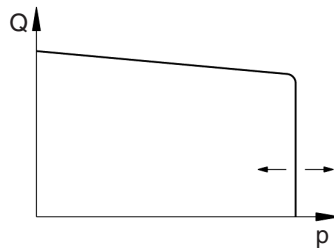
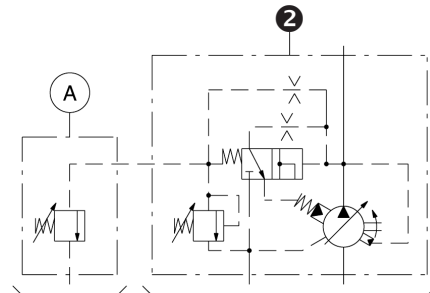
- 2 Pump with proportional pressure control with CETOP 03 (UNI ISO 4401-03) interface

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

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 border="1"> <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 border="1"> <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									
<p>Pump with two pressure stages, one of which is non-adjustable (set to the minimum pressure of the pump).</p> <p>A – Solenoid valve not supplied.</p> <p>Recommended valve (24V nominal voltage):</p> <table border="1"> <tr> <th>Type</th> <th>Part no.</th> </tr> <tr> <td>WSM06020V-01-C-N-24DG</td> <td>3135462</td> </tr> </table> <p>Connection housing:</p> <table border="1"> <tr> <th>DPT06020-01x</th> <th>558020</th> </tr> </table> <p>other nominal voltages and connectors on request</p> <table border="1"> <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									
<p>Pump with two adjustable pressure stages.</p> <p>A – Pressure relief valve supplied factory-assembled and tested.</p> <p>B – Solenoid valve not supplied.</p> <p>Recommended valve (24V nominal voltage):</p> <table border="1"> <tr> <th>Type</th> <th>Part no.</th> </tr> <tr> <td>WKM08130C-01-C-N24DG</td> <td>3115602</td> </tr> </table> <p>Connection housing:</p> <table border="1"> <tr> <th>D08130-01X</th> <th>555528</th> </tr> </table> <p>other nominal voltages and connectors on request</p> <table border="1"> <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									
<p>Pump with proportional pressure control.</p> <p>A – Proportional valve not supplied.</p> <p>Recommended valve (24V nominal voltage):</p> <table border="1"> <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> <p>Connection housing:</p> <table border="1"> <tr> <th>DPT06020-01X</th> <th>558020</th> </tr> </table> <p>other nominal voltages and connectors on request</p> <table border="1"> <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
---------------	---	--------

- 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			
<p>Load sensing pump with standard pressure control.</p> <table border="1"> <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							
<p>Load sensing pump with remote pressure control.</p> <p>A – Pressure relief valve (0 - 5 l/min) not supplied.</p> <p>Recommended valve:</p> <table border="1"> <tr> <th>Type</th> <th>Part no.</th> </tr> <tr> <td>DB3E-02X-250V180</td> <td>562555</td> </tr> </table> <p>Note: The length of the pilot line between the compensator and the valve must not exceed 5 m.</p> <p>Remote control port 1/4" (BSP) or 1/2" 20 UNF</p> <table border="1"> <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									
<p>Load sensing pump with two pressure stages, one of which is non-adjustable (set to the minimum pressure of the pump).</p> <p>A – Solenoid valve not supplied.</p> <p>Recommended valve (24V nominal voltage):</p> <table border="1"> <tr> <td>Type</td> <td>Part no.</td> </tr> <tr> <td>WSM06020V-01-C-N-24DG</td> <td>3135462</td> </tr> </table> <p>Connection housing:</p> <table border="1"> <tr> <td>DPT06020-01x</td> <td>558020</td> </tr> </table> <p>other nominal voltages and connectors on request</p> <table border="1"> <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									
<p>Load sensing pump with two adjustable pressure stages.</p> <p>A – Pressure relief valve supplied factory-assembled and tested.</p> <p>B – Solenoid valve not supplied.</p> <p>Recommended valve (24V nominal voltage):</p> <table border="1"> <tr> <td>Type</td> <td>Part no.</td> </tr> <tr> <td>WKM08130C-01-C-N24DG</td> <td>3115602</td> </tr> </table> <p>Connection housing:</p> <table border="1"> <tr> <td>D08130-01X</td> <td>555528</td> </tr> </table> <p>other nominal voltages and connectors on request</p> <table border="1"> <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									

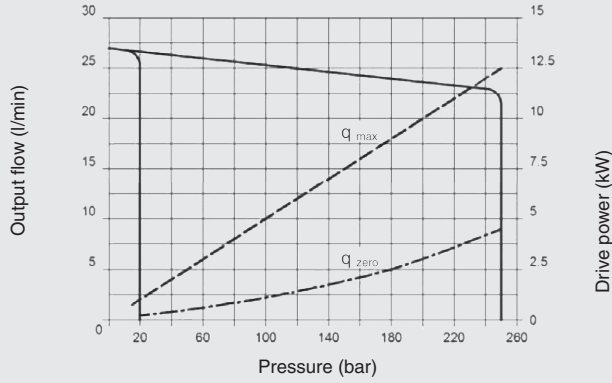
3.2.21 Load sensing and proportional pressure control

Description	Performance characteristics	Hydraulic circuit									
<p>Load sensing pump with proportional pressure control.</p> <p>A – Proportional valve not supplied.</p> <p>Recommended valve (24V nominal voltage):</p> <table border="1"> <tr> <td>Type</td> <td>Part no.</td> </tr> <tr> <td>PDBM06020-01-C-N-210-24PG-18.0</td> <td>3362791</td> </tr> </table> <p>Connection housing:</p> <table border="1"> <tr> <td>DPT06020-01X</td> <td>558020</td> </tr> </table> <p>other nominal voltages and connectors on request</p> <table border="1"> <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

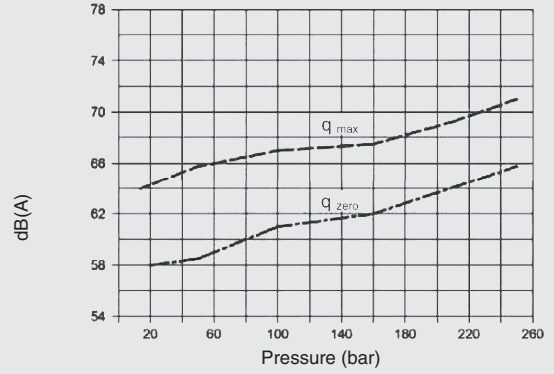
3.2.22 PVV103-05-16

Volumetric efficiency

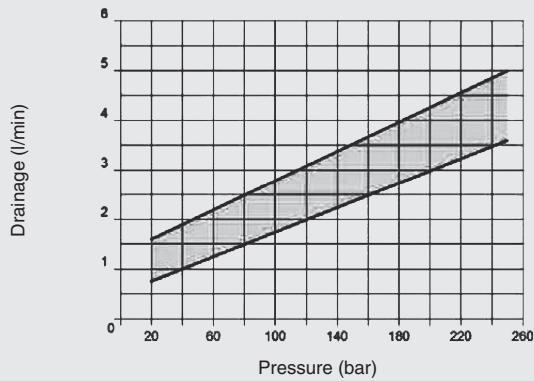


Maximum noise level

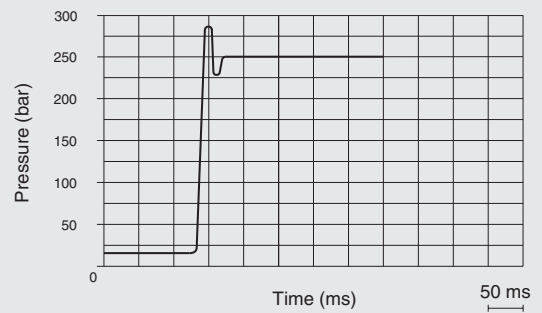
measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling.



Drain port



Response times and peak pressure



Drive power at maximum displacement

Drive power at zero flow setting

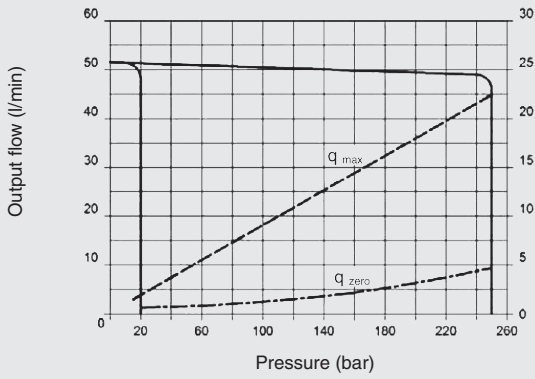
Pressure peaks are due to the test system.

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

Curve peaks at 285 bar,

Curve starts at 15 bar

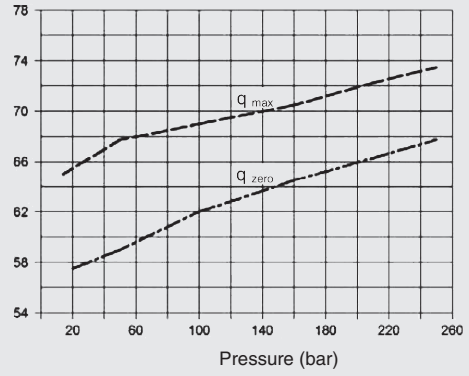
Volumetric efficiency



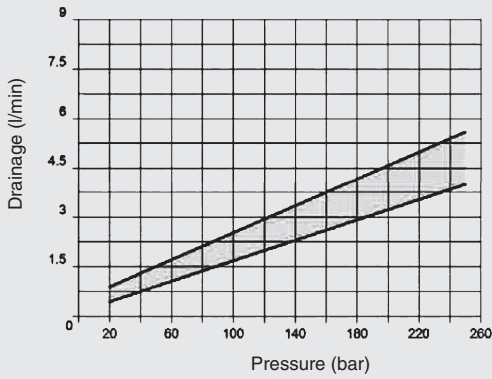
Drive power (kW)

Maximum noise level

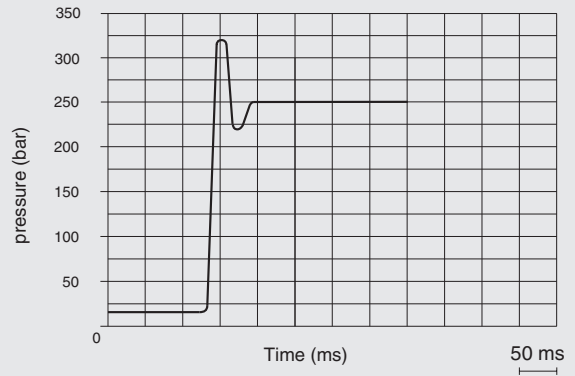
measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling.



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.

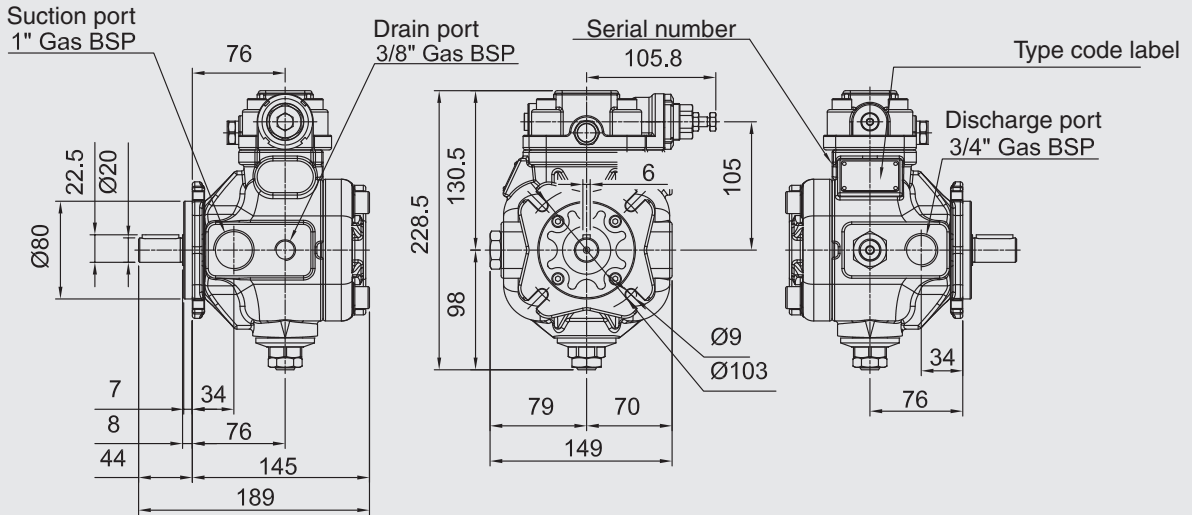
Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

Curve peaks at 300 bar,
Curve starts at 15 bar

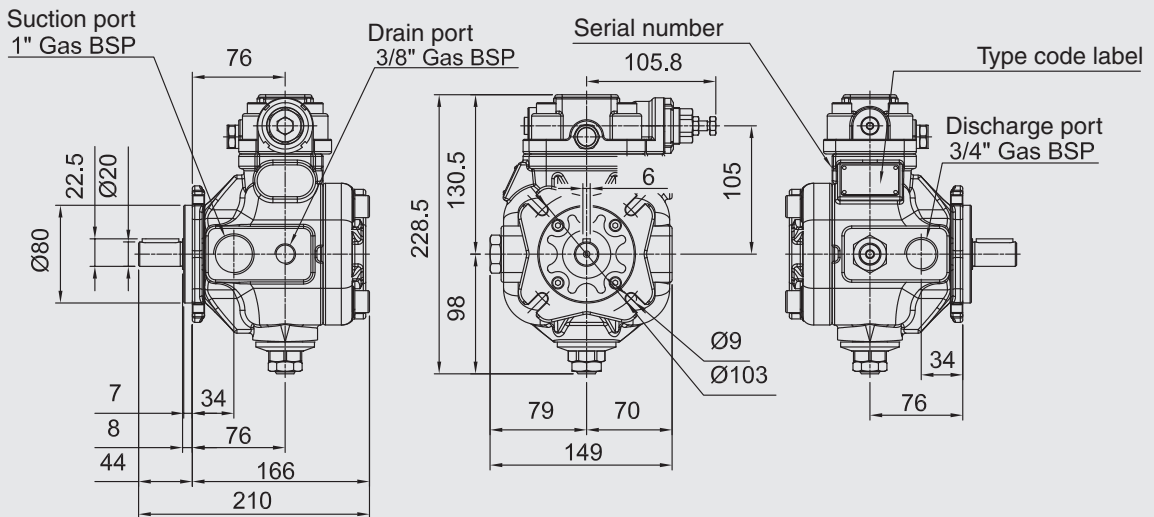
DIMENSIONS

3.2.24 PVV103-05-16

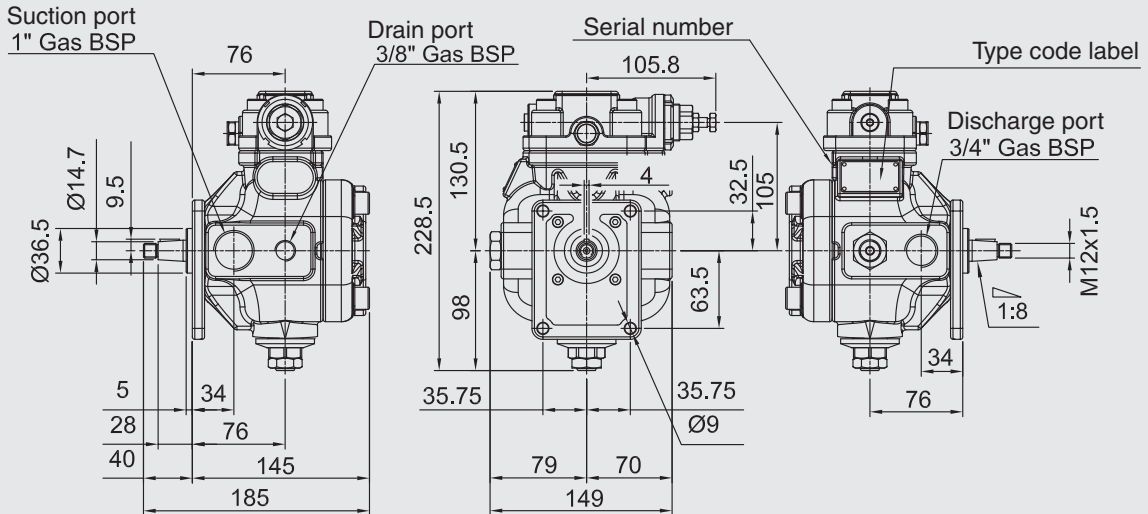
PVV103-05-16 (F)



PVV103-05-16 (F-A)

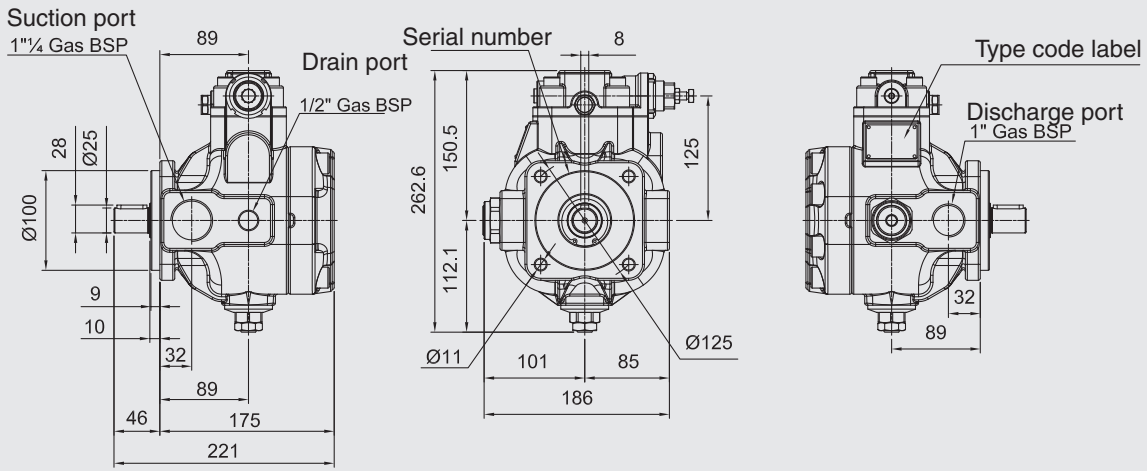


PVV103-05-16 (FGR2)

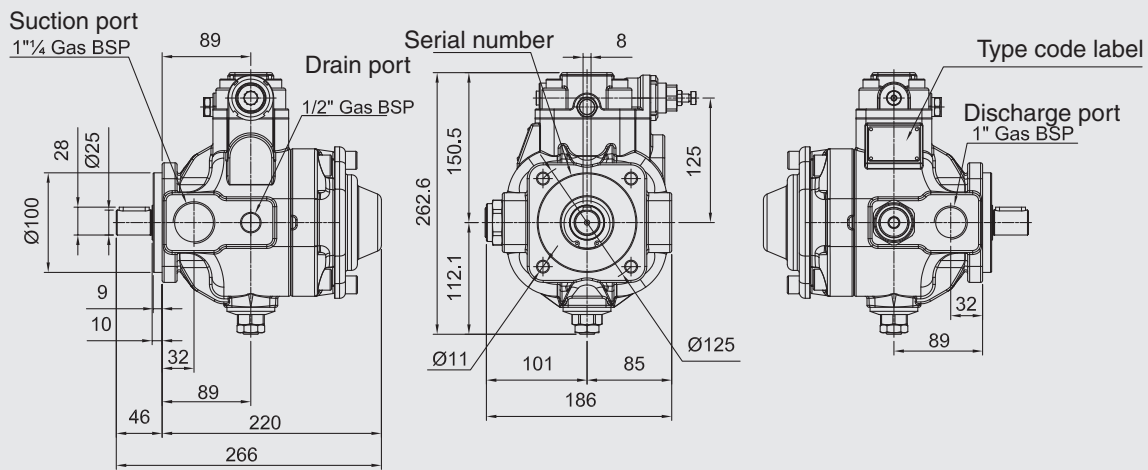


3.2.25 PVV103-1-32

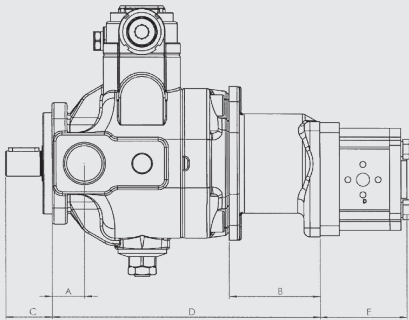
PVV103-01-32 (F)



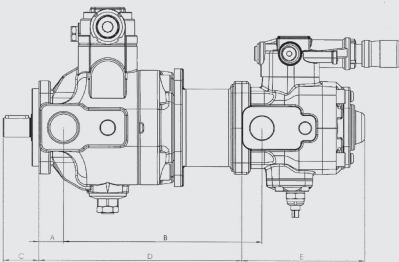
PVV103-01-32 (F-A)



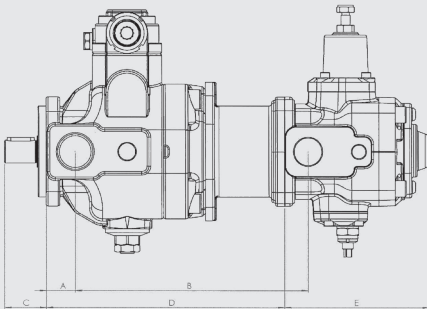
Multiple pumps
Front pump PVV103-05-16 F



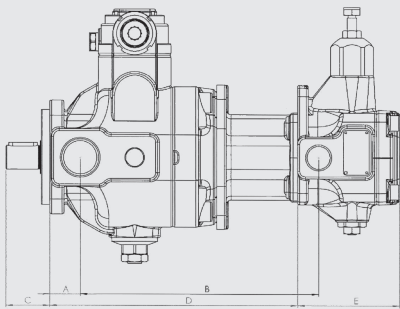
End pump	A	B	C	D	E
Gear pump Size 2	34	72	44	211	dependent on size selected



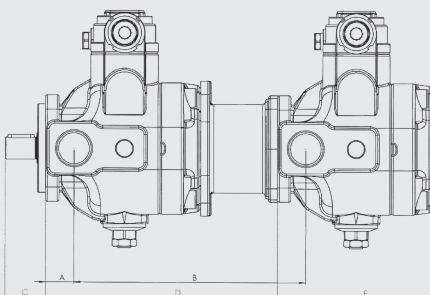
End pump	A	B	C	D	E
PVV100-1- ... F PVV101-1- ... F	34	206	44	214	159



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

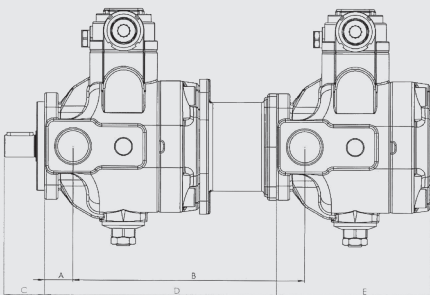
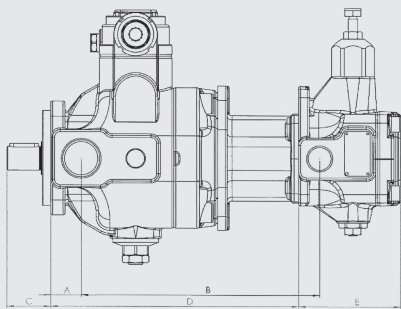
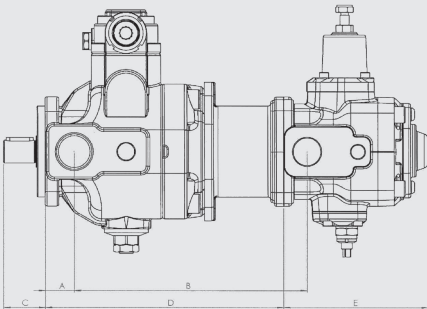
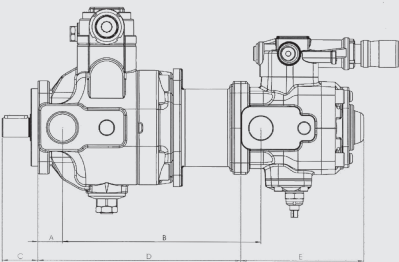
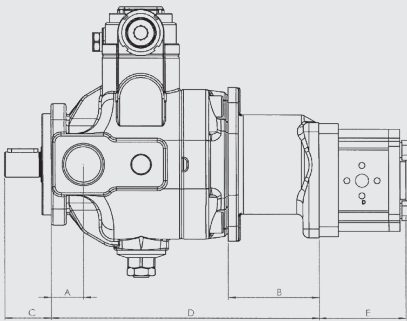


End pump	A	B	C	D	E
PVV102-05- ... F	34	200	44	212	107



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