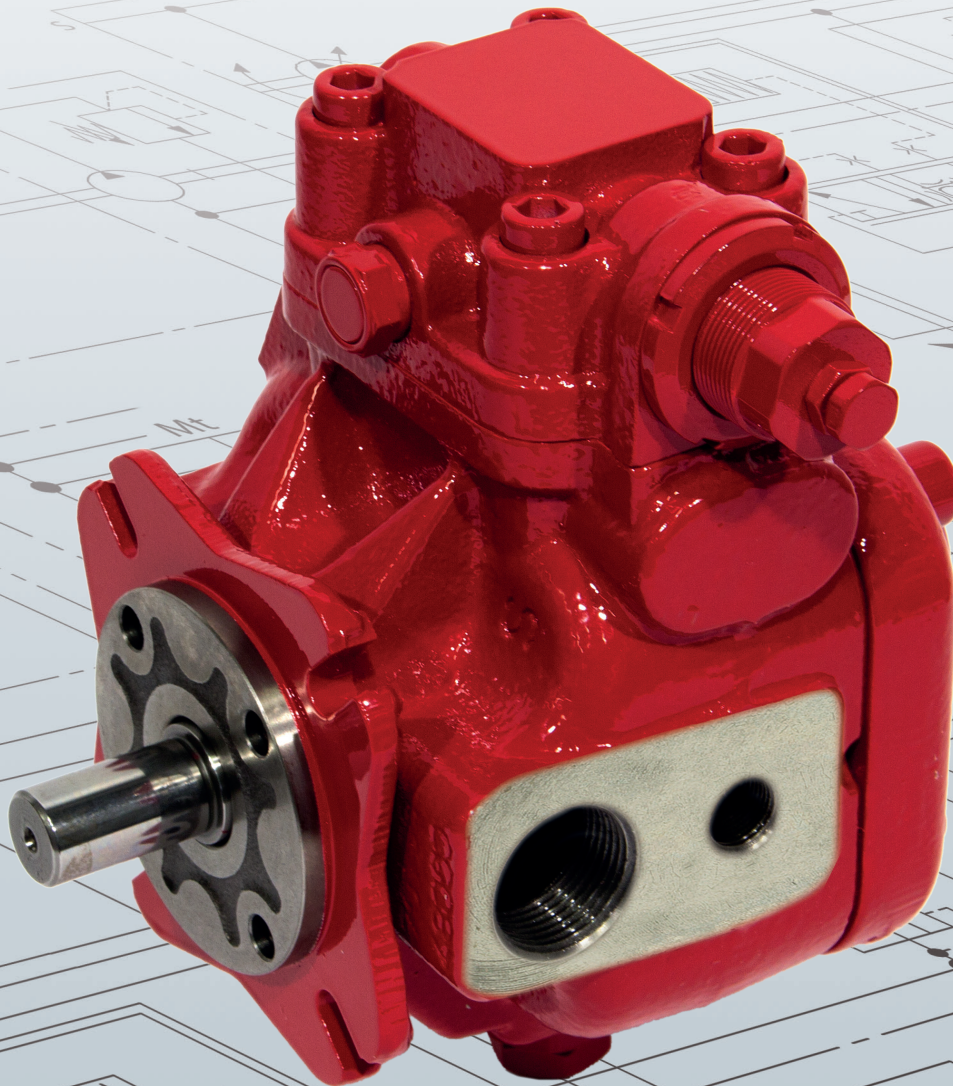


HYDAC INTERNATIONAL

**Variable Displacement
Vane Pump**
for
Open Loop Hydraulic Systems



EXCLUSION OF LIABILITY

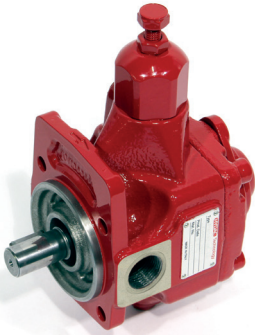
We have made every effort to ensure the accuracy of the contents of this document. However, errors cannot be ruled out. Consequently, we accept no liability for such errors that may exist nor for any damage or loss whatsoever which may arise as a result of such errors. The content of this manual is checked regularly. Any corrections required will be incorporated in future editions. We welcome any suggestions for improvements. All details are subject to technical modifications. Technical specifications are subject to change without notice.

Variable Displacement Vane Pump for Open Loop Hydraulic Systems

1. VANE PUMPS

1.1 MECHANICAL COMPENSATION

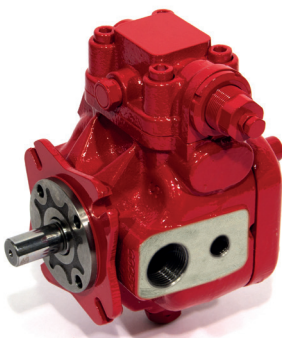
PVV102



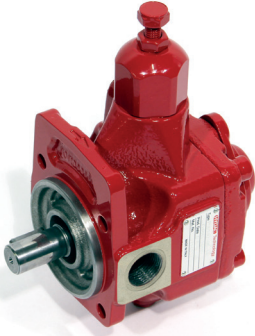
Series	Geometric Displacement [cm ³ /rev]	Operating pressure Rated pressure [bar]	Maximum drive speed [rpm]
PVV102-05-16	17	120	1800
PVV102-1-20	21	100	
PVV102-1-25	26		
PVV102-1-32	33		
PVV102-2-40	42		90
PVV102-2-50	51		
PVV102-2-63	63		
PVV102-3-80	80		
PVV102-3-100	100	90	1500
PVV102-3-120	123		

1.2 HYDRAULIC COMPENSATION

PVV103



Series	Geometric Displacement [cm ³ /rev]	Operating pressure Rated pressure [bar]	Maximum drive speed [rpm]
PVV103-05-16	17	250	1800
PVV103-1-20	21		
PVV103-1-25	26		
PVV103-1-32	33		
PVV103-2-40	42	210	1500
PVV103-2-50	51		
PVV103-2-63	63		
PVV103-3-80	80		
PVV103-3-100	100	210	1500
PVV103-3-120	123		



1.1 VARIABLE DISPLACEMENT, MECHANICAL COMPENSATION CONTENTS

PVV102

Ordering code	1.1.1 Mechanical compensation
Technical Information	1.1.2 Specifications 1.1.3 Hydraulic fluids 1.1.4 Viscosity range 1.1.5 Temperature range 1.1.6 Seals 1.1.7 Filtration 1.1.8 Max. drive and through drive torques 1.1.9 Through drive models 1.1.10 Installation notes 1.1.11 Adjustments
Control Options	1.1.12 Standard pressure control
Performance Data	1.1.13 PVV102-05-16 1.1.14 PVV102-1-20 /-25 /-32 1.1.15 PVV102-2-40 /-50 /-63 1.1.16 PVV102-3-80 /-100 /-120
Dimensions	1.1.17 PVV102-05-16 1.1.18 PVV102-1-20 /-25 /-32 1.1.19 PVV102-2-40 /-50 /-63 1.1.20 PVV102-3-80 /-100 /-120

ORDERING CODE

1.1.1 Variable Displacement, Mechanical Compensation

PVV102 - 05 - 16 F H R M - XXXX

**Variable displacement vane pump
with mechanical compensation**

Size

05 | 1 | 2 | 3

Displacement

16 | 20 | 25 | 32 | 40 | 50 | 63 | 80 | 100 | 120

Flange and ports

F ISO 3019/2 – BSP ISO 228/1 thread
FGR2 for size 2 gear pump - BSP ISO 228/1 thread (size 05 only)

Pressure setting range

H 20 - 120 bar (size 05)
30 - 100 bar (sizes 1 and 2)
50 - 90 bar (size 3)
L 15 - 50 bar (sizes 1 and 2)
30 - 50 bar (size 3)

Shaft rotation (viewed from shaft end)

R Clockwise

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

1.1.2 Specifications

Pump size		16	20	25	32	40	50	63	80	100	120
Geometric displacement	[cm ³ /rev]	17	21	26	33	42	51	63	80	100	123
Pressure*	Rated [bar]	120	100						90		
Drive speed	Min. [rpm]	800									
	Max. [rpm]	1800					1500				
Approx. weight	[kg]	7.4	18.3			43.8			56		
Permitted axial shaft force	[N]	No radial or axial loads allowed.									
Permitted radial shaft force	[N]										

* Pressure peaks exceeding 30 % of the maximum operating pressure must be eliminated by adopting the appropriate measures.

1.1.3 Hydraulic fluids

The pump series is designed for use with:

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

For use with other fluids, please contact
HYDAC Drive Center.

1.1.4 Viscosity range

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

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

1.1.5 Temperature range

+15 to +60 °C (measured in tank)

Notice: The highest fluid temperature will be at the drain port of the pump.
This is up to 20 °C higher than in the tank.

1.1.6 Seals

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

1.1.7 Filtration

For maximum pump and component lifetime, the system should be protected from contamination by effective filtration. The contamination level should be within

18/16/13 acc. to ISO 4406/99

or

Class 7 acc. to NAS 1638.

1.1.8 Max. drive and through drive torques

Nominal size		05	1	2	3
Geometric displacement	[cm ³ /rev]	17	21 - 26 - 33	42 - 51 - 63	80 - 100 - 123
Max. torque on primary shaft	[Nm]	110 ¹	250	586	900
Max. through drive torque	[Nm]	55		110	110 / 180 ²

¹ With flange version F. For flange version FGR2 70 Nm.

² Only for combination size 3 + 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 primary pump.

1.1.9 Through drive models

Through drive pump	Drive pump PVV102-			
	05	1	2	3
PVV102-05	•	•	•	•
PVV103-05	•	•	•	•
PVV102-1		•	•	•
PVV103-1		•	•	•
PVV102-2			•	•
PVV103-2			•	•
PVV102-3				•
PVV103-3				•
PGI100-2		•	•	•
PGI101-3			•	•
PGI102-2		•	•	•
PGI102-3			•	•
PGE101-..._BQ	•	•	•	•
PGE102-..._BR	•	•	•	•
PGE103-..._BS			•	•
PVF100-1	•	•	•	•
SAE A (parallel shaft)	•	•	•	•
SAE B (parallel shaft)			•	•

For other through drive combinations, please contact HYDAC Drive Center.

1.1.10 Installation notes

Step 1

PVV102 pumps can be installed vertically or horizontally. 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 circulation 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 **radial and/or axial loads** are permitted on the pump shaft.

Step 4

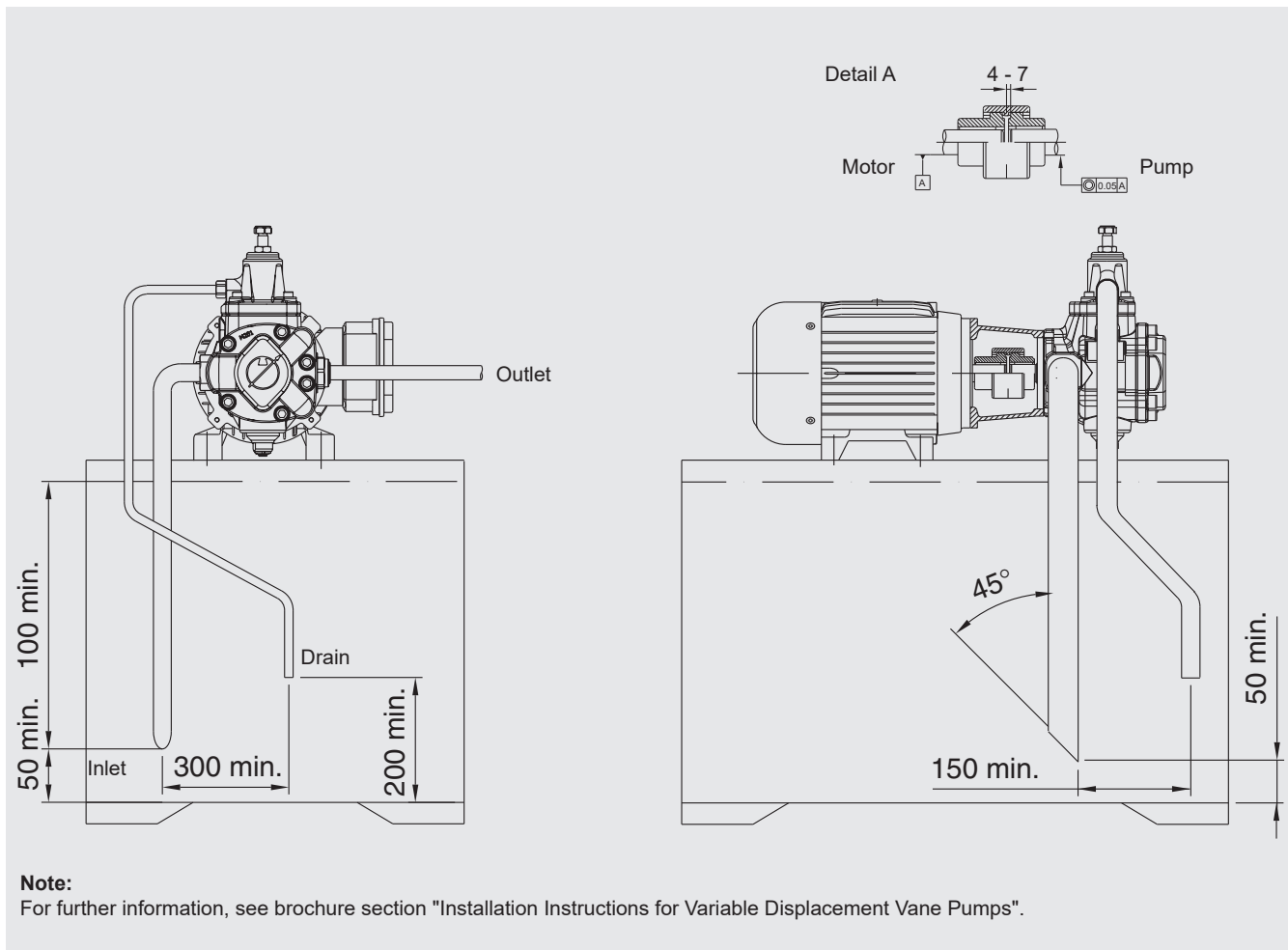
During commissioning, the pump must first be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump.

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.



1.1.11 Adjustments

Pump size	Available displacement [cm ³ /rev]	Reduced displacement by screw turn [cm ³ /rev]	Min. adjustable displacement [cm ³ /rev]
PVV102-05-16	17	9.7	3.1
PVV102-1-20	21	10	9.5
PVV102-1-25	26	10	15
PVV102-1-32	33	10	19
PVV102-2-40	42	16	27.5
PVV102-2-50	51	16	35.5
PVV102-2-63	63	16	43.5
PVV102-3-80	80	16	63
PVV102-3-100	100	16	80
PVV102-3-120	123	16	100

CONTROL OPTIONS

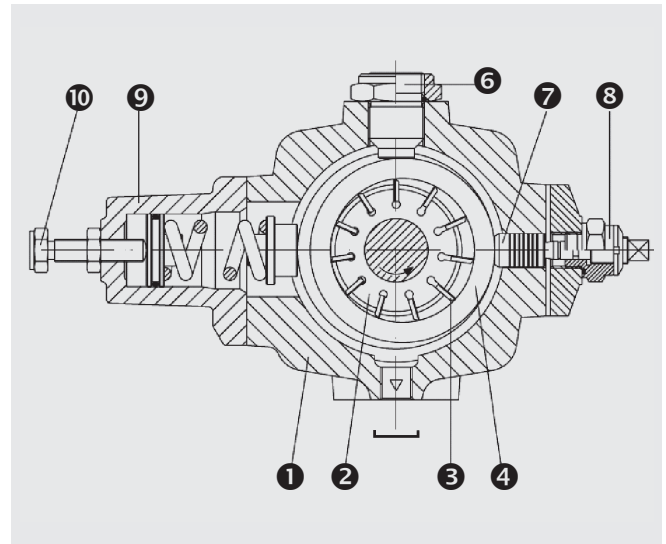
1.1.12 Mechanical pressure compensation

The PVV102 variable displacement vane pumps come in four nominal sizes: size 05, 1, 2 and 3, each of which is available with different displacements.

The low pressure pumps, type PVV102, are equipped with a mechanical pressure regulating device.

The pumps consist of:

- a housing **1**
- a rotor **2**
- vanes **3** which convey the fluid between inlet and outlet chambers
- a stator **4** (adjustable ring) with variable eccentricity and thus variable displacement
- side pressure plates with axial hydrostatic balancing, which limit the inlet and outlet chambers
- pressure screw **6** for balancing the pumps (must not be adjusted by user)
- a displacement adjustment piston **7**
- maximum displacement adjustment screw **8**
- pressure controller **9**
- pressure adjustment screw **10**



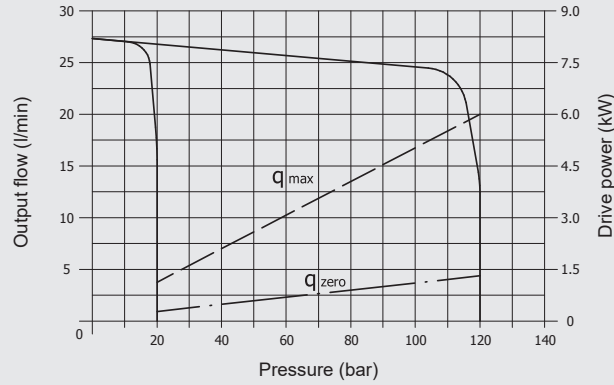
Diagrams and characteristic curves for pressure control:

Description	Performance characteristics	Hydraulic circuit
Standard pump with standard pressure control		

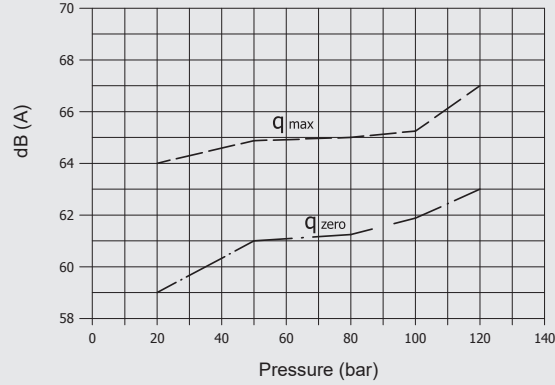
PERFORMANCE DATA

1.1.13 PVV102-05-16

Volumetric efficiency

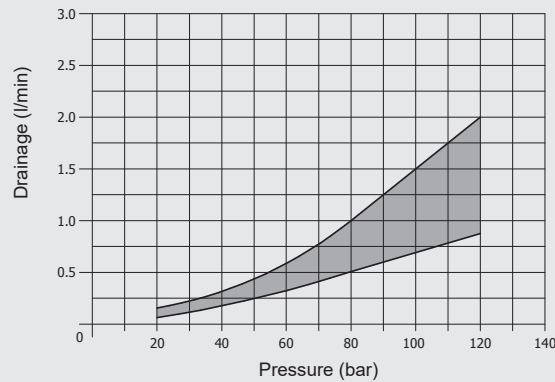


Maximum noise level



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

Drainage flow



Values determined with pump
on zero flow setting

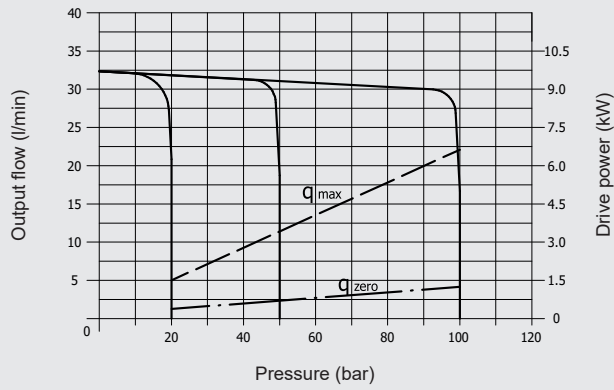
Drive power at maximum displacement

Drive power at zero flow setting

1.1.14 PVV102-1-20 / -25 / -32

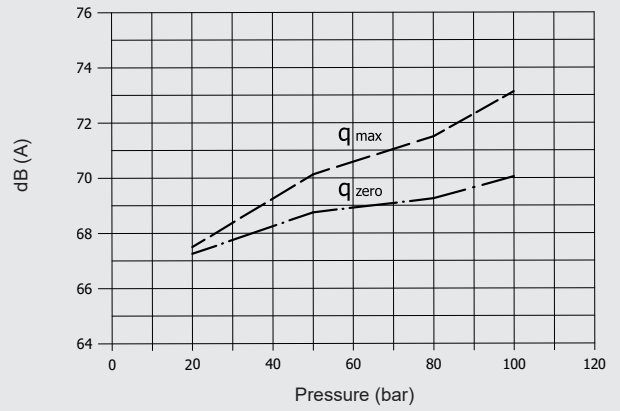
Volumetric efficiency

PVV102-1-20



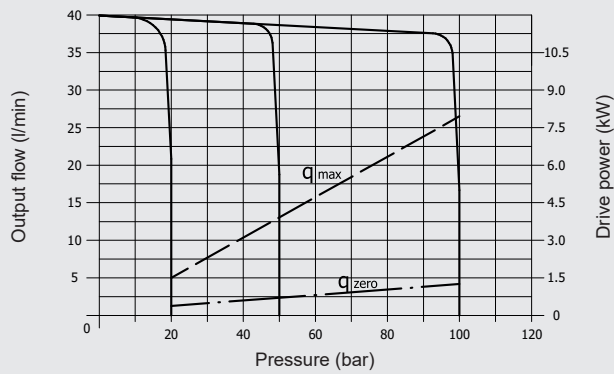
Maximum noise level

measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling PVV102-1-20 / -25 / -32



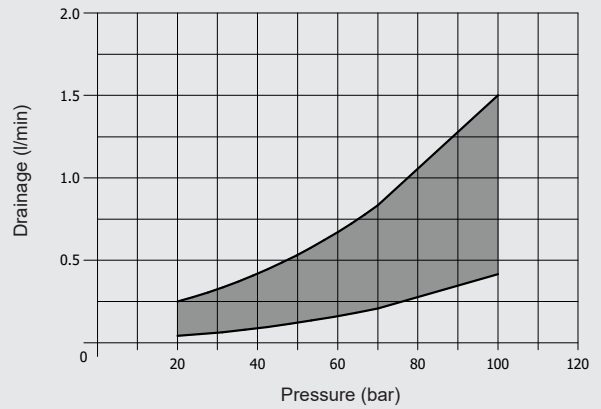
Volumetric efficiency

PVV102-1-25



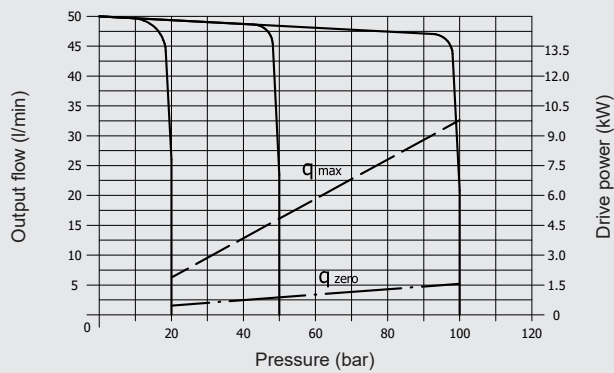
Drainage flow

Values determined with pump on zero flow setting PVV102-1-20 / -25 / -32



Volumetric efficiency

PVV102-1-32



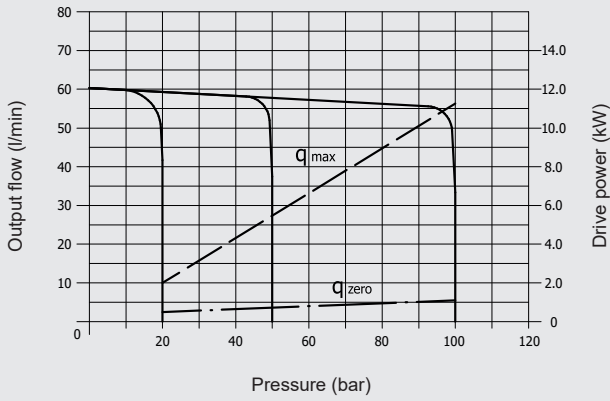
Drive power at maximum displacement

Drive power at zero flow setting

1.1.15 PVV102-2-40 / -50 / -63

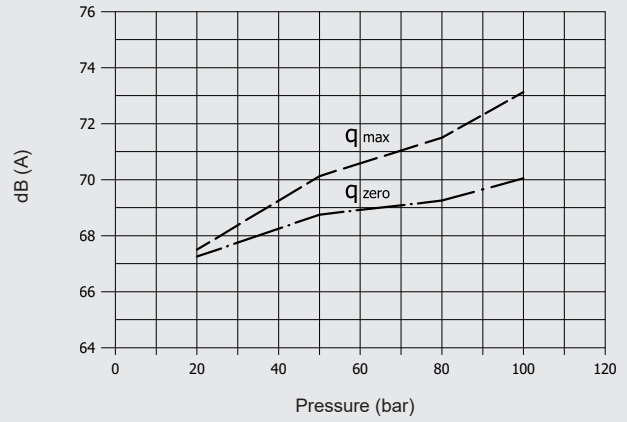
Volumetric efficiency

PVV102-2-40



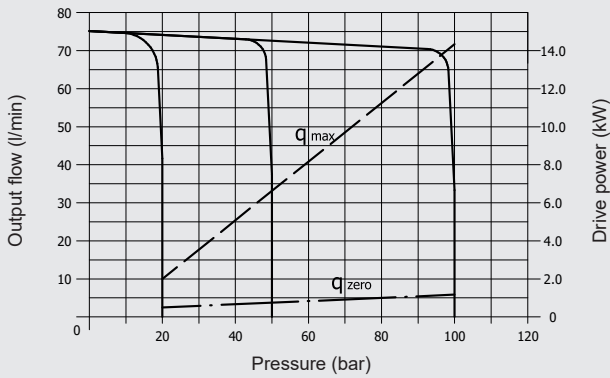
Maximum noise level

measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling PVV102-2-40 / -50 / -63



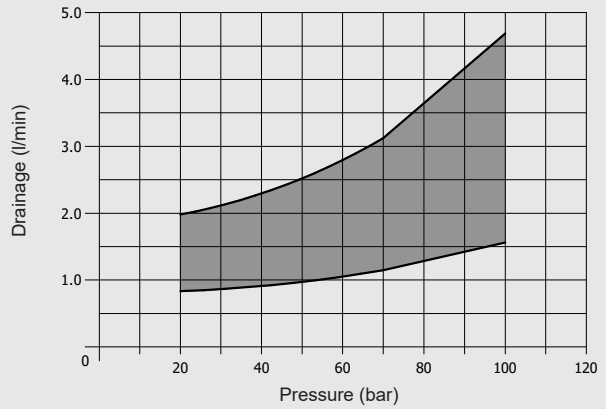
Volumetric efficiency

PVV102-2-50



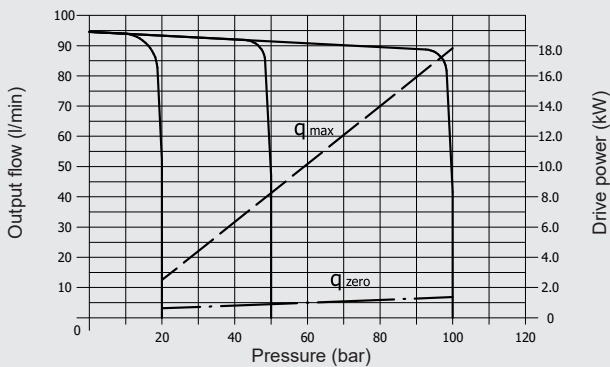
Drainage flow

Values determined with pump on zero flow setting PVV102-2-40 / -50 / -63



Volumetric efficiency

PVV102-2-63



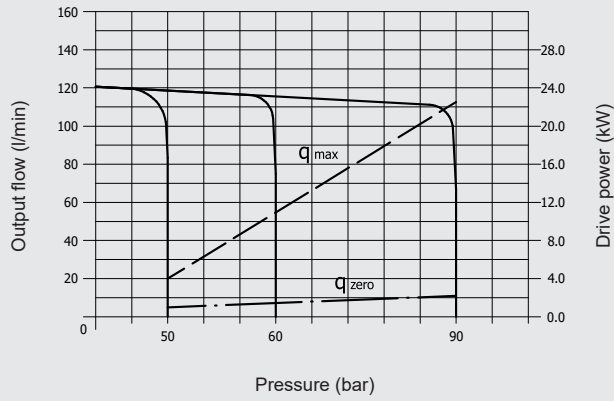
Drive power at maximum displacement

Drive power at zero flow setting

1.1.16 PVV102-3-80 / -100 / -120

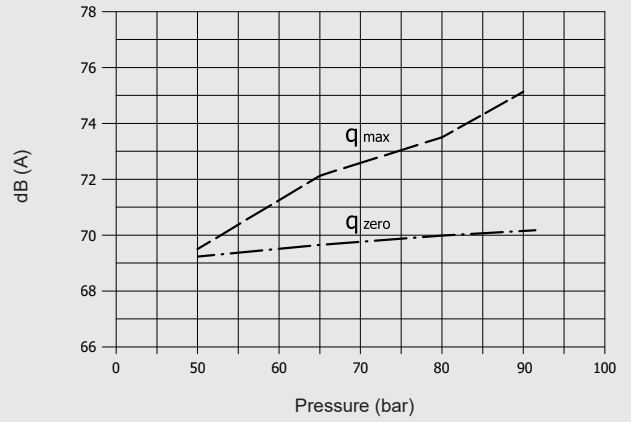
Volumetric efficiency

PVV102-3-80



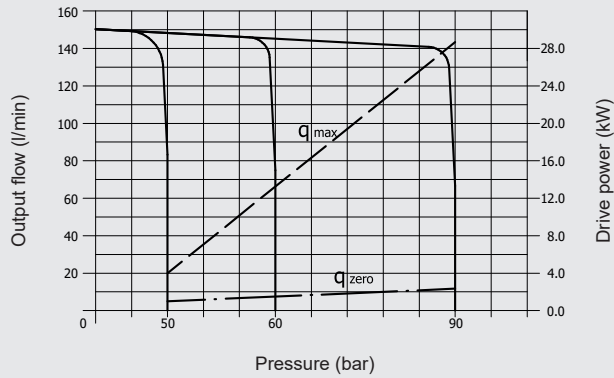
Maximum noise level

measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling PVV102-3-80 / -100 / -120



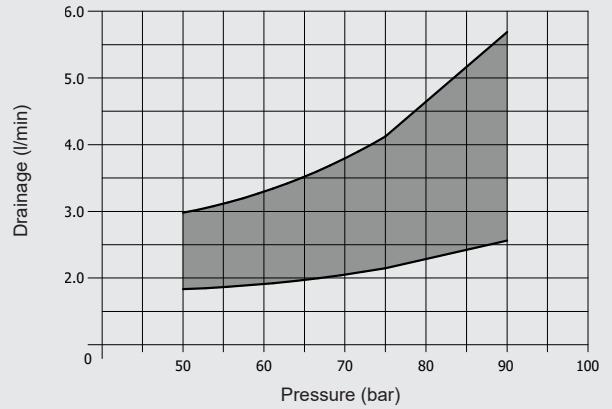
Volumetric efficiency

PVV102-3-100



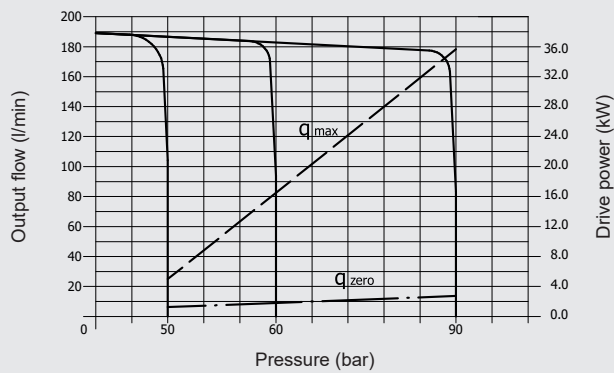
Drainage flow

Values determined with pump on zero flow setting PVV102-3-80 / -100 / -120



Volumetric efficiency

PVV102-3-120

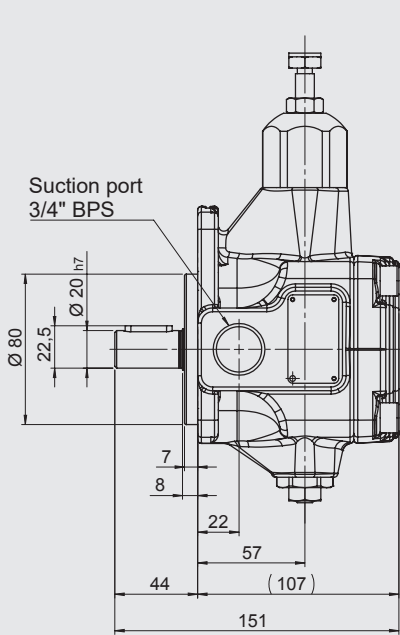


Drive power at maximum displacement

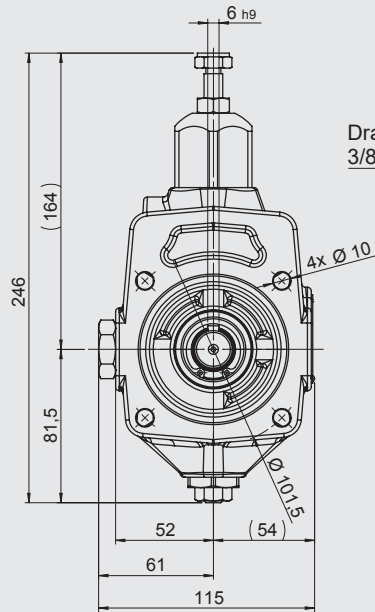
Drive power at zero flow setting

DIMENSIONS

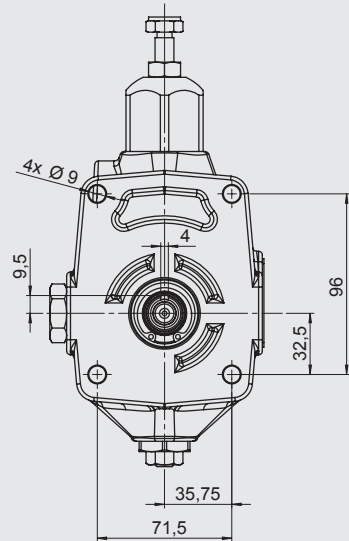
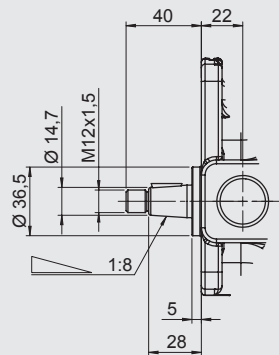
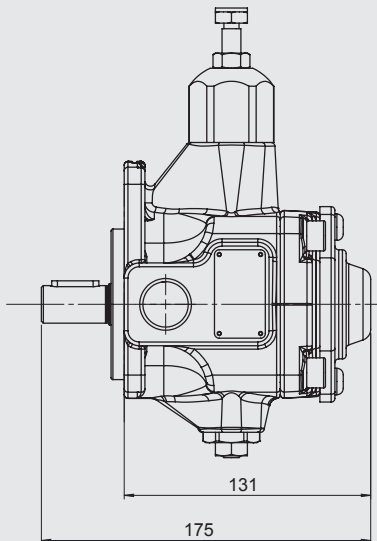
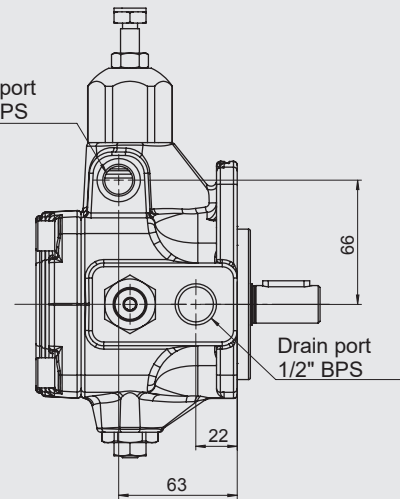
1.1.17 PVV102-05-16



with through drive (-A)

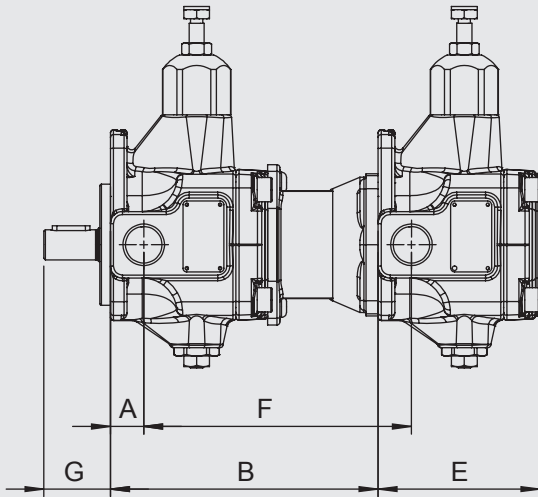


FGR2 flange (not for through drive version -A)

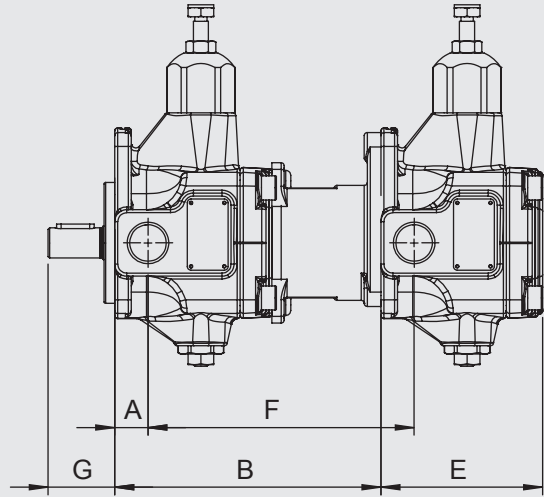


Multiple pumps
Primary pump PVV102-05- ... F

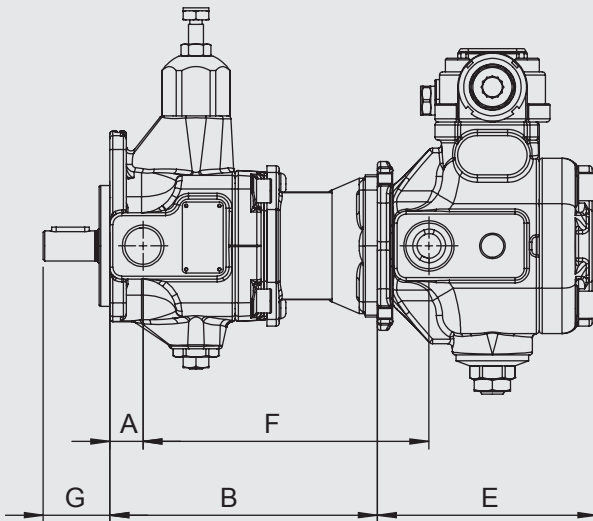
1. PVV102-05 + PVV102-05



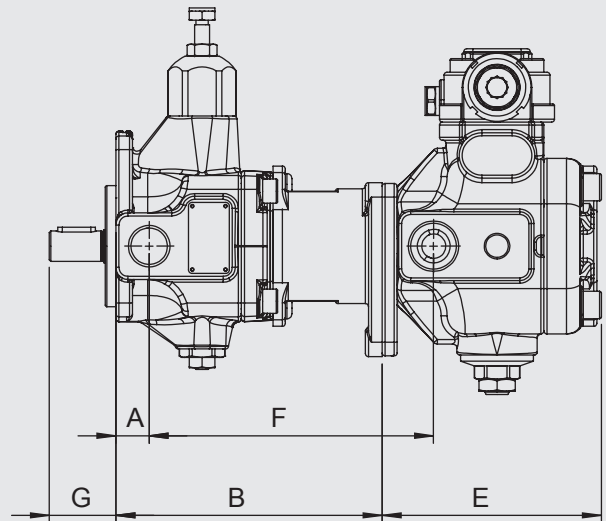
2. PVV102-05 + PVV102-05-FGR2



3. PVV102-05 + PVV103-05



4. PVV102-05 + PVV103-05-FGR2

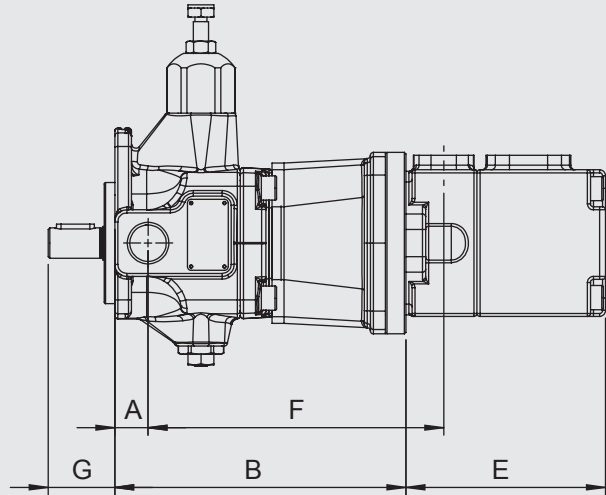
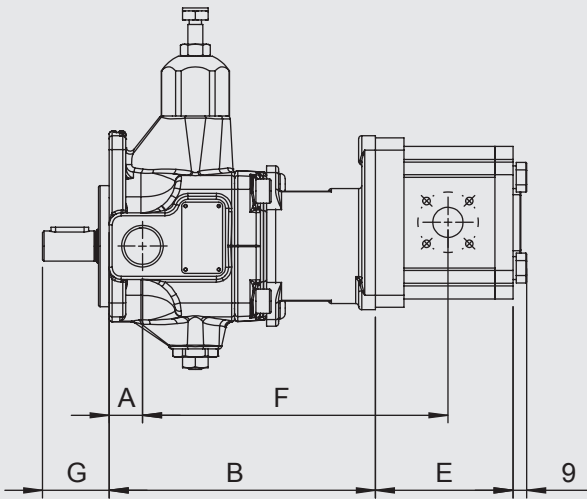


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	22	177	107	177	44
2. PVV102-05-16FGR2	22	176	107	176	44
3. PVV103-05-16FHRM	22	177	145	189	44
4. PVV103-05-16FGR2	22	176	145	188	44

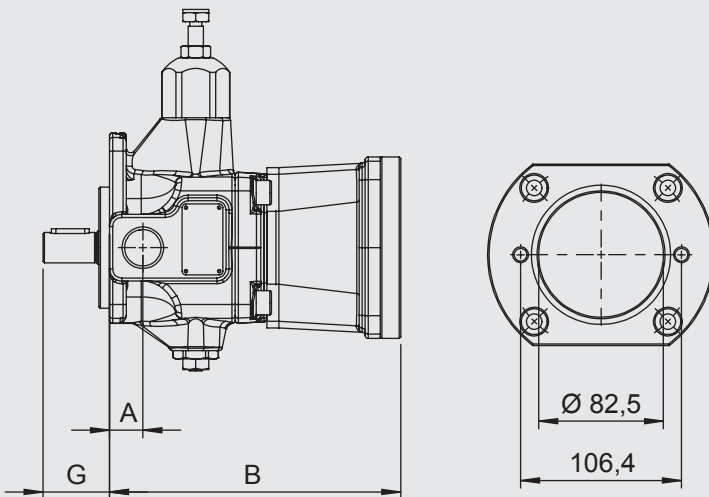
Multiple pumps
Primary pump PVV102-05- ... F

5. PVV102-05 + PGE

6. PVV102-05 + PVF100-1



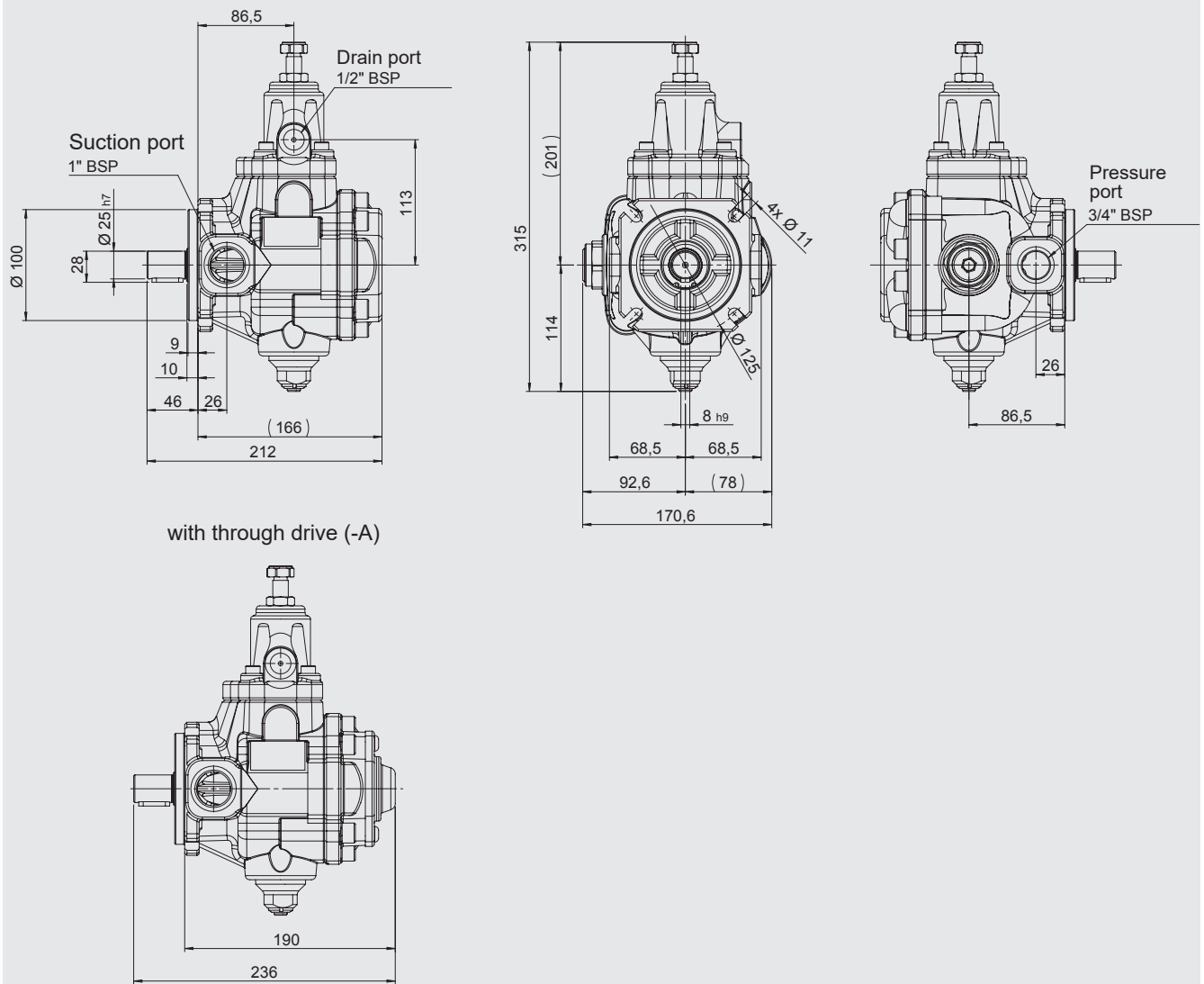
7. PVV102-05 + SAE A



Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PGE101 / PGE102	22	176	*	*	44
6. PVF100-1	22	192.5	134	195.5	44
7. SAE A	22	192.5	-	-	44

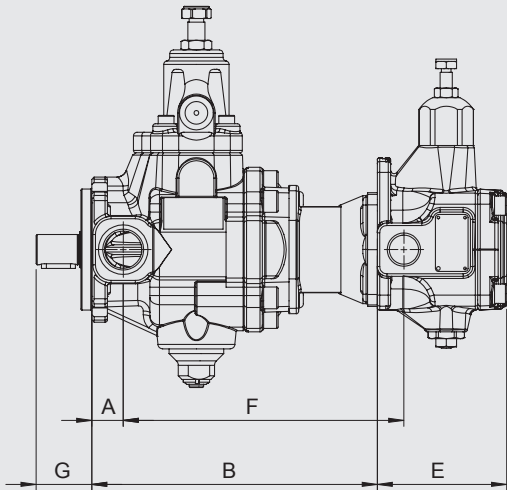
* Length is dependent on the size selected.

1.1.18 PVV102-1-20 / -25 / -32

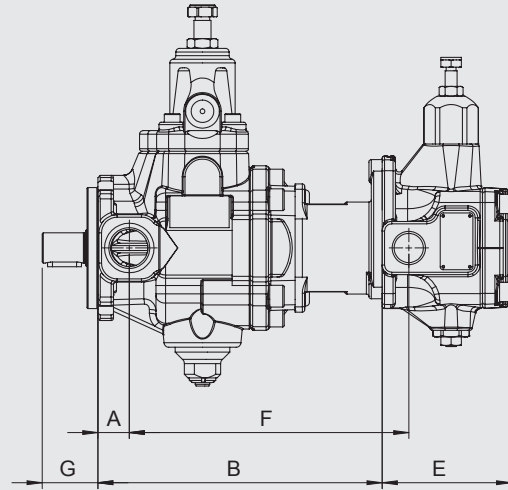


Multiple pumps
Primary pump PVV102-1- ... F

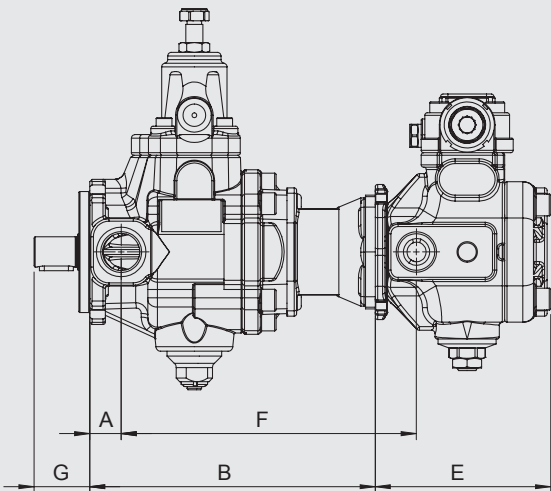
1. PVV102-1 + PVV102-05



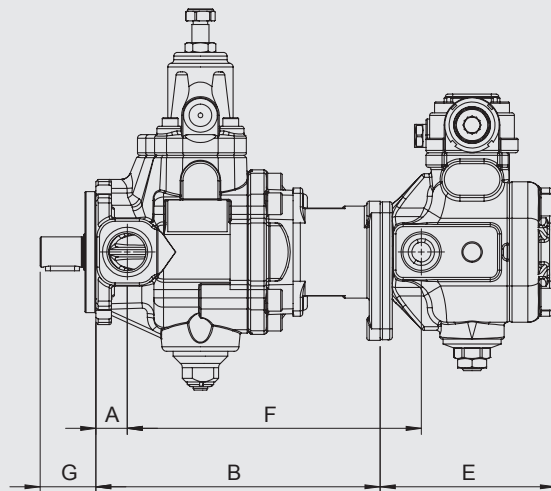
2. PVV102-1 + PVV102-05-FGR2



3. PVV102-1 + PVV103-05



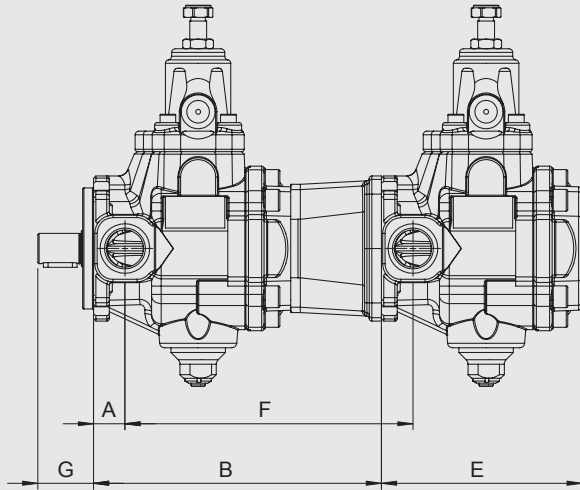
4. PVV102-1 + PVV103-05-FGR2



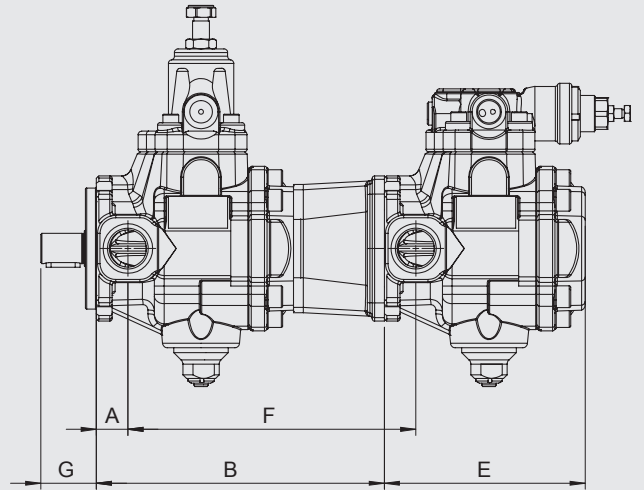
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	26	236	107	232	46
2. PVV102-05-16FGR2	26	235	107	231	46
3. PVV103-05-16FHRM	26	236	145	244	46
4. PVV103-05-16FGR2	26	235	145	243	46

Multiple pumps
Primary pump PVV102-1- ... F

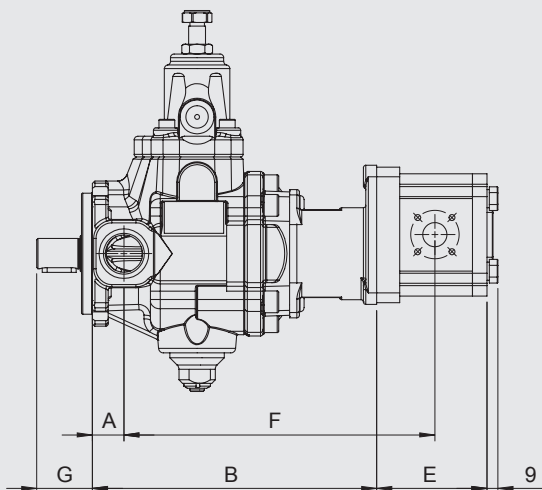
5. PVV102-1 + PVV102-1



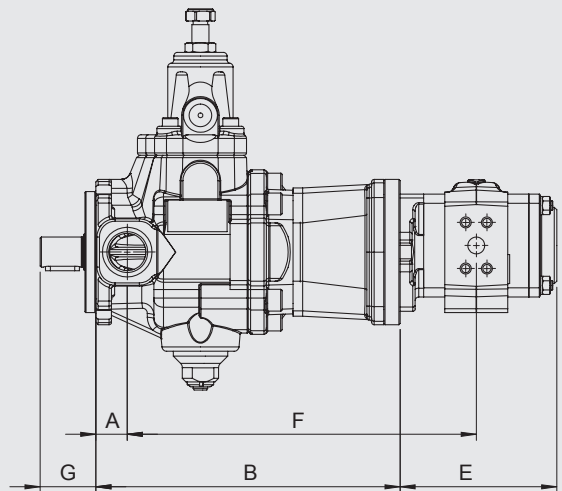
6. PVV102-1 + PVV103-1



7. PVV102-1 + PGE



8. PVV102-1 + PGI

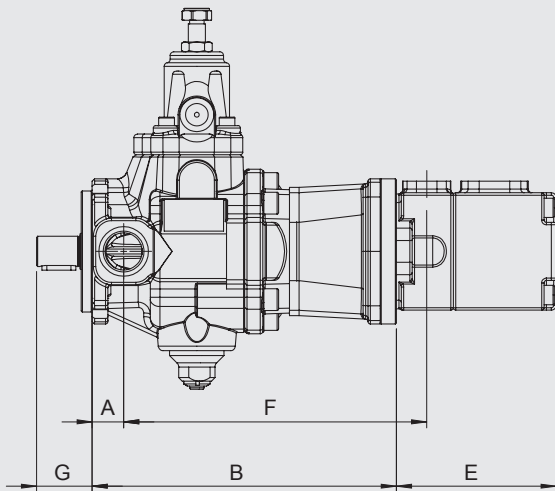


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PVV102-1-20/25/32FHRM	26	238	166	238	46
6. PVV103-1-20/25/32FHRM	26	238	166	238	46
7. PGE101 / PGE102	26	235	*	*	46
8. PGI10X-2	26	251.5	*	*	46

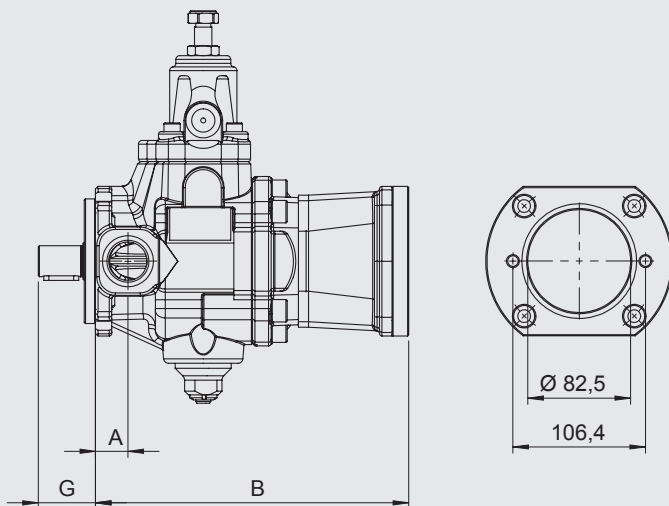
* Length is dependent on the size selected.

Multiple pumps
Primary pump PVV102-1- ... F

9. PVV102-1 + PVF100-1

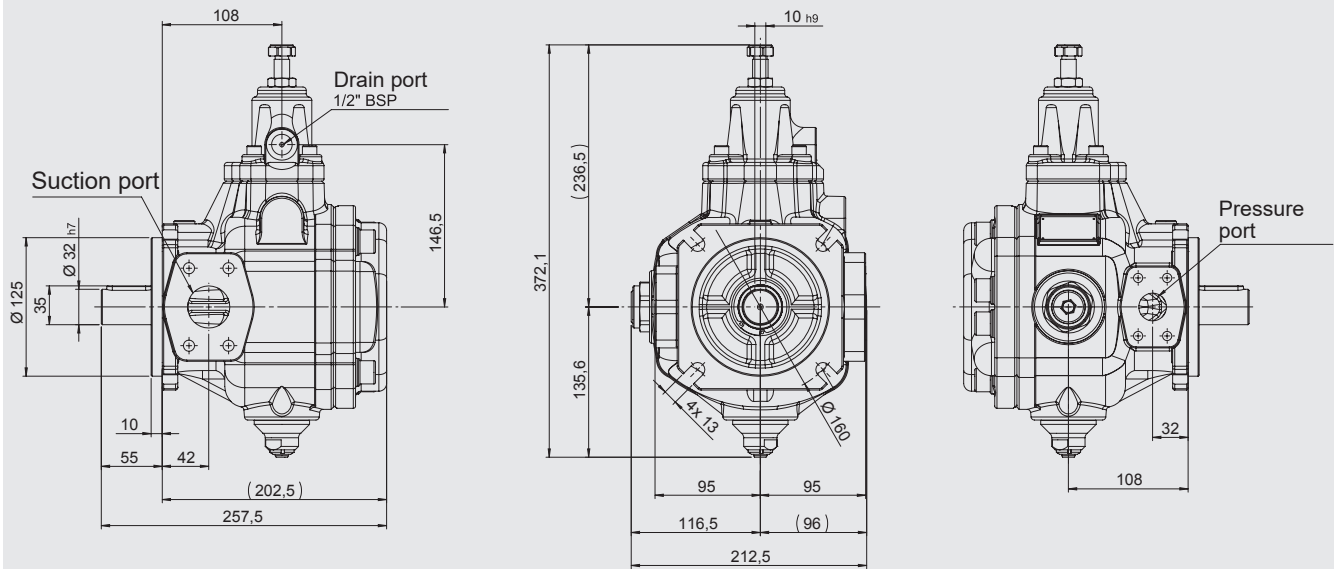


10. PVV102-1 + SAE A

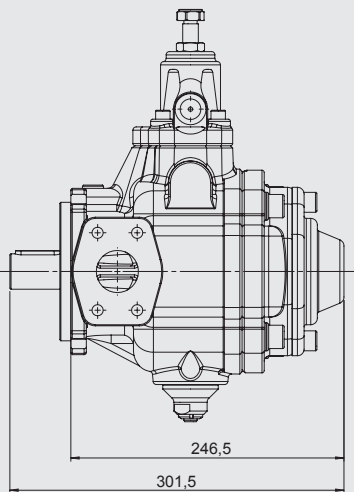


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
9. PVF100-1	26	251.5	134	250.5	46
10. SAE A	26	251.5	-	-	46

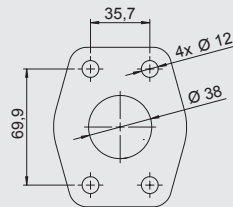
1.1.19 PVV102-2-40 / -50 / -63



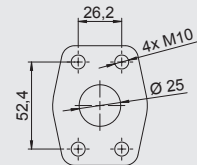
with through drive (-A)



Suction port

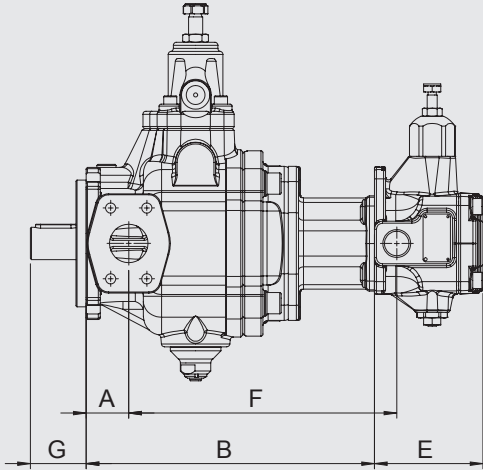


Pressure port

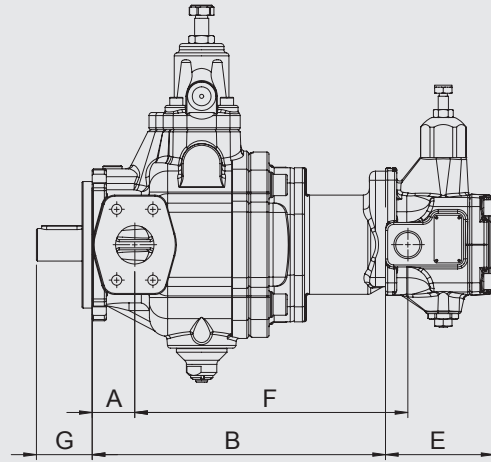


Multiple pumps
Primary pump PVV102-2- ... F

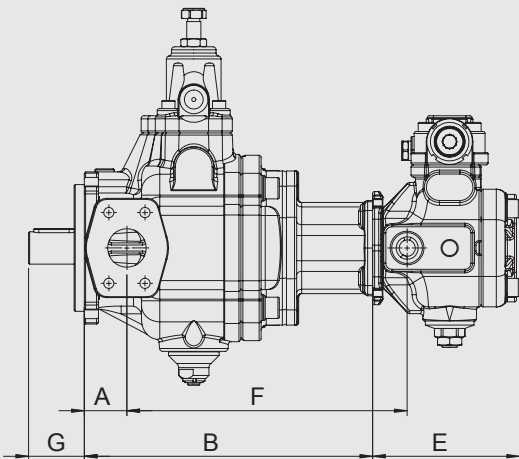
1. PVV102-2 + PVV102-05



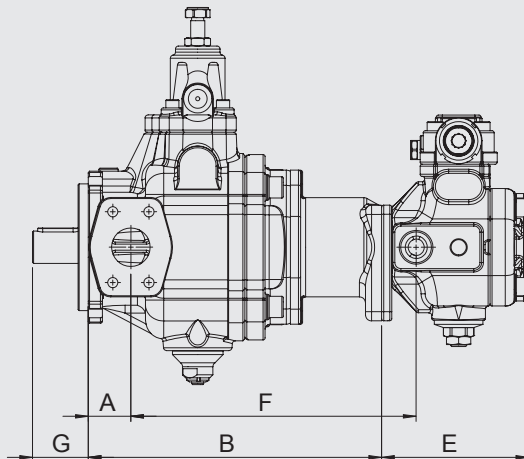
2. PVV102-2 + PVV102-05-FGR2



3. PVV102-2 + PVV103-05



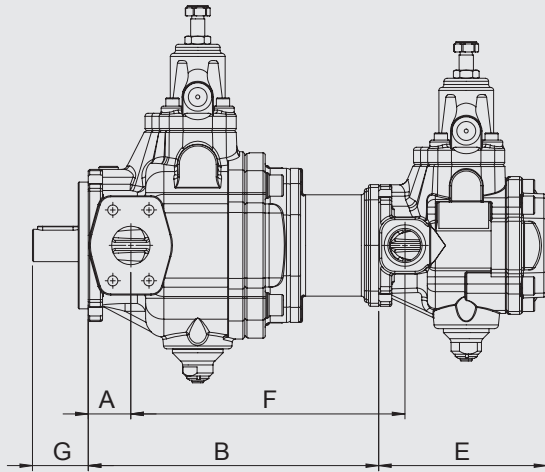
4. PVV102-2 + PVV103-05-FGR2



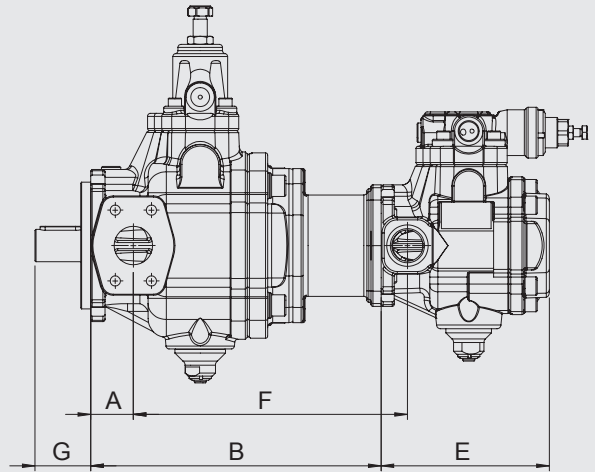
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	42	284.5	107	264.5	55
2. PVV102-05-16FGR2	42	289.5	107	269.5	55
3. PVV103-05-16FHRM	42	284.5	145	276.5	55
4. PVV103-05-16FGR2	42	289.5	145	281.5	55

Multiple pumps
Primary pump PVV102-2- ... F

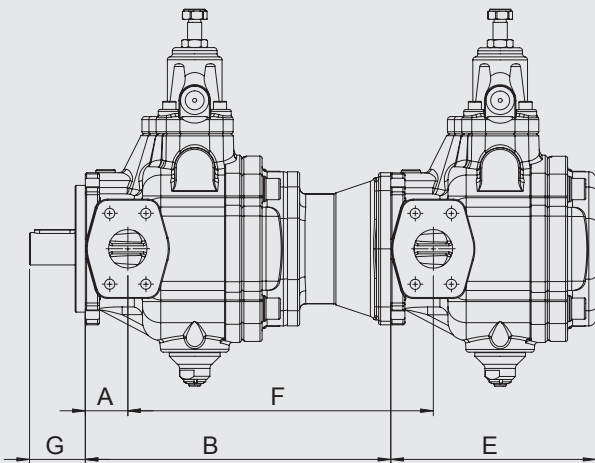
5. PVV102-2 + PVV102-1



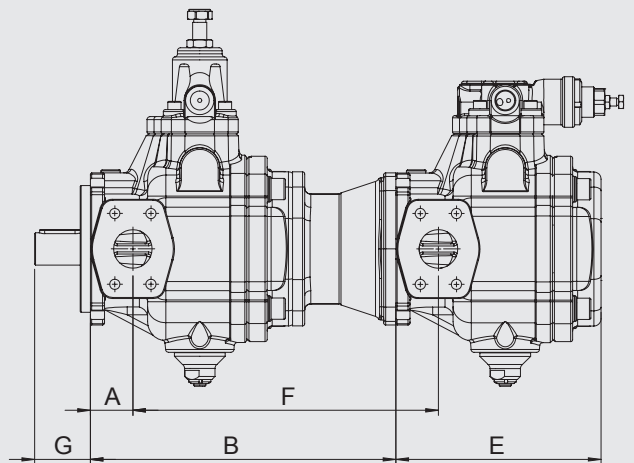
6. PVV102-2 + PVV103-1



7. PVV102-2 + PVV102-2



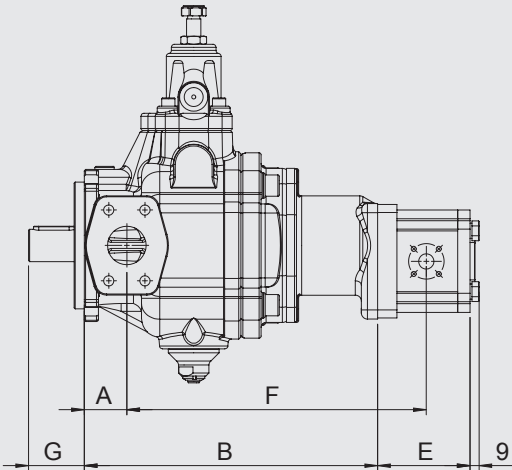
8. PVV102-2 + PVV103-2



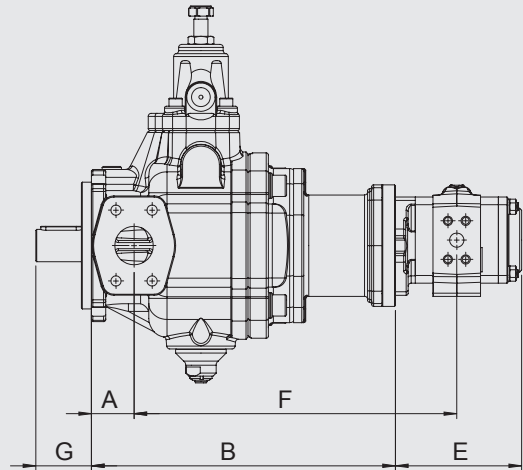
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PVV102-1-20/25/32FHRM	42	286.5	166	270.5	55
6. PVV103-1-20/25/32FHRM	42	286.5	166	270.5	55
7. PVV102-2-20/25/32FHRM	42	301.5	202.5	301.5	55
8. PVV103-2-20/25/32FHRM	42	301.5	202.5	301.5	55

Multiple pumps
Primary pump PVV102-2- ... F

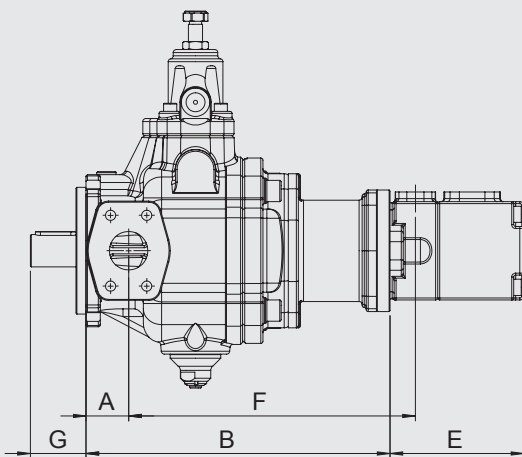
9. PVV102-2 + PGE



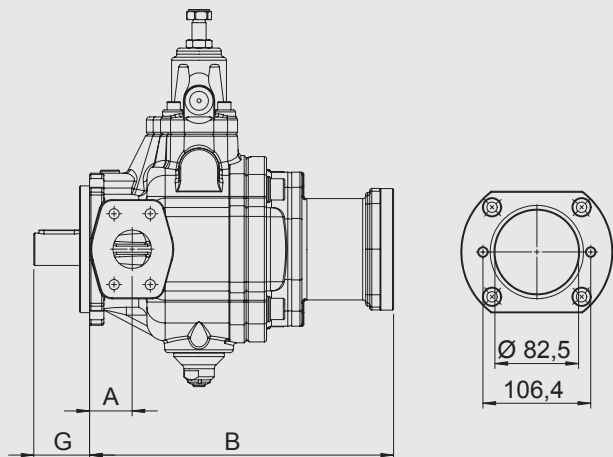
10. PVV102-2 + PGI



11. PVV102-2 + PVF100-1



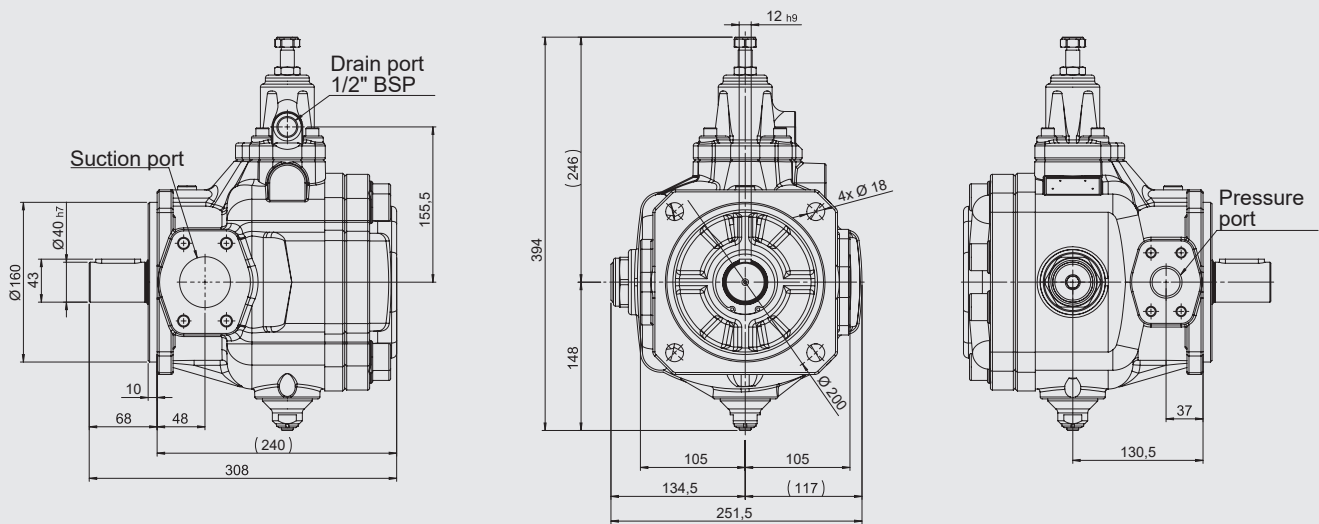
12. PVV102-2 + SAE A



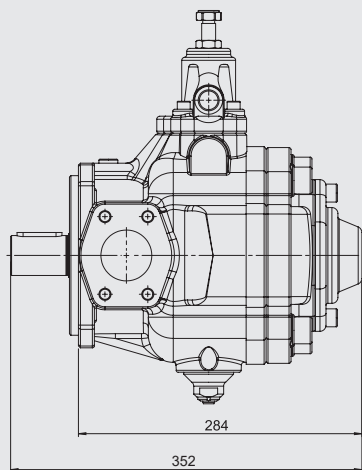
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
9. PGE101 / PGE102 / PGE103	42	289.5	*	*	55
10. PGI10X-2 / PGI10X-3	42	300	*	*	55
11. PVF100-1	42	300	134	283	55
12. SAE A	42	300	-	-	55

* Length is dependent on the size selected.

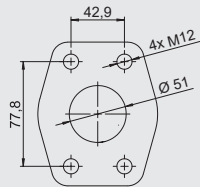
1.1.20 PVV102-3-80 / -100 / -120



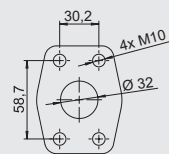
with through drive (-A)



Suction port

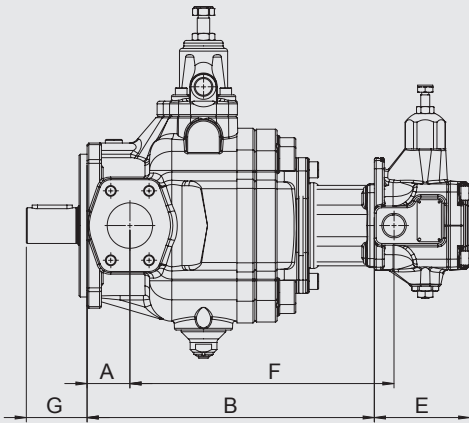


Pressure port

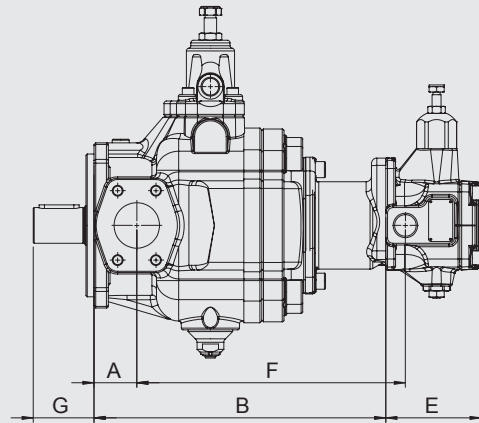


Multiple pumps
Primary pump PVV102-3- ... F

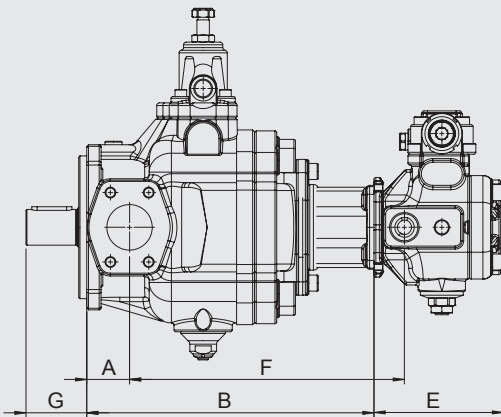
1. PVV102-3 + PVV102-05



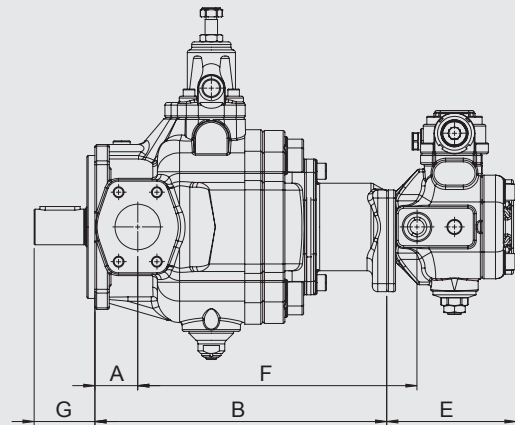
2. PVV102-3 + PVV102-05-FGR2



3. PVV102-3 + PVV103-05



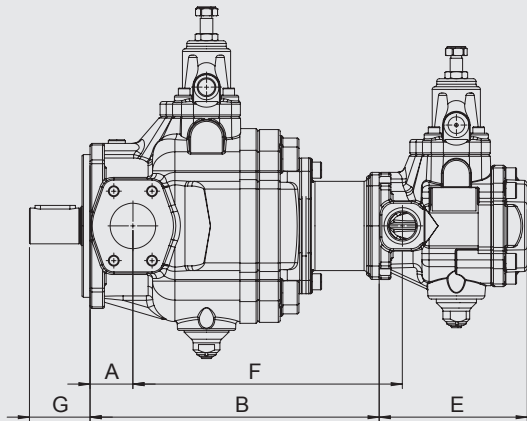
4. PVV102-3 + PVV103-05-FGR2



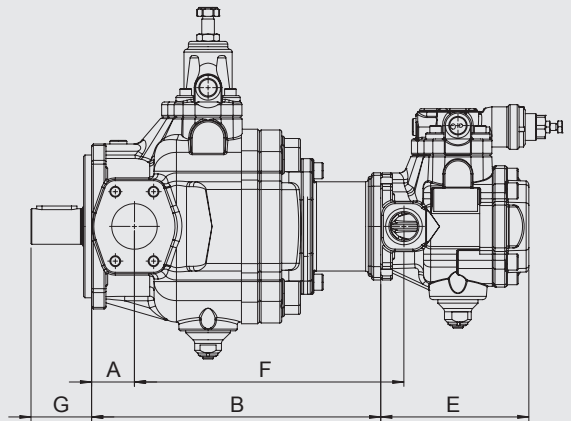
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	48	322	107	296	68
2. PVV102-05-16FGR2	48	327	107	301	68
3. PVV103-05-16FHRM	48	322	145	308	68
4. PVV103-05-16FGR2	48	327	145	313	68

Multiple pumps
Primary pump PVV102-3- ... F

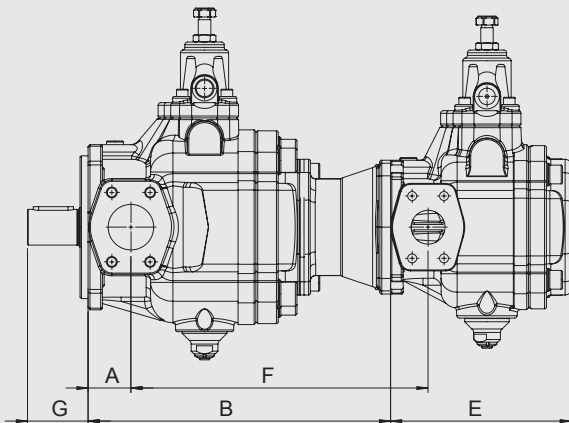
5. PVV102-3 + PVV102-1



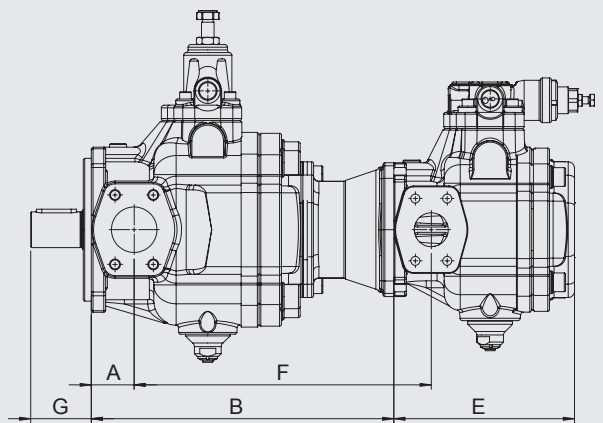
6. PVV102-3 + PVV103-1



7. PVV102-3 + PVV102-2



8. PVV102-3 + PVV103-2

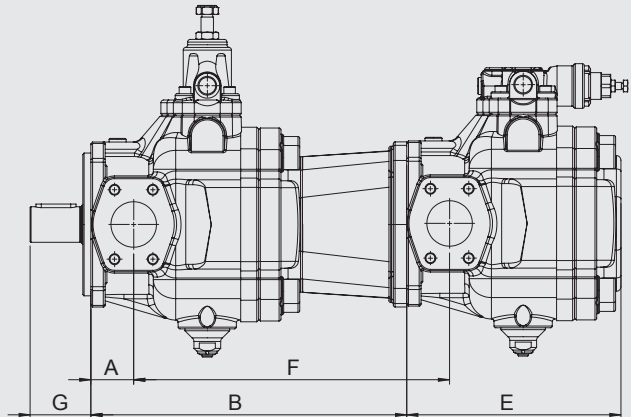
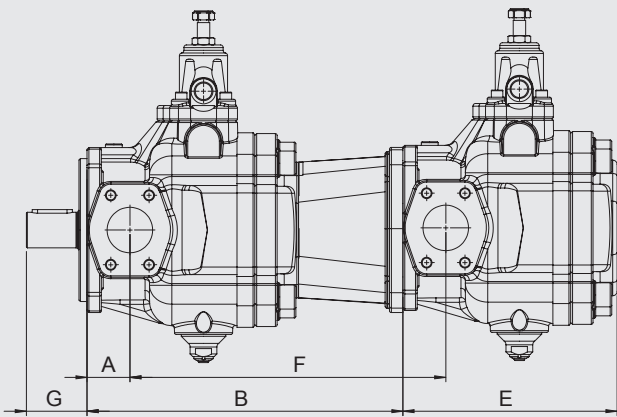


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PVV102-1-20/25/32FHRM	48	324	166	302	68
6. PVV103-1-20/25/32FHRM	48	324	166	302	68
7. PVV102-2-20/25/32FHRM	48	339	202.5	333	68
8. PVV103-2-20/25/32FHRM	48	339	202.5	333	68

Multiple pumps
Primary pump PVV102-3- ... F

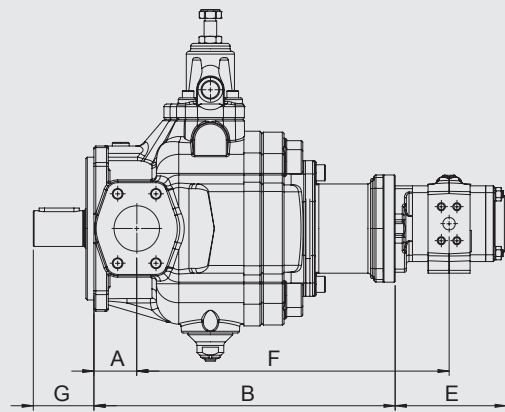
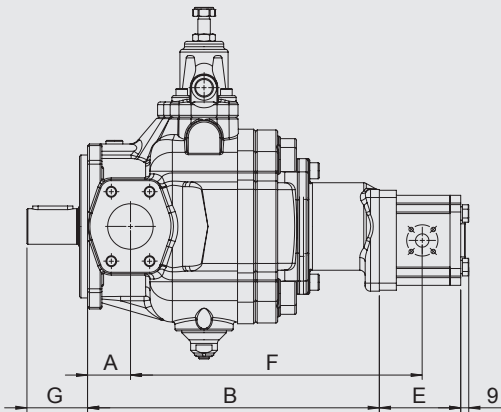
9. PVV102-3 + PVV102-3

10. PVV102-3 + PVV103-3



11. PVV102-3 + PGE

12. PVV102-3 + PGI

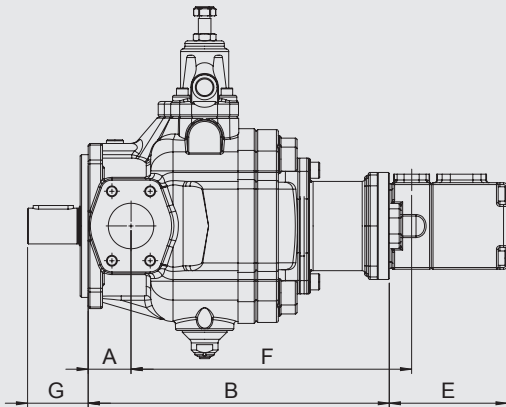


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
9. PVV102-3-20/25/32FHRM	48	354	240	354	68
10. PVV103-3-20/25/32FHRM	48	354	240	354	68
11. PGE101 / PGE102 / PGE103	48	327	*	*	68
12. PGI10X-2 / PGI10X-3	48	337.5	*	*	68

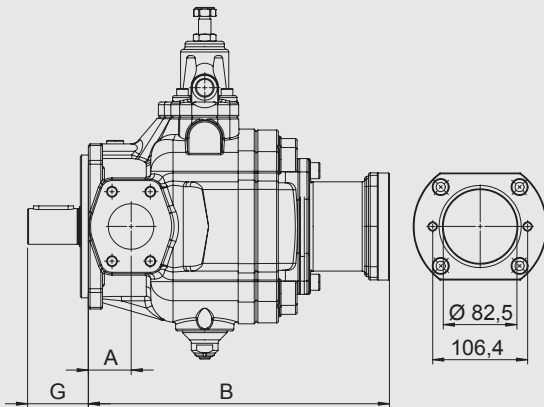
* Length is dependent on the size selected.

Multiple pumps
Primary pump PVV102-3- ... F

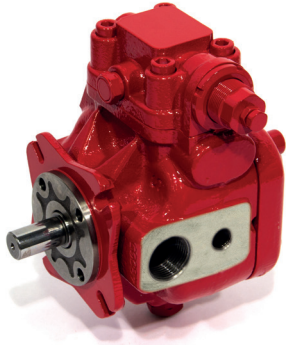
13. PVV102-3 + PVF100-1



14. PVV102-3 + SAE A



Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
13. PVF100-1	48	337.5	134	314.5	68
14. SAE A	48	337.5	-	-	68



1.2 VARIABLE DISPLACEMENT, HYDRAULIC COMPENSATION CONTENTS

PVV103

Ordering Code	1.2.1 Hydraulic compensation
Technical Information	<ul style="list-style-type: none"> 1.2.2 Specifications 1.2.3 Hydraulic fluids 1.2.4 Viscosity range 1.2.5 Temperature range 1.2.6 Seals 1.2.7 Filtration 1.2.8 Max. drive and through drive torques 1.2.9 Through drive models 1.2.10 Installation notes 1.2.11 Adjustments
Control Options	<ul style="list-style-type: none"> 1.2.12 Standard pressure control 1.2.13 Remote pressure control 1.2.14 2-stage pressure control, one stage non-adjustable 1.2.15 2-stage pressure control, both adjustable 1.2.16 Proportional pressure control 1.2.17 Load sensing and standard pressure control 1.2.18 Load sensing and remote pressure control 1.2.19 Load sensing and 2-stage pressure control, one stage non-adjustable 1.2.20 Load sensing and 2-stage pressure control, both adjustable 1.2.21 Load sensing and proportional pressure control
Performance Data	<ul style="list-style-type: none"> 1.2.22 PVV103-05-16 1.2.23 PVV103-1-20 / -25 / -32 1.2.24 PVV103-2-40 / -50 / -63 1.2.25 PVV103-3-80 / -100 / -120
Dimensions	<ul style="list-style-type: none"> 1.2.26 PVV103-05-16 1.2.27 PVV103-1-20 / -25 / -32 1.2.28 PVV103-2-40 / -50 / -63 1.2.29 PVV103-3-80 / -100 / -120 1.2.30 Controllers

ORDERING CODE

1.2.1 Variable Displacement Hydraulic Compensation

PVV103 - 05 - 16 F H R M - XXXX

Variable displacement vane pump
with hydraulic compensation

Size

05 | 1 | 2 | 3

Displacement

16 | 20 | 25 | 32 | 40 | 50 | 63 | 80 | 100 | 120

Flange and ports

F ISO 3019/2 – BSP ISO 228/1 thread
FGR2 for size 2 gear pump - BSP ISO 228/1 thread (size 05 only)

Pressure setting range

H 20 - 250 bar (sizes 05, 1 and 2)
40 - 250 (sizes 3-80/100)
40 - 120 (sizes 3-120)

Shaft rotation (viewed from shaft end)

R Clockwise

Seals

M NBR
E FPM (FKM)

Options

A Single pump (without through drive)
Through drive for double pump

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

Modification number

XXXX Determined by manufacturer

TECHNICAL INFORMATION

1.2.2 Specifications

Pump size			16	20	25	32	40	50	63	80	100	120
Geometric displacement		[cm ³ /rev]	17	21	26	33	42	51	63	80	100	123
Pressure*	Rated	[bar]	250									210
	min.	[rpm]	800									
Drive speed	min.	[rpm]	1800					1500				
	max.	[rpm]										
Approx. weight		[kg]	16.5	18.5		43.7			57.2			
Permitted axial shaft force		[N]	No radial or axial loads allowed.									
Permitted radial shaft force		[N]										

* Pressure peaks exceeding 30 % of the maximum operating pressure must be eliminated by adopting the appropriate measures.

1.2.3 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

For use with other fluids, please contact
HYDAC Drive Center.

1.2.4 Viscosity range

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

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

1.2.5 Temperature range

+15 to +60 °C (measured in tank)

Notice: The highest fluid temperature will be at the drain port of the pump.
This is up to 20 °C higher than in the tank.

1.2.6 Seals

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

1.2.7 Filtration

For maximum pump and component lifetime, the system should be protected from contamination by effective filtration. The contamination level should be within
18/16/13 acc. to ISO 4406/99

or

Class 7 acc. to NAS 1638.

1.2.8 Max. drive and through drive torques

Nominal size		05	1	2	3
Geometric displacement	[cm ³ /rev]	17	21 - 26 - 33	42 - 51 - 63	80 - 100 - 123
Max. permitted drive torque	[Nm]	130	250	586	900
Max. through drive torque	[Nm]	55		110	110 / 180*

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

Notice:

Always mount multiple pumps in the descending order of their drive torques. The sum of the individual torques of the pumps must not exceed the maximum torque permitted on the primary pump.

1.2.9 Through drive models

Through drive pump	Drive pump PVV103-			
	05	1	2	3
PVV102-05	•	•	•	•
PVV103-05	•	•	•	•
PVV102-1		•	•	•
PVV103-1		•	•	•
PVV102-2			•	•
PVV103-2			•	•
PVV102-3				•
PVV103-3				•
PGI100-2		•	•	•
PGI101-3			•	•
PGI102-2-		•	•	•
PGI102-3-			•	•
PGE101-..._BQ	•	•	•	•
PGE102-..._BR	•	•	•	•
PGE103-..._BS			•	•
PVF100-1	•	•	•	•
SAE A (parallel shaft)	•	•	•	•
SAE B (parallel shaft)			•	•

For other through drive combinations, please contact HYDAC Drive Center.

1.2.10 Installation notes

Step 1

PVV103 pumps can be installed vertically or horizontally. 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 circulation 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 **radial and/or axial loads** are permitted on the pump shaft.

Step 4

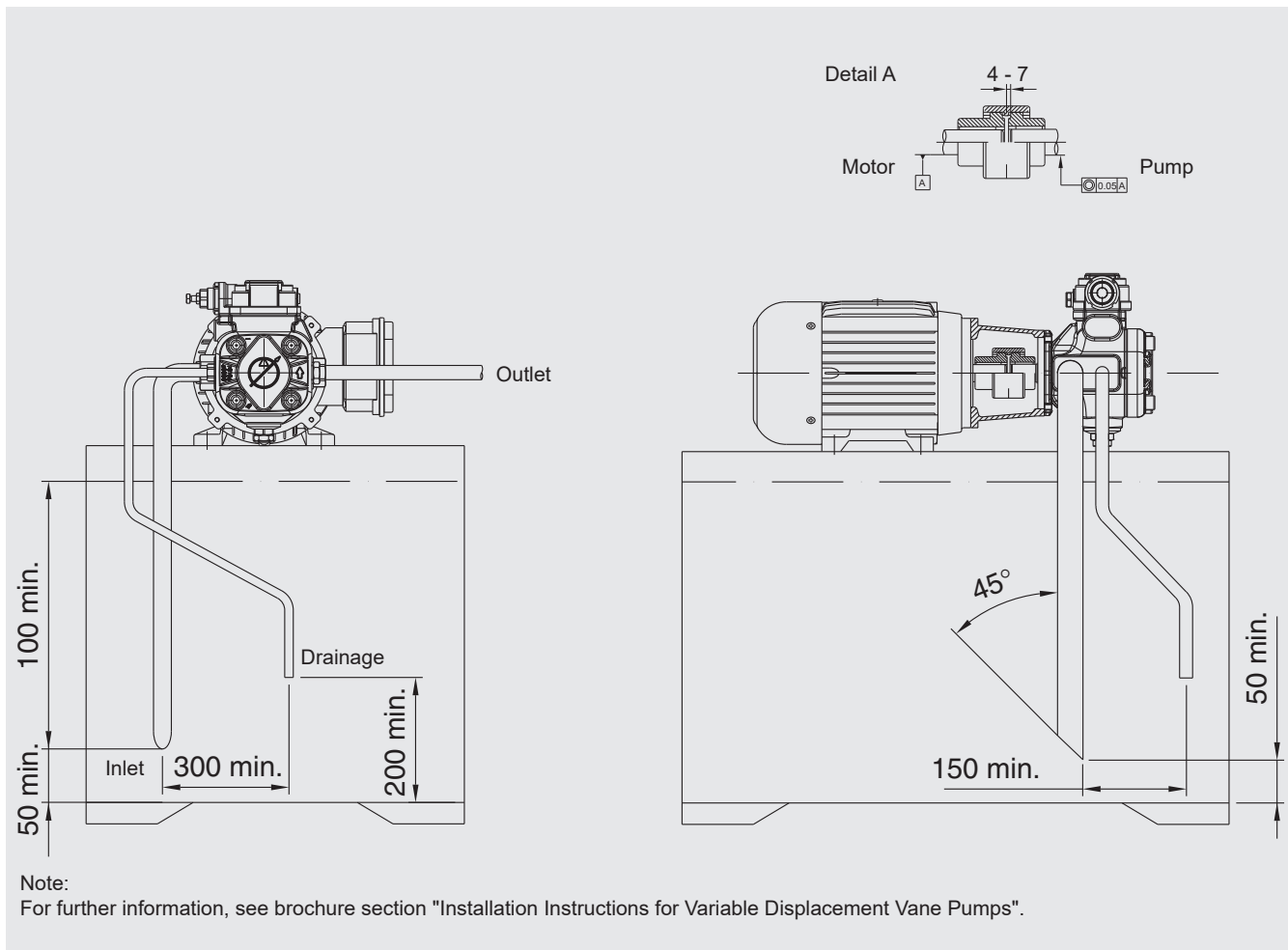
During commissioning, the pump must first be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump.

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.



1.2.11 Adjustments (values may vary)

Pump size	Available displacement [cm ³ /rev]	Reduced displacement by screw turn [cm ³ /rev]	Min. adjustable displacement [cm ³ /rev]
PVV103-05-16	17	11	3.3
PVV103-1-20	21	10	9.5
PVV103-1-25	26	10	15
PVV103-1-32	33	10	19
PVV103-2-40	42	16	27.5
PVV103-2-50	51	16	35.5
PVV103-2-63	63	16	43.5
PVV103-3-80	80	16	63
PVV103-3-100	100	16	80
PVV103-3-120	123	16	100

CONTROL OPTIONS

Diagrams and characteristic curves for pressure control:

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

Ordering code	P	CS002	Ordering code	P	CS003	Ordering code	P	CS004
---------------	---	-------	---------------	---	-------	---------------	---	-------

- ③ Pump with proportional pressure control with CETOP 03 (ISO 4401-03) interface

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

1.2.12 Standard Pressure Control

Description	Performance characteristics	Hydraulic circuit
Standard pump with standard pressure control.		

1.2.13 Remote Pressure Control

Description	Performance characteristics	Hydraulic circuit				
Pump with remote pressure control. RV – Pressure relief valve (0 - 5 l/min) not supplied. Recommended valve: <table border="1" style="width: 100%;"> <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 1/4" (BSP)	Type	Part no.	DB3E-02X-250V180	562555		
Type	Part no.					
DB3E-02X-250V180	562555					

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

1.2.14 2-stage pressure control, one stage non-adjustable

Description	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>EV – 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>CS003</td> </tr> </table>	Type	Part no.	WSM06020V-01-C-N-24DG	3135462	DPT06020-01x	558020	Ordering code	P	CS003		<p>②</p>
Type	Part no.										
WSM06020V-01-C-N-24DG	3135462										
DPT06020-01x	558020										
Ordering code	P	CS003									

1.2.15 2-stage pressure control, both adjustable

Description	Characteristics	Hydraulic circuit									
<p>Pump with two adjustable pressure stages.</p> <p>W1 – Pressure relief valve supplied factory-assembled and tested.</p> <p>EV1 – 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>CS004</td> </tr> </table>	Type	Part no.	WKM08130C-01-C-N24DG	3115602	D08130-01X	555528	Ordering code	P	CS004		<p>②</p>
Type	Part no.										
WKM08130C-01-C-N24DG	3115602										
D08130-01X	555528										
Ordering code	P	CS004									

1.2.16 Proportional pressure control

Description	Performance characteristics	Hydraulic circuit			
<p>Pump with proportional pressure control.</p> <table border="1"> <tr> <td>Ordering code</td> <td>P</td> <td>CS005</td> </tr> </table>	Ordering code	P	CS005		<p>③</p>
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 Needle valve not supplied.

1.2.17 Load sensing and standard pressure control

Description	Performance characteristics	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			

1.2.18 Load sensing and remote pressure control

Description	Performance characteristics	Hydraulic circuit							
<p>Load sensing pump with remote pressure control.</p> <p>RV – 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)</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							

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

Description	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>EV – 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									

1.2.20 Load sensing and 2-stage pressure control, adjustable

Description	Characteristics	Hydraulic circuit									
<p>Load sensing pump with two adjustable pressure stages.</p> <p>W1 – Pressure relief valve supplied factory-assembled and tested.</p> <p>EV1 – 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									

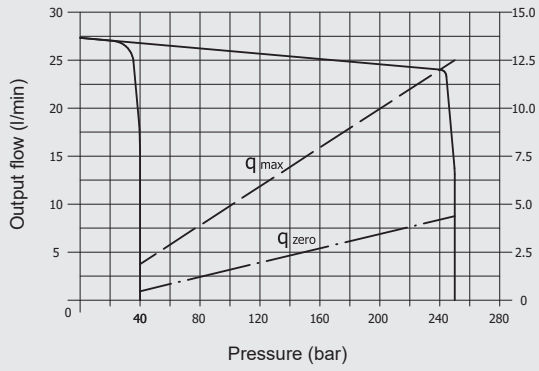
1.2.21 Load sensing and proportional pressure control

Description	Characteristics	Hydraulic circuit			
<p>Load sensing pump with proportional pressure control.</p> <table border="1"> <tr> <td>Ordering code</td> <td>P</td> <td>CLS005</td> </tr> </table>	Ordering code	P	CLS005		
Ordering code	P	CLS005			

PERFORMANCE DATA

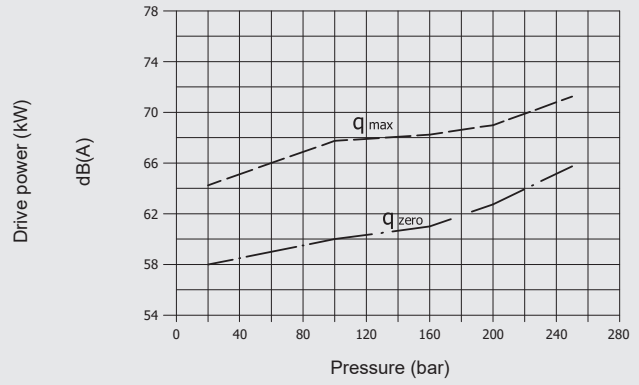
1.2.22 PVV103-05-16

Volumetric efficiency



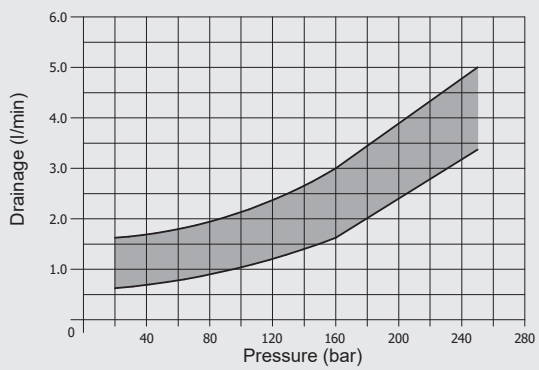
Maximum noise level

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



Drainage flow

Values determined with pump on zero flow setting

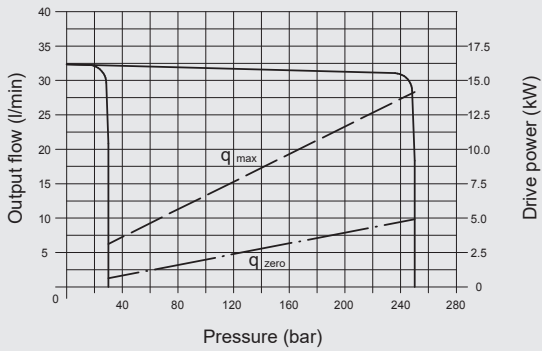


Drive power at maximum displacement

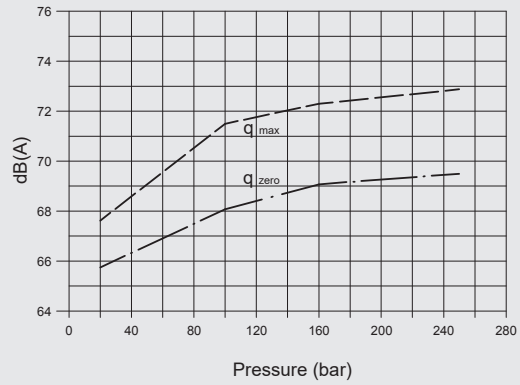
Drive power at zero flow setting

1.2.23 PVV103-1-20 / -25 / -32

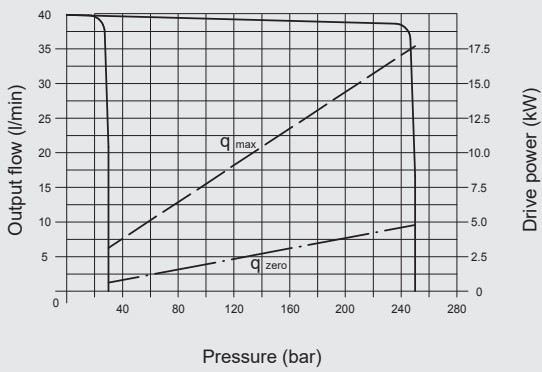
Volumetric efficiency
PVV103-1-20



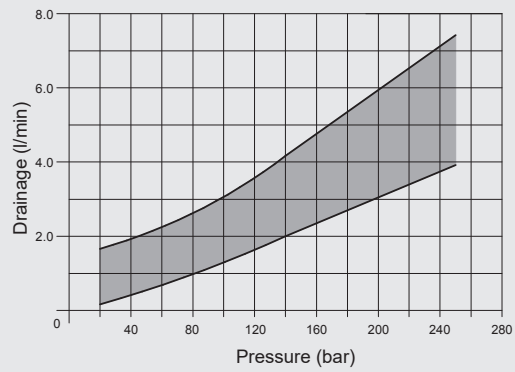
Maximum noise level
measured with noise level meter 1 metre away
from pump in an anechoic room using a flexible
coupling.
PVV103-1-20 / -25 / -32



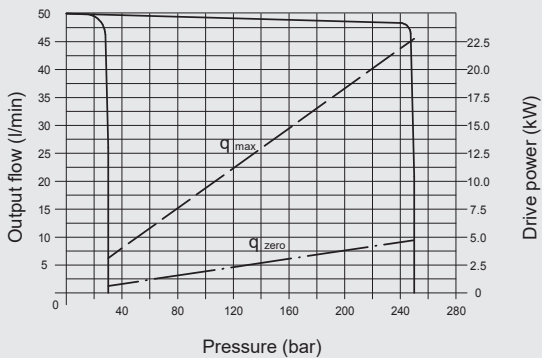
Volumetric efficiency
PVV103-1-25



Drainage flow
PVV103-1-20 / -25 / -32



Volumetric efficiency
PVV103-1-32



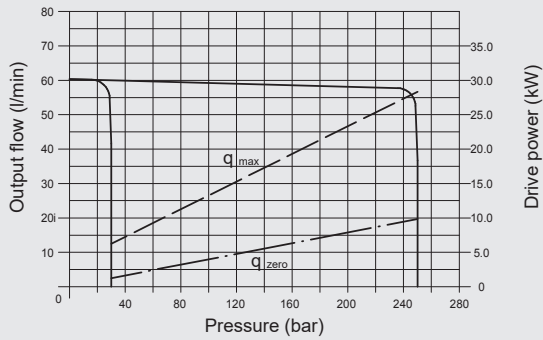
Drive power at maximum displacement

Drive power at zero flow setting

1.2.24 PVV103-2-40 / -50 / -63

Volumetric efficiency

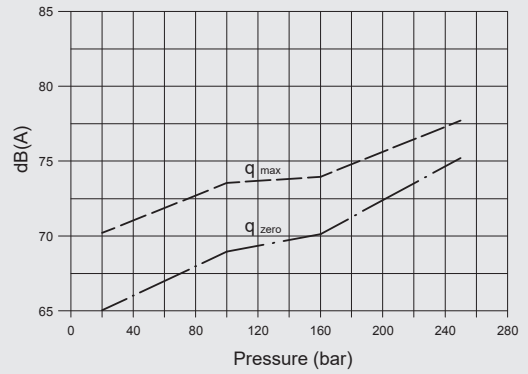
PVV103-2-40



Maximum noise level

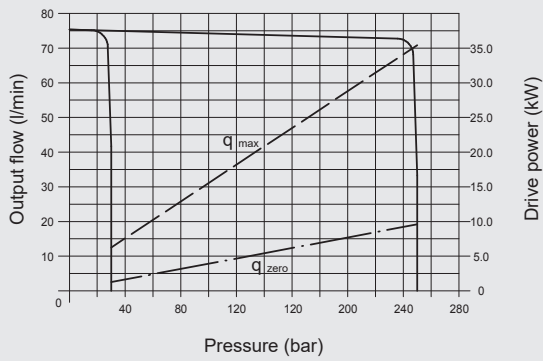
measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling.

PVV103-2-40 / -50 / -63



Volumetric efficiency

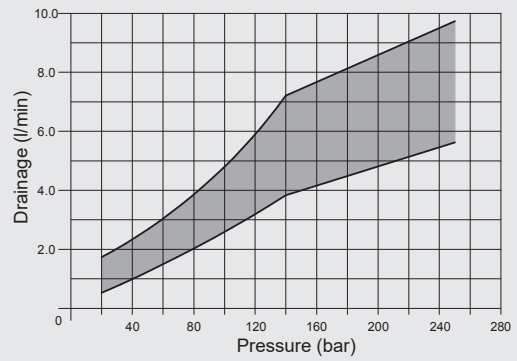
PVV103-2-50



Drainage flow

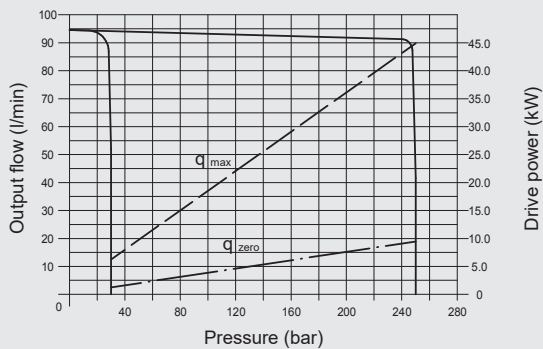
Values determined with pump on zero flow setting

PVV103-2-40 / -50 / -63



Volumetric efficiency

PVV103-2-63



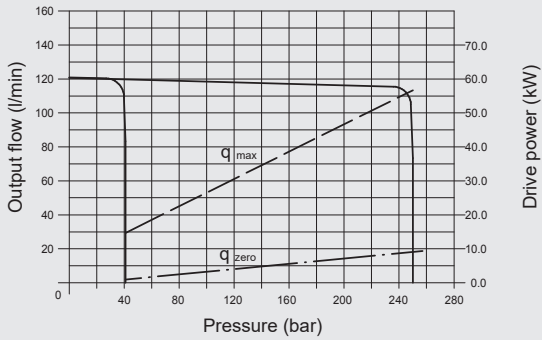
Drive power at maximum displacement

Drive power at zero flow setting

1.2.25 PVV103-3-80 / -100 / -120

Volumetric efficiency

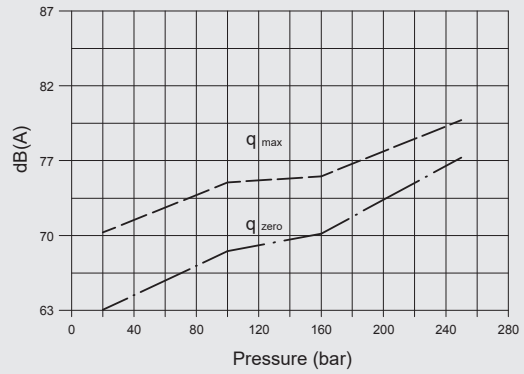
PVV103-3-80



Maximum noise level

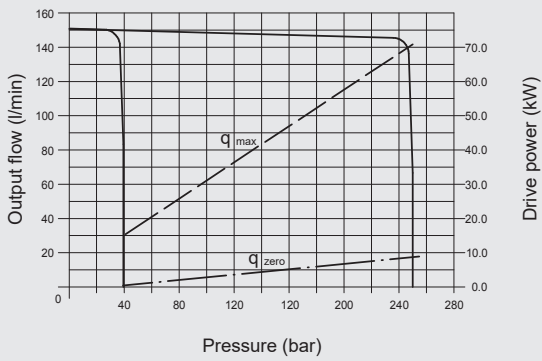
measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling.

PVV103-3-80 / -100 / -120



Volumetric efficiency

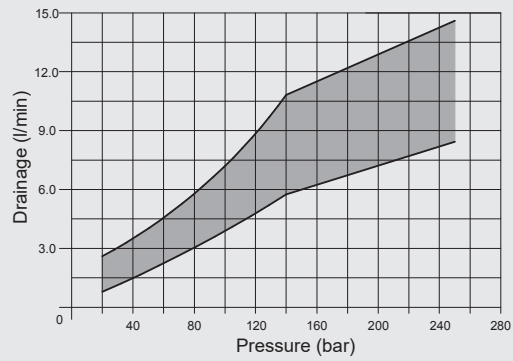
PVV103-3-100



Drainage flow

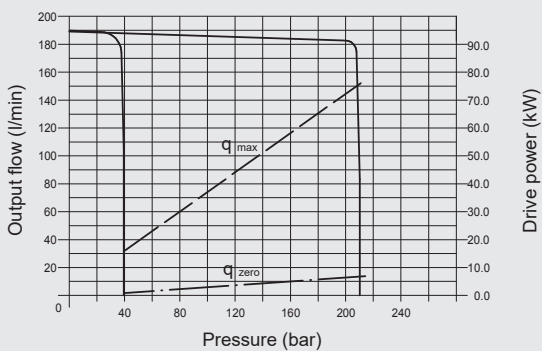
Values determined with pump on zero flow setting

PVV103-3-80 / -100 / -120



Volumetric efficiency

PVV103-3-120



Drive power at maximum displacement

Drive power at zero flow setting

Pressure peaks are due to the test system.

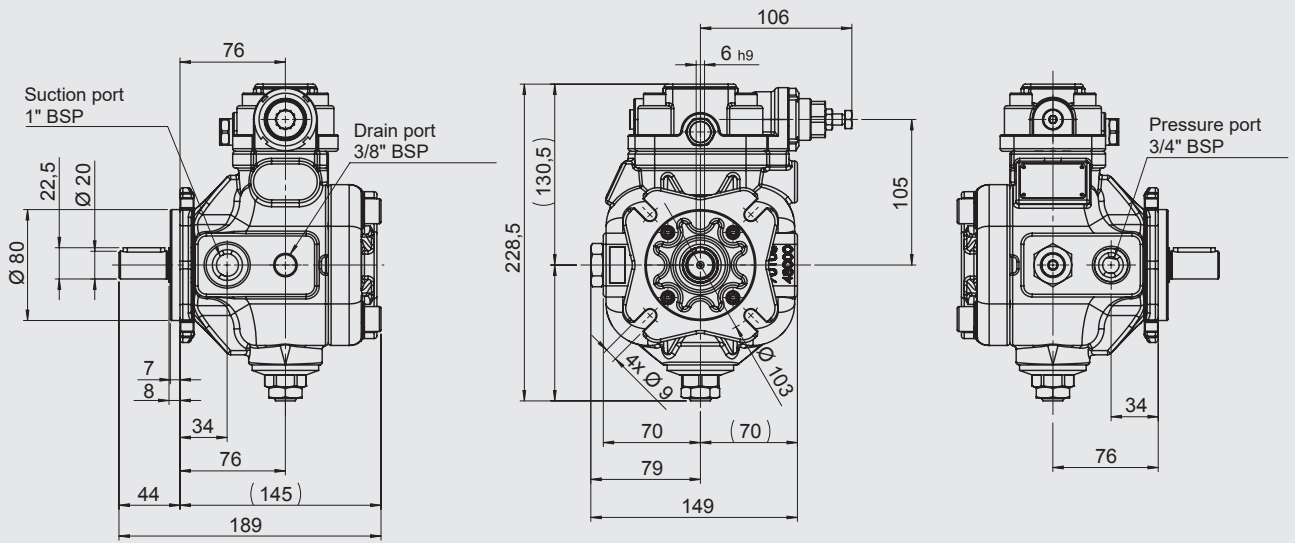
Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

Curve peaks at 300 bar!

Curve starts at 15 bar

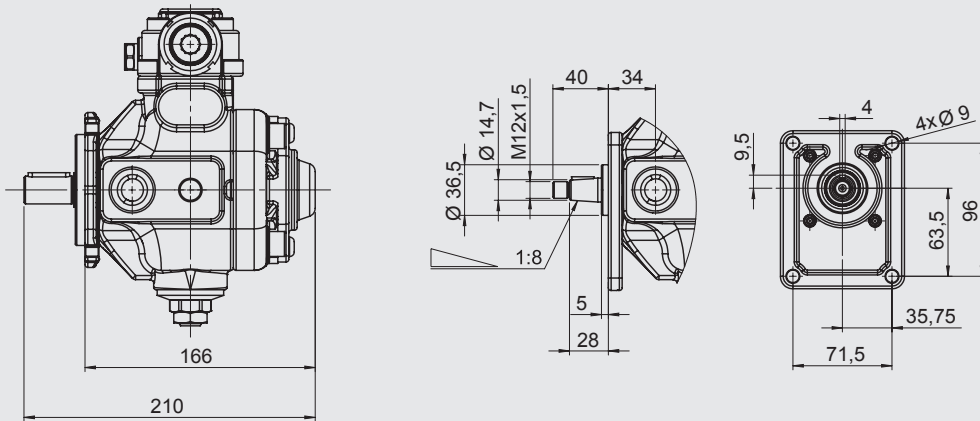
DIMENSIONS

1.2.26 PVV103-05-16

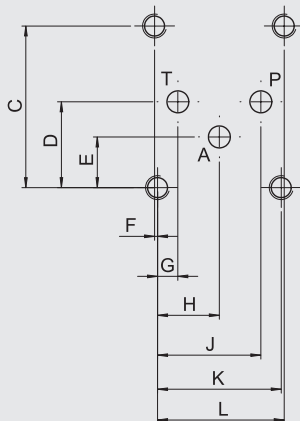


with through drive (-A)

FGR2 flange (not for through drive version -A)



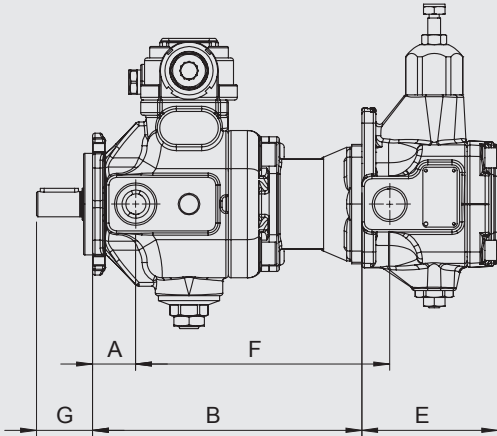
Connection ISO 4401-06 (CETOP 03) for controller PC(L)S003/004



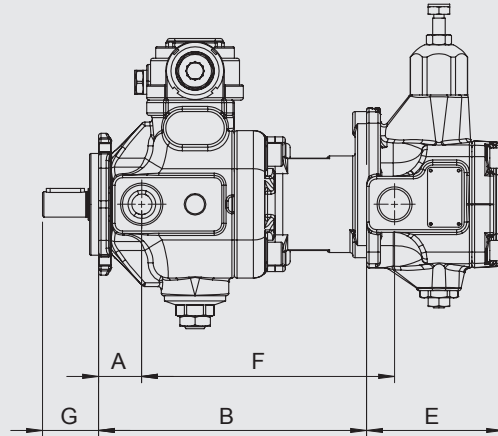
	Dim. [mm]
C	40.5
D	21.5
E	12.7
F	0.75
G	5.1
H	15.5
J	25.9
K	31
L	31.75

Multiple pumps
Primary pump PVV103-05-16 F

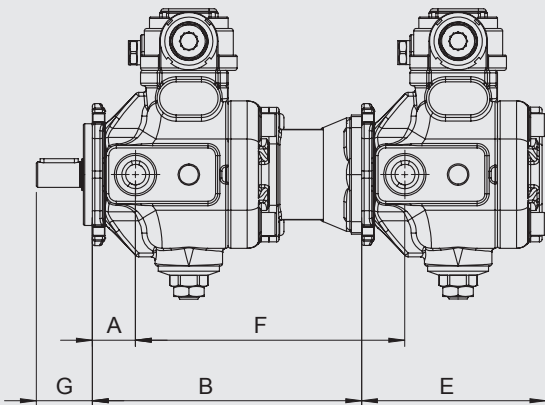
1. PVV103-05 + PVV102-05



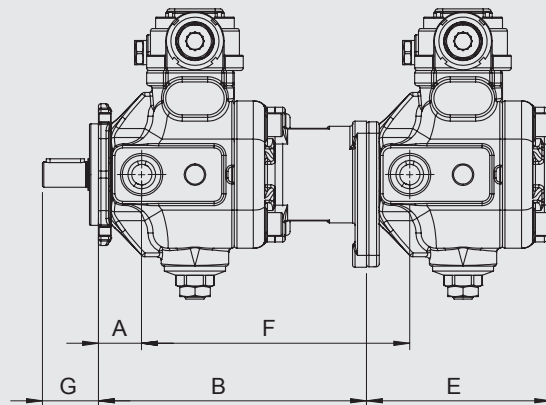
2. PVV103-05 + PVV102-05-FGR2



3. PVV103-05 + PVV103-05



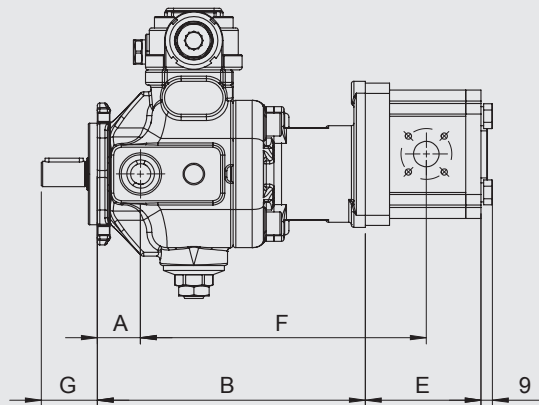
4. PVV103-05 + PVV103-05-FGR2



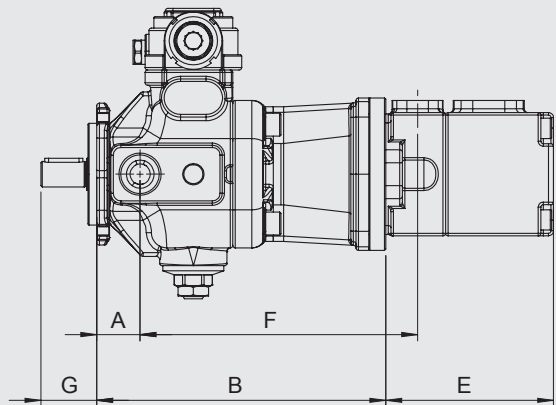
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	34	212	107	200	44
2. PVV102-05-16FGR2	34	211	107	199	44
3. PVV103-05-16FHRM	34	212	145	212	44
4. PVV103-05-16FGR2	34	211	145	211	44

Multiple pumps
Primary pump PVV103-05-16 F

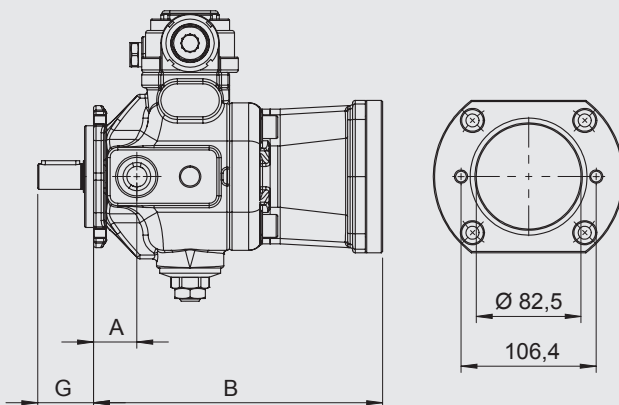
5. PVV103-05 + PGE



6. PVV103-05 + PVF100-1

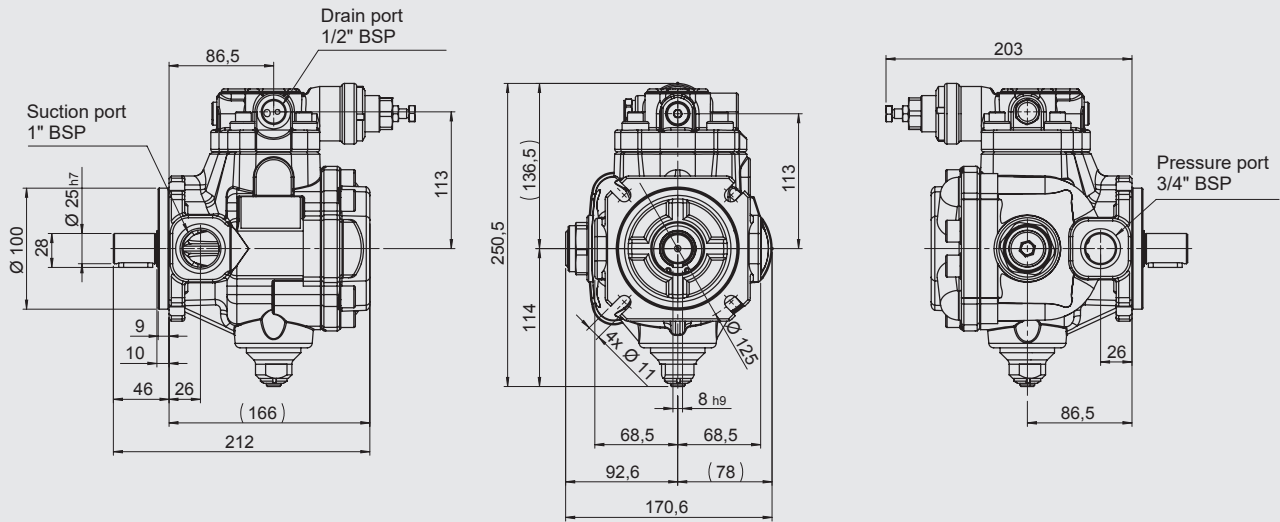


7. PVV103-05 + SAE A

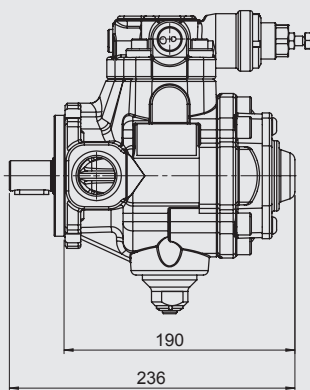


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PGE101 / PGE102	34	211	*	*	44
6. PVF100-1	34	227.5	134	218.5	44
7. SAE A	34	227.5	-	-	44

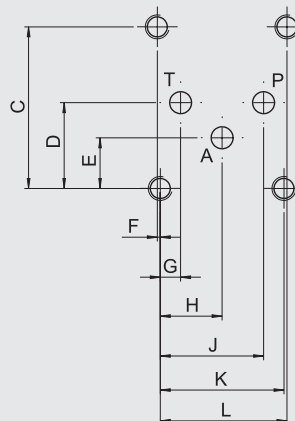
* Length is dependent on the size selected.



with through drive (-A)



Connection ISO 4401-06 (CETOP 03) for controller PC(L)S003/004.

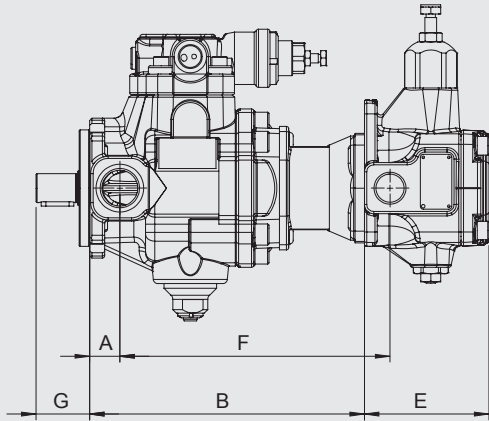


	Dim. [mm]
C	40.5
D	21.5
E	12.7
F	0.75
G	5.1
H	15.5
J	25.9
K	31
L	31.75

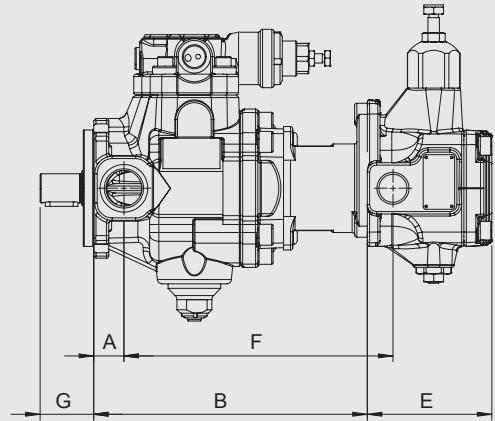
Connection A is only available for controllers PCS004 and PCLS004.

Multiple pumps
Primary pump PVV103-1-32 F

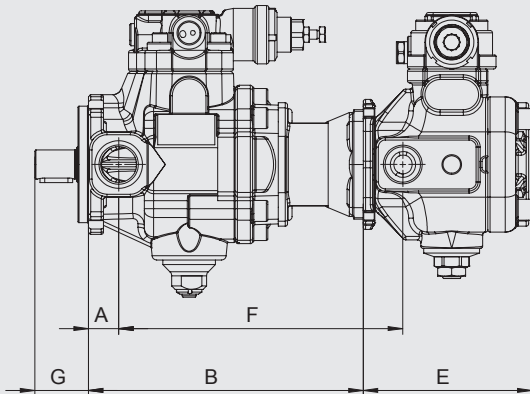
1. PVV103-1 + PVV102-05



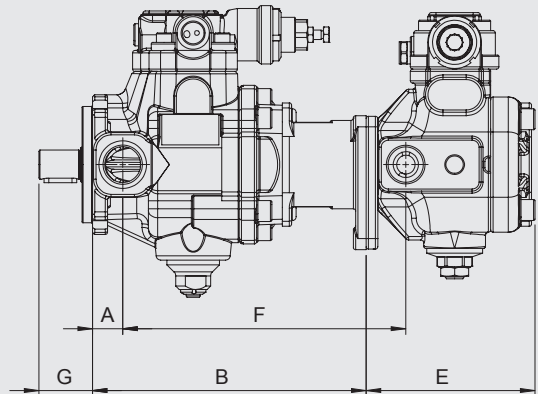
2. PVV103-1 + PVV102-05-FGR2



3. PVV103-1 + PVV103-05



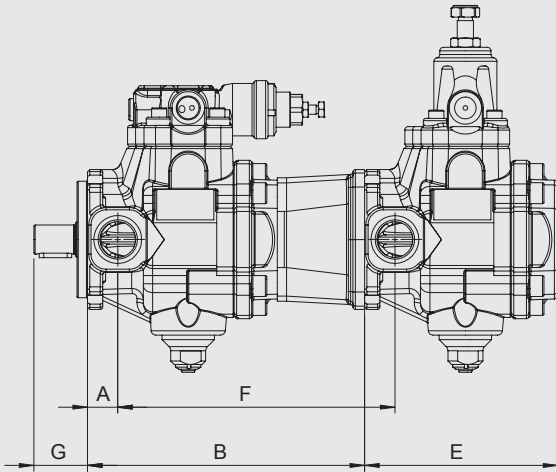
4. PVV103-1 + PVV103-05-FGR2



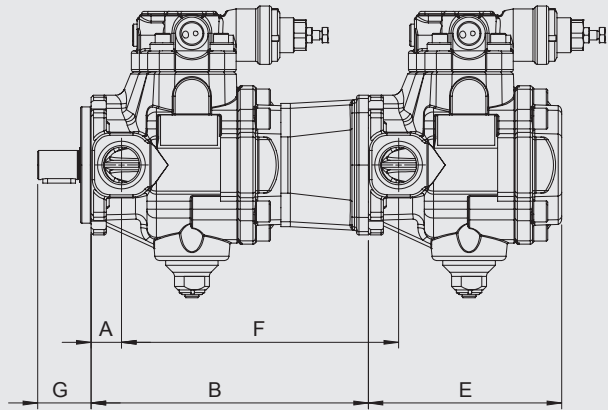
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	26	236	107	232	46
2. PVV102-05-16FGR2	26	235	107	231	46
3. PVV103-05-16FHRM	26	236	145	244	46
4. PVV103-05-16FGR2	26	235	145	243	46

Multiple pumps
Primary pump PVV103-1-32 F

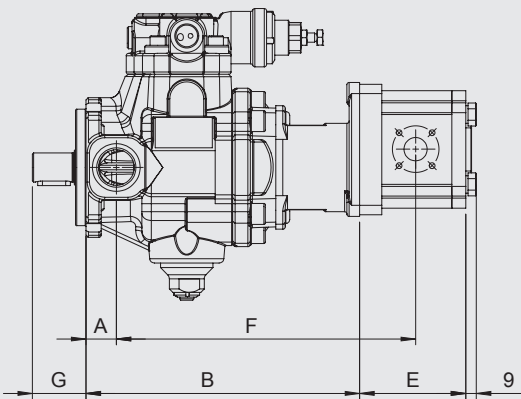
5. PVV103-1 + PVV102-1



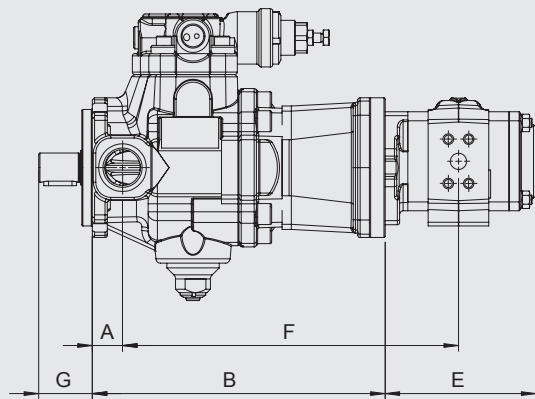
6. PVV103-1 + PVV103-1



7. PVV103-1 + PGE



8. PVV103-1 + PGI10X-2



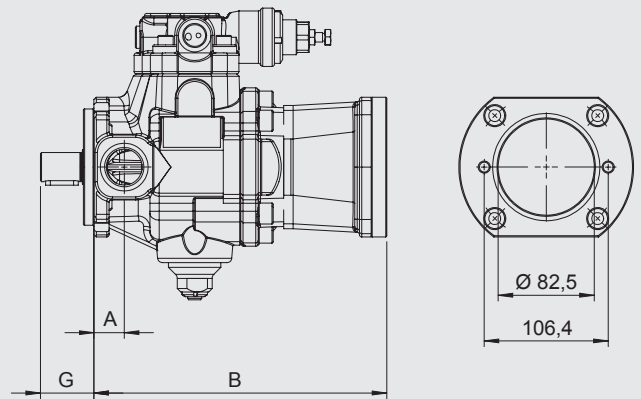
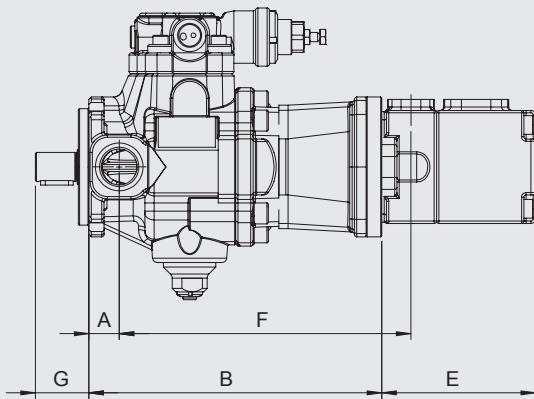
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PVV102-1-20/25/32FHRM	26	238	166	238	46
6. PVV103-1-20/25/32FHRM	26	238	166	238	46
7. PGE101 / PGE102	26	235	*	*	46
8. PGI10X-2	26	251.5	*	*	46

* Length is dependent on the size selected.

Multiple pumps
Primary pump PVV103-1-32 F

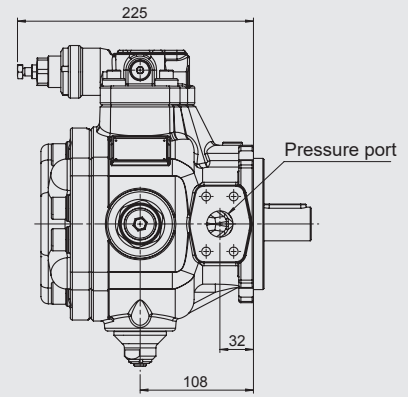
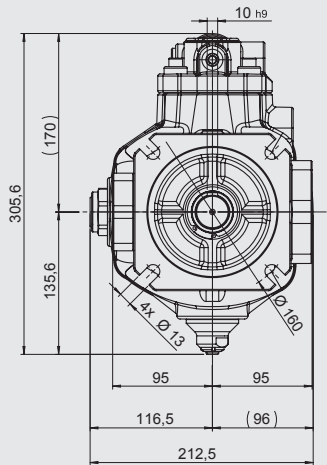
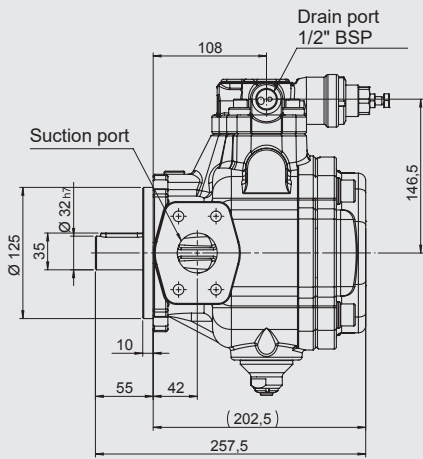
9. PVV103-1 + PVF100-1

10. PVV103-1 + SAE A

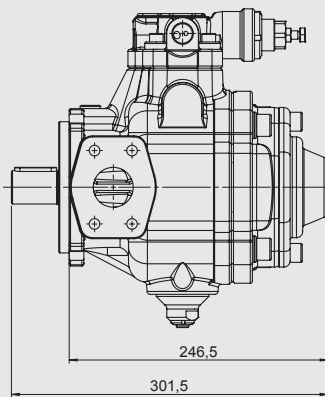


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
9. PVF100-1	26	251.5	134	250.5	46
10. SAE A	26	251.5	-	-	46

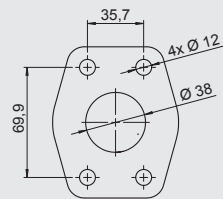
1.2.28 PVV103-2-40 / -50 / -63



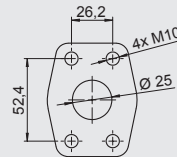
with through drive (-A)



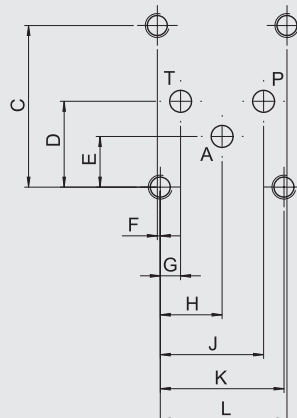
Suction port



Pressure port



Connection ISO 4401-06 (CETOP 03) for controller PC(L)S003/004.



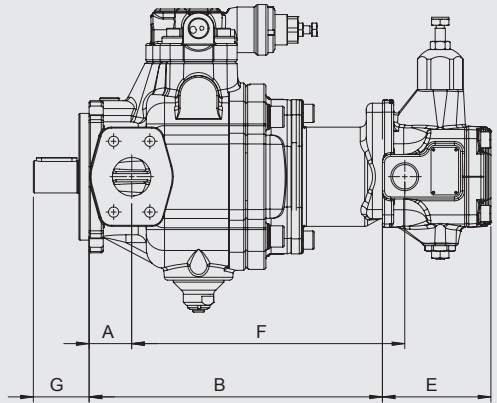
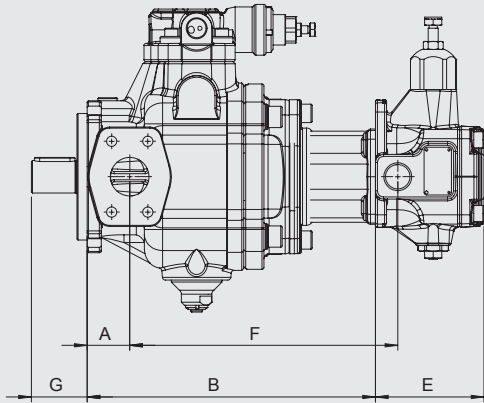
	Dim. [mm]
C	40.5
D	21.5
E	12.7
F	0.75
G	5.1
H	15.5
J	25.9
K	31
L	31.75

Connection A is only available for controllers PCS004 and PCLS004.

Multiple pumps
Primary pump PVV103-2-

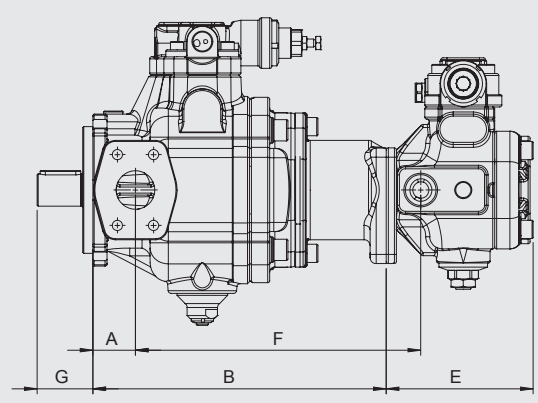
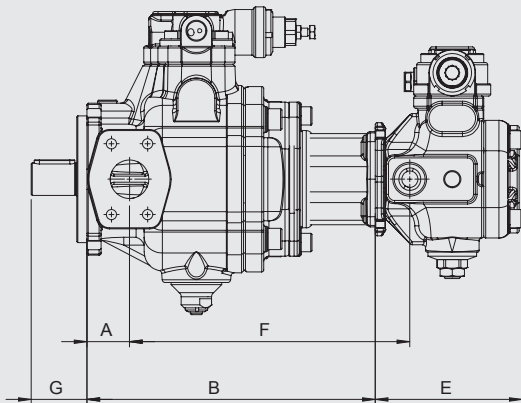
1. PVV103-2 + PVV102-05

2. PVV103-2 + PVV102-05-FGR2



3. PVV103-2 + PVV103-05

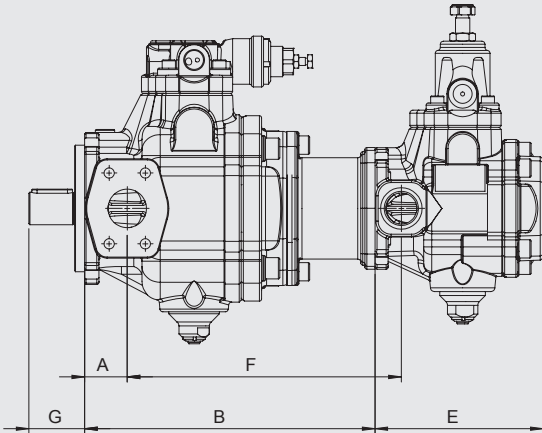
4. PVV103-2 + PVV103-05-FGR2



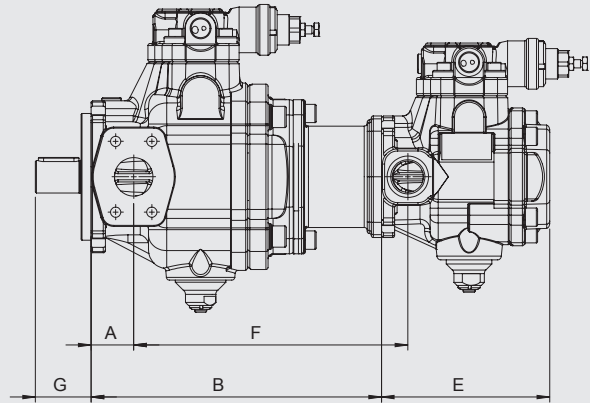
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	42	284.5	107	264.5	55
2. PVV102-05-16FGR2	42	289.5	107	269.5	55
3. PVV103-05-16FHRM	42	284.5	145	276.5	55
4. PVV103-05-16FGR2	42	289.5	145	281.5	55

Multiple pumps
Primary pump PVV103-2-

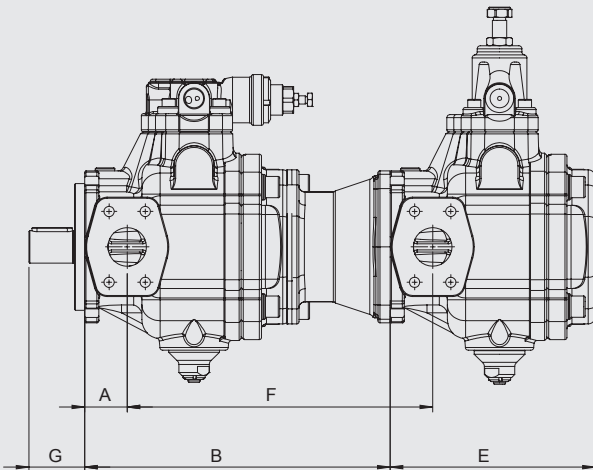
5. PVV103-2 + PVV102-1



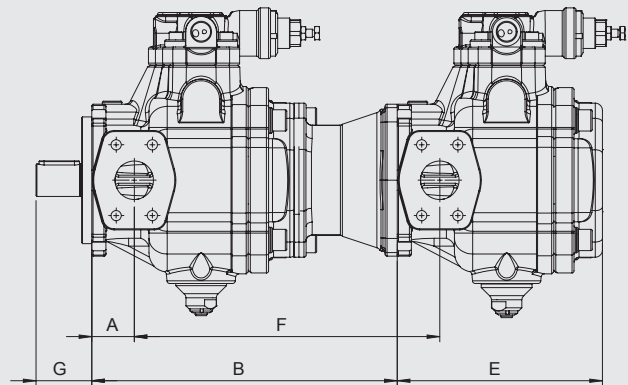
6. PVV103-2 + PVV103-1



7. PVV103-2 + PVV102-2



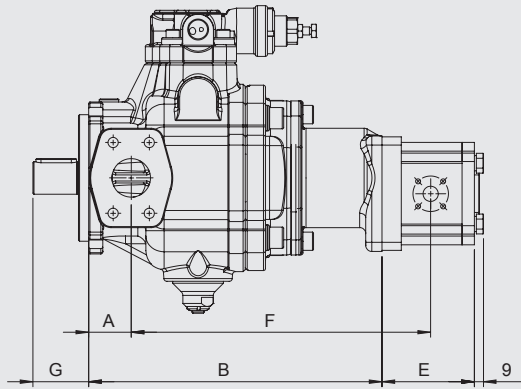
8. PVV103-2 + PVV103-2



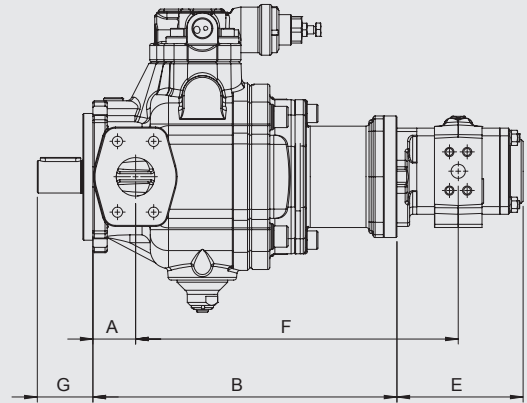
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PVV102-1-20/25/32FHRM	42	286.5	166	270.5	55
6. PVV103-1-20/25/32FHRM	42	286.5	166	270.5	55
7. PVV102-2-20/25/32FHRM	42	301.5	202.5	301.5	55
8. PVV103-2-20/25/32FHRM	42	301.5	202.5	301.5	55

Multiple pumps
Primary pump PVV103-2-

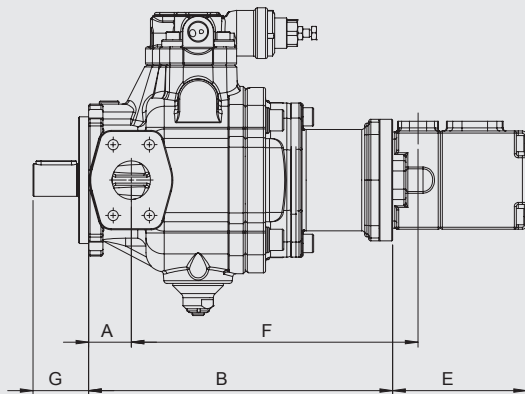
9. PVV103-2 + PGE



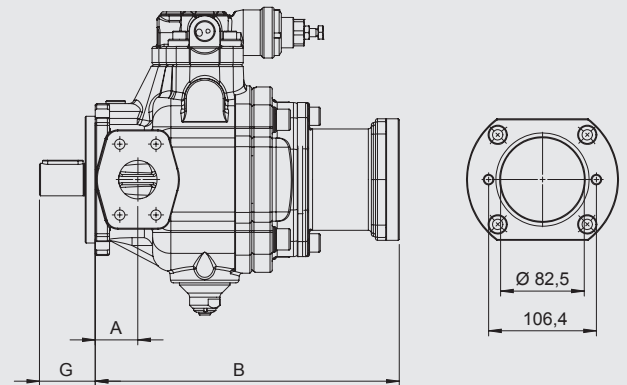
10. PVV103-2 + PGI



11. PVV103-2 + PVF100-1



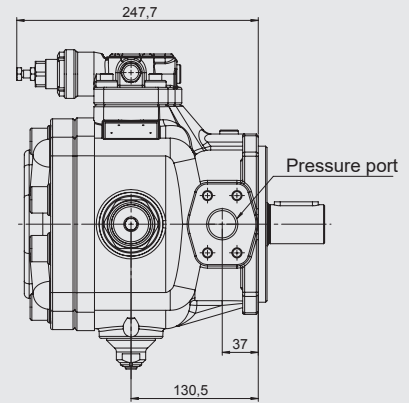
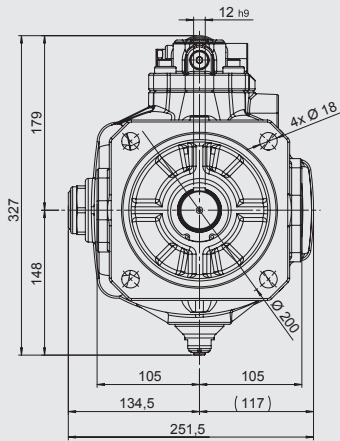
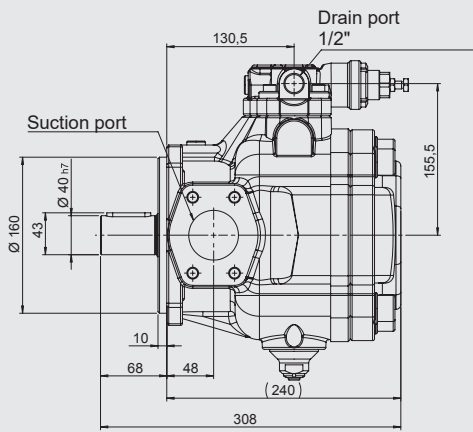
12. PVV103-2 + SAE A



Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
9. PGE101 / PGE102 / PGE103	42	289.5	*	*	55
10. PGI10X-2 / PGI10X-3	42	300	*	*	55
11. PVF100-1	42	300	134	283	55
12. SAE A	42	300	-	-	55

* Length is dependent on the size selected.

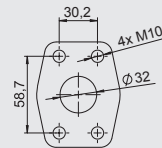
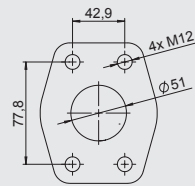
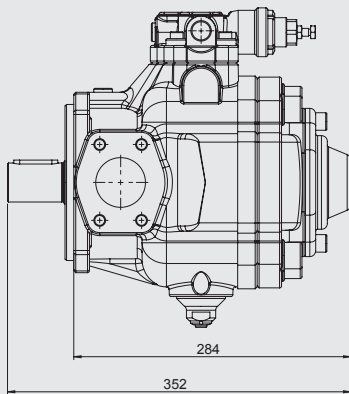
1.2.29 PVV103-3-80 / -100 / -120



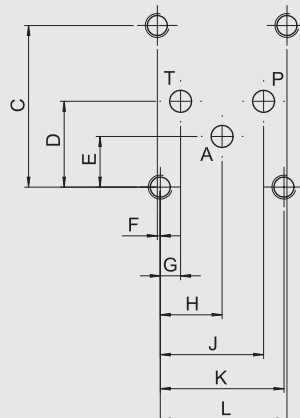
with through drive (-A)

Suction port

Pressure port



Connection ISO 4401-06 (CETOP 03) for controller PC(L)S003/004.

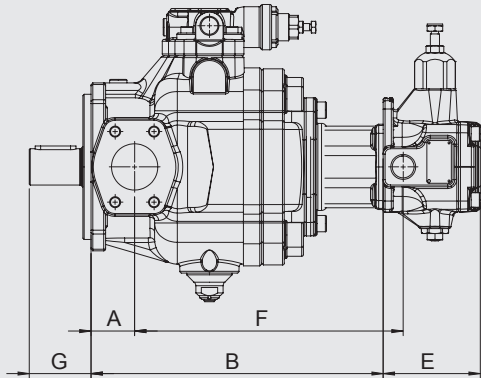


	Dim. [mm]
C	40.5
D	21.5
E	12.7
F	0.75
G	5.1
H	15.5
J	25.9
K	31
L	31.75

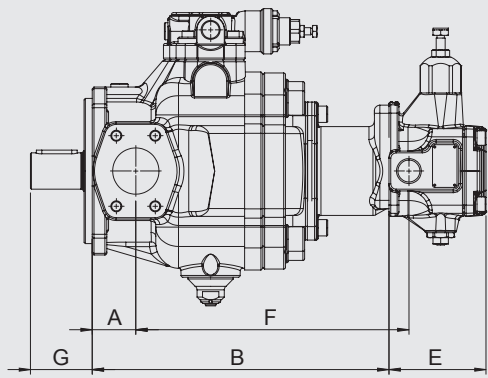
Connection A is only available for controllers PCS004 and PCLS004.

Multiple pumps
Primary pump PVV103-3-

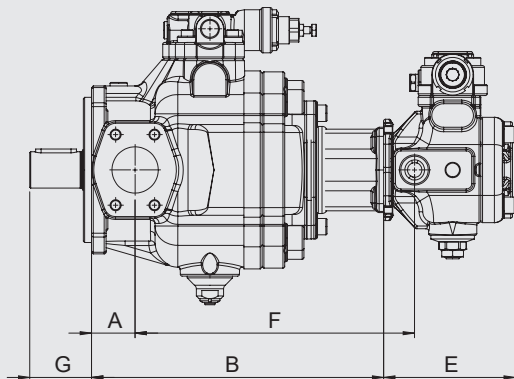
1. PVV103-3 + PVV102-05



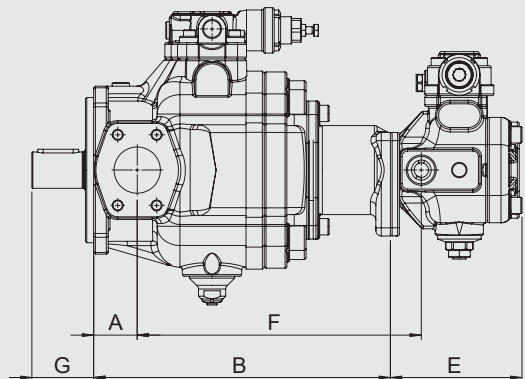
2. PVV103-3 + PVV102-05-FGR2



3. PVV103-3 + PVV103-05



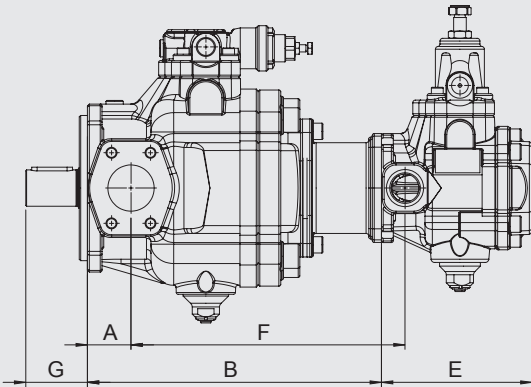
4. PVV103-3 + PVV103-05-FGR2



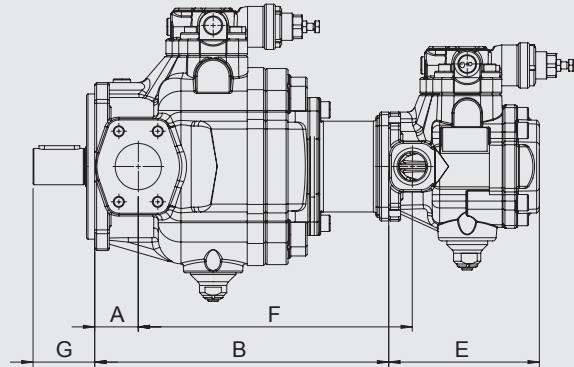
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
1. PVV102-05-16FHRM	48	322	107	296	68
2. PVV102-05-16FGR2	48	327	107	301	68
3. PVV103-05-16FHRM	48	322	145	308	68
4. PVV103-05-16FGR2	48	327	145	313	68

Multiple pumps
Primary pump PVV103-3-

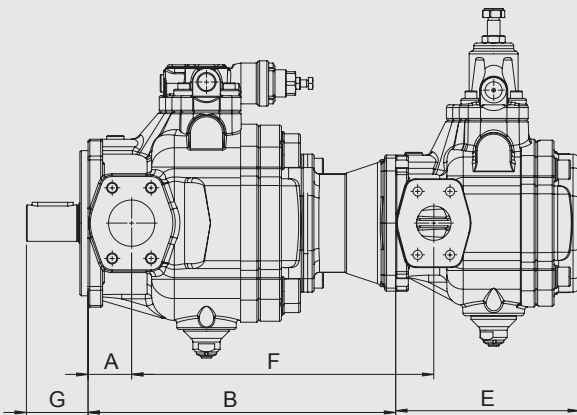
5. PVV103-3 + PVV102-1



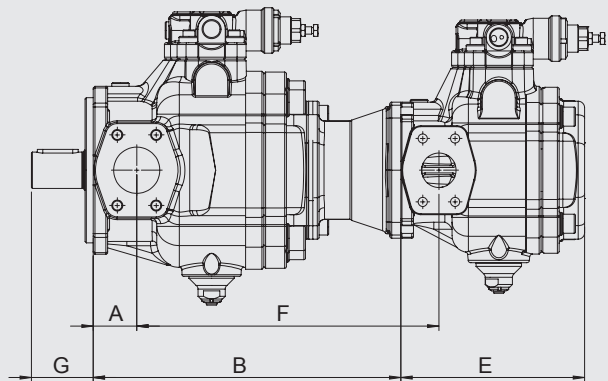
6. PVV103-3 + PVV103-1



7. PVV103-3 + PVV102-2



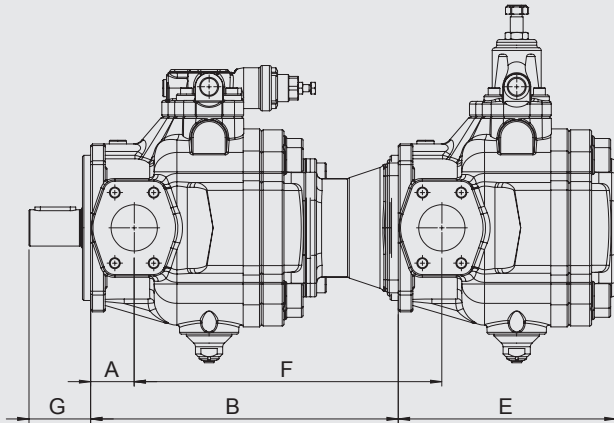
8. PVV103-3 + PVV103-2



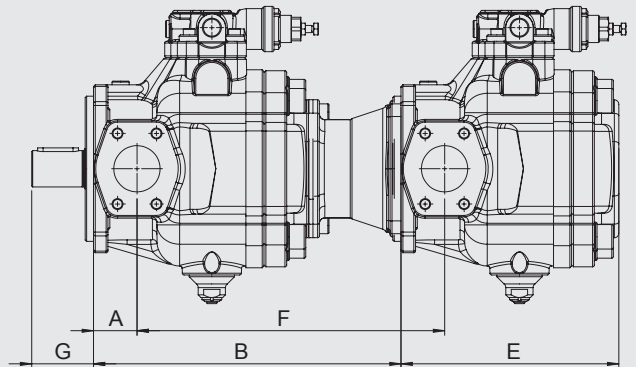
Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
5. PVV102-1-20/25/32FHRM	48	324	166	302	68
6. PVV103-1-20/25/32FHRM	48	324	166	302	68
7. PVV102-2-20/25/32FHRM	48	339	202.5	333	68
8. PVV103-2-20/25/32FHRM	48	339	202.5	333	68

Multiple pumps
Primary pump PVV103-3-

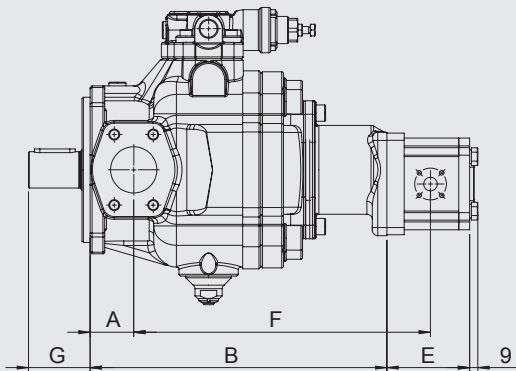
9. PVV103-3 + PVV102-3



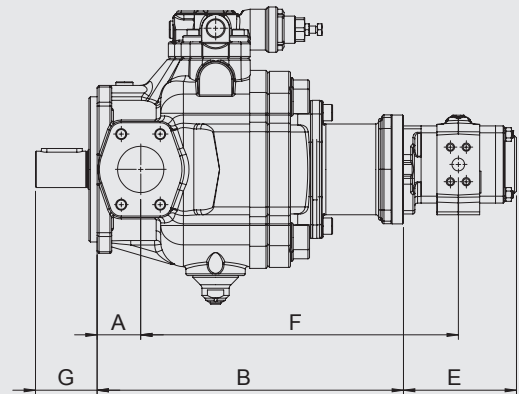
10. PVV103-3 + PVV103-3



11. PVV103-3 + PGE



12. PVV103-3 + PGI

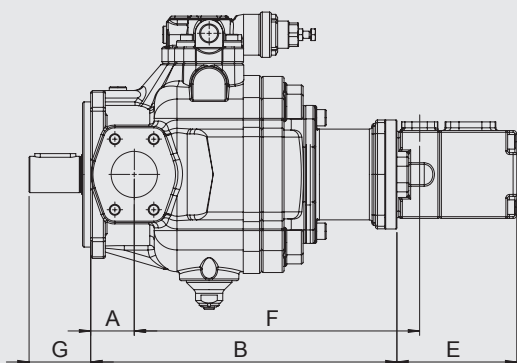


Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
9. PVV102-3-20/25/32FHRM	48	354	240	354	68
10. PVV103-3-20/25/32FHRM	48	354	240	354	68
11. PGE101 / PGE102 / PGE103	48	327	*	*	68
12. PGI10X-2 / PGI10X-3	48	337.5	*	*	68

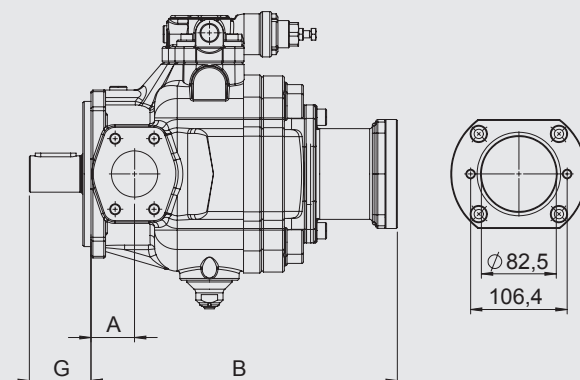
* Length is dependent on the size selected.

Multiple pumps
Primary pump PVV103-3-

13. PVV103-3 + PVF100-1



14. PVV103-3 + SAE A



Secondary pump	A [mm]	B [mm]	E [mm]	F [mm]	G [mm]
13. PVF100-1	48	337.5	134	314.5	68
14. SAE A	48	337.5	-	-	68

1.2.30 Controllers

Standard controller dimensions

"U" / "Y" - standard pressure controller

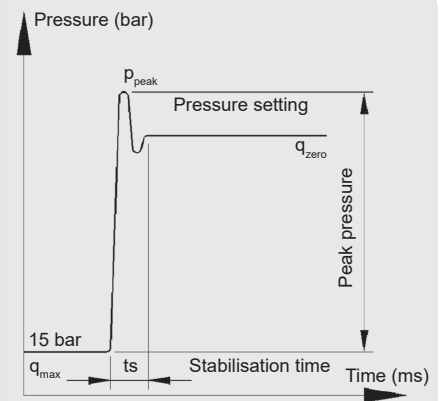
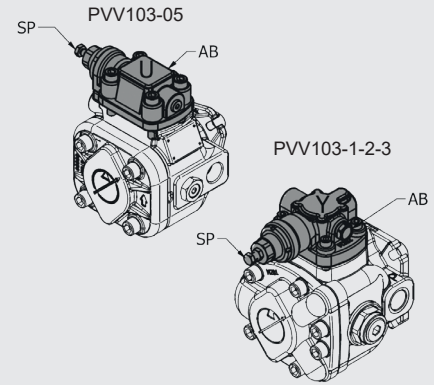
"SP" pressure adj. screw	AF width 13
Lock nut	AF width 13
Connection "AB" vent port (closed)	1/4" BSP

Dynamic characteristic of pressure controller

$V_{g_{max}} \rightarrow V_{g_{min}}$ (reduced state)

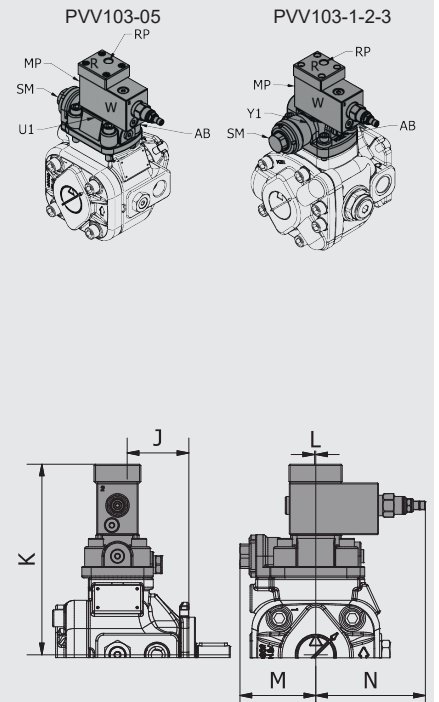
Pump size	15 → 210 bar	15 → 250 bar
	ts	ts
PVV103-05	50 ms	40 ms
PVV103-1-	80 ms	60 ms
PVV103-2	100 ms	80 ms
PVV103-3	120 ms	100 ms

Pressure peaks are due to the test system.
Pressure peaks exceeding 30 % (10 % for size 3)
of the maximum operating pressure must be avoided.
Curve peaks at 300 bar.
Curve starts at 15 bar.



Controller PCS002 dimensions

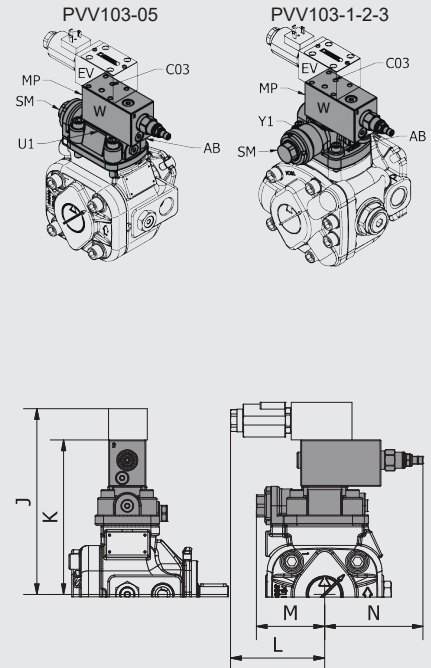
Pilot ports	"U1" / "Y1" pressure controller with interface for additional controller modules				
	"SM" minimum pressure setting (preset – do not change!)				
	"W" maximum pressure setting (preset to maximum pressure)				
	"R" remote control block				
	"RV" additional unloading valve (not included in the scope of delivery)				
Ports	"AB" vent port (closed)	1/4" BSP			
	"MP" gauge port (closed)	1/4" BSP			
	"RP" remote control port	1/4" BSP			
Dimensions		Size 05	Size 1	Size 2	Size 3
	J [mm]	66	76	97.7	120.2
	K [mm]	203	204	237.5	246.5
	L [mm]	1.3	1.3	1.3	1.3
	M [mm]	81	-	-	-
	N [mm]	117	117	117	117



Controller PCS003 dimensions

Pilot ports	"U1" / "Y1" pressure controller with interface for additional controller modules				
	"SM" minimum pressure setting (preset – do not change!)				
	"W" maximum pressure setting (adjustable)				
	"EV" directional valve (not included in the scope of delivery)				
Ports	"AB" vent port (closed)	1/4" BSP			
	"MP" gauge port (closed)	1/4" BSP			
	"C03" interface	ISO 4401-03 (CETOP 03)			
Dimensions		Size 05	Size 1	Size 2	Size 3
	J [mm]	*	*	*	*
	K [mm]	183	184	217.5	226.5
	L [mm]	*	*	*	*
	M [mm]	81	-	-	-
	N [mm]	117	117	117	117

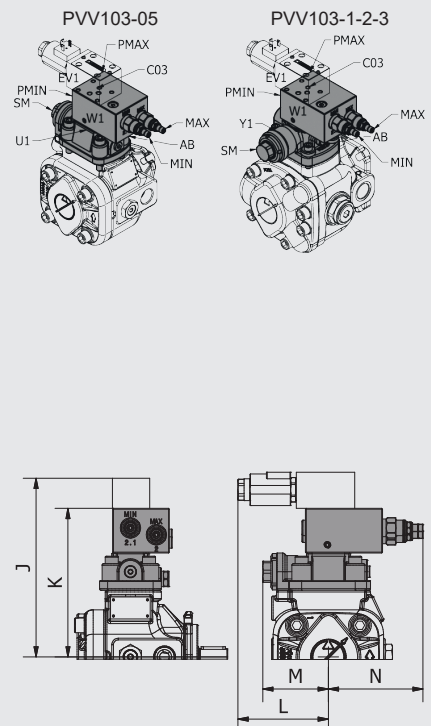
* Dimensions dependent on selected directional valve.



Controller PCS004 dimensions

Pilot ports	"U1" / "Y1" pressure controller with interface for additional controller modules				
	"SM" minimum pressure setting (preset – do not change!)				
	"W1" maximum pressure settings "MIN" – adjustable pressure range 1 "MAX" – adjustable pressure range 2 (MIN<MAX)				
	"EV1" directional valve (not included in the scope of delivery)				
Ports	"AB" vent port (closed)	1/4" BSP			
	Gauge port "p _{min} ", "p _{max} " (closed)	1/4" BSP			
	"C03" interface	ISO 4401-03 (CETOP 03)			
Dimensions		Size 05	Size 1	Size 2	Size 3
	J [mm]	*	*	*	*
	K [mm]	183	184	217.5	226.5
	L [mm]	*	*	*	*
	M [mm]	81	-	-	-
	N [mm]	117	117	117	117

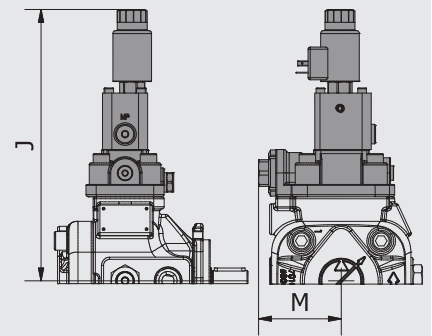
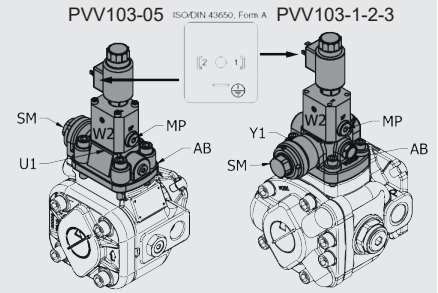
* Dimensions dependent on selected directional valve.



Controller PCS005 dimensions

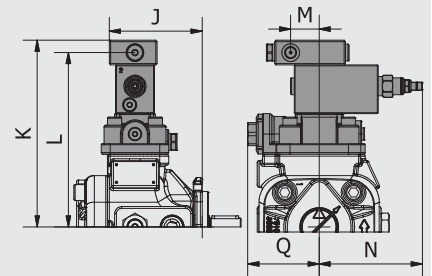
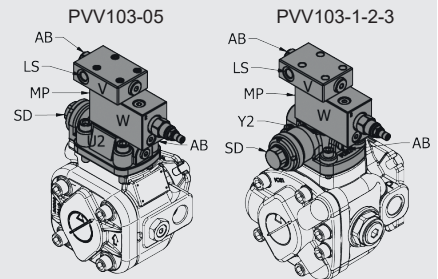
Pilot ports	"U1" / "Y1" pressure controller with interface for additional controller modules				
	"SM" minimum pressure setting (preset to 20 bar – do not change!)				
	"W2" proportional pressure reducing valve				
Ports	"AB" vent port (closed)	1/4" BSP			
	"MP" gauge port (closed)	1/4" BSP			
Electrical properties	Voltage	24 VDC ± 10 %			
	Current	590 mA			
	Power	22 watts			
	Nominal resistance at 50 °C	37.2 Ω ± 5 %			
	Nominal resistance at 20 °C	26.2 Ω ± 5 %			
	Max. temperature at the solenoid coil at 20 °C	105 °C			
	Protection class	IP65			
	Recommended dither frequency	160 – 200 Hz (*)			
	Linearity, hysteresis, repeatability	< 5 % (*)			
Dimensions	Ports ISO/DIN 43650, form A				
		Size 05	Size 1	Size 2	Size 3
	J [mm]	272	272	299	308
K [mm]	81	-	-	-	

* Dependent on the electronic controller for the proportional valve.



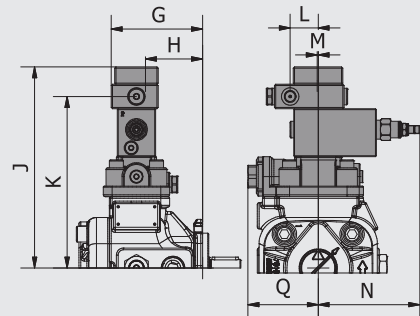
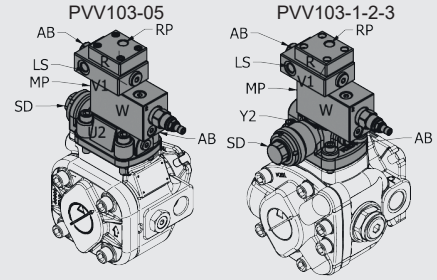
Controller PCLS001 dimensions

Pilot ports	"U2" / "Y2" – load-sensing controller with pressure control				
	"SD" differential pressure setting Δp				
	"W" maximum pressure setting				
	"V" load-sensing block				
	"Z" needle valve (manual or proportional) (not included in the scope of delivery)				
Ports	"AB" vent port (closed)	1/4" BSP			
	"MP" gauge port (closed)	1/4" BSP			
	"LS" load-sensing port	1/4" BSP			
Dimensions		Size 05	Size 1	Size 2	Size 3
	J [mm]	105	115	137	159.5
	K [mm]	211	212	245.5	254.5
	L [mm]	197	198	234.5	240.5
	M [mm]	32	32	32	32
	N [mm]	117	117	117	117
	Q [mm]	81	-	-	-



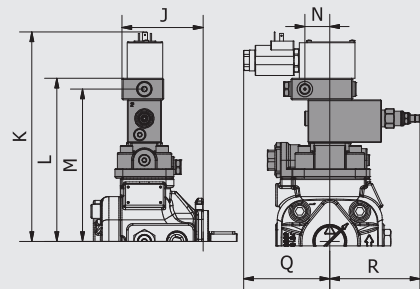
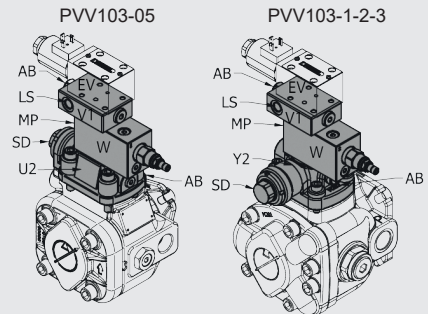
Controller PCLS002 dimensions

Pilot ports	"U2" / "Y2" load-sensing controller with pressure control				
	"SD" differential pressure setting Δp				
	"W" maximum pressure setting (preset to maximum pressure)				
	"V1" load-sensing block with interface for additional controller modules				
	"R" remote adjustment block				
	"Z" needle valve (manual or proportional) (not included in the scope of delivery)				
	"RV" additional maximum remote adjustment unloading valve (not included in the scope of delivery)				
Ports	"AB" vent port (closed)	1/4" BSP			
	"MP" gauge port (closed)	1/4" BSP			
	"LS" load-sensing port	1/4" BSP			
	"RP" remote control port	1/4" BSP			
Dimensions		Size 05	Size 1	Size 2	Size 2
	G [mm]	105	115	137	159.5
	H [mm]	66	76	97.5	120
	J [mm]	231	232	265.5	274.5
	K [mm]	197	198	231.5	240.5
	L [mm]	32	32	32	32
	M [mm]	1.3	1.3	1.3	1.3
	N [mm]	117	117	117	117
Q [mm]	81	-	-	-	



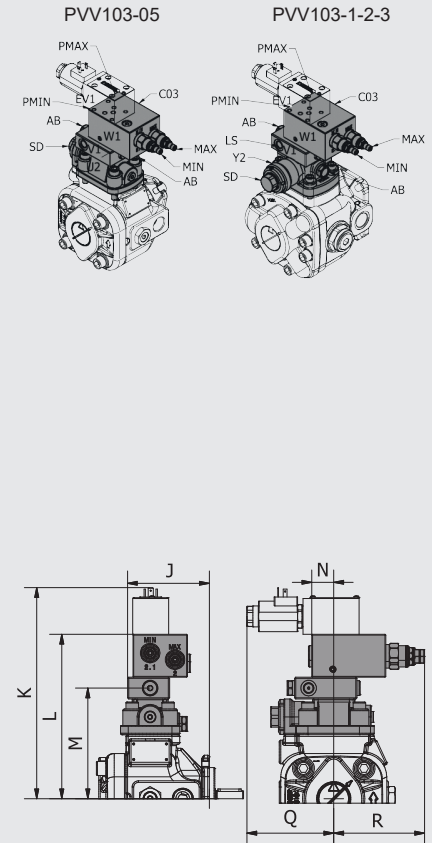
Controller PCLS003 dimensions

Pilot ports	"U2" / "Y2" load-sensing controller with pressure control				
	"SD" differential pressure setting Δp				
	"W" maximum pressure setting (adjustable)				
	"V1" load-sensing block with interface for additional controller modules				
	"EV" directional valve (not included in the scope of delivery)				
	"Z" needle valve (manual or proportional) (not included in the scope of delivery)				
Ports	"AB" vent port (closed)	1/4" BSP			
	"MP" gauge port (closed)	1/4" BSP			
	"LS" load-sensing port	1/4" BSP			
	"C03" porting pattern	ISO 4401-03 (CETOP 03)			
Dimensions		Size 05	Size 1	Size 2	Size 3
	J [mm]	105	115	137	159.5
	K [mm]	*	*	*	*
	L [mm]	211	212	245.5	254.5
	M [mm]	197	198	237.5	240.5
	N [mm]	32	32	32	32
	Q [mm]	*	*	*	*
	R [mm]	117	117	117	117



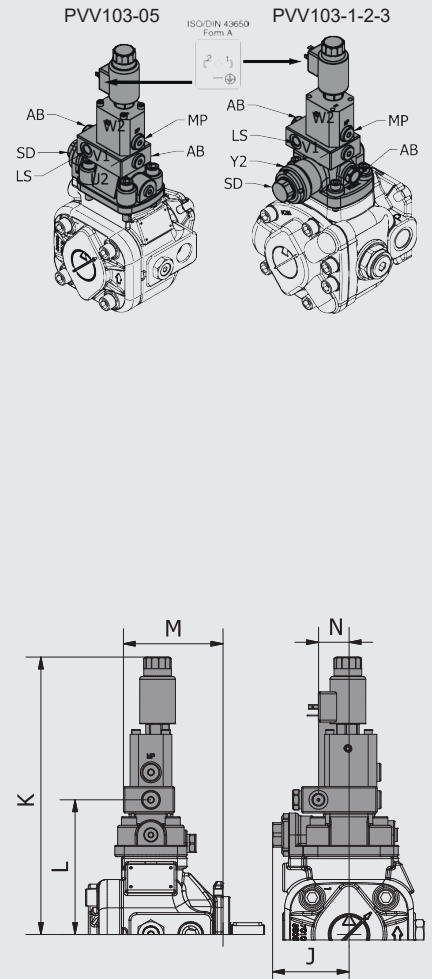
Controller PCLS004 dimensions

Pilot ports	"U2" / "Y2" load-sensing controller with pressure control				
	"SD" differential pressure setting Δp				
	"W1" maximum pressure settings				
	"MIN" – adjustable pressure range 1				
	"MAX" – adjustable pressure range 2 (MIN<MAX)				
	"V1" load-sensing block with interface for additional controller modules				
	"EV" directional valve (not included in the scope of delivery)				
"Z" needle valve (manual or proportional) (not included in the scope of delivery)					
Ports	"AB" vent port (closed)	1/4" BSP			
	Gauge port "p _{min} ", "p _{max} " (closed)	1/4" BSP			
	"LS" load-sensing port	1/4" BSP			
	"C03" porting pattern	ISO 4401-03 (CETOP 03)			
Dimensions		Size 05	Size 1	Size 2	Size 3
	J [mm]	105	115	137	159.5
	K [mm]	*	*	*	*
	L [mm]	211	212	245.5	254.5
	M [mm]	142	143	176.5	185.5
	N [mm]	32	32	32	32
	Q [mm]	*	*	*	*
	R [mm]	117	117	117	117



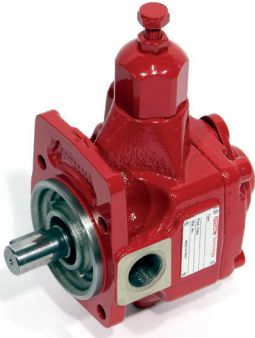
Controller PCLS005 dimensions

Pilot ports	"U2" / "Y2" load-sensing controller with pressure control				
	"SD" differential pressure setting Δp				
	"W2" proportional pressure reducing valve				
	"V1" load-sensing block with interface for additional controller modules				
	"Z" needle valve (manual or proportional) (not included in the scope of delivery)				
Ports	"AB" vent port (closed)	1/4" BSP			
	"MP" gauge port (closed)	1/4" BSP			
	"LS" load-sensing port	1/4" BSP			
Electrical properties	Voltage	24 VDC \pm 10 %			
	Current	590 mA			
	Power	22 watts			
	Nominal resistance at 50 °C	37.2 Ω \pm 5 %			
	Nominal resistance at 20 °C	26.2 Ω \pm 5 %			
	Max. temperature at the solenoid coil at 20 °C	105 °C			
	Protection class	IP65			
	Recommended dither frequency	160 – 200 Hz (*)			
	Linearity, hysteresis, repeatability	< 5 % (*)			
	Ports	ISO/DIN 43650, form A			
Dimensions		Size 05	Size 1	Size 2	Size 3
	J [mm]	81	-	-	-
	K [mm]	300	301	327	336
	L [mm]	142	143	176.5	185.5
	M [mm]	105	115	137	159.4
	N [mm]	32	32	32	32



Variable Displacement Vane Pumps:

Installation Manual



MECHANICAL COMPENSATION

PVV102-05-16
PVV102-1-20
PVV102-1-25
PVV102-1-32
PVV102-2-40
PVV102-2-50
PVV102-2-63
PVV102-3-80
PVV102-3-100
PVV102-3-120



HYDRAULIC COMPENSATION

PVV103-05-16
PVV103-1-20
PVV103-1-25
PVV103-1-32
PVV103-2-40
PVV103-2-50
PVV103-2-63
PVV103-3-80
PVV103-3-100
PVV103-3-120

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 commissioning must be strictly observed.

2. INSTALLATION AND ASSEMBLY

The PVV pumps can be installed vertically or horizontally.

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. radial 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 circulation speed to be achieved (the volume of oil should be approximately four times the displacement of all the pumps). 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 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 connected to 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).

Pressure line

Ensure that the pressure line has adequate strength. It is recommended that a non-return valve and an automatic vent valve are fitted in the pressure line for trouble-free operation.

6. FILTRATION AND FLUID TYPES

Size		05	1	2	3	
Geometric displacement	[cm ³ /rev]	16	20 - 25 - 32	40 - 50 - 63	80 - 100	120
Actual displacement	[cm ³ /rev]	17	21 - 26 - 33	42 - 51 - 63	80 - 100	123
Nominal pressure	[bar]	102	120	100	90	
		103	250			210
Setting range for pressure controller	[bar]	102	H: 20 - 120	L: 15 - 50 H: 30 - 100	L: 30 - 50 H: 50 - 90	
		103	H: 20 - 250		H: 40 - 250	H: 40 - 210
Max. permitted drain pressure	[bar]	1				
Inlet pressure	[bar]	0.8 - 1.5 absolute				
Speed range	[rpm]	800 - 1800		800 - 1500		
Direction of rotation	[viewed from shaft end]	Clockwise				
Permitted shaft load	[Nm]	No radial or axial loads allowed.				
Max. permitted drive torque	[Nm]	102	110*	250	586	900
		103	130	250	586	900
Operating fluids		The pump series is designed for use with: hydraulic oil (normal mineral oil) HLP acc. to DIN ISO 51524/2 or HM ISO 6743/4 For use with other fluids, please contact HYDAC Drive Center.				
Viscosity range	[cSt, mm ² /s]	22 - 68				
Viscosity in starting operation in full flow condition	[cSt, mm ² /s]	Max. 400				
Viscosity index according to ISO 2909	[cSt, mm ² /s]	Min. 100				
Suction temperature	[°C]	+15 / +60				
Max. contamination level of operating fluid		20/18/15 acc. to ISO 4406: 1999, Class 9 acc. to NAS 1638				
Recommended contamination level for a longer life expectancy of the pump		18/16/13 acc. to ISO 4406: 1999, Class 7 acc. to NAS 1638				

* With flange version F. For flange version FGR2 70 Nm.

For different operating conditions and/or for further information, please contact HYDAC Drive Center.

7. COMMISSIONING

Check before initial start-up whether all valves and shut-off valves are open and all protective caps have been removed. Fill the pump via the drain port and then remount the drain line.


The container must be filled with oil.

 **Ensure that the pump shaft can be rotated manually without any resistance.**

On pumps with through drive option A in 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, the protective hood can briefly be unscrewed from the fan of the electric motor and the pump can be turned via the fan.

Check that the direction of rotation of the motor corresponds with the direction of rotation of the pump. Pump: clockwise viewed from shaft end.


Start the motor in jogging mode, allowing free circulation of the fluid to the reservoir, to 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 without pressure and directly into the reservoir for several minutes (7 to 10 minutes).

After this time, all air should be **completely eliminated** from the system. To aid this procedure, type PVV103 has a vent valve on the pressure controller: unscrew the plug to release the air and then close plug.

Subsequent start-ups may only be carried out with a maximum pressure of 30 bar, on the condition that the system and pump are completely full of oil.

 **If the pump is set via the flow limitation 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. Flow 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), without pressure, until the temperatures have equalised.

In the event of queries or for further information, please refer to the HYDAC Pump Catalogue or contact HYDAC Drive Center's technical sales service.

8. ADJUSTMENTS

Pressure (fig. 4/5) and flow (see 10. Flow adjustment screw) must only be changed at the pump using the adjustment screws on the unit.



Notice: the pressure must only be adjusted when the pump is at zero flow setting (i.e. when P is closed).

No other alterations may be made to the pump.

9. DIMENSIONS

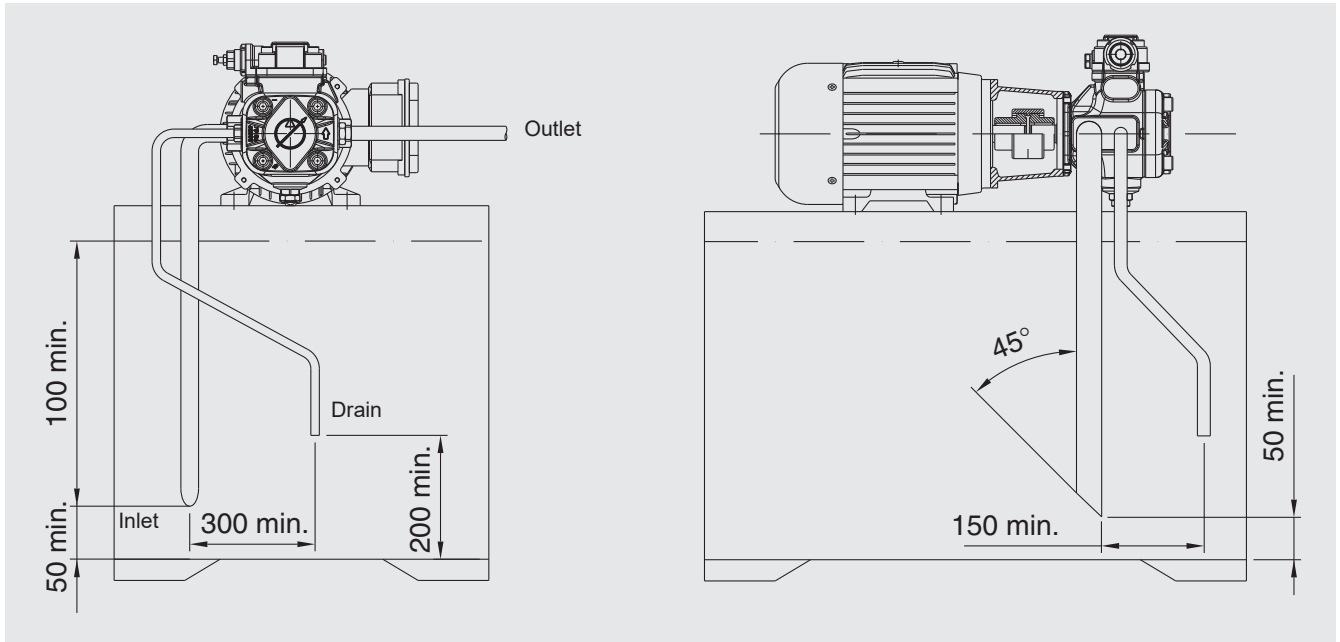


Fig. 2

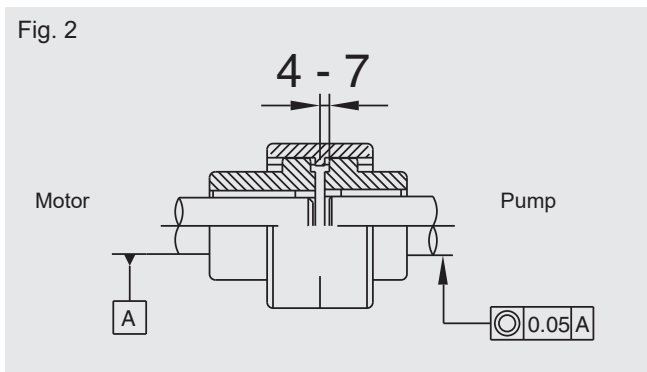


Fig. 3

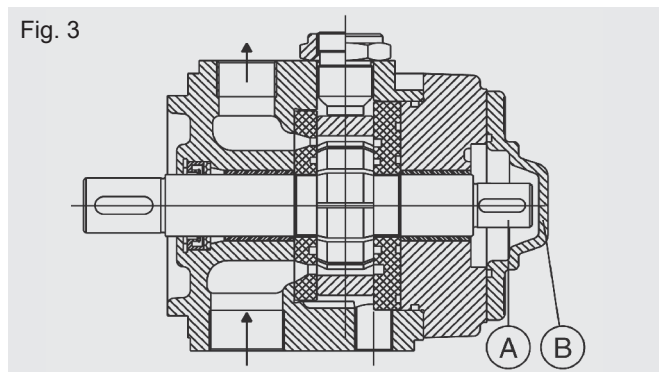
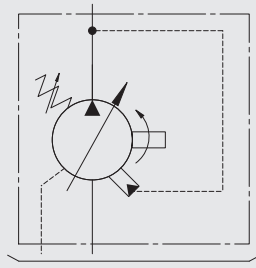
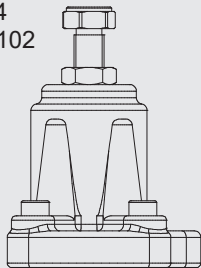


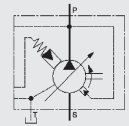
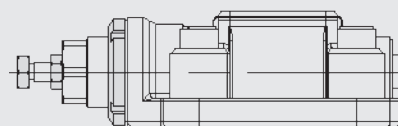
Fig. 4
PVV102



Pressure adjustment screw

Clockwise rotation increases the operating pressure.

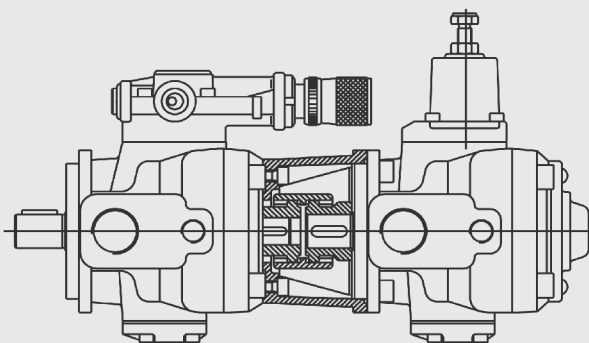
Fig. 5
PVV103



Pressure setting knob

Clockwise rotation increases the operating pressure.

Tab. 2



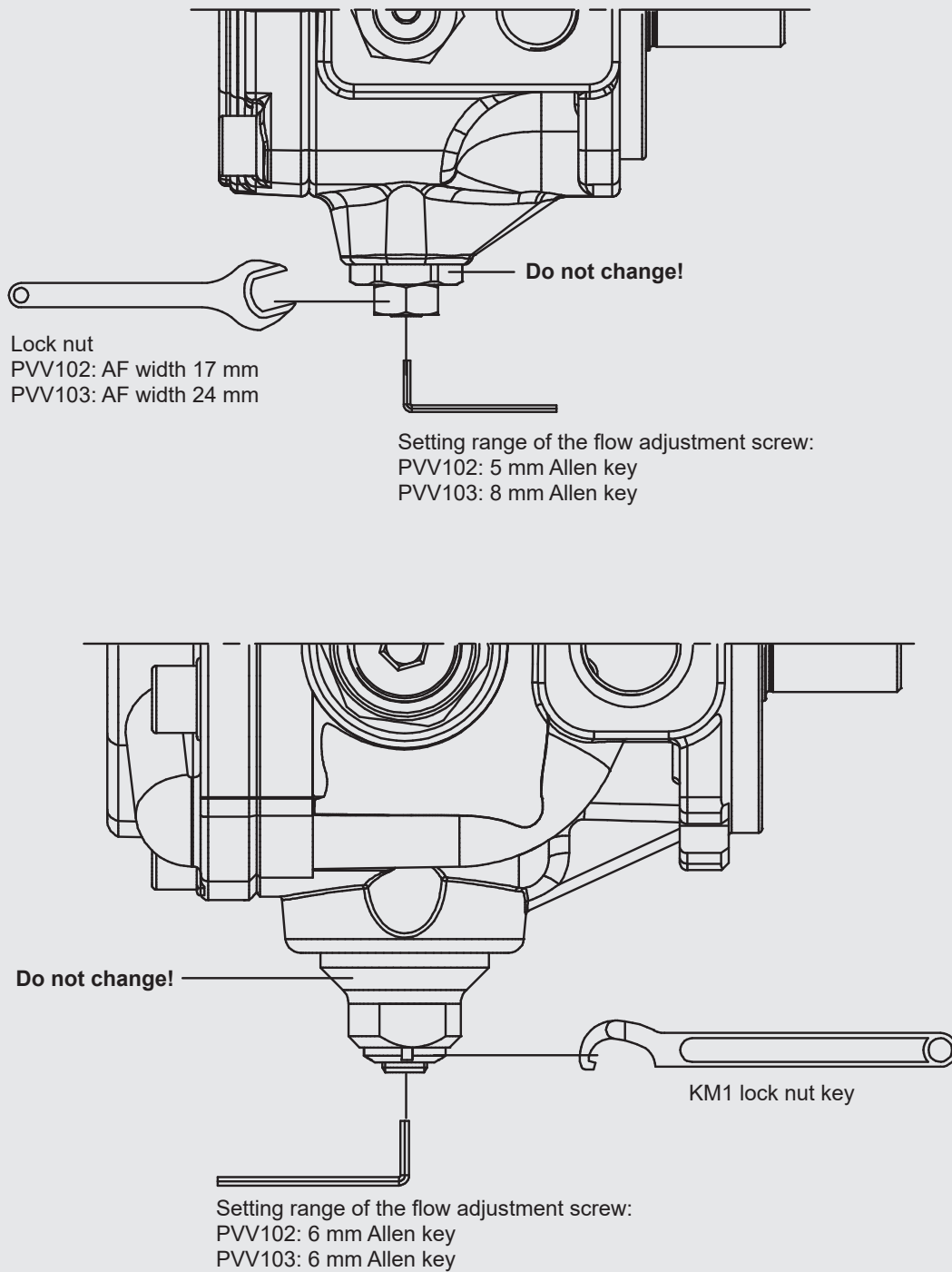
Note:

The sum of the individual torques of the pumps must not exceed the maximum torque permitted on the primary pump.

Primary pump	Max. torque secondary pump
PVV102-05 / PVV103-05	55 Nm
PVV102-1 / PVV103-1	55 Nm
PVV102-2 / PVV103-2	110 Nm
PVV102-3- / PVV103-3	110 / 180* Nm

* only for coupling size 3 and secondary pump size 3

10. FLOW ADJUSTMENT SCREW



Geometric displacement [cm ³ /rev]	PVV102										PVV103									
	16	20	25	32	40	50	63	80	100	120	16	20	25	32	40	50	63	80	100	120
Max. flow rate [cm ³ /rev]	17	21	26	33	42	51	63	80	100	123	17	21	26	33	42	51	63	80	100	123
Min. flow rate [cm ³ /rev]	3.1	9.5	15	19	27.5	35.5	43.5	63	80	100	3.3	9.5	15	19	27.5	35.5	43.5	63	80	100
Reduced flow per screw turn [cm ³ /rev]	9.7	10	10	10	16	16	16	16	16	16	11	10	10	10	16	16	16	16	16	16

Data can vary from pump to pump.



If the pump's flow adjustment screw is set to less than 50 % of the nominal flow rate, start-up is only permitted on the condition that the system and pump are completely filled with fluid.

NOTES

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Accumulators 30.000



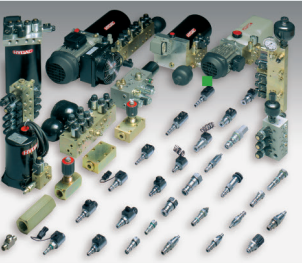
Filter Technology 70.000



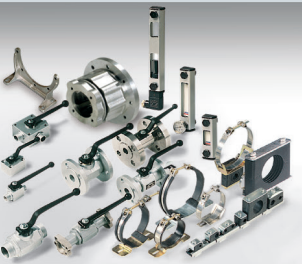
Process Technology 77.000



Filter Systems 79.000



Compact Hydraulics 53.000



Accessories 61.000

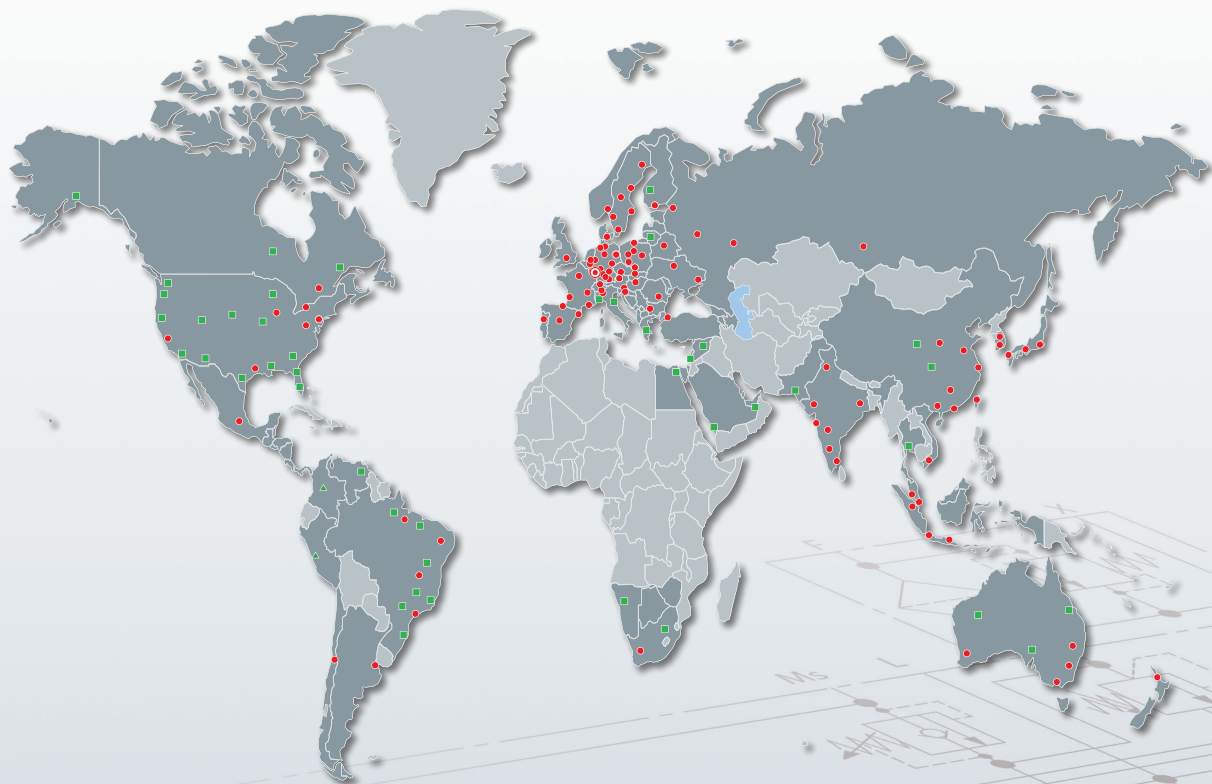



Electronics 180.000



Cooling Systems 57.000

Global Presence. Local Expertise. www.hydac.com



-  HYDAC Head Office
-  HYDAC Companies
-  HYDAC Sales and Service Partners
-  Free Sales Partners

HYDAC INTERNATIONAL

HYDAC DRIVE CENTER
GmbH

Kiesgräble 13
89129 Langenau
Germany

Phone: +49 7345 93360-01
Fax: +49 7345 93360-4190

E-mail: antriebe@hydac.com
Internet: www.hydac.com