3.3 VARIABLE DISPLACEMENT MECHANICAL COMPENSATION

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ORDERING CODE

3.3.1 Variable Displacement Mechanical Compensation

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

Variable displacement vane pump with mechanical compensation

Size

1 | 2 | 3

Displacement

20 25 | 31 40 50 | 63 80 100

Flange and ports

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

Pressure setting range

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

Shaft rotation

R	Clockwise (viewed from shaft end)

Seals

M	NBR
E	FPM (FKM)

Flow adjustment

Q	Volume adjustment screw (standard)

Options

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

Modification number

XXXX Determined by manufacturer

TECHNICAL INFORMATION

3.3.2 Specifications

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

3.3.3 Hydraulic fluids

The pump series is designed for use with:

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

Synthetic fluids
(Polyolester, HFD-U)

3.3.4 Viscosity range

Normal operating viscosity: 22 - 68 cSt (mm²/s)
Maximum viscosity at start-up: 400 cSt (mm²/s)

3.3.5 Temperature range

-10 to +50 °C

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

3.3.6 Seals

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

3.3.7 Filtration

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

18/16/13 to ISO 4406/99

or

Class 7 to NAS 1638

3.3.8 Max. drive and through drive torques

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

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

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

3.3.9 Through drive models

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

* PGI102-2 NOT 22 cm³ and 25 cm³

For other possible through drives, please contact HYDAC.

3.3.10 Installation notes

Step 1

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

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

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

Step 2

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

The oil tank must be the correct size to dissipate the thermal power generated by the system components, and to achieve a low circulating speed.
To ensure maximum pump working life, the suction oil temperature must never exceed 50 °C. In systems where the pump runs for a long time at a zero flow setting it is recommended that an oil cooler is installed. The pressure in the drain line must never exceed the value specified.
The drain line must always feed directly into the tank, independently of all other lines and it must extend under the minimum oil level to avoid generating foam. In addition, the drain line must be free of restrictions and situated as far as possible away from the suction line.

Step 3

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

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

Other types of motor-pump couplings are not permitted.

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

Step 4

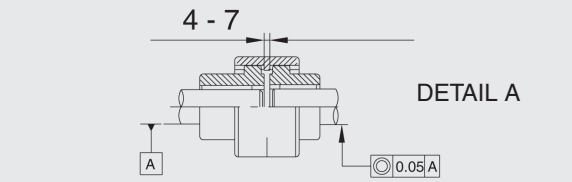
During commissioning, the pump must firstly be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump. Sizes 2 and 3 have an air bleed port on the compensator.

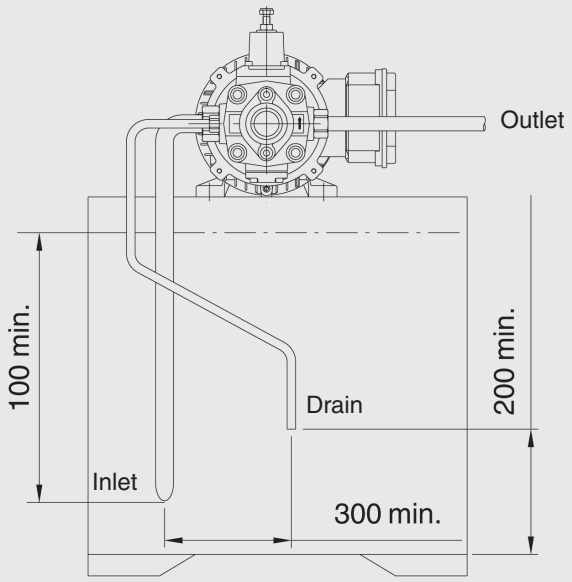
Venting the pump can take several minutes.

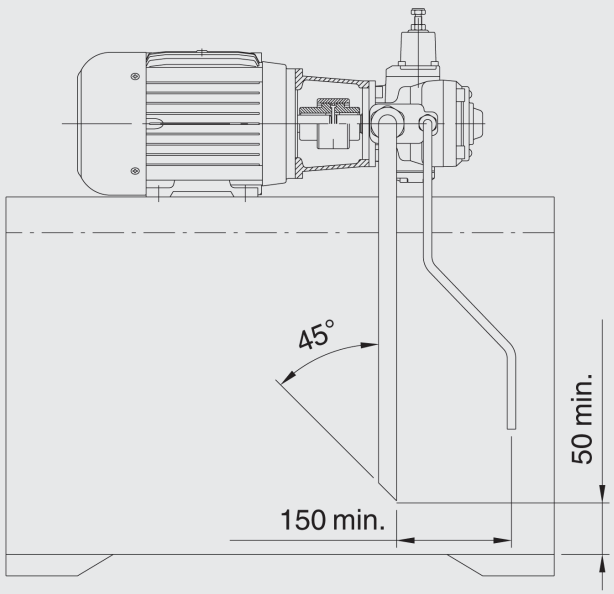
Pump filling (oil emerging from the discharge port) should only take a few seconds. If not, the pump must be switched off and the procedure repeated.

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

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







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

3.3.11 Adjustments

Pump size	Available displacement [cm³]	Volume adjustment screw rate [cm³]	Min. adjustable displacement [cm³]
PVV101-1-20	22.1	2.7	9.6
PVV101-1-25	26.9	7.5	9.6
PVV101-2-31	34.5	11.7	16.4
PVV101-2-40	42.8	1.5	16.4
PVV101-2-50	53.1	9.8	16.4
PVV101-3-63	69	20.9	23.7
PVV101-3-80	86.2	26.9	23.7
PVV101-3-100	105.5	45.5	23.7

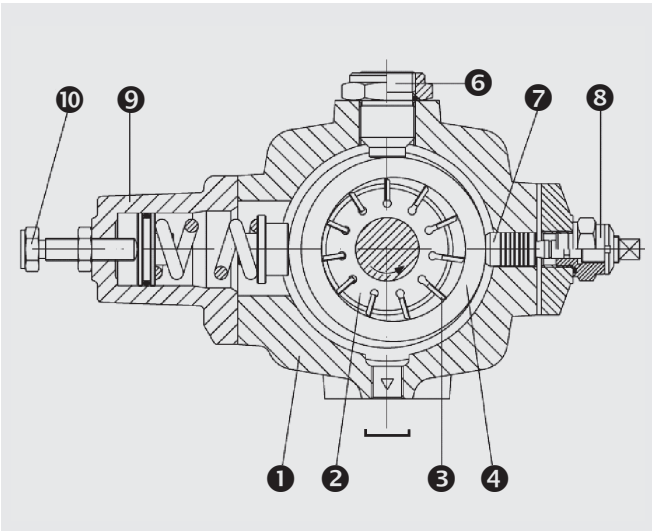
CONTROL OPTIONS

3.3.12 Standard pressure control

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

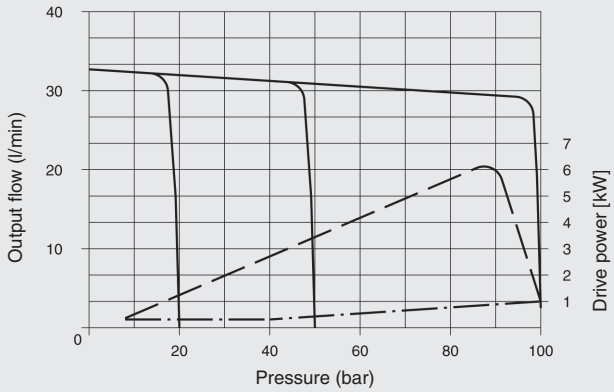
The low pressure pumps, type PVV101 (100 bar), are equipped with a mechanical pressure regulating device.

Pump components include:
a body ❶,
a drive rotor ❷,
which houses the vanes ❸
that convey the fluid into
the inlet and outlet chambers;
a stator ❹ (mobile ring) for varying the eccentricity and
therefore displacement;
side distribution plates
with axial hydrostatic compensation,
which delimit the inlet and outlet chambers;
a guide block balancing adjustment screw ❻
(this must not be altered by the user);
a displacement adjustment piston❼,
a maximum volume adjustment screw ❽
a pressure regulating device ❾;
a pressure regulator adjustment ❿.



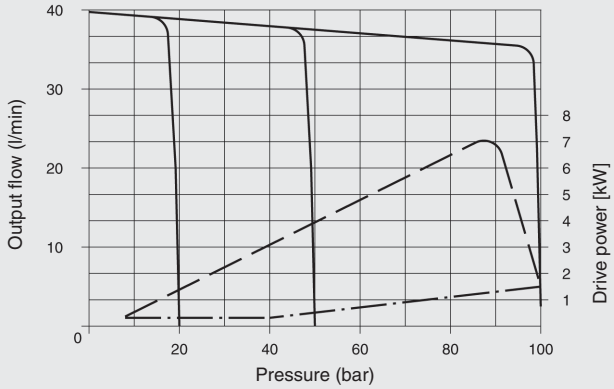
Volumetric efficiency

PVV101-1-20



Volumetric efficiency

PVV101-1-25



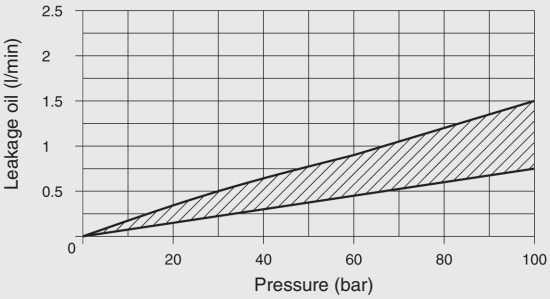
Drive power at maximum displacement

Drive power at zero flow setting

Leakage oil

Values determined with pump on zero flow setting

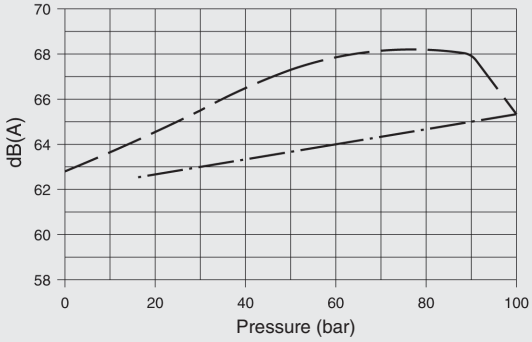
PVV101-1-20 / -25



Maximum noise level

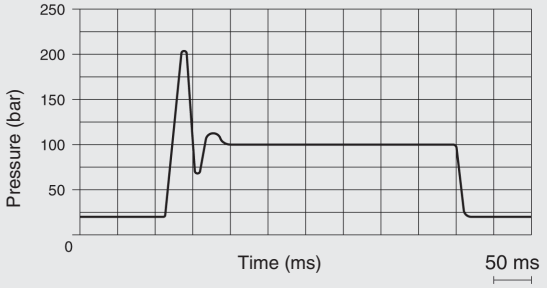
with sound-level meter placed 1 meter away from pump, flexible coupling

PVV101-1-20 / -25



Response times and peak pressure

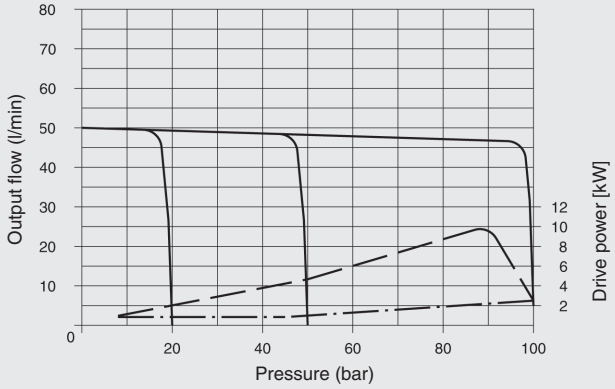
PVV101-1-20 / -25



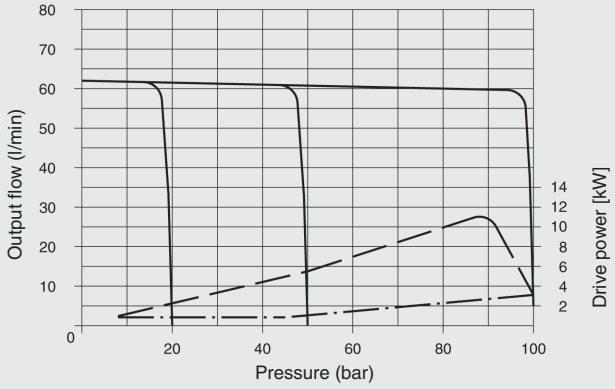
Pressure peaks are due to the test system.

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

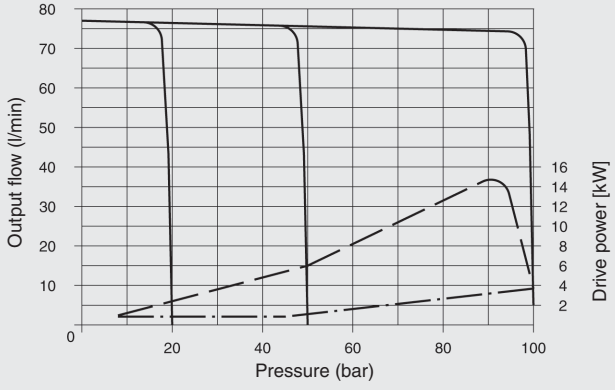
Volumetric efficiency
PVV101-2-31



Volumetric efficiency
PVV101-2-40



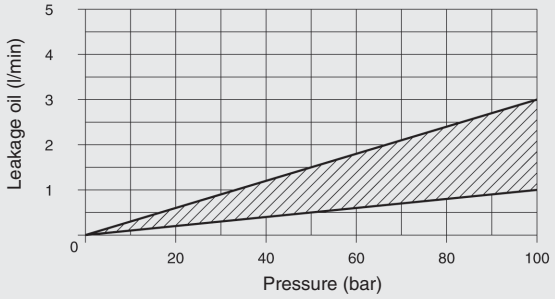
Volumetric efficiency
PVV101-2-50



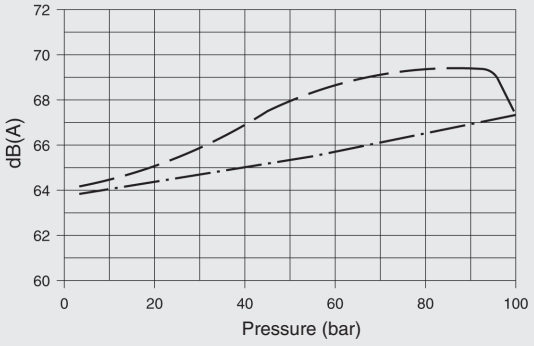
Drive power at maximum displacement

Drive power at zero flow setting

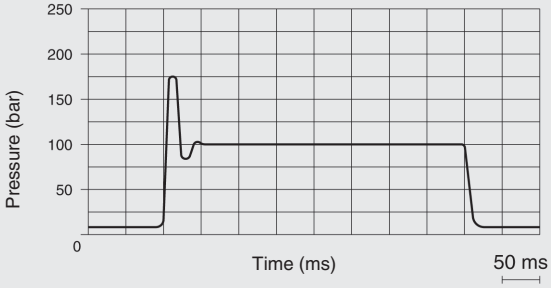
Leakage oil
Values determined with pump on zero flow setting
PVV101-2-31 / -40 / -50



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



Response times and peak pressure
PVV101-2-31 / -40 / -50

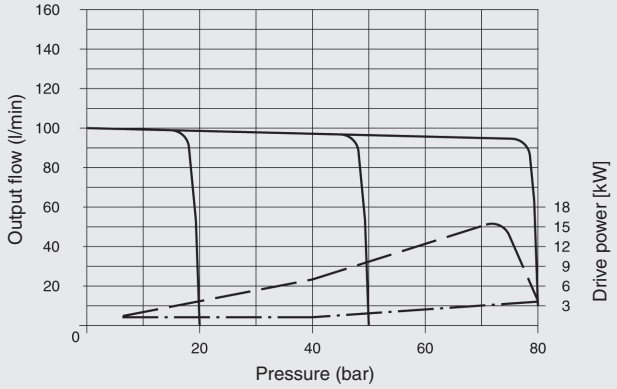


Pressure peaks are due to the test system.

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

Volumetric efficiency

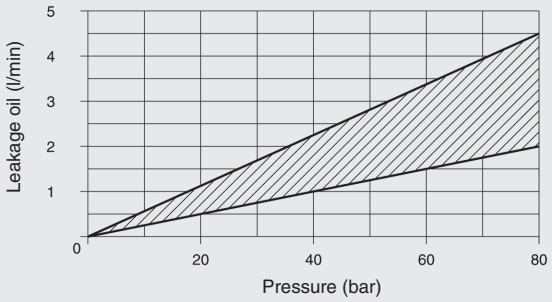
PVV101-3-63



Leakage oil

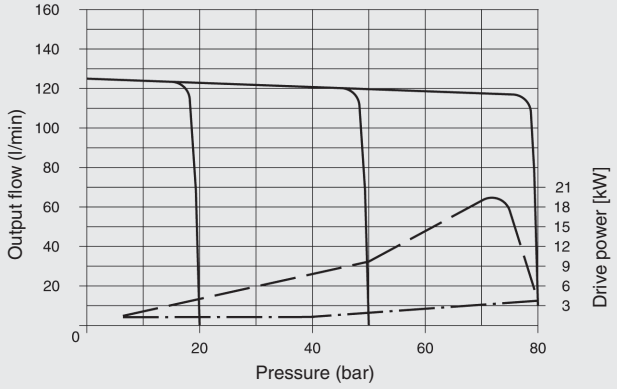
Values determined with pump on zero flow setting

PVV101-3-63 / -80 / -100



Volumetric efficiency

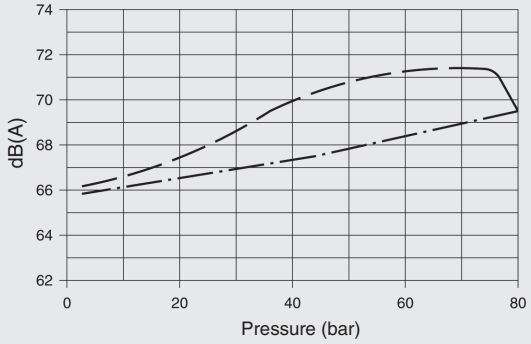
PVV101-3-80



Maximum noise level

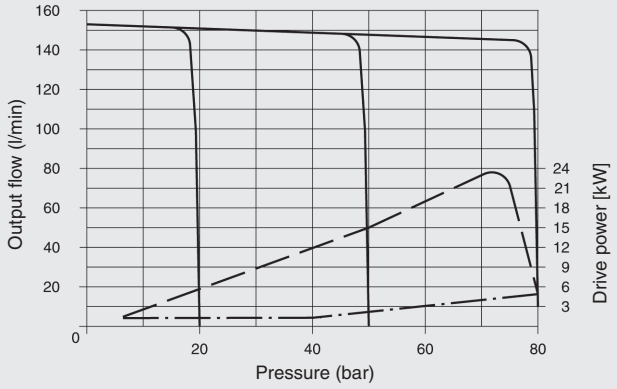
with sound-level meter placed 1 meter away from pump, flexible coupling

PVV101-3-63 / -80 / -100



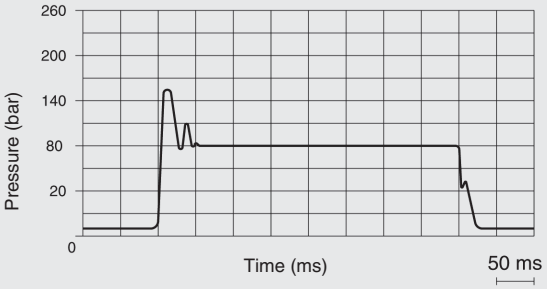
Volumetric efficiency

PVV101-3-100



Response times and peak pressure

PVV101-3-63 / -80 / -100



Drive power at maximum displacement

Drive power at zero flow setting

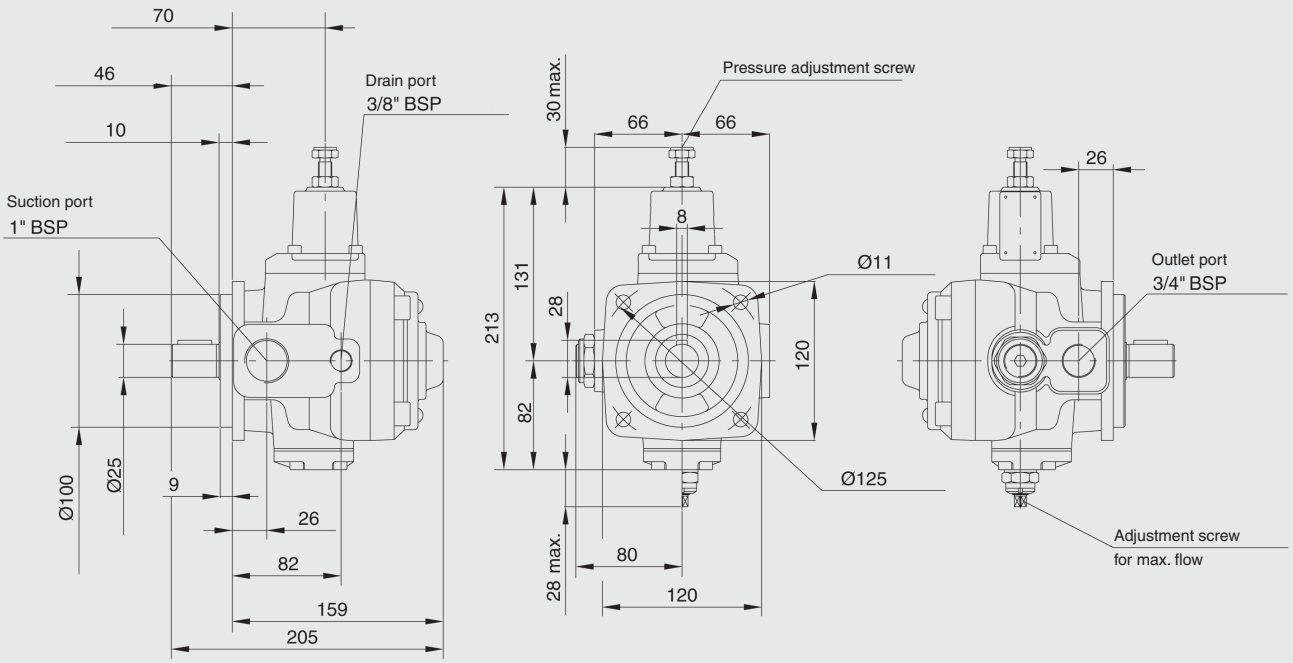
Pressure peaks are due to the test system.

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

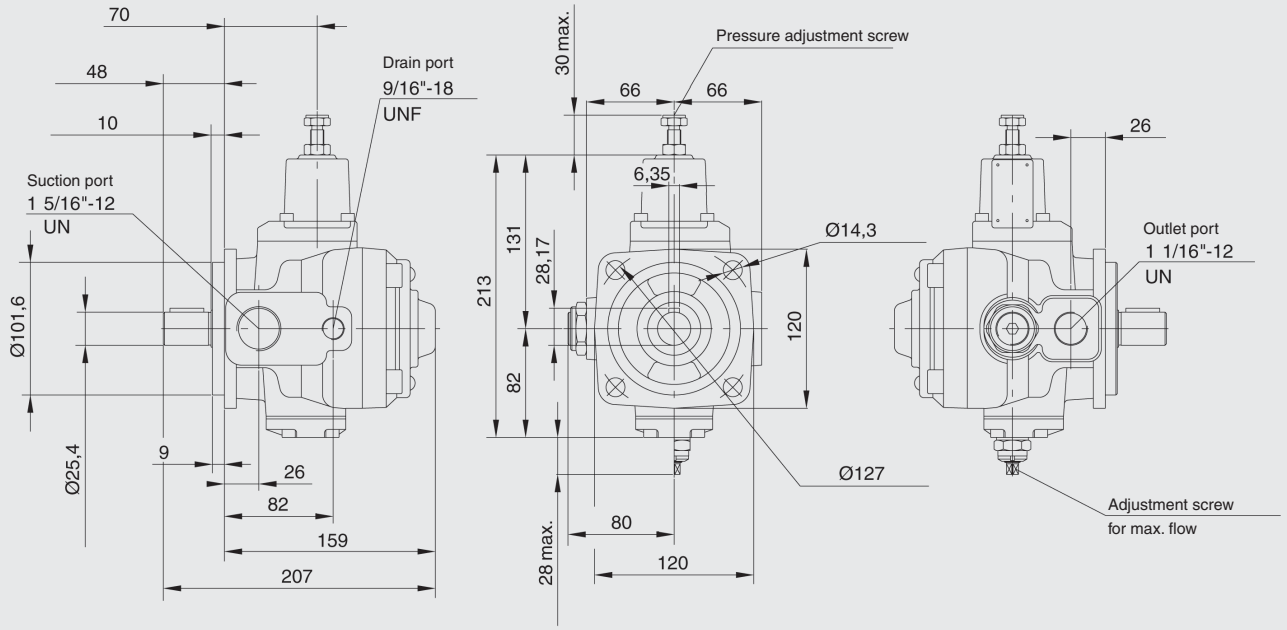
DIMENSIONS

3.3.16 PVV101-1-20 / -25

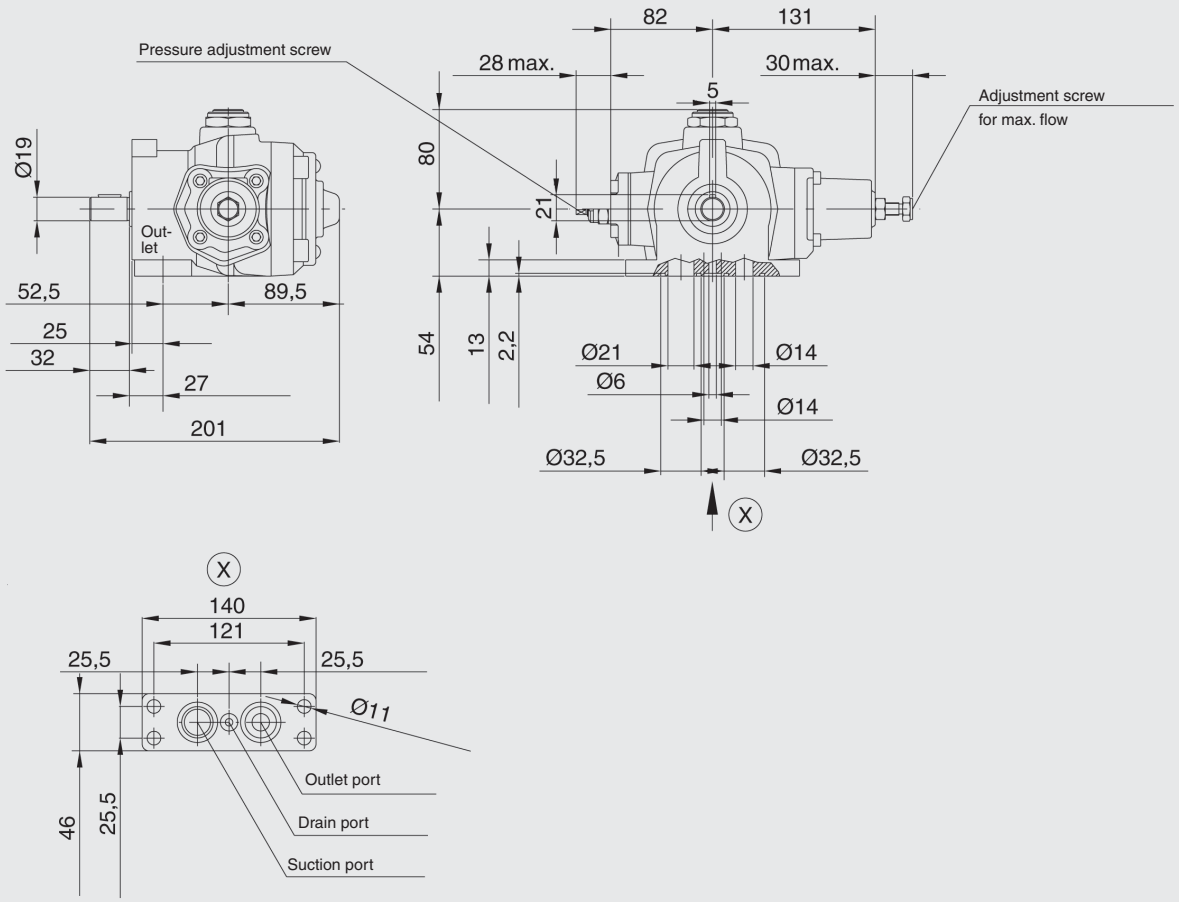
PVV101-1-20 / -25 (F)



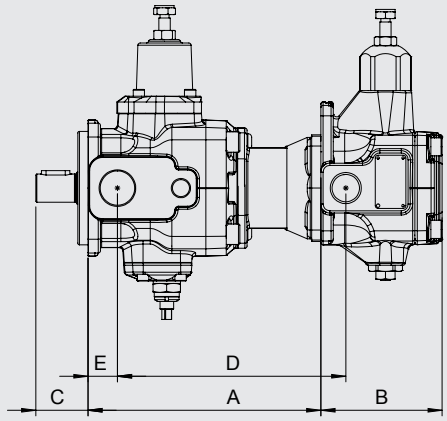
PVV101-1-16 / -20 / -25 (US)



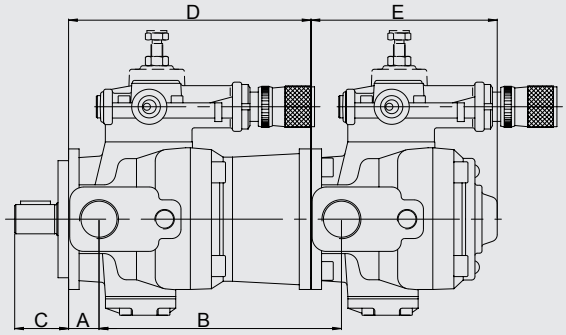
PVV101-1-20 / -25 (B)



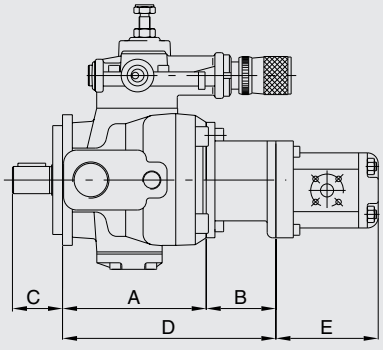
Multiple pumps
Front pump PVV101-1- ... F



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



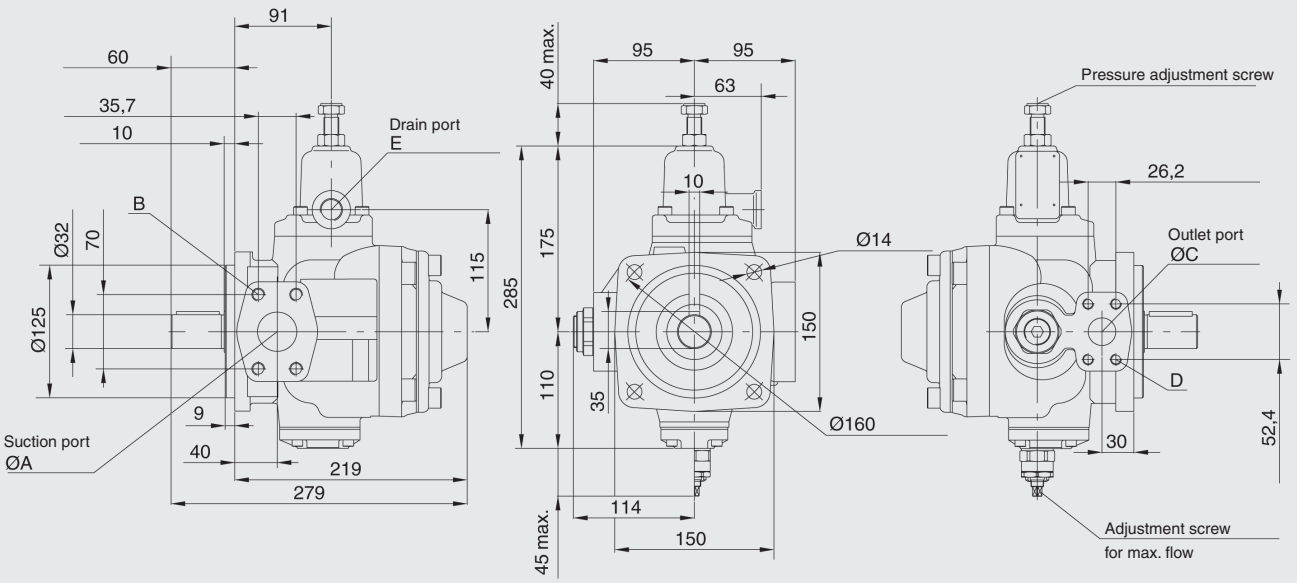
End pump	A	B	C	D	E
PVV100-1- ... F/ PVV101-1- ... F	26	207	46	207	159



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

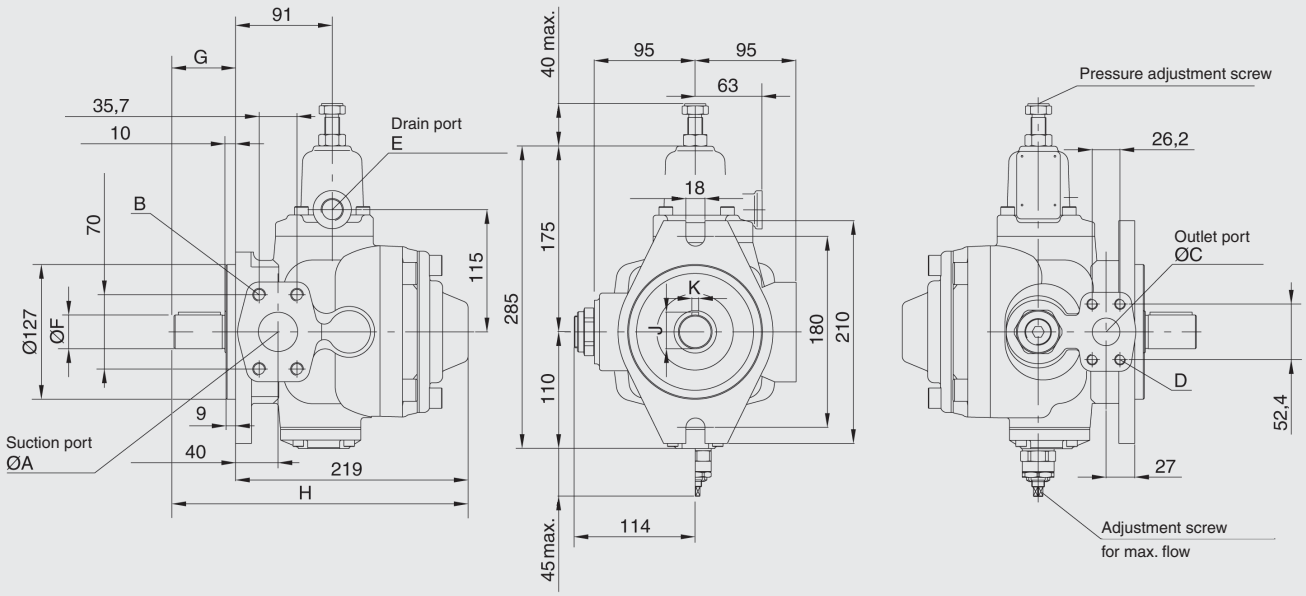
3.3.17 PVV101-2-31 / -40 / -50

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



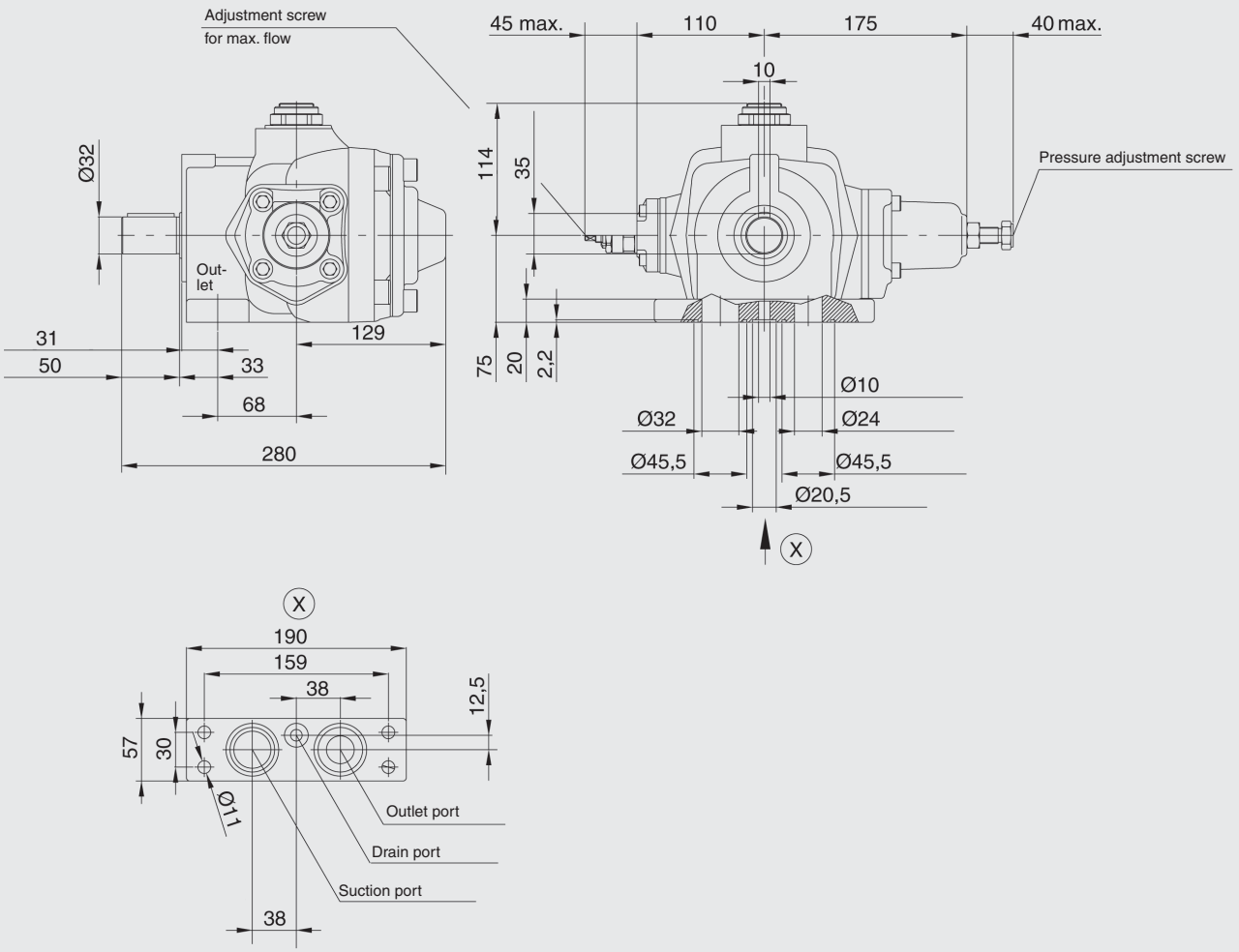
Flange	ØA	B	ØC	D	E
F (ISO)	38	SAE (3000) 1 ½" M12 x 45	25	SAE (3000) 1" M10 x 35	½" BSP
F UNC (ISO) only as end pump	38	SAE (3000) 1 ½" ½"-13 UNC	25	SAE (3000) 1" ⅜"-16 UNC	⅞-14 UNF

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

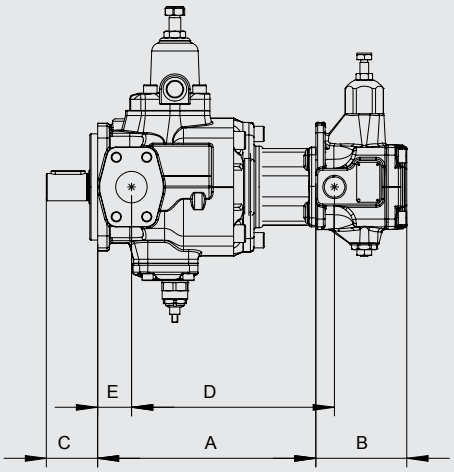


Flange	ØA	B	ØC	D	E	ØF	G	H	J	K
FS (SAE)	38	SAE (3000) 1 ½" M12 x 45	25	SAE (3000) 1" M10 x 35	½" BSP	32	60	279	35	10
US (SAE)	38	SAE (3000) 1 ½" ½"-13 UNC	25	SAE (3000) 1" ⅜"-16 UNC	⅞"-14 UNF	31.75	58	277	34.5	6.35

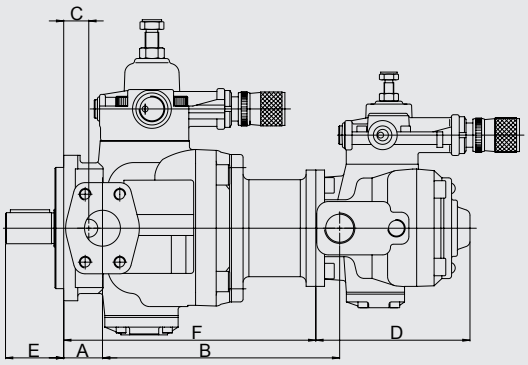
PVV101-2-31 / -40 / -50 (B)



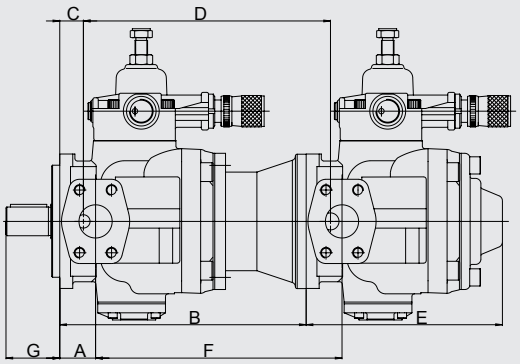
Multiple pumps
Front pump PVV101-2- ... F



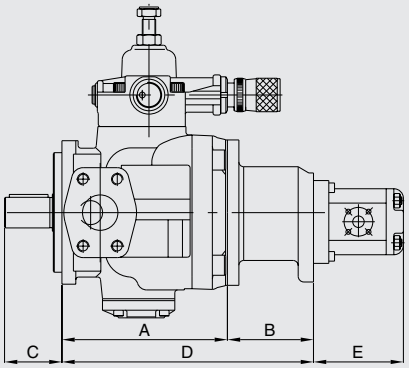
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	240	40
PVV102-05- ... F-GR2	261	107	60	245	40



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

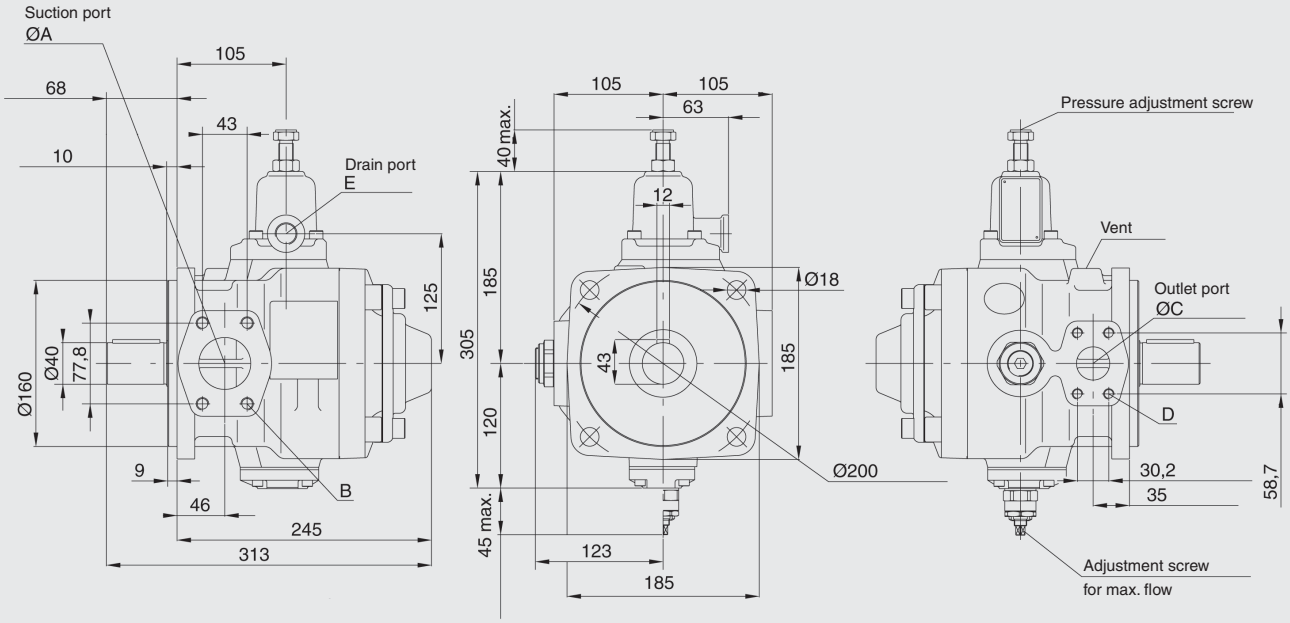


End pump	A	B	C	D	E	F	G
PVV100-2- ... F / PVV101-2- ... F	40	275	30	275	220	275	60



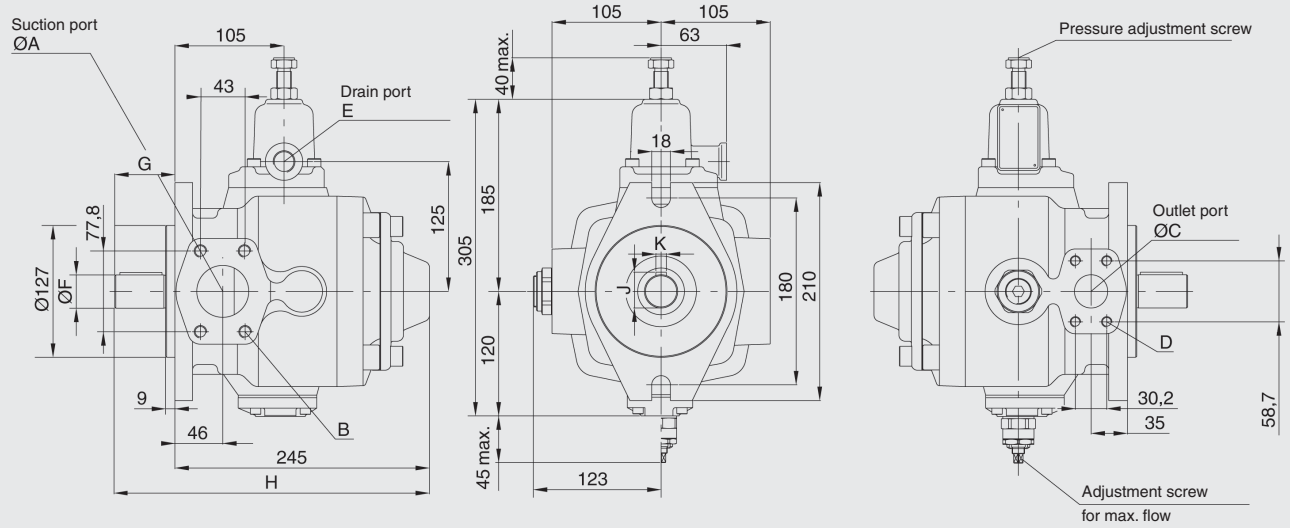
End pump	A	B	C	D	E
Gear pump size 1	173	90	60	263	dependent on gear pump selected
Gear pump size 2	173	90	60	263	
Gear pump size 3	173	90	60	263	

PVV101-3-63 / -80 / -100 (F / F UNC)



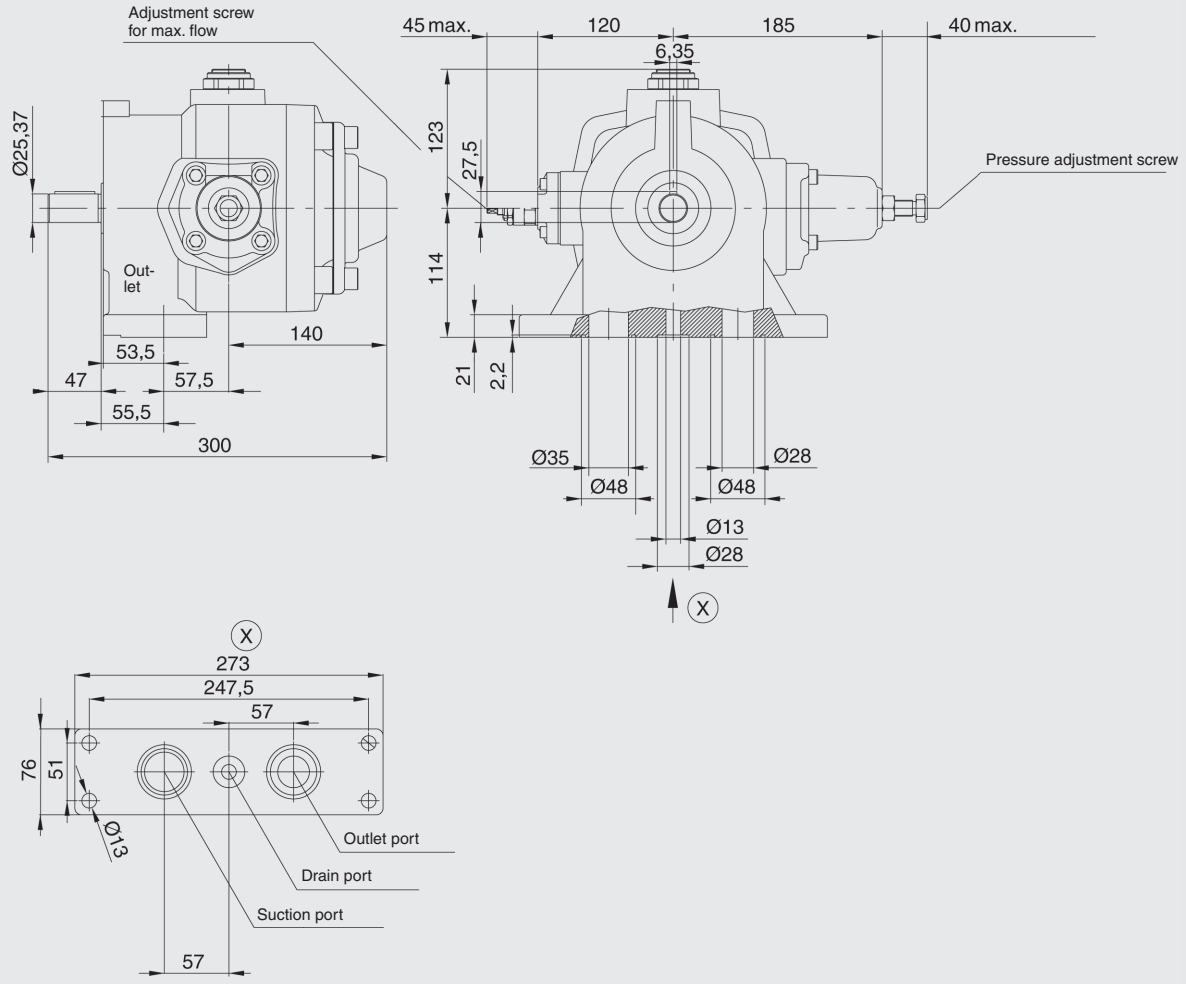
Flange	ØA	B	ØC	D	E
F (ISO)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 ¼" M10 x 40	½" BSP
F UNC (ISO) only as end pump	51	SAE (3000) 1 ½" ½"-13 UNC	32	SAE (3000) 1 ¼" 7/16"-14 UNC	⅞-14 UNF

PVV101-3-63 / -80 / -100 (FS / US)

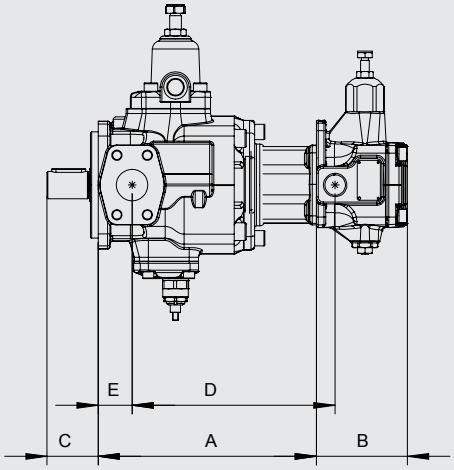


Flange	ØA	B	ØC	D	E	ØF	G	H	J	K
FS (SAE)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 ¼" M10 x 40	½" BSP	32	60	305	35	10
US (SAE)	51	SAE (3000) 2" ½"-13 UNC	32	SAE (3000) 1 ¼" 7/16"-14 UNC	⅞"-14 UNF	31.75	58	303	34.5	6.35

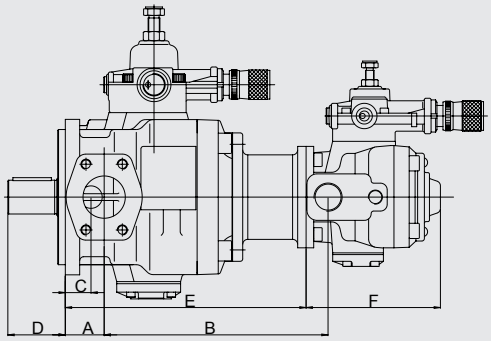
PVV101-3-63 / -80 / -100 (B)



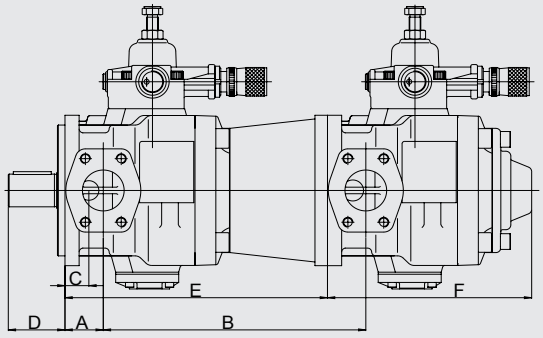
Multiple pumps
Front pump PVV101-3- ... F



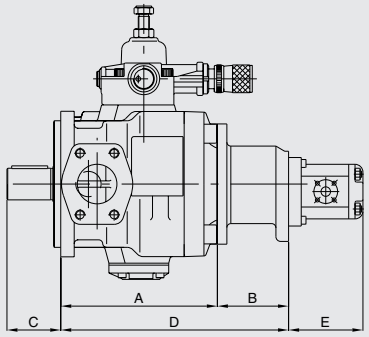
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	240	40
PVV102-05- ... F-GR2	261	107	60	245	40



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



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



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