3.1 VARIABLE DISPLACEMENT, HYDRAULIC COMPENSATION

CONTENTS PVV100

ORDERING CODE

3.1.1 Variable Displacement Hydraulic Compensation

PVV100 – 1 – 20 F H R M __ Q - KL - XXXX

Variable displacement vane pump with hydraulic compensation

Size

1 | 2 | 3

Displacement

20 25 | 31 40 50 | 63 80 100

Flange and ports

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

Pressure setting range

H	30 - 160 bar (size 1 and 2) 30 - 150 bar (size 3)

Shaft rotation

R	Clockwise (viewed from shaft end)

Seals

M	NBR
E	FPM (FKM)

Control type

–	Pressure compensator
PCS002	Remote pressure compensator
PCS003	2-stage pressure compensator, one stage non-adjustable
PCS004	2-stage pressure compensator, adjustable
PCS005	Proportional pressure compensator
PCLS001	Load sensing and standard pressure control
PCLS002	Load sensing and remote pressure control
PCLS003	Load sensing control and 2-stage pressure control, one stage non-adjustable
PCLS004	Load sensing control and 2-stage pressure control, both adjustable
PCLS005	Load sensing and proportional pressure control

Volume adjustment

Q	Flow adjustment screw (standard)

Options

KL	Key lock compensator

Modification number

XXXX	Determined by manufacturer

TECHNICAL INFORMATION

3.1.2 Specifications

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

3.1.3 Hydraulic fluids

The pump series is designed for use with:

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

Synthetic fluids
(Polyolester, HFD-U)

3.1.4 Viscosity range

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

3.1.5 Temperature range

-10 to +50 °C

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

3.1.6 Seals

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

3.1.7 Filtration

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

18/16/13 to ISO 4406:1999

or

Class 7 to NAS 1638 or cleaner.

3.1.8 Max. drive and through drive torques

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

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

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

3.1.9 Through drive models

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

* PGI102-2 NOT 22 cm³ and 25 cm³

For other possible through drives, please contact HYDAC.

3.1.10 Installation notes

Step 1

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

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

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

Step 2

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

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

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

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

Step 3

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

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

Other types of motor-pump couplings are not permitted.

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

Step 4

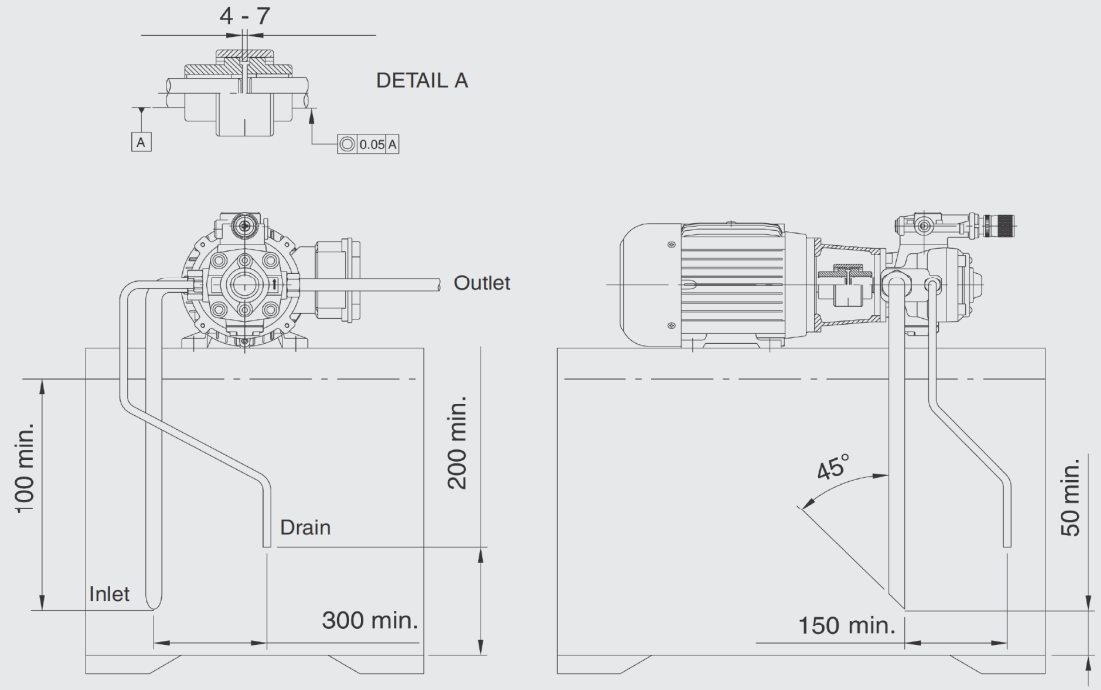
During commissioning, the pump must firstly be run at maximum capacity (P connected to T), with the oil flowing directly into the tank, in order to vent the pump. Size 2 and 3 have an air bleed port on the compensator.

Venting the pump can take several minutes.

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

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

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



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

3.1.11 Adjustments

Pump size	Available displacement [cm³]	Volume adjustment screw rate [cm³]	Min. adjustable displacement [cm³]
PVV100-1-20	22.1	2.7	9.6
PVV100-1-25	26.9	7.5	9.6
PVV100-2-31	34.5	11.7	16.4
PVV100-2-40	42.8	1.5	16.4
PVV100-2-50	53.1	9.8	16.4
PVV100-3-63	69	20.9	23.7
PVV100-3-80	86.2	26.9	23.7
PVV100-3-100	105.5	45.5	23.7

CONTROL OPTIONS

Diagrams and characteristic curves for pressure control:

❶ Pump with standard pressure control

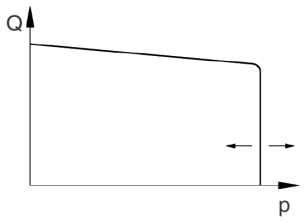
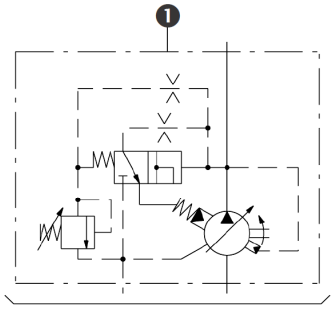
❷ Pump with pressure control
with CETOP 03 (UNI ISO 4401-03) interface

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

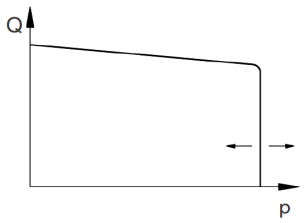
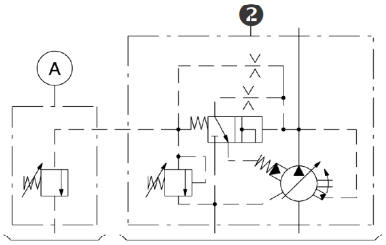
❷ Pump with proportional pressure control
with CETOP 03 (ISO 4401-03) interface

Ordering code	P	CS005

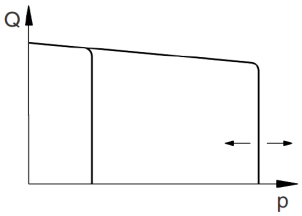
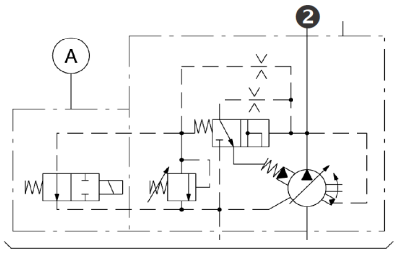
3.1.12 Standard pressure control

Description	Performance characteristics	Hydraulic circuit
Standard pump with standard pressure control		

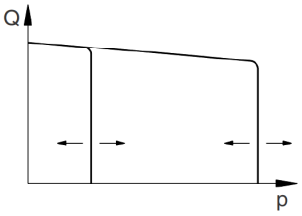
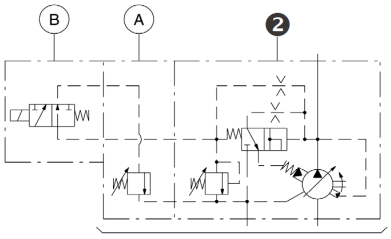
3.1.13 Remote pressure control

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

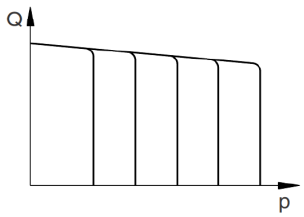
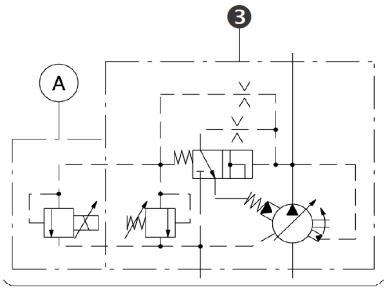
3.1.14 2-stage pressure control, one stage non-adjustable

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

3.1.15 2-stage pressure control, adjustable

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

3.1.16 Proportional pressure control

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

CONTROL OPTIONS

Diagrams and characteristic curves for combined load sensing and pressure control

❹ Load sensing pump with standard pressure control

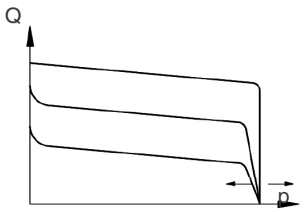
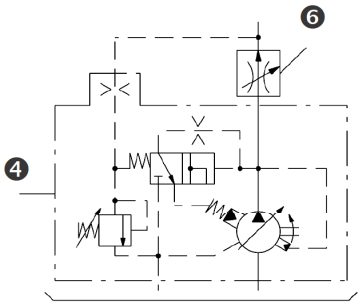
Ordering code	P	CLS001

❺ Load sensing pump
with CETOP 03 (ISO 4401-03) interface

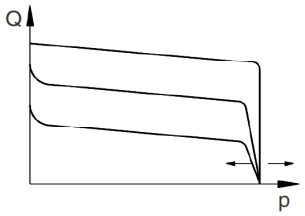
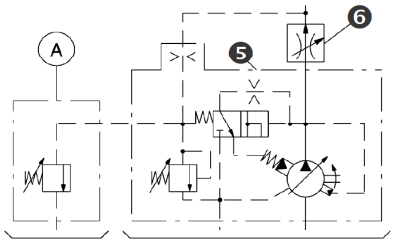
Ordering code	P	CLS002 - 3 - 4 - 5

❻ Throttle valve not supplied.

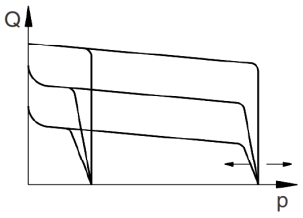
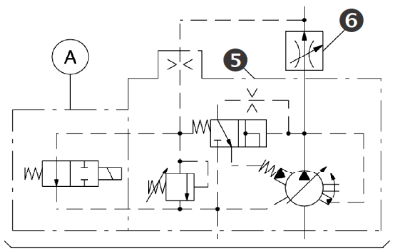
3.1.17 Load sensing and standard pressure control

Description	Control curves	Hydraulic circuit
Load sensing pump with standard pressure control. Ordering code | P | CLS001		

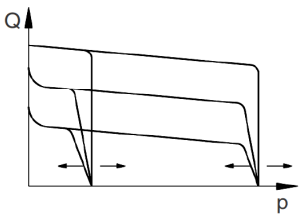
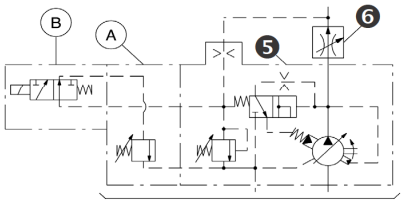
3.1.18 Load sensing and remote pressure control

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

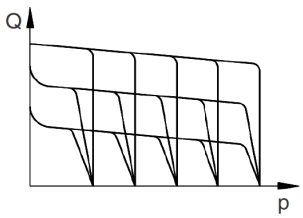
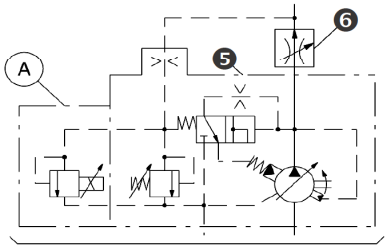
3.1.19 Load sensing and 2-stage pressure control, one stage non-adjustable

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

3.1.20 Load sensing and 2-stage pressure control, adjustable

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

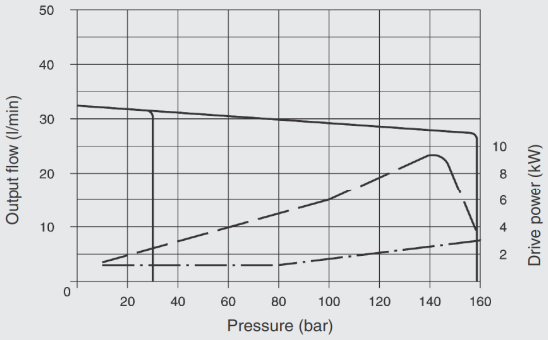
3.1.21 Load sensing and proportional pressure control

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

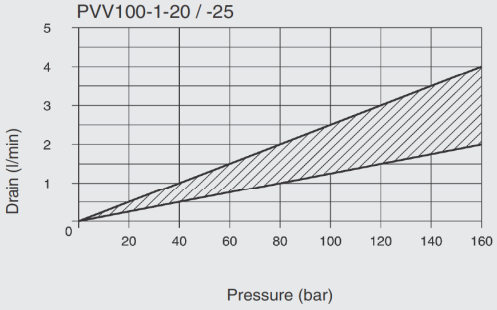
PERFORMANCE DATA

3.1.22 PVV100-1-20 / -25

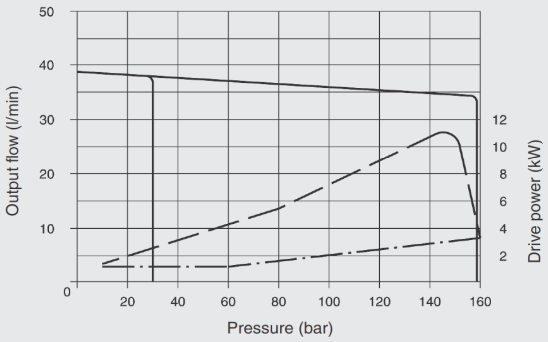
Volumetric efficiency
PVV100-1-20



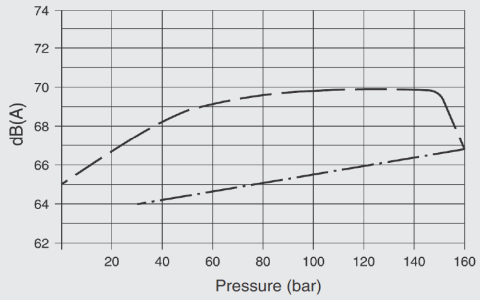
Drain
Values determined with pump on zero flow setting
PVV100-1-20 / -25



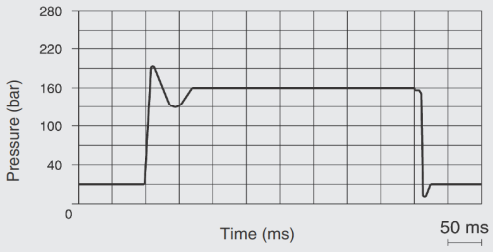
Volumetric efficiency
PVV100-1-25



Maximum noise level
with sound-level meter placed 1 meter away from pump, flexible coupling
PVV100-1 -20 / -25



Response times and peak pressure
PVV100-1-20 / -25



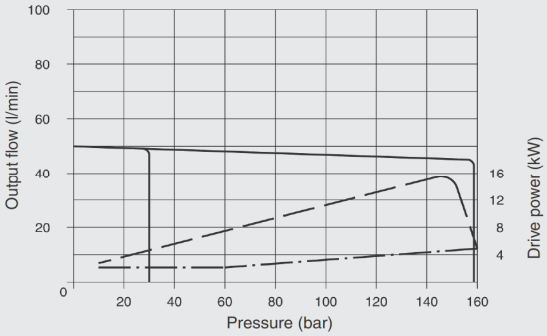
Drive power at maximum displacement

Drive power at zero flow setting

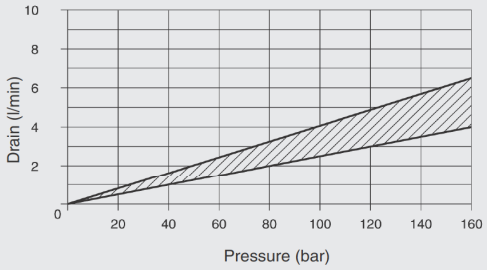
Pressure peaks are due to the test system.
Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

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

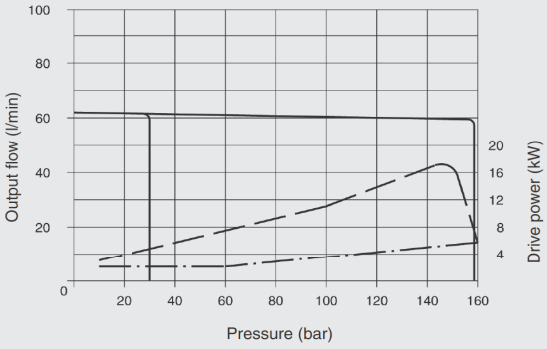
Volumetric efficiency
PVV100-2-31



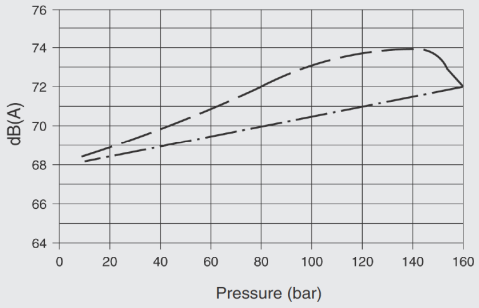
Drain
Values determined with pump on zero flow setting
PVV100-2-31 / -40 / -50



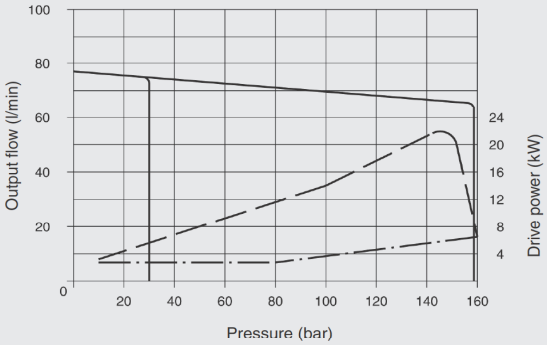
Volumetric efficiency
PVV100-2-40



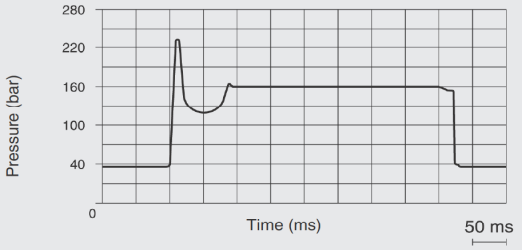
Maximum noise level
with sound-level meter placed 1 meter away from pump, flexible coupling
PVV100-2-31 / -40 / -50



Volumetric efficiency
PVV100-2-50



Response times and peak pressure
PVV100-2-31 / -40 / -50



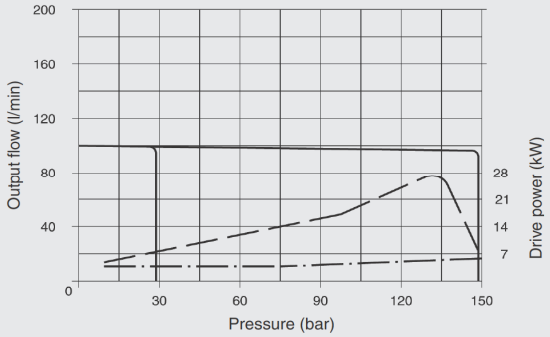
Drive power at maximum displacement

Drive power at zero flow setting

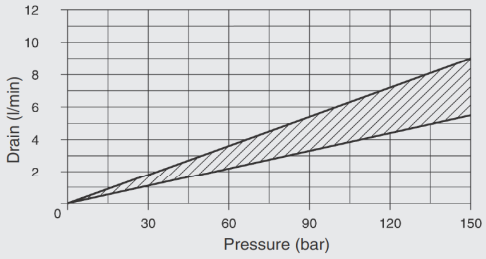
Pressure peaks are due to the test system.
Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

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

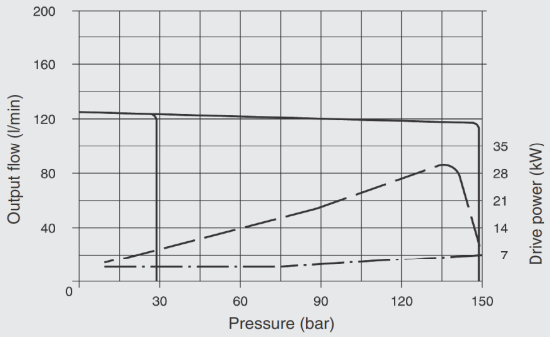
Volumetric efficiency
PVV100-3-63



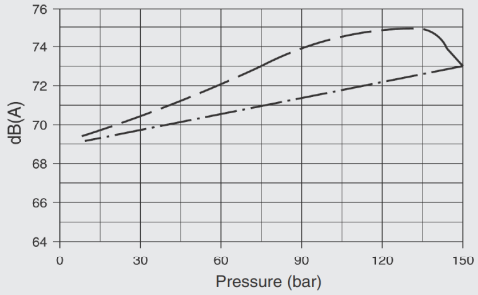
Drain
Values determined with pump on zero flow setting
PVV100-3-63 / -80 / -100



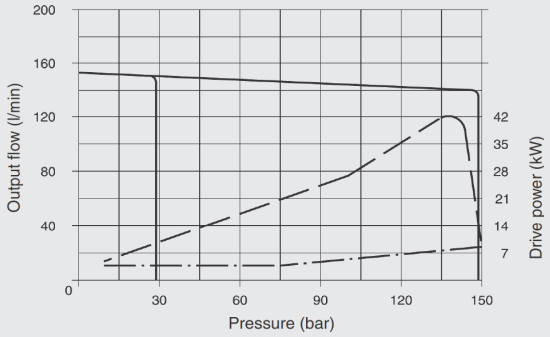
Volumetric efficiency
PVV100-3-80



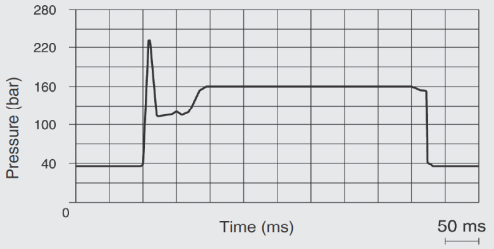
Maximum noise level
with sound-level meter placed 1 meter away from pump, flexible coupling
PVV100-3-63 / -80 / -100



Volumetric efficiency
PVV100-3-100



Response times and peak pressure
PVV100-3-63 / -80 / -100



Drive power at maximum displacement

Drive power at zero flow setting

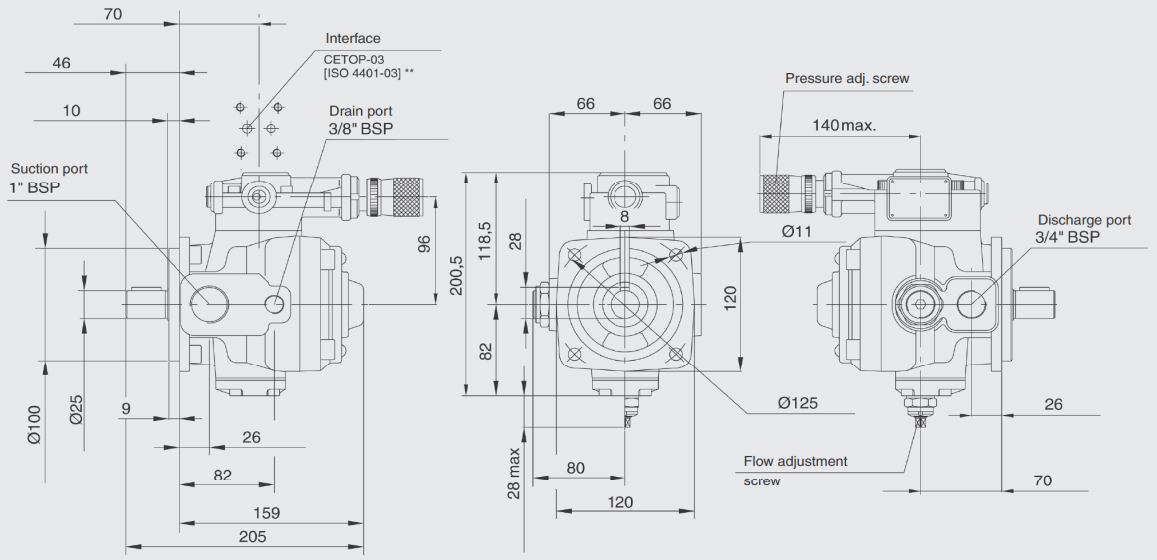
Pressure peaks are due to the test system.
Pressure peaks exceeding 30 % of the maximum operating pressure must be avoided.

3

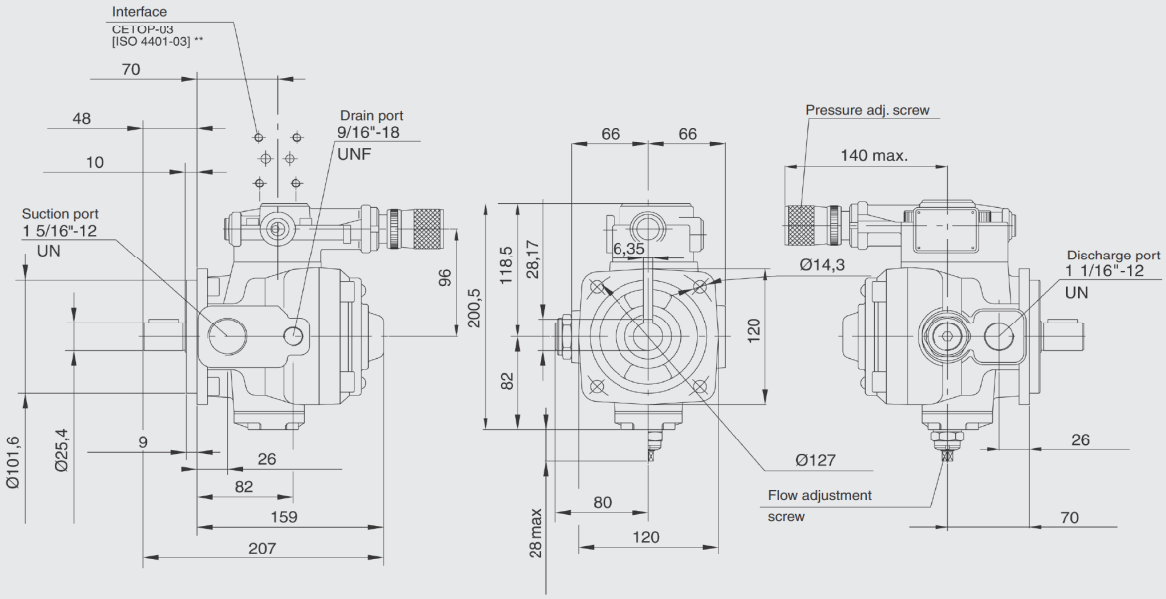
DIMENSIONS

3.1.25 PVV100-1-20 / -25

PVV100-1-20 / -25 (F)

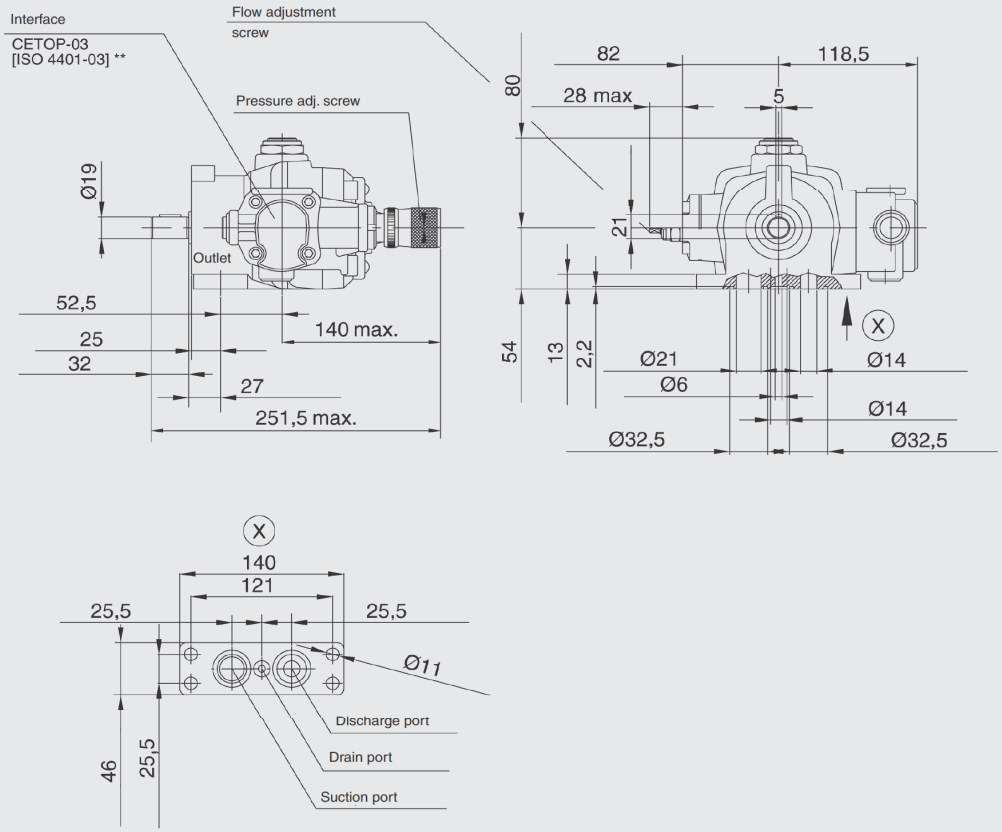


PVV100-1-20 / -25 (US)



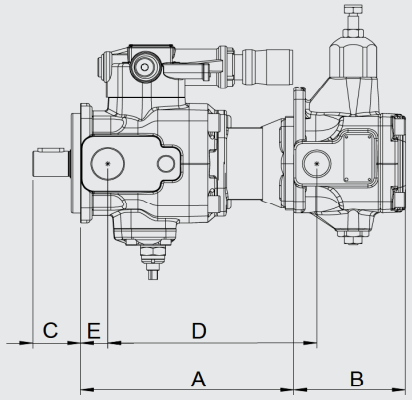
** dependent on model selected

PVV100-1-20 / -25 (B)

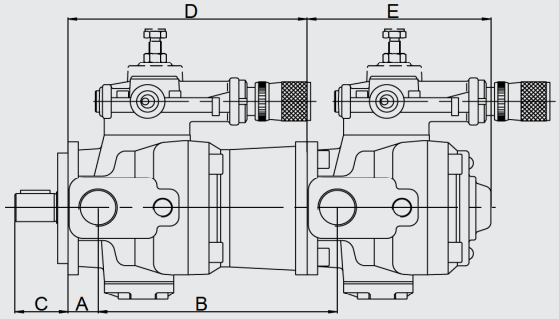


** dependent on model selected

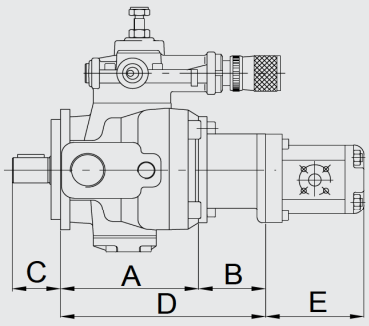
Multiple pumps
Front pump PVV100-1- ... F



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



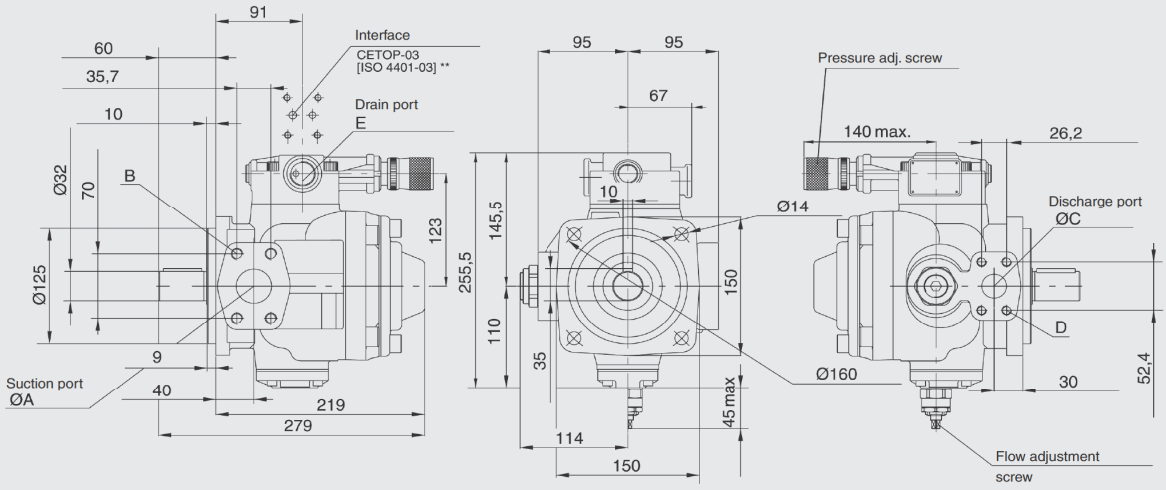
End pump	A	B	C	D	E
PVV100-1- ... F/ PVV101-1- ... F	26	207	46	207	159



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

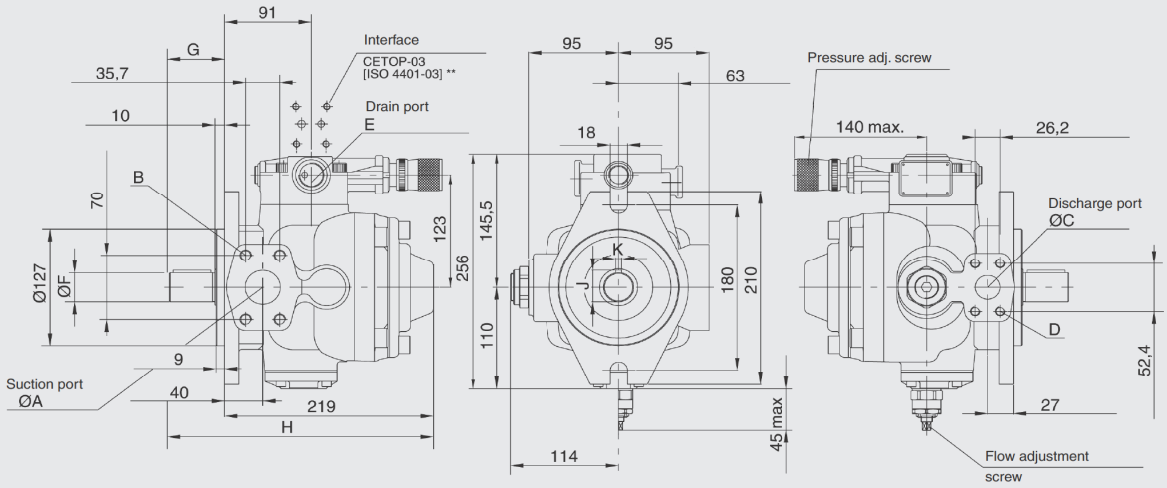
3.1.26 PVV100-2-31 / -40 / -50

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



Flange	ØA	B	ØC	D	E
F (ISO)	38	SAE (3000) 1 ½" M12 x 45	25	SAE (3000) 1" M10 x 35	¾" BSP
F UNC (ISO) as end pump	38	SAE (3000) 1 ½" ½"-13 UNC	25	SAE (3000) 1" ⅜"-16 UNC	1 1⁄16"-12 UN

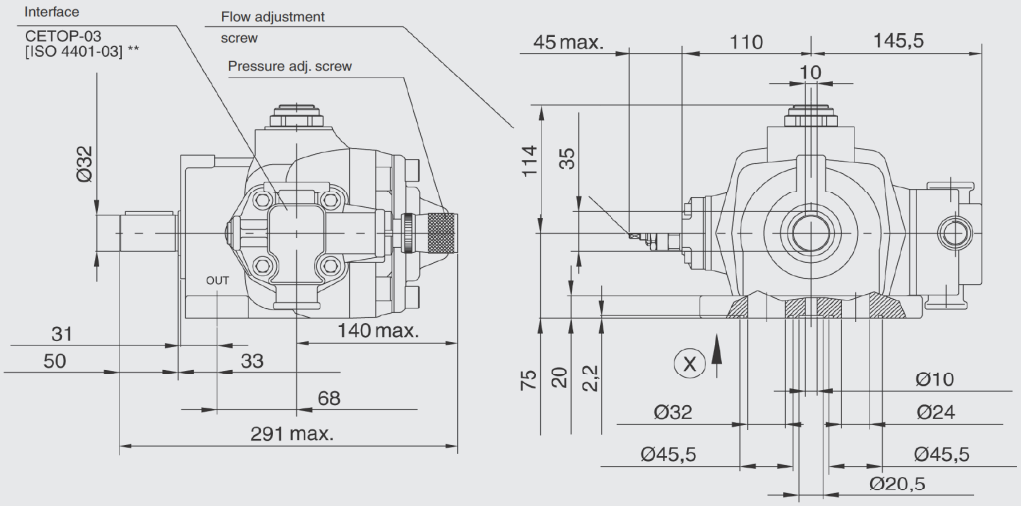
PVV100-2-31 / -40 / -50 (FS / US)

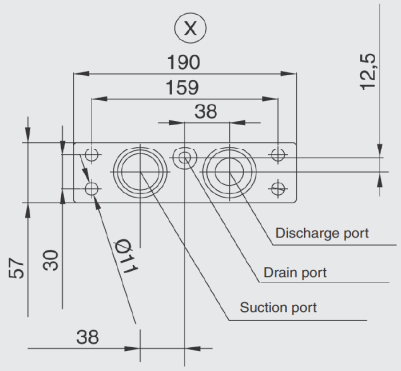


Flange	ØA	B	ØC	D	E	ØF	G	H	J	K
FS (SAE)	38	SAE (3000) 1 ½" M12 x 45	25	SAE (3000) 1" M10 x 35	¾" BSP	32	60	279	35	10
US (SAE)	38	SAE (3000) 1 ½" ½"-13 UNC	25	SAE (3000) 1" ⅜"-16 UNC	1"1⁄16-12 UN	31.75	58	277	34.5	6.35

** dependent on model selected

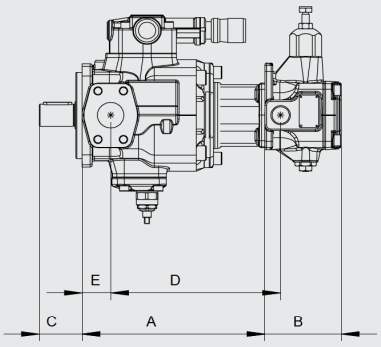
PVV100-2-31 / -40 / -50 (B)



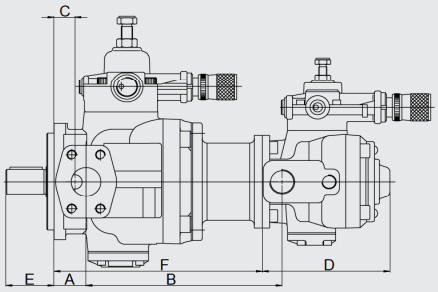


** dependent on model selected

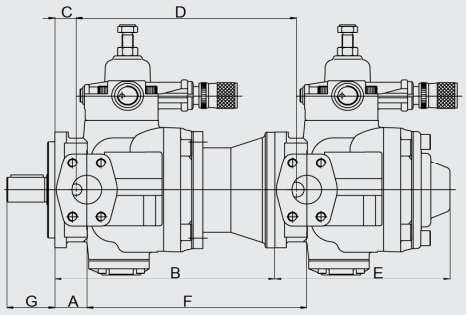
Multiple pumps
Front pump PVV100-2- ... F



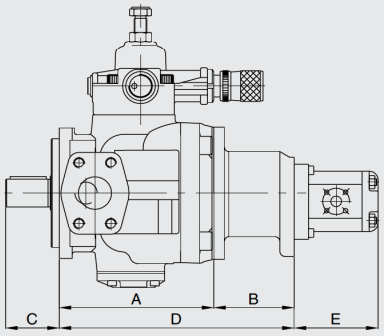
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	238	46
PVV102-05- ... F-GR2	261	107	60	243	46



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



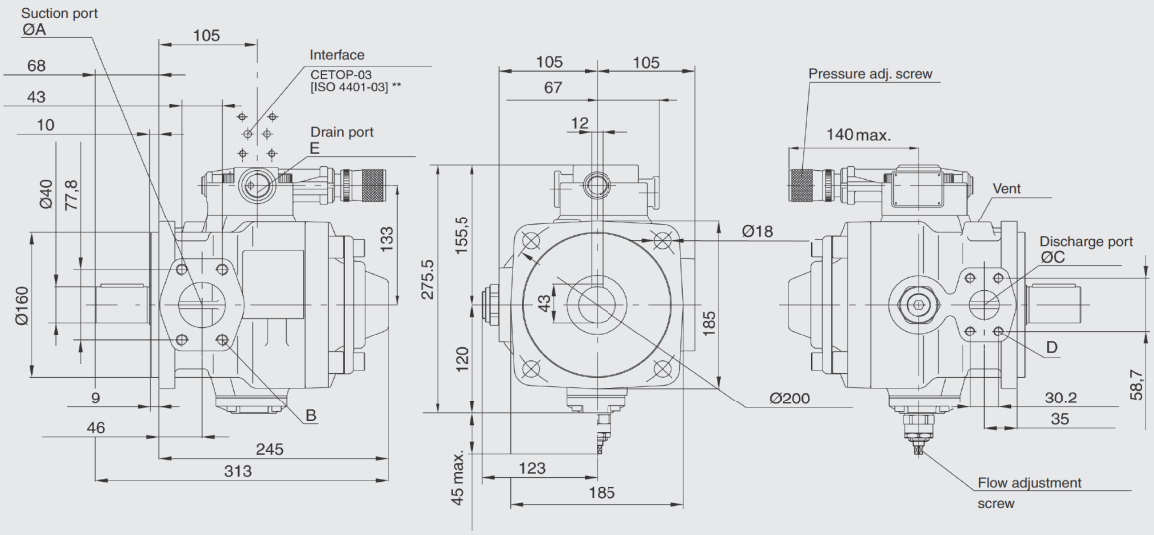
End pump	A	B	C	D	E	F	G
PVV100-2- ... F/ PVV101-2- ... F	40	275	30	275	220	275	60



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

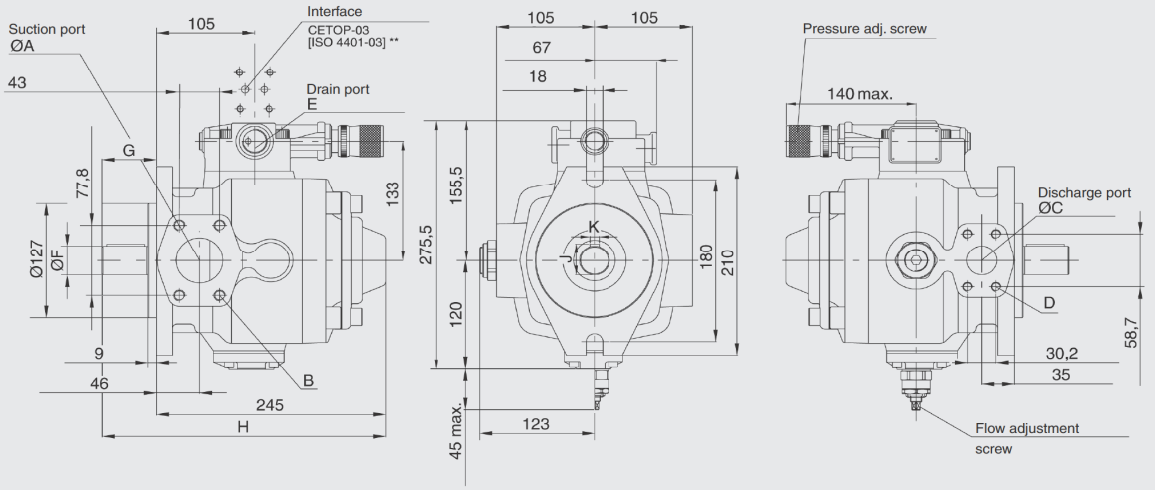
3.1.27 PVV100-3-63 / -80 / -100

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



Flange	ØA	B	ØC	D	E
F (ISO)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 ¼" M10 x 40	¾" BSP
F UNC (ISO) as end pump	51	SAE (3000) 2" ½"-13 UNC	32	SAE (3000) 1 ¼" 7/16"-14 UNC	1 1/16"-12 UN

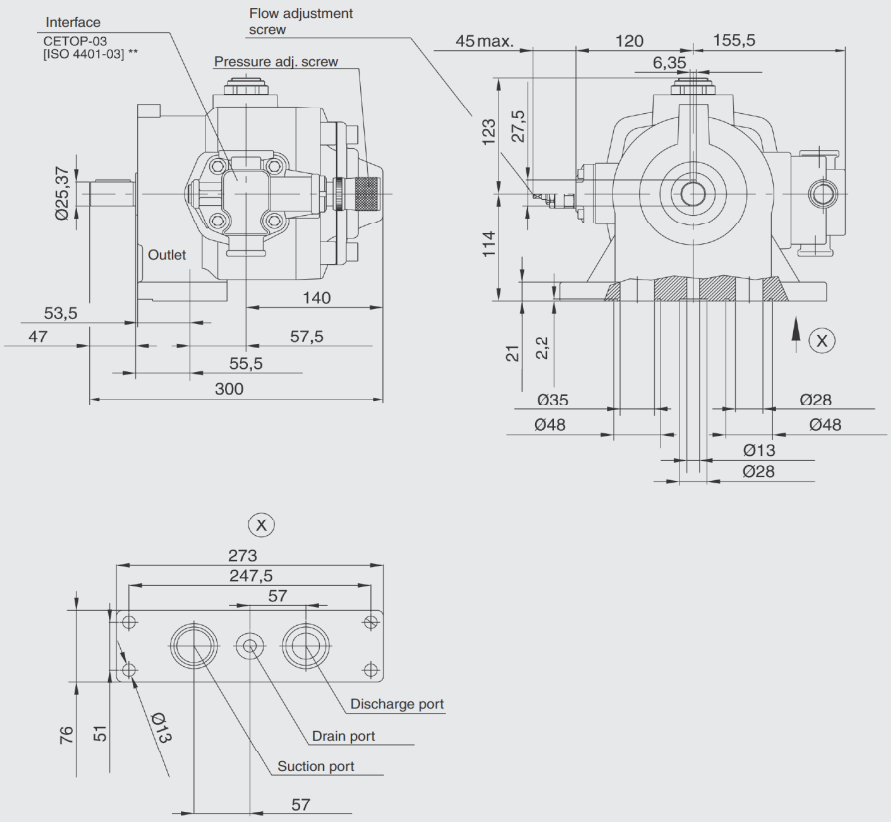
PVV100-3-63 / -80 / -100 (FS / US)



Flange	ØA	B	ØC	D	E	ØF	G	H	J	K
FS (SAE)	51	SAE (3000) 2" M12 x 45	32	SAE (3000) 1 ¼" M10 x 40	¾" BSP	32	60	305	35	10
US (SAE)	51	SAE (3000) 2" ½"-13 UNC	32	SAE (3000) 1 ¼" 7/16"-14 UNC	1"1/16-12 UN	31.75	58	303	34.5	6.35

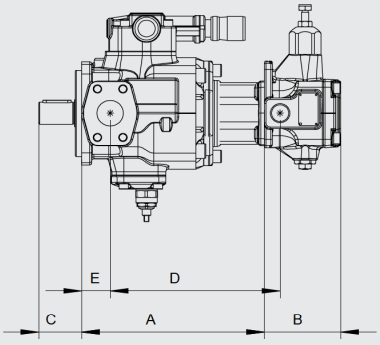
** dependent on model selected

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

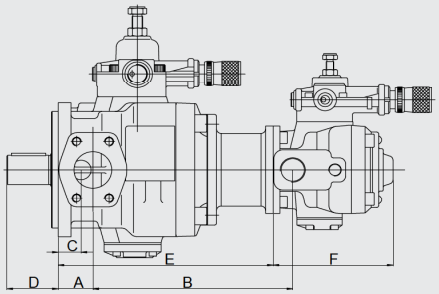


** dependent on model selected

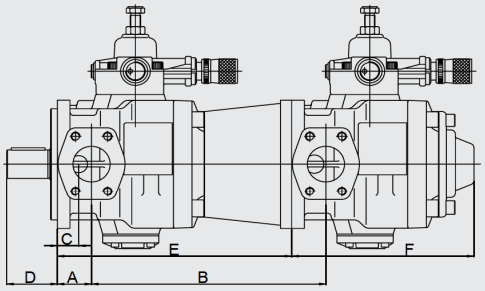
Multiple pumps
Front pump PVV100-3- ... F



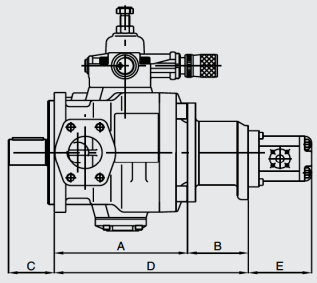
End pump	A	B	C	D	E
PVV102-05- ... F / US	256	107	60	238	46
PVV102-05- ... F-GR2	261	107	60	243	46



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



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



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