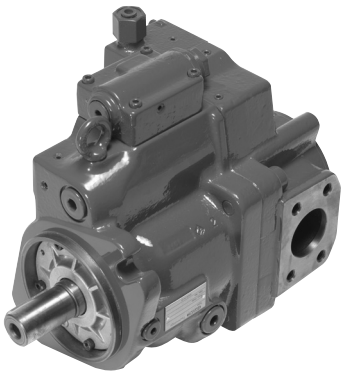


2.3 MEDIUM HEAVY DUTY SERIES

CONTENTS PPV101

ORDERING CODE

2.3.1 Medium Heavy Duty Series

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

Axial piston pump
Medium Heavy Duty Series

Size

45	45 cm³/rev
80	80 cm³/rev
112	112 cm³/rev
140	140 cm³/rev
200	200 cm³/rev

Design series: B

Seals

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

Open circuit: 1

Through drive and ports

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

Shaft rotation

R	Clockwise
L	Anti-clockwise

(viewed from shaft end)

Mounting flange and shaft

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

* Standard models

Connection threads

M	Metric threads
S	UNC threads

Control type

P	Remote pressure compensator
L	Load sensing and pressure control

Additional pressure control

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

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

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

Additional control options

–	No additional control

Torque limiter control

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

** For settings, see next page

Displacement control

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

Modification number

XXXX	Determined by manufacturer

2.3.2 Torque limiter settings

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

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

TECHNICAL INFORMATION

2.3.3 Specifications

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

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

2.3.4 Hydraulic fluids

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

For use with other fluids, please contact HYDAC.

2.3.5 Viscosity range

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

2.3.6 Temperature range

-20 to +95 °C

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

2.3.7 Fire-resistant fluids

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

○ = Recommended

△ = Acceptable but with reduced pump life

2.3.8 Seals

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

2.3.9 Filtration

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

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

2.3.10 Adjustments

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

2.3.11 Max. drive and through drive torques

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

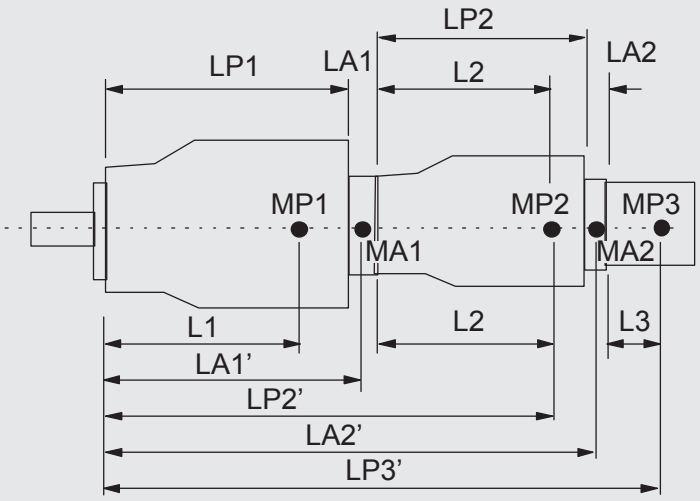
Pump size		112		140		200	
Maximum torque on primary shaft [Nm]		980*1		980*1		980	1800
Mounting flange	Standard	SAE C and D	ISO 180	SAE C and D	ISO 180	SAE E	SAE E
	Bolts	2 and 4	4	2 and 4	4	4	4
Drive shaft	Standard	SAE C, CC and D	ISO 45 mm	SAE C, CC and D	ISO 45 mm	SAE D	SAE F
	Type	Splined shaft /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

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

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

2.3.12 Through drive limitations

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



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

Bending moment = ((L1.mP1) + (LA1'.mA1) + (LP2'.mP2) +(LA2'.mA2) +LP3'.mP3) +…)/102[Nm]
((L1.mP1)
+ (LP1+(LA1/2)).mA1
+ (LP1+LA1+L2).mP2
+ (LP1+LA1+LP2(LA2/2)).mA2)
+ (LP1+LA1+LP2+LA2).mP3)
+……)/102

Pump overall length [mm] (Lp)

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

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

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

Pump weight [kg] (MP)

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

Pump adapter weight (MA) & Length (LA)

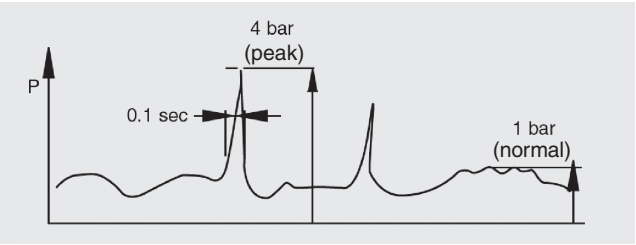
Size	Adapter kit	Weight (MAx)	Length (LAx)
45	SAE "A"	0	0
	SAE "B" & "BB"	2	20
80	SAE "A"	0	0
	SAE "B" & "BB"	3	20
	SAE "C" & "C4"	4	24.5
112 / 140	SAE "A"	0	0
	SAE "B" & "BB"	3	25
	SAE "C" & "CC" & "C4"	5	30
	SAE "D"	10	43
200	SAE "A"	1	6
	SAE "B" & "BB"	8	25
	SAE "C" & "CC" & "C4"	8	30
	SAE "D"	10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

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

2.3.13 Installation notes

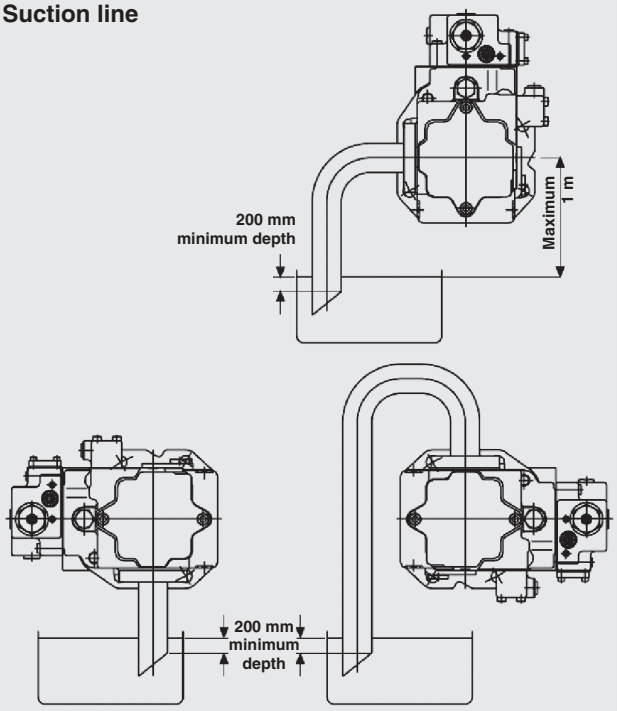
The pump should be installed horizontally with the case drain line initially rising above the level of the pump before continuing to the tank as shown in the diagram below. Do not connect the drain line to the suction line.

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



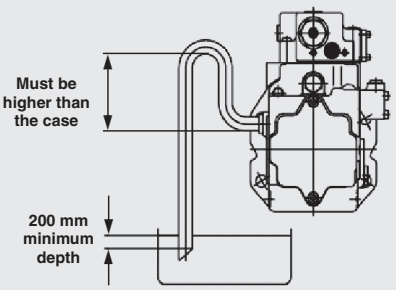
Installing the pump above the tank

Suction line



Drain line

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



Precautions:

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

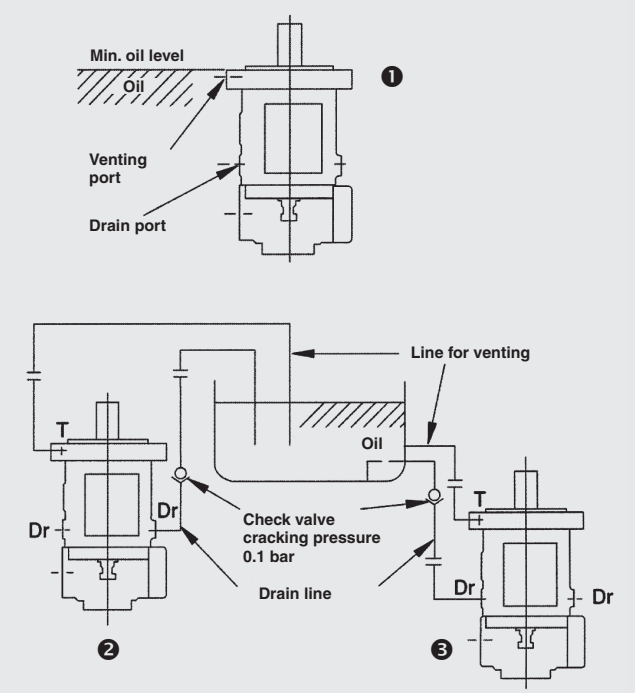
Vertical installation of the pump

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

The oil level in the tank should be higher than the pump mounting flange (see diagram ❶).
If the oil level in the tank is lower than the mounting flange, forced lubrication is required through the venting port (1 - 2 l/min.)

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

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

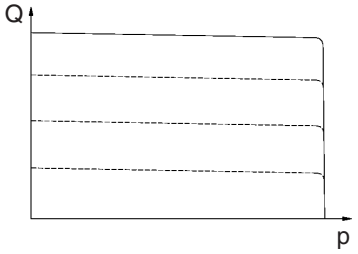
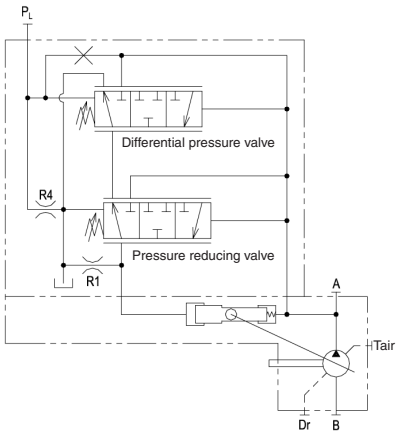


A check valve with a cracking pressure of 0.1 bar should be installed at the case drain port as shown.

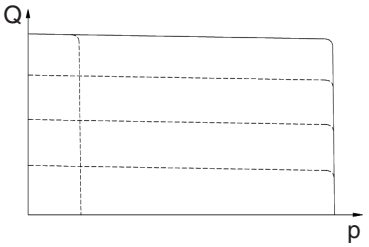
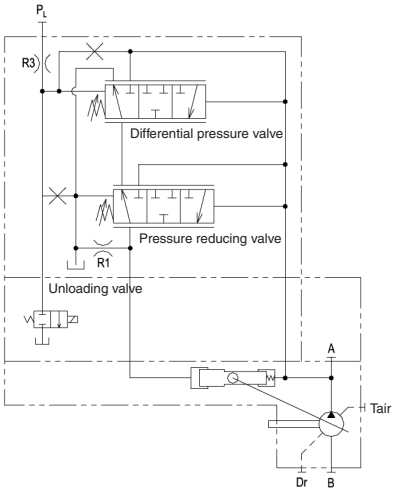
Recommended check valves:

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

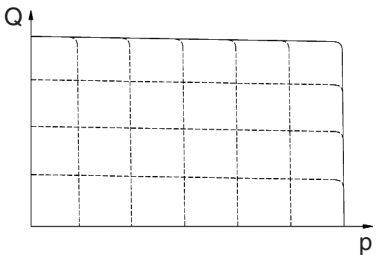
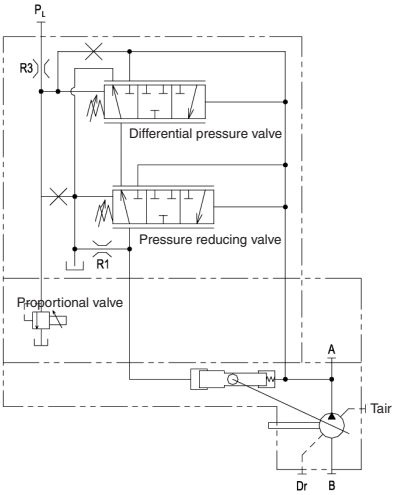
2.3.14 Load sensing and pressure cut-off- L0 / L1

Description	Performance characteristics	Hydraulic circuit
The pump displacement is controlled to match the flow requirements as a function of the system differential pressure (load pressure vs. pump pressure). In addition, there is a pressure cut-off function incorporated into the control. With the L1 option, R4 orifice is plugged. The factory setting of the differential pressure is 15 bar. The adjustment range is from 10 to 30 bar.		

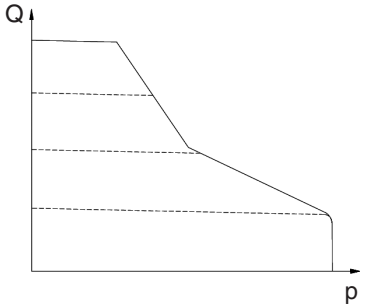
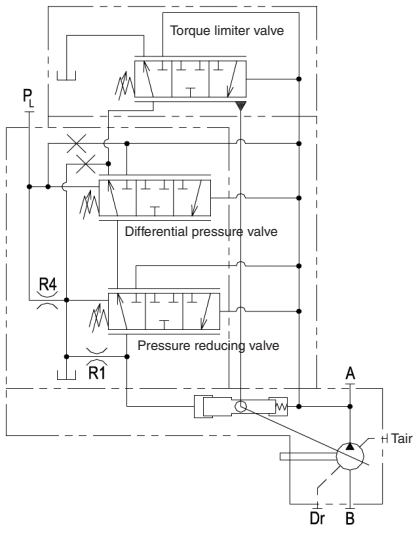
2.3.15 Load sensing and pressure cut-off with integrated unloading valve – LN / LM

Description	Performance characteristics	Hydraulic circuit
A solenoid unloading valve is installed between the load sensing control and the pump which, when activated, de-strokes the swash plate. On the LM type, the solenoid valve must be energized for the load sensing function to be activated.		

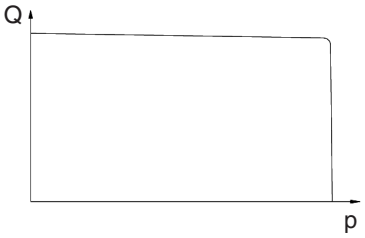
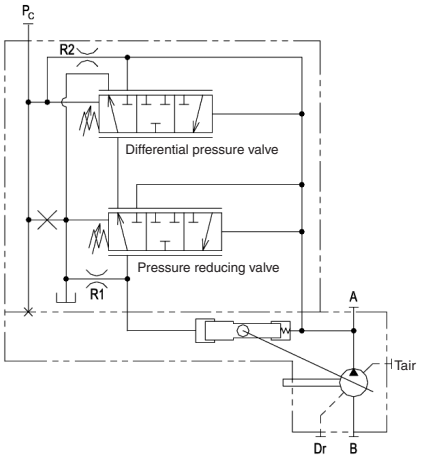
2.3.16 Load sensing and pressure cut-off with integrated proportional pressure relief valve – LV

Description	Performance characteristics	Hydraulic circuit
A solenoid proportional pressure relief valve is installed between the load sensing regulator and the pump to control the maximum pressure. An electrical amplifier card is also required.		

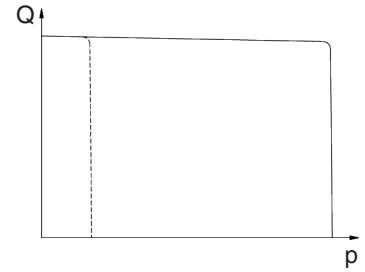
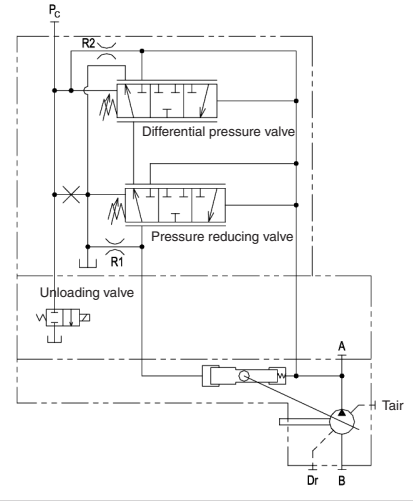
2.3.17 Load sensing and pressure cut-off with torque limiter – L0/1-xx

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

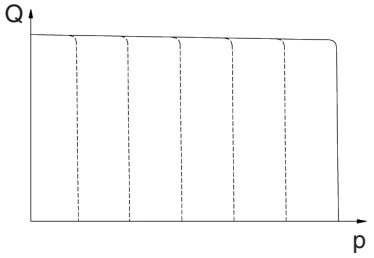
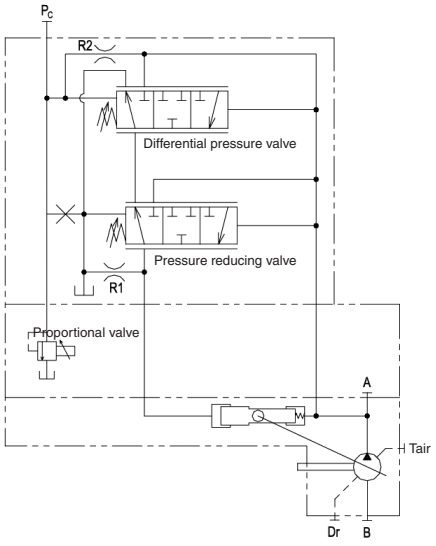
2.3.18 Pressure cut-off – P0

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

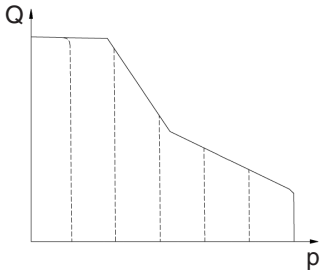
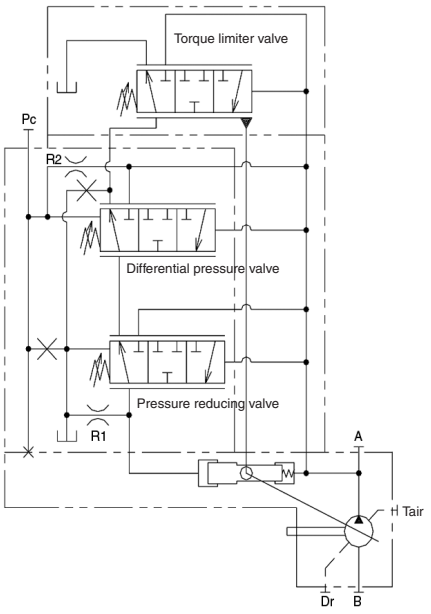
2.3.19 Pressure cut-off with integrated unloading valve - PN/ PM

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

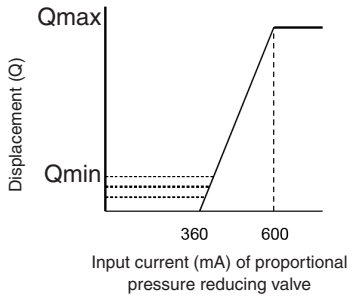
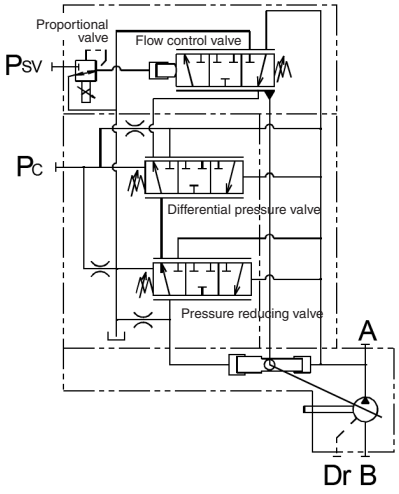
2.3.20 Pressure cut-off with integrated proportional pressure relief valve - PV

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

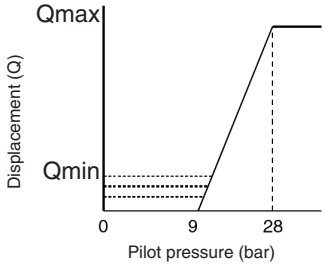
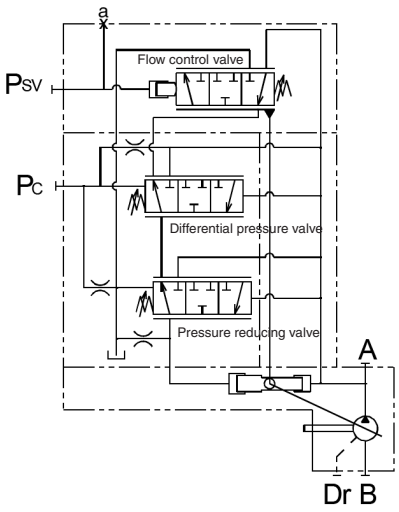
2.3.21 Pressure cut-off with torque limiter - P0/1-xx

Description	Performance characteristics	Hydraulic circuit
P0 control functions as before. In response to a rise in operating pressure, the swash plate adjustment angle is reduced, limiting the input torque. This regulator prevents an overload of the drive motor. The torque limit control module consists of two springs that oppose the spool force generated by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set. **Note:** An external pressure control can be connected to the Pc port.		

2.3.22 Electrical displacement control – /1-E0

Description	Performance characteristics	Hydraulic circuit
Varying the input signal to the proportional pressure reducing valve (PPRV) allows the user to control the pump displacement. As the input current to the PPRV increases, the pump displacement increases proportionally. Note: An external supply pressure of 40 bar is required at the pressure control (Psv) port (50 bar max).		

2.3.23 Pilot-operated displacement control – /1-Q0

Description	Performance characteristics	Hydraulic circuit
Varying the input pressure at the Psv port allows the user to control the pump displacement. As the inlet pressure increases, the pump displacement increases proportionally.		

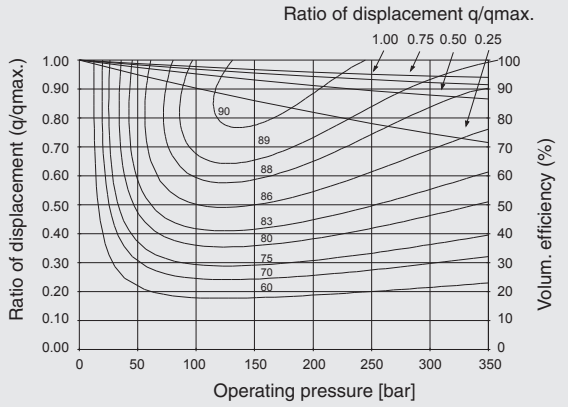
Recommended valve for use with remote pressure control

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

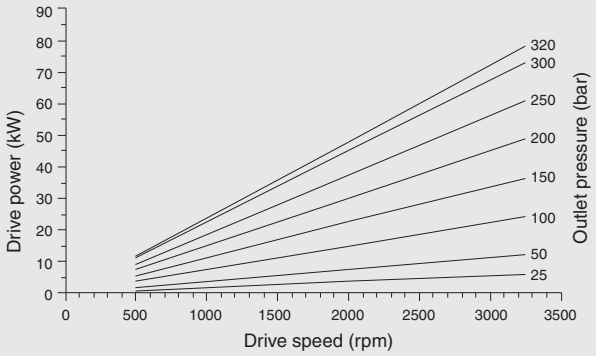
PERFORMANCE DATA

2.3.24 PPV101-45

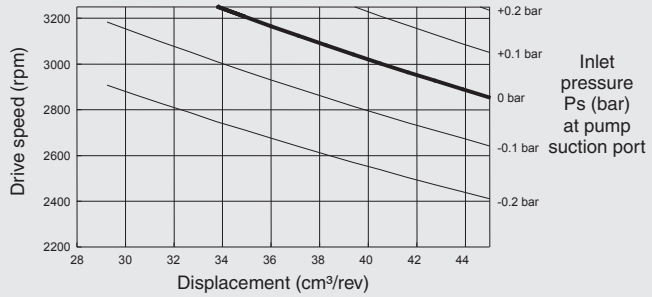
● **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs.), test temperature 50 °C, viscosity 31 cSt (ISO VG 46)



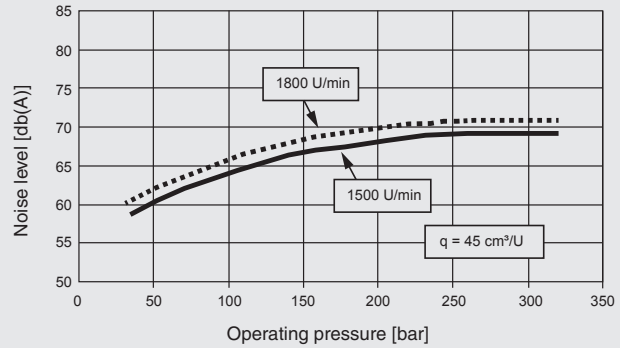
● **Power curve**
Note: Suction pressure 1 bar abs., max. displacement



● **Self-priming capability**



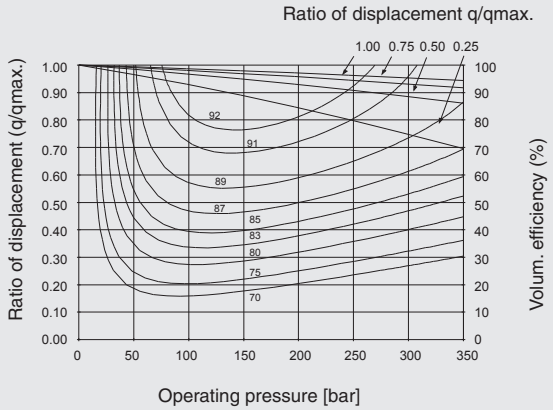
● **Noise level**



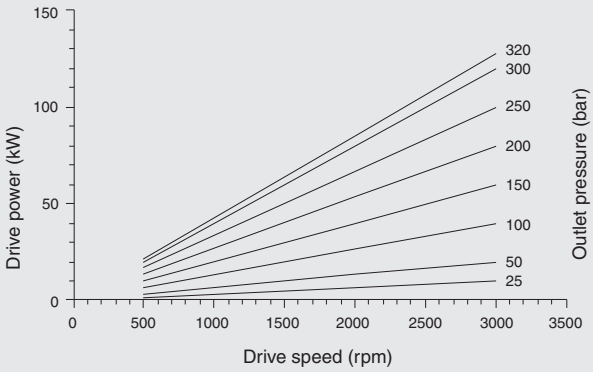
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

2.3.25 PPV101-80

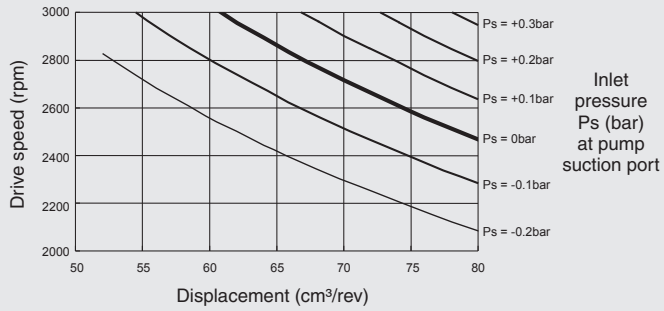
● **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs.), test temperature 50 °C, viscosity 31 cSt (ISO VG 46)



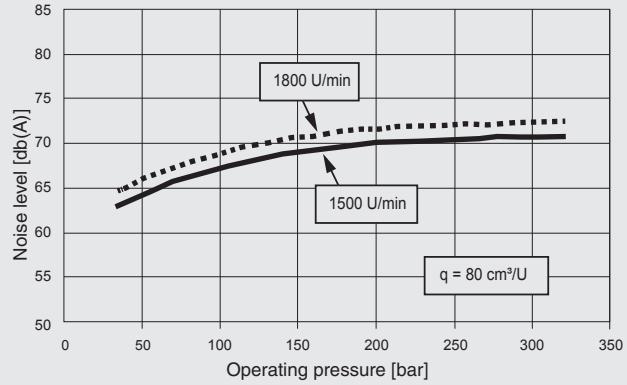
● **Power curve**
Note: Suction pressure 1 bar abs., max. displacement



● **Self-priming capability**

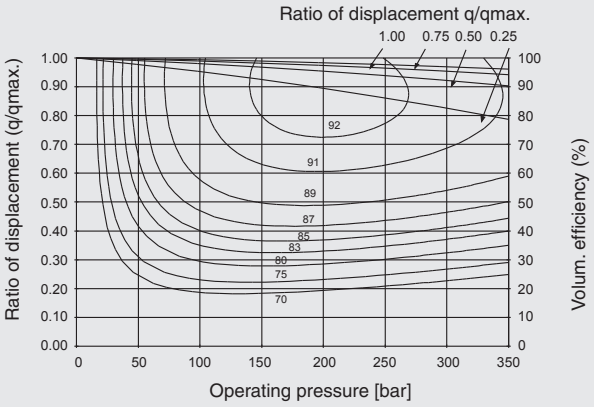


● **Noise level**

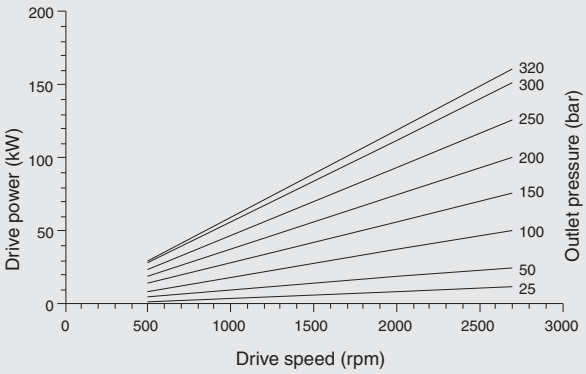


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

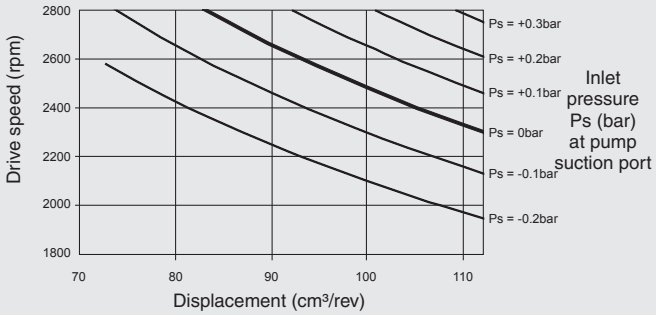
- **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs.), test temperature 50 °C, viscosity 31 cSt (ISO VG 46)



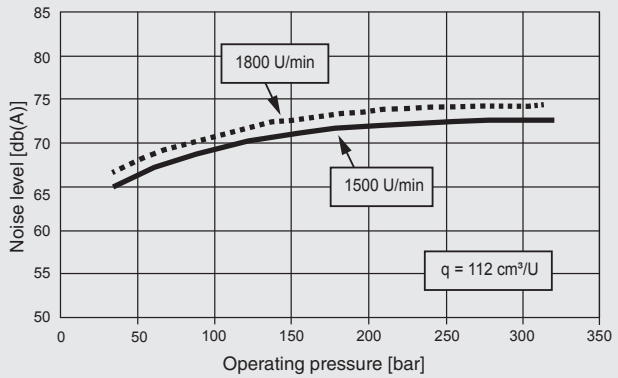
- **Power curve**
  Note: Suction pressure 1 bar abs., max. displacement



- **Self-priming capability**



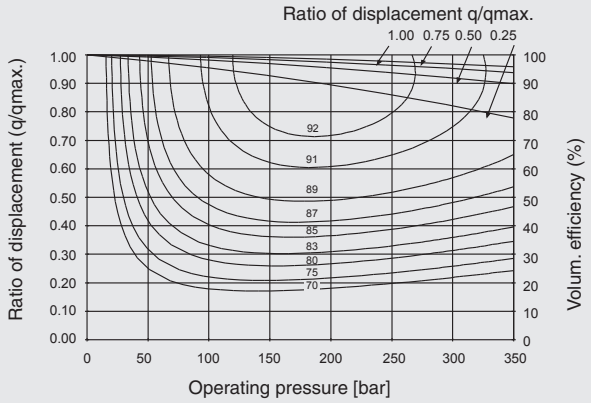
- **Noise level**



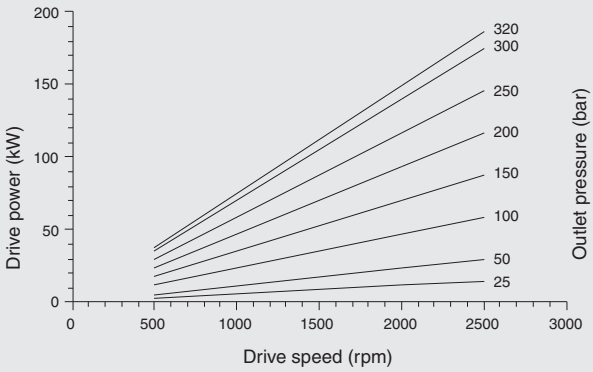
* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

2.3.27 PPV101-140

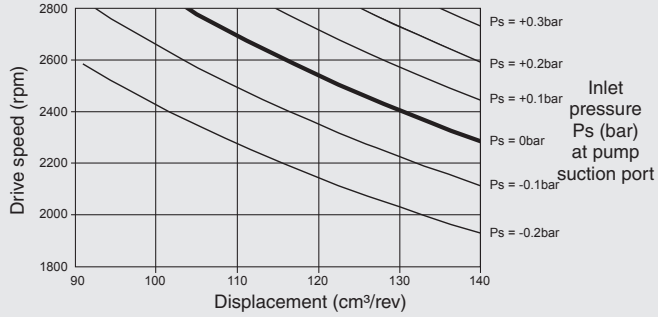
● **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs.), test temperature 50 °C, viscosity 31 cSt (ISO VG 46)



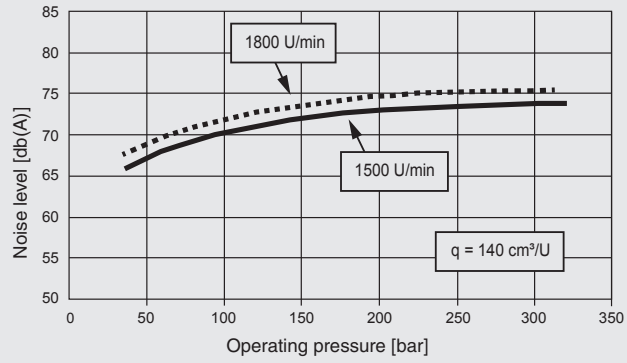
● **Power curve**
Note: Suction pressure 1 bar abs., max. displacement



● **Self-priming capability**

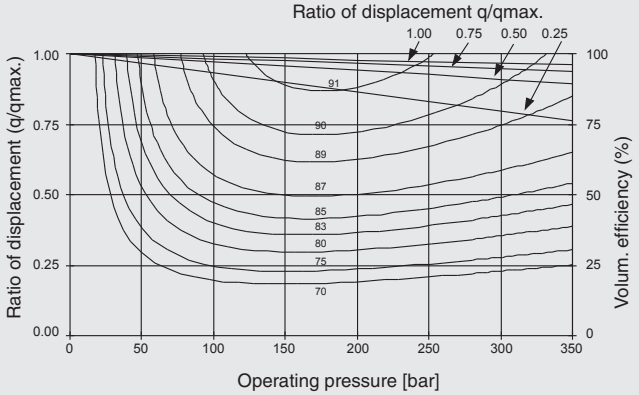


● **Noise level**

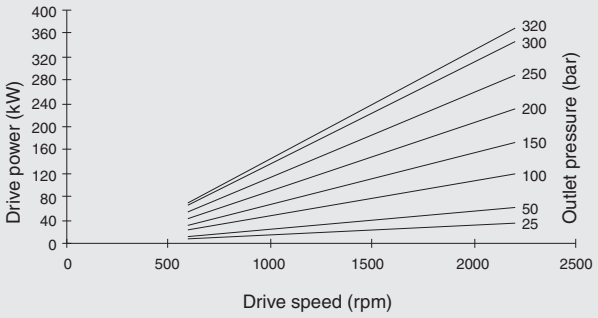


* measured with noise level meter 1 metre away from pump in an anechoic room using a flexible coupling to DIN45635

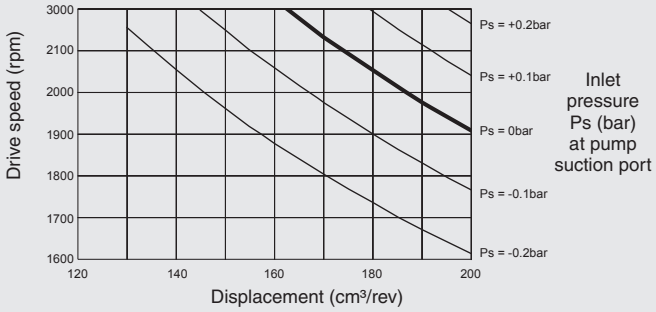
● **Efficiency** (speed range 1500 rpm and 1800 rpm with suction pressure 1 bar abs.), test temperature 50 °C, viscosity 31 cSt (ISO VG 46)



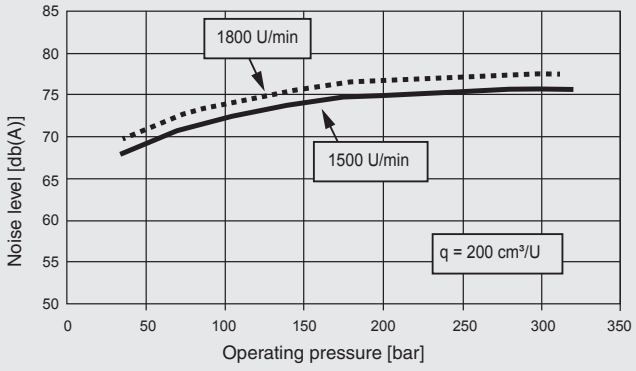
● **Power curve**
Note: Suction pressure 1 bar abs., max. displacement



● **Self-priming capability**



● **Noise level**



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

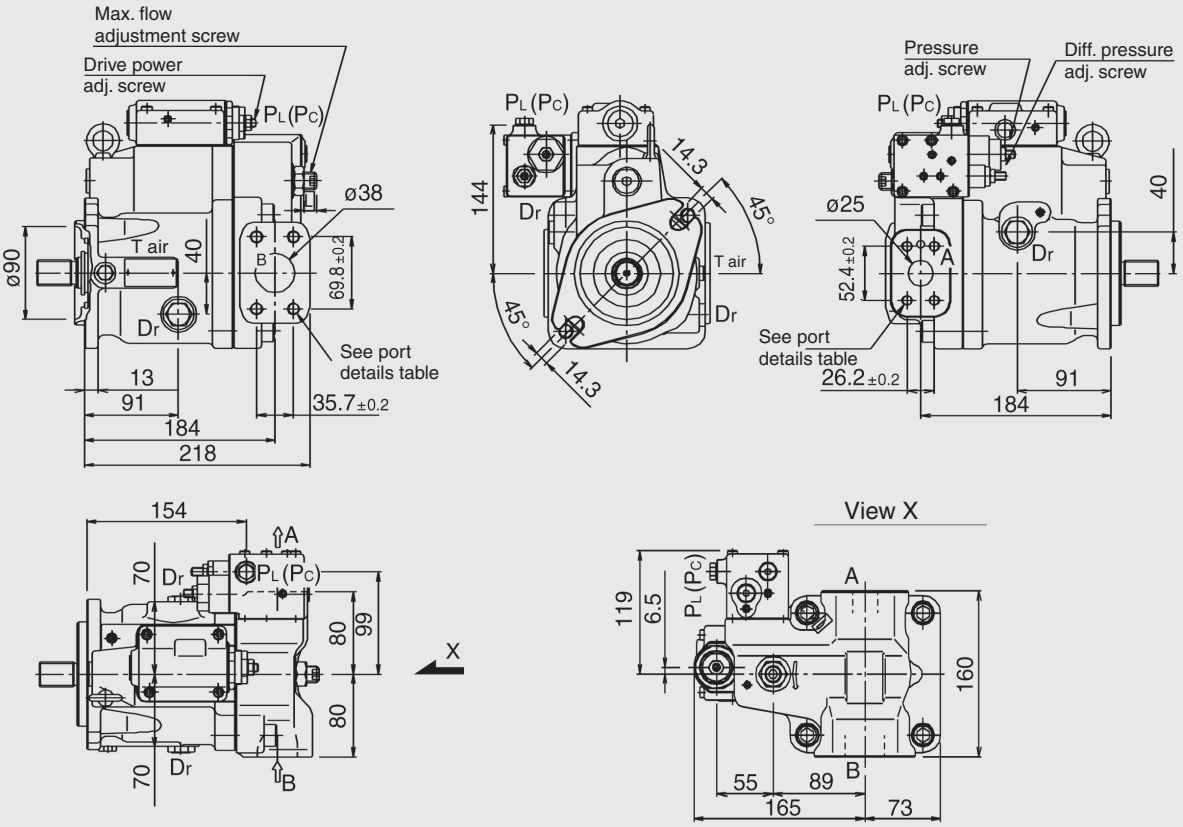
DIMENSIONS

2.3.29 PPV101-45

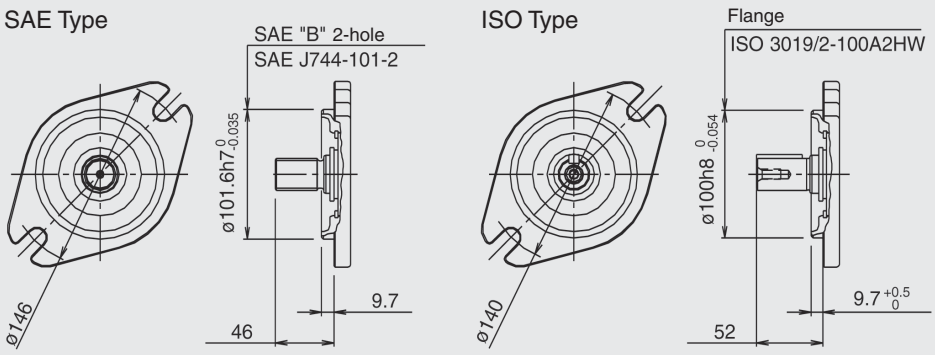
PPV101-45 with cut-off / load sensing control and torque limiter module (clockwise rotation)

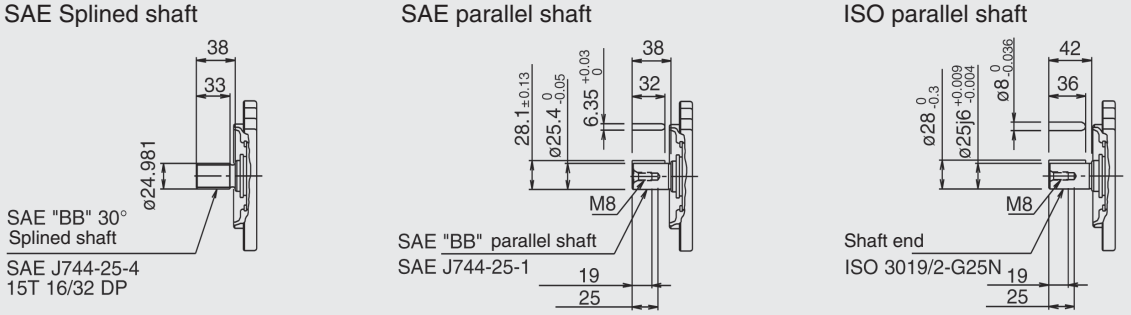
Note: for anti-clockwise rotation, suction port "B" and discharge port "A" are reversed

Single pump "0"

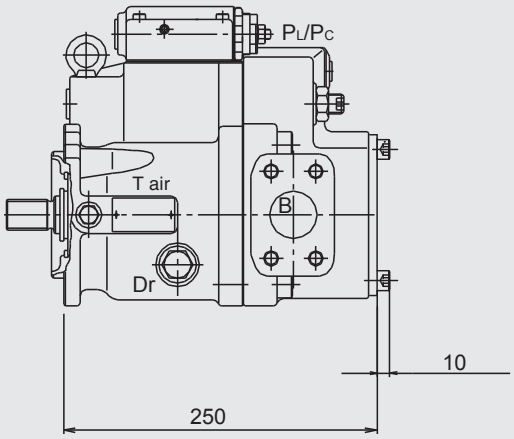


Mounting flange and shaft options

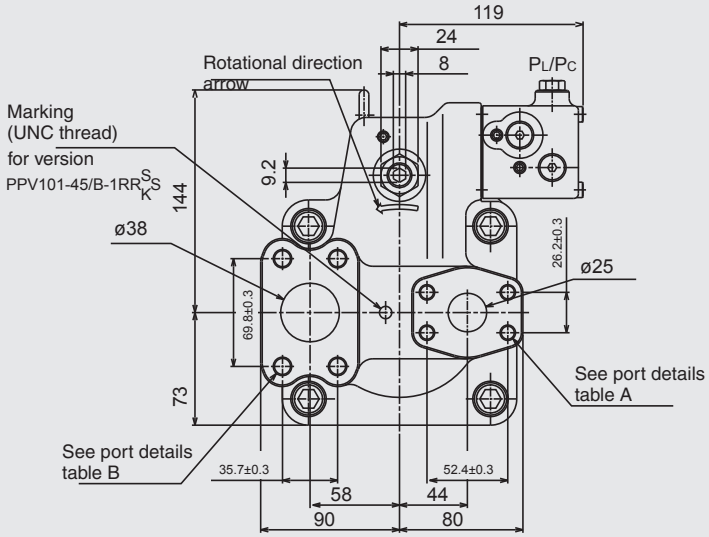


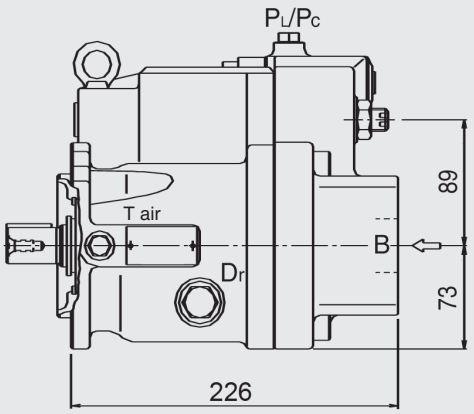


Single pump prepared for through drive "N"



Option for rear suction and discharge ports





Port details

SAE flange ports

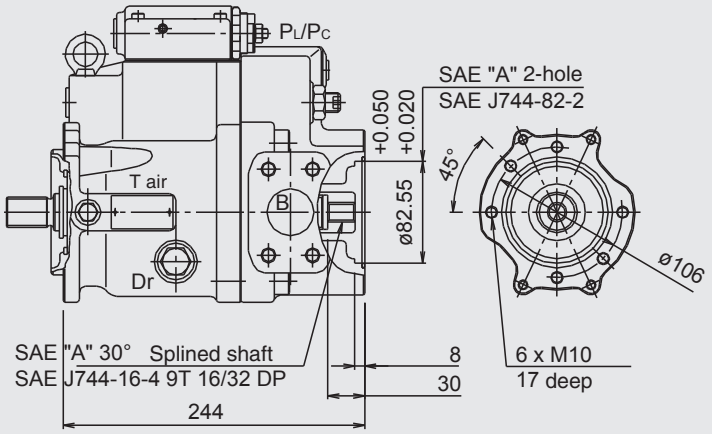
Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C std pressure (code 61) 1"	57	3/8-16UNC-2B x 18 mm
B	Suction port	SAE J518C std pressure (code 61) 1½"	98	1/2-13UNC-2B x 22 mm
Metric version ("M" in position 9 of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

Auxiliary ports:

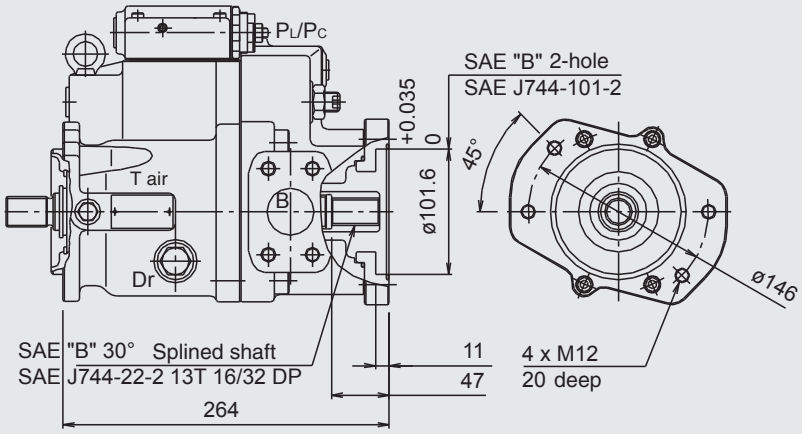
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K", "U" or "T" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926/1 parallel thread with O-ring, ½" OD tube 3/4-16UNF-2B	98
PL PC	Load sensing port Pressure control port	SAE J1926/1 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B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

Through drive options

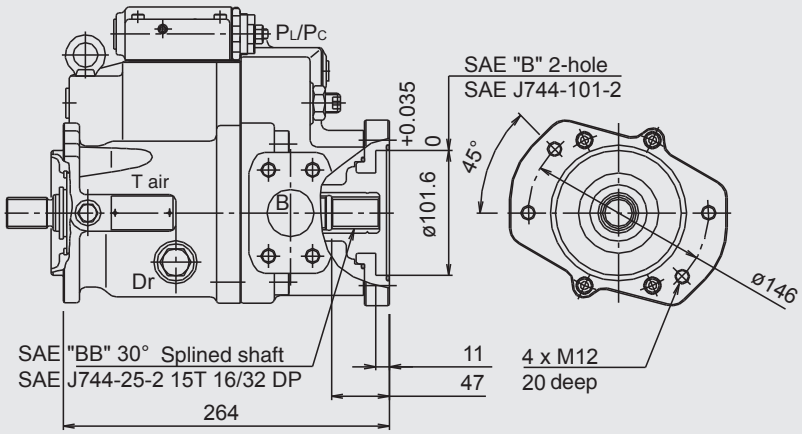
Through drive "A"



Through drive "B"



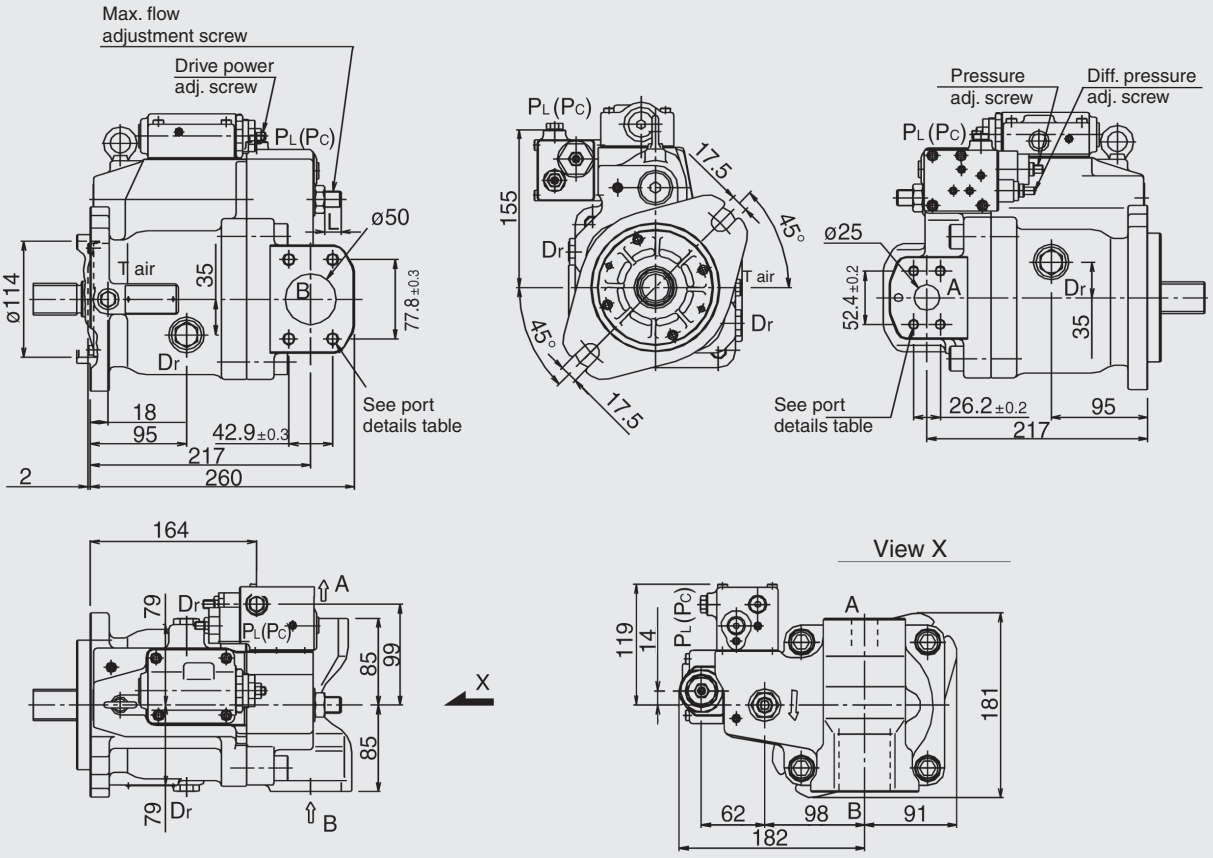
Through drive "BB"



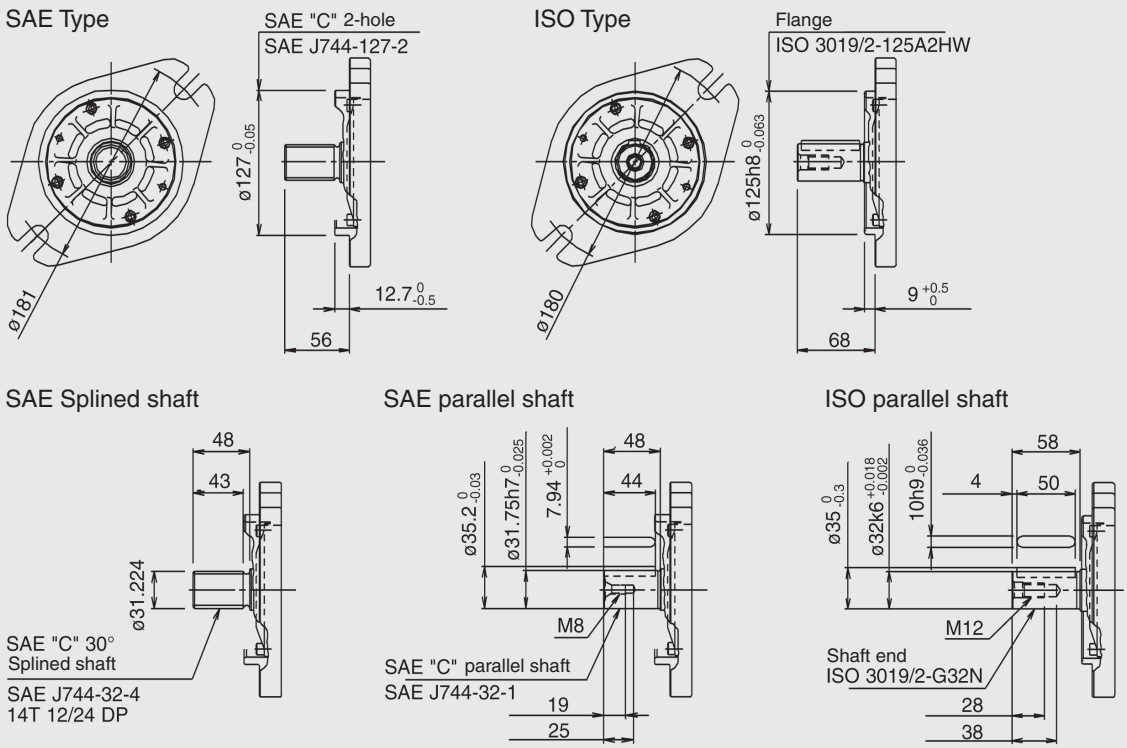
PPV101-80 with cut-off / load sensing control and torque limiter module (clockwise rotation)

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

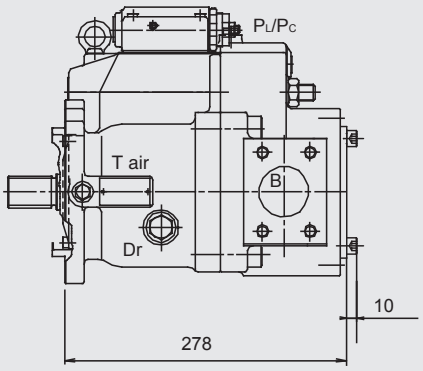
Single pump "0"



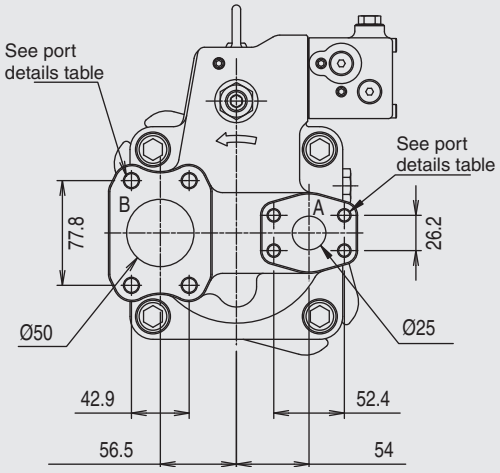
Mounting flange and shaft options

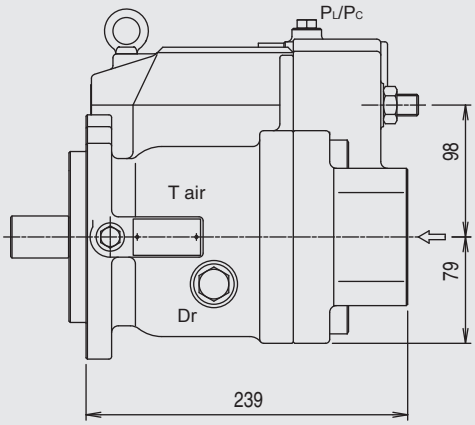


Single pump prepared for through drive "N"



Option for rear suction and discharge ports





Port details

SAE flange ports

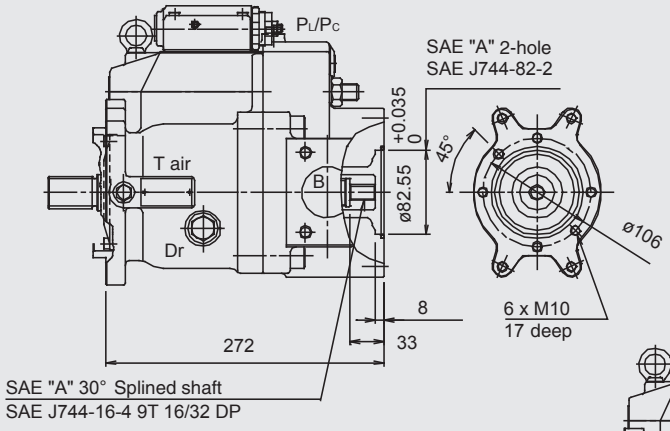
Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C std pressure (code 61) 1"	57	3/8-16UNC-2B x 18 mm
B	Suction port	SAE J518C std pressure (code 61) 2"	98	1/2-13UNC-2B x 22 mm
Metric version ("M" in position 9 of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

Auxiliary ports:

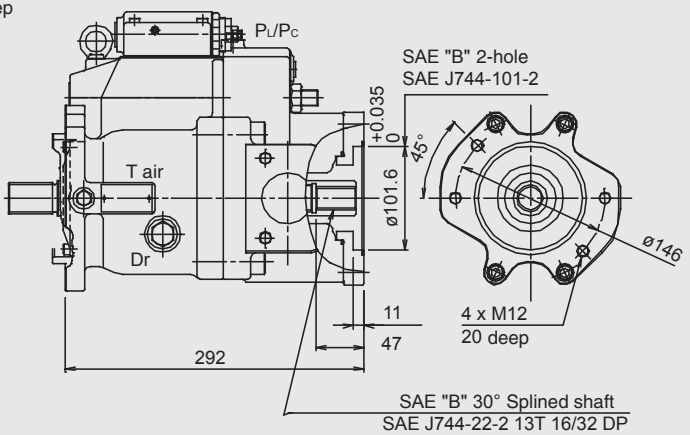
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926/1 parallel thread with O-ring, ½" OD tube 3/4-16UNF-2B	98
PL PC	Load sensing port Pressure control port	SAE J1926/1 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12
T air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

Through drive options

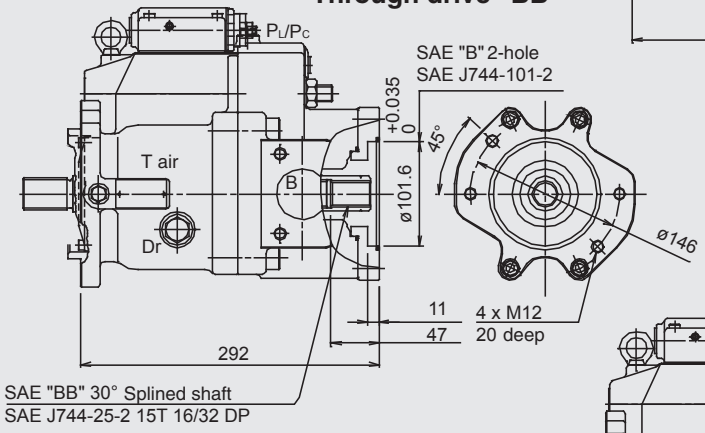
Through drive "A"



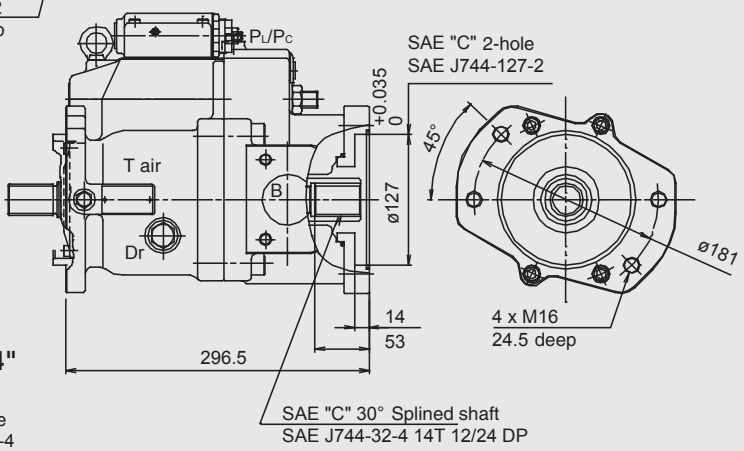
Through drive "B"



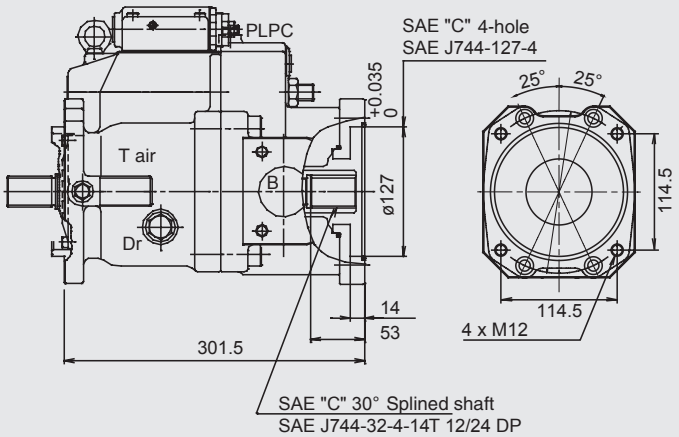
Through drive "BB"



Through drive "C"



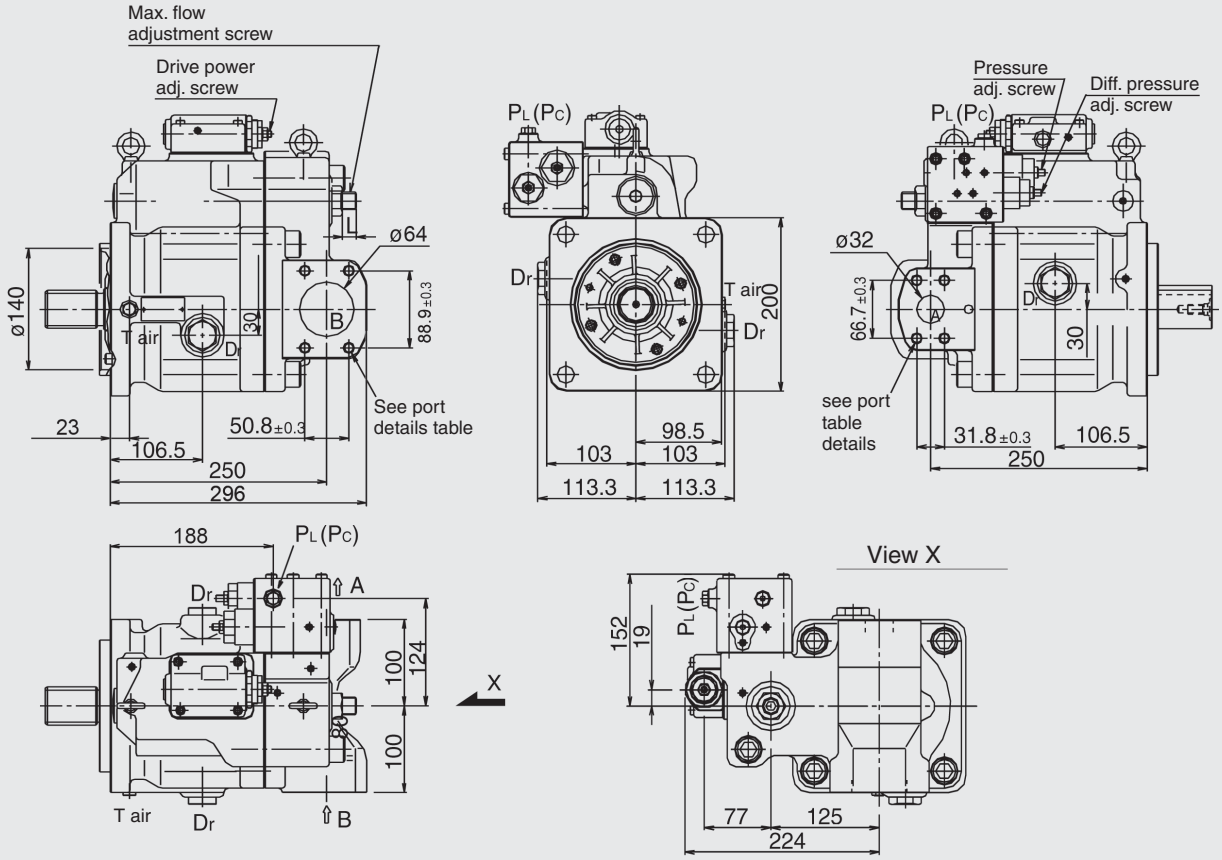
Through drive "C4"



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

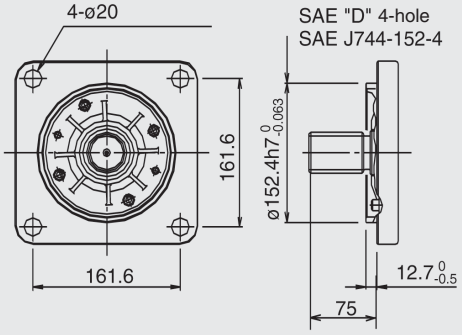
Note: for anti-clockwise rotation, suction port "B" and discharge port "A" are reversed

Single pump "0"

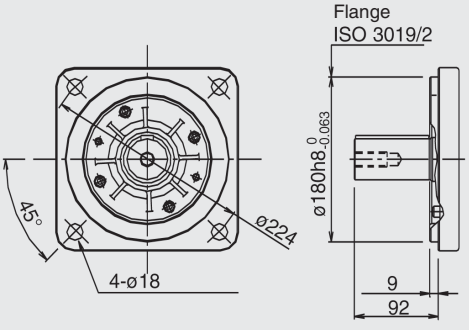


Standard mounting flange (SAE D 4-hole flange) and shaft options

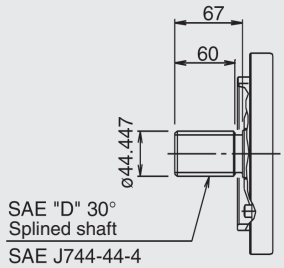
SAE Type



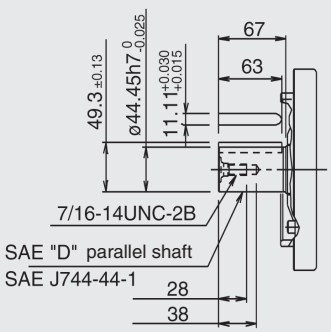
ISO Type



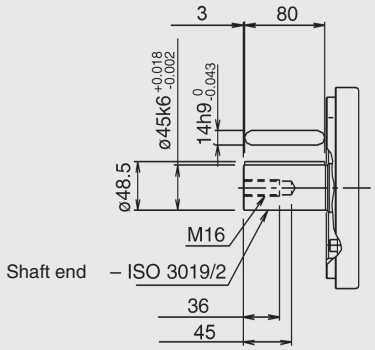
SAE Splined shaft



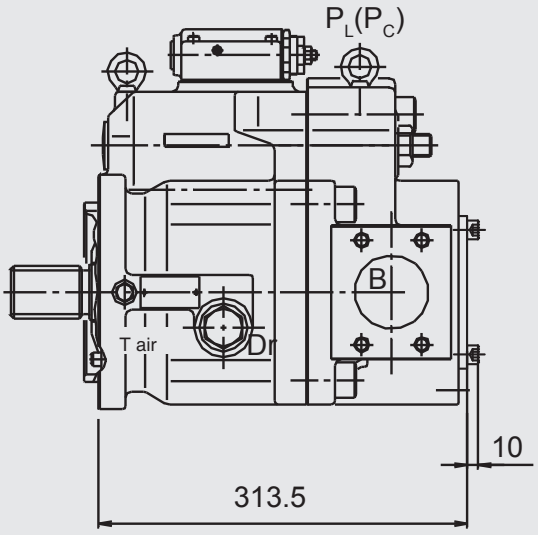
SAE parallel shaft



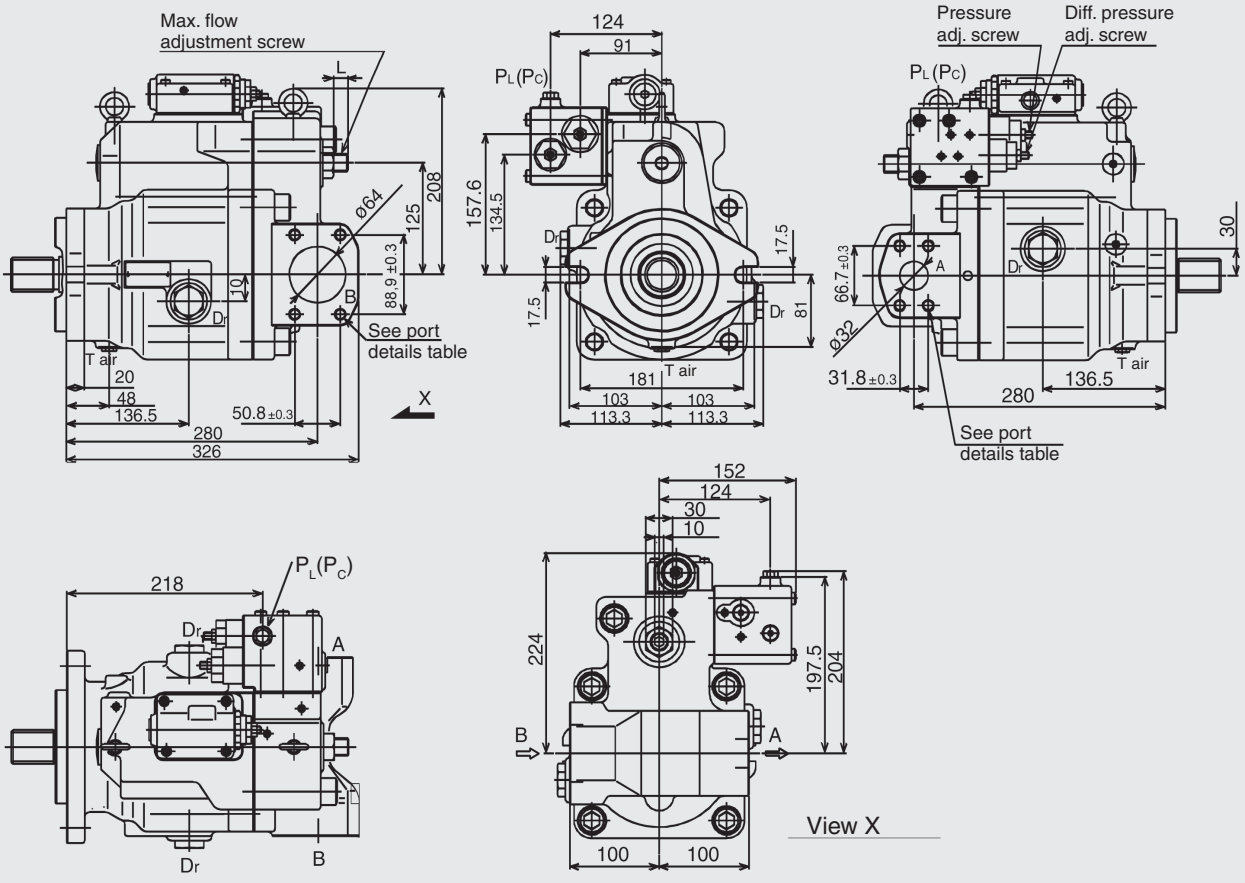
ISO parallel shaft



Single pump prepared for through drive "N"

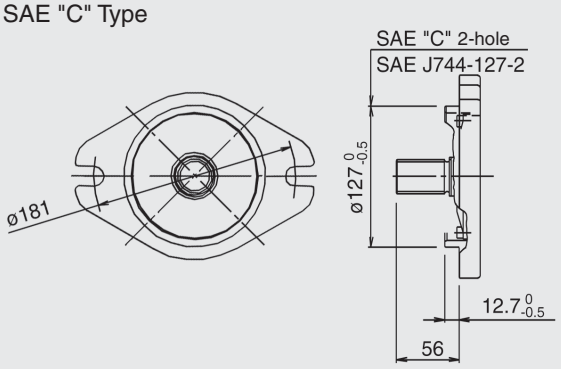


SAE 2-hole flange option

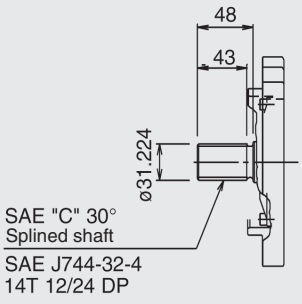


Mounting flange (2-hole) and shaft options

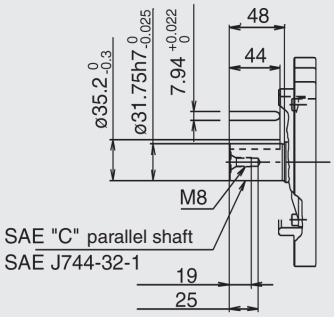
SAE "C" Type



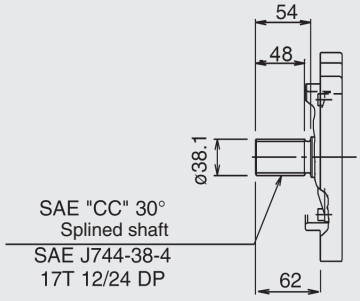
SAE "C" Splined shaft



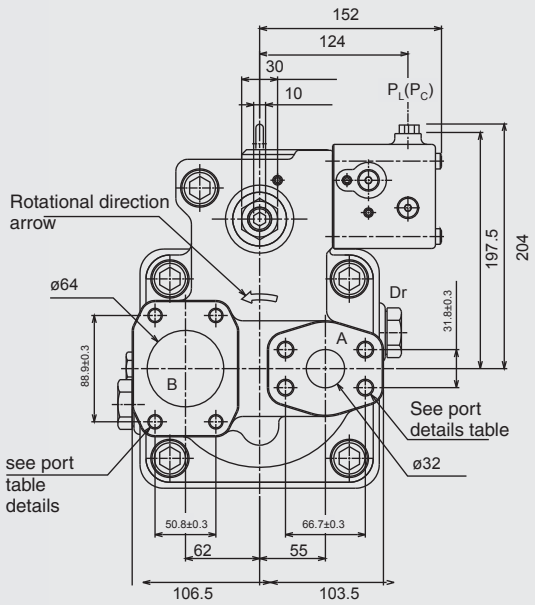
SAE "C" parallel shaft

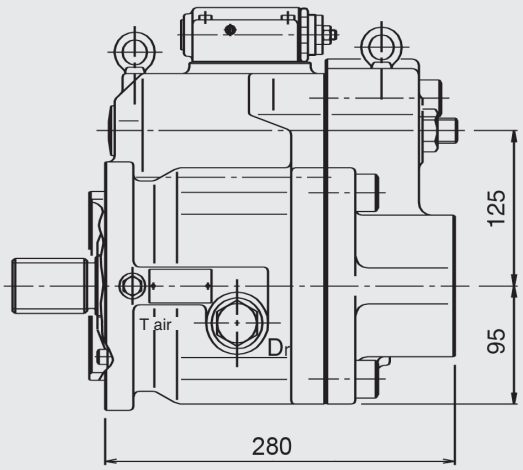


SAE "CC" Splined shaft



Option for rear suction and discharge ports





Port details

SAE flange ports

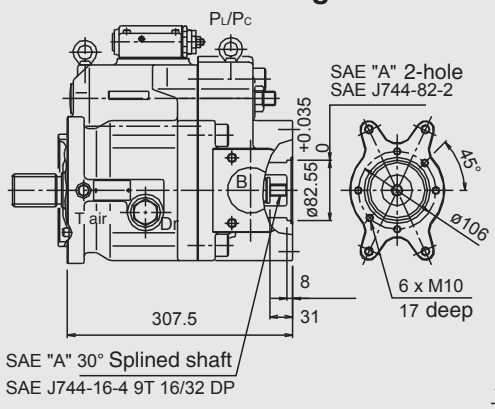
Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C high pressure (code 62) 1¼"	98	1/2-13UNC-2B x 22 mm
B	Suction port	SAE J518C std pressure (code 61) 2½"	98	1/2-13UNC-2B x 22 mm
Metric version ("M" in position 9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

Auxiliary ports:

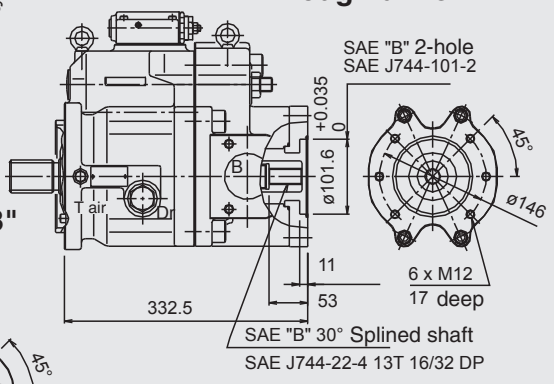
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K", "C", "R", "X", "U" or "T" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926/1 parallel thread with O-ring, ¾" OD tube 1 1/16-12UNF-2B	167
PL PC	Load sensing port Pressure control port	SAE J1926/1 parallel thread with O-ring, ¼"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

Through drive options

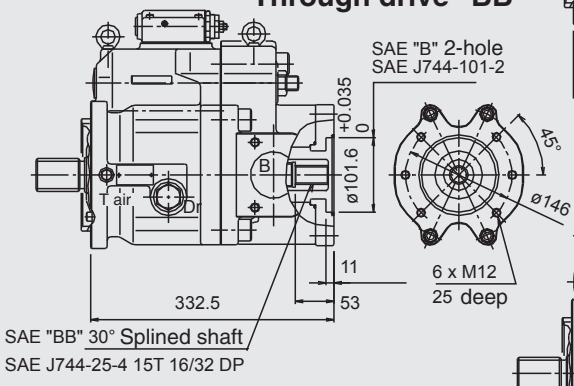
Through drive "A"



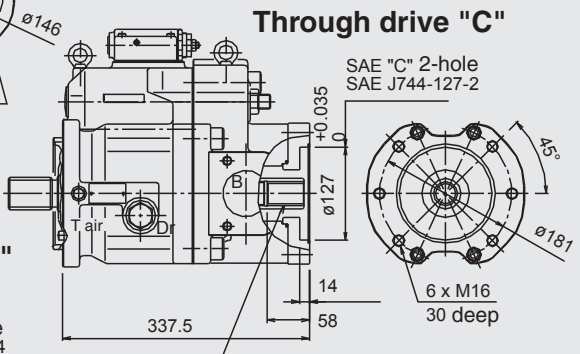
Through drive "B"



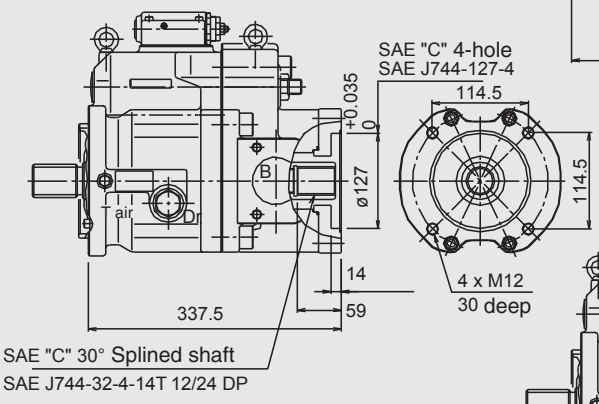
Through drive "BB"



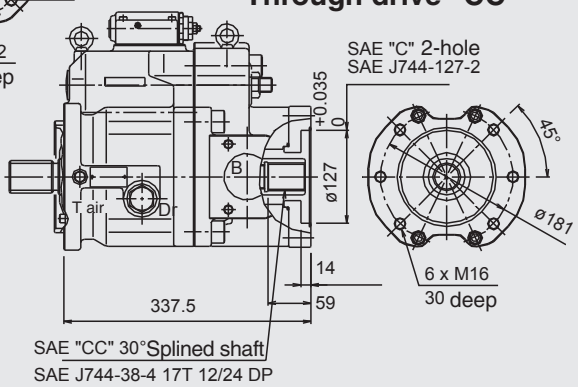
Through drive "C"



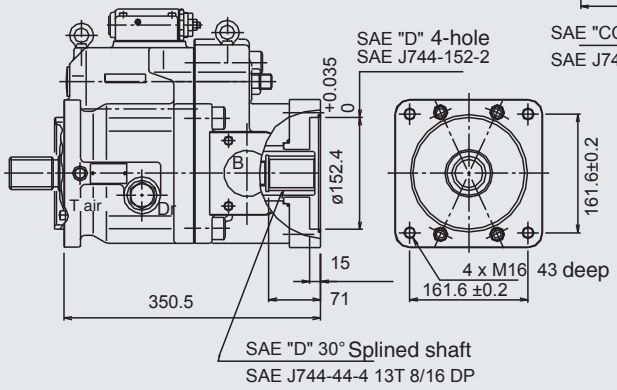
Through drive "C4"



Through drive "CC"



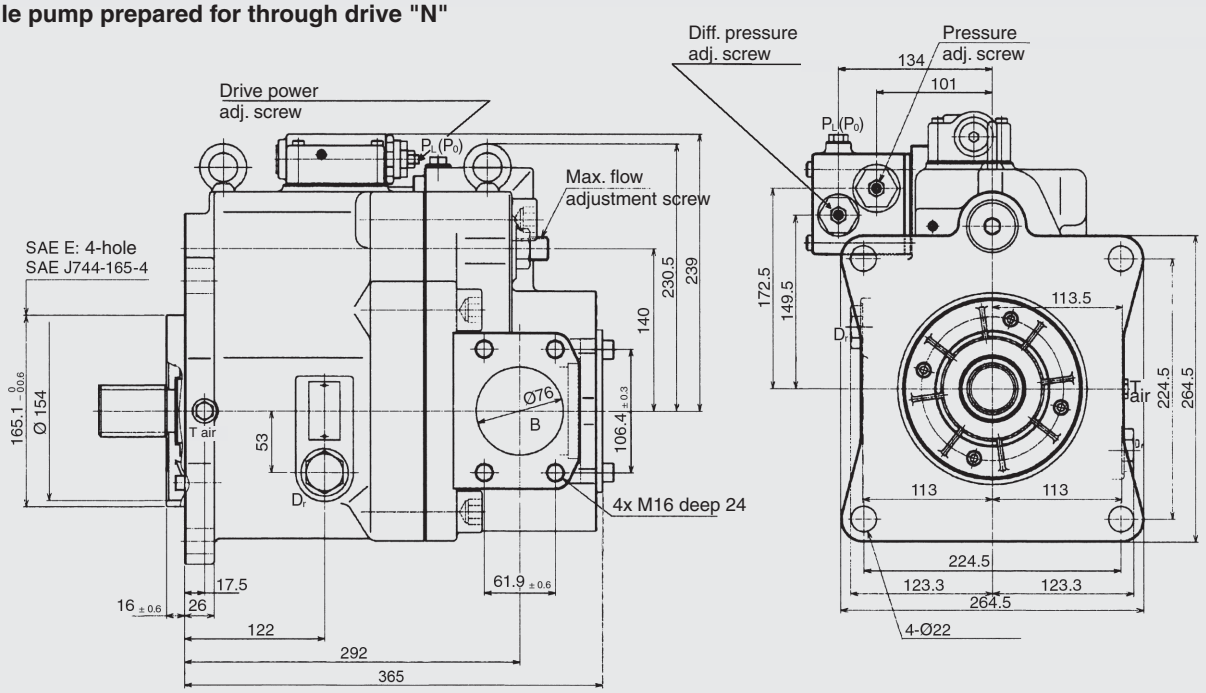
Through drive "D"

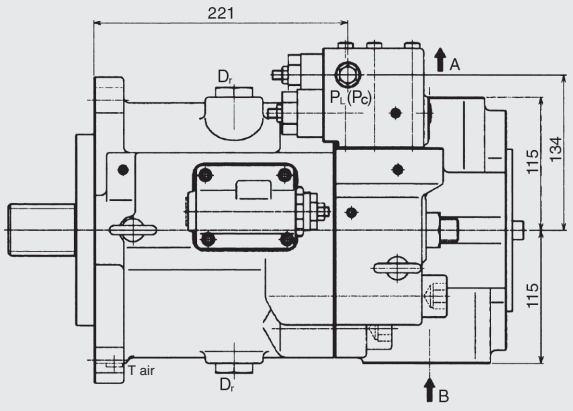


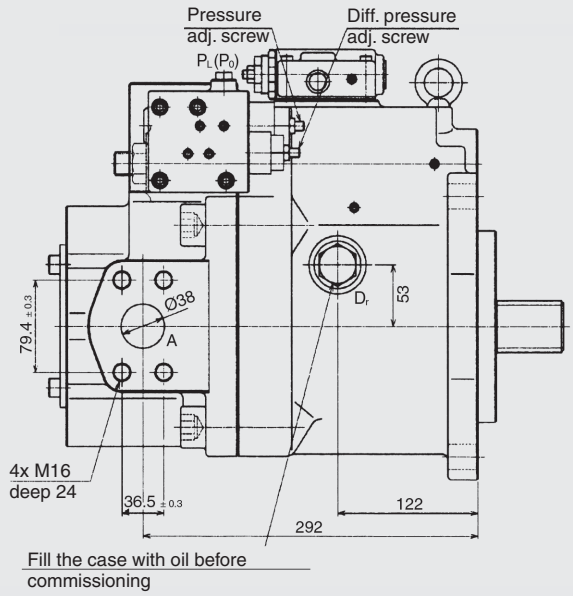
PPV101-200 with cut-off / load sensing control and torque limiter module (clockwise rotation)

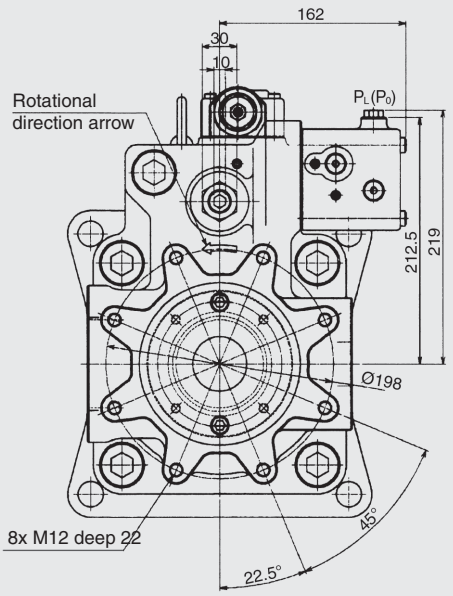
Note: for anti-clockwise rotation, suction port "B" and discharge port "A" are reversed

Single pump prepared for through drive "N"



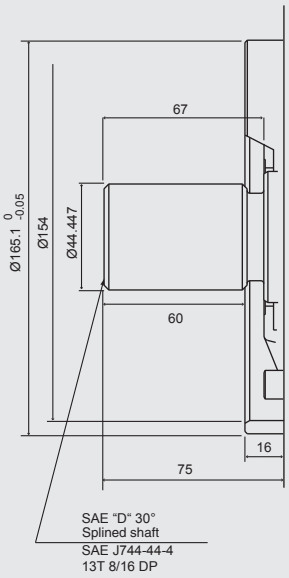




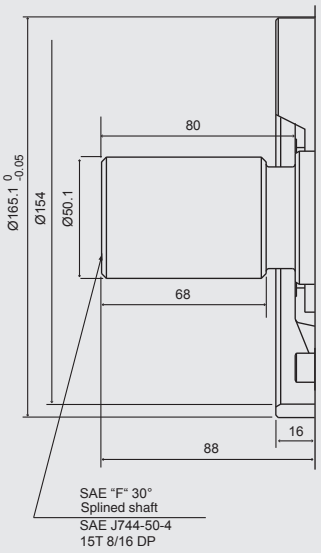


Mounting flange and shaft options

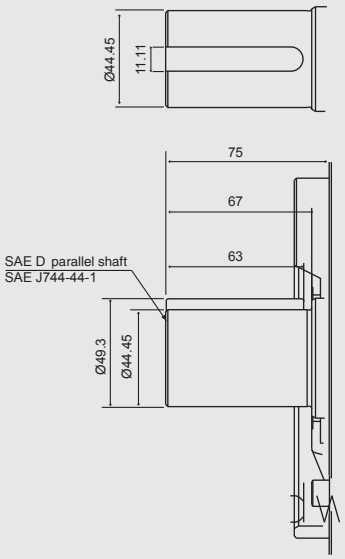
SAE "D" Splined shaft



SAE "F" Splined shaft



SAE parallel shaft



Port details

SAE flange ports

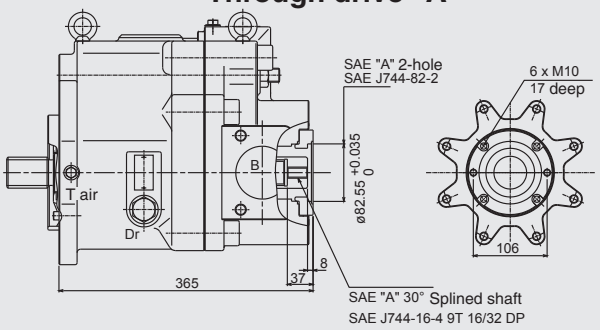
Code	Port description	Size	Torque (Nm)	Flange thread
UNC threaded version ("S" in position 9 of model code):				
A	Discharge port	SAE J518C high pressure (code 62) 1¼"	235	5/8-11UNC-2B
B	Suction port	SAE J518C std pressure (code 61) 3"	235	5/8-11UNC-2B
Metric version ("M" in position 9 of model code):				
A	Discharge port	SAE J518C high pressure (code 62) 1¼"	235	M16 x 24
B	Suction port	SAE J518C std pressure (code 61) 3"	235	M16 x 24

Auxiliary ports:

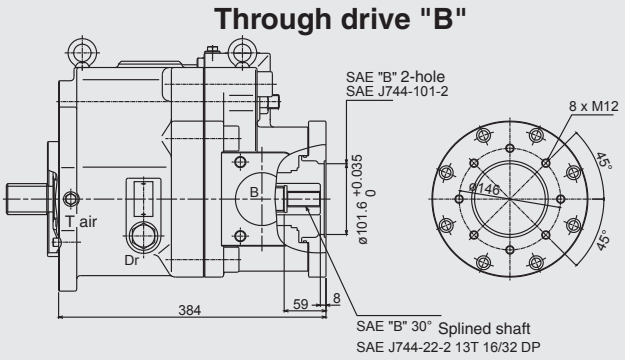
Code	Port description	Size	Torque (Nm)
SAE version ("S", "K" in position 8 of model code):			
Dr	Drain port (x2)	SAE J1926 parallel thread with O-ring, ¾" OD tube 1.1/16-12UNF-2B	167
PL PC	Load sensing port Pressure control port	SAE J1926 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12
T air	Venting port	SAE J1926 parallel thread with O-ring, ¼" OD tube 7/16-20UNF-2B	12

Through drive options

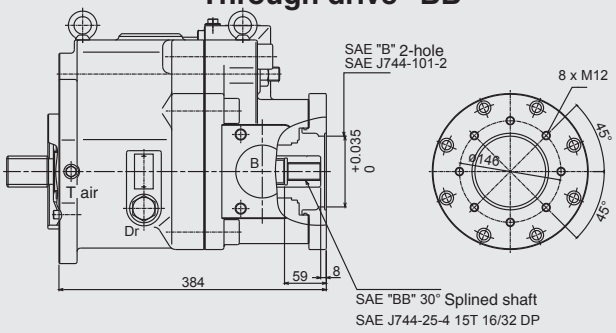
Through drive "A"



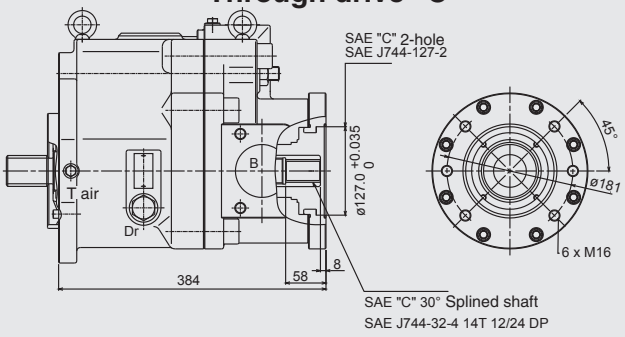
Through drive "B"



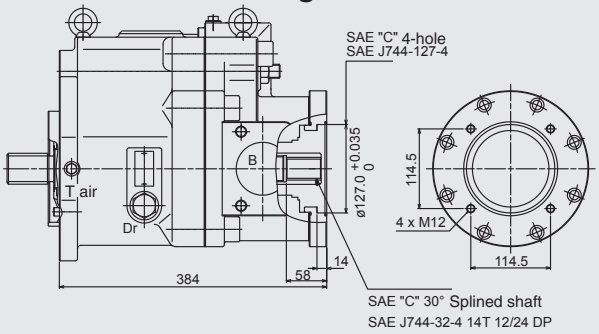
Through drive "BB"



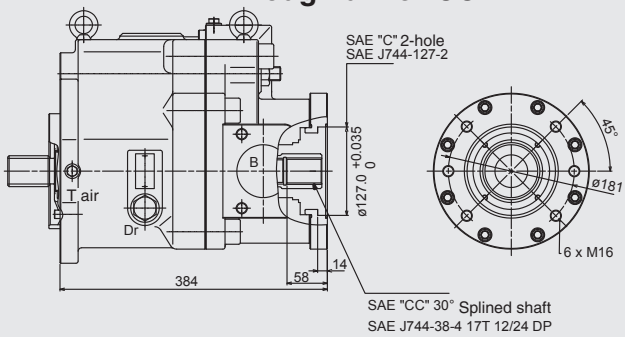
Through drive "C"



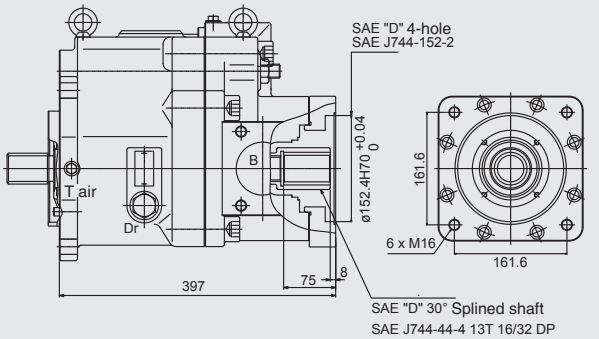
Through drive "C4"



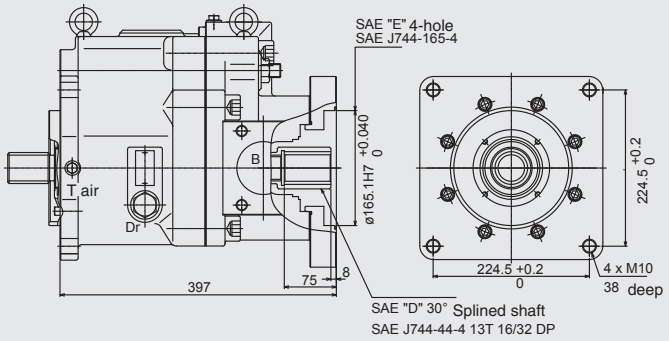
Through drive "CC"



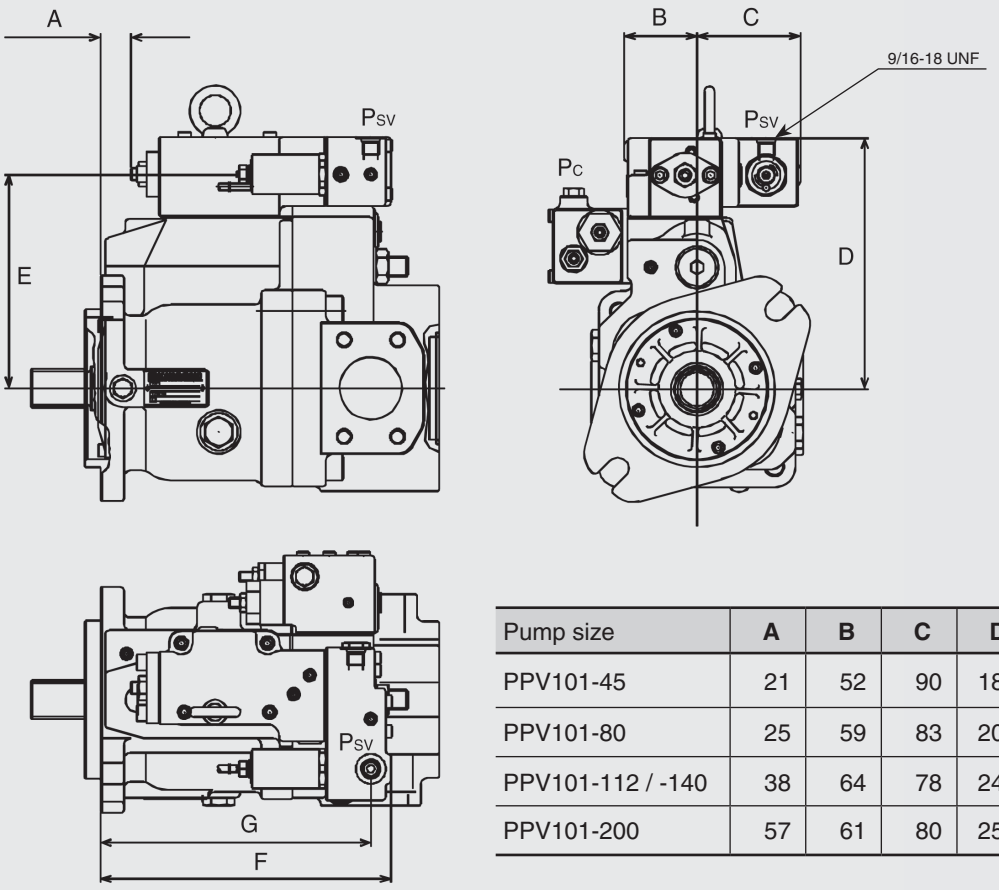
Through drive "D"



Through drive "E"



2.3.33 Electrical displacement control



Pump size	A	B	C	D	E	F	G
PPV101-45	21	52	90	187	157	226	210
PPV101-80	25	59	83	202	172	233	217
PPV101-112 / -140	38	64	78	244	214	247	231
PPV101-200	57	61	80	258	229	257	249

2.3.34 Unloading valve

Unloading valve (*N, M)

Pump size	A	B
PPV101-45	169	155
PPV101-80	169	166
PPV101-112 / -140	202	190
PPV101-200	212	205

Proportional valve (*V)

Pump size	A	B
PPV101-45	179	233
PPV101-80	179	244
PPV101-112 / -140	212	280
PPV101-200	222	295

A = Distance between the centre line of the pump and the top of the bolt head for the cut-off regulator.

B = Distance between the centre line of the pump and top of the solenoid valve.