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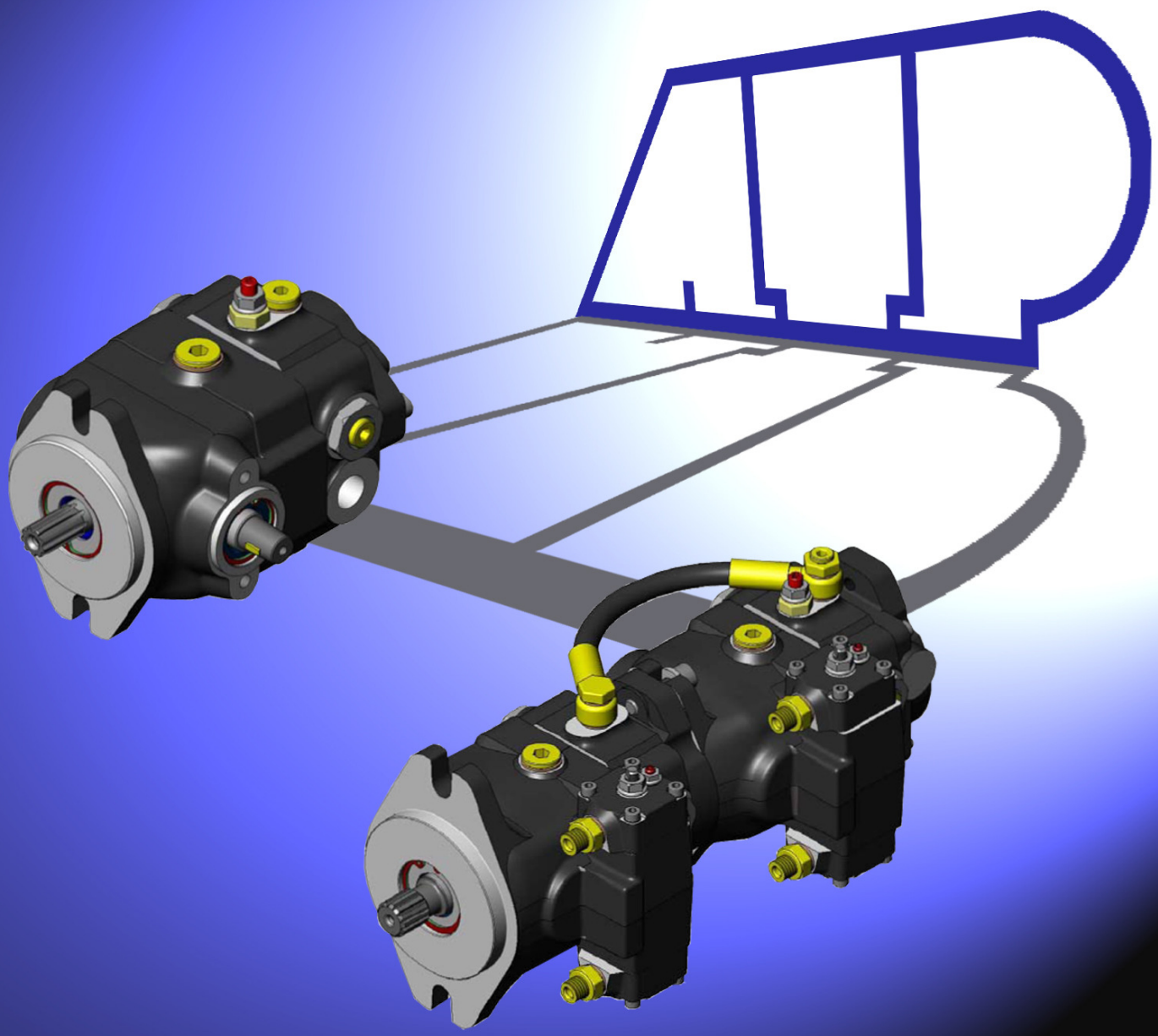
Axial Piston Pump
TPV 1000 (Ex 6 -18)

Variable Displacement Closed Loop System



Ein Produkt von

H·T HANSA · TMP srl

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ATP HYDRAULIK AG

Innovation. Präzision. Perfektion.

- Engineering

- Produktion

- Kundendienst

- Handel

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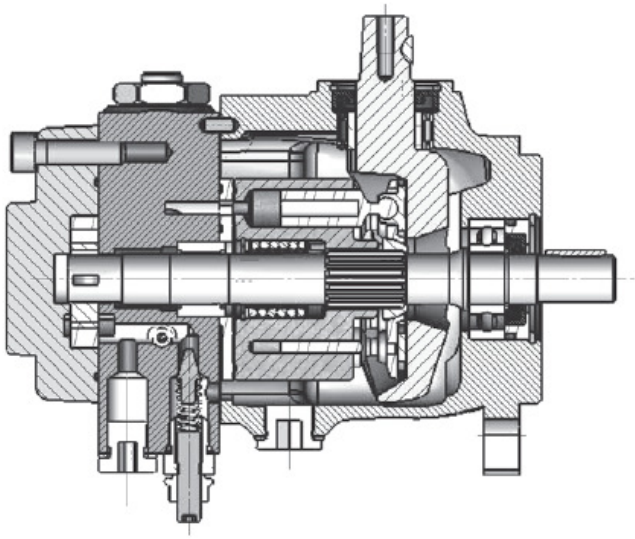
Inhaltsverzeichnis

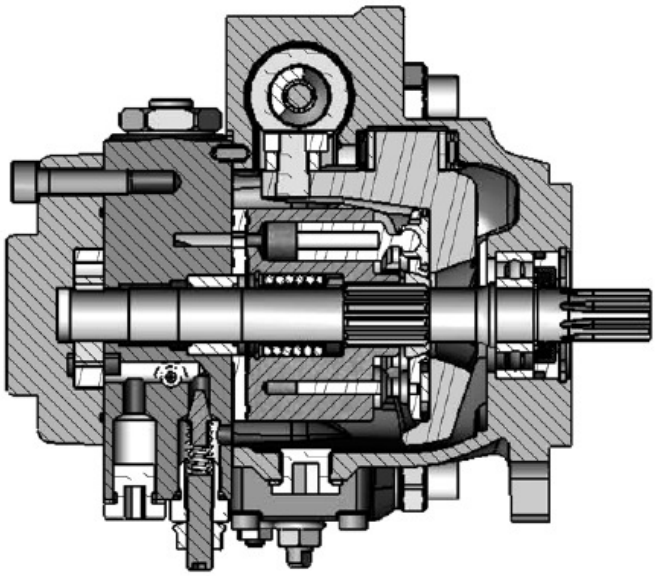
General Informations

TPV modes are a variable displacement axial piston pumps, with swashplate system, for closed loop hydrostatic transmissions

Direct Mechanical Control



Hydraulic Remote Control



Features

- Silent running
- High rotation speed
- Compact design
- Suitable for multiple pump assembly
- Easy maintenance
- Built in pressure relief valves
- Optionals: screw-type or electric by-pass-valve, purge valve, adapter flange from SAE-A to SAE-B
- Accessories: auxiliary gearpumps, hydraulic and electric remote control valves, mounting kits for diesel and petrol engines

Installation Instructions

- During the assembly, check that pump is in line and concentric with the driveshaft sleeve to prevent overloading of the pump shaft bearing.
- Clean carefully all tanks and pipes internally before assembly.
- The pipe internal diameter must be suitable for the max oil speed trough them.
- It is advisable to fit the pump lower than oil level tank.
- Heat exchangers must be previewed in the machine design, to keep temperature level within the limit of 80°C.

Multiple Pumps

- In case of installing multiple pump it is advisable to mount a supplementary support (see optional SP).
Attention: connect the support to the engine and/or use an elastic support.

Maximum Shaft Torque

In the case of installation of multiple pump, verify that the total shaft torque is no more than the maximum value rated for each shaft type.

Optionals

The TPV pumps can be supplied in different versions, with different types of shaft and equipped with different types of control devices and optionals:

- Direct mechanical control lever	DM
- Spring zero return	DMS
- Detent on zero position	LCS1
- Hand wheel control	LCS2
- Remote hydraulic servo-control	SHI
- Remote electronic servo-control	SEI
- By-pass lever	LB
- Screw By-pass	SB
- Electric By-pass	BEO (normally open)
- Electric By-pass	BEC (normally closed)
- Supplementary support for multiple pumps	SP
- Purge valve	VS
- Adaptors flange from SAE A to SAE B	FB
- Adaptors coupling Z = 9 / Z = 13	ST
- Purge valve + By-pass lever	VSLB

First Starting

- Before starting fill all the system components with new and filtered oil.
- Verify that the charge pressure is correct.
- Restore the tank oil level.

Maintenance

- The first oil change must be made after approximately 500 hours of operations, and then every 2000 hours.
- The filter cartridge must be replaced the first time after 50 hours and then every 500 hours, such time should be reduced when the filter clogging indicator shows that the catridge is clogged or when the system works in a heavily polluted environment.

Technical Instructions

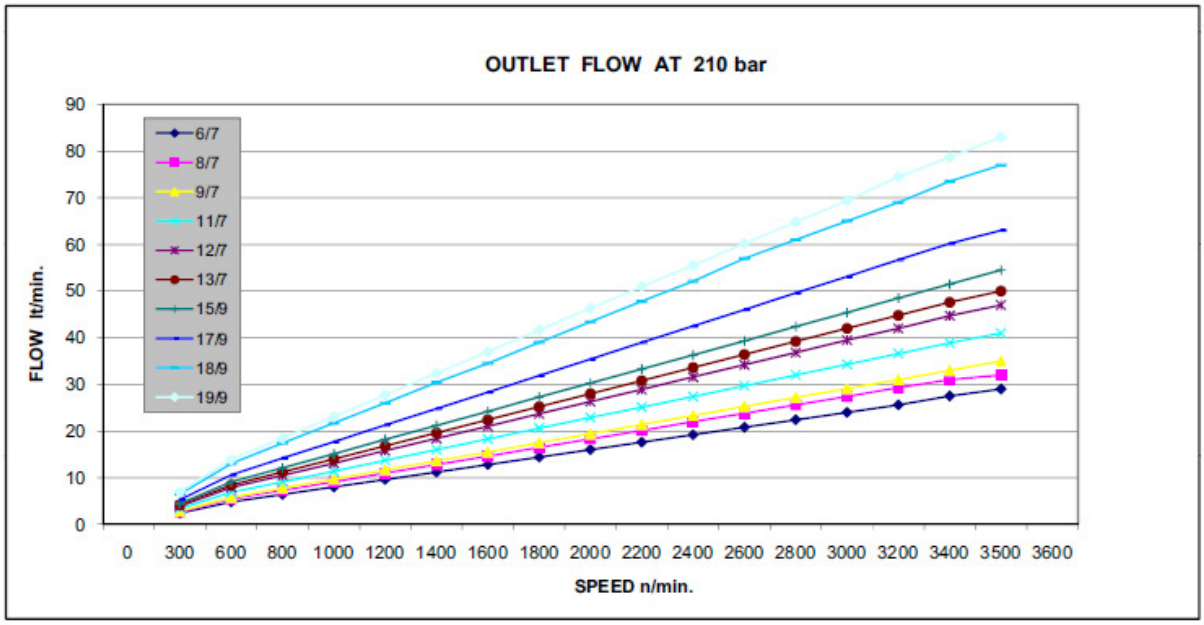
Pump Model		TPV 6-7	TPV 8-7	TPV 9-7	TPV 11-7	TPV 12-7	TPV 13-7	TPV 15-9	TPV 17-9	TPV 18-9	TPV 19-9
Max. displacement	cm^3/n	7,4	8,9	9,6	11,2	12,8	13,6	15,00	17,1	18,2	19,4
Flow rating (1)	lt/min.	25,01	31,96	34,74	40,32	46,08	48,88	54,00	61,77	66,37	69,84
Power rating (1)	kW	8,75	11,18	12,15	14,11	16,12	17,11	18,9	21,61	23,23	24,44
Boost pump displacement	cm^3/n	3,9 (Rear cover Closed, B1, B2) 4,7 (Rear cover SAE A)									
Rated pressure	bar	210									200
Max. pressure	bar	300	300	300	300	300	300	280	280	270	250
Max. relief valve setting	bar	300									
Standard Boost pressure (2)	bar	11 (Mechanical Control) 20 (Hydraulic/Electric Servo Control)									
Suction pressure	bar (absolute)	>= 0,8									
Max.case pressure	bar	1,5									
Min. inlet shaft speed	n/min.	500									
Rated speed	n/min.	3600									2900
Max. speed	n/min.	3900									3200
Max. oil temperature	°C	80									
Oil viscosity	$mm^2/sec.$	15-35									
Fluid contamination		18/15/12 according to ISO 4406									
Dry weight (single pump) (3)	kg	8,8									
Dry weight (tandem pump) (3)	kg	19,5									

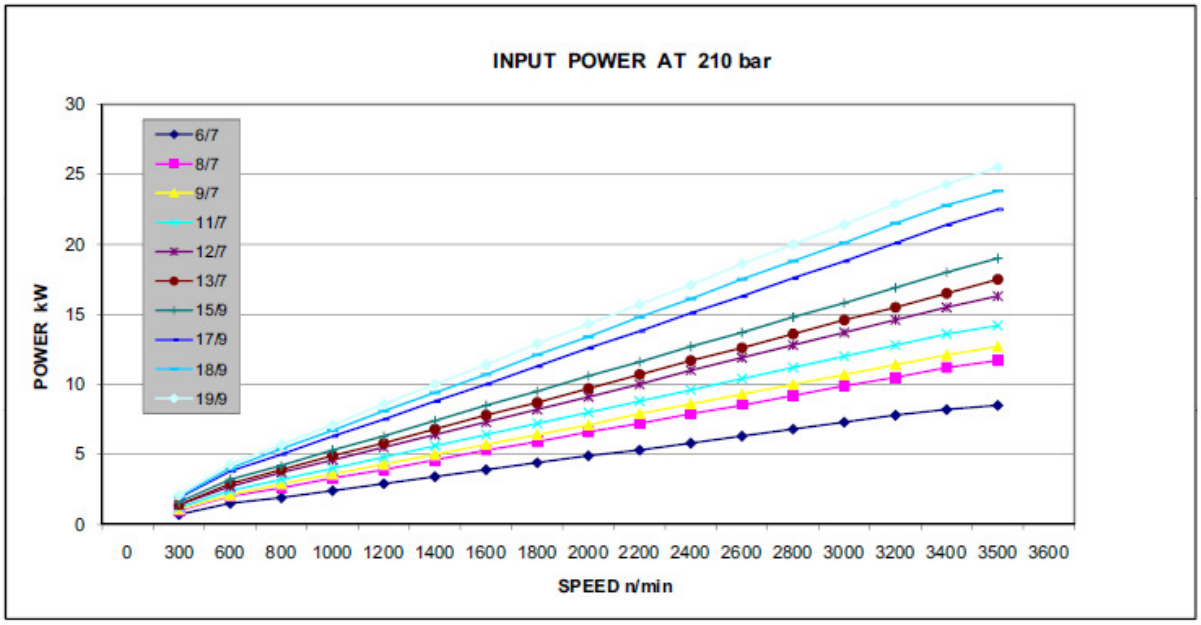
(1) 3600 n/min. 210 bar

(2) 1500 n/min.

(3) Indicative values, weight varies depending on configuration and optionals

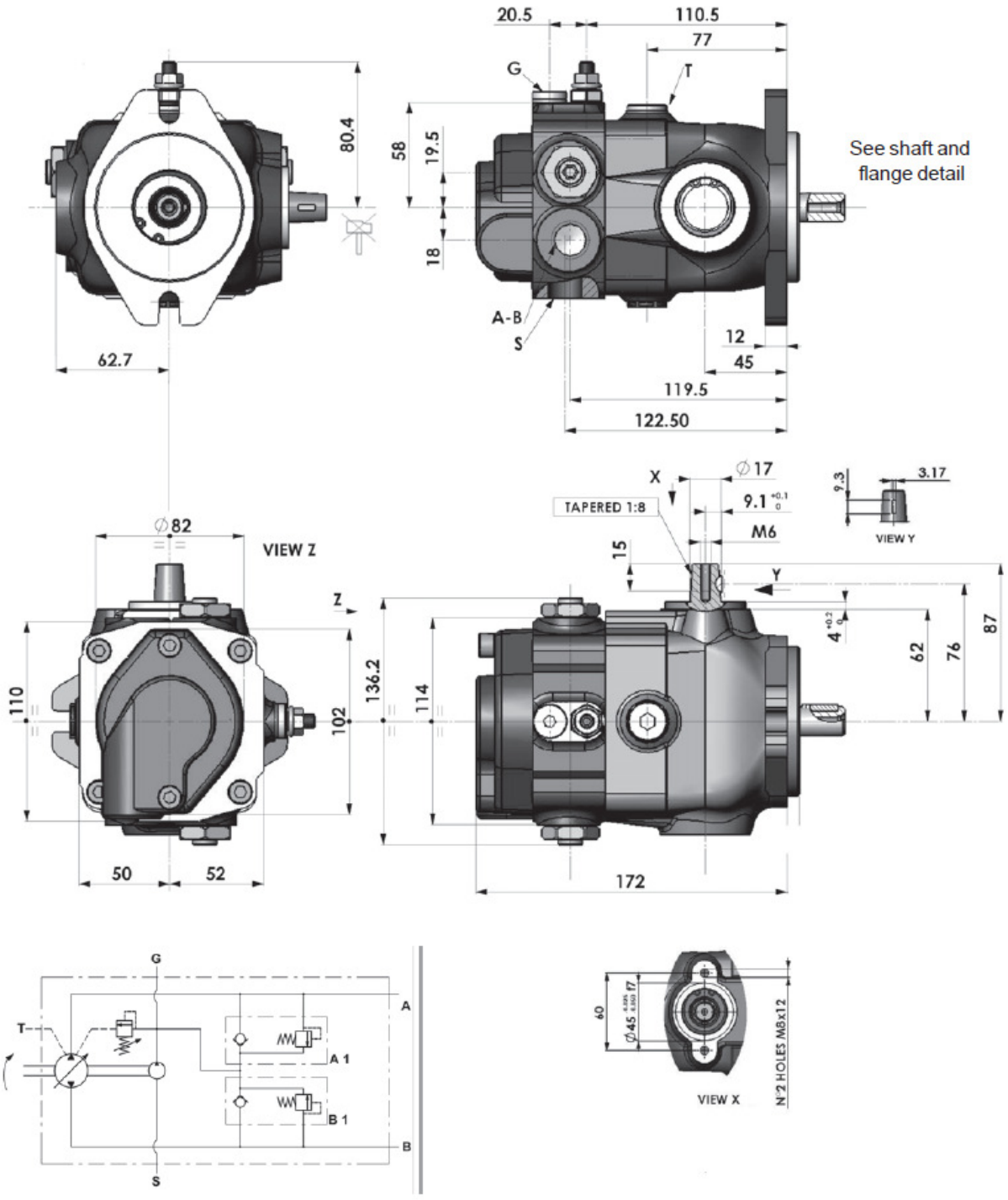
Performance





Single Pump – Direct Mechanical Control

Installation Drawing

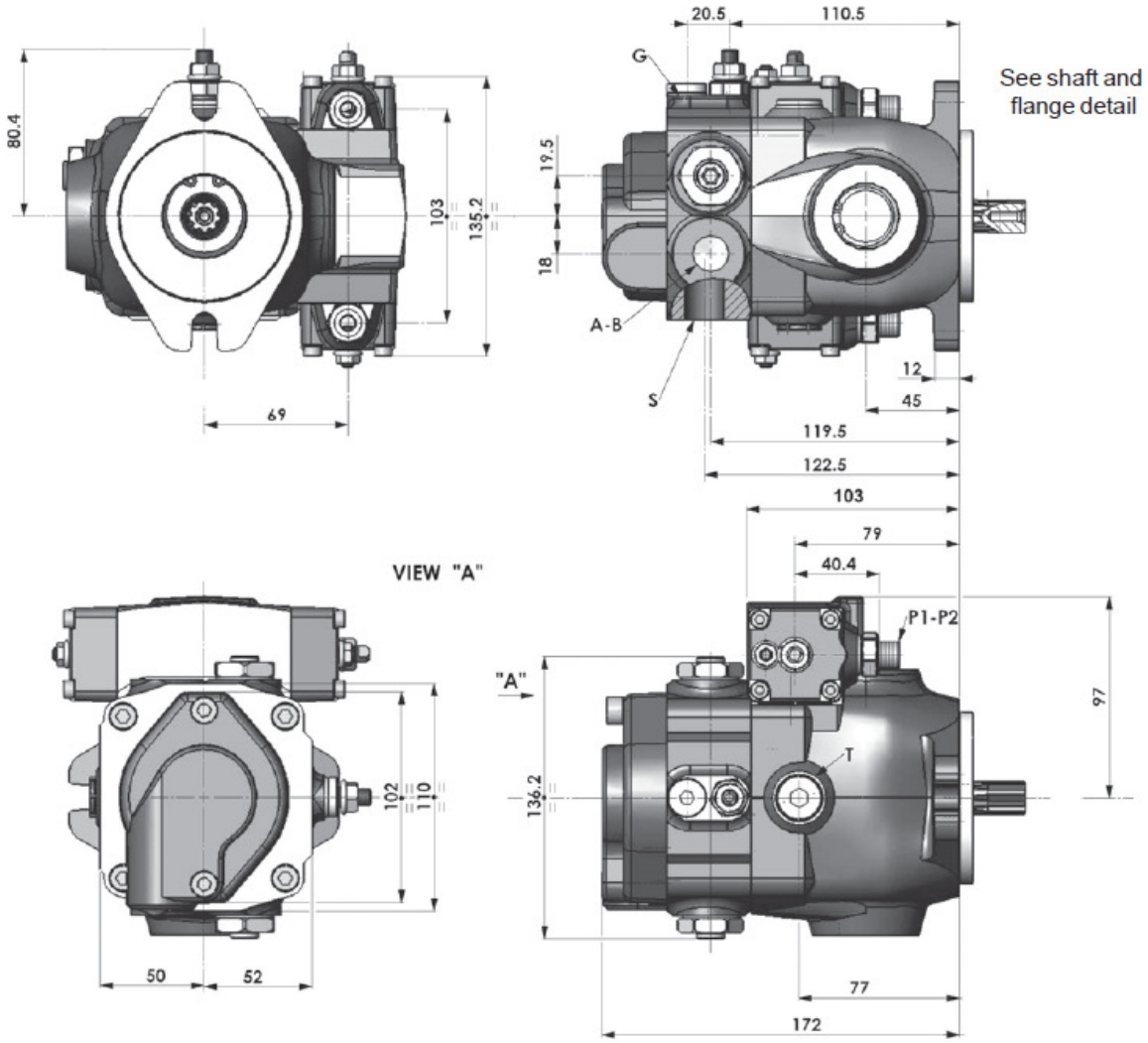


Hydraulic Diagram

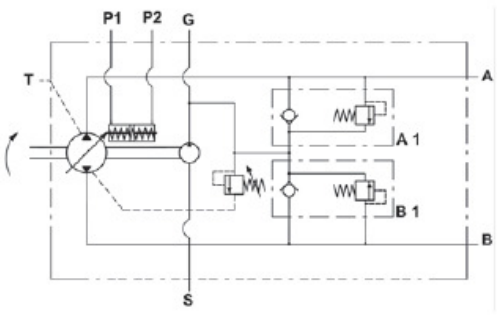
Pipe connection		
A - B	Main ports	1/2" BSP
T	Drain	3/8" BSP
S	Suction	1/2" BSP
G	Charge system	1/4" BSP

Single Pump – Hydraulic Remote Servo Control

Installation Drawing



Hydraulic Diagram



Pipe connection		
A - B	Main ports	1/2" BSP
T	Drain	3/8" BSP
S	Suction	1/2" BSP
G	Charge system	1/4" BSP
P1 - P2	Servo-control ports	1/4" BSP

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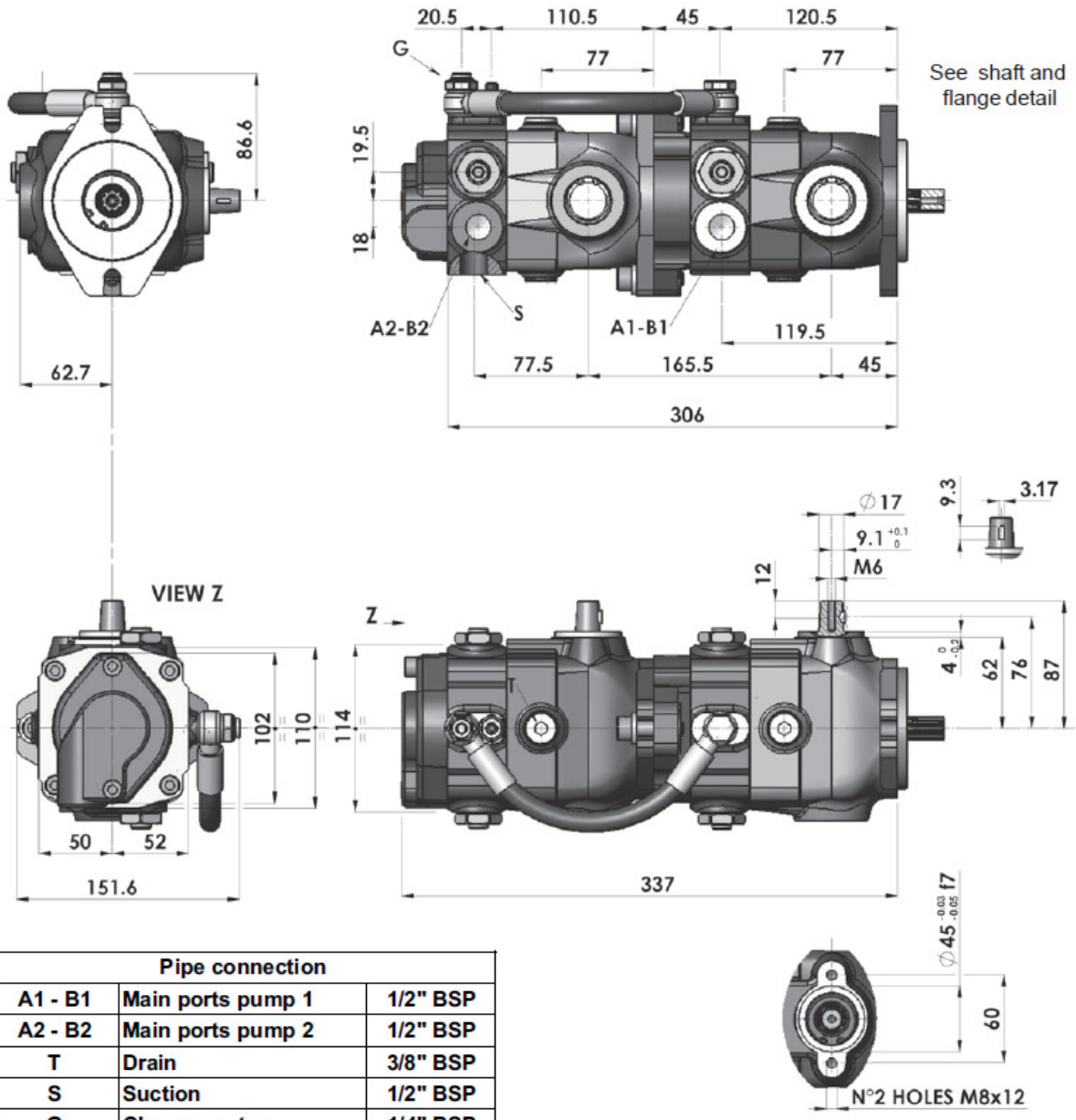
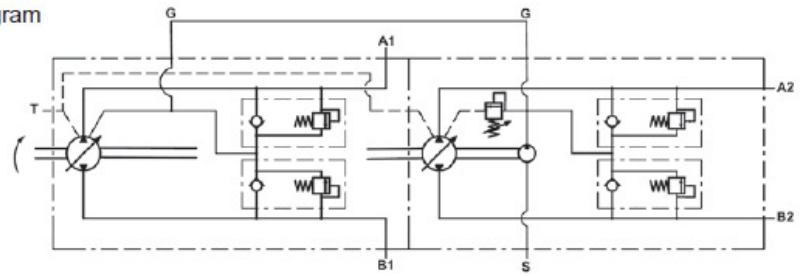
Tandem Pump – Direct Mechanical Control

Installation Drawing



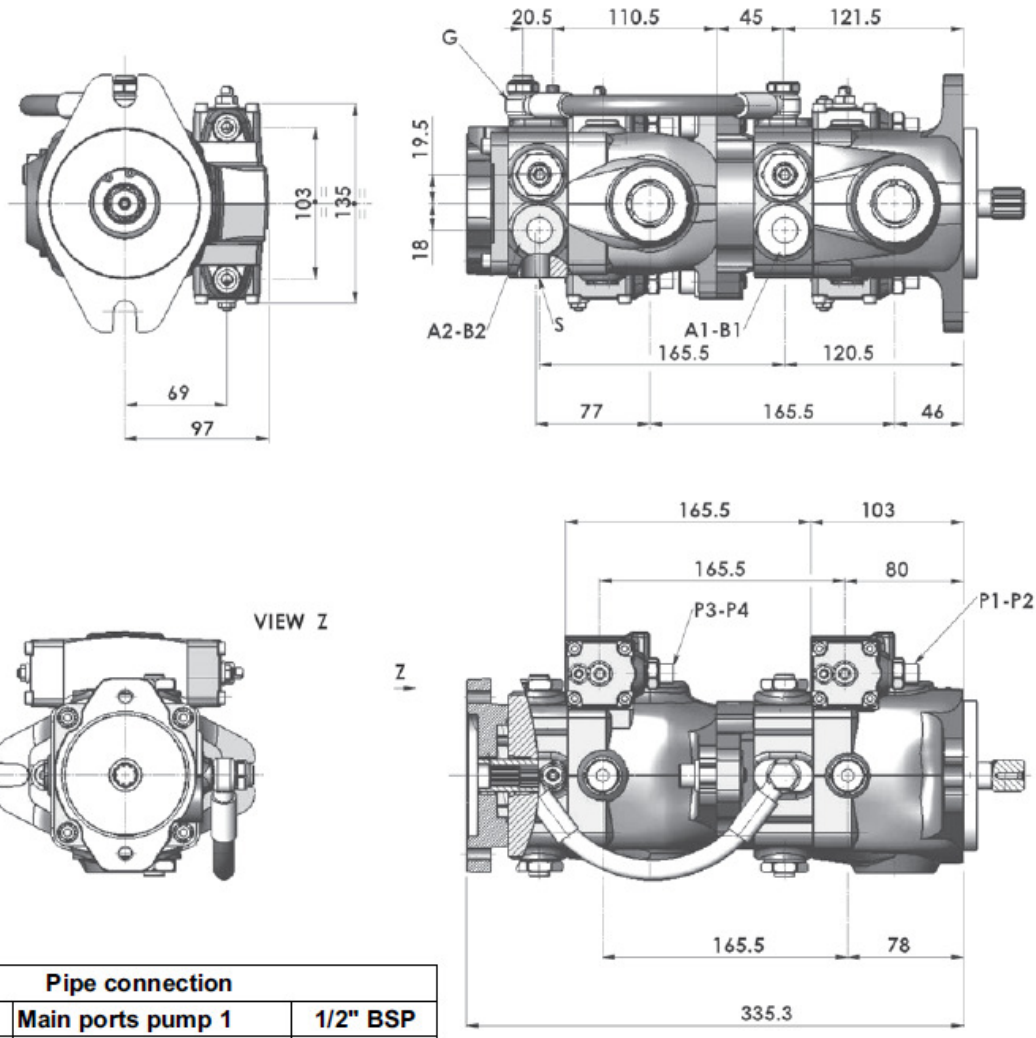
Pipe connection		
A1 - B1	Main ports pump 1	1/2" BSP
A2 - B2	Main ports pump 2	1/2" BSP
T	Drain	3/8" BSP
S	Suction	1/2" BSP
G	Charge system	1/4" BSP

Hydraulic Diagram



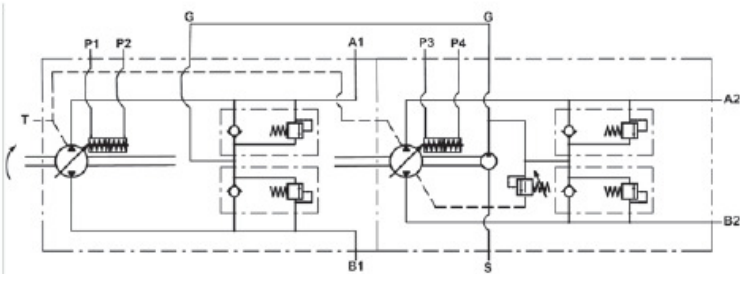
Tandem Pump – Hydraulic Remote Servo Control

Installation Drawing



Pipe connection		
A1 - B1	Main ports pump 1	1/2" BSP
A2 - B2	Main ports pump 2	1/2" BSP
T	Drain	3/8" BSP
S	Suction	1/2" BSP
G	Charge system	1/4" BSP
P1-P2-P3-P4	Servocontrol port	1/4" BSP

Hydraulic Diagram



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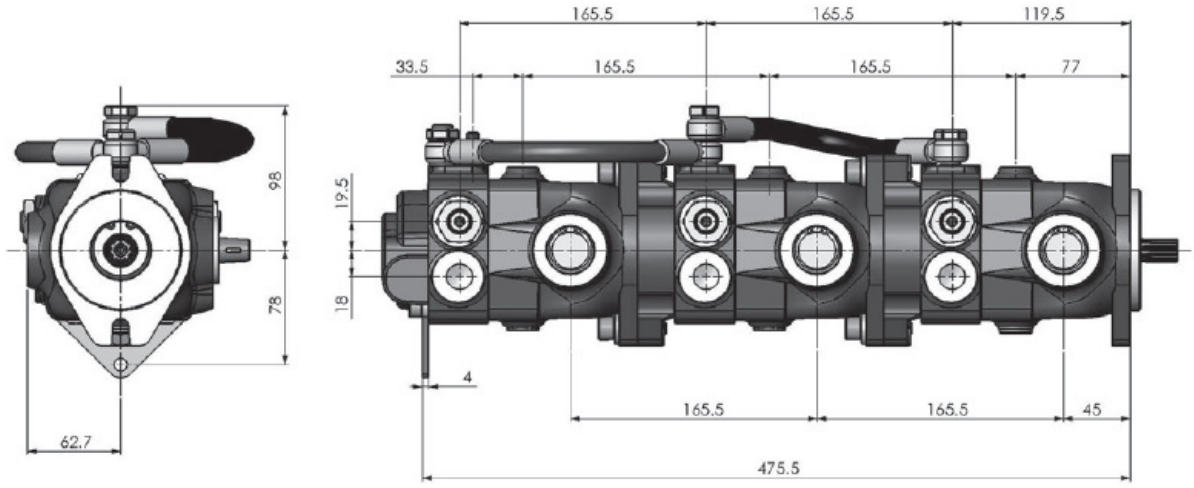
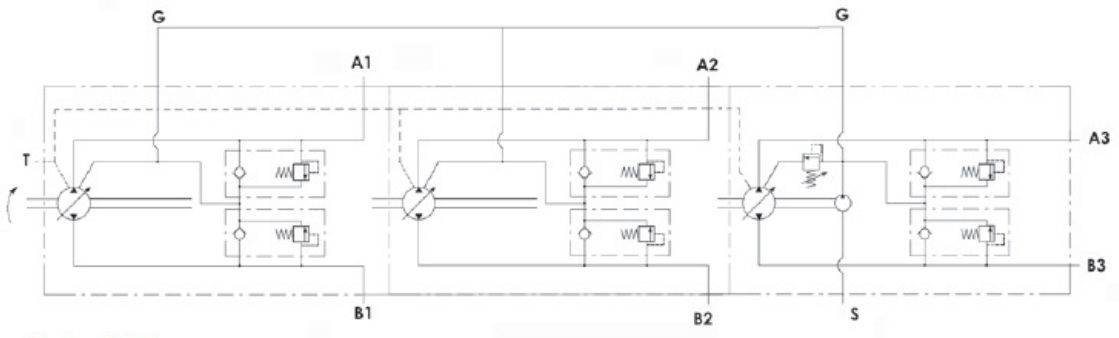
Triple Pump – Direct Mechanical Control

Installation Drawing



See shaft and flange detail

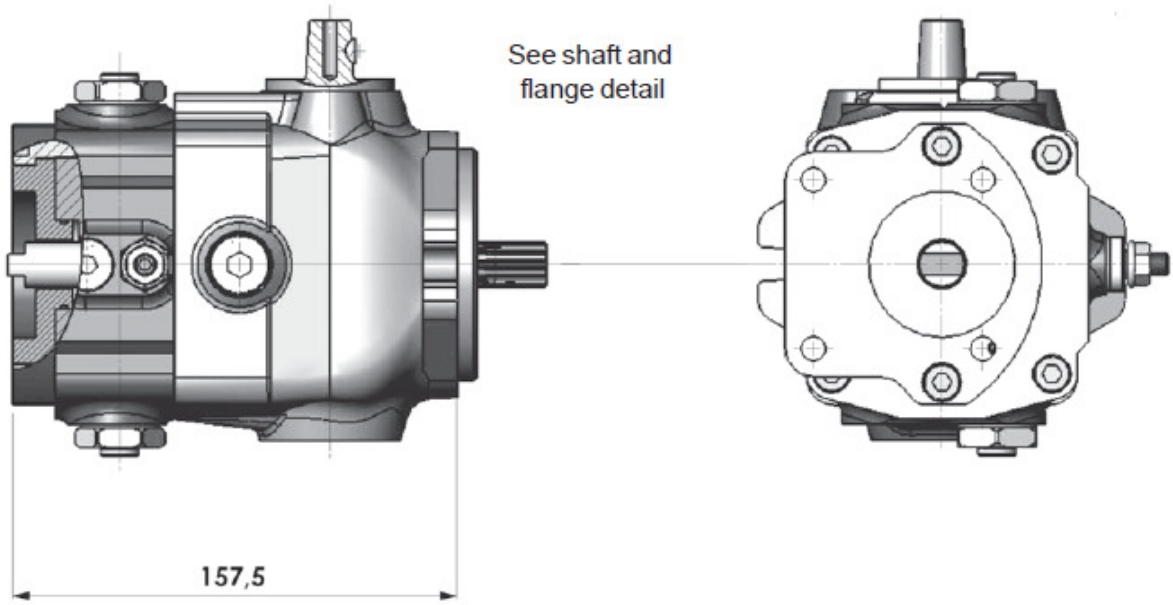
Pipe connection		
A1 - B1	Main ports pump 1	1/2" BSP
A2 - B2	Main ports pump 2	1/2" BSP
A3 - B3	Main ports pump 3	1/2" BSP
T	Drain	3/8" BSP
S	Suction	1/2" BSP
G	Charge system	1/4" BSP

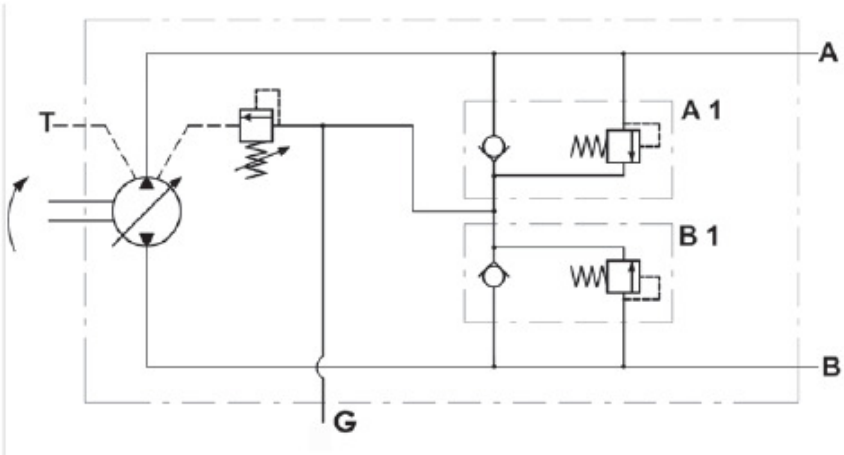


Hydraulic Diagram

Single Pump – Direct Mechanical Control without Charge Pump

Installation Drawing





Hydraulic Diagram

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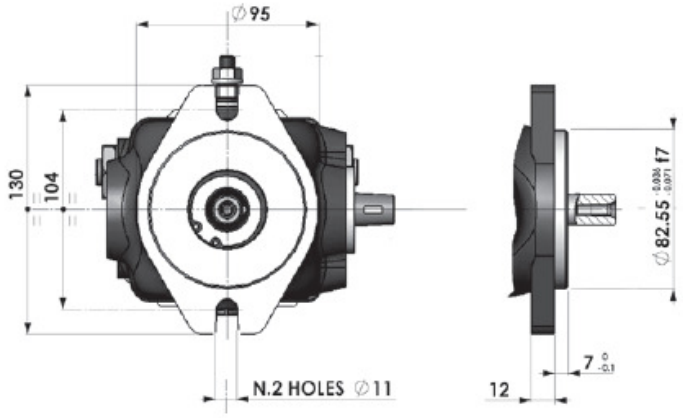
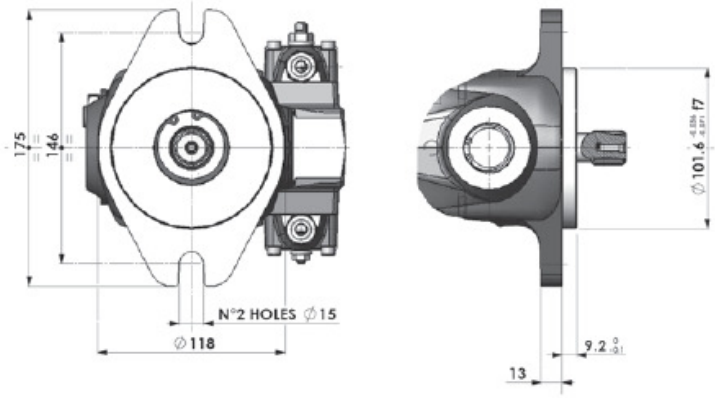
Mounting Flanges and Shaft Options

Flanges

SAE A - 2 holes flange **F1**



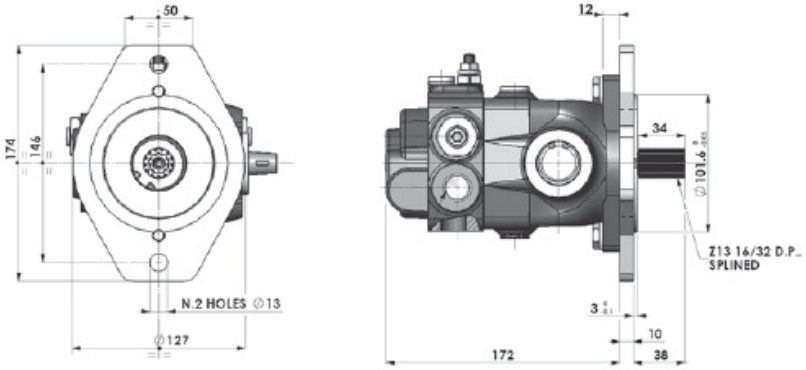
SAE B - 2 holes flange **F2** (only for SHI and SEI 1-2)



OPTIONALS

Adaptor flange from SAE A to SAE B **FB**

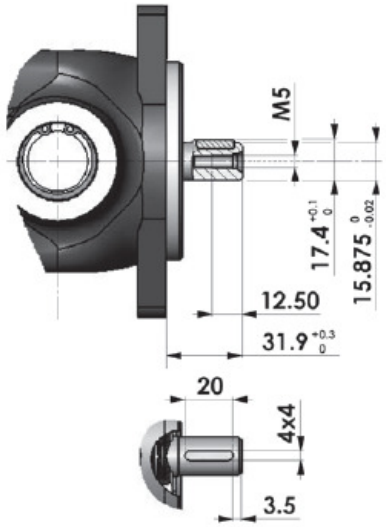
Adaptor coupling Z=9 / Z=13 **ST**



Shaft

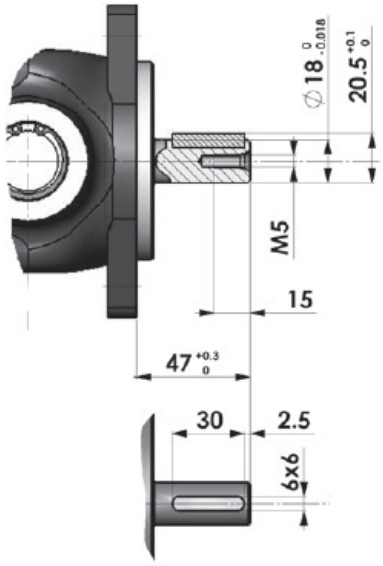
Parallel keyed shaft 15,875 mm. diam. PS1

Max. torque = 65 Nm



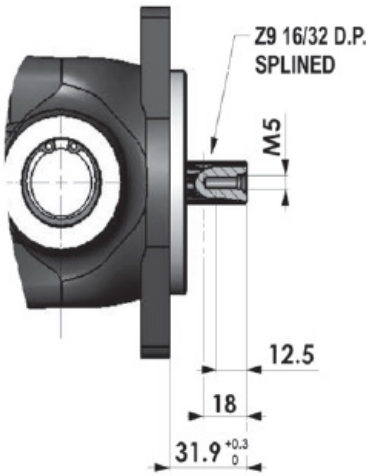
Parallel keyed shaft 18 mm. diam. PS3

Max. torque = 85 Nm



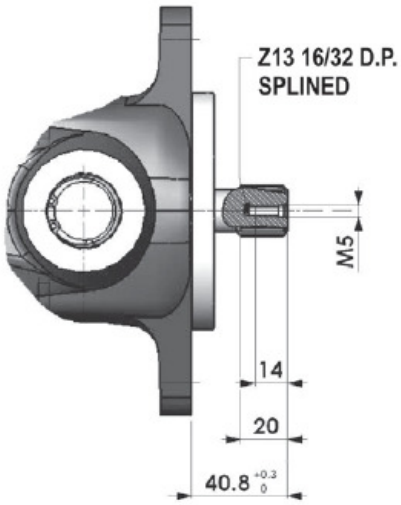
Splined shaft Z = 9 SS2

Max. torque = 80 Nm



Splined shaft Z = 13 SS3 (only for SHI, SEI 1-2 and F2)

Max. torque = 320 Nm

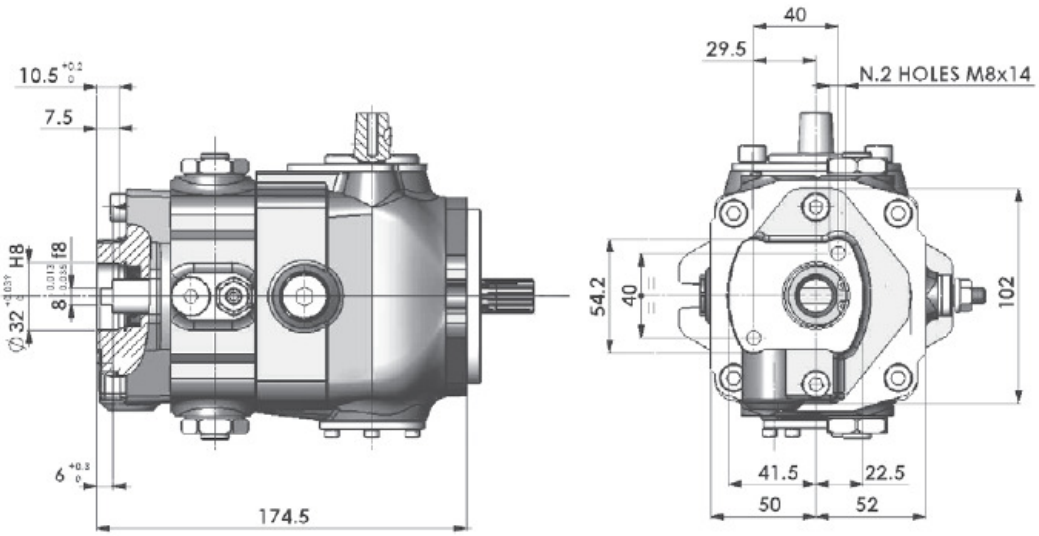


Attention: for the application of multiple pumps the total absorbed torque must not exceed the indicated value

Rear Pump Mounting Flanges

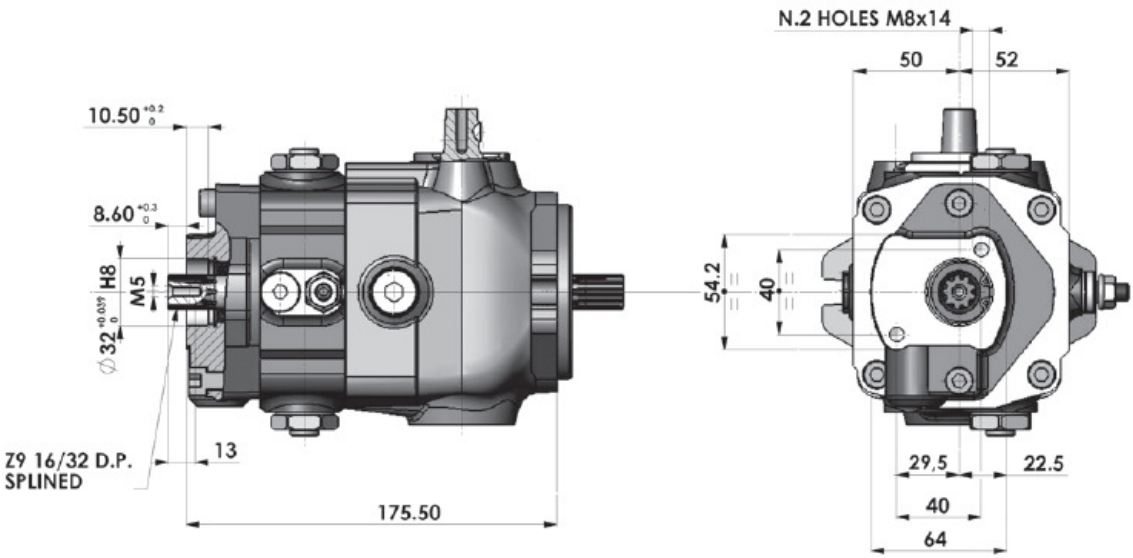
B1 - German Standard

Max. torque = 48 Nm



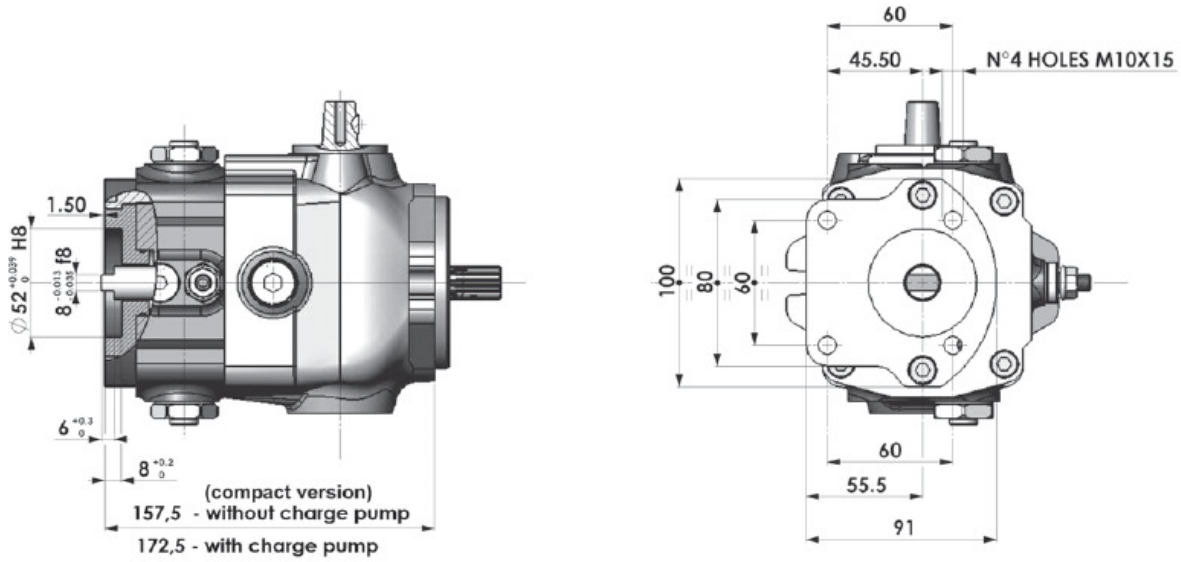
B1-Z9 - German Standard with 9 teeth shaft

Max. torque = 60 Nm



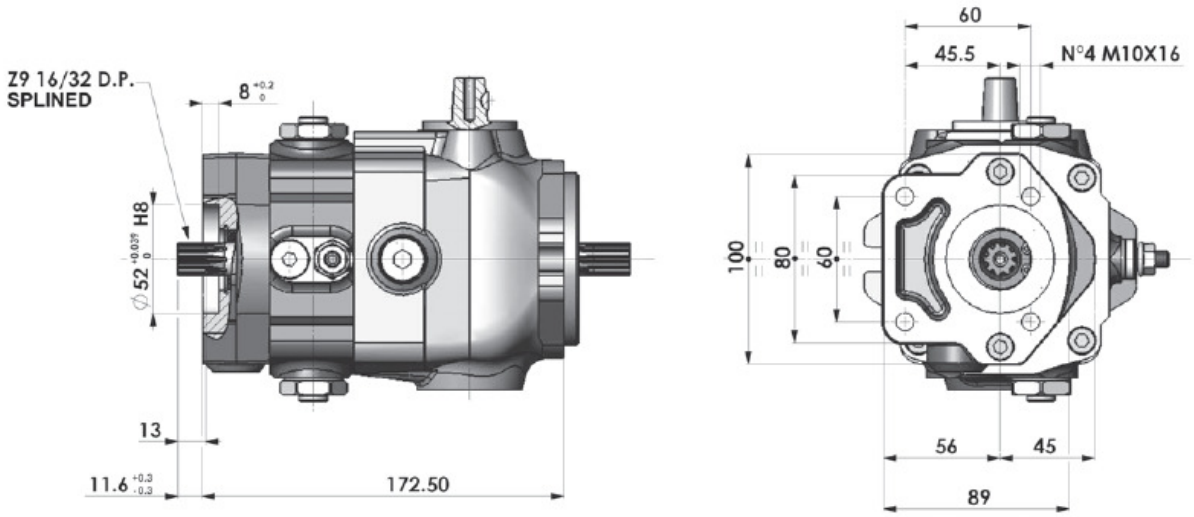
B2 - German Standard

Max. torque = 52 Nm



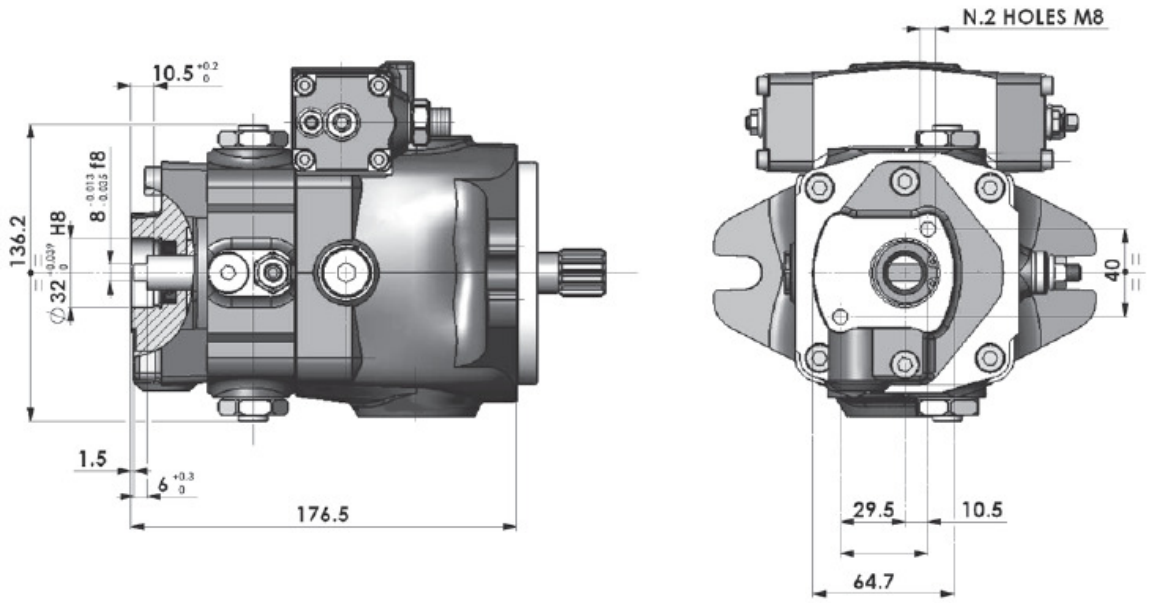
B2-Z9 - German Standard with 9 teeth shaft

Max. torque = 60 Nm



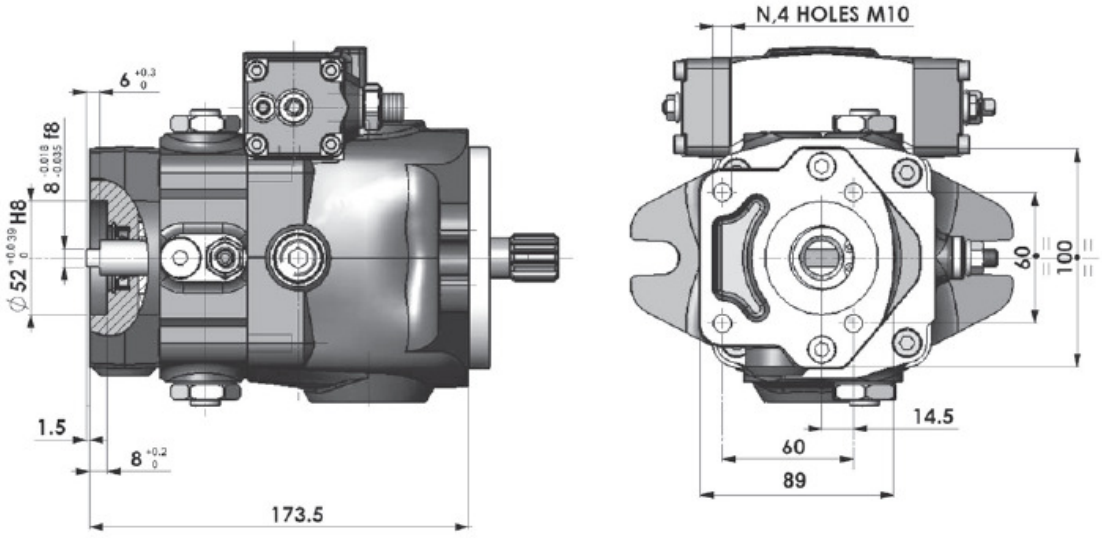
B1 - German Standard

Max. torque = 48 Nm



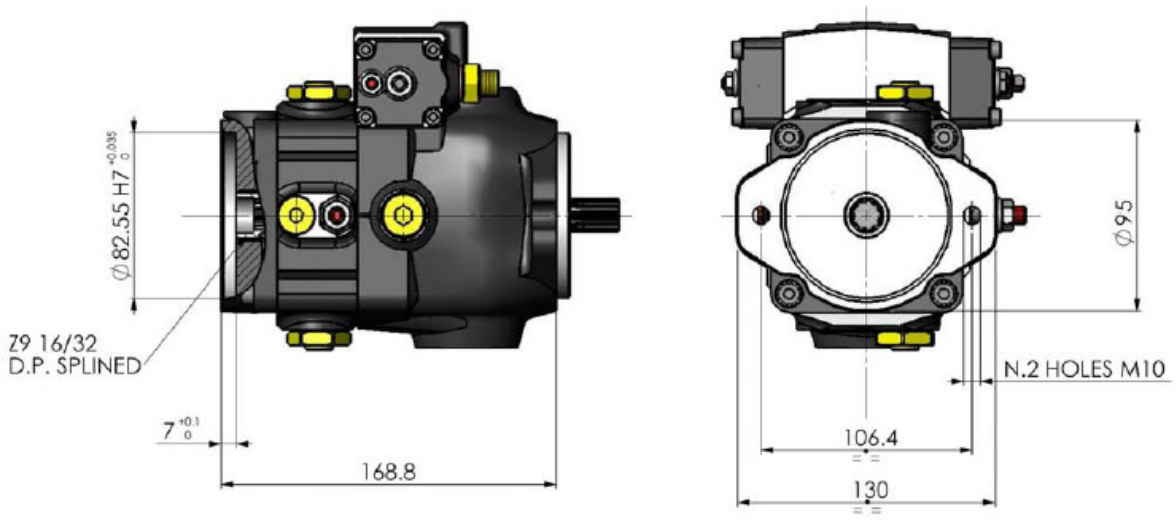
B2 - German Standard

Max. torque = 52 Nm



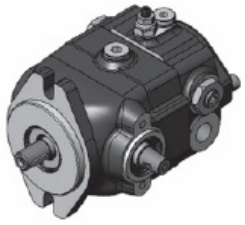
SAE A - R - 2 holes

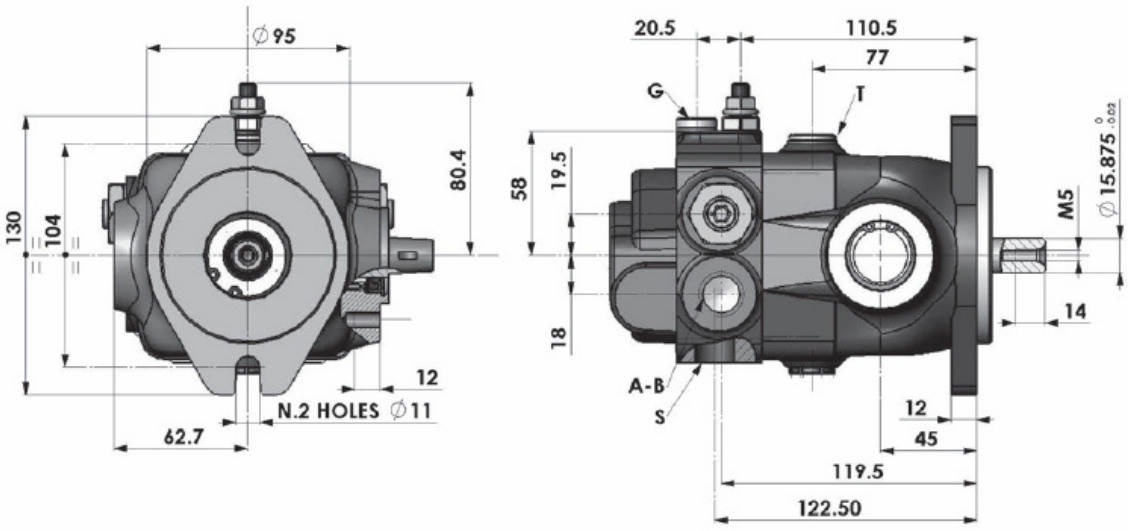
Max. torque = 60 Nm



Control Devices

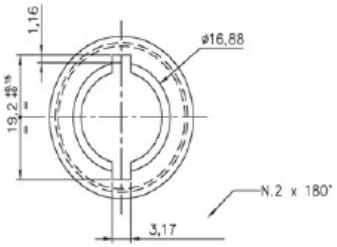
Direct Mechanical without Control Lever DM

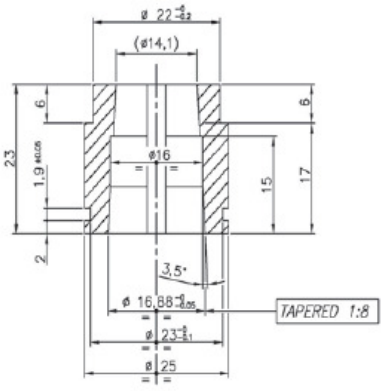




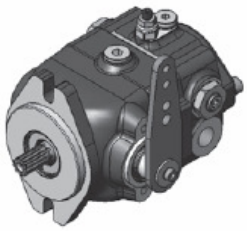
Tapered Bush BC

Tapered bush with woodruff key, external cylindric.
Suitable for arrangement of specific control levers.

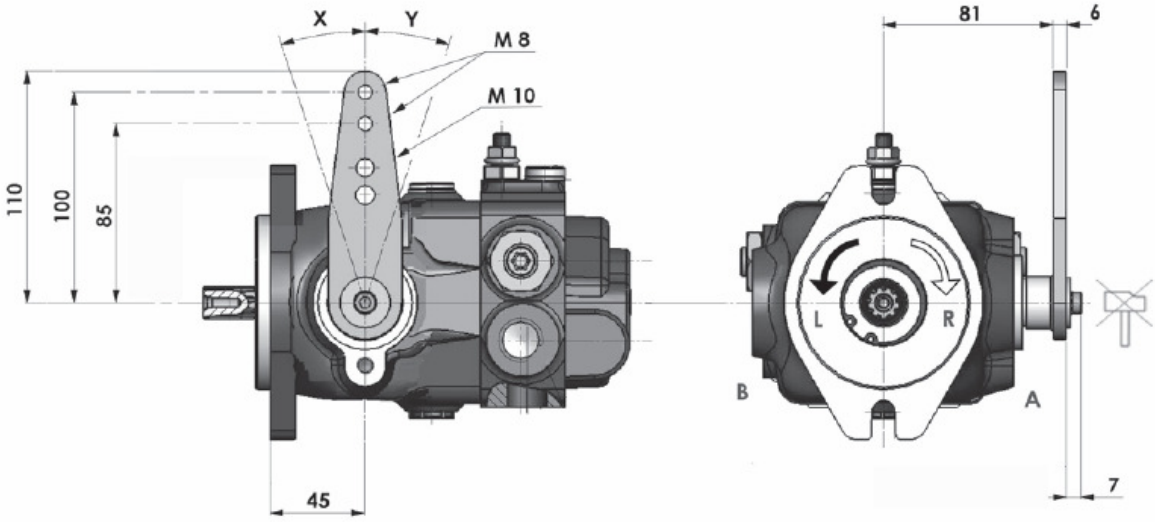




Direct Mechanical Control Lever LC



The pump displacement variation is obtained
by rotate the lever shaft in a clockwise or counter-clockwise direction.
The lever shaft is directly linked to the pump swashplate by means
of a tapered mounting, this reduce the noise due to vibrations.

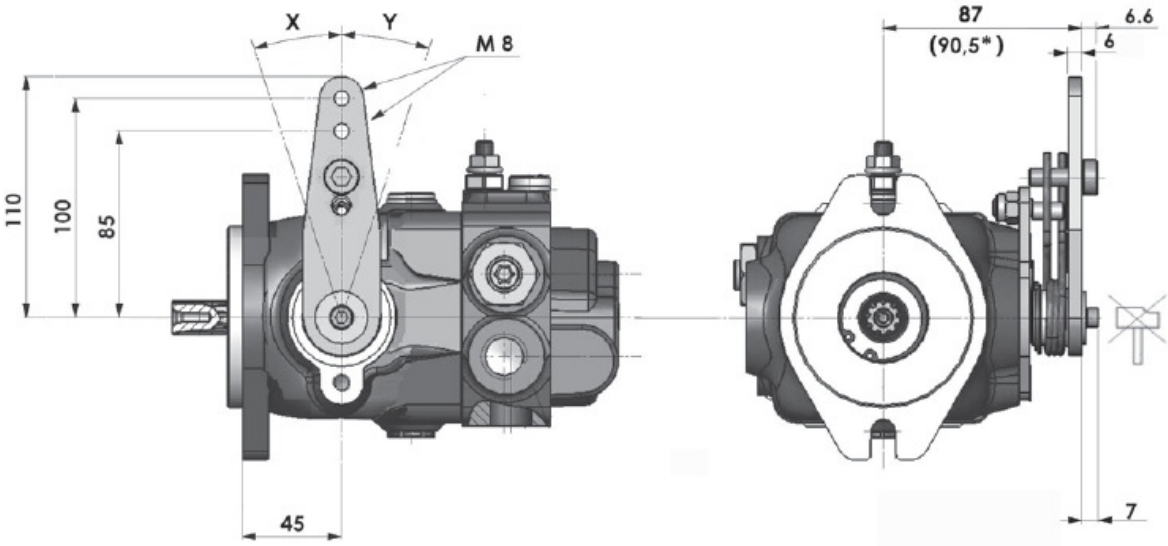


Lever Angle										
Pump Model	6 / 7	8 / 7	9 / 7	11 / 7	12 / 7	13 / 7	15 / 9	17 / 9	18 / 9	19 / 9
Lever Angle (X - Y)	10°	12°	13°	15°	17°	18°	15°	17°	18°	19°

Flow Directional			
Pump Rotation	Lever Position	Flow Out	Flow In
Clockwise R	X Y	A B	B A
C. Clockwise L	X Y	B A	A B

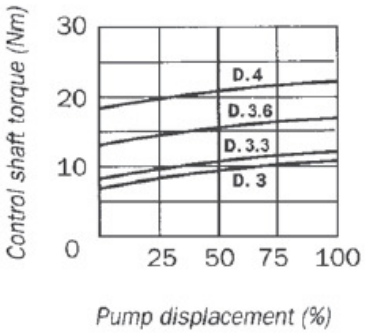
Control Lever with return to zero position **DMS**

The pump displacement variation is obtained
by rotate the lever shaft in a clockwise or counter-clockwise direction
(for angle and flow direction please see page 21).
Return to zero is obtained trough a spring integrated in the lever shaft.
The lever shaft is directly linked to the pump swashplate by means
of tapered mounting, this reduce the noise due to vibrations.

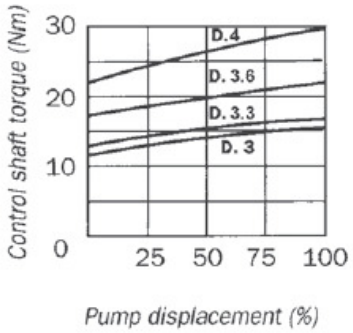


Standard Spring Diameter: **3,6 mm**
Spring Diameter Available: **3,3 - 4 - 5 mm**

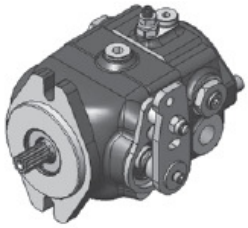
Lever force - 100 bar



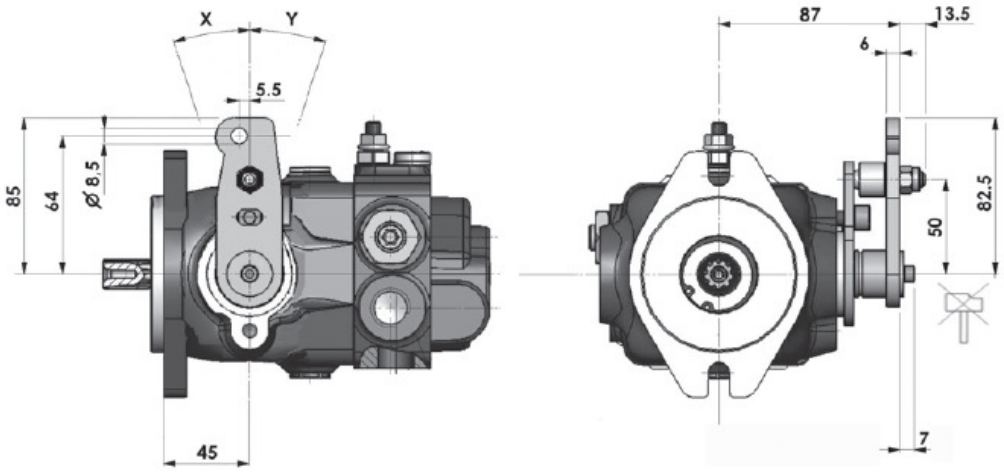
Lever force - 200 bar



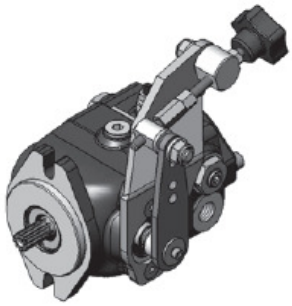
Control Lever with detent in zero position LCS1



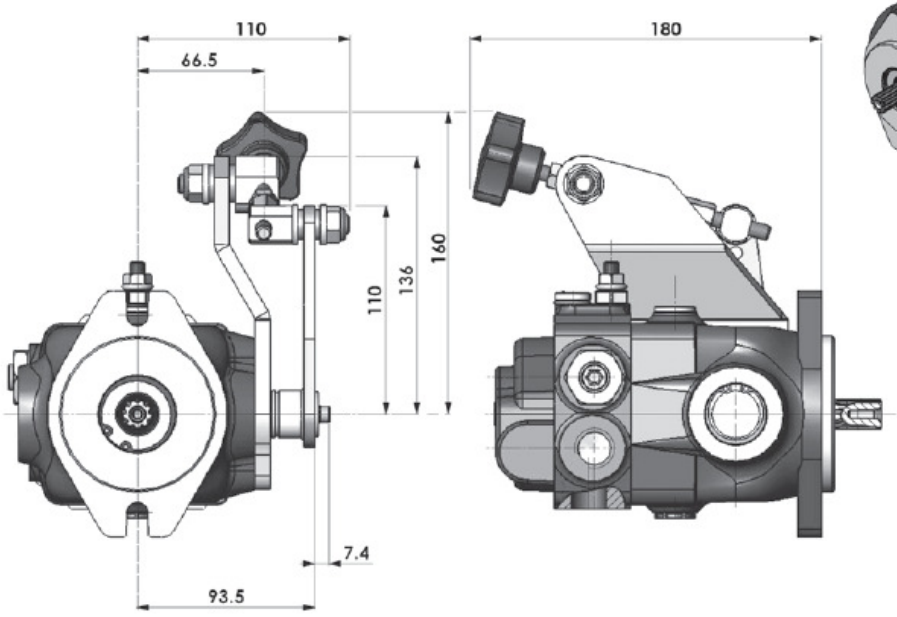
The pump displacement variation is obtained
by rotate the lever shaft in a clockwise or counter-clockwise direction
(for angle and flow direction see previous page).
A mechanical detent in zero displacement position is incorporated in the lever shaft.
The lever shaft is directly linked to the pump swashplate by means
of tapered mounting, this reduce the noise due to vibrations.



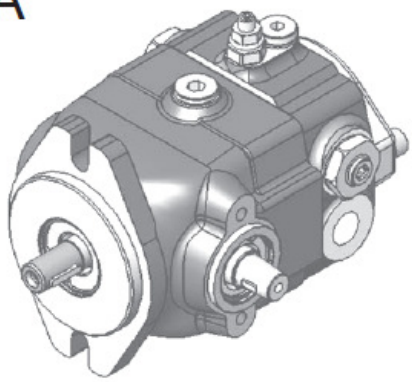
Hand wheel control LCS2



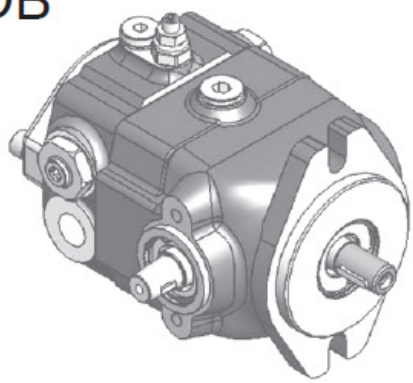
The pump displacement variation is obtained
by rotate the hand-wheel in a clockwise or counter clockwise direction.



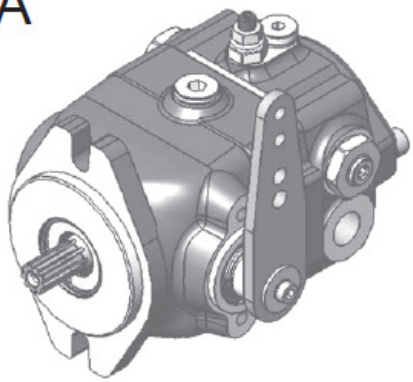
OA



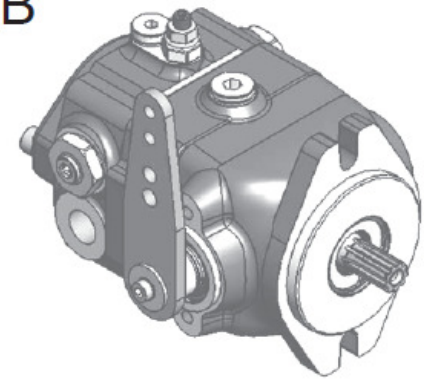
OB



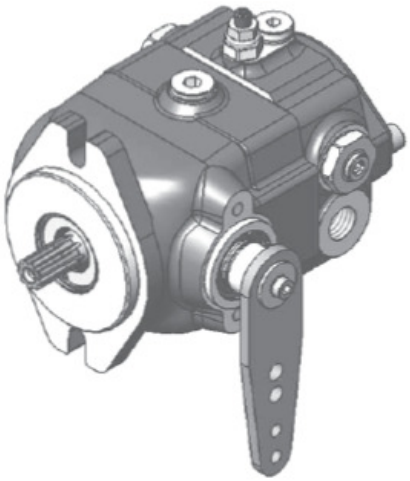
LA



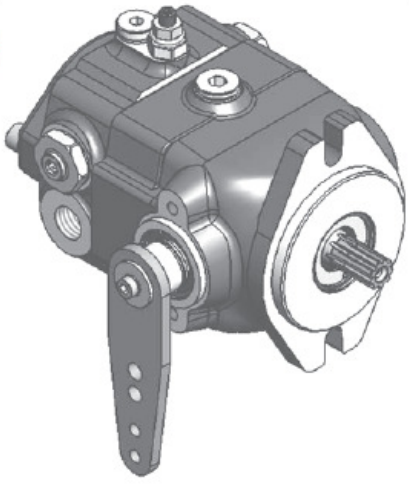
LB



RA

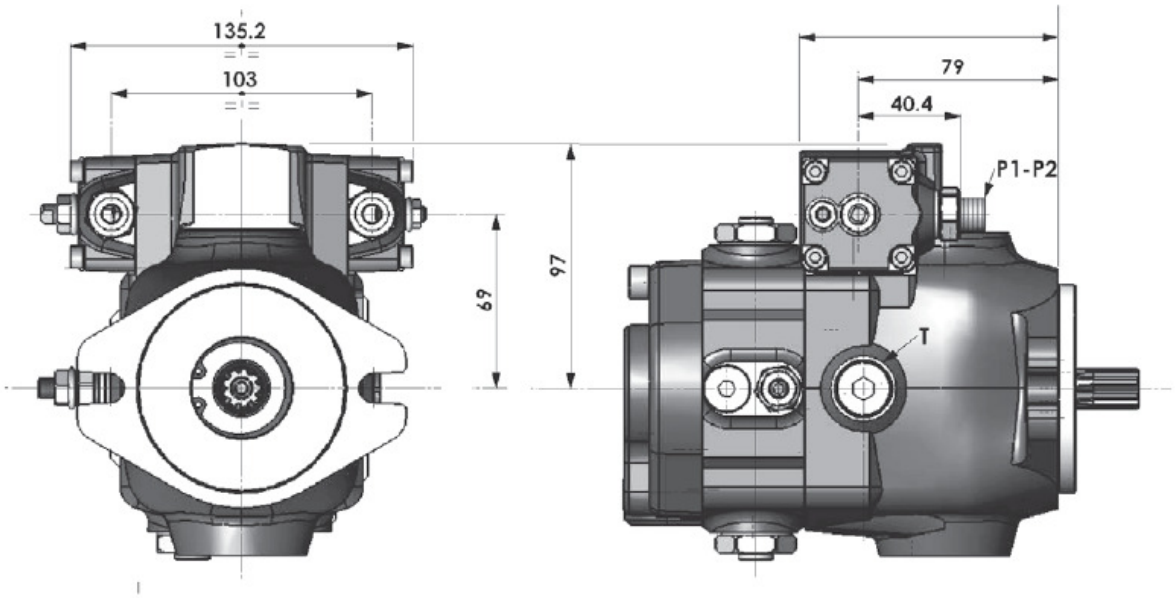


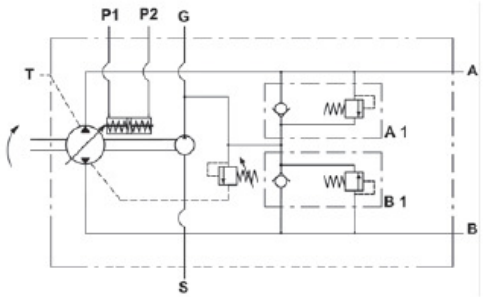
RB



Hydraulic Remote Servo-Control SHI

The displacement pump variation is obtained by adjusting the pressure on the P1 and P2 servo-control connections by means of a hydraulic proportional joystick (containing pressure reducing valves).
The servo-control supply can be obtained by taking pressure from the auxiliary pump (G connection).
The servo-control feedback time can be adjusted by inserting a restrictor on the joystick supply line.
The servo-control operation curve in both control direction goes from 2 to 12 bar (tollerance +- 5%).
The adjustement curve of the hydraulic control system has to be wider (2 - 12 bar) with final step.

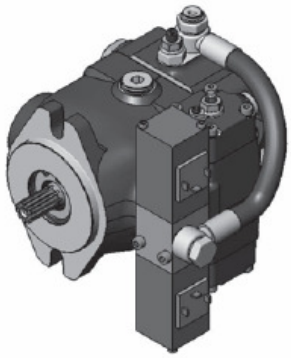




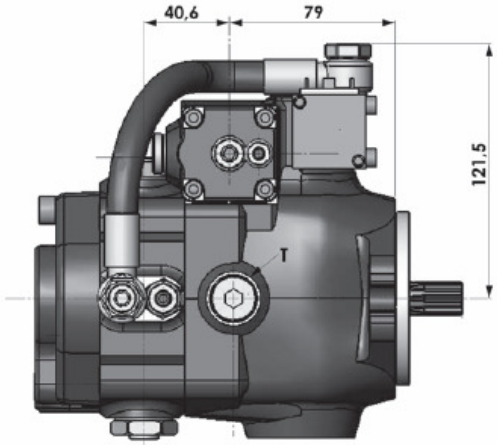
Pipe connection		
A - B	Main ports	1/2" BSP
T	Drain	3/8" BSP
S	Suction	1/2" BSP
G	Charge system	1/4" BSP
P1 - P2	Servo-control ports	1/4" BSP

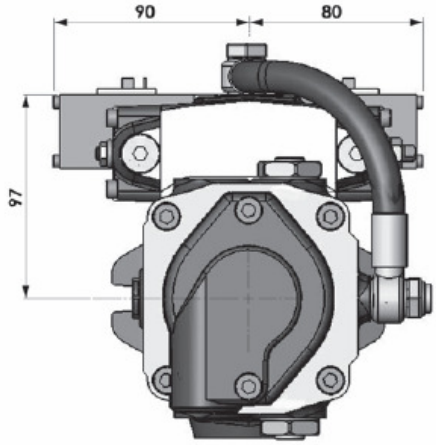
Electric Remote Servo-Control **SEI**

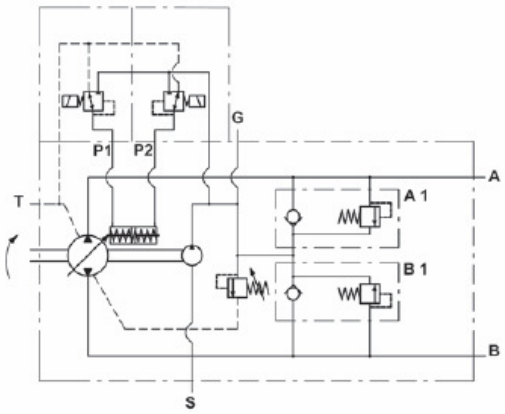
SEI1 (12V DC)
SEI2 (24V DC)



The pump displacement variation is obtained
by an electric signal, wich increases
from 0 to 800 mA (supply voltage 24V DC) or
from 0 to 1600 mA (supply voltage 12V DC).







Hydraulic Diagram

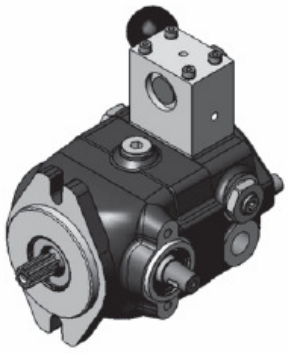
SPECIFICATIONS	
Max. pressure	24 bar
Sealing	NBR
Available voltage	12 - 24 V DC
Coil resistance	12V:3,7 Ω 24V:15,5 Ω
Max. current 12 V DC	1600 mA
Max. current 24 V DC	800 mA
Hysteresis	5%
PWM	120 Hz
Protection index with connector	IP 65

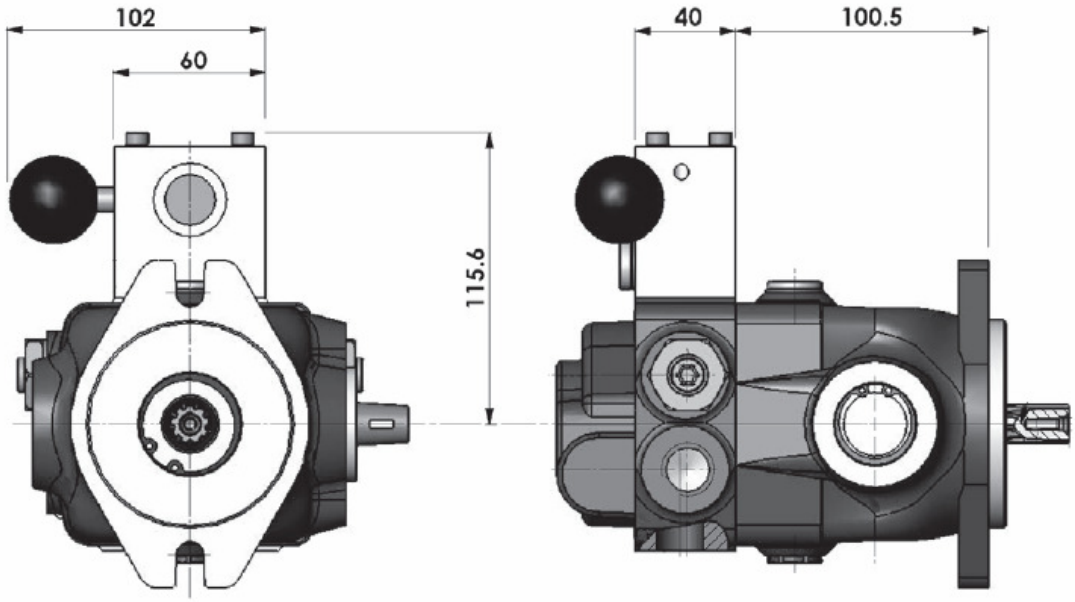
Electric Characteristics

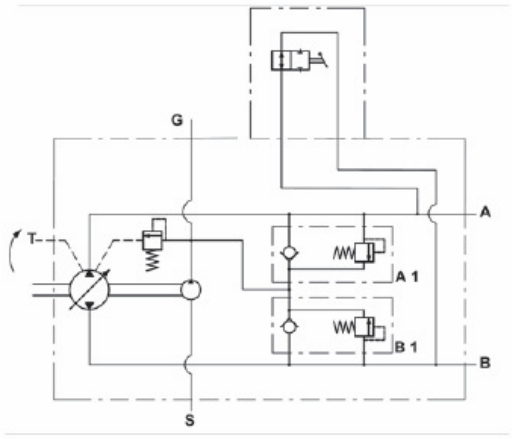
Optionals

Lever By-pass LB

Hand drive valve to join the A and B ports
to allow the free-wheeling of the motor.
(Available also Screw by-pass).



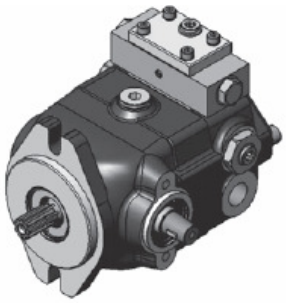


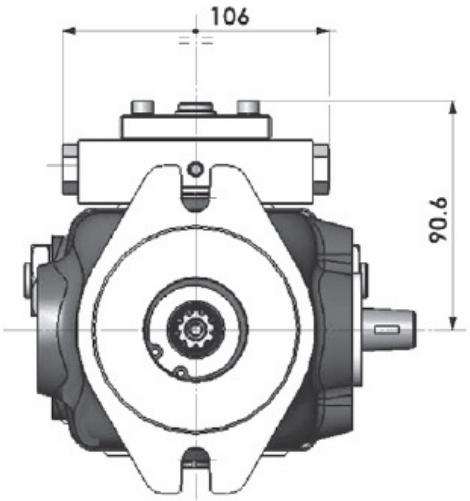


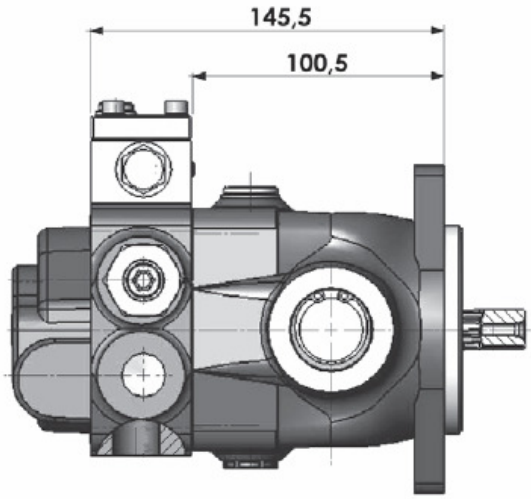
Hydraulic Diagram

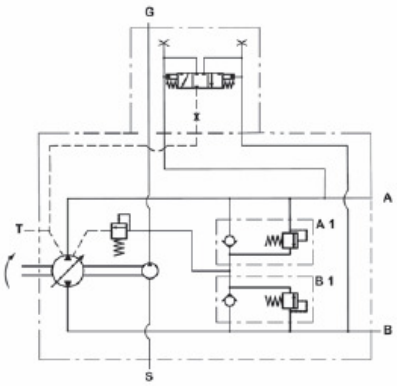
Purge Valve VS

Subtracting warm oil from the closed circuit, the purge valve allows the flow of cool fluid from the charge system.
Oil flow for cooling = 1 lt/min. at 1500 n/min.







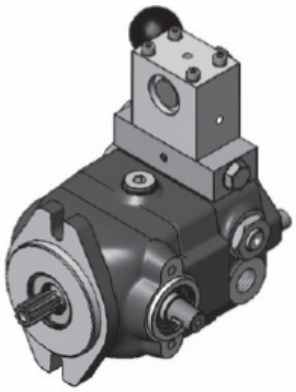


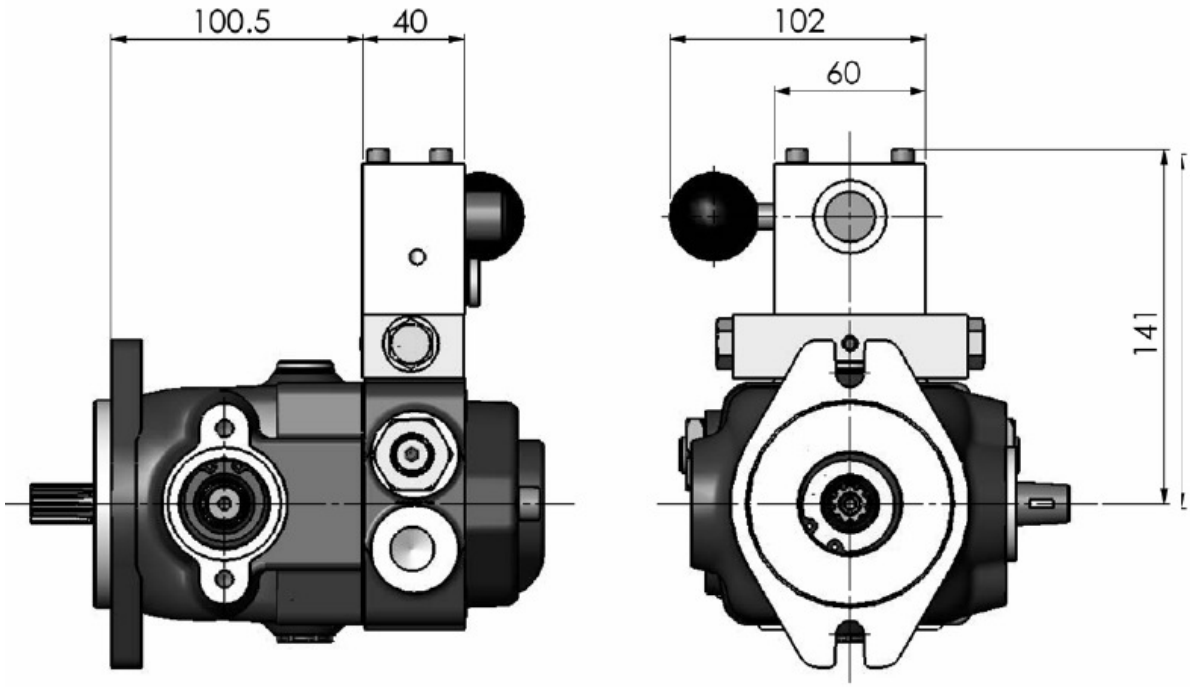
Hydraulic Diagram

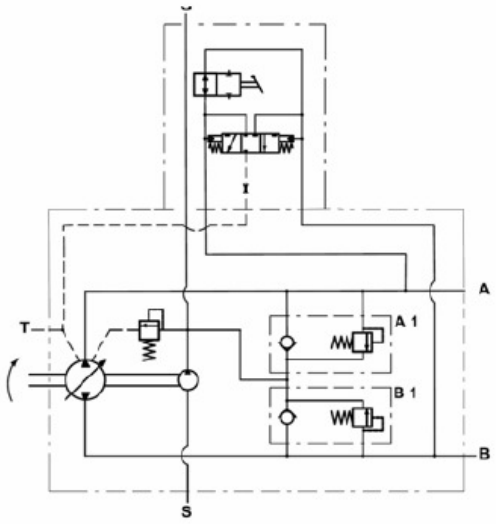
Purge Valve + Lever By-pass VSLB

The Hand drive valve join the A and B ports
to allow the free-wheeling of the motor.

The purge valve,subtracting warm oil from the closed circuit,
allows the flow of cool fluid from the charge system.
Oil flow for cooling = 1 lt/min. at 1500 n/min.



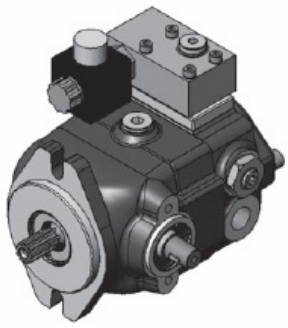


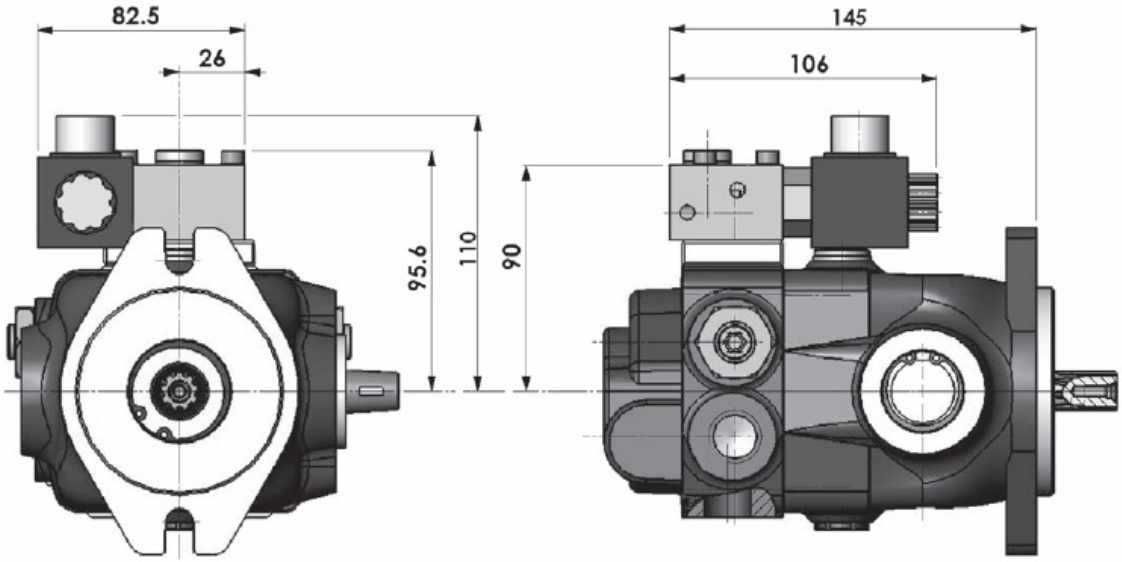


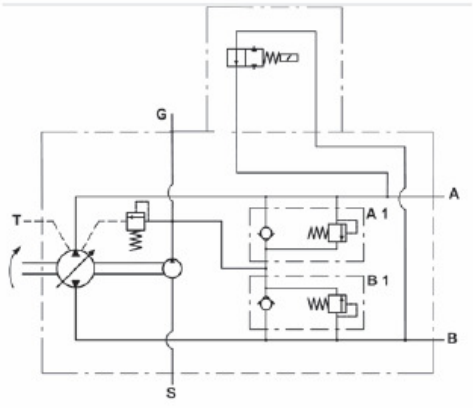
Hydraulic Diagram

Electric By-pass **BEO** (normally open)
BEC (normally closed)

Electric drive valve to join the A and B ports
to allow the free-wheeling of the motor.







Hydraulic Diagram

SPECIFICATIONS		
Max. pressure		350 bar
Sealing		NBR
Available voltage		12 - 24 V DC
Coil resistance		12V: 7,4 Ω 24V: 28,5Ω
Max. current 12 VDC	Cold coil 1,62 A - Warm coil 1,10 A	
Max. current 24 VDC	Cold coil 0,85 A - Warm coil 0,61 A	
Max. Power Cold coil		12V: 20 W 24V: 20 W
Protection index with connector		IP 65

Electric Characteristics

Available Configurations

14	SHI CONTROL DEVICES					
	Hydraulic control zero spiring		Servo control fittings		Flow restrictor	
STANDARD	R		G		-	
O/N REQUEST	R	RED (STANDARD) (High load)	G	1/4" BSP	-	No restrictor
	B	BLU (Low load)	J	9/16 JIC	5 + X	0.5 + X Diameter restrictor
			M	M12x1.5 metric		

TPV 1000: PUMP DISTRIBUTION PLATE AVAILABLE CONFIGURATIONS		1 - PUMP SERIES: TPVT - TPVT3	1 - PUMP SERIES: TPV								
			6 - MOUNTING FLANGE: F1 7 - CONTROL: DM - BC - LC - LCS1 - LCS2 - DMS								
			11 - CHARGE PUMP: 00 - 06 - 06(xx)							11 - CHARGE PUMP: 00/1	
12 - REAR PUMP CONNECTIONS		TPVT TPVT3	C	B1	B2	B1-Z9	B2-Z9	SA-R		B1	B2
5 - SHAFT	SS2	X	X	X	X	X	X	X		X	X
	PS1		X	X	X						
	PS3	X	X	X	X			X		X	X
		6 - MOUNTING FLANGE: F2 7 - CONTROL: DM - BC - LC - LCS1 - LCS2 - DMS									
		11 - CHARGE PUMP: 00 - 06 - 06(xx)								11 - CHARGE PUMP: 00/1	
		TPVT TPVT3	C	B1	B2	B1-Z9	B2-Z9	SA-R		B1	B2
	SS3	X	X	X	X			X			
		6 - MOUNTING FLANGE: F1 7 - CONTROL: SHI - SEI1 - SEI2 - SEIP									
		11 - CHARGE PUMP: 00 - 06 - 06(xx)								11 - CHARGE PUMP: 00/1	
12- REAR PUMP CONNECTIONS		TPVT TPVT3	C	B1	B2	B1-Z9	B2-Z9	SA-R		B1	B2
5 - SHAFT	SS2	X	X	X	X	X	X	X		X	X
	PS1		X	X	X						
	PS3	X	X	X	X			X		X	X
		6 - MOUNTING FLANGE: F2 7 - CONTROL: SHI - SEI1 - SEI2 - SEIP									
		11 - CHARGE PUMP: 00 - 06 - 06(xx)								11 - CHARGE PUMP: 00/1	
		TPVT TPVT3	C	B1	B2	B1-Z9	B2-Z9	SA-R		B1	B2
	SS3	X	X	X	X			X			

TPV 1000: PUMP BODY & SHAFT AVAILABLE CONFIGURATIONS		1 - PUMP SERIES: TPV - TPVT - TPVT3			
		6 - MOUNTING FLANGE: F1			
12 - REAR PUMP CONNECTIONS		7 - CONTROL: DM - BC - LC - LCS1 - LCS2 - DMS - DMS(XX)		7 - CONTROL: SHI - SEI1 - SEI2 - SEIP	
14 - OPTIONAL		TUTTI ECCETTO "PR"	PR	SHI	SEI1 - SEI2 - SEIP
5 - SHAFT	SS2	X	X	X	X
	PS1	X	X	X	X
	PS3	X			
		6 - MOUNTING FLANGE: F2			
	SS3			X	X

TPV 1000: PUMP DISTRIBUTION PLATE AVAILABLE CONFIGURATIONS		1 - PUMP SERIES: TPVT - TPVT3	1 - PUMP SERIES: TPV				
			ALL EXCEPT "SA"		11-REAR PUMP CONNECTION: SA		
14 - OPTIONALS	2 - DISPLACEMENT	TPVT TPVT3	11 - CHARGE PUMP: 00 - 06 - 06(xx)	11 - CHARGE PUMP: 00/1	11 - CHARGE PUMP: 06 - 06(xx)	11 - CHARGE PUMP: 00	11 - CHARGE PUMP: 00/1
00, SP, FB, ST, PR, VTS, RG-	06-08-09-11-12-13/7	X	X	X	X		
	15-17-18/9	X	X	X	X	X	
VS	06-08-09-11-12-13/7	X	X	X			
	15-17-18/9	X	X				
LB	06-08-09-11-12-13/7	X	X	X			
	15-17-18/9	X	X				
SB	06-08-09-11-12-13/7		X	X			
	15-17-18/9			X			
BEO	06-08-09-11-12-13/7	X	X	X			
	15-17-18/9	X	X				
BEC	06-08-09-11-12-13/7	X	X	X			
	15-17-18/9	X	X				

Order Code

1000	TPV	6-7	-	CR	SS2	F1	DM	OA	-	10	06	B1	000	00
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

0 - Pump series

1000 = TPV pump 1000 (Ex 6-18)

1 - Pump model

TPV = Closed loop circuit single pump
TPV-T = Closed loop circuit tandem pump
TPV-T3 = Closed loop circuit triple pump
TPVS* = Closed loop circuit special pump upon customer request

2 - Pump displacement (primary)

6-7 = 7,4 cm³/n **8-7** = 8,9 cm³/n **9-7** = 9,6 cm³/n **11-7** = 11,2 cm³/n **12-7** = 12,8 cm³/n
13-7 = 13,6 cm³/n **15-9** = 15 cm³/n **17-9** = 17,1 cm³/n **18-9** = 18,2 cm³/n **19-9** = 19,4 cm³/n

3 - Tandem pump displacement (secondary)

6-7 = 7,4 cm³/n **8-7** = 8,9 cm³/n **9-7** = 9,6 cm³/n **11-7** = 11,2 cm³/n **12-7** = 12,8 cm³/n
13-7 = 13,6 cm³/n **15-9** = 15 cm³/n **17-9** = 17,1 cm³/n **18-9** = 18,2 cm³/n **19-9** = 19,4 cm³/n

4 - Rotation

CR = Clockwise Rotation (right)
CC = Counter-clockwise Rotation (left)

5 - Shaft (mounting side)

SS2 = Splined shaft Z 9 - 16 / 32 D.P.
PS1 = Parallel keyed shaft 15,875 mm diam.
PS3 = Parallel keyed shaft 18 mm diam. with increased bearing for external radial load
SS3 = Splined shaft Z 13 - 16 / 32 D.P. (only available with remote hydraulic servo-control with SAE B flange)

6 - Mounting flange

F 1 = SAE A 2 holes - pilot diam.82,5 mm.
F 2 = SAE B 2 holes - pilot diam.101,6 mm. (only available with remote hydraulic servo-control SHI)

7 - Controls

DM = Direct mechanical (without control lever)
BC = Tapered bush
LC = Control lever
LCS1 = Control lever with detent in zero position
LCS2 = Control lever with hand wheel
DMS = Control lever with return spring (standard spring diameter 3,6 mm)
DMS(30) = Control lever with return spring (spring diameter 3 mm)
DMS(33) = Control lever with return spring (spring diameter 3,3 mm)
DMS(40) = Control lever with return spring (spring diameter 4 mm)
DMS(50) = Control lever with return spring (spring diameter 5 mm)
SHI = Integrated Hydraulic remote servo control
SEI1 = Integrated Electric remote servo control 12 V DC
SEI2 = Integrated Electric remote servo control 24 V DC

8 - Control devices position primary pump

OA = Position A (without lever)
OB = Position B (without lever)
LA = Position A-left
RA = Position A-right
LB = Position B-left
RB = Position B-right

9 - Control devices position secondary pump

OA = Position A (without lever)
OB = Position B (without lever)
LA = Position A-left
RA = Position A-right
LB = Position B-left
RB = Position B-right

10 - Relief valve pressure setting *

10 = 100 bar **15** = 150 bar **18** = 180 bar
20 = 200 bar **25** = 250 bar **30** = 300 bar

* The rated pressure value are changing with different speed.

11 - Charge pump

00 = Without charge pump
01 = Without charge pump compact version (only for rear pump flange B1 - B2)
06 = Rear cover B1-B2-Standard pump 3,9 cm³/n - pressure setting 10 bar (1500 n/min)
06 = Rear cover SAE A-Standard pump 4,7 cm³/n - pressure setting 10 bar (1500 n/min)
06(xx) = Other pressure settings on request (between 8 and 30 bar), contact our technical department

12 - Rear pump connection option

C = Closed cover (without rear fitting)
B1 = German standard pump group 1 mounting
B2 = German standard pump group 2 mounting
B1Z9 = Flange as German standard pump group 1 mounting with 9 teeth male shaft
B2Z9 = Flange as German standard pump group 2 mounting with 9 teeth male shaft
SA = SAE A - 2 holes mounting flange (female shaft)
TA = Taper shaft 1:10 15 mm. diam.

13 - Gear pump displacement

000 = Without pump

Group 1	**112** = 1,2 cm³/n	**117** = 1,7 cm³/n	**122** = 2,1 cm³/n	**126** = 2,6 cm³/n
	132 = 3,1 cm³/n	**138** = 3,6 cm³/n	**143** = 4,2 cm³/n	**149** = 4,9 cm³/n
	159 = 5,9 cm³/n	**165** = 6,5 cm³/n	**178** = 7,5 cm³/n	
Group 2	**204** = 4,2 cm³/n	**206** = 6,0 cm³/n	**209** = 8,4 cm³/n	**211** = 10,8 cm³/n
	214 = 14,4 cm³/n	**217** = 16,8 cm³/n	**219** = 19,2 cm³/n	**222** = 22,8 cm³/n
	226 = 26,2 cm³/n			

14 - Optionals

00 = Without optionals
LB = Lever by-pass
VS = Purge valve
VSBEO = Electric by-pass + Purge valve
VSLB = Lever by-pass + Purge Valve
SB = Screw by-pass (Compact version only)
BEO = Electric by-pass normally open (12V DC only)
BEC = Electric by-pass normally closed (12V DC only)
SP = Multiple pump support
FB = Conversion flange from SAE A to SAE B
ST = Conversion shaft 9 teeth to 13 teeth
FBST = Conversion flange from SAE A to SAE B + Conversion shaft 9 teeth to 13 teeth
PR = Full resistant swash plate bearing
RG = Servo control special devices (please see table 14 at page 31)

Accessories

Hydraulic Gear Pump German Standard B1
Hydraulic Gear Pump German Standard B2

For more detailed information ask for catalogue HT 15 F.....

Hydraulic Remote Servo Controls

For more detailed information ask for catalogue HT 73 B.....

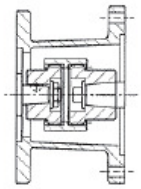
Electric Remote Servo Controls

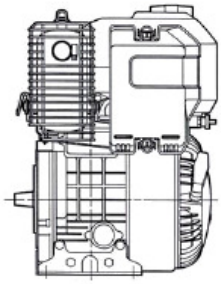
For more detailed information ask for catalogue HT 150 A.....

Flanges and Couplings for Gasoline and Diesel engines

GASOLINE OR DIESEL ENGINES

FLANGES AND COUPLINGS





For more detailed information ask for specific catalogue